Appendix 13

PROJECT IRON BOOMERANG
east west line parks limited

Executive Summary

'The modern world is built on steel which has become essential to economic growth. In developing and developed nations alike, steel is an indispensable part of life … The future growth in demand for steel will be driven mainly by the needs of the developing world.'[1] Note: 87% of all world metals consumed are iron and steel.

Australia is rich in natural resources. Among the key resources in abundance are iron ore and thermal and coking coal; the key feedstock for steel. Queensland has an abundance of coal, while Western Australia has an abundance of iron ore. Australia has a small population with limited steel production, so these resources are shipped internationally to be used as inputs to steel production.

Strong growth in raw steel production and consumption, driven by the rapid industrialisation of China and India in particular, is expected to continue. This will necessitate substantial investment in new global steelmaking capacity. Australia plays a significant leading role in the export steelmaking supply-chain as it has an estimated 40% of the world's high grade seaborne iron ore and 65% of the world's seaborne coking coal.

Project Iron Boomerang was developed by East West Line Parks Pty Ltd ("EWLP") to explore the economic feasibility of establishing first-stage steel mill semi-finished steel production in Australia, close to the major raw materials inputs.

This Pre-Feasibility Study provides strong evidence that the construction of first-stage smelter precincts offers many cost effective consolidation and efficiency savings, and that a dedicated railroad with all supporting infrastructure is feasible and economically favourable for steelmakers. The project will also deliver major energy savings for related global environmental benefits. This study outlines a convincing case for steel manufacturers and others to participate in the full Feasibility Study of PIB.

1. Project Iron Boomerang

There is a clear need for additional global steelmaking capacity. Project Iron Boomerang ("PIB"), being located in Australia, is uniquely suited to meet a portion of that expanding demand as a result of five major advantages.

- Proximity to the major global demand for steel, particularly in Asia;
- Availability, sustainability and quality of the major steelmaking raw material inputs;
- Competitiveness and blending capability for the supply of these resources;
- Availability of large sites to accommodate the smelter precincts; and

[1] Ian Christmas, IISI Secretary General, Dec 2007, UNFCCC Conference, Bali.

- Stability and low sovereign risks involved in major investments.

The PIB business case is focussed on facilitating the construction of twelve 10,000 hot-metal tonnes per day (3.6m tpy) first-stage steel smelter units, producing a total of 44 million tonnes per annum of slab steel. Iron ore and coal will be transported to common points for processing. Iron ore will be transported to Queensland to be combined with the coal, while coal will be transported to Western Australia to be processed with the iron ore.

The steel smelters will be constructed in industrial precincts (smelter parks) in Queensland and Western Australia. PIB will develop the precincts, which will include shared ore reception facilities, ore stockpiles (iron ore and coking coal), stacker/reclaimers, conveyor systems, coke, oxygen and electricity production, water and other utilities, and steel slab export facilities. Participating steelmakers will construct, own and operate their steel smelters.

The second major feature of PIB's business case is the construction of a new transcontinental railroad to transport the raw materials. Among the economic and environmental advantages of PIB is that the trains will be fully utilised during their transits in both directions. Figure 1 illustrates the railway and its connections to the major resources in Western Australia and Queensland and to the ports from which the steel slabs will be shipped.

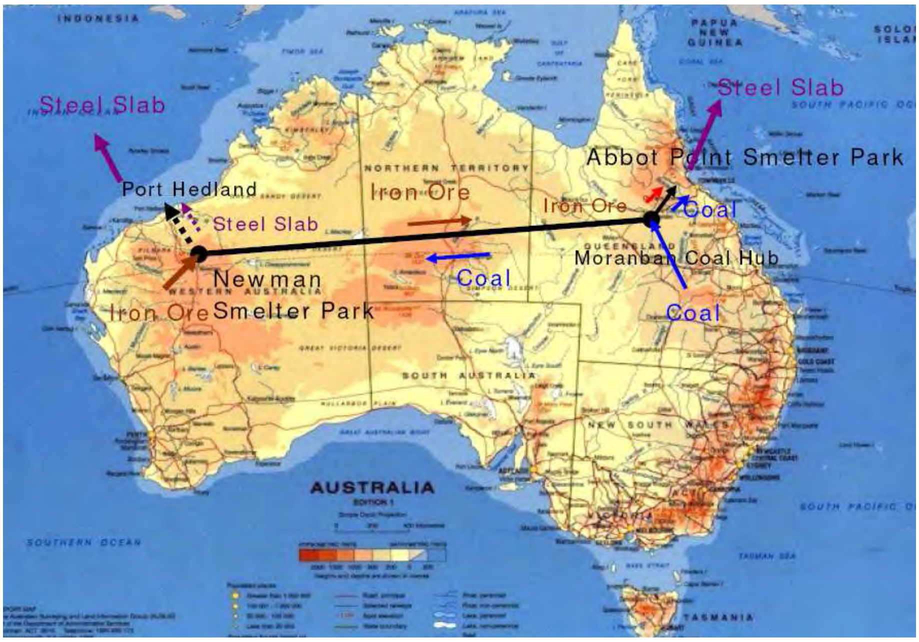

Figure 1 Transcontinental railway connecting iron ore and coal

2. Key Value Drivers

The key value drivers of PIB relate to efficiencies in the supply-chain, precinct economics and environmental benefits. The drivers are:

- Reduce transport and other supply-chain costs by a three times consolidation of major raw material inputs before shipping, and to maximise back-loading of ships and trains (coal railed west and iron ore railed east);

- Develop synergies in co-location of raw material production and make available large smelter park sites suitable for the consolidation of industry;
- Facilitate construction of high efficiency steel smelters using world-class technology;
- Provide benefits of co-location of steel smelters, shared services and efficiencies in managing energy inputs and outputs; and
- Deliver major global environmental benefits from improved transport efficiencies, modern first-stage steel production techniques and optimised efficient energy utilisation through co-generation use of secondary and tertiary heats.
- New inland prospect mine developments up to US$50 billion; stemming from the PIB transcontinental rail transport infrastructure services
- $9 billion (as at Sept 2007) in infrastructure expansion CAPEX is saved by locating the first-stage production in Australia; PIB consumes 116 million tonnes of iron ore, coal and limestone which is transformed to 44 million tonnes of slab steel, shipped overseas. The consolidated "takeout factor" is 72m t of infrastructure capital expenditure not needed; ships, trains wharves in both sending and receiving countries. This greatly reduces the strain and the resultant financial risk overexposure for an ordinary or bad market time.

3. Project Stages

There are five stages to the development of Project Iron Boomerang.

- **Pre-Feasibility**: establishment of project concepts and operational requirements, financial models and major steelmakers and/or investor commitment to the Feasibility Study;
- **Feasibility Stage**: proof of concept and definition of project operational requirements, detailed project scoping, preliminary engineering environmental impact assessment, cost estimates, market viability, planning and other regulatory approvals, risks assessments, management and allocation strategies, resulting in confirmation of the business case and a "bankable" Feasibility Study;
- **Commitment and Financial Closing**: develop investment agreements and briefing requirements to gain commitments from steelmakers to build smelters, reach necessary agreements with governments, develop major procurement contracts and call tenders for EPCM and/or DCM contracts, and completion of due diligence processes by investors and suppliers;
- **Implementation**: land acquisitions by government, as required, for lease to EWLP, engagement of project managers, detailed engineering and

environment management plans, procurement of design and construction, procurement of rolling stock and precinct plant and equipment; and

- **Operations:** commissioning and commencement of operations.

This report marks the conclusion of the first stage and transition into the second stage, as the necessary funding is obtained for the Feasibility Study.

4. Key Project Elements

There are a number of key project elements.

- **Smelter Parks** – Each precinct will provide sites for six steel smelters and supporting industry (such as coke production plants) at each end of the East West Line ("EWL"). Smelter park locations are proposed for near Newman in the Pilbara in Western Australia and Abbot Point in Queensland. The possibility of further development is discussed in Section 8 of this report, and will be evaluated during the Feasibility Study.
- **Infrastructure** – The facilities necessary for servicing the smelter parks and steel smelters (water, precinct transport logistics, power, gas, waste management, etc.) will be constructed. This will include the effective management of environmental outcomes within the smelter parks.
- **Rail link** - EWL will be a standard gauge railway to current "world's best practice" heavy-haul standards. It will be approximately 3,370 km long.
- **Port facilities** – Ports at Abbot Point and at Port Hedland (or other proposed ports in Western Australia) will be used for the export of the steel slabs to the consuming markets in Asia for finishing and sale.

Details of the concept, the precincts and the transport arrangements are provided in this report. The Project Case adopts the assessed EWL rail charges and the materials handling logistics costs of stockpiling and delivering the iron ore and coal in the precincts to the individual steel smelter gate, and the costs of transporting steel slab from each smelter to the Australian port.

5. Market Overview

The implications of the business environment for PIB are:

- Australia is well placed geographically with very competitive, high quality iron ore and coking coal resources and very large reserves;
- The smelter parks and railway are located in sparsely populated regions, and will have minimal impact on existing land uses and populations;
- PIB's financial feasibility and global environmental benefits are strongly positive; and
- There is a continuing need to replace existing production capacity that is obsolete, or economically or environmentally requiring replacement.

PIB is not a threat to major trading nations' maintenance of steelmaking capacity. The project case provides for only 44M tpy of production out of a forecast world-wide new steelmaking capacity of over 500M tpy over the next decade. So PIB is targeting less than 10% of projected global greenfield capacity growth and in another context under 8% of China's total 2007 steel production.

6. Precinct Economics and Advantages

Precinct economics and the major advantages of co-locating smelters in the PIB precincts include:

- Sharing of input and output materials handling infrastructure outside the steel smelter gate to achieve the scale economies of high asset utilisation;
- Economies of scale of building and operating the supporting industrial plant for steel smelters, including the stockyards, coke plant, oxygen plant, and sintering plant, etc;
- Sharing of support services provided in the smelter park, including water supply, new and waste water treatment, power supply and reticulation, and the economies of scale in initial capital costs and ongoing operating and maintenance costs;
- Reduced total inventory holdings, covering much lower supply-chain reliability risks (and much closer proximity to major input suppliers);
- Ability to permanently optimise the inputs into the steel smelter charge to improve efficiency and consistency of slab steel quality, due to location, quantity and quality of the resource base available;
- Opportunity for shared design and construction costs of steel smelters, including the anticipated commonality of designs and extensive use of modular construction techniques; and
- Maximising the efficiency of energy use in purpose designed precincts, with co-generation from utilisation of waste heat and treatment of volatile gases from both the coke and steel mill making process producing substantial surplus electricity for sale, world's best practice emissions and potential carbon credits for efficient energy utilisation against current expanding supply chain and operations infrastructure logistics system practices.

7. Railway

The Pre-Feasibility Study Report identifies a number of key issues and preliminary conclusions with respect to the railway.

- An EWL is technically feasible, with a very economic route and grading, and minimal impact on existing land uses or the environment;
- The EWL costs are sensitive to volume, with average rail costs reducing as the tonnages increase, hence increasing the overall logistics savings; and

- The total transport savings for the Project Case of six steel smelters in each precinct is assessed as US$406 million per annum.

A transcontinental railroad is supported because the notional alternative of coastal shipping around Australia is economically and environmentally inferior.

8. Additional Economic Advantages

The economics of the PIB concept and the major fixed infrastructure costs of the EWL are driven by volume. The initial two smelter parks could be expanded beyond six steel smelters each or additional precincts opened, depending upon demand. This would substantially improve economies of scale of the precincts, supporting infrastructure and the railway.

The environmental advantages to steelmakers are significant, and an economic dimension to this is rapidly emerging. Carbon credits are a part of the international emissions trading schemes that are being developed. These schemes provide a way of moving the control of greenhouse gases into markets, and will be investigated during the Feasibility Study.

The railway will pass close by many known resource deposits that have not been economical to mine. Many of these mines will be opened once access through PIB is established. It will also provide the opportunity to effectively use cheaper lower grade iron ore reserves without the added transport penalty involved in exporting these ores to an overseas smelter.

9. Government Approvals

Key government related issues involved with the project include:

- planning and environmental approvals;
- land acquisition;
- project business environment; and
- government support services.

An Environmental Impact Statement ("EIS") is mandatory, responding to an approved Terms of Reference, which will be subject to prior consultation with advisory agencies.

10. Feasibility Study

The primary objective of the Feasibility Study is to establish the economic and environmental benefits of Project Iron Boomerang to steelmakers and governments. This will require the following key outcomes:

- Fully developed Scope of Works and Project Plan (for the railway and smelter parks and industrial plants);
- Environmental and Planning Approvals for the overall project;

- Finalise the rail corridor, smelter park locations and agreement in respect of land acquisition and passage rights;
- Detailed capital and operating cost estimates;
- Detailed analysis of the project time frames and procurement packages to ensure key milestones can be achieved;
- Government approvals in respect of the regulatory and policy settings required to support the project;
- Preliminary procurement activities to support the Business Case and a fast track project implementation stage;
- Finalise the detailed business framework for the project; and
- Finalise agreements with other key service providers in commitment to their associated project works.

Key inputs into the Feasibility Study will be the specific requirements of the steelmakers in their proposed developments in the smelter parks, including:

- Technical: scale, technologies, layouts, environmental impacts;
- Market: knowledge of the steel industry and steelmaking, major risks and opportunities as perceived by the steelmakers;
- Commercial: how precincts will function with respect to the "common user" facilities, timing of developments, procurement practices and construction resourcing arrangements; and
- Expertise: commitment of the steelmakers' individual expertise to the Feasibility Study through Management Advisory Committee participation.

Key timings for the Feasibility Study are:

- Project planning approvals (April 2009)
- Financial close (December 2010)
- Award major contracts (March 2011)
- Complete land procurement (September 2010 – February 2011)
- Railway construction (commence April 2011– complete June 2014)
- Precinct construction (commence April 2011)
- Smelter construction (commence June 2011 – complete June 2014)
- Commissioning (July 2014 – December 2014)
- First steel production (December 2014)

11. Feasibility Study Budget

The proposed Feasibility Study budget is A$150 million as detailed below. The expenditures during the Feasibility Study will predominately be incurred in Australian dollars.

	A$million
Preliminary engineering and surveys	$50.0
Environmental Impact Study	48.0
Consultants - engineering	7.5
Consultants - environmental, economic, legal, tax	8.0
Project management, administration and overheads	11.5
Contingencies (20%)	25.0
Total	$150.0

12. Team Capability

EWLP has established a management group of experienced senior executives and specialists with many years of leadership and management experience. The senior management group has worked for major international and domestic companies across a number of different industry sectors and major projects including banking, consulting, finance, government, logistics, transport, supply-chain management and technology. They have demonstrated leading analytical, business and managerial skills at strategic levels in the functional areas outlined in the EWLP organisation structure. Their experience provides significant risk mitigation to lead the project during the Feasibility Study. Profiles of the management group are included at Appendix E.

13. Conclusion

This Pre-Feasibility Study Report outlines a convincing case for steel manufacturers and others to join together to commence a full Feasibility Study of PIB. There is sufficient evidence here that the construction of first-stage smelter precincts offers many cost effective savings and that a dedicated railroad with all supporting infrastructure is feasible and economically favourable for steelmakers. The Feasibility Study will test these early findings in depth and further establish the validity of the Business Case.

The potential savings for steelmakers estimated in this preliminary analysis are significant. Capital expenditure required for each steel smelter is expected to be reduced by US$900 million by use of standard modular construction of the smelters and shared services for facilities such as stacker/reclaimers and conveyor systems. For a representative coastal steel mill in East Asia, the delivered cost of slab steel will be reduced by US$107 per tonne. The savings projected as compared to current practices are based on conservative estimates; and do not include savings likely to be realized with the likely continuing increases in transportation costs under the existing practices of shipping ores and coal to smelters in international locations. EWLP will provide a table to steelmakers where the details of a specific steel mill site can be inputted to estimate the specific savings to be realised through PIB.

The projected cost of the Bankable Feasibility Study is A$150 million. Steelmakers, the ultimate beneficiaries of PIB, are being asked to be the principal funders of this study. Funding for this study is based upon 12 steelmakers and three other investors that have an interest in the project contributing A$10 million each. The contribution will entitle the company to have a seat on the Management Advisory Committee, which will advise the EWLP Board of Directors and management during the study and subsequently during construction.

Steelmaker participants will select a precinct and construction sequence at that precinct on a first-come, first-served basis. For example, the first contributor may choose to construct the third steel smelter at the Queensland precinct. The second contributor would then choose from the remaining eleven positions.

Project Iron Boomerang delivers triple bottom line benefits (financial, environmental and social) that are very positive to all participants, particularly steelmakers. You are invited to participate in this major project. Section 11 in the report explains how to proceed.

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Acknowledgements

This is an important and, some would say, ambitious but practical and common sense project with positive, long-term implications for the world's steel industry. The project is expected to deliver sustainable competitive advantages and positive global environment outcomes. Many people and their supporting organisations have contributed to the vision, planning and progress of Project Iron Boomerang and to the completion of this Pre-Feasibility Study Report.

Companies in the steel, resources, infrastructure services, rail, engineering and finance industries have provided strategic planning, information, data and comments on the project as it has progressed. We have benefited from the expert assistance of Calibre Engenium, Deacons, Leighton Contractors Pty Limited, Pro-Met Engineers Pty Ltd, Corus Consulting and particularly, Xstrata Coal, for their early support. As can be seen in the Attachments to the report, AustralAsian Resource Consultants, Hill Michael Associates Consulting and in particular, Trimble/Quantm Limited have all provided their continuous professional and valuable assistance. The Ranbury Management Group has provided leased office support service facilities and made CFO David Hallam available to the project for advice on corporate structure, accounting and tax issues. As of 1 October 2008, 19 of the world's top steel companies have signed the three-year Confidentiality Agreement. Many of these companies have shared data with us, which has been most useful in developing this report.

We have also benefited from the assistance and close working cooperation of the government agencies, in particular, both the Sovereign State Governments of Queensland and Western Australian, the Northern Territory and the Federal Australia Government, plus the Governments of China, India, Japan and South Korea.

The team with major responsibility for conducting this study, however, are the founder group. The team is led by Shane Condon as the founder of the project and its driving force. Other founding group members include Gordon Thomson - WA (Dep Project Leader), Prof Jerry Bowman, Saul Eslake, Ross Hunter, Steve Kennedy, Anton Michielsen, David Russell QC, Prof Art Shulman, Graham Tew, and Prof Clem Tisdell. All have donated substantial amounts of their time and expertise to the project.

Administrative support and international stakeholder management in China, India, Japan and South Korea has been ably provided by Yi-Ling Chan, Haruhiko Kinase, JunWon Lee and Nick Meng. Jim Handford, co-founder with Shane Condon, has been an important supporter throughout, including financially, and provided initial aerial and ground survey work of potential corridors.

The Project's unique concept and strategy calls upon the unity of all such parties in this great enterprising endeavour.

1. Project Concept Overview

Australia is a resource rich country. Among the many resources in abundance are iron ore and coking coal, the key feedstock for steel. Queensland has an abundance of coal, while Western Australia has an abundance of iron ore. Australia has a limited domestic market and steel production, so these resources are shipped to steelmakers in a range of major trading countries as inputs to their international steel production cycle. In global seaborne supply terms, Australia is the pre-eminent supplier of these mutually dependent key steelmaking ores.

East West Line Parks Pty Ltd ("EWLP") has been established to facilitate the establishment of first-stage steelmaking in Australia. Subsequent second-stage steel mill processing is anticipated to occur close to international mass market distribution locations (centres of high population), to considerable finished steel transport logistics and distribution economic cost advantage.

Project Iron Boomerang ("PIB") is EWLP's means of creating a first-stage steel mill operations paradigm shift in international steelmaking that delivers multiple bottom line benefits to all participants.

Capital expenditure is expected to be reduced by US$1.15 billion for each smelter (compared to a standalone OECD greenfield turnkey plant benchmark cost) by use of standard modular construction of the smelters and shared services for facilities such as stacker/reclaimers and conveyor systems. The analysis in this Pre-Feasibility Study Report supports a fob cost-of-slab-steel production reduction of US$107 per tonne (over 30% compared to the world benchmark (September 2007) average of US $340 per tonne) for slab steel delivered to a coastal East Asia steel mill. As part of the provision of information to steelmakers who have signed the Confidentiality Agreement, EWLP has developed and provided steelmakers with a PIB calculator application tool; a pro-active cost comparison table. With this tool, independent assumptions can be applied to the circumstances of a specific operating steel mill and/or to a greenfield alternative international investment site, and direct comparison made to the economies of a smelter located in PIB. The table is a one page summary of key comparative advantages of Project Iron Boomerang.

Iron ore and coking coal would be transported to common points (smelter parks) for processing. Iron ore would be transported to Queensland to be combined with the coal. Similarly, coal would be transported to Western Australia to be processed with the iron ore.

The method of transportation will be a new transcontinental railroad. A transcontinental railroad is proposed because the notional alternative, coastal shipping around Australia is economically and environmentally inferior to a railroad in many aspects. The costs of building inwards-loading port facilities in already overcrowded and congested out-loading ports that are not currently meeting expansion growth needs is a major constraint issue. A key component of the economic advantages of Project Iron Boomerang is that the trains will be fully utilised during their transits in both directions. Furthermore, it is clearly evident that the PIB continental rail will open up many new inland Australia prospect development mines of immediate and future world resource supply significance. The value of new mines is estimated to be up to US$50 billion. (refer to Appendix F).

Industrial precincts will be established in Queensland and Western Australia. The precincts will include ore reception facilities, ore stockpiles (iron ore and coal), stacker/reclaimers, conveyor systems, coke production batteries, electricity production, water and other utilities, and steel slab export facilities.

Central to all this industrial activity will be multiple steel mill smelters producing steel slab. This places the first-stage production of steel close to the necessary raw materials and in close proximity to ports. This results in efficient shipping of the three-times consolidated steel products to market.

Strong world growth in raw steel production and consumption, primarily driven by the rapid industrialisation of China and India, is expected to continue and require substantial investment in new steelmaking capacity. This makes the very large world class natural resources of Bowen Basin coal in Queensland and Pilbara iron ore in Western Australia strategically very important.

Project Iron Boomerang will meet a portion of the long-term global demand for sustainable, cost effective steel production. In addition, the project will deliver a dramatic reduction in environmental outcomes compared to the current steelmaking paradigm.

This Pre-Feasibility Study Report shows emphatically that PIB will deliver substantial economic and environment benefits. The estimated cost reduction for slab steel delivered to a representative coastal second-stage steel mill in East Asia is over 30%. The environmental benefits include an estimated reduction in carbon emissions of 8.7 million tonnes annually, against the existing supply chain and steelmaking operating practices.

The key business drivers of PIB are:

- Three-times consolidation of steelmaking feedstock close to the resources for the production of first-stage steel products;
- Operations and Production Financial Risk Mitigation Management and Reduction
- PIB reduces the need to expand the currently expanding iron ore and coal supply-chain capex infrastructures by US$9 billion (Sept.,2007); i.e. in Australia, on the sea, and in the key receiving countries of China and India by 72m tpy of coking coal iron ore and limestone. This is risk finance overexposure for the ordinary or bad market times (refer to Appendix A)
- Steelmaking ore stockpile inventory for improved just-in-time finance and supply chain risk management consolidations.

- Alternate slab steel international market delivery options are available ex Australia, if international domestic home cyclical markets become oversupplied.

- Develop synergies in co-location of raw material production with first-stage steel production and make available large smelter park sites suitable for the major operations and services scale consolidation of industry;

- Construct high efficiency smelters using world-class tested and proven technology;

- Reduce transport costs by consolidation of major raw material inputs and maximising land and sea "back-loading" (coal railed west and iron ore railed east); and

- Deliver major global environmental benefits from improved transport efficiencies, modern first-stage steel production techniques and efficient energy utilisation.

The objective of this Pre-Feasibility Study is to demonstrate the advantages of PIB such that the funding of a full Feasibility Study can be undertaken.

1.1 Physical Description

Project Iron Boomerang is an "enabler" to provide for the resource-intensive first-stage of steelmaking to be sited in smelter precincts much closer to the resource feedstocks. The main resources are iron ore and coking coal. The project includes the development of a rail link between the extensive Pilbara iron ore resources in Western Australia and the coking coal mines in the Bowen Basin in Queensland. The railway will feed raw materials to steel smelters in the precincts at each end. This Pre-Feasibility Study assumes that steel smelters will produce semi-finished steel slab (plain carbon, stainless and alloys) for export to downstream processing locations. Steel billets, bloom or intermediate pig iron outputs are also possible. The decision on output will ultimately be made by the steelmakers. Infrastructure will be established to transport the semi-finished product to nearby shipping ports for export.

The construction of global steelmaking facilities in Australia will be an important attraction for the world's major steel producers under the project concept and strategy. The locations permit immediate access to competitive suppliers of the main high-quality feed stocks for steel. The proximity of production to raw material inputs delivers a competitive edge to steelmakers over the very long life of the smelters. The reserves of iron ore and coking coal in Australia are estimated to be sufficient to service demand for at least 100 years. Further, PIB will reduce the transportation costs of marginal iron ore and coal resources sufficiently to make these additional reserves more economic for mining.

This is shown in the map of Australia below.

Figure 1.1 Transcontinental railway connecting iron ore and coal

In addition to the logistical advantages of reducing the supply-chain, there are significant economic advantages of co-location of high-volume first-stage steel production in the precincts. The similarly significant environmental benefits of the project reinforce the overall project business case. It is expected that the proximity of the smelter parks to major natural gas in Western Australia and coal seam gas in Queensland will provide further production economies, potential energy security, diversity and environmental benefits. The close proximity of the smelter parks to existing and expanding port facilities further enhances the viability of the project.

The key project elements are as follows.

- **Smelter parks** – Each precinct will provide sites for six steel smelters and supporting industry (such as coke production plants) at each end of the East West Line ("EWL"). Initially, it is proposed to locate a smelter park near Newman in Western Australia and another at Abbot Point (near Bowen) in Queensland. Additional smelters may be feasible within each of the initial two smelter parks, with even greater economies of scale. The optimal number of steel smelters in a precinct will be evaluated during the Feasibility Study. A second smelter park at each end may also be required, subject to ultimate demand for smelters. This is discussed in Section 8.

- **Infrastructure** – The facilities necessary for servicing the smelter parks and steel smelters (water, precinct transport logistics, power, gas, waste management, etc.) will be constructed. This will include the effective management of environmental outcomes within the smelter parks.

- **Rail link** - The EWL will be a standard gauge railway to current Pilbara "world's best practice" heavy-haul standards. It will link iron ore resources in the Pilbara and coking coal mines in the Bowen Basin to smelter parks in Queensland and Western Australia.

- **Moranbah Rail hub** – A railway in the Moranbah area in the northern Bowen Basin will connect the EWL to the existing Queensland Rail ("QR") narrow gauge coal network (and all Central Queensland coal mines) to allow transfer of coal to the standard gauge EWL trains for delivery to the west.

- **Port facilities** – Ports at Abbot Point and at Port Hedland (or other proposed ports in Western Australia) will be used for the export of the steel slab for further processing worldwide.

- **Additional infrastructure** – Investment will be required in the relevant communities and surrounding regions to support the construction, operation and maintenance of the smelter parks and railroads.

Transport infrastructure required includes the following.

- The 3,370 km long East West Line, rolling stock and supporting facilities.

- Construction by Queensland Rail of the 69km long Northern Missing Link to connect the Goonyella region mines to the Newlands Railway and to Abbot Point, and capacity upgrade of the Newlands and Goonyella rail systems to meet overall Queensland export coal tonnages, as well as demand from the Abbot Point Smelter Park. Coal will be delivered to both the Moranbah Coal Hub and Abbot Point Smelter Park via the QR narrow gauge rail network, hence providing existing rail access to all northern Bowen Basin coal mines.

- A narrow gauge, electrified spur line and balloon loop to the Moranbah Coal Hub to link with the EWL, and transfer coal from the QR narrow gauge system to the EWL standard gauge system for delivery to the west.

- Railroad links to one or more iron ore producers in the Pilbara to deliver iron ore via the EWL to the smelter parks near Newman and Abbot Point. There are several potential iron ore suppliers, including:

  - BHP Billiton has several existing and proposed iron ore mines in the vicinity;

  - Rio Tinto has several existing and proposed mines but may require a linking of the Newman railroad and Rio Tinto operated railroad system (possibly near Yandi and / or Mining area C) to participate in PIB as an iron ore supplier;

- Fortescue Mining Group has completed its Christmas Creek iron ore mine (with other expansion mine prospects nearby) and its new multi-user railroad is also nearing completion; and

- Hancock Prospecting is considering several mines based on its Roy Hill deposits and these are located approximately along the EWL route.

- Transport links from the smelter parks to the ports (for transporting steel slabs for export). Proposed access to Port Hedland from the Newman Smelter Park may be via the existing Newman Railroad or Fortescue Mining's recently completed railroad, upgraded to suit the additional train numbers and tonnages, and a separate rail spur and transfer facility handling product at Port Hedland. Abbot Point could involve a separate short rail system or road delivery for transport of steel slab to ship.

- Port facilities to handle the steel slabs at Abbot Point and at Port Hedland. This would involve construction of dedicated facilities (new or shared wharf and loading systems) for loading the planned 60,000 tonnes per day of product at each location (for the project case of six 10,000 hot-metal tonnes per day steel smelters at each smelter park). At this preliminary stage and for the purposes of this document, Port Hedland is the port of choice for exports from the Newman Smelter Park, but this is subject to commercial negotiations regarding port facilities, rail access and cost, and competing demands for available harbour capacity.

- Port facilities will also be required for handling the importation of construction materials, prefabricated modules during construction, and pre assembled units, diesel fuel, and other miscellaneous items.

- Transport infrastructure for other inputs to first-stage steel production (for example, limestone, magnetite, manganese). These requirements will depend on the source locations and volumes required. Options include railing, importing, slurry pipelines or road transport.

- Transport for waste products from production processes (local processing for re-use or disposal, or railing or trucking solid wastes to mine sites for incorporation in open cut mine rehabilitation).

Water resources are a key input to the production process, and the sources and infrastructure proposed for the two smelter parks are set out below.

- **Newman Smelter Park** - Surplus water piped from the dewatering of various mine pits and local groundwater from the Upper Fortescue Aquifers, with a potential to pipe water from the Fitzroy River Basin for further stages. An option to utilise a slurry pipeline for transporting beneficiated magnetite is possible, potentially providing another diverse water supply option by utilising the recovered water following treatment.

- **Abbot Point /Moranbah Smelter Park** - Pipeline/channel from the Burdekin River, with a likely requirement for an augmentation (raised dam height) of the existing Burdekin Falls Dam to guarantee adequate secure water volumes.

1.2 Logistics Flows

Initial planning is premised on each steel smelter being rated at a nominal 10,000 per day of slab steel output, as per current industry standards for efficient production. Although there can be substantial variation between manufacturers, for the purpose of this report, the essential inputs and outputs for each steel smelter are assessed as:

Iron ore	5.5 million tonnes per annum
Coking coal	2.6 million tonnes per annum
Slab steel	3.7 million tonnes per annum

It is expected that all participating steelmakers will opt to extend their production facilities to the Basic Oxygen Furnace stage to produce semi-finished steel, including steel slab or billets. The smelter precincts and supporting infrastructure will provide for this.

Apart from iron ore and coal, other key inputs to the project will include limestone, manganese and other process and alloying elements, and water. Natural gas and/or coal seam methane gas may also be feedstock but subject to cost and availability.

The existing and proposed logistics flows are simplified as below. PIB delivers a consolidation of the major inputs prior to shipment, reduces the number of handlings, and maximises the opportunity for back-loading, thus increasing the overall logistical efficiencies.

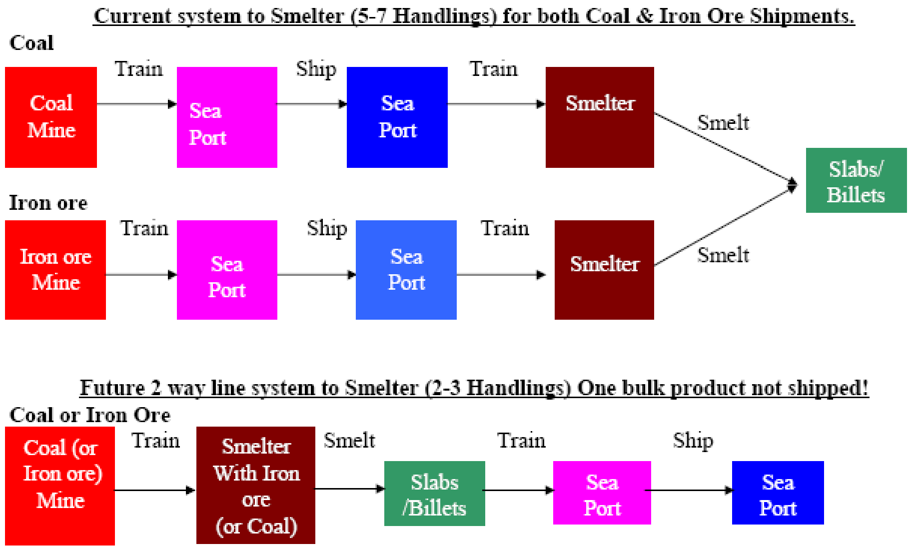

Figure 1.2 Handling and Logistics Flows

With the product consolidation and value-adding of PIB, export shipping of the steel slabs to the next processing stages will be done in Handymax and Panamax size vessels. This is in contrast to the large Capesize vessels used for iron ore and bulk coal exports from Australia. This delivers market advantages through the ability to service ports and berths which are not accessible to the larger deep-draft Capesize ships (a particular issue with most Indian ports). It also opens up direct access through the Suez Canal to Europe and the Panama Canal to the east coast of the USA. The direct access substantially reduces the overall shipping distances to these markets. The use of Handymax and Panamax ships has the potential to considerably reduce demurrage charges in congested ports. Further, they are better configured for back-loading goods or bulk materials upon return to Australia.

1.3 Environmental Outcomes

1.3.1 Local impacts

i) Smelter parks

Coke plants and steel smelters can have high local impacts. Sound operations management is required to deal with air emissions, water quality and solid wastes. Proximity of the Abbot Point precinct to the Great Barrier Reef and the coastal wetlands, adds a further sensitivity to managing the environmental impacts at this location. The comprehensive Environmental Impact Study will assist in determining the requirements to manage or mitigate environmental outcomes and in determining the conditions of environmental planning approvals. Preliminary planning provides for full collection, treatment and re-use of all process water and rainfall run-off from the smelter park sites to prevent contamination of local waters and groundwater.

The supporting infrastructures for the smelter parks (ports, water supply, gas, electricity) have low to medium impacts during construction and operation.

These impacts are readily manageable with current expertise and practices, and the experience of recent and current similar activities.

The advantage of co-locating smelters in shared service precincts provides for superior environmental outcomes that are achievable and more affordable.

A key environmental consideration is the availability and effective management of water used in the production processes and maximising the re-use of this water. The proposed use of large quantities of surplus water from mine dewatering in the Pilbara should reduce the negative environmental impacts of disposing of this water in the current semi-arid natural drainage systems.

ii) East West Line and supporting infrastructure

Environmental impacts are expected to be relatively low and readily managed during construction. The ongoing railway operation and maintenance will also be low impact (similar to existing railway operations and recent rail construction in the Pilbara in Western Australia, the coal fields in Central Queensland and the Alice Springs – Darwin line in the Northern Territory).

The sensitivity of some relatively fragile arid environments along the rail corridor will need to be managed carefully during the construction phase. Significant alignment planning undertaken to date, however, indicates that the railway requires limited major earthworks to achieve the required grading, and that construction impacts will be relatively low. Sourcing adequate quantities of water for construction purposes along the corridor will be a short term issue to be carefully managed.

The land traversed is predominantly beef cattle grazing country or vacant land, and overall impacts on existing land uses are expected to be low.

iii) Shipping

By locating the first-stage production in Australia, the volume of shipping from Australia will decrease significantly. Rather than ship iron ore and coal to overseas steel smelters, the 106 million tonnes of iron ore and coal are transformed to 44 million tonnes of slab steel, which is then shipped overseas for further processing.

In addition to the environmental and economic advantages of the reduced shipping volumes, PIB will also reduce the need for port expansion in Australia and overseas.

A further advantage to the environment is the reduction in the amount of shipping that exposes the Great Barrier Reef to degradation or the possibility of a disaster.

iv) Accommodation and community infrastructure

Preliminary investigations indicate that the environmental impacts in the provision of short and long-term accommodation and supporting community infrastructure at Bowen (to meet the needs of the Abbot Point Smelter Park) are readily manageable. The specific requirements to meet the Newman Smelter Park are yet to be fully assessed.

1.3.2 Global benefits

Whilst the construction and operation of PIB has some local negative environmental impacts that need to be effectively managed, the global environmental net benefits are expected to be positive and extremely significant. The major benefits include:

- Proper planning of the smelter precincts to maximise environmental benefits from synergies between the various production processes, and particularly their energy inputs/outputs, and opportunity to use natural gas and coal seam methane gas as primary energy sources;
- Improved environmental outcomes by ultimately replacing inefficient steel smelters elsewhere with current, much lower environment-impacting technology, purpose designed to achieve best practice environmental performance (rather than the bolt-on upgrades common with existing long-life coke ovens and steel smelters);
- Presence of sufficient production scale in the smelter parks to allow effective greenhouse gas capture and potential for CO_2 sequestration as this technology is proven, and the economic environment for its implementation is provided, including any carbon credit schemes; and
- Transport logistics efficiencies of PIB, with reduced transport energy use and accompanying greenhouse gas emissions reductions (from consolidation and maximising back-loading).

The global environmental benefits of the project are expected to be very large compared to the local environmental impacts. Realisation of the benefits will require the involvement of Federal and State Governments affected to allow proper inter-jurisdictional recognition and realisation. The emergence of markets for the trading of carbon credits will facilitate this benefit.

1.3.3 Sustainability

Current iron ore market and mining practices generally involve exploitation of the premium high quality ore deposits, with the cost of mining and transport of the lower grade ores to distant markets not generally viable.

PIB, generates lower transport logistics and local processing costs, which will allow multiple lower grade iron ores to be economically beneficiated and blended into quality sustainable smelter feedstocks. The specific ore deposits and quantities will be subject to considerations of efficiency of steel smelter operations and feedstock blends, quality of outputs required, and relative cost of supply of the various iron ore grades. Though significant transport cost reductions are enabled by the positioning of the smelter parks close to ore deposits and ports, of particular interest will be the reduction in transport costs at the Newman Smelter Park, where iron ore transport costs to the steel smelter will be a small fraction (~5%) of the alternative of shipping this quality ore to overseas mills.

PIB provides the opportunity for substantially improving the sustainability of the Pilbara iron ore deposits, by providing access to surplus power from the Newman Smelter Park for the beneficiation of the large regional magnetite deposits for blending with the depreciating grade hematite deposits in the region.

This is particularly the case with the very large magnetite deposits in the Pilbara. Local beneficiation of these ores, using surplus power generated from the waste of the coke ovens, will provide economic benefits and permit more precise overall blending with the hematite ores. Higher quality steel outputs, higher steel smelter efficiencies and lower greenhouse gas emissions will result. The alternative use of natural gas for this application has not proven viable to date, given the market price of the North West Shelf gas in the world LNG market. The locally available and competitively priced electricity also will facilitate the use of a slurry pipeline to transport magnetite from the extensive deposits near Cape Preston. The water in the slurry may also provide additional water to Newman Smelter Park from the Lower Fortescue Aquifer.

PIB will improve the sustainability of existing steelmaking in the major steelmaking countries of China and India where:

- Reliance is placed on local coal and/or iron ore deposits, but the quantum of reserves and variable quality of those reserves do not match those in Australia; and

- Competition for internal transport infrastructure will likely remain for a considerable period.

Building steelmaking capacity adjacent to the major Pilbara and Bowen Basin resources will assist in overall sustainability of steelmaking in the Asia Pacific region.

The project has identified current infrastructure and transport cost savings for the importing and exporting nation to the value of US$9 billion (refer to Appendix AP 5).

1.4 Financial

Project Iron Boomerang is a steelmakers' project. The Feasibility Study will be funded by supporters of PIB. These are expected to be primarily steelmakers who are interested in constructing and operating steel smelters. Supporters of the Feasibility Study will be invited to nominate representatives to the Management Advisory Committee, and to become investors in EWLP when the project proceeds to construction and implementation. Steelmaker supporters will also be entitled to become shareholders in EWLP and to build a steel smelter(s) in a smelter park when the project proceeds.

East West Line Parks Pty Ltd will build, own and operate the EWL, and build, own and operate the basic infrastructure of the smelter parks. This includes basic site works, access roads, materials handling infrastructure (conveyor systems, handling equipment, pipelines, etc) to and from the steel smelter gates, and precinct services such as water supply and treatment.

Steelmakers will build, own and operate their steel smelters and further downstream processing. Steelmakers are the principal stakeholder group in PIB. Whilst cooperation amongst the steelmakers is required in establishing the East West Line railway and the smelter parks, they will still fully compete in the business of making and selling steel, as they do now. They will buy services from EWLP, including transport logistics from mine to steel smelter gate, and from steel smelter gate to ship, and various smelter park services. However, EWLP will have no involvement in the operations of the steel smelters or of the businesses of the steelmakers.

The estimated total cost to EWLP of constructing the railway and precincts is estimated at US$12.5 billion. The funding of EWLP when it proceeds to the construction and implementation phase will be determined during the Feasibility Study. Debt is expected to provide at least half of the investment. It is anticipated that the participating steelmakers will be the principal equity providers, and hence the controlling shareholders.

The Feasibility Study may determine that it is in the best interests of the project to invite other major investors to participate in EWLP, in which case the amount required to be raised from participating steelmakers will be reduced. The budget and time schedule of the Feasibility Study are provided in Section 10 of this report.

At some point after EWLP has an attractive operating history, we expect that there will be an initial public offering and listing of shares on one or more stock exchanges. This provides an exit strategy for steelmakers.

1.5 Summary

Project Iron Boomerang plans to build a transcontinental railway to connect the iron ore resources in Western Australia and the coal resources of Queensland and to establish smelter parks at each end. The railway will provide an efficient logistical means of bringing together the two principal resources for steelmaking. The smelter parks will provide the means for co-locating six steel smelters at each end. The economics of locating smelters in close proximity are strong. Standard modular construction of the smelters is expected to achieve an estimated savings of about US$700 million each. Also, there are substantial direct and indirect benefits associated with the concentration of steel smelters in purpose designed smelter parks. Sharing of services (stacker/reclaimers, conveyor systems, coke production batteries, etc.) is expected to save an additional US$450 million per smelter.

The economic benefits presented by the project translate into an estimated reduction in the cost of slab steel delivered to a representative steel mill in East Asia of US$107 per tonne. The railway will also enable the opening up of a number of new ore deposits that are not now economically viable, thus expanding the supply of raw materials to the steel makers by providing new opportunities for mine investment and ownership.

PIB will have significant positive environmental benefits. The transportation efficiencies translate to substantial reductions in the use of fuel and there will be efficiencies in managing energy inputs/outputs. The CO_2 savings are estimated as 8.7 million tonnes annually. In addition to the favourable implications for the environment, the development of emissions trading markets and schemes is estimated to result in savings of US$4 per tonne of slab steel.

The remainder of this Pre-Feasibility Study Report will provide details of PIB and the range of economic, environmental and strategic advantages that it will deliver for participating steelmakers.

2. Business Model and Corporate Governance

2.1 Key Stakeholders and Proposed Roles

Project Iron Boomerang is a visionary concept of high global significance and scale. It will entail a high degree of cooperation amongst the world's major steelmakers in committing to and implementing the project, for their individual benefits and for the substantial global environmental benefits and resource management sustainability.

This section describes the following:

- Key stakeholder groups and their respective roles and responsibilities in PIB;
- The governance structure of PIB and outlines the five phases of PIB; and
- The proposed business model for sourcing the requisite finance for each phase of development.

The key stakeholders and their respective roles in the project are:

East West Line Parks Pty Ltd

EWLP will manage and administer PIB through all phases of the project. During the Feasibility Study, EWLP will manage the project through one or more Engineering, Procurement and Construction Management (EPCM) contractors who will be contracted to design, build and eventually manage the construction of the project. On completion of all phases, EWLP will be responsible for operations, management and administration of the Operation phase of the project.

The execution strategy for the EPCM components of PIB will be based on subdividing the total scope of work into parts that are best suited to the following methodologies:

- Engineering, procurement and construction management package;
- Lump sum construction and supply packages (LS);
- Lump sum turn key (LSTK) packages;
- Schedule of Rate packages (SORs);
- Procurement supply packages;
- Service contracts and purchase orders; and
- Specialist engineering consultant packages.

All of the above methodologies have been, or are being, used successfully by major resource and logistics companies in Australia.

During the Feasibility Phase, the EPCM Contractors' deliverables will comprise a series of packages of engineering, design and commercial documentation, which will be used for the tendering and award of construction.

EWLP has established a senior management group comprising experienced senior executives and leading specialists with many years of leadership and management experience to assist in the completion of the Feasibility Study. The senior management group of EWLP has worked for major international and domestic companies across a number of different industry sectors and major projects including banking, consulting, finance, government, law, logistics, mineral and petroleum resources, project management (rail, bridges, power plants), transport, supply chain management, and technology. The group has demonstrated superior analytical, business and managerial skills at a strategic level in the functional areas outlined in the EWLP Organisation Structure at Figure 2.1 and Figure 2.2.

The group's collective experience is expected to mitigate risk and deliver leadership during and beyond the Feasibility Study. It also provides a sound basis for the EWLP organization in partnership with the steelmakers, to lead Project Iron Boomerang through its Execution and Operations phases. Profiles of the senior management group and individual capabilities are included in Appendix E.

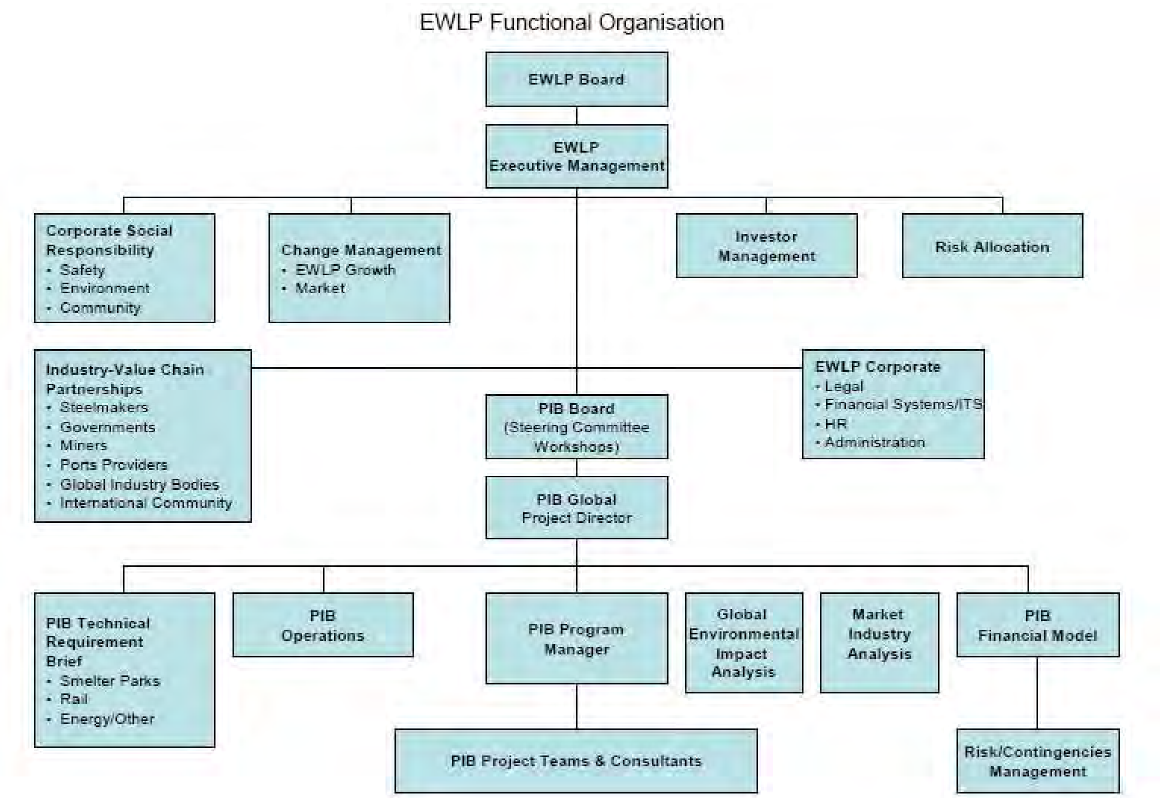

Figure 2.1 EWLP Functional Organisation

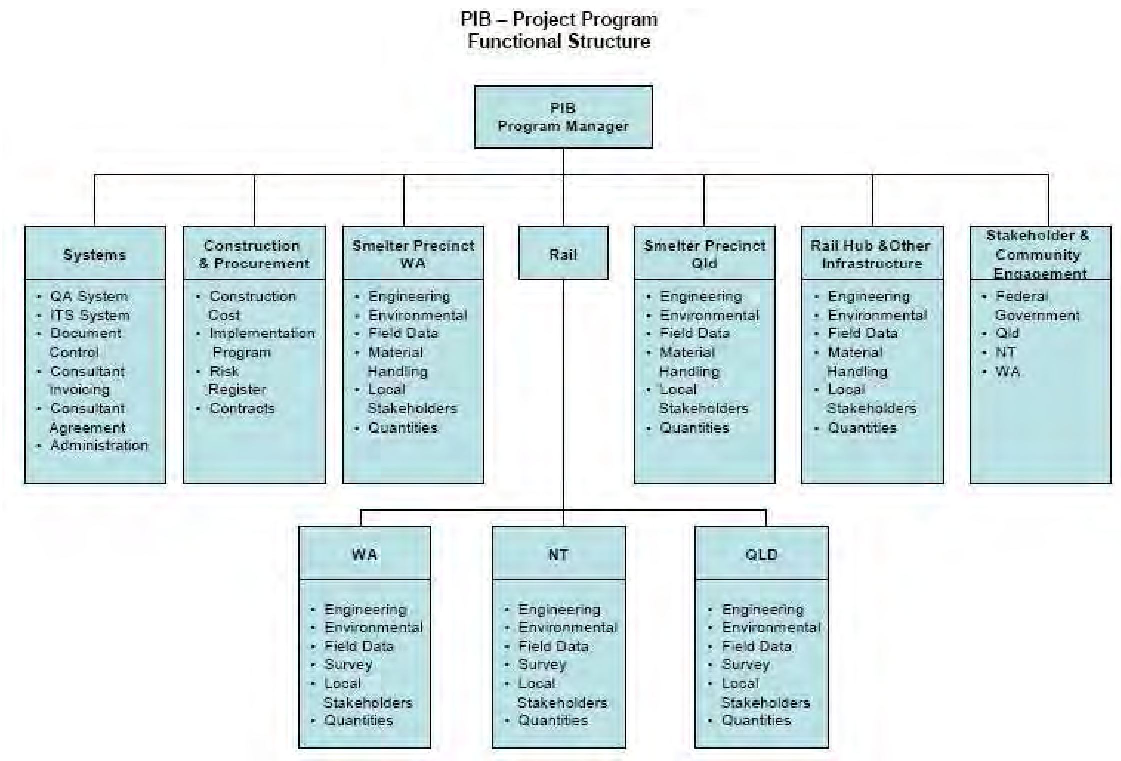

Figure 2.2 PIB Project Program Functional Structure

Steelmakers

Steelmakers will build, own and operate the steel smelters and downstream processing overseas. Steelmakers will be the principal stakeholder group in PIB. Whilst cooperation is required in establishing the EWL and the smelter parks, the steelmakers are likely to remain competitors in the business of making and selling steel. The common link will be purchasing the services of EWLP administration, including transport logistics from mine to steel smelter gate, and from steel smelter gate to ship, and various smelter park services. The steelmakers will also be the controlling shareholders of the consortium after the equity raising for the implementation of PIB.

Governments

State and Federal governments will provide the approvals to allow the project to proceed, acquire land for the rail corridor and smelter parks in accordance with legislation and regulatory frameworks.

Existing and traditional landowners and members of local communities

EWLP and PIB will ensure that the project contributes in meaningful ways to the long-term sustainability of community in a manner that demonstrates respect for sacred sites and practices. The project's footprint can and will be adjusted to meet these community needs. The project recognises the potential contribution that traditional and other local landowners will make to the project by their involvement and employment on the project.

Coal, iron ore and other resource suppliers

It is anticipated that steel raw material suppliers will continue to produce and sell raw material to the steelmakers as per current arrangements. In addition, it is proposed that the project have access to railroad infrastructure and possible surplus ground water from mine sites in the Pilbara, to provide the most efficient project outcomes. Agreement with existing iron ore producers, future producers and rail infrastructure owners (existing and future), with the support of the WA Government, will provide mutual benefit to these miners and their customers.

Other service providers

It is anticipated that government owned trading corporations in Queensland and WA (including rails, ports, water, etc.) will be required to undertake significant investment in their traditional areas to accommodate the project and to provide services on a commercial basis.

The smelter parks will operate most efficiently when certain production facilities, in addition to those nominated above to be supplied by EWLP, are shared. These may include coke, oxygen, and sintering plants, etc. It is envisaged that these would be operated on a collective basis by participating steelmakers within each smelter park, or by separate entities created to provide these services on a commercial basis.

The major raw material stockyards will provide the option for separate steelmakers' stockpiles (acquired separately), or for full sharing of raw materials acquired on a collective basis. The business model for acquisition of raw materials, whether on an individual basis or on a collective basis for the smelter park, will be a matter for resolution by participating steelmakers.

2.2 *East West Line Parks Pty Ltd*

EWLP was incorporated in Queensland, Australia in 2006. The company was initially established to assess the economic viability of the PIB concept. Having achieved that goal, as demonstrated in this report, the company will now proceed to a comprehensive Feasibility Study. If the results of the Feasibility Study support the economic advantages of PIB, project implementation and operation will then be progressed. Steelmaker support is fundamental to the project.

EWLP is led by Shane Condon, Founder and Managing Director, and is governed by a Board of Directors. Currently, the board consists of the two major funders of the project, Shane Condon, and James Handford, and Gordon Thomson who has responsibilities for the operations based in Western Australia. As outlined below, the Board of Directors and governance structure will change at the commencement of the feasibility phase.

Activities to date have included completion of the pre-feasibility phase as detailed in this report, and the marketing of the PIB concept to steelmakers and other key stakeholders.

2.3 *Evolution of Project Iron Boomerang*

PIB has been planned in five phases. These are shown and summarised in Figure 2.3 (Corporate Timeline).

These phases are:

- Pre-Feasibility (essentially complete) and commitment to the Feasibility Study;
- Feasibility Study;
- Commitment to the project and financial closing;
- Implementation with detailed engineering, procurement, supply and construction (EPCM) of the railroad, the two precincts and supporting infrastructure, and the twelve steel smelters; and
- Ongoing operations and further developments.

The following sections discuss the business models that will be implemented in each phase.

2.3.1 Bridging phase to the Feasibility Study

After completion and distribution of this Pre-Feasibility Study Report, EWLP commences the raising of the funding to undertake the Feasibility Study. The proposed budget for the study is A$150 million, excluding in-kind contributions by the steelmakers in respect of their own steelmaking facilities activities. EWLP intends to raise this funding from 12 steelmakers and 3 investors (total of 15), with each contribution being A$10M (total of A$150M).

In return for each A$10M contribution, a steelmaker will obtain a guarantee of one steel smelter allocation in the initial 12 steel smelters proposed. Steelmakers will also become equity holders in the consortium if the project proceeds to implementation.

Contributions from non-steelmakers will entitle the sponsoring entities to an opportunity to participate in the implementation and operation phases, subject to specific negotiation on that area of participation and meeting “best for project” criteria. Non-steelmaker contributors will also have the option of having an equity participation in the consortium.

2.3.2 Feasibility Study

The Feasibility Study will be funded by supporters of PIB. As noted above, these are expected to be primarily steelmakers who are interested in constructing and operating steel smelters. The budget and time schedule of the Feasibility Study are provided in Section 9 of this report.

Governance arrangements for the Feasibility Study will include the establishment of a Management Advisory Committee (MAC). All contributors to the Feasibility Study will be invited to appoint a representative (or a joint representative) to the committee. In addition, EWLP will appoint an ex-officio member of the committee to chair meetings. The function of the MAC will be to:

- Keep investors fully apprised of the progress of the project;
- Provide expertise and information to the project as required and requested;
- Make recommendations to the Board of Directors of EWLP; and
- Provide a common platform for members to discuss and reach consensus on matters of common interest such as the configuration of steel smelters and support facilities.

In addition to the MAC, EWLP will expand its Board of Directors to seven members. At least two directors will be representatives of the sponsors of the Feasibility Study.

2.3.3 Implementation

In anticipation of positive outcomes from the Feasibility Study and a Board recommendation to proceed to project implementation, arrangements with respect to equity and debt funding will occur in parallel with the Feasibility Study. It is also possible that long-lead procurement items (e.g., locomotives) may be placed on conditional order prior to the decision to proceed to implementation.

The initial phase of the implementation period will include completion of the railroad connecting the east and west precincts. During this phase the basic smelter park precincts will be developed, and four steel smelters will be constructed concurrently, two at each end. The planned staging of steel smelter construction is due to practical construction resource constraints as well as overall steel market considerations. PIB will commence operations in late 2014 when the railroad and the initial four steel smelters are completed.

Details of the project oversight, management and control during the implementation phase will be determined during the Feasibility Phase. Concurrent with the raising of the major equity to fund the implementation phase, the Board of EWLP would be reconstituted to accommodate the new equity holders. We anticipate that steelmakers will emerge as the controlling shareholders of the consortium, and that the MAC will have a role in determining the initial members of the future Board of Directors.

2.3.4 Completion of precincts and twelve steel smelters

PIB will commence operations as soon as the railroad and the initial four steel smelters are completed. Construction will then continue until the twelve steel smelters are completed.

2.3.5 Ongoing operations and further developments

Although the project scope is to support the operations of 12 steel smelters, the basic railroad capacity can support in excess of 24 smelters. Capacity upgrades would involve acquisition of additional trains, construction of additional passing loops, and expansion of train servicing and railroad maintenance capability. Any further development will provide lower prices to steelmakers, as well as the other major global environmental and resource sustainability benefits. This is discussed further in Section 8 of this report.

2.4 Raising Capital

The structuring of equity at the commencement of the implementation phase will be determined during the Feasibility Study. We anticipate that a public company will be established. However, alternative forms such as joint venturing will be considered if these prove to be more tax efficient or deliver higher shareholder value.

The total capital cost of the railroad, operating rolling stock and the smelter park precincts is estimated to be approximately US$12.3 billion. This excludes funding of the steel smelters and supporting industrial plant, and investment in ancillary infrastructure. For purposes of this Pre-Feasibility Study Report, we conservatively assume the project is financed with 50% debt and 50% equity, although a higher level of debt will be feasible. The final decisions on the funding will be made by the future PIB consortium Board of Directors after taking advice from the Management Advisory Committee. The decisions will be guided by the results of the Feasibility Study and the positions of the major participants.

Assuming that all of the equity will be raised from the participating steelmakers and investors, each steel smelter position will require an investment of approximately US$500 million in equity to the consortium. The Feasibility Study may determine that it is in the best interests of the project to invite other major investors to participate in the consortium, in which case the amount required to be raised from participating steelmakers will be reduced.

Various options on ownership and funding of elements of the project, such as the railroad rolling stock and servicing facilities where mature alternative models exist, will be explored during the Feasibility Study.

Debt for the implementation phase will be primarily in the form of construction loans. Subsequently, the debt will be primarily through syndicated loans, although the issuance of public bonds is expected as the operating performance of PIB develops. Backing of company bonds will be discussed with Australian and international governments. Nothing in this report is conditioned on gaining such backing.

Investors in the company at the commencement of implementation will require the existence of an exit strategy. As part of this exit strategy, at some point after PIB has an attractive operating history, we expect that there will be an initial public offering (IPO). The optimal timing of an IPO will be regularly evaluated. Significant steelmaker equity in the consortium on a continuing basis is considered desirable to provide continuity of the passing on of the benefits of PIB to the end-users.

Separate ownership and operating entities for the railroad and the smelter parks may also be desirable, and this would be determined at the appropriate time by the shareholders of PIB.

PIB is committed to environmental responsibility and sustainability and plans to conduct itself and report its actions in a manner prescribed by the Global Compact Sustainability Reporting Guidelines of the Global Reporting Initiative (GRI).

2.5 *Subsequent Financing*

We do not currently anticipate capital raisings beyond what is achieved at the commencement of the implementation period. However, there are possible developments that could make further financing desirable, for example, a decision to expand the scope of PIB beyond 12 steel smelters would require additional financing. Also, further development that would use the railroad for other activities could require significant investment. Any such investments would be evaluated on their merits at the time.

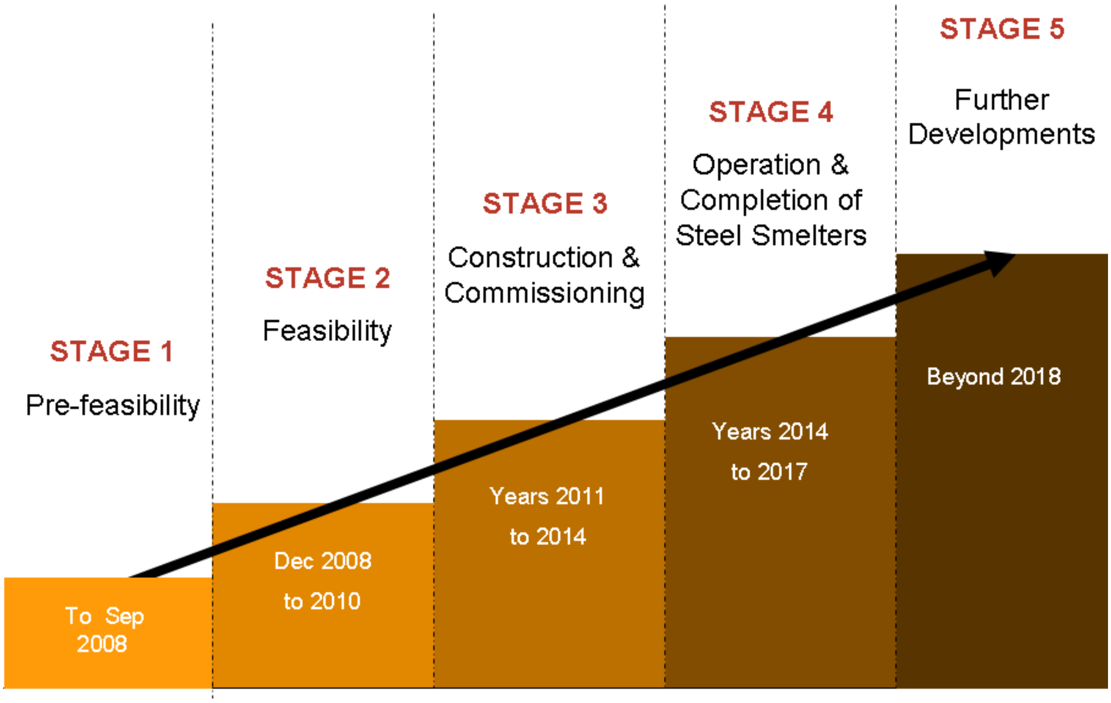

Figure 2.3 Corporate Timeline

3. Market Analysis

3.1 Market Overview

The world steel market environment can be summarised as:

- Robust growth – Recent growth has been driven by the BRICs (Brazil, Russia, India and China). Significant production growth is predicted to continue in the BRICs, and to a lesser extent, other developing countries.

- Globalisation - The steel industry has an increasing focus on managing logistics and production chains in a global sense, rather than on the historically narrow national basis.

- Concentration – Mergers and acquisitions among steelmakers are creating fewer but larger producers, driven by market forces (e.g., Mittal/Arcelor, and Tata/Corus) or under government direction (as in China).

- Profitability - The industry has been reasonably profitable, whetting its appetite to invest sustaining and growth capital in response to the continuation of the dynamic market environment.

- Closures - There have already been shut-downs of inefficient production facilities (on financial and/or environmental grounds) and relocation to more suitable industrial areas.

- Environmental - There is a growing need and awareness of the environmental and resource demands of locating major steel smelters in densely populated regions in Asia, including consideration of the demands on available water and land transport.

- Uncertainty - Increasing transport bottlenecks (port congestion, demurrage, shipping shortages) and price volatility create uncertainty as seaborne traded volumes of major raw material inputs progressively increase their proportion of steel production inputs.

- Input quality - An expectation of increasing focus on quality of scarce resource inputs, favouring a greater trend to more trading globally in the key higher quality iron ore and coking coal inputs.

- Technology - Steel smelter technology (and use of coke as reducing agent) is expected to remain the dominant production process progressively assisted by the development of more process efficient technologies.

- Increasing prices - Raw material inputs are becoming more expensive, driven by demand growth, supply lags, and an expected continuation of high energy (oil, coal, gas), general resources and export/import infrastructure costs.

The implications for steelmakers competing in the above-described world steel markets can be profound. Some may fail and others will be acquired by stronger competitors. When the profitability of steelmaking weakens at some future date, it will be the companies with the lowest cost inputs that will survive. The opportunity for new market entrants in strong and weak markets reduces annually.

It is notable that the large steelmakers are seeking to vertically integrate into markets beyond steelmaking (e.g., ship building, automobile manufacturing, white goods). The opportunity is to profit from each stage of the manufacture of elaborately transformed goods.

In the drive for size, efficiency and profitability, it is logically consistent that the steelmakers should seek a measure of control to activities closer to the supply of raw materials.

The implications of this business environment for Project Iron Boomerang are that steelmakers now view the Project as the next logical step to increase market competitiveness.

Some issues which support this view are:

- Strong demand for steel smelters and steel slab for rolling mills is forecast to continue, covering new production capability, but also as replacement for inefficient and higher polluting old facilities.

- Australia is uniquely endowed with world-scale reserves of very competitive, high quality iron ore, coking coal and other minerals important to the steelmaking processes.

- The PIB smelter parks and railway are located in very sparsely populated regions, and will have minimal impact on existing land uses and populations.

- PIB has a strong triple bottom line, with financial, environmental and social (Australia and the steelmaking countries) attributes that are all very positive.

- There is strong developing interest and support in PIB to date from major steelmakers throughout Asia, State and Federal Governments, resource producers and infrastructure developers.

PIB should not be seen as a threat to major trading nations' maintenance of steelmaking capacity because the project is targeting less than 10% of projected global capacity growth over the next decade. Similarly, PIB does not expect to have any impact on existing arrangements between resource companies and steelmakers. The focus of PIB is on the future markets.

Individual steelmakers will have a variety of reasons and circumstances influencing their decision making regarding participation in PIB. These include:

- Need for new capacity or replacement capacity and desired timing;

- Direct, close door-to-door delivery access to major raw materials;
- Overall logistics costs and finished cost of producing and getting steel to market;
- Increased alternatives for locating steelmaking capacity (access to land, transport, etc.);
- Environmental benefits of locating new mills away from population centres and closer to material inputs (iron ore, coal, water, limestone, manganese, etc.);
- Lower operating and sovereign risk considerations; and
- Co-location in smelter parks facilitates sharing infrastructure and services with more affordable environmental outcomes.

3.2 Steelmaking Technology

Current steelmaking technologies produce a first-stage melt from the iron oxide ores use the steel smelter/coke process, a smelting reduction process (such as Corex) also using coal as the reducing agent, or the DRI technologies involving direct reduction (in the form of lumps, pellets or fines) by a reducing gas produced from natural gas or coal. These latter technologies include HIsmelt, DIOS and a number of other proprietary R&D processes being trialled on a relatively small scale.

Steel smelters rely on traditional coke as the primary reducing agent for removing the oxygen from iron oxides and can use coal or gas for providing the additional process heat requirements. The steel smelter produces molten pig iron, which is then further processed into steel in the basic oxygen furnace, or to be used as an input to electric arc furnaces. The other processes mentioned above do not involve coke in the process.

Steel smelters currently provide approximately 90% of the world's primary "virgin" iron (excluding re-use of scrap steel), and in spite of significant investment in new technology that does not rely on coke, steel smelter technology is expected to remain the predominant technology for new steel production into the foreseeable future. Industry forecasters predict that steel smelter technology will account for over 85% of virgin iron production in 2025 (Dr N.J. Bristow, Future Steel and Coke Industry Trends, Intertec European Coke Conference, Dusseldorf, April 11, 2006).

Project Iron Boomerang is premised on steel smelter technology being the primary steelmaking "technology of choice" of the steelmakers building new steel smelters in the smelter parks. However, PIB remains open to other technologies being employed where these technologies are viable and contribute to the overall project benefits.

Figure 3.1 describes the basic steelmaking processes.

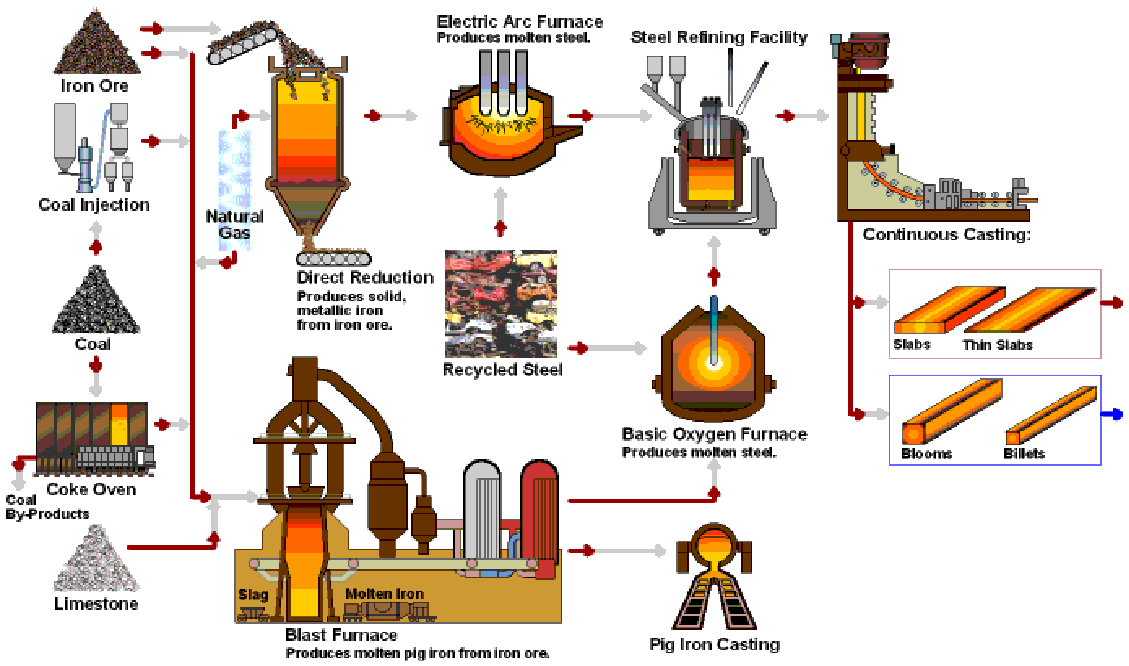

Figure 3.1 Steelmaking Process (Source: World Coal Institute)

In the absence of iron ores from other sources for blending, the Pilbara iron ores may require beneficiation for use as sole feedstock into the steel smelters, whether using some of the poor sintering hematite ores or the lower iron content magnetite ores, pelletising of part of the iron ore feedstock may also be required. Locating pelletising plants within the smelter parks, with the availability of surplus energy, will provide another advantage to the viability of some of the Pilbara ore deposits, and overall sustainability of iron ore bodies of the region. The project anticipates that beneficiation of magnetite will provide the best chemical balance efficiency feed as one of the key steelmaking attributes of the project.

3.3 Steel Production Growth Forecasts

World production of steel has increased substantially in recent years, with statistics summarised as:

	2005	2006	2007	2008 Forecast	2009 Forecast	Annual Growth
Production (Mt)						
World	1140	1250	1344	1415	1492	7.72%
China	356	423	489	533	586	16.15%
Consumption (Mt)						
World	1126	1239	1322	1398	1473	7.70%
China	350	384	438	482	528	12.71%

Table 3.1 World Steel Production

(Source: The Australian Bureau of Agricultural and Resource Economics (ABARE), Australian Commodities, June quarter2008)

Recent world growth has been predominantly driven by domestic demand in China, where production has increased by almost 150% in the past five years. Chinese steel production is now over four times that of Japan and is over one-third of total world production. In spite of this impressive growth, however, China's per capita consumption of steel still remains low by the standards of industrialised nations.

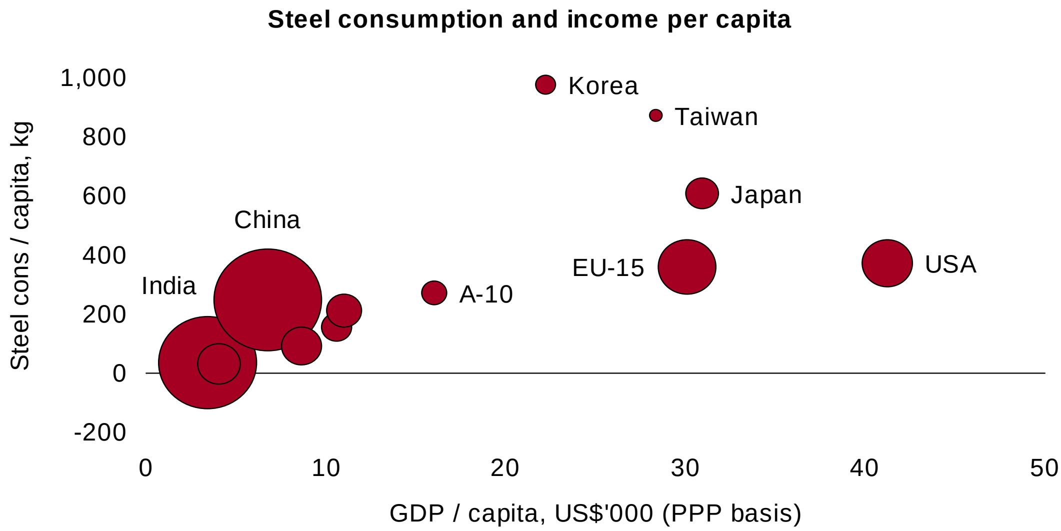

Figure 3.2 Steel Consumption and Income per Capita

(Source: Hatch Beddows. Note: PPP – purchasing power parity)

India is expected to be the next major steel growth market, with its own ambitious plans to increase its steel production five-fold over the next decade. It has an even lower per capita consumption of steel than China.

Other significant consumption growth markets are expected to be the Russian Federation countries, Brazil, and the industrialising Asean countries.

Growth forecasts in steel production over the next decade are for strong growth to continue, with projections of up to 700 million tonnes over the next decade of new capacity being required. Figure 3.3 shows the summary of research undertaken by Deutsche Bank in 2005. Virgin iron production will comprise approximately 500 million tonnes over 10 years of this growth. Other industry observers predict similar strong growth to continue.

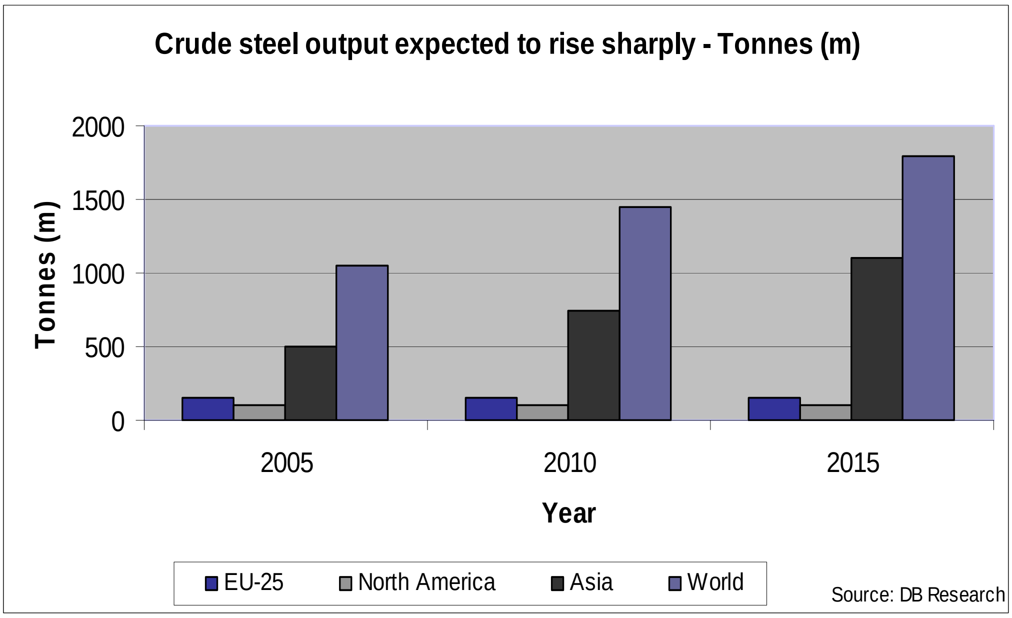

Figure 3.3 Projected Crude Steel Output

In addition to new capacity to meet growth in steel consumption, there is a continuing need to replace existing production capacity that is obsolete, or economically and/or environmentally no longer viable. This is currently occurring in Europe and the USA (with new steel mills being developed in Brazil taking advantage of the large iron ore deposits in Brazil and its relatively low cost structure compared to western Europe or the USA), and partially adopting the Project Iron Boomerang concept of back-loading. Brazilian steelmakers back-load some coal from Australia and produce steel slab for export to consumer markets.

The smelter capacity replacement process will also increasingly occur in China as the Chinese Government seeks to rationalise the number of producers and close large numbers of high polluting, inefficient and small steel mills. There are a reported 1,500 steelmakers in China, but only 26 mills have an annual output of greater than 3 M tpy. The Chinese government has set a target of a major rationalising of the industry, with the largest ten steel mills to account for 50% of total output in 2010, and 70% in 2020. Most of these companies are owned by the central government, and PIB offers a timely opportunity to the

Chinese Government to locate part of China's new and replacement capacity to environmentally responsible locations.

PIB's business case is focussed on constructing twelve 10,000 hot-metal tonnes per day steel smelters or 3.6 M tpy producing a project output total of 44 million tonnes per annum of slab steel. The choice of 10,000 tonnes per day is a notional size. The steelmakers will ultimately dictate the size of smelters that will best suit the attributes of PIB. This level of production will be reached within ten years, and potentially could double over a longer period. The tonnage represents less than 10% of the predicted (predominantly Asian-driven) global growth in steel smelter capacity over the next decade, and a lower percentage when overall replacement steel smelter capacity is considered. PIB envisages that the final processing of slab steel to finished product would be undertaken in the consuming mass market regions.

3.4 Major Raw Material Resource Suppliers

Most major steel producing nations have an increasing reliance on seaborne imported raw materials. This trend is expect to continue as the steel production volumes increase and local sources of raw materials become harder to extract or quality reduces. There has also been a growing trend for major steelmakers to acquire a stake in raw material resources to secure future long-term supply.

Australia has extremely large reserves of both iron ore and coking coal and is ideally located relative to the dominant Asian growth market. The Pilbara accounts for approximately 40% of the traded iron ore market, and Queensland's Bowen Basin supplies approximately 50% of the world's seaborne traded metallurgical coal. This market share is likely to continue, given the extent and quality of the reserves, the world's best practice mining operations, proximity to the major Asian market and the existing high-grade infrastructure.

In addition, both the Pilbara and the Bowen Basin are characterised by a number of ore deposits and resource companies, either already producing or actively pursuing opportunities to develop new deposits. Opportunities exist in Australia for individual steelmakers to acquire deposits outright, joint venture with miners to develop deposits, or remain solely as purchasers of the major raw material inputs. The East West Line will open many new opportunities for the existing, undeveloped and new mines across the nation (refer to Appendix F).

The Pilbara is currently dominated by the two major iron ore miners (BHP Billiton and Rio Tinto). Both are undergoing major expansion projects. Fortescue Metals Group completed development of a 45M tpy mine and a new railroad to Port Hedland in mid-2008. Several new market entrants are seeking to capitalise on the current and projected robust demand for iron ore and current market prices. Major rail and port upgrades are underway, and Cape Preston is proposed as the next major export port for the Pilbara region.

Australian iron ore exports are forecast to grow from 269M tpy in 2007 to over 405M tpy in 2012, predominantly from the Pilbara (The Australian Bureau of Agricultural and Resource Economics (ABARE), Australian Commodities, March quarter 2007). The individual miners have even more bullish forecasts, driven by expectations of continuing robust demand, and the quality and location advantages of the Pilbara to the Asian markets.

The Queensland coking coal market has a similar dynamic, but with a wider mix of suppliers competing for market share, and with a similar major expansion underway in response to market demand and robust prices. Australian metallurgical coal exports are forecast to grow from 125M tpy in 2006 to 152M tpy in 2012, predominantly sourced from the Bowen Basin (The Australian Bureau of Agricultural and Resource Economics (ABARE), Australian Commodities, March quarter 2007). Industry forecasts are again far more bullish than the ABARE forecasts.

The first four steel smelters in PIB are planned to come on-stream in late 2014, hence it will not impact on the current round of mine developments and major rail and port infrastructure upgrades, which are generally underpinned by existing contract commitments. The other smelters will progressively come on stream over the next three to five years. PIB is expected to moderate the next major infrastructure expansion phase, by partially reducing the growth required for other non-project rail, port and shipping capacity for the export of raw materials, but not reducing the mining expansion requirements.

PIB provides steelmakers direct access to highly competitive and proven suppliers of both high quality iron ore and coal, and provides the opportunity to efficiently increase the potential suppliers in the Pilbara. It also provides the sustainable opportunity to utilise the very extensive lower grade magnetite ores beneficiated and blended with the primary hematite ores in a sustainable manner.

The lower grade ores, such as the very extensive magnetite reserves, would require local beneficiation prior to delivery to the smelter parks. This will reduce logistics costs per tonne of iron railed. Magnetite beneficiation requires electricity to power the grinding circuits and magnetic separation. PIB expects to provide competitive energy sources in the form of high-voltage electricity from the smelter parks (compared to the only current alternative of natural gas). Low cost electricity makes magnetite beneficiation viable which, in turn, lowers transport costs for local steel production.

3.5 Cost Advantages of Project Iron Boomerang

This Pre-Feasibility Study documents a number of advantages of PIB to steelmakers including a substantial cost advantage per tonne of steel produced. The cost advantage arises from logistical savings from reductions in the transportation of iron ore, coal and slab steel in addition to production economies related to the co-location of six steel smelters in each precinct.

Advantages are also achieved by reductions in both capital expenditures and operating expenditures. The details are provided in later sections and supporting appendices.

To illustrate the potential cost advantage of PIB, a base case is developed in Section 7. The base case assumes the fob delivery of slab steel to a coastal East Asia steel mill. The analysis shows an estimated cost reduction of over 30% (US$107 per metric tonne).

The cost advantages of PIB that are estimated in the Pre-Feasibility Study are compelling and support the funding of a comprehensive Feasibility Study.

3.6 Conclusions

The market analysis above leads to a number of key conclusions.

World steel markets will continue their strong growth, particularly in Asia. The PIB business case is premised on producing only 44 M tpy out of a forecast world-wide new steelmaking capacity of over 500M tpy over the next decade.

Steel production is now a global industry, with efficient logistics outcomes a major consideration. When the profitability of steelmaking weakens at some future date, it will be the companies with the lowest cost inputs that will survive. PIB presents steelmakers the opportunity to be competitive and profitable in both the strong and weak cyclical markets for steel.

In the drive for size, efficiency and profitability, it is logically consistent that the steelmakers should seek a measure of control of activities closer to the supply of raw materials. Steelmakers now view PIB, with its triple bottom line benefits, as the next logical step to increase market competitiveness.

PIB will give steelmakers continued ex mine site to steel mill gate direct delivery access to the premium iron ore and coking coal resources in the Pilbara and Bowen Basin, with enhanced competition between suppliers. However, PIB does not impede the current round of major rail and port infrastructure expansions underway in both Western Australia and Queensland for iron ore and coal exports.

PIB also provides the opportunity to effectively use cheaper lower-grade iron ore reserves for many decades without the added transport penalty involved in exporting these ores to overseas smelters.

PIB will provide substantial savings in the delivered cost of slab steel to international second stage steel mills in a variety of market locations to distinct advantage.

4. Smelter Park Precincts

4.1 General

Initial smelter park locations proposed are at Abbot Point near Bowen in Queensland, and adjacent to the Mt Newman Railroad near Poonda Siding, 55 km north west of Newman in the Pilbara region of WA.

Key selection considerations for each location include:

- Large flat sites available with limited existing use, and large buffer areas;
- Proximity to transport infrastructure (rail and/or port);
- Available water; and
- Proximity to existing service centres and community infrastructure.

PIB is expected to require a construction workforce in excess of 8,000 workers (refer to Appendix AS14) over an extended period, and require a permanent direct workforce of 2,000 to 3,000 workers at each precinct.

Key features in the preliminary planning for each smelter park are locating the facilities and steel smelters to make efficient use of the sites, optimise the major material handling logistics (raw material inputs, finished product and wastes), and efficiently manage the energy inputs and outputs. The rail access and major common user materials stockyard are central to planning and achieving the maximum advantages of the precinct co-location. The aggregated handlings of solid materials for the six steel smelters in each precinct, to and from the steel smelter gate, are in excess of 160M tpy.

Features common to both smelter parks (and included in budget costings) are:

- Rail reception points (tipplers for the EWL trains and bottom dump at Abbot Point for the narrow gauge coal trains);
- Large stockyards, stacking and reclaiming equipment and conveyor systems for the raw materials (iron ore, coal, coke, limestone) to access the processing plants, and provide sufficient stockpile capacity to guarantee continuity of supply and the ability to blend from separate stockpiles;
- Single large coking plant to produce coke orders for individual steel smelters, and attached co-generation power plant to utilise surplus gases and heat for base-load electrical power generation;
- Water supply, on-site storage, waste water and stormwater collection systems, and water treatment facilities to maximise water re-use and prevent environmental impacts from contaminated water run-off;
- Transport systems to deliver completed product to rail or direct to wharf for export;

- Transport systems to collect and manage the solid wastes generated, including maximising any further processing opportunities for its re-use;
- Rail servicing facilities; and
- Smelter park maintenance facilities, site management and security.

Other common user processing facilities could include sintering plants and oxygen production.

Precinct economics and the major advantages of co-location in the PIB precincts include:

- High utilisation rate (24/7) of common user infrastructure, with essential requirement for built-in redundancy able to be more effectively utilised;
- Reduced total inventory holdings covering much lower supply chain reliability risks (and much closer proximity to major input suppliers);
- Standard Modularised design and construction and economy of scale in building facilities and supporting infrastructure;
- Economy of scale in operational support and maintenance; and
- Efficient management of energy involved in the various processes and maximising its re-use will be features of the smelter park concept and the scale involved.

A notional concept layout for the major common-user stockyard is as below.

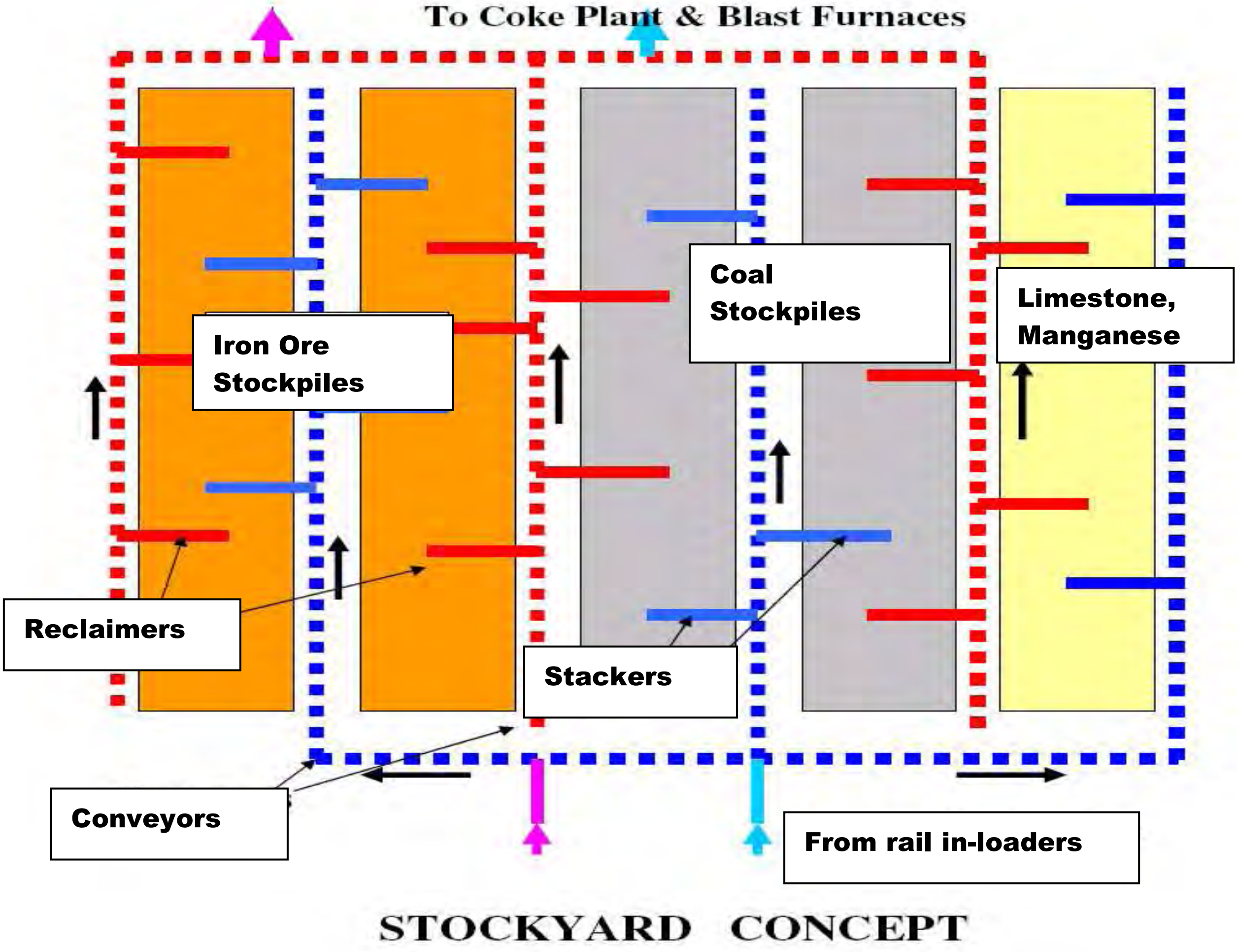

Figure 4.1 Stockyard Concept

The stockyard is scalable to meet the collective stockpile needs, storage volumes, product types, blending requirements and delivery rates for the major input materials. Preliminary costings assume a basic row module of 1500m x 60m, with yard machines staged to match required input delivery rates and output production rates. Notional stockpile quantities for the project case are 4.5Mt of iron ore (seven weeks equivalent usage) and 2.1Mt of coal (five weeks usage).

The possibility of collection of waste gases for sequestration needs to be investigated further, with the smelter park concept offering the concentrated scale to potentially make this viable.

Specific features of each initial smelter park location are discussed in the following sections.

4.2 Abbot Point Smelter Park

Proposed location for planning purposes is as indicated below. There are a number of significant features of the site.

Figure 4.2 Proposed Location of Abbot Point Smelter Park

The existing port is to be expanded by Queensland Ports Corporation to meet the requirements of PIB and other potential industrial users in the region. Deep water access for Capesize ships is available. Expansion will include additional berths, breakwaters and land access to the north west of the existing coal export terminal and jetty.

Water will be sourced from the Burdekin River via an open channel/pipeline as an extension to the "Water for Bowen" project by Sunwater. Water supply security will be achieved by an extension (two metre raising) of the Burdekin Falls Dam, which currently has a storage capacity of 1.86 million ML with very high recharge reliability from its large catchment and location within the wet tropics.

A large area of flat land is available that is currently used for cattle grazing and with residential areas remote from the site and located away from prevailing winds.

The major environmental issue will be proximity to local Caley Valley wetlands and to the Great Barrier Reef. Rainwater runoff will need to be fully contained and collected and treated on site for maximum re-use.

Rail access is via the Queensland Rail narrow gauge Newlands coal system, linking to the Goonyella and Blackwater coal rail systems, and the North Coast Line and the EWL. Road access is by way of the Bruce Highway (Highway 1) which skirts the site.

Bowen (current population approximately 8,000) will be the major local support centre and accommodation centre for construction and permanent workforces.

Air services are available at Townsville (international and domestic), Proserpine and Mackay (domestic), with international flights also at Cairns and Brisbane for transfer to domestic flights. An upgrade of Bowen Airport and commencement of regular domestic jet services is likely as a result of PIB.

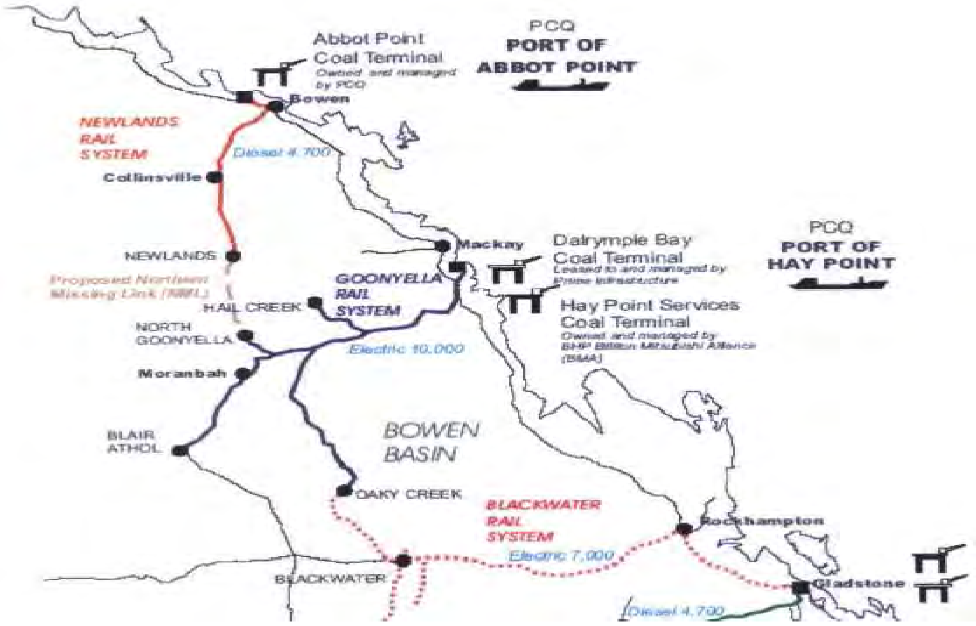

Figure 4.3 Bowen Basin Coal Rail & Port Network

The proposed area and concept precinct layout at Abbot Point is as indicated on the following.

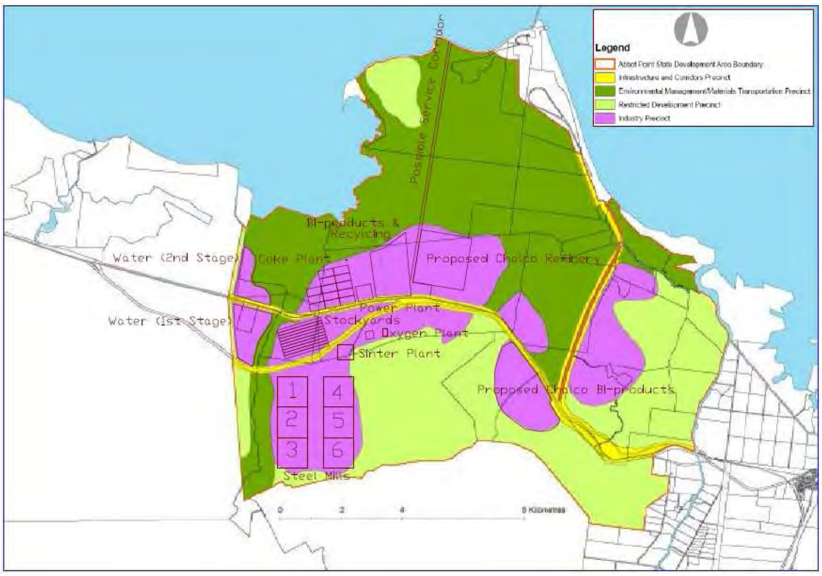

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Figure 4.4 Abbot Point Smelter Park – Notional Area

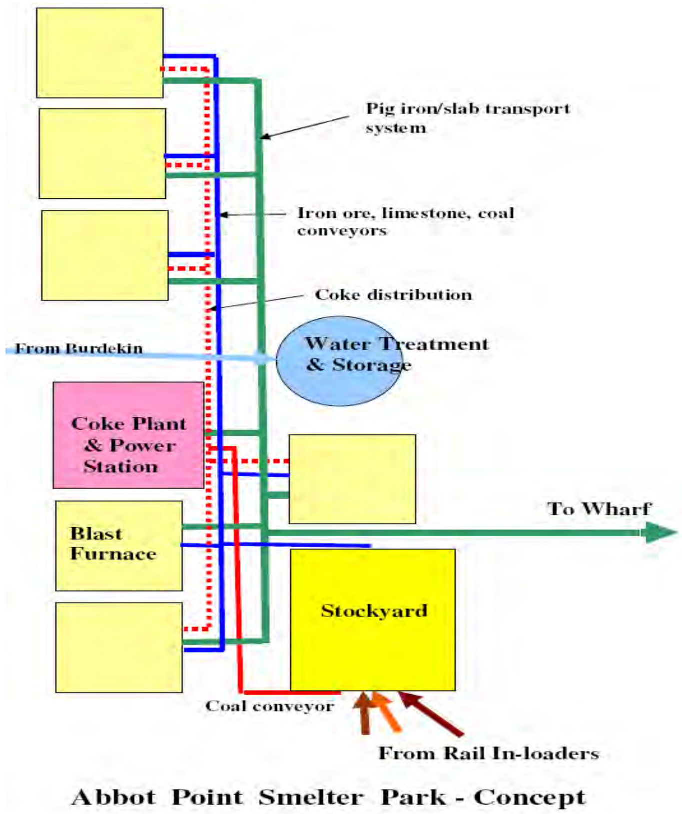

Figure 4.5 Abbot Point Smelter Park - Concept

4.3 *Newman Smelter Park*

The proposed location of the initial smelter park in the Pilbara is 55 km northwest of Newman, adjacent to Poonda Siding on the Mt Newman Railroad. The site is located in the Fortescue River valley but well distant from the river channels.

Significant features of the proposed site for the Newman Smelter Park ("NSP") are detailed below.

The NSP location is in close proximity to major iron mines and planned mines, accessing the BHP Billiton's Mt Whaleback and adjoining ore bodies, Yandi, and Area C, the Hamersley Iron's Marandoo, West Angelas, Yandicoogina and Hope Downs mines, and FMG's Christmas Creek and Cloudbreak deposits, all within 250km of Poonda, with only short rail connections needed to link existing rail systems to connect to these mines. These mines will have a total production capability of over 240 M tpy. Further extensive deposits are located in the Pilbara, which become more viable with short hauls and lower transport costs, and the potential for beneficiation. A slurry pipeline to link to the large Cape Preston magnetite deposits is also an option, providing greater diversity of competitive suppliers, and additional water to NSP.

The NSP location is at the upstream ends of the various rail systems, with lesser rail capacity constraints compared to those rail sections closer to the ports, which are utilised by all the mines in each rail/port system. Limited rail capacity upgrades will be needed to these rail systems to divert iron ore to NSP via the EWL to Abbot Point.

Rail capacity requirements from NSP to Port Hedland are proposed as 3 x 24,000 tonne payload steel trains per day. This will likely require further rail capacity augmentation of the existing Mt Newman Railroad with some additional duplication, but this would be expected to replace a similar number of iron ore trains from the BHP Billiton mines exporting via Port Hedland.

The NSP site is very large and relatively flat, and is currently used for cattle grazing.

Water is planned to be supplied via piping from de-watering of nearby mine pits (e.g., Mt Whaleback, Yandi, Hope Downs – assuming agreement with these mine operators) and from harvesting local groundwater in the upper Fortescue River aquifers.

Rail access from the mines and to Port Hedland is proposed as being via the Mt Newman Railroad, with short connections to link to the Hamersley Iron rail systems near Yandi and Mining Area C. A separate spur line to link to the FMG railroad and mines is proposed if steelmakers require FMG ores or access to other deposits in the Chichester Ranges area.

Newman is the local service centre (current permanent population is approximately 2,000). A major expansion of the town will be required to accommodate PIB. Significant fly-in/fly-out commuting of workers is also anticipated.

A major environmental issue associated with the location is the sourcing of sufficient water and its handling and treatment of stormwater run-off and used water to prevent local contamination. The NSP site is remote from any residential areas.

Options for disposing of solid wastes are local landfill or return to mine sites for incorporating in filling in mine pits.

The proposed location and concept layout for the Newman Smelter Park is as follows.

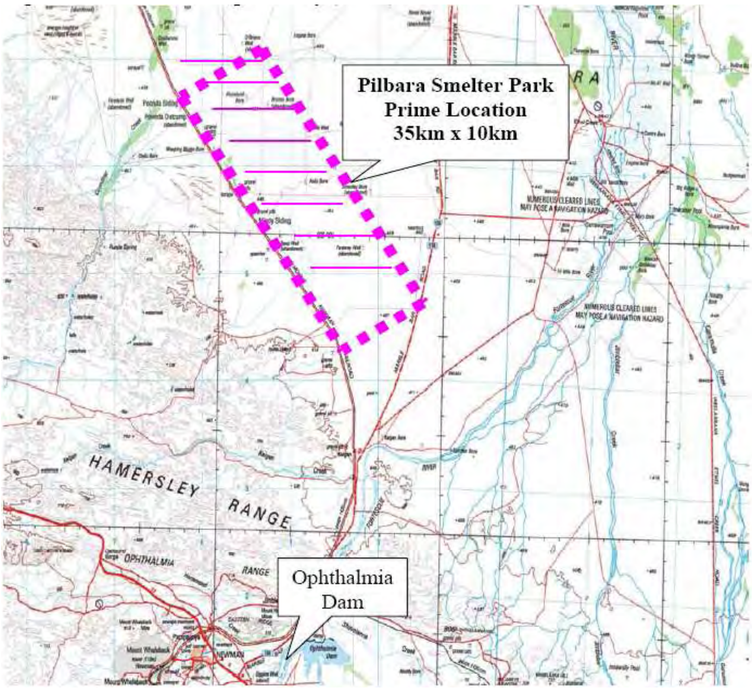

Figure 4.6 Proposed location of Newman Smelter Park

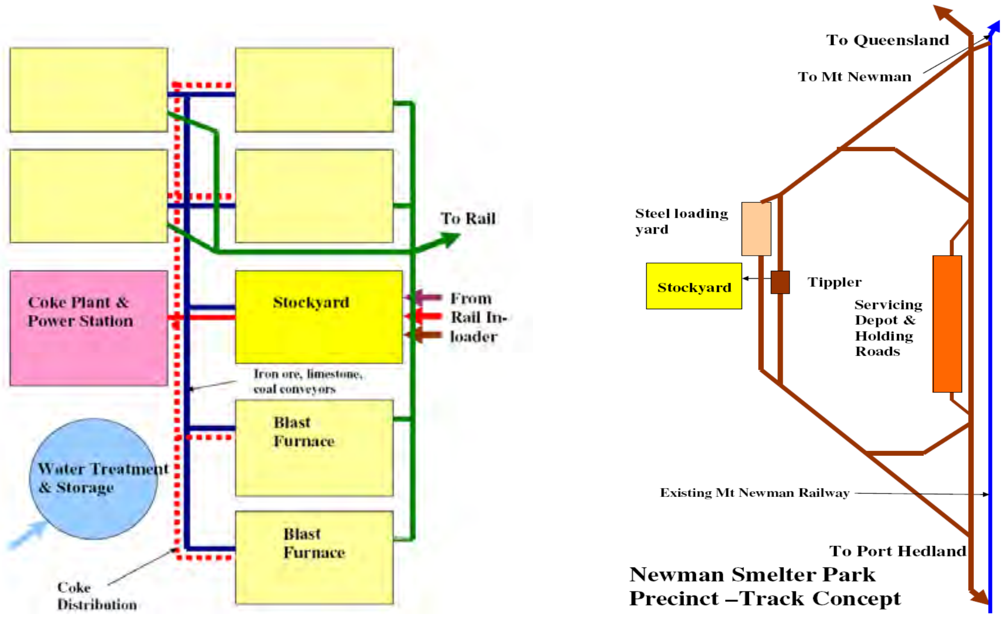

Figure 4.7 Newman Smelter Park – Concept Layouts

4.4 *Port Hedland Steel Handling*

The preliminary operational concept for Port Hedland for the handling of slab/billets provides for a separate short rail spur to a rail unloading and storage yard in the Boodarie area. Road transport will then be used to a dedicated wharf/berth in the Anderson Point area. The concept is notional only at this phase, with no involvement by the Port Hedland Port Authority or Government on the concept planning, or with any competing users for port capacity or land side facilities.

Panamax or Handymax size ships are assumed as adequately meeting shipping requirements for steel slab/billets, with a notional 60,000 tonnes per day throughput needed when all six steel smelters are operating.

Rail deliveries are proposed on 3,100 metre (refer to Appendix AP12) long trains with a payload of 24,000 tonnes (refer to Appendix AR2).

Diesel fuel deliveries to Newman Smelter Park will involve an estimated 2.5 million litres per week, and are proposed via tank wagons attached to a steel train. Diesel fuel storage tanks and rail tanker loading facilities are proposed in the vicinity of the steel handling yard.

An alternative to Port Hedland is the proposed port at Cape Preston, with options subject to a detailed feasibility study and the timing of any development at Cape Preston.

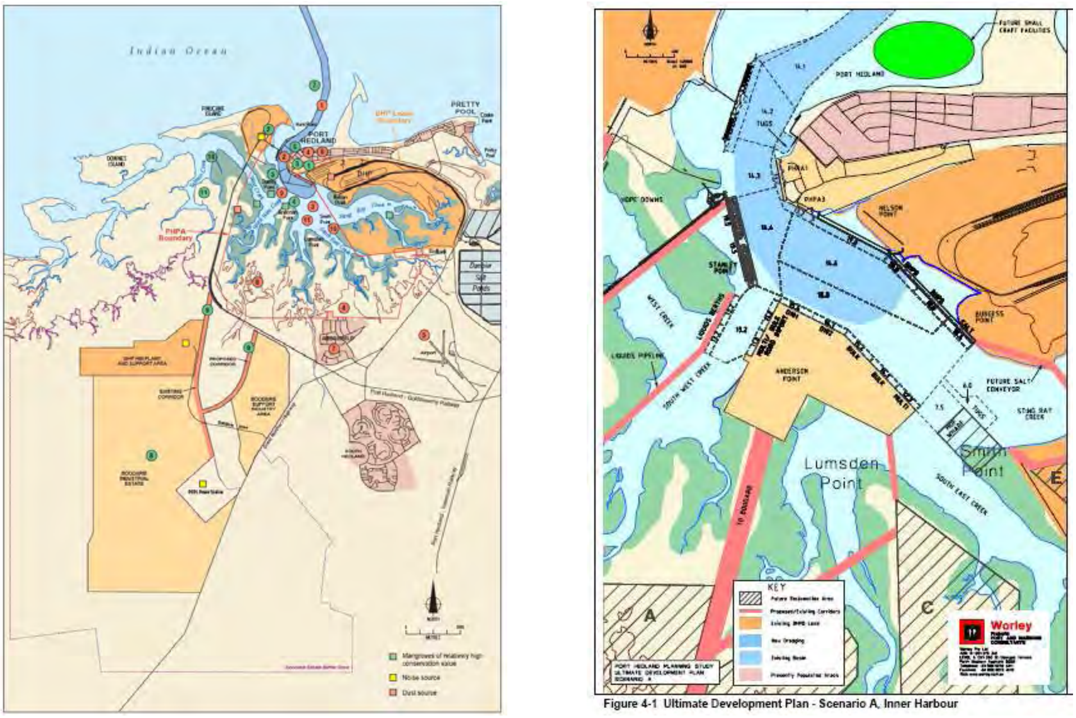

Figure 4.8 Port Hedland

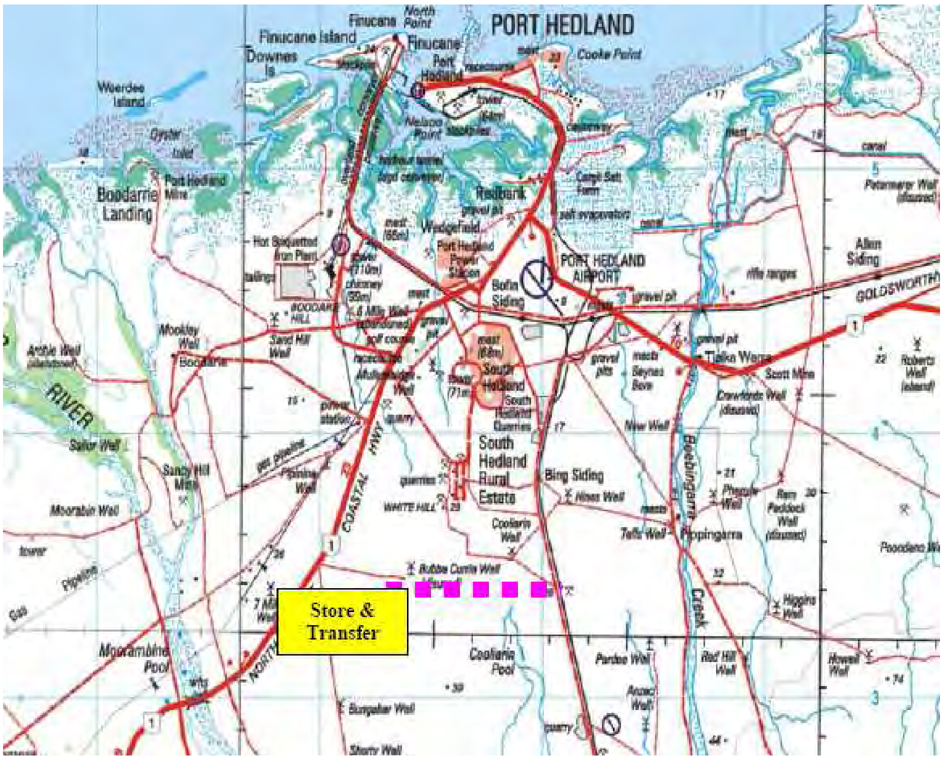

Figure 4.9 Port Hedland - Rail/Road Transfer and Storage Yard

5. Railroad

The East West Line linking the Pilbara iron ore mines with the Bowen Basin coking coal mines and the smelter parks is the fundamental element in the PIB concept and the major fixed cost element. The Pre-Feasibility Study has identified a viable railroad alignment suitable for heavy haul rail operations and developed a comprehensive operations and resourcing plan to meet the phased needs of the smelter parks. This relies on well established and proven railroad technologies and engineering practice in delivering a reliable, low risk logistics outcome for steelmakers. The following sections summarise the results of the detailed studies undertaken to date.

5.1 Rail Alignment

5.1.1 Background and methodology

The target origin/destination for the East West Line is Abbot Point, via the existing narrow gauge Newlands Railroad corridor and its planned extension to near Riverside Mine, then connecting to the existing Mt Newman-Port Hedland Railroad near Poonda Siding, approximately 55km northwest of Newman.

Quantm Pty Ltd, a subsidiary of Trimble Corporation, was engaged to identify viable corridors to stringent heavy haul rail grading and alignment criteria and determine the most efficient corridor alignment. The technology utilised for this initial desk top investigation was Quantm's proprietary alignment design software package. This relies on using available 3-dimensional digital terrain data, topographical data, land use data and other relevant databases, to design viable alignments, compare relative construction costings, and determine the most appropriate alignment/s.

The key rail design criteria for the EWL are:

- maximum grading of 0.5% (one in 200); and
- minimum horizontal curve radius of 3,000 metres.

The overall route length from Riverside to Newman was dissected into 15 overlapping sections to cover the level of data processing and accuracy required, and the top 50 viable alignments were determined and ranked. The Quantm software generated full alignment designs to specified minimum standards, cross-sections, quantity take-offs, and costings for selected quantities and nominated unit rates.

Selected preliminary alignment

The outcome of the Quantm modelling was the determination of alignments that achieve the design criteria, and which are practical and efficient options in terms of overall route length, minimising land use impacts, construction costs, and rail operating costs.

The selected preliminary route option is as indicated on the map below. This route has a number of important features.

The route passes through sparsely populated areas with the predominant land use being for low intensity cattle grazing on very large pastoral properties.

It skirts the upper reaches of the drainage systems in western Queensland, and is located to the south of the normal monsoonal influence, reducing the size of drainage structures and irregular flooding impacts, and providing better foundations and gravel/ballast sources.

It passes close to the settlements of Kynuna in Western Queensland, and Ti Tree, approximately 170km north of Alice Springs on the Adelaide-Darwin Railroad. The towns are both on major highways. The locations are proposed to be utilised as important railroad infrastructure maintenance centres, crew change points, and Ti Tree would be the major intermediate locomotive re-fuelling depot.

Significant river crossings are limited to the Bogie, Broken, and Fortescue Rivers, and the upper reaches of the Diamantina, McKinlay, Hanson and Lander Rivers, and Wokingham Creek.

The bulk of the alignment in the Northern Territory ("NT") and WA traverses low rainfall regions, with poorly or non-defined surface drainage systems to cater for the sporadic major rainfall events. Design issues will be determining an appropriate under-track drainage system and adopting flood-proofing measures at locations where very infrequent track over-topping events may occur.

Virtually the entire route will be subject to Native Title, being predominantly pastoral leasehold or unallocated Crown land. Negotiations with the traditional owners for access will be necessary. The route also passes through Aboriginal Reserves in the NT and WA. Cultural heritage issues may impact on local design outcomes.

Approximately 500 km of the route in WA and the NT passes through arid desert terrain, comprising dunes and gibber plains. This will require particular consideration in respect of sub-ballast design, economical sourcing of suitable gravel base, and long-term track and dune stability.

Overall route length of the EWL from Abbot Point to Newman Smelter Park is approximately 3,370 km. Overall track length, inclusive of crossing loops, terminals, and maintenance sidings, is approximately 3,500 km.

A map showing major Indigenous and Environmental areas is below.

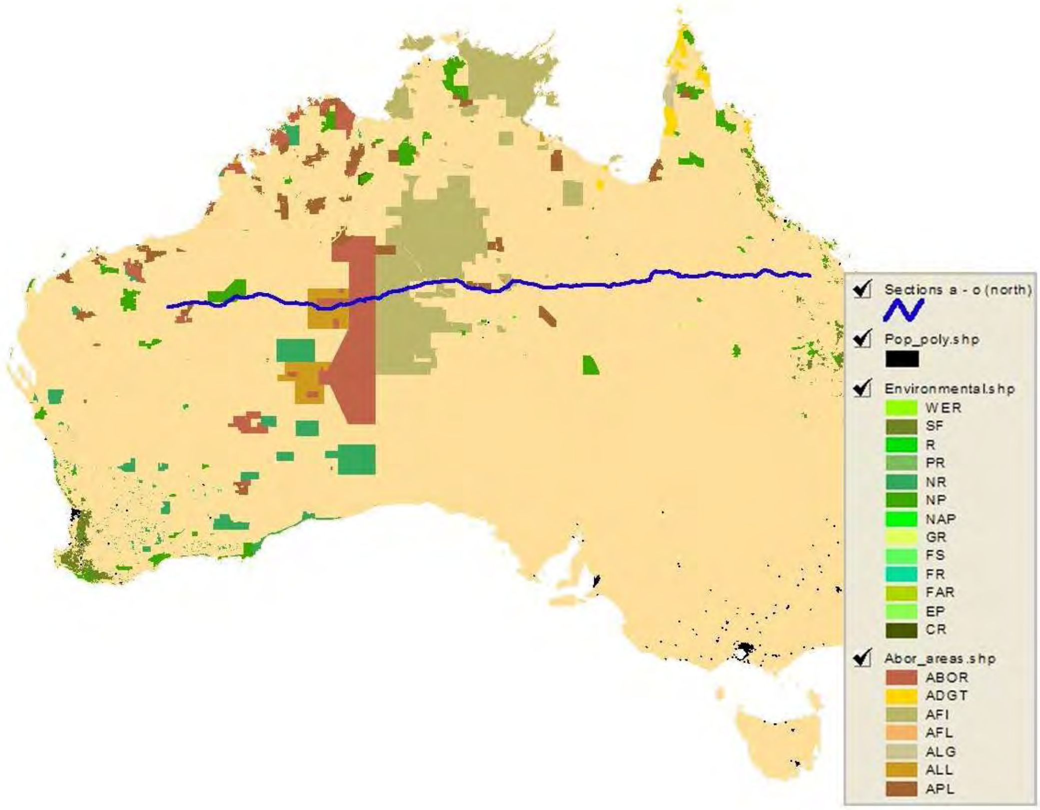

Figure 5.1 Major Indigenous and Environmental Areas

The Quantm report, which is the basis for the planned route, is included as an attachment to this Pre-Feasibility Report. Further, Quantm has produced a fly-over video of the route. This video CD is available as an attachment to this report. It allows close inspection of the full route and provides detailed information about the topography, ownership and use of all lands.

5.2 *Railroad Standards and Implementation*

Preliminary planning provides for the following design standards:

- axle load to 40 tonnes (TAL), but operation will be nominally at approx 34 TAL for iron ore traffic, and 23 TAL for coal (volume constrained);
- rail size 68 kg/m;
- pre-stressed concrete sleepers (at 600mm spacings);
- crushed rock ballast with 250mm depth below sleepers;
- design train is 4 locos (7,000hp AC traction) with 300 wagons; and
- crossing loops to be 3.5km long and each to also include a refuge loop.

Proposed construction methodology is working concurrently on four fronts:

- west from Abbot Point (rail shipped to Abbot Point);

- east from Ti Tree (rail delivered via the Adelaide-Darwin Railroad);
- west from Ti Tree (rail delivered via the Adelaide-Darwin Railroad); and
- east from Newman Smelter Park (rail shipped to Port Hedland and railed to Newman Smelter Park).

Sleeper manufacturing plants and rail welding plants are to be established at the three starting points. Major track materials (rail and concrete sleepers) will be fed by work trains from these starting points to each construction front. Ballast sources will be developed along the route (to minimise transport distances) and trucked to loading sidings for final delivery to track by rail.

Key railroad implementation issues will be:

- resources availability (skilled workers and equipment, particularly the specialist track construction equipment);
- provision and logistics of construction camps, and the quality of services provided in ensuring workforce morale and efficient deployment;
- effective management of local stakeholders and landowner issues and local construction impacts;
- sourcing gravel sub-ballast layer and ballast (to acceptable strength and durability quality standards) along the route (to minimise haulage distances and cost);
- sourcing water for construction;
- supply of rail and pre-stressed concrete sleepers to meet the tight track construction period;
- logistics of construction materials and support, particularly rail, sleepers and ballast, and pre-cast concrete materials;
- local sourcing for concrete in remote areas;
- dealing with flood plain crossings and potentially poor soil conditions;
- economic designing for rare flood events;
- desert crossings;
- remoteness issues (in managing human resources, location of construction camps, response to equipment failures);
- achieving economic production rates and having civil construction (earthworks and structures) keeping well ahead of the tracklaying front on each section;

- equipment reliability; and
- climatic conditions (extreme heat during summer).

Major track materials quantities are (refer to Appendix AR5):

Rail	473,000 tonnes
Concrete sleepers	5,800,000
Ballast	7,660,000 cubic metres
Main line turnouts	78
Siding turnouts	146

5.3 Terminals

Concept layout for the Newman Smelter Park rail terminal is:

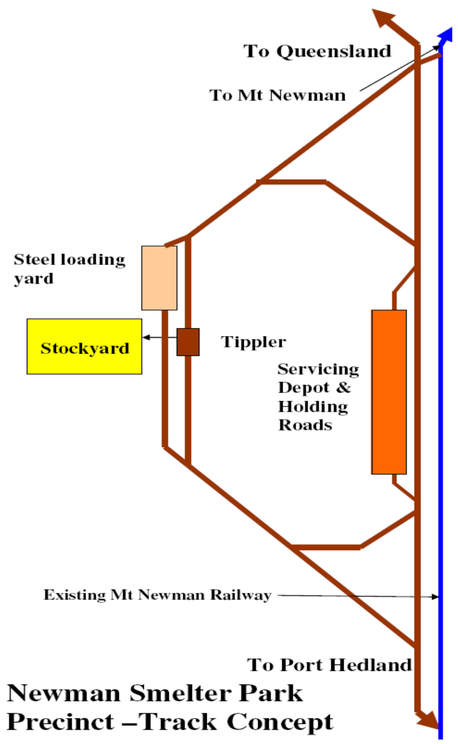

Figure 5.2 Newman Smelter Park Rail Terminal

Details of the concept for the Abbot Point rail balloon loops (separate EWL standard gauge loop and tippler, and the Queensland Rail ("QR") narrow gauge balloon loop and bottom-dump unload station), as well as locations for the EWL rolling stock depots, have yet to be developed. The decisions require the involvement of other stakeholders in the region and other potential industrial users of the area around Abbot Point.

The Moranbah Coal Hub comprises a short QR narrow gauge spur line and balloon loop (electrified) with bottom dump unloading station, feeding the coal stockyard via conveyor and coal stacker. The EWL comprises a single straight-through track with passing loop, with an overhead bin (fed from the stockyard by a reclaimer and conveyor) to load coal on west bound EWL trains.

The Port Hedland Steel Handling Yard is proposed as a 2 km long siding with run-around track, adjacent to a hardstand area for forklift or crane unloading of steel slab for stockpiling or direct loading to truck for delivery to wharf. An additional siding for loading of fuel tankers is also proposed.

5.4 *Railroad Operations*

5.4.1 Planning assumptions

The key operational planning assumptions are as follows.

Locomotives are to proven heavy haul standard, designed for heavy duty, hot and arid conditions, similar to GM's SD70ACe diesel electric AC traction locomotive with extended fuel tank capacity.

Wagons for the main iron ore/coal traffic are low tare, stainless steel bodies, similar to the latest BHP Billiton design but with a 400mm higher wall to provide additional cubic capacity to better balance the coal-iron ore traffic balance.

Design train is 4 locomotives x 300 wagons with distributed power. Train payloads (and gross trailing mass) are:

	Iron ore	**Coal**
Payload/wagon	109 tonnes	65 tonnes
Payload/train	32,700 tonnes	19,500 tonnes
Operating axle load	33.3 tonnes	22.4 tonnes
Gross trailing load	40,050 tonnes	26,850 tonnes

The number of daily train services for the project case of six steel smelters each end is three trains/day each direction (based on 340 days/year operation).

Overall EWL train cycle time is estimated at 124 hours, which includes 16 hours to load and unload (iron ore and coal) and an average running speed of 75kph (excluding crossing delays, crew changes, locomotive provisioning and train inspections).

The steel train from Newman Smelter Park to Port Hedland is 3 locomotives x 200 wagons with a payload of 24,000 tonnes. Short haul delivery of iron ore to the Newman Smelter Park will be in smaller trains comprising two locomotives and 150 wagons.

Train operations provide for maximum 12 hour shifts, with the four shifts between Moranbah Coal Hub to Newman Smelter Park being two person crews (to overcome problems of shift length and remoteness), and the crew for shorter runs between Moranbah and Abbot Point, and Newman to the iron ore mines and Port Hedland being a single person. Crew depots and crew change points would be located at Abbot Point, Moranbah, Kynuna, Ti Tree, mid-point between Ti Tree and Newman, Newman Smelter Park, and Port Hedland.

Train control is based on satellite based voice and data communications from the locomotive (and on track machines) to central control, with computer based travel authority and validation protocols linked to GPS tracking to provide a basic Automatic Train Control system.

Crossing loops will initially be based on maximum three hour section running times (nominal spacing of 210 km) and be equipped with power operated points, remotely activated by the train driver on approach. Sixteen crossing loops are proposed initially to meet the operational flexibility of six steel smelters each end.

Rolling stock servicing depots (for locomotives and wagons) are located at Abbot Point (main depot) and Newman Smelter Park. Locomotive fuelling is undertaken at both terminals and at Ti Tree.

5.4.2 Rolling stock requirements

Train numbers and rolling stock requirements for the Project Case are assessed as (refer to Appendix AR3):

	No. of trains	Locomotives	Tippler wagons	Other wagons
EWL trains	15	69 (*)	4,950 (*)	
Local IO trains	3	6	450	
Steel trains	3	9		630 (*)
Fuel trains	1	1		30
Work trains	2	2		80
Totals		87	5,400	

(*) Includes spares.

Rolling stock specifications will be developed with the major proven suppliers during the detailed feasibility, based on the latest proven technology. Consideration will include fitting all trains with electronic braking to assist train handling, in-cab fuel utilisation efficiency support tools, and on-wagon health monitoring and reporting diagnostics.

Courtesy of EDI Rail & United Group

5.4.3 Infrastructure maintenance

Infrastructure maintenance objectives and resourcing are focussed on maintaining the fixed infrastructure "fit for purpose with high performance reliability" by preventative maintenance and providing the ability to respond quickly to incidents to minimise operational disruptions. Key activities involve:

- condition monitoring (track alignment and rail condition);
- rail grinding;
- tamping and lining to maintain top and line;
- drainage maintenance and vegetation control;
- desert crossing maintenance; and
- maintenance of turnouts, point machines and other electrical/mechanical equipment.

Five infrastructure maintenance depots are proposed to provide geographic coverage along the EWL, plus two high production mobile resurfacing gangs and a separate rail grinding production gang.

5.4.4 Rolling stock servicing and maintenance

Maintenance depots for locomotives and the wagon fleet are proposed near Abbot Point (main depot) and at the Newman Smelter Park. These depots will cater for scheduled periodic inspections, component change-outs and minor repairs. This will include wheel and bogie change-outs, engine replacements, and an underfloor wheel lathe.

Wayside condition monitoring will include wheel bearings (acoustic and/or infra red heat sensors) and wheel flat spot detection, with all rolling stock equipped with electronic tag identification.

5.4.5 Railroad manning levels

Preliminary EWL workforce resourcing requirements are (refer to Appendix AR2):

Function	**Personnel**
Train crew	165
Rolling stock maintenance	150
Infrastructure maintenance	274
Operations and administration	183
Total	**772**

5.4.6 Diesel fuel

Diesel fuel is the greatest single rail operating expense. Total estimated consumption is 450ML per annum. Diesel fuel logistics are:

- re-fuel or top up locomotives at Abbot Point, Ti Tree and Newman with storage depots at each location;
- rail fuel to Newman from Port Hedland;
- rail fuel to Ti Tree via the Adelaide – Darwin Railroad from either Darwin or Adelaide, depending on source (or from Abbot Point); and
- ship fuel into Abbot Point and pipe to storage depot.

5.5 Connectivity to Coal and Iron Ore Mines

5.5.1 Coal mines

Coal deliveries to the Abbot Point Smelter Park and to the Moranbah Coal Hub will be on the QR narrow gauge network, providing access to all coal mines in the Bowen Basin. The EWL rail system will operate totally independently of the QR narrow gauge network.

5.5.2 Iron ore mines

Access to the Pilbara region iron ore mines will be by a combination of existing lines, short connections to link the existing rail networks (the BHP Billiton and Rio Tinto rail systems), and (potentially) short spur lines to connect with new railroads and iron ore mines (e.g., FMG's Christmas Creek mine and rail system).

The linkages from the Mt Newman system to the Rio Tinto rail system and mines at Yandicoogina, West Angelas, Marandoo and Hope Downs, can be achieved with short connections where they intersect or are nearby (from near Yandi and Area C). These connections will provide adequate train refuging for EWL trains and should not adversely impact rail capacity at the upper ends of the various iron ore rail systems.

An issue will be the different wheel rail profile between the two rail systems, and the impact this could have on wheel and rail life for large tonnages and high axle loads. The EWL is proposed to be configured with a similar wheel-rail profile to the BHP Billiton system, as it will be its predominant rail access system. It is considered that the relatively short hauls for the iron ore trains to access the Rio Tinto mines on that rail system, and the conservative axle load proposed (34 TAL), should be acceptable to all stakeholders. This should be confirmed during the Feasibility Study.

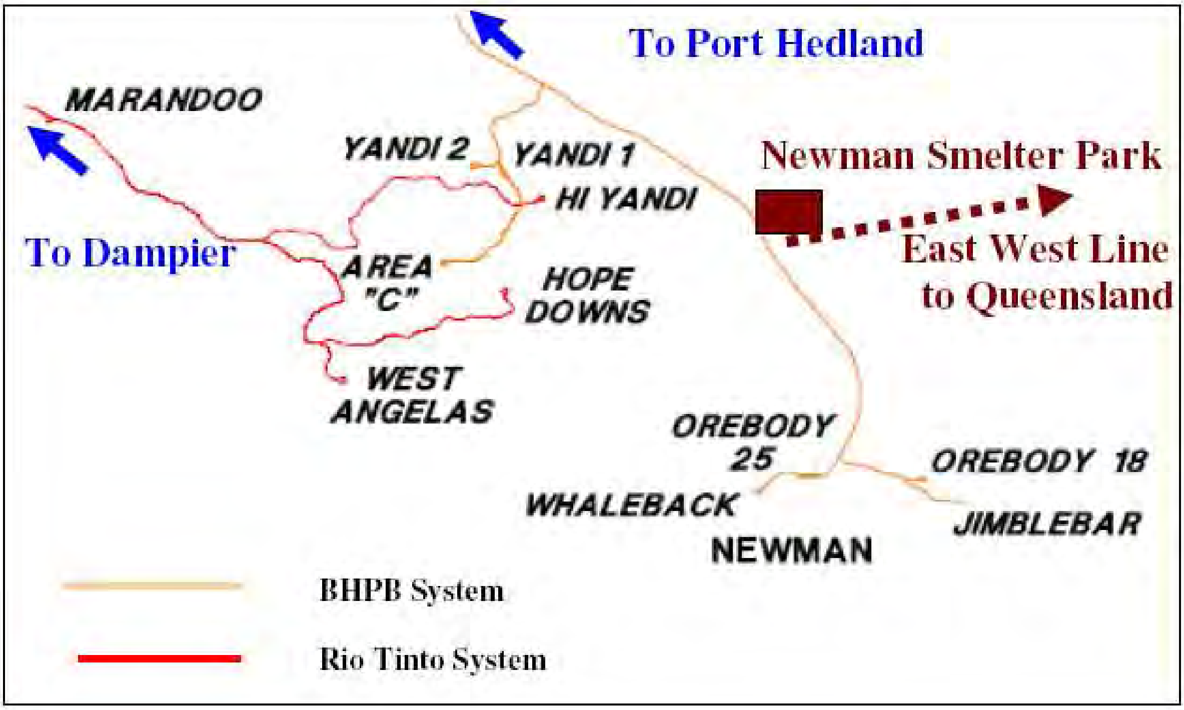

Figure 5.3 Newman Smelter Park Location

5.6 *Conclusions*

Key conclusions to be drawn from this section are as below.

The East West Line linking Abbot Point to Newman is technically feasible, with a very economic route and grading, and minimal impact on existing land uses or the environment.

A highly efficient railroad operation is planned, utilising proven technology and maximising back-loading principles.

The project case of six steel smelters at each end only entails running three EWL trains each way per day, and there is substantial reserve capacity to cheaply service additional steel smelters and lower overall prices for all users.

The rail design and construction is relatively straight forward with the major issue being securing the resources (materials, skilled workers and specialist equipment) to build it in an economical timeframe to suit the start-up of the initial steel smelters.

The railroad and PIB concept provides very good connectivity to the existing and future coal and iron ore mines in the Bowen Basin and Pilbara regions respectively, providing the opportunity for steelmakers to access a number of competitive suppliers of the major steelmaking inputs.

6. Financial Summary

This section reports on the financial analysis that has been conducted during the Pre-Feasibility Study. Summary information is reported on capital expenditure, operating expenditure, revenue requirement and the business outcomes of PIB. Detailed information is provided in the financial spreadsheets that are attachments to this report, including textual descriptions of the mechanics of the spreadsheets. Sensitivity analysis is reported on key assumptions. Then the railroad option is compared to using coastal shipping as the means to transport the raw materials to the smelter precincts. The section begins with a brief description of the analysis conducted.

The most important data for steelmakers evaluating the economics of PIB is the basic financial justification of the project compared to the base case of the existing logistics model of steelmakers importing major raw material inputs and other comparable estimates. This is reported in Section 7 and in many ways is the most important part of this report.

All of the financial analysis supports the economics of PIB as being compelling. Proceeding to the next step of conducting a Feasibility Study of PIB and EWLP is recommended.

6.1 Methodology of the Financial Analysis

A detailed financial model has been developed covering the first 25 years of project implementation and servicing the operation of the Project Case of six 10,000 hot-metal tonnes/day steel smelters in each of the two initial smelter parks. The analysis is then extended to 50 years using the terminal value method. The amounts in the table are expressed in US dollars, as that will be the functional currency of the project, and as at the commencement of implementation.

The financial spreadsheet model (Appendix A) consists of eight worksheets. The main elements of the analysis are the capital expenditure ("capex") and operating expenditure ("opex") data. The analysis separates the railroad from the precincts for steel smelters. The railroad is further separated into above and below rail, as is conventional for railroads. The initial forecasts of capex and opex are largely in Australian dollars as that will be the most common currency of the capital and operating costs incurred. The Australian dollar amounts are then converted into US dollars at the forecasted US$ long-run average exchange rate. Working capital, primarily accounts receivable, inventory requirements and allowances for accounts payable and payroll, is built up in the final year of construction in quarterly increments. The investment in working capital is assumed to be consistent with the average working capital of publicly listed companies in the appropriate industries.

The implementation period is assumed to span four years for the construction of the railroad, completion of the precincts for the first four steel smelters (two at each end of the rail line), and the establishment of the rolling stock of the railroad sufficient to service the production of the first four steel smelters.

Additional rolling stock will be acquired to service the additional steel smelters as they come on line.

The precincts will be constructed in three phases, each involving the construction of two steel smelters at each end of the rail line. Construction of the steel smelters will be undertaken by the owner/operators. That is not a part of PIB or the analysis here. The precincts will be developed so that the steel smelters can also be built and be operational by the completion of the railroad. The second development phase for the precincts will see four additional steel smelters constructed over an 18-24 month period, and the third phase will be the last four steel smelters constructed over an additional 18-24 month period for a total of twelve steel smelters. Although it is considered likely that there will be further development of precincts and steel smelters, that is not included in the analysis here.

The analysis is conducted at the level of the firm rather than only the equity. Therefore, the cost of capital is the Weighted Average Cost of Capital ("WACC"), as is commonly used in practice. As with the currency of the forecasts, the WACC is expressed in US dollars. For purposes of this analysis and report, the firm is assumed to be funded equally with debt and equity. This is considered a conservative assumption as the achievable leverage is almost certainly higher. As the leverage is increased, within prudent limits, the cost of capital will reduce due to the tax deductibility of interest payments, making the project even more financially attractive than is presented here.

Advice has been taken on the forecasted interest rates. During construction, borrowing is expected to be at a premium over the rate on short term US Treasury bills that includes issuance costs. In making this assumption, it was noted that commitments for the funding of the construction project will be in place from the beginning, and its customer base will also be in place. The debt financing of the project after operations commence is assumed to be achievable at a premium over the rate on long-term US Treasury bonds. The rate assumes the use of syndicated loans appropriate for major infrastructure investments with a secure customer base and includes issuance costs.

The equity of the project will be higher risk during the implementation period and then reducing to low risk once operations begin. As with the discussion on the costs of debt capital above, the risks during the construction and operating periods are mitigated by the commitment to full funding and the established customer base. The cost of equity capital is estimated using the Capital Asset Pricing Model, as is accepted practice.

There are two principle outputs of the financial model. The prices that need to be achieved for the rail and precinct services and the value created by PIB for EWLP, which is the net present value of the full project. The financial model has been constructed with the capability to do sensitivity analysis on key input variables as required.

6.2 *Financial Analysis*

The EWLP financial analysis of the PIB case for the works and operations undertaken by EWLP includes the capex of the railroad, the smelter park precincts, the materials handling facilities at Moranbah and Port Hedland and the opex of these facilities. Significant investments will be undertaken by other service providers such as Queensland Rail, Ports Corporation Queensland in its Abbot Point port expansion, and iron ore miners in upgrading their respective rail networks in the Pilbara, and Sunwater in respect of construction of major water supply infrastructure to Abbot Point from the Burdekin Dam. The capex and opex of the associated infrastructure are excluded from the PIB capex and opex. However the project financial analysis does include the estimated service charges associated with these investments and operations by others.

Prices per tonne (US$):	
Below rail	$15.00
Above rail	$13.00
Total rail (of railed tonnes on EWL)	$28.00
Precincts (output/t steel)	$17.00
Investment (US$ millions):	
Below rail	$ 7,041.1
Above rail	$ 1,461.9
Precincts	$ 3,801.0
Working capital (at full production)	$ 40.3
Total investment	$ 12,344.3
Value created in EWLP (US$millions):	
Rail	$1,633.7
Precincts	$1,174.4
Total	$2,810.2
Assumptions (long run):	
Cost of capital from commencement of operations (WACC based on 50% debt)	7.5%
Inflation rate	2.5%
Exchange rate	A$1.00 = US$0.75
Diesel (per litre) Govt Tax Exempt	$0.56

Detail in support of the above data is provided in the spreadsheets included as Appendix A, specifically AF3, AF4, AF5, AF6 and AF7. The spreadsheet analysis allows for conducting sensitivity analysis of key factors, which is discussed in Section 6.6 below.

6.3 *Capital Expenditures*

Capital expenditures are reported in detail in Appendix A, specifically AF1 and AF4, and are summarised as:

Capex Element	**US$M**
EWL Railroad	6,123
Rolling stock	1,271
Moranbah Coal Hub	159
Abbot Point Smelter Park and associated servicing facilities	1,441
Newman Smelter Park and associated facilities plus Port Hedland steel handling	1,705
Contingency provision (15%)	1,605
Total Capex	**12,304**

There will be considerable investment in addition to the direct expenditures by PIB. The capital expenditures for steel smelters, basic oxygen furnaces, coke plant and other supporting processing facilities to be built by steelmakers are expected to ultimately be in excess of US$30 billion. Total investment by state government entities will be of the order of $2 billion (refer to Appendix A for details).

Transport logistics in the Pilbara are fully costed within the above totals, with PIB proposing to own the rolling stock and paying an access fee to the relevant railroad owner where operating 3rd party product on its rail system. This principally applies to BHP Billiton with other parties' iron ore, steel and fuel being hauled on the Mt Newman railroad system.

Direct imported content for the PIB railroad and precinct works (excluding the steel smelters and associated works) is estimated at approximately US$3.1 billion (refer to Appendix AP10).

6.4 *Operating Expenditure*

Total operating expenditures for PIB infrastructure, when all 12 steel smelters are operating, are currently estimated at US$766 million per annum. Major components are labour and energy (primarily diesel fuel). Operating expenditures (excluding capital charges and depreciation) are summarised as (refer to Appendix AF2):

Opex Element	**US$M pa**
EWL Railroad Operations	
Labour (operations and maintenance)	83
Diesel fuel	254
Infrastructure maintenance (excluding labour)	16
Rolling stock maintenance (excluding labour)	65
Other	49
Track access charges and coal haulage by QR	36
Railroad - Total	**503**
Precincts	
Abbot Point Smelter Park (includes port charges for steel exports)	97
Moranbah Coal Hub	14
Newman Smelter Park	113
Port Hedland Steel Handling	39
Precincts - Total	**263**
Total Opex	**766**

Excluded from the above costs are raw water charges delivered to Abbot Point (expected to total A$46m per annum) and any charge applicable for purchasing groundwater allocation for the Newman Smelter Park, and supply of any energy to the steelmakers.

6.5 Revenue Requirements

PIB annual revenue requirements at the full operational phase of the project are currently assessed as:

Revenue Element	US$M pa
Below-rail charges	783
Above-rail charges	679
Precinct services	745
Total Revenue per annum	**2,207**

6.6 Sensitivity

The main drivers that influence the financial performance of the project include:

- required return on assets for PIB;
- construction costs;
- debt servicing costs;
- fuel prices (higher fuel prices favour PIB due to its lower total fuel usage when compared to the current situation for steelmakers importing iron ore and coking coal); and
- shipping rates (particularly given the high volatility of charter rates based on supply and demand fundamentals).

From a steelmakers perspective other key issues include the capital cost differentials between building in Australia and other locations, and future operating costs of the steel smelters.

Items not included in the financial analysis here are any monetary benefits from carbon trading and the sale of surplus energy from the precincts. These advantages are discussed in Section 8.

We have conducted sensitivity analysis on the project case outlined in Section 6.1 above. The key variables in the financial analysis are:

- capex;
- opex;
- cost of capital (WACC);
- exchange rate (AUD – USD); and
- inflation.

The structure of the sensitivity testing is to hold the value created by the project constant and measure the impact of a change in a variable on the prices for rail and precincts. Rail prices include both above and below rail. The prices in the base case are $28.00 per tonne hauled on the EWL for rail and $17.00 per output tonne of steel for precincts. In practice, if these changes eventuated, it is likely that there would be adjustments to both the prices and the return to PIB. The main sensitivity results are shown in the following table.

Factor	Adjustment	Rail	Precinct
Capex - rail	Increase 10%	$29.84	
Capex - precincts	Increase 10%		$17.81
Opex – rail	Increase = 10%	$28.99	
Opex - precincts	Increase = 10%		$17.67
WACC (base = 7.5%)	7%	$26.99	$16.39
	8%	$29.06	$17.65
Exchange rate (base = 0.75)	A$1 = US$0.80	$29.66	$18.01
	A$1 = US$0.70	$26.35	$16.00
Inflation (base = 2.5%)	1.5%	$31.08	$18.87
	3.5%	$25.15	$15.27

In evaluating the sensitivities above, it is important to bear in mind that virtually any of these changes will have similar impacts on other cost structures within the steel industry, including transportation costs. Although we do not extend our analysis to the entire industry, we consider it likely that most of the factors that would lead to the changes modelled here would impact on alternative production and transportation alternatives, such that there may be little or no implications for comparison purposes. As an illustration, an increase in opex as a result of an increase in the price of diesel fuel is likely to enhance the value of PIB as it reduces the total use of diesel fuel relative to alternatives now in place. Also, a change in inflation is likely to have a similar impact on the cost of capital, and the two will tend to be offsetting.

6.7 Comparison of Railway with Coastal Shipping

The genesis of PIB was to provide a far more efficient transport logistics solution to the current trend of hauling very large volumes of raw materials from remote locations to the steelmaking facilities, generally located in the major consuming countries.

This relied on the principles of consolidation of steelmaking raw materials and back-loading in the transportation of these raw materials to maximise the transport intensity. PIB provides the opportunity for semi-finished steel production close to raw material inputs, the unique feature of maximum back-loading on the railway, and consolidation of the major raw inputs of iron ore and coking coal providing a 60% reduction in transport mass prior to the long shipping leg to consuming markets.

The economic advantages of clustering steel smelters in precincts to achieve efficiencies are clear, as are the environmental gains of locating first-stage steel production in Australia rather than bulk shipping coal and iron ore overseas. That leaves the question of whether it is more efficient to transport the commodities to the precincts by rail, as proposed by PIB, or by coastal shipping. At least in principle, it would be possible to develop the precincts and steel smelters as planned with PIB, but use coastal shipping rather than a new railway to transport the coal and iron ore for first-stage processing in Australia.

The coastal shipping alternative requires lower capital investment compared to the continental railway, but the operating costs are commensurately more highly variable. The comparative advantages of the two options are then a matter of economies of scale. The alternatives were assessed for different numbers of steel smelters. The coastal shipping alternative was viable for up to four steel smelters at each end but required an assumption of minimal congestion of rail and port links in Central Queensland and the Pilbara. This assumption is clearly not realistic. The coastal shipping alternative would put considerable additional stress on the both rail and port infrastructure, and substantial additional investment would be required to overcome capacity bottlenecks. In fact, an additional advantage of PIB is that it will reduce the expansion pressure on ports in Western Australia and Queensland. We have not attempted to estimate the additional cost that would be required to accommodate the increased shipping, but it would be significant. Thus, even at four steel smelters at each end, the railway alternative would likely be more economic.

The economics rapidly move in favour of the railway option for six steel smelters or more at each end. In addition, the coastal shipping option does not share the advantages of the railway of considerable spare capacity (exceeding 12 steel smelters each end), which is highly economic, and of being essentially insulated from the export bottlenecks.

The case for coastal shipping is weak at best.

6.8 Summary

The business case for PIB is based on:

- need for additional world steelmaking capacity;
- reduced logistics costs to the steelmakers;
- benefits of co-location and precinct economics, and efficiencies in managing energy inputs/outputs;
- environmental benefits of locating the major steelmaking processes in Australia, close to the major raw material inputs, and installing new capacity based on latest technology and processing efficiencies;
- availability, sustainability and quality of the major raw material inputs in Australia, and the competitiveness of the supply of these resources;
- the large sites available to accommodate the precincts; and
- the stability and low sovereign risks involved in major investments in Australia.

This section puts those advantages into financial terms.

PIB is based upon developing a railroad connecting the coal resources in Queensland with the iron ore resources in WA, precincts at each end of the railroad to accommodate six steel smelters at each end, each producing 10,000 tonnes per day of steel slab for export to hypothetical East Asia coastal rolling mills. The steel smelters are not included in PIB. They will be constructed and operated by steel companies that participate in the project.

The economics of PIB are compelling.

The spreadsheets included in Appendix A provide a range of preliminary evaluations associated with PIB. The analysis is all consistent with significant positive economic impact from PIB as anticipated in the study.

The pre-feasibility investigations indicate substantial advantages to steelmakers on a number of dimensions.

Building a railroad across northern Australia to bring together the coal and iron ore resources is highly efficient. It is far superior to the alternative of using coastal shipping for the transportation. More importantly, the PIB case delivers annual transport logistics saving of US$406 million (refer to Appendix AP4) compared to the current structure where the resources are shipped overseas for first-stage steel production. This is discussed and analysis presented in Section 7. PIB dominates the status quo and will provide substantial cost advantages to the steelmakers that participate.

Although it is not included in this financial analysis of PIB, precinct economics are another source of substantial savings. These savings are driven by achieving high asset utilisation of essential common user infrastructure. The average capital cost of each steel smelter and its share of supporting infrastructure for the PIB case of six steel smelters in each smelter park is estimated at only 60% of that of a "stand-alone" steel smelter (an estimated capital cost saving of US$1.15 billion for each). This is discussed and analysis presented in Section 7.

In addition, to the economic advantages to steelmakers, the environmental advantages are significant. These were mentioned earlier in Section 1. Further, there are a number of potentially substantial economies and advantages of PIB that are not included in the financial analysis here. These are discussed in Section 8.

The financial analysis reported in this section provides strong support for proceeding to the next step of conducting a Feasibility Study of PIB and EWLP.

7. Project Analysis

This section reports on further analysis that has been conducted during the Pre-Feasibility Study. The analysis covers:

- project logistics and break-even analysis of PIB with respect to the number of steel smelters;
- the advantages of scale in developing smelter parks, with common–user facilities and services shared by all steelmakers located in the precincts; and
- a comparison of the PIB Project Case to a Base Case of a coastal East Asia second-stage steel mill.

The economic support for PIB is very significant, as the analysis shows that the cost to deliver slab steel to a coastal East Asia steel mill is reduced by over 30% relative to the benchmark rate as of September 2007.

7.1 Project Logistics and Break-Even Analysis

PIB's economic analysis of its logistics is detailed in Appendix A. The analysis covers only the major material logistics - iron ore, coal and steel slab. Lesser inputs, such as fluxes and other additives used in steelmaking, will have only a secondary impact on the analysis but will be covered in the detailed Feasibility Study.

As an extension of the analysis in Section 6 and Appendix A, the optimal number of steel smelters to locate in precincts was investigated. There are obvious economies of scale, but they are not without limit. The analysis also included sensitivity to the volatile shipping costs.

Key inputs into the analysis are:

Shipping costs. Recent history indicates that market rates are highly variable. A conservative assumption on shipping rates has been adopted.

Rail and port infrastructure costs and prices. Current prices (or costs) have been assessed and adopted. Future prices are expected to increase in real terms as more costly expansion projects are undertaken, existing assets are re-valued, and increasing tonnages lead to increasing congestion and more costly expansion paths.

PIB service charges. The charges applicable for the logistics services provided by PIB are as derived in the financial analysis for the project (refer to Section 6).

Conclusions are:

- Break-even from a cost perspective is between four and five steel smelters in each smelter park. The initially proposed six steel smelters in each smelter park generate substantial annual saving.

- The costs are sensitive to volume on the East West Line, with average rail costs reducing as the tonnages increase, hence increasing the overall logistics savings.

- Key considerations in future shipping rate volatility are basic supply/demand fundamentals, port congestion leading to a continuation of excessive ship queuing, bunker oil prices in a "peak oil" scenario, and the cost of ship building (driven partly by steel prices). A real increase in shipping rates has a significant impact on project viability. As shown in Section 6, higher fuel costs enhance the advantages of PIB.

- The East West Line has the capacity, with relatively minor enhancements, to support at least 24 steel smelters, and perhaps as many as 30.

- The optimal number of steel smelters is related to the number of steel smelters to be co-located in a precinct. The preliminary view is that six to eight steel smelters in a precinct is optimal. This warrants further investigation in the Feasibility Study.

- The cost advantages of expanding to eight steel smelters in a precinct, to a total of 16 smelters, are substantial.

- If the number of steel smelters in a precinct is not more than eight, but the full scope of PIB is to expand to a total of 24 smelters, then developing two precincts at each terminus is optimal. Further investigation of the optimal magnitude of PIB will be undertaken in the Feasibility Study.

- The cost advantages of expansion beyond the basic case of twelve steel smelters are substantial. Although EWLP bases its viability on twelve steel smelters, the potential of PIB is considerably greater.

7.2 Precinct Economics

In addition to the supply-chain logistics benefits, Project Iron Boomerang provides substantial direct and indirect benefits associated with the concentration of steel smelters in purpose designed smelter parks, with a sharing of infrastructure and supporting services by all of the steelmakers in each smelter park.

These precinct benefits include:

- Sharing of input and output materials handling infrastructure outside the steel smelter gate, and the economies of achieving high asset utilisation for this shared infrastructure.

- Sharing of the support services provided in the smelter park, including water supply, water treatment (new and waste water), power supply and reticulation, and the economies of scale in initial capital costs and ongoing operating and maintenance costs.

- Economies of scale of building and operating the supporting industrial plant between each steel smelter, including the coke plant, oxygen plant, and sintering plant.
- Ability to optimise the inputs into the steel smelter to improve efficiency and consistency of slab steel quality, due to location, depth and quality of resources available.
- Maximising the efficiency of energy use in a purpose designed precinct, with co-generation from utilisation of waste heat and volatile gases from the coke making process producing substantial surplus electricity for sale, and potential carbon credits for efficient energy utilisation.
- Shared design and construction costs, including the anticipated commonality of designs and extensive use of modular construction techniques.
- Reduced inventory holding of major material inputs due to much shorter supply lines and potential sharing of inventory.

It can be noted that the precinct benefits are capable of being implemented elsewhere, where sufficient land and other resources may be available, but these would not attract the concurrent benefits of the supply chain inherent with the smelter parks being located adjacent to the major iron ore and coal resources in northern Australia.

7.3 Project Case - Base Case Description

For the purposes of this Pre-Feasibility Study, a simplified analysis has been undertaken to demonstrate the financial benefits of PIB to steelmakers. The PIB case is compared to a representative case for the delivery of slab steel to a coastal East Asia steel mill.

Project Case: The Project Case provides for a total of twelve steel smelters located at the two smelter park precincts - Abbot Point and Newman. Each steel smelter produces 10,000 tonnes/day of steel slab, with the 43.8 million tonnes per annum of steel slab being shipped to the consuming markets in East Asia for finishing and sale. Details of the concept, the precincts and the transport arrangements are provided in earlier sections of this report. The Project Case adopts the assessed East West Line rail charges and the materials handling logistics costs of stockpiling and delivering the iron ore and coal in the precincts to the individual steel mill gate, and the costs of transporting steel slab from each mill to ship (as described in Section 6).

Base Case: The Base Case assumes that equivalent steel slab making capacity, producing a total 43.8 million tonnes per annum of steel slab, are located at various coastal locations in East Asia. The case assumes that these mills would be sourcing their 60% of their iron ore and all of their coal requirements from Australia in the direct comparison of supply chain costs. The remaining 40% of their iron ore is assumed to be sourced from Brazil. The Base Case assumes current transport costs (rail, port, shipping) will be applicable in transporting the design transport task of 65.8 million tonnes per annum of iron ore, and 39.6 million tonnes per annum of coking coal from mines in Australia to steel mills in East Asia. The Base Case likely understates the real future costs, as increasing congestion and resultant costs are likely to become more significant than any further productivity improvements in the supply chain.

Project Iron Boomerang is focussed on future supply chain arrangements and in best meeting the needs of new steelmaking capacity, where greater reliance will be placed by steelmakers on seaborne supply chains. This reliance will be essential as their local sources of iron ore and/or coal become increasingly exhausted, or become uneconomic and of diminishing quality. Locating new steel mills in near-coastal locations to minimise supply chain costs and reduce competition for major internal land transport capacity in major consuming countries, such as China and India, is also expected.

The earliest start-up for producing the first steel slab is in late 2014, given the planning and construction lead-times involved. The financial analysis in this report has been undertaken on “current costs” estimated in 2007 dollars. Future price movements (construction costs, oil, labour costs, shipping rates, exchange rates, etc) would be expected to impact on both the Project Case and the Base Case to varying degrees, and preliminary sensitivity to key inputs has been undertaken and reported in Section 6.

A preliminary quantification of these benefits of the Project Case over the Base Case for 12 steel smelters is provided in the table below.

	Savings	Saving (US$m)	
	(US$ / t)	Per Smelter	12 Smelters
CAPEX Savings			
Shared services	8.30	450	5,400
Smelters - prefabrication of modular construction	5.60	300	3,600
Smelters - standard order construction	7.40	400	4,800
Feasibility Study cost (for 12 smelters)	0.70	40	480
Total Slab tonne CAPEX Savings	22.00	1,190	14,280
OPEX Savings			
Steel smelter efficiency (iron ore quality blend)	34.00	122.4	1,469
Precinct shared services	16.00	57.5	690

Supply chain consolidation	10.60	38.2	458
Sales of surplus energy	5.20	18.6	223
Brazil vs Port Headland for shipping iron ore	15.20	83.5	1,002
Carbon credit trading benefit	4.00	14.5	174
Total Slab tonne OPEX Savings	85.00	335	4,016
Total Slab tonne Savings	**107.00**	**1,525**	**18,296**

The analysis is based upon a number of assumptions including:

- Costs are based upon the fob cost to a second-stage steel mill in coastal East Asia.
- Base Case steel mill is assumed to import 40% of its iron ore from Brazil and the balance from Australia.
- Capex savings per tonne is annualised over the life of the project.
- CO_2 emission savings are 8.7m tonnes per year, and the CO_2 emission trading price is estimated at US$20/tonne of CO_2.
- Bulk supply and service discounts that can be achieved through precinct location have not yet been quantified.

The analysis indicates that PIB will reduce the fob production cost of slab steel for delivery to the representative second-stage steel mill by US$107 per tonne. Based on the September 2007 worl benchmark average for fob slab steel cost of production US$340/mt, the savings are in excess of 30%.

Each steelmaker, and each existing steel mill will have different mixes of current supply chain arrangements, including varying reliance on seaborne traded iron ore and coal, varying existing suppliers (and country/s of origin) of these two major inputs and other resource inputs (including possibly local suppliers), and with mills located at coastal or inland locations.

A detailed spreadsheet identifying these costs savings and the underlying assumptions is included in Appendix A. As an extension to this Pre-Feasibility Study Report, EWLP will provide steelmakers with a model that will permit the Base Case analysis to be altered for different situations. The EWLP project team will be available to assist individual steelmakers to customise this to their own circumstances in helping to better understand the advantages of PIB.

It should be noted that the evaluation has not included the cost of any re-heat of the steel slabs preparatory to further processing or rolling, where such re-heating might not now be required within an integrated steel mill facility.

7.4 *Summary*

The business case for PIB is based on:

- the advantages of locating new efficient, steelmaking capacity in Australia, close to the major world class, price competitive, iron ore and coal resources;
- benefits of co-location and precinct economics, and efficiencies achievable in managing energy inputs/outputs; and
- indicative 30% reduced costs to the steelmakers.

This section puts those advantages into financial terms in comparing the Project Case of locating six steel smelters in each smelter park at Abbot Point and Newman, compared to a Base Case of providing similar production capacity at various East Asian coastal locations.

PIB provides a real supply-chain advantage, with the benefits of consolidation and maximising back-loading justifying the relatively high initial capital cost of a new transcontinental railroad linking the major ore bodies and the smelter parks in the Pilbara and the Bowen Basin. The economics of the railway are driven by volume, and the break-even point is about four steel smelters at each end. Additional steel smelters will reduce the overall transport costs for all users, and the rail link has substantial reserve capacity.

However the precinct economics provides a very compelling justification for the PIB concept. This arises from the advantages from utilising shared services, the economies of scale achieved in the smelter parks with six or more steel smelters, and the production efficiencies and sustainable quality inputs and outputs from locating the smelter parks near the quality major resource inputs.

The net benefit to steelmakers is estimated at approximately US$107/tonne of steel slab. This benefit will increase with additional steel smelters (and further economy of scale), but the actual quantum will vary for individual steelmakers depending on their own circumstances.

The reduction in initial capital cost for each steel smelter is estimated at over US$1 billion, compared to a stand-alone OECD location facility as a result of sharing on services, prefabrication and modular construction, and the economies of building twelve similar smelters. The proposed extensive use of standardised design, maximising the use of prefabricated and modular construction, and assembly line construction processes possible with the staged construction of the twelve steel smelters, should more than offset the additional construction labour rates in Australia compared to alternative sites, and the increased costs due to relative remoteness, particularly the Newman Smelter Park.

The Project analysis reported in this section provides strong support for proceeding to the next step of conducting a Feasibility Study of PIB and EWLP.

8. Additional Economic Advantages

Project Iron Boomerang has advantages beyond those that provide the basis for the financial analysis included in this Pre-Feasibility Study Report. These include the option of expanding the project beyond six steel smelters at each end of the railroad, environmental benefits and carbon credits and the ancillary infrastructure investments that will arise with the commencement of PIB.

8.1 Expansion of Precincts

This report assumes six smelters at each end, each producing 10,000 tonnes per day of steel slab for export. There will also be supporting infrastructure in each smelter park. The scope and costings of PIB are based on this minimum scheme. In Section 7 the Project Case was compared to a Base Case of building new coastal steel mills in East Asia that rely on imported iron ore and coal. The comparison assumed the finishing rolling mills were located close to the consuming markets. This comparison shows that steelmakers producing in PIB will reduce the fob cost of slab steel by US$107/tonne compared to the Base Case of the current structure. With this level of advantage it is likely that there will be demand for expansion beyond the Project Case. Further development should provide lower prices to steelmakers, as well as the other major global environmental and resource sustainability benefits. Development of precincts beyond the Project Case is considered in this section.

The economics of the PIB concept and the major fixed infrastructure costs of the East West Line are driven by volume. The EWL has substantial reserve capacity, with only three loaded trains operating per day in each direction for the Project Case. The EWL capacity should be at least 24 steel smelters and perhaps 30 or more. Additional rail activity would be at low marginal costs. Further increases in scale of production only reinforce the overall financial benefits of the project, with lower unit costs of the supply chain.

All the opportunities below would add positively to the overall value proposition of PIB.

8.1.1 More than six smelters per precinct

The two smelter parks could be expanded beyond six steel smelters each. This will substantially improve economies of scale of the precincts, supporting infrastructure and the railroad, but may be constrained by the environmental footprint of each precinct and possible water limitations at the Newman Smelter Park.

The transport savings for the Project Case of six steel smelters in each precinct was assessed as US$406 million per annum (refer to Appendix AP4). The additional transport savings of additional steel smelters in excess of the Project Case in each precinct, are estimated at US$600 million per annum (refer to Appendix AP4) for seven steel smelters in each precinct and US$830 million per annum (refer to Appendix AP4) for eight steel smelters in each precinct.

The analysis is based on conservative estimates of future shipping rates and fuel prices. An increase in shipping rates improves the overall project viability.

Note that this analysis of potential savings only includes transport savings. Further savings will be realised from reduced average costs of the precincts and steel smelters.

8.1.2 More than one precinct at each end

An expansion alternative is to develop additional precincts, which would likely be one at each end and potentially with six or more smelters per precinct. Second smelter parks at each end could be located near Moranbah in Queensland (utilising the EWL and Abbot Point for slab steel exports), and near Port Hedland or Cape Preston in WA (subject to the availability of sufficient water and ultimate port capacity at Port Hedland).

Additional smelters will provide even greater economies of scale than in the Project Case. As the expansion will require the development of new precincts, and the associated infrastructure, we conservatively assume no further savings at the precinct level on a cost per tonne basis. However, an expansion of the steel slab making capacity to 24 steel smelters will permit a substantial reduction in the overall rail charges.

The expansion will require additional rolling stock and some expansion of servicing depots, but the below-rail upgrade essentially involves construction of additional passing loops only, plus a more extensive track maintenance regime. Preliminary estimates indicate a reduction in the rail costs for all users by approximately 30%, or an US$8.00/tonne reduction for a collective project additional continental freight saving of US$848 or US$35m p/a for each PIB steel mill (refer to Appendix AP4). This will be evaluated more fully during the Feasibility Study.

Further more, with the expected additional generated commercial freight demands stemming from the expected developments of many inland mines, the above additional freight savings are expected to duplicate and further reduce PIB rail operating and service costs and enhance the PIB investor net returns.

8.2 Related developments within precincts

The precincts are very large industrial parks with the basic infrastructure in place. Power, water and roads will be developed as part of the precinct development. This creates opportunities for complementary industries to locate in the smelter parks.

A key consideration in the precinct planning is to maximise the energy efficiency of the steelmaking process. A large power co-generation plant is proposed as an integral element of the coke production process, using surplus heat and burning the released volatiles to produce electricity for internal precinct use, and for export to external users. Refer to the attached report from

Hill Michael Associates Consulting "Pre-Feasibility Evaluation and Strategic Comment – Energy" in respect of energy related aspects of each precinct. Opportunities exist within both Queensland and WA to value-add from efficient utilisation of surplus heat and volatile gases for sale of electricity for base load use, and to replace existing high cost gas or diesel fired electricity generation in the Pilbara.

A particular attraction in the Pilbara will be providing base load power for the production and beneficiation of iron ores. Other industries that are high energy users may be attracted to the precincts to take advantage of surplus energy generation. An immediate related major industry prospect is with the production of cement from the steel mill slag waste and with the related co-gen use of the precincts heats offering energy and CO_2 savings of over 50% against standard operating process plants.

The expansion of the precincts to accommodate such businesses would have low marginal cost and would generate additional revenue to the precincts. This would reduce the charges to the steel smelter operators.

8.3 Environment and Carbon Credits

In addition to the economic advantages to steelmakers, the environmental advantages are significant. These were discussed in Section 1. There is an economic perspective on these advantages.

Global warming has become a major international issue with scientific, economic and political dimensions. The United Nations Intergovernmental Panel on Climate Change ("IPCC") has issued a series of reports on global warming and climate change. The Kyoto Protocol was established in 1997 and has now ratified by over 170 countries including Australia in 2008. The objective of the protocol is to reduce the greenhouse gas emissions that are believed to cause climate change.

Carbon credits are a part of an international emissions trading scheme; a way of moving the control of greenhouse gases into markets. The credits provide a way to reduce greenhouse effect emissions by having the market for carbon credits determine a price for trading on an industrial scale. Credits can be exchanged between businesses or bought and sold in international markets at the price set by the market. The credits can be used to finance carbon reduction arrangements between trading partners.

At this point, we are not able to evaluate the impact of carbon credits on EWLP, but it is clearly an issue to be investigated during the Feasibility Study. We believe it has the potential to enhance the interest in the project as well as to possibly provide another revenue source for EWLP.

8.4 Infrastructure Support Investments

A feature of PIB is the substantial investment that will be required in supporting infrastructure. This includes power, water and other services. These developments are not incorporated within PIB. We assume that they will be provided by independent companies who will then charge PIB and the steel smelter operators for their services. The charges that we expect to be imposed upon PIB are included in our analysis. Charges for these services that are imposed directly on the steel smelter operators are not included in our analysis.

We have discussed these infrastructure projects with people in the related industries as well as with engineering and finance companies. We understand that the projects are not unique or complex. Construction should be relatively conventional, particularly when compared to the construction of the railroad across the continent.

We expect there will be considerable interest in funding these investments. Infrastructure investments attract interest internationally. These investments will have distinct advantages over most infrastructure investments as the customer base is clear and demand is predictable. These will be relatively low risk investments.

We consider it important for EWLP to maintain control of these ancillary developments. Steelmakers will be the owners of PIB and the users of the services from the infrastructure. We anticipate EWLP being very involved in the awarding of contracts with respect to the whole range of infrastructure investments. It is likely that EWLP will realise income from the developments, but that possibility is not included in the financial analysis reported in Section 6.

8.5 Enhancement of Iron Ore and Coal Reserves

The railroad will pass close by many known resource deposits that have not previously been economical to mine. We expect that there will be mines open once the access through PIB is established. It will also provide the opportunity to effectively use cheaper lower grade iron ore reserves without the added transport penalty involved in exporting these ores to overseas smelters. Indicative known resource deposits are identified at Appendix F.

We anticipate there will also be additional traffic on the railroad linked to feed stocks into the smelters (e.g., from limestone quarries and a manganese mine) or from other non-PIB related mineral deposits or resource industries along the route. Any additional rail traffic generated on the EWL will contribute to improving the overall financial outcomes for EWLP or to reduced charges to the steelmakers.

Linking the iron ore railroads in the Pilbara (Hamersley, Newman and the FMG railroads) is another interesting concept that would deliver opportunity and alternatives to the owners of these railroads and their current customer base, as well as the large customer base represented by steelmakers involved in PIB. For purposes of the Pre-Feasibility Study, we have assumed direct linkage to the Newman rail systems (and use of this system on a third party rail operator basis) and connections to the Hammersley rail system and mines, it is important to note that the use of any of these rail systems is not essential for the success of PIB.

8.6 Summary

In the previous sections, we show that PIB is expected to reduce the cost of a metric tonne of slab steel by US$107 for the average case of delivering the slab to an East Asia steel mill for second-stage processing. In this section, we discuss a number of additional economic and environmental advantages of PIB.

The Project Case for PIB is for six steel smelters in a precinct at each end of the railroad. However, the capacity of the railroad will be considerably in excess of what is required to deliver the iron ore and coal to the 12 steel smelters. The capacity is sufficient to service at least 24 steel smelters, and perhaps 30 or more. We provide estimates of the impact of expanding the number of steel smelters.

If the number of steel smelters is increased on each of the two precincts from six to eight, the transport logistics savings more than doubles from US$406 million per annum to US$830 million per annum (refer to Appendix AP4). This results from economies of scale in transport logistics. Additional economies of scale savings would be expected for the steelmakers within the precincts.

An alternative for expansion is to develop a new precinct at each end of the railroad, with six steel smelters in each. Although there are likely to be savings realised in establishing the precincts and in the above rail capex and opex, we focus on the additional savings that could result from the below rail. The capex and opex would be low for below rail. Our preliminary estimates indicate a reduction in the rail costs for all users of US$8.00/tonne (refer to Appendix AP4).

The development of the railroad and precincts creates opportunities for complementary industries to locate in the smelter parks. In planning the precinct, a key consideration is to maximise the energy efficiency of the steelmaking process. There appears to be opportunity for substantial savings through utilisation and sale of surplus co-gen related secondary and tertiary heats. The expansion of the precincts to accommodate synergistic businesses would have low marginal cost and would generate additional revenue to the precincts. This would reduce the charges to the steel smelter operators.

There are significant environmental advantages to PIB, which were discussed in Section 1. There is also an economic perspective on the advantages through carbon credit trading. This will be explored further in the Feasibility Study.

Substantial investment will be required in the supporting infrastructure for PIB such as power, water and other services. These capex developments are not incorporated within PIB but will be provided by independent companies who will then charge for their services. EWLP intends to maintain control of these infrastructure developments and considers it likely that that it will realise income from them.

A spin-off consequence of establishing EWL is that it will provide access to numerous deposits of iron ore and coal that have not previously been cost efficient to mine. This will provide windfall benefit to the miners and additional traffic on the railroad. The additional rail traffic generated will improve the overall financial outcomes for PIB and/or reduce rail charges to the steelmakers.

There are many dimensions to PIB, and this section has discussed a few of the more significant ones that are not included in the financial analysis presented in Section 6. The magnitude of these considerations is expected to provide further advantages to the steelmakers that participate in PIB.

9. Government Regulatory Approvals, Environmental Approvals and Land Acquisition

This section provides an overview of the environmental challenges faced by the project and the approach that will be followed during the Feasibility Study to address these issues. It also addresses the rail corridor and smelter park land acquisition process, and the other requisite Governmental regulatory approvals and policy settings needed to bring the project to fruition.

Key government related issues involved with the project include:

- planning and environmental approvals;
- land acquisition;
- project business environment; and
- government support services.

There are four Australian governments involved (Commonwealth, Queensland, WA and the Northern Territory) as well as numerous Local Authorities, Statutory Agencies, and Aboriginal Land Councils. In addition, the very large scale and global nature of the project will involve other national Governments in terms of trade matters, investment and global environmental outcomes.

PIB entails major capital investments in the railroad and steel smelters by foreign owned companies, as well as in the long-term operation of these industrial plants, primarily as value-adding to basic major resource exports. Critical to attracting this investment and to the project proceeding are the obtaining of the various government approvals and having in place the appropriate business policy settings to provide maximum certainty over the project life cycle.

Facilitation of regulatory approvals will be coordinated by obtaining:

- approved Major Project Facilitation (“MPF”) status from the Prime Minister’s Department and the Commonwealth Minister for Infrastructure, Transport, Regional Development and Local Government;
- approved ‘significant project’ status from the Queensland Coordinator General; and
- approved ‘major project’ status from the WA and Northern Territory Ministers for Industry and Resources.

PIB will promote the establishment of a Steering Group comprising senior representation from each of the four governments to facilitate overall planning, environmental and other approvals, and interfacing with PIB and the individual steelmakers and associated entities involved.

9.1 Globally Responsible Approach to the Environment

Actions in governance, planning and managing PIB and its impact on the environment, will be guided by its values of building community and engaging in best environmental practices as core aspects of bringing benefit to its local, national and global stakeholders. PIB will conduct itself and report its actions in a manner prescribed by the Global Compact Sustainability Reporting Guidelines of the Global Reporting Initiative (GRI). These guidelines include:

- Assessing sustainability performance with respect to laws, norms, codes, performance standards, and voluntary initiatives. Environmental laws will be regarded as the minimum standard, with international best practice standards used as a guideline to continually improve our performance and set new national and global standards for environmental outcomes;

- Creating a continuous platform for dialogue with stakeholders concerning expectations for responsibility and performance;

- Understanding the impacts (positive and negative) that the project can have on sustainable development; and

- Comparing our performance against industry norms and those of our partnering organisations over time to inform our decisions.

9.2 Project Planning and Environmental Approvals

Preliminary planning has identified the key smelter park sites near Newman and at Abbot Point as best meeting the range of criteria covering matters such as environmental outcomes, site availability, water availability and logistics outcomes; however the sheer scale of the industrial activity proposed demands far more extensive evaluation of impacts and amelioration measures.

The rail corridor preliminary planning by PIB and Quantm has involved an initial desk top evaluation of land-use and environmental impacts to determine the most viable corridors meeting rail design criteria. The initial study has identified a rail corridor that will avoid known protected areas and minimise unwanted environmental, social and cultural impacts. These will be confirmed in the Feasibility Study.

PIB will trigger consideration and require planning approvals under an extensive range of Commonwealth, State and Territory legislation covering environmental protection, land use, resources use and sustainability, transport, cultural heritage and Native Title.

An Environmental Impact Statement (“EIS”) is mandatory, responding to an approved Terms of Reference, which will be subject to prior consultation with advisory agencies. The EIS will address the impacts and proposed management and amelioration measures on the natural environment, existing land uses, infrastructure, and communities, cultural heritage, and social and economic impacts. This EIS is proposed to address the impact of the proposed railroad and the smelter parks, including industrial developments in the smelter parks.

The Governments involved will be requested to follow similar procedures used to establish the environmental impact for the implementation of the Darwin - Alice Springs rail line. This precedent included:

- Establishing an overall Framework Agreement with Governments and Land councils;
- Sacred site clearance and long-term railroad corridor leases were negotiated within this framework with all affected parties including Aboriginal Land Trusts and Communities;
- Access rights were negotiated by Governments involved (Northern Territory, South Australia, and Commonwealth);
- Upon completed negotiations, conditional access rights were handed over to the consortium that owned and operated the line; and
- Environmental issues were identified and resolved.

9.2.1 Environmental approvals

Environmental approvals will include consideration under the Commonwealth Environment Protection and Biodiversity Act, 1999 ("EPBC Act") and various state legislation and regulations relating to the natural environment, wildlife conservation, water, air and land conservation. Major local environmental considerations anticipated include the following.

Smelter park precincts and adjoining areas

- Water availability, water treatment, handling process water (collection, treatment and re-use), and managing stormwater flows. The Abbot Point site is particularly sensitive, given its proximity to the Caley Valley Wetlands and the Great Barrier Reef waters. Total retention of all water used and stormwater runoff is proposed in response to these particular issues.
- Clean air provisions (note that both initial smelter park locations are remote from existing residential areas).
- Dealing with solid process wastes.
- Local transport management issues (road, rail, port).
- Housing and community infrastructure for the substantial construction workforces and permanent workforces.

East West Line Railroad

- Implementation activities, including sourcing of water for construction, construction access to the railroad on local roads, and impacts of the transitory construction camps.

- There is a need to minimise any impacts on waterways, natural vegetation, fragile semi-arid areas and existing National Parks or conservation areas (given the possible proximity to implementation activities).

- On-going operational issues include noise, responding to spillage (from derailments, diesel fuelling), pollution control at the rail depots, and corridor land management practices (vegetation control, waterway management).

- There is extensive practical experience in constructing and managing similar heavy haul railroads in Australia to satisfy environmental concerns.

Other associated infrastructure and environmental concerns include the following.

- **Northern Missing Rail Link** (by Queensland Rail) – EIS has been completed (2006) and conditions of approval notified. Land is currently being acquired (by negotiated agreement with existing landowners). QR is awaiting commercial decision and commitment by coal miners to use the link, to proceed to construction.

- **Abbot Point Port Works** (by Queensland Ports Corporation) – will require EIS and environmental approvals. Issues are considered manageable with some impact likely on existing sea grasses.

- **Burdekin Dam Raising and "Water for Bowen" Channel** (by Sunwater) – will require EIS and environmental approvals. Limited issues are anticipated.

- **Moranbah Coal Hub** (by EWLP) and spur line by QR – expect minimal issues with activity similar to existing coal mine supporting infrastructure in the region.

- **Port Hedland Steel Handling Yard and Wharf** (by EWLP) – to include in overall project EIS. Concept is compatible with current Port Hedland Port Authority strategic planning.

9.2.2 Approvals process

The EIS approvals process is shown in Figure 9.1 below.

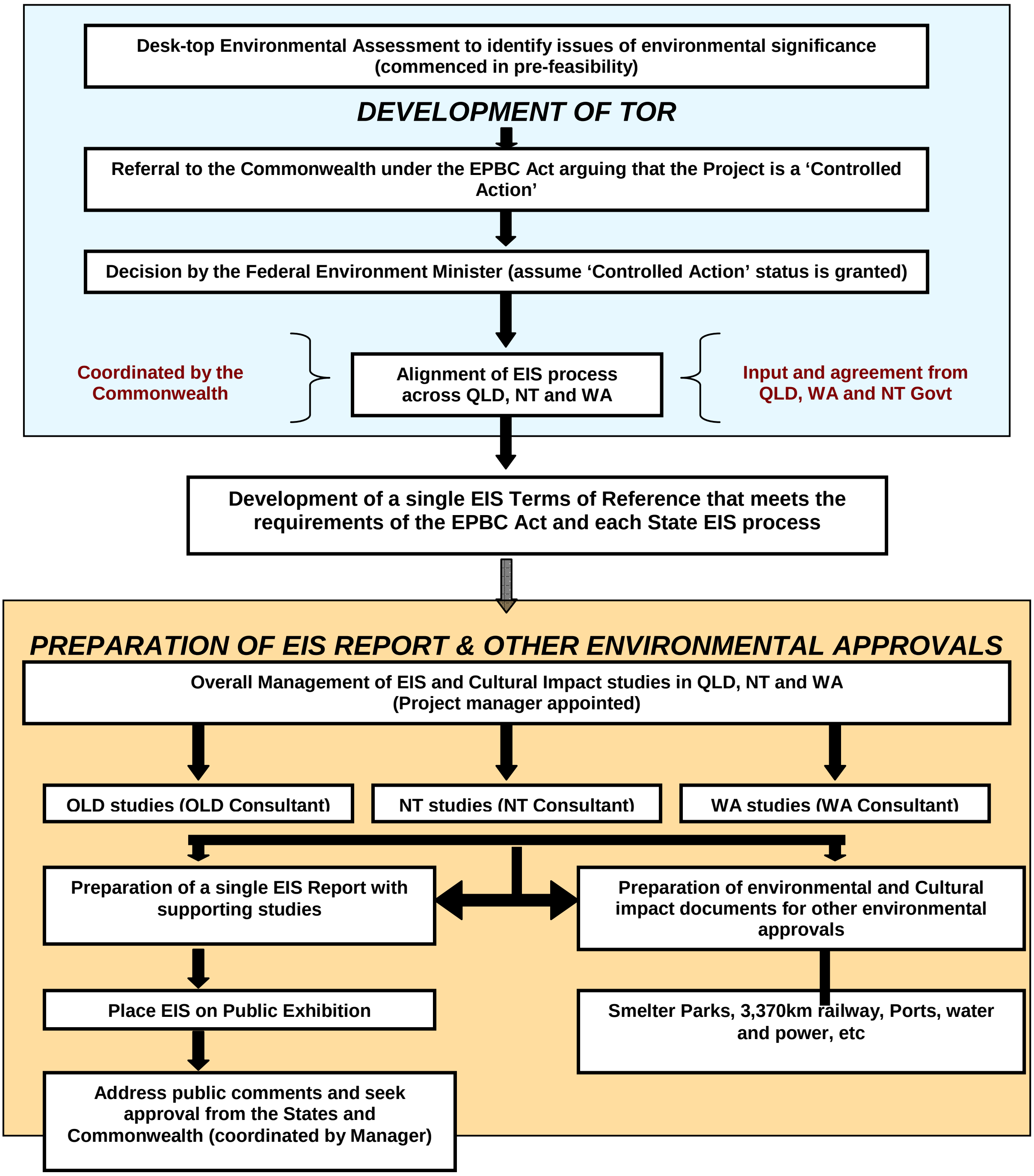

Figure 9.1 EIS Approval Process

(Courtesy of AustralAsian Resource Consultants)

9.3 Land Acquisition

9.3.1 Smelter park precincts

The land tenure and acquisition process for the smelter park precincts will be subject to negotiation and agreement with the Queensland, Northern Territory and WA Governments. A long-term lease (99 year plus), or freehold title in favour of PIB as the smelter park owner and operator of common-user facilities, is planned. The Queensland Government has recently acquired a large site at Abbot Point and designated it as a State Development Area (refer to Appendix G). We will request from Western Australian Government that the Newman Smelter Park Precinct be accommodated in a similar area.

9.3.2 Rail corridor and associated facilities.

Land acquisition for the rail corridor will be subject to negotiation with the Queensland, WA, and Northern Territory Governments, as part of the EIS and planning approval process, with all Governments exercising their compulsory acquisition powers to secure the corridor land. We expect that the rail corridor would then be leased to PIB as the nominated rail manager under existing legislative provisions. Long-term leases (99 years plus) are proposed.

9.3.3 Native title and cultural heritage

The bulk of the rail corridor land and the Newman Smelter Park Precinct are existing lease hold, vacant crown land, or Aboriginal reserve, and subject to native title considerations under the Native Title Act 1993 and relevant state legislation.

A fully inclusive process of consultation and negotiation with the traditional owners of the land, assisted by each of the Governments, is proposed to facilitate agreement on the rail corridor and precinct lands. Recent major mining and infrastructure projects in northern Australia have been able to progress more quickly when the key stakeholders are included in the negotiations from the beginning, and their historical traditions and roots are recognised. In order to minimise delays, negotiations with traditional land owners and others on land access rights will commence in parallel with environmental assessments.

The aims of these negotiations with traditional owners will be to create long-term benefits that will positively impact on current and future generations. Extensive opportunities will be provided to local indigenous communities, including training, to maximise employment opportunities during the implementation phase and importantly in the long-term operations phase.

9.4 Other Regulatory and Policy Settings

9.4.1 Competition regulation

The railroad and smelter park precincts are essentially private sector commercial business entities, with the fundamental business model preventing monopoly control or abuse of market power. PIB requires that the railroad not be "declared" under National Competition Policy and the Trade Practices Act and not be subject to 3rd party operators having access rights.

Whilst the business will not be regulated, PIB is keen to generate additional rail business where commercially viable and where it does not compromise the valid business (and safety) interests of PIB. This particularly applies to further mining developments that may utilise the EWL, and opportunities will be actively pursued on a fully commercial basis.

Foreign investment

The project and business model involves major investment by foreign owned steelmakers in the PIB and in their own smelters and supporting industry. Foreign Investment Review Board approval of this investment is required for the project to proceed. Such individual (steel mills etc.) approvals while supported by PIB within the master project will need to be sought individually by each foreign owned company participating in the project.

Tariff concessions

In Australia

The project will involve major procurement of equipment and processing plant that cannot be supplied by Australian suppliers (due to scale and technology). The biggest single threat to the project viability is the much higher construction and fabrication costs in Australia, compared to Asian and South American competitors in particular. This will be coupled with the skilled labour limitations in Australia due to the current resources boom, and the relative remoteness of the major construction sites at Abbot Point and Newman.

Maximum tariff concessions and/or enhanced By-Law Scheme covering the imported materials, equipment and prefabricated pre-assembly modules is essential to minimise any competitive disadvantage.

In Home Countries

A key element of the project is the capturing of the value–add in processing of major steelmaking raw materials in Australia by the world's major steelmakers, and for their importing of this semi-finished material into their home countries (or elsewhere) for further processing and consumption. The removal of any discriminatory import duties or tariffs on these imports that may detract from the project's viability would be important and a subject for negotiation between the Australian and respective home countries' governments.

Sponsored migration and temporary workers schemes

The project requires large construction workforces for an extended duration of up to eight years, with an estimated 8,000 – 10,000 direct workers at both Bowen and Newman, plus approximately 4,000 transitory workers to build the railroad, and smaller workforces to build infrastructure near Moranbah and at Port Hedland. Following current policy and practices, five-year working visas will be sought for needed skilled workers from overseas.

On-going operation of the steel smelters will involve a permanent workforce of 2,000 – 3,000 workers, requiring specialist skills based on the parent companies' steelmaking skills, to be located in both Bowen and Newman. A flexible arrangement as to manning by the steelmakers is proposed, involving rotation from their parent workforces.

Community Infrastructure and Government Trading Corporation Services

The project will require significant community infrastructure in regional centres, particularly at Bowen and Newman, with lesser requirements at a number of other support centres, to support the large construction workforce and permanent employees. Major investment by Government Owned Trading Corporations will also be required to meet the requirements of the project.

Support from Government in the timely provision of essential services to support the local communities and Local Authorities is required. This includes availability of developed sites for housing, water supply and sewage, roads, power, telecommunications, schools, and so on.

Whilst the arrangements with the Government Owned Trading Corporations are proposed on a fully commercial basis, support from government stakeholders in approving the timely provision of this essential supporting infrastructure is required.

9.5 Conclusions

Whilst the project is extremely large and challenging, similar project elements including railroads, ports, major industrial developments and minerals processing plants, have been approved and built in WA, Queensland and the Northern Territory, and the established regulatory approvals processes, including inter-jurisdictional cooperation, are proven.

Potentially major environmental impacts will be associated with the smelter parks, and the concentration of industrial activity in these areas. Key concerns will be on water consumption and on effective management of process water quality and emissions.

Land acquisition will rely on the compulsory acquisition powers of the respective Governments. Early full inclusion of traditional land owners in the process, and the maximising of opportunities for indigenous communities to derive long-term sustainable employment opportunities in the project, will facilitate the land acquisition process.

The project credentials for positive global environmental outcomes and major investment and regional job creation, should ensure strong bi-partisan support for the project from all levels of government in Australia.

10. Project Implementation

EWLP has been set-up to develop and imp1ement Project Iron Boomerang. EWLP proposes to progress the project in five phases in accordance with the timelines and budgets used in the financial forecasts. It has developed a functional organizational structure which provides the corporate governance, strategies and global network to lead a team of organizations and professionals across Australia to deliver the project. It is an organization which can grow and change as the project develops through the phases.

The five phases of Project Iron Boomerang development are:

- **Pre-Feasibility**: establishment of project concepts and operational requirements, financial models and major steelmakers and/or investor commitment to the Feasibility Study;
- **Feasibility Stage**: proof of concept and definition of project operational requirements, detailed project scoping, preliminary engineering environmental impact assessment, cost estimates, market viability, planning and other regulatory approvals, risks assessments and develop risk management and allocation strategies, resulting in confirmation of the business case and a "bankable" Feasibility Study;
- **Commitment and Financial Closing**: development of investment agreements and briefing requirements to gain commitments from steelmakers to build smelters within the precincts, prepare concession/franchise agreements with governments, and develop major procurement contracts and call tenders for EPCM and/or DCM contracts; completion of due diligence processes by investors, and suppliers;
- **Implementation**: land purchase by government for lease to EWLP, engagement of project managers, detailed engineering and environment management plans, procurement of design and construction, procurement of rolling stock and precinct plant and equipment; and
- **Operations:** commissioning and commencement of operations.

This section of the Pre-Feasibility Report outlines key issues to be addressed in each phase, significant project risks, organizational structure, team capability, and budgets. As EWLP will follow an emergent strategy in developing the project, this section places the greatest emphasis on the next phase, the Feasibility Study and the opportunities to be realised and uncertainties to be reduced.

10.1 East West Line Park and PIB Project Functional Structure

EWLP has conceived a three tier functional structure to deliver to Project Iron Boomerang the global steelmakers. The three tiers are the EWLP business and its investors and stakeholders, the PIB global project, and the Australian program of works. The project's functional structure is shown in Section 2

The genesis of this structure is that it models how EWLP has developed the Pre-Feasibility Study through high level volunteers with specific professional skills in various facets of the project, staff who have been multi-tasked to provide support services, and supporting companies to market knowledge, and specific services. Throughout the Pre-Feasibility Study regular teleconferences and meetings of the global team have been held to discuss and lead all elements of the project. The three tier approach works as follows;

- Tier 1 is the EWLP business and its close relationship with its clients, steelmakers, investors and major stakeholders, supply chain providers and governments. EWLP will set the overall project strategy, risk allocation matrix, corporate governance structure and engage staff, consultants, contractors and suppliers. EWLP will set up a Steering Committee made up of EWLP leaders, steelmaking representatives, and senior consultants to guide the PIB project to which the PIB Global Project Director will report.

- Tier 2 is the PIB global project. A key factor to the success of PIB will be an alliance of steelmakers to gain the knowledge of material handling and support infrastructure needed to set the technical requirements and brief for the precincts and shared facilities therein.

  The PIB project has significant positive global environmental impacts, these must be assessed and the valve thereof returned to EWLP and its wider stakeholders to justify the project on environmental terms. A team of analysts will be engaged to assess these impacts across different countries.

  The PIB project has complex operational requirements which will be developed in further detail so that operational costs can be established with detail and certainty and so that plant and equipment such as rolling stock, and precinct material handling can be finalised and procured.

  Throughout the Feasibility Study the market analysis, capital and operational costs will be regularly updated to ensure project contingencies are properly assessed and not over stated and to ensure PIB retains it competitive advantage.

- Tier 3 is a program of local projects to study separately the detailed engineering, local environmental and community aspects of each major infrastructure element, the smelter precincts, the railroad, the rail hub and other infrastructure.

  Separate teams will assess the construction costs and time program, maintain the risk register and quality assurance system and prepare procurement contracts.

  Program support services, such as its network, and a central collaborative document control system, will be established.

A network of local community engagement officers will be established and provided with information, hot lines and internet, etc. to ensure all levels of the community and stakeholders, both local and national, are part of the project.

10.2 Implementation Timeline

- The timeline for the project implementation is given in Figure 10.1 below. It demonstrates the interaction between the different phases.

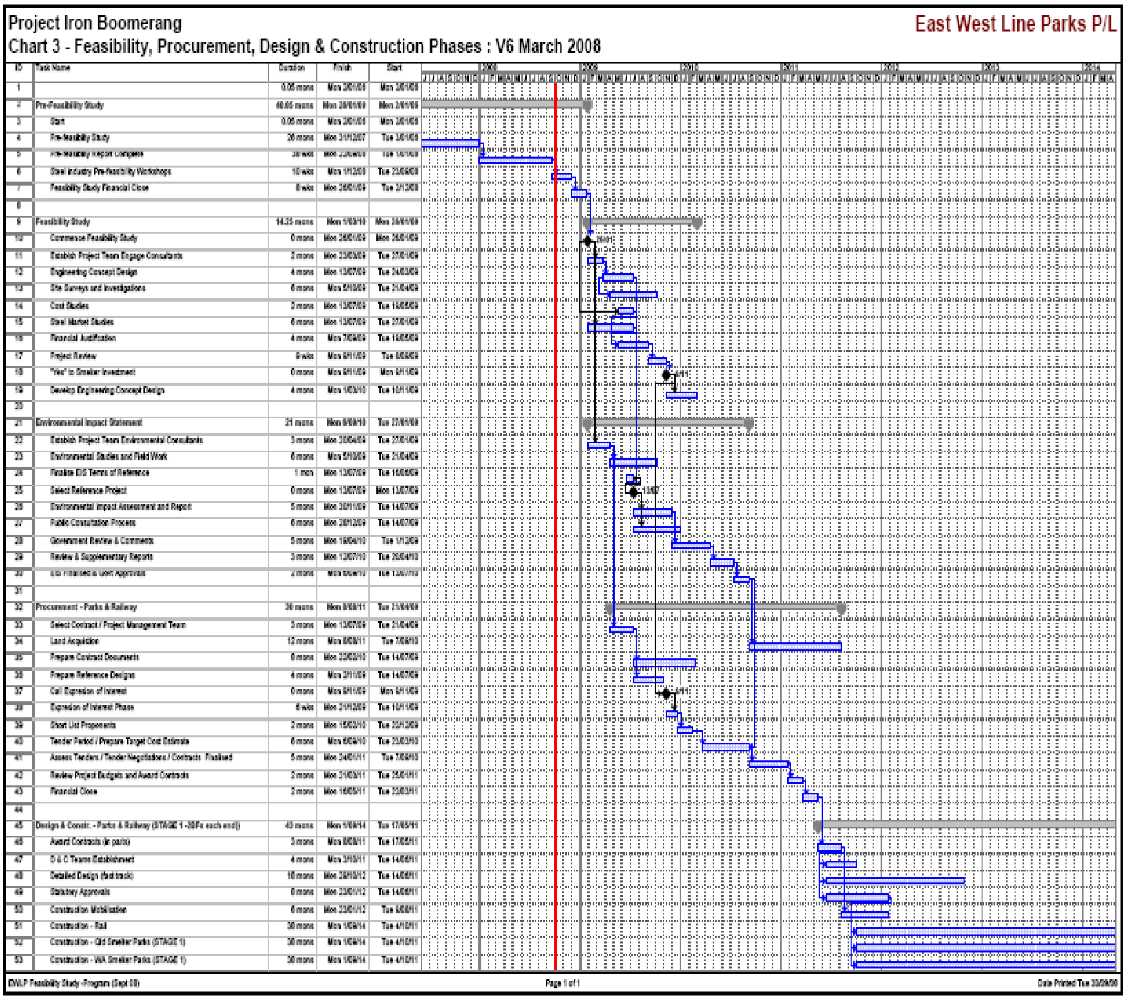

Figure 10.1 Feasibility, Procurement, Design and Construct Phases

Key milestones within the program are:

- An approval in principal by the investing steelmakers to the project and their commitment to build the smelters;

- The commitment by the steelmakers will also enable the government to complete its reviews and to complete the environmental and planning approvals;

- With steelmakers and governments fully engaged and committed, suppliers and contractors can competitively tender the works so that construction, capital costs and operating cost can be confirmed and risks reduced; and

- Once the above three milestones are achieved financial closure can be finalised along with agreements and land purchases.

10.3 Feasibility Study

The primary objective of the Feasibility Study is to prove the feasibility of the Project Iron Boomerang to steelmakers and governments. This requires the study of the following key outcomes:

- Fully developed Scope of Works and Project Plan (for the railroad and smelter parks and industrial plants);
- Environmental and Planning Approvals for the overall project;
- Finalising of the rail corridor, smelter park locations and agreement in respect of land acquisition (inclusive of sufficient engineering to support the Environmental Impact Study and cost estimates);
- Detailed capital and operating cost estimates and developed Business Case;
- Detailed analysis of the project time frames, and procurement packages, to ensure key milestones can be achieved,
- Government approvals in respect of the regulatory and policy settings required to support the project;
- Preliminary procurement activities to support the Business Case and a fast track project implementation phase;
- Finalising the detailed business framework for the project; and
- Finalising agreements with other key service providers in commitment to their associated project works.

The Project Plan will integrate project scope and performance requirements, quality, safety and environmental control systems, time program of works, cost estimates and budget controls, procurement plan, human and other resource plans, communication plan, quality and safety plans.

Key inputs into the Feasibility Study will be the specific requirements of the steelmakers in their proposed developments in the smelter parks, including:

- Technical: scale, technologies, layouts, environmental impacts;
- Market: knowledge of steel industry, major risks and opportunities as perceived by the steelmakers;

- Commercial: how precincts will function with respect to the "common user" facilities, timing of developments, procurement practices and construction resourcing arrangements; and
- Expertise: substantial in-kind commitment of the steelmakers' individual expertise will be required.

Other key project participants will also contribute their specific expertise "in-kind" to the Feasibility Study, particularly in design and constructability issues.

Key planned milestones are:

- Commitment to Feasibility Study – December 2008;
- Finalise EIS Terms of Reference – July 2009;
- Preliminary "Approval in Principle" by steelmakers – October 2009;
- Obtain planning and environmental approvals – April 2009; and
- Construction to commence – April 2011.

Feasibility Study risks are:

- Resourcing of Feasibility Study to meet time/cost/quality requirements;
- Obtaining and maintaining a critical mass of commitment by steelmakers to Feasibility Study;
- Obtaining political support for the project;
- Obtaining planning and environmental approvals, particularly in respect of smelter parks and managing local environmental impacts and water issues (availability in WA and managing waste water and runoff at both sites);
- Gaining agreement on Native Title in respect of land to be used and satisfying Cultural Heritage requirements;
- Obtaining reliable cost estimates and construction and implementation programs; and
- Governments requiring additional or extended studies with critical impacts to project approvals, the Feasibility Study costs and implementation program.

EWLP recognises these risks and has developed a functional structure to provide resources to control or mitigate these risks.

10.4 Commitment and Financial Close

An early "in-principle" commitment to proceed to a definitive number of steel smelters and the supporting industrial infrastructure will be critical to providing some certainty to the scope of the project, the concept design layouts, and the essential inputs into the Environmental Impact Study and detailed planning and pre-procurement activities by all associated parties, including key potential suppliers. The key milestone for the approval in principal is April 2009 if the current implementation program is to be met.

Financial close will be subject to obtaining the key planning and environmental approvals, and confirmation on other key business settings. Financial close will trigger awarding of critical supply and construction contracts to ensure long lead time items and activities can meet program.

Commitment and financial close risks

- Timely completion of commercial arrangements and commitments with equity partners and lenders;
- Extended government approval processes and the need for additional studies to address unforeseen environmental impacts and/ or community concerns;
- Gaining sufficient interest from key suppliers and contractors to ensure bankable competitive cost estimates from them are provided to firm up project construction and operational costings within the financial modeling;
- Fully assessing project contingencies to avoid double counting and threatening the overall project viability;
- Securing government commitment to purchases land and grant EWLP leases; and
- The complexity of taxation laws involved with major global investors can diminish overall project returns.

10.5 Implementation

Concept planning based on anticipated commitments and approvals provides for the following key milestones.

- Project planning approvals (April 2009)
- Financial close (December 2010)
- Award major contracts (March 2011)
- Complete land procurement (September 2010 – February 2011)

- Railroad construction (commence April 2011– complete June 2014)
- Precinct construction (commence April 2011)
- Smelter construction (commence June 2011 – complete June 2014)
- Commissioning (July 2014 – December 2014)
- First steel production (December 2014)

Key program related issues include:

- Complexity of the project and number of separate stakeholders, competing steelmakers, investors and decision-makers involved at the planning and approval phases;
- Number of "approving entities" involved;
- Competition for resources (skilled personnel, equipment, materials);
- Ability to mobilise resources (particularly at both Smelter Park precincts with accommodation and supporting infrastructure);
- Logistics management for the railroad construction;
- Managing environmental impacts;
- Assessing the time and cost impacts of the very diverse geographic, geological and climatic conditions which prevail of the length of the project; and
- Managing interfaces within the project and with associated service providers.

Project procurement will likely comprise a range of proven delivery mechanisms covering the wide range of activities. These include having a desire to reduce overall construction time, appropriate risk allocation outcomes, maximise economies of scale whilst recognising the sheer scale of the overall project (scope, geographic extent and construction costs), and best manage the interfaces. Early major contractor and supplier involvement will be essential to maximise their experience in constructability issues and logistics management at the early design phase in particular.

Implementation phase (design, procurement, construction) risks

- Skilled resource availability (design, construction) and timely provision of on-site accommodation and services;
- Staging, timing and co-ordination to the transcontinental rail construction to ensure all sections are completed to program;

- Equipment and materials availability;
- Contractor/supplier performance;
- Interface and coordination management;
- Meeting construction environmental conditions, particularly sediment control, fragile arid environments and impacts on native vegetation;
- Economic technical solution to the desert crossings, and extent of poor ground conditions;
- Extensive bridge crossing needed and raised track aligned to protect the facilities from flooding;
- Proximity of suitable gravel, ballast and water for railroad construction (cost, time impacts);
- Major adverse weather impacts (cyclones);
- Transport of imported plant, equipment, materials, and the large prefabricated assembly modules; and
- Construction safety performance.

10.6 Operations

The operating period will begin at the commissioning of the railroad and the first four steel smelters. As the construction of the next eight steel smelters will be on-going, there will be an overlapping of the implementation and operating phases of PIB.

When the initial operations commence, there will be a number of additional activities to be managed. Foremost will be the completion of the remaining steel smelters. Consideration of additional precincts and steel smelters beyond that incorporated within the scope of PIB here will become important.

Operational phase risks

- Railroad and precinct common user facilities' reliability and availability, including availability and responsiveness of support base;
- High asset utilization of rolling stock (high kms/year usage);
- Major adverse weather impacts (and supply chain reliability and recovery);
- Meeting environmental performance standards;
- Port/rail congestion from other users;

- Retaining skilled resources in remote areas;
- Maintenance of facilities; and
- Ongoing supplier contracts.

10.7 Further Developments

Refer to Section 8, Additional Economic Opportunities for a full description of some the ongoing development potential of the project. EWLP will explore these opportunities at all phases to ensure to use of assets will be maximised.

10.8 Risk Management

The management of risk is an important issue with any project and particularly with one as large and complex as Project Iron Boomerang. EWLP will adopt structured processes, methodologies and techniques to identify and communicate risk information. We intend to conform to the joint *Australian/New Zealand Standard, AS/NZS 4360:2004, Risk management*. Consistent with this Standard, a preliminary identification of risks covering the project life cycle has been undertaken and included in the above phases.

All levels of EWLP will be empowered to examine project risks as part of developing the project. Strategies include avoiding the risk, transferring the risk to another party, reducing the negative effect of the risk, and accepting some or all of the consequences of a particular risk.

10.8.1 Risk management techniques

Traditional risk management focuses on risks stemming from physical or legal causes (e.g. natural disasters or fires, accidents, death, and lawsuits) and uses insurance. Financial risk management focuses on risks that can be managed using traded financial instruments. Strategic risk management encompasses the broad range of operational actions available to management.

Hedging risks with financial instruments is an alternative that will be considered. The two areas where this is common are foreign exchange rates and interest rates. The use will depend upon the phase of development of the project and the issue.

It is likely that the functional currency for the railroad and precincts once operations commence will be the US dollar. The intent is that revenue will be generated almost entirely in US dollars. However, an appreciable portion of costs will be incurred in Australian dollars. The currency hedging policies for EWLP will be developed during the Feasibility Study as part of the risk allocation matrix. The Feasibility Study is different in that the time period is substantially shorter and a significant portion of costs will be incurred in Australian dollars, perhaps as much as three-quarters. We intend to engage in currency hedging to the extent that our currency exposure relative to our funds available for the Feasibility Study is significant and could potentially impinge on EWLP's ability to complete the Feasibility Study on time and on budget.

At this stage, we do not anticipate engaging in hedging of interest rate risk. Rather, where interest rate volatility or uncertainty is a concern, we expect to use floating rate debt.

EWLP will use insurance to mitigate a range of standard risks. There will be a number of risk areas that are re-occurring and not catastrophic, particularly after implementation has commenced. During the Feasibility Stage, analysis will be conducted to determine where it is financially prudent for EWLP to self-insure in these aspects. As a principle, EWLP expects to procure insurance coverage for risks that have the potential to impact appreciably on the financial viability of PIB, when such insurance is commercially available.

10.8.2 Risk registers

A major tool for ensuring that risks are addressed appropriately is the use of a Risk Register. PIB will utilise Risk Registers to list all the risks identified at the beginning and during the life of the project. The initial Risk Register will be maintained to account and control risks during the Feasibility Study. Risk Registers are also prepared for the Construction phase; partitioned into General, Railroad and Precincts. Each risk is grading in terms of likelihood of occurring and the consequences to the project in terms of time and costs. Control strategies are then developed and residual risks are assessed, again in terms of likelihood and consequences. For each risk, management responsibility is assigned to a specific person.

10.8.3 Commercial risks and contingencies (all phases)

- Sovereign risks (changing ground rules)
- Cost escalation (fuel, labour, materials, services)
- Market demand (steel, by-products)
- EWLP governance and ownership issues

Generally the above risks are not readily addressed with insurance or financial instruments and encompass a broad range of areas. These will be addressed with risk management strategies that are appropriate for the issues. We will impose structure, discipline, process, and a level of conformance on PIB to ensure that risks are approached systematically and are continually reviewed.

10.8.4 Risk allocation matrix

EWLP will develop a risk allocation matrix which it will use a network of Deed Agreements risks between major parties. These risk allocation matrixes will be the basis for negotiations with steelmakers, investors, major suppliers and contractors.

10.9 East West Line Parks Team for the Feasibility Study

EWLP has successfully assembled a high caliber team of professional people with global experience in developing, planning, analyzing and delivering major infrastructure projects to the steel industry and railroads such as PIB in Australia and other countries. This knowledge and experience coupled with the knowledge of the investors; steelmakers, consultants (Quantum, Engenium, Ranbury, Monash Rail), miners (Xstrata) and contractors (Leighton) gives EWLP all the range of skills necessary to lead the project Feasibility Study and procure the additional services of contractors, consultants and suppliers to deliver the project.

Profiles of the management group and their capabilities are included in Appendix E.

10.10 Feasibility Study Budget

The proposed Feasibility Study Budget is A$150 million as detailed below. The expenditures during the Feasibility Study will predominately be incurred in Australian dollars, so the budget is in that currency.

	A$millions
Preliminary engineering and surveys	50.0
Environmental Impact Study	48.0
Consultants - engineering	7.5
Consultants - environmental, economic, legal, tax	8.0
Project management, administration and overheads	11.5
Contingencies (20%)	25.0
Total	150.0

This budget excludes direct in-kind contributions from the project participants.

10.11 Summary and Conclusions

The following key conclusions arise with respect to the implementation of PIB.

A commitment to project implementation will be challenging, given the range of stakeholders involved and the need to fully align the various interests from a program perspective.

The preliminary program is ambitious and challenging but for good reason, and implementation will occur in a period of uncertain competing demands for resources.

An early decision by steelmakers and commitment to proceed with a common configuration of steel smelters and the supporting infrastructure will be critical to the timing of the project.

The time line for PIB is realistic but will require continuous communication and coordination between EWLP and the steelmakers concerning their respective construction projects.

Risk management is a practice of systematically selecting cost effective approaches for minimising the effect of threats to an organisation. All of the risks facing a company cannot be fully avoided or mitigated. There are too many complexities as well as financial and practical limitations. PIB will have to accept a level of residual risks. Risk management will be facilitated in at least three ways:

- Using proven technology, and reputable contractors and suppliers in the design, procurement and construction phases, and in supporting the operating phase;
- Utilising the technical and operational expertise of the steelmakers and other proposed major investors in EWLP and participants of PIB with respect to their respective areas; and
- Development of a comprehensive Risk Management Plan.

The project program and budget projection provide for appropriate provision of contingency funds to cover unforeseen scope and normal risk events during the feasibility phase. Preliminary evaluation of the above risks suggests that they will be manageable in the context of current planning and actual experience on similar railroad projects and major individual industrial projects in North Queensland, the Pilbara in WA, and in the Northern Territory.

11. Conclusion and Invitation to Participate

11.1 Project Iron Boomerang and Its Advantages

Project Iron Boomerang is based upon developing first-stage steel production facilities in smelting precincts adjacent to existing resource locations in Queensland and Western Australia. Australia has an estimated 40% of the world's seaborne high grade iron ore and 65% of the world's seaborne coking coal. These resources have been estimated to have the capacity to meet demand for a hundred years. The precincts will be connected by a railway enabling cost effective transport of input resources to the appropriate smelter precinct.

This Pre-Feasibility Study outlines a convincing preliminary case for steel manufacturers and others to join together to commence the full Feasibility Study of PIB. The study provides evidence that the construction of first-stage smelter precincts offers many cost effective savings and that a dedicated railroad with all supporting infrastructure is feasible and economically favourable for steelmakers. The project will also deliver major global environmental benefits from improved transport efficiencies, modern first-stage steel production techniques and efficient energy utilisation. The Feasibility Study will test these early findings in depth, and further establish the validity of the business case.

The pre-feasibility financial assessment is based on six steel smelters in each precinct and assumes the production of steel slabs for export to second-stage production locations. The decision on output will ultimately be made by the steelmakers. The project also encompasses the transportation of the output of the steel smelters to the ports in Australia from which they will be shipped. The project does not include the construction of the steel smelters or their operation. This will be the responsibility of the steelmakers that participate in the project.

If steelmakers choose standard modular construction of the smelters, there is an estimated savings of about US$700 million each. Also, there are substantial direct and indirect benefits associated with the concentration of steel smelters in purpose designed smelter parks. Capital expenditure savings in the shared services is estimated at US$450 million for each smelter.

The potential savings for steelmakers are significant. For a representative steel mill in East Asia, the cost of delivered steel slab is estimated to be reduced by US$107 per tonne. The savings projected as compared to current practices are based on conservative estimates and do not include the likely and continuing increase in transportation costs under the existing practices of shipping ores and coal to smelters in other international locations.

11.2 Financing and Administration of the Feasibility Study

A full Feasibility Study is necessary to confirm the highly favourable results of this Pre-Feasibility Study before the commencement of construction of PIB. The projected cost of the study is A$150 million.

Steelmakers, the ultimate beneficiaries of PIB, are being asked to be the principal funders of this study. Other companies that have an interest in the project may also participate through investor positions. The project encompasses the staged construction of twelve steel smelters. To secure a right to a steel smelter position, a steelmaker will contribute a proportionate share of the costs of the Feasibility Study; that is A$10 million. The contribution will entitle the company to have a seat on the Management Advisory Committee, which will advise the East West Line Parks Board of Directors and management during the study and subsequently during construction. This will be the means by which the steelmakers and other key participants will provide information to EWLP and receive information on the development of PIB. The contribution will not acquire an equity interest but will acquire the right to an equity participation in EWLP as described above.

A key benefit to steelmaker contributors to the Feasibility Study, and an incentive for early commitment, will be the selection of positions in the precincts. The construction of six steel smelters at each of the two precincts will be staged, with two steel smelters at each end being constructed during each stage. Steelmaker participants will select a precinct and a construction sequence at that precinct on a first-come, first-served basis. For example, the first contributor may choose to construct the third steel smelter at the Queensland precinct. The second contributor would then choose from the remaining eleven positions.

In addition to securing a position in the proposed smelter parks, participation in the Feasibility Study will bring additional benefits including early identification of opportunities for increased investment and control of coal and iron ore resources in central Australia. There appear to be many resources that are uneconomical until an east-west railway line is built. PIB will make many of these resources economic for mining, thereby increasing security of supply for existing steelmaking facilities, and providing a platform for further expansion and investment in Australia.

11.3 Invitation to Participate

Companies interested in participating in PIB are invited to contact EWLP. As a recipient of this Pre-Feasibility Study Report, you have signed a Confidentiality Agreement. To progress your participation in the Feasibility Study, please contact:

Shane Condon, Project Founder and Managing Director
East West Line Parks Pty Ltd
Level 15, 344 Queen Street
Brisbane, Queensland 4000
Australia

Tel: +61 7 32216966
Fax: +61 7 32112913

Please Note:

i) This preliminary survey was conducted on 2006.

The figures emanating from this report have since been adjusted to September 2007 to take into account inflation and cost escalation to the PFS Report Spreadsheets

ii) The trans-Australia continental rail crossing flyover should be viewed together with this report

This report has been prepared and submitted to East West Line Parks Pty Ltd by:

QUANTM
A TRIMBLE COMPANY

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Submitted to: 30 March 2007

Shane Condon Ref No: 00941
EWLP Pty Ltd
Brisbane, Australia

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1.0 EXECUTIVE SUMMARY

The Iron Boomerang Project is East-West Line Parks P/L (EWLP) vision for a trans-continental railway linking the Central Queensland coal fields with the Pilbara iron ore region in Western Australia. Iron ore smelting plants at both ends of the railway will provide pig iron and/or steel for export from Queensland and Western Australia.

The objective of this pre-feasibility investigation into the rail line is to conduct a wide area search for potential corridors and to identify macro level land use constraints and opportunities. In assessing alternative feasible corridors, comparative construction cost estimates were also made.

The investigation was carried out using the Quantm corridor identification and alignment optimisation system. The use of this sophisticated technology allowed a much higher level of information to be generated at this pre-feasibility stage than would have been possible if a conventional approach had been adopted.

The project database was assembled from publicly available digital terrain models, land use and topographic information. EWLP provided unit construction costs and the operational requirements of the rail line, including maximum grade limits and minimum horizontal and vertical curve values.

EWLP stipulated that the Queensland end of the railway (start point) be located near Moranbah, with EWLP to use the existing Newlands system and proposed extension of this line to North Goonyella (the Northern Missing Link). In Western Australia the railway was to end (finish point) adjacent to Poonda Siding, located approximately 50km north of Newman on the existing Mt Newman – Port Hedland railway.

Significant waypoints for the corridors were also identified and included proposed crew change depot locations near Kynuna in Central Queensland, and near Ti Tree in the Northern Territory. An intermediate crew change depot in Western Australia was likely to be remote from any established settlement.

Based on this set of data, the Quantm system was utilised to generate up to 50 alignments in each 200km section of the study area between the start and finish points of the rail line. Sorting the alignments in order of construction cost identified the generally lower cost corridors. The topographical maps overlaid on the corridors and terrain facilitated the identification of potential issues that will need to be investigated in more detail in subsequent studies. Features of note within the identified corridors included:

- several major non-perennial river crossings,
- proximity to National Parks and mining leases,
- the need to secure access for the corridor to cross several areas that are under Aboriginal ownership/control, and
- located the approximate position of crossing points on existing rail and road infrastructure, and location relative to existing settlements.

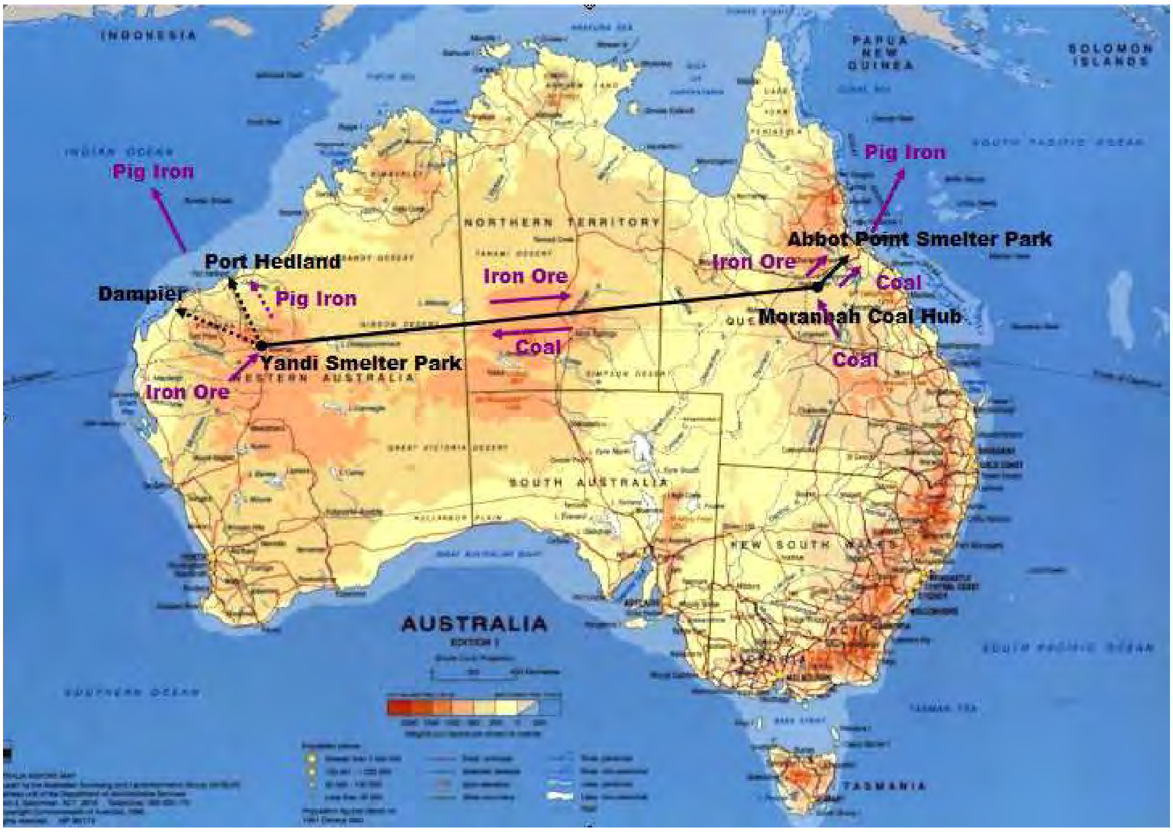
The investigation showed that the straight line distance between the East and West start/finish points was some 2,900km. With the initially targeted maximum gradient restricted to 0.5%, the lowest cost corridor that complied with this limit was 3,120 kms at an overall construction cost at 2006 prices of approximately $6.5 billion AUD.

The information in this report forms the foundation for subsequent, more detailed studies that would assess further the relative merits of the alternative corridors, develop optimum alignments within those corridors and to provide a higher level of certainty of cost outcomes.

2.0 BACKGROUND

The Project Iron Boomerang (PIB) concept is to construct and operate a heavy haul railway from coast to coast across the Australia continent near the Tropic of Capricorn. The line will travel from the North Queensland port of Abbot Point, through the coalfields of Central Queensland and extend to the iron ore region in the Pilbara, Western Australia where it will link into the existing iron ore railways to the Western Australia port of Port Hedland.

The East West Line railway (EWL) will be standard gauge, built to contemporary Pilbara iron ore railway standards, and linking to the existing and planned rail lines and iron ore mines in the Pilbara, and to proposed steel smelter parks at each end of the line. The EWL will link with the existing narrow gauge coal network in the Bowen Basin, accessing the existing and future coal mines in that region, via a transhipping facility near Riverside Mine (the Moranbah Coal Hub). The EWL will also be connected to the Adelaide to Darwin railway.



(Fig 2.a) Proposed Project Route, Smelter Parks and Movements of Mine Haul Materials.

The EWL will carry iron ore or coal in either direction to iron ore smelting plants located near Newman in Western Australia, and at Abbot Point. The coal hub near Moranbah will transfer coal from the narrow gauge network in Central Queensland for back-loading on trains heading to the west. Smelters will be located near the mine sites or ports, and will produce pig iron or steel, primarily for export. The EWL trains, running predominantly loaded in both directions, underpins a dramatic improvement in transport efficiency and environmental performance compared with current practices of shipping raw materials offshore for processing.

EWLP Pty Ltd has retained Quantm Pty Ltd to carry out the initial corridor identification and alignment development using Quantm's specialised software, which is an innovative and unique system for transport infrastructure optimisation. This Report describes the outcomes of this initial study and will form the basis for undertaking subsequent detailed feasibility work.

3.0 OBJECTIVES

The primary objective of this work is to demonstrate that a comprehensive search for favourable corridors has been made and to provide confirmation that there are a range of corridors where alignments are compatible with macro land use constraints and railway operational and engineering requirements.

Identified corridors will highlight the main land use considerations and flag potential opportunities and issues that will be addressed at subsequent, more detailed stages. The potential corridors should also be compatible with the geometric requirements of the rail line, i.e. be within maximum gradient and minimum curvature requirements for a heavy haul rail line.

Strategic construction cost comparisons between alternative corridors will also be made to identify least cost corridors that maintain compliance with land use, rail operational and engineering requirements.

It is recognised that at this pre-feasibility desk top study stage that many unknowns have been left out, particularly in regards to detailed topography, site specific geology, hydrology and flood impacts and localised land use. So as not to unduly skew the study results to one alignment or another on assumed data, the cost impacts of these items will be considered in the comparative cost, and an allowance made in the general contingencies for railway capital costs. This method is to give confidence that a railway which meets the required heavy haul gauge horizontal and vertical alignment criteria can be achieved within the overall route.

4.0 PROJECT AND RAIL OPERATIONAL CRITERIA

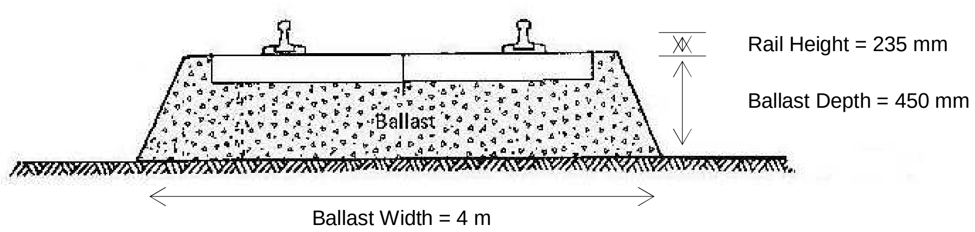
4.1 Specific Rail Requirements

4.1.1 Grades

Rail operational criteria used within the Quantm analysis was to account for the heaviest of haul requirements, this being the movement of iron ore eastwards from the Pilbara to the smelter parks in Queensland. Although slightly steeper grades heading westwards for coal / coke loading could be accommodated due to the different product density and volumes needed, EWLP decided that a maximum design grade of 1 in 200 (i.e. 0.5%) would account sufficiently for fully loaded diesel-electric locomotives moving in either directions for this initial stage evaluation.

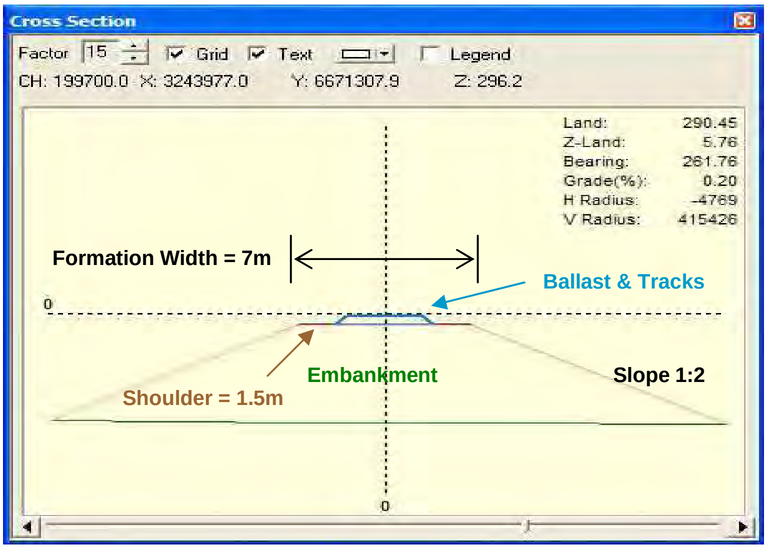
4.1.2 Standard Heavy Gauge & Cross Section

Rail alignment design was based on the standard heavy gauge system (1,435 mm). Ballast depth was specified as 450mm from top of sleeper, with a total depth of rail structure to sub-ballast of 685mm.



(Fig 4.a) Rail & Ballast Specifications.

The formation width of the rail corridor was 7m in both cut and fill, which included a 4m width for ballast and 1.5m shoulders. Although not included in the determination of alignments for this analysis, an overall corridor width of 50metres to include for an access track along the corridor was assumed.



(Fig 4.b) Rail Corridor Cross Section.

4.2 General Project Requirements

4.2.1 Start / Finish Points

EWLP stipulated the following start, finish and way points for the rail corridor.

Start Point: Immediately West of the Goonyalla Riverside Mine, which is located approximately 30km north of Moranbah and 180km west of Mackay in Central Queensland.

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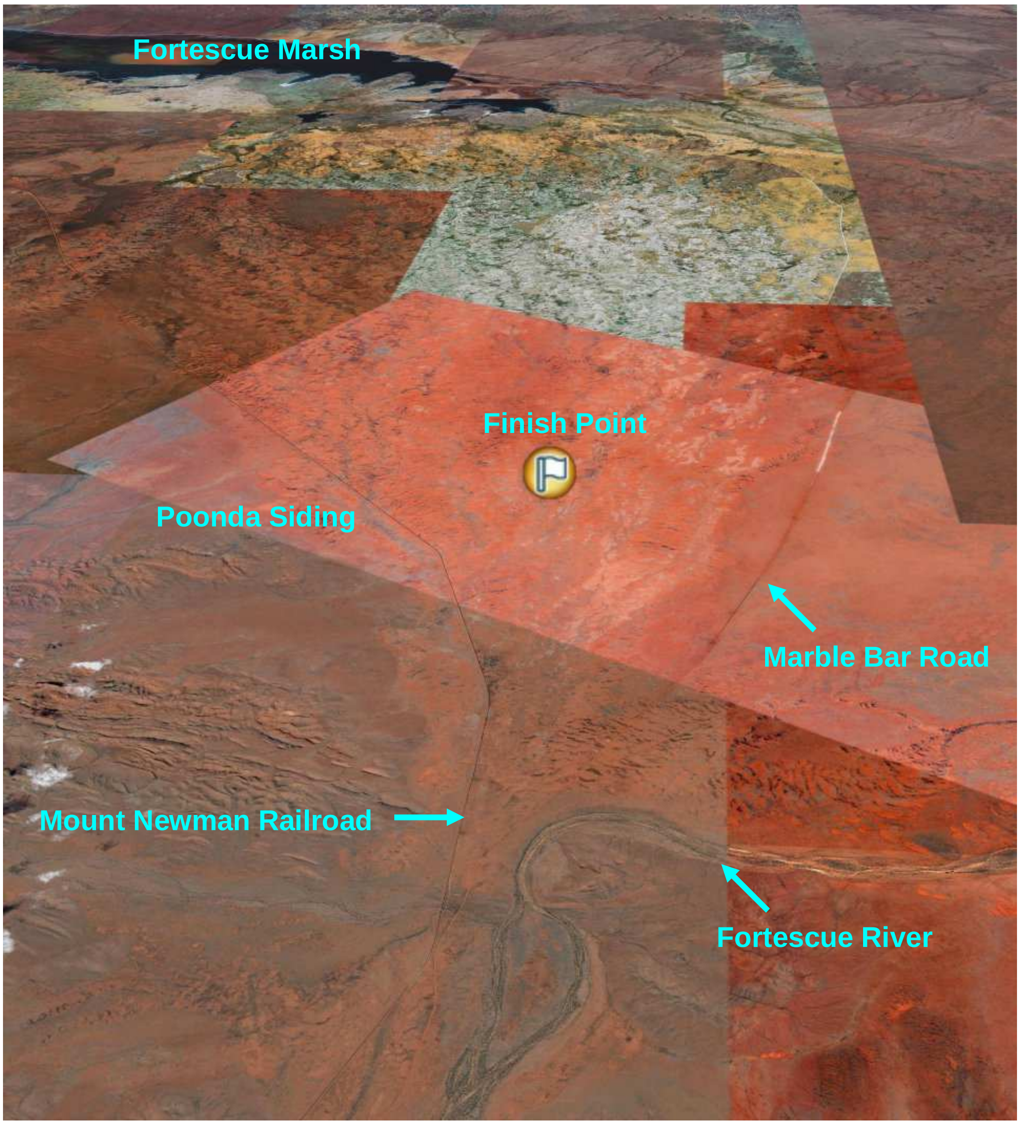
(Fig 4.c) Rail Corridor Start Point: West of Goonyalla Riverside Mine, Qld.

Finish Point: East of Poonda Siding located at the 334km point on the existing Mt Newman Railway, approximately 50km north of Newman, in the Fortescue River Valley, Pilbara, Western Australia.



(Fig 4.d) Rail Corridor Finish Point: East of Poonda Siding, Pilbara, WA.

4.2.2 Tie in Points with Existing Mine Haul Infrastructure

At the Queensland end, the Initial Smelter Park is proposed to be located adjacent to the existing export coal terminal at Abbot Point (near Bowen). The EWL is proposed to be co-located with the existing narrow gauge Newlands Line and along the proposed extension of this line to North Goonyella (the Northern Missing Link), which will be owned and operated by Queensland Rail (QR). The feasibility of constructing this section of railway has been carefully studied and established by Queensland Rail. This existing rail corridor will require selective widening to accommodate the EWL and future narrow gauge upgrades, and limited deviations to satisfy EWL grading requirements. For this level of analysis, no Quantm work was required on this section.

A narrow gauge electrified spur-line will be built to connect the existing QR Goonyella network near Riverside, to a transfer facility (the Moranbah Hub) for the transhipping of coal onto EWL trains for delivery to the WA smelters. Coal for the smelters at Abbot Point will be delivered via the QR narrow gauge network.

Similarly, at the Western Australian end the proposal for a smelter park east of the Poonda siding on the existing Mount Newman railway line will facilitate a means of rail connections with the Hammersley and Mt Newman systems (and possibly other new systems) to allow the transportation of the product to an export port (currently Port Hedland). It is believed that BHP Billiton will share the use of their existing Newman line with EWLP as the PIB will complement the marketing of iron ore from their existing mines.

4.2.3 Waypoints

EWLP require a number of waypoints along the rail corridor to serve as refuelling stations, maintenance depots, crew change over points, etc. If possible, these waypoints should be within close proximity to existing settlements where EWLP workers will reside and integrate into these communities, but far enough away that any adverse impact on the nearby community such as rail operating noise would be minimised.

Possible way-points suggested by EWLP included; Winton and Kynuna in Queensland, Ti-Tree in the Northern Territory, which is located approximately 185km North of Alice Springs, and a third location halfway between Ti-Tree and the Pilbara.

5.0 METHODOLOGY

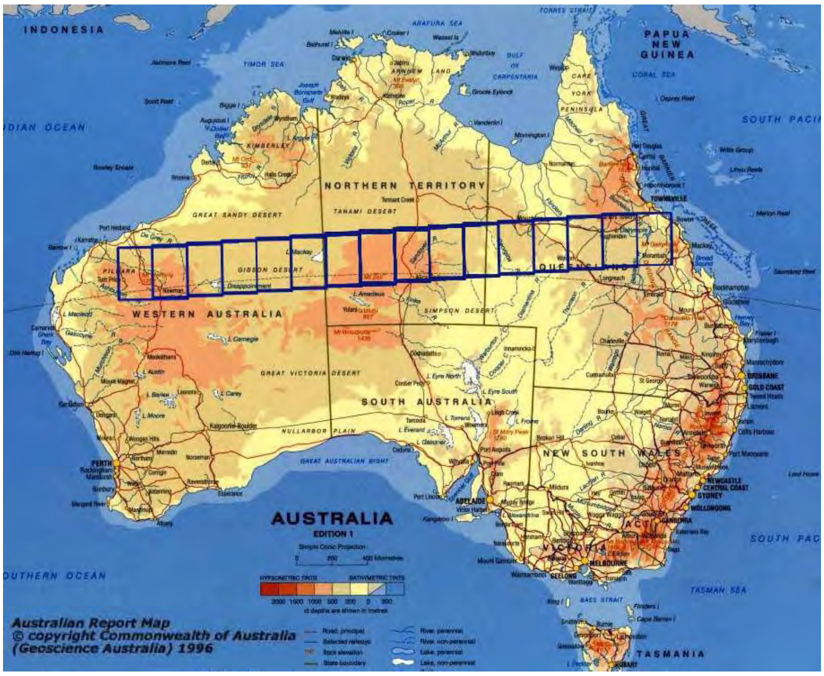
5.1 Quantm System

The Quantm system for corridor identification and alignment optimisation was the technology utilised to generate the results. This system identifies viable corridors and optimises alignments for rail carriageways. The system can take into consideration the land use constraints, unit construction costs [eg rails, sleepers, ballast, earthworks and structures], design geometry for the rail, existing linear features [eg roads, rail lines and rivers], and generates sets of alignments that comply with the criteria and are of lowest cost. The system is very fast at generating alignments compared to conventional methods, which allows a comprehensive search for corridor opportunities to be made and facilitates rapid sensitivity analysis of key parameters.

Quickly re-optimising alignments as new constraints emerge during investigations, stakeholder consultations or geotechnical studies can also significantly reduce planning times. The Quantm system is a great tool within the community consultation process in that it provides a transparent alignment selection methodology and an electronic audit trail of alignment development decisions. The Quantm System also provides a high level of confidence that an alignment which meets the engineering criteria can be achieved over the entire length.

5.2 Methodology Description

Total length of the rail line is in the order of 3,000km and to obtain the level of accuracy and detail required to meet the objectives, the rail study area was broken into 15 sections. Each of approximately 400km, made up of a 200km section plus a 100km overlap with each adjacent section as shown in the diagram below:



(Fig 5.a) Rail Corridor Study Area.

In order to ensure the set of lowest cost overall corridors are identified, the methodology utilised a floating start and finishing points for each section of the overall line. The cheapest corridors were then used as a basis for determining the transfer points between sections. The corridor and sub-corridor alternatives were then spliced together to form composite corridor options for the full 3,000km line.

The sequential steps in this methodology are summarised as follows:

Step 1: Data acquisition: Digital terrain data, existing roads and rail, water features, mining leases, ownership maps, topographic maps.

Step 2: Compile the geographic information into a single data base using a common projection system.

Step 3: Break the study area into 15 x 400 km sections.

Step 4: Utilising the Quantm system, generate sets of 50 alignments in the first section to identify corridor options.

Step 5: On the adjacent section, generate sets of 50 alignments from each of the corridor end points of the previous section to identify corridor options in the section.

Step 6: Continue process until all 15 sections have been processed.

Step 7: Compile a composite map of the corridor options across the full length of the rail line.

Step 8: Assess each of the corridors and sub-corridors for opportunities and issues relating to land use constraints and surface features.

Step 9: Prepare report on results.

Note: EWLP provided the engineering requirements, operational requirements, unit construction costs and the definition of constraints that were used in the Quantm system to generate the corridor options and identified the initially preferred corridor options from the Quantm generated alignments.

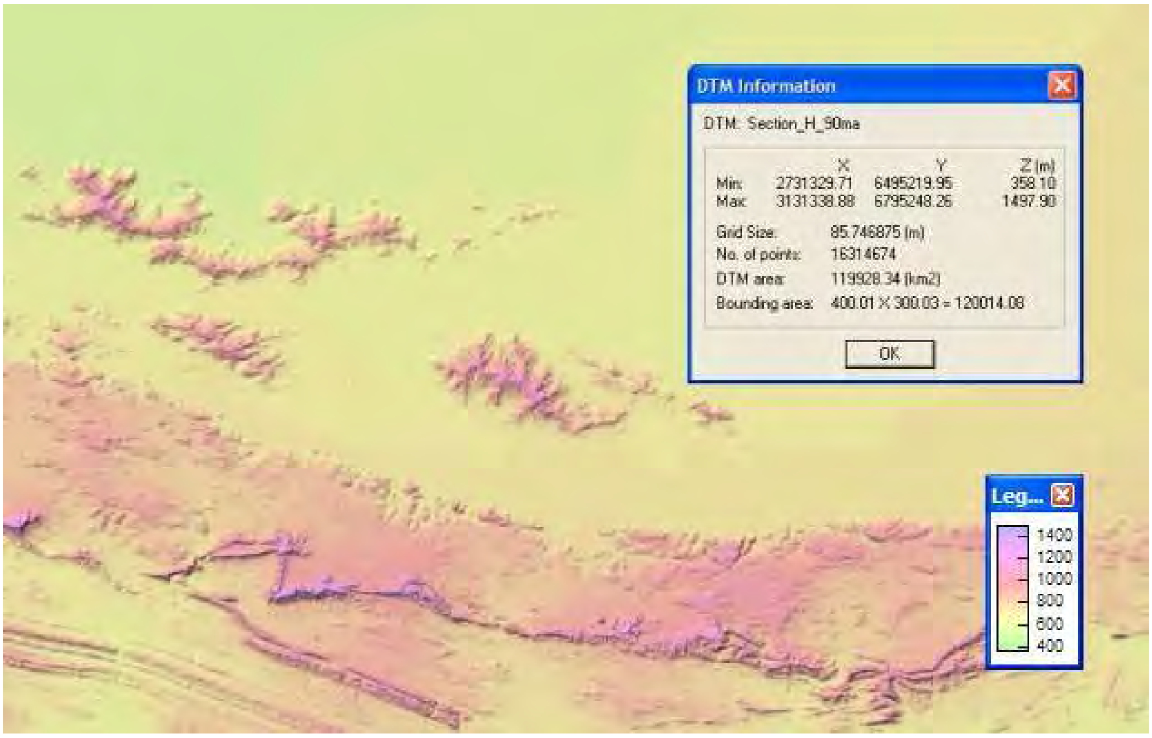
6.0 DATA ACQUISITION AND APPLICATION

6.1 Projection System

The Quantm system operates using Cartesian (X, Y, Z) co-ordinates and therefore requires a projection system to convert spherical (i.e. latitude, longitude) co-ordinates into Quantm compatible Cartesian co-ordinates. Due to the extreme scale of this project, a custom projection system was created to reduce the distorting effects of the earth's curvature. Since the project is primarily East-West oriented a Mercator projection with origin latitude -22°30'00" and central meridian 134°00'00" was deeme d most appropriate. The standard WGS84 spheroid was used along with a 3,000,000m false Easting and 9,000,000m false Northing.

6.2 Terrain Data

Digital terrain data was acquired from the U.S. Geological Survey EROS Data Centre. This 3 arc second SRTM (Shuttle Radar Topography Mission) data was projected then converted into Quantm format. Once projected the final Quantm DTM (Digital Terrain Model) had a resolution of approximately 86m.



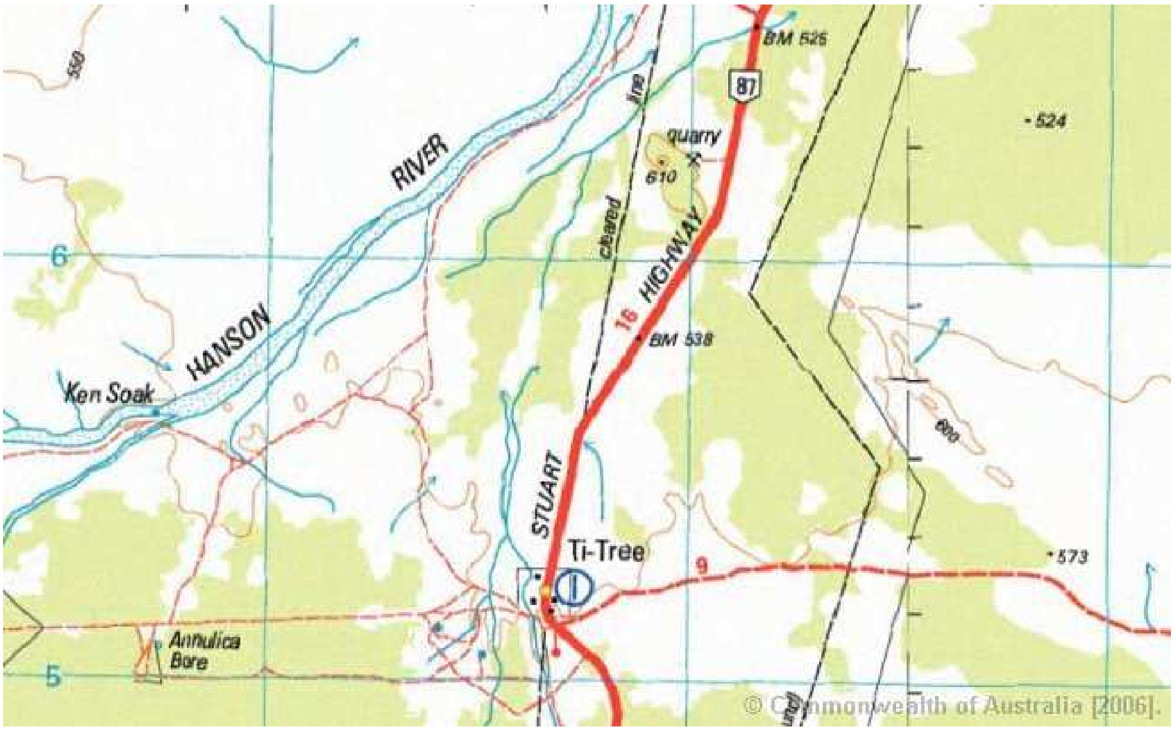
(Fig 6.a) Sample Image of Quantm 3D Digital Terrain Model.

6.3 Topographic Data

Topological maps obtained from the Australian Government's Geoscience Australia Website were used within Quantm to provide a seamless coverage of digital topological data across the entire study area. The maps form part of the GEODATA TOPO 250k 3rd Series and exist at a 1:250,000 scale resolution - i.e. 1cm on a map represents 2.5 km on the ground.

The series of maps were acquired in Enhanced Compressed Wavelet (ECW) format and then projected into the project coordinate system to align them within the project database. The drawings provide a vector representation of features on the earths surface and include natural and constructed features such as, but not limited to; existing road and rail infrastructure, land use areas, hydrography, vegetation, terrain, elevation, utilities and environmental boundaries.

The information gained by loading these maps within Quantm Integrator as a background image enabled more informed decisions on the appropriateness of corridor options, whilst ensuring their potential impact on communities and critical infrastructure would be noted and included in future analysis.

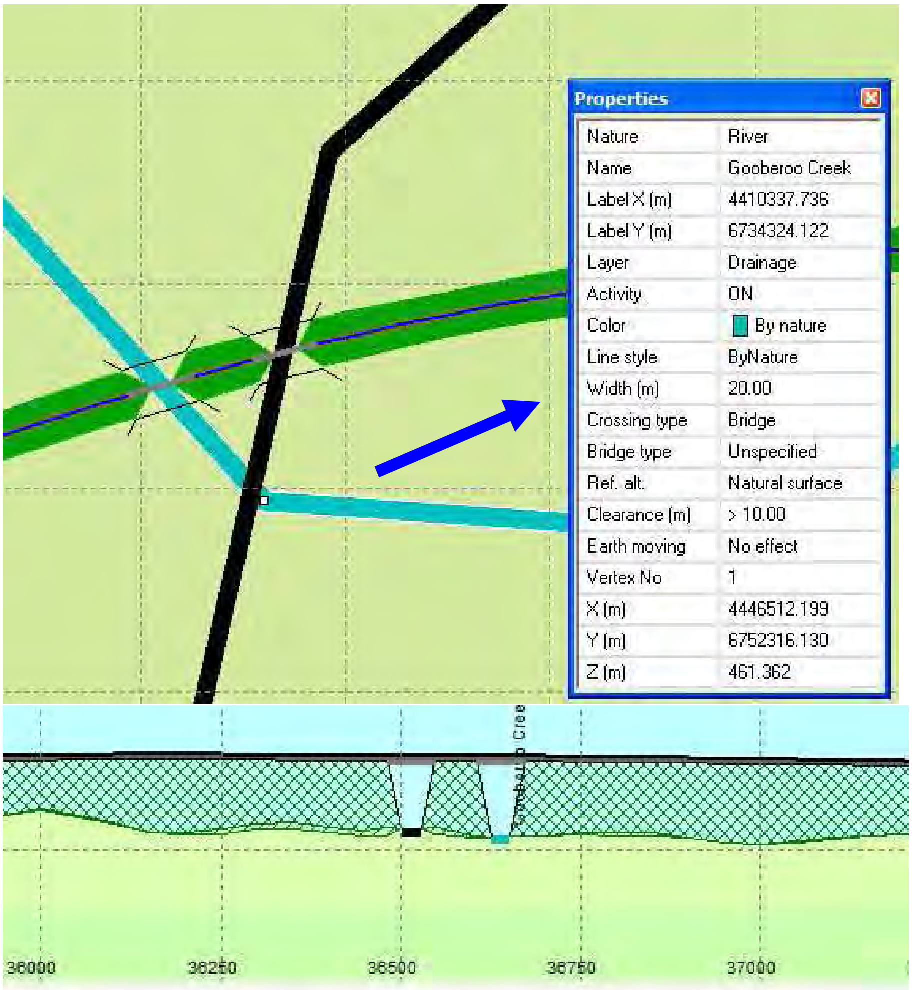


(Fig 6.b) Sample Image of Topological Map.

6.4 Roads, Rail, Water Courses

Existing road and rail infrastructure, together with water management areas, lakes and perennial/non-perennial drainage basins were acquired in digital format from Geoscience Australia. Although these were not included within this first stage of Quantm analysis and therefore did not actively influence the location of corridors, their influence on possible corridor options and the required structure crossings was noted for future consideration.

At this stage no hydrology studies have been carried out, nor have the necessary alignment adjustments and extra culvert or bridge structures across flood plains been considered. A key study requirement for the feasibility stage will be the determination of the required heights for crossing these flood plains.

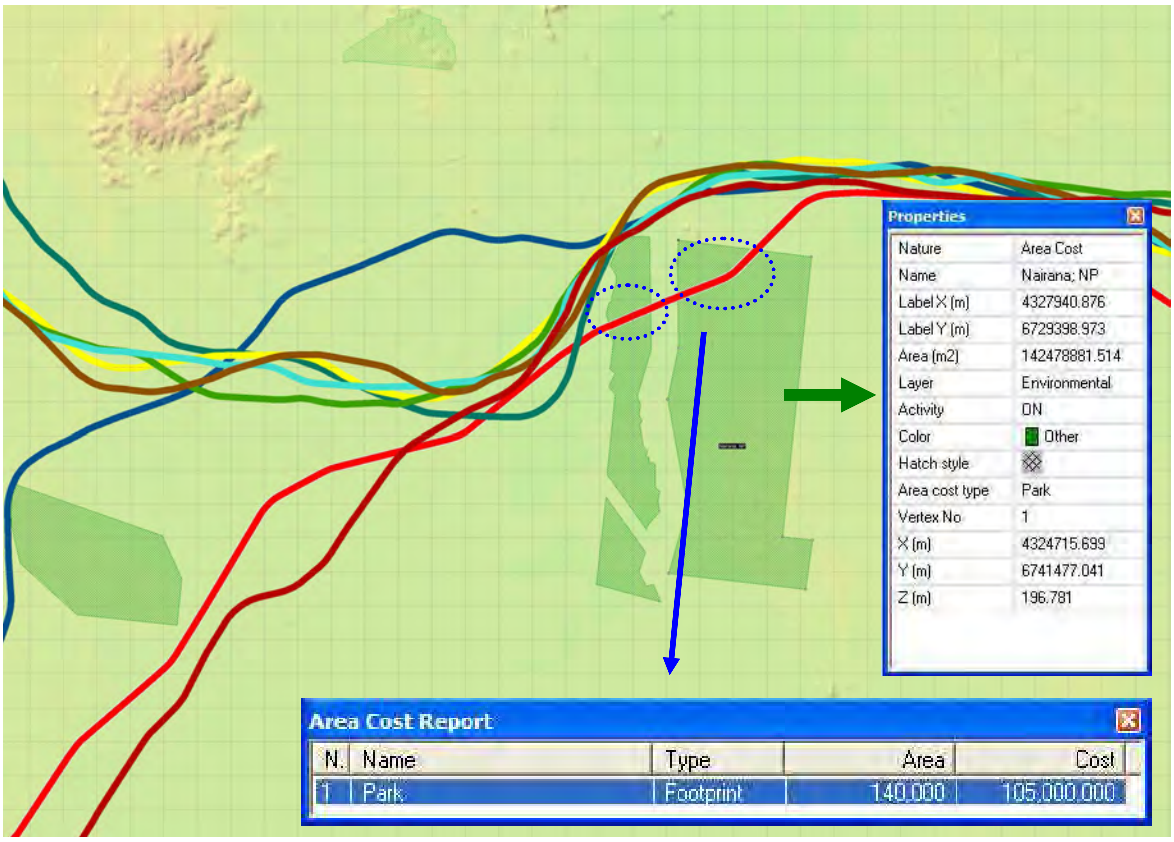


(Fig 6.c) Using Quantm to Constrain River & Highway features with Structure Crossings.

6.5 Land Usage / Environmental

Land-use and environmental data was assembled from Geoscience Australia and other state agencies which included populated places, utilities, national and state parks, crown lands and indigenous reserves. These constraints were not included within the system at this stage of the analysis. However, their influence on possible corridor options and the required structure crossings was noted for future consideration.

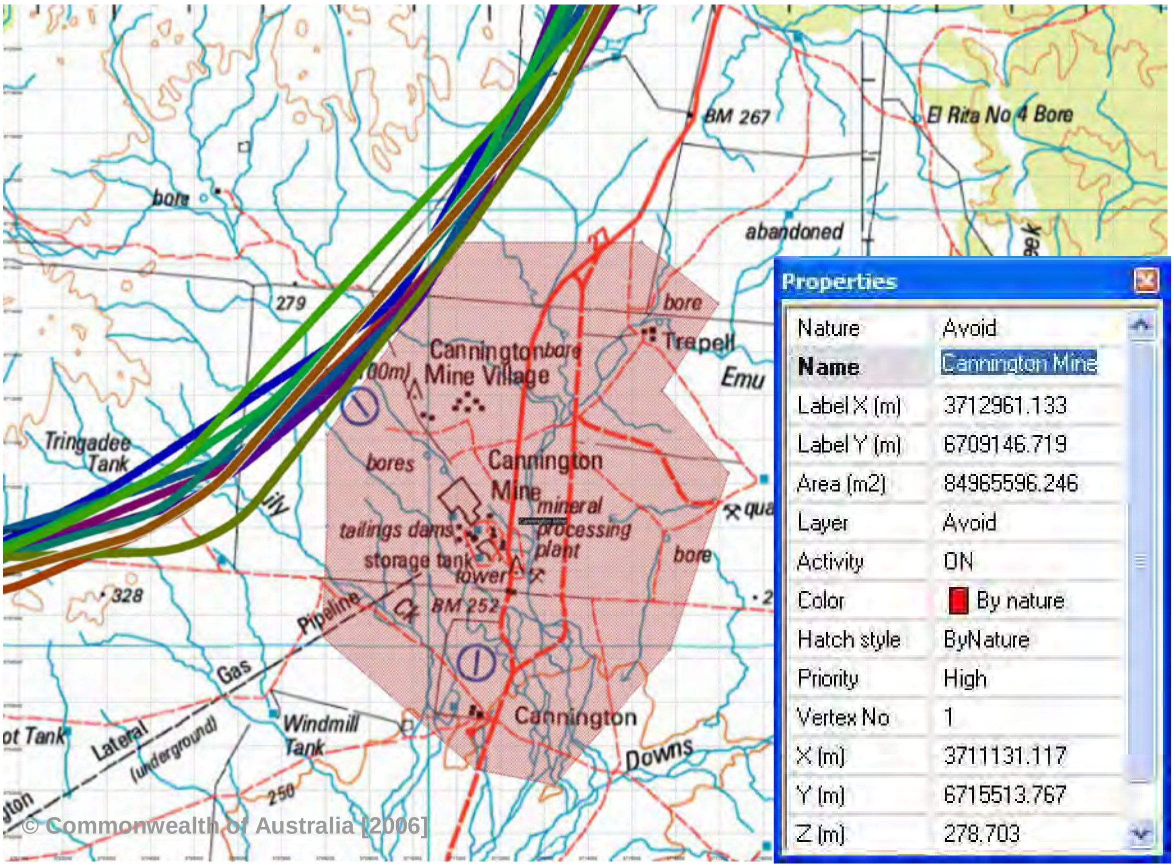
The following is an example that illustrates how these constraints could be included in future Quantm analysis to minimise their impact on sensitive environmental and land-use areas. The alignment marked in RED passes through the Nariana National Park. To minimise the impact on the National Park, but retain the low costs associated with this alignment, the alignment was "seeded" back into the Quantm system with the National Park attributed with a land acquisition cost. The resultant refined alignment options [shown in other colours] complied with this new constraint at a minimal or no extra cost.



(Fig 6.d) Using Quantm to define Areas of Land Acquisition such as Nairana National Park, Queensland.

6.6 Mineral Exploration Leases

Current and proposed mining leases, exploration permits and licenses were sourced from the Queensland Government Department of Mines and Energy; Northern Territory Department of Primary Industry, Fisheries and Mines; and Western Australian Department of Industry and Resources. The datasets consisting of spatial information featuring boundary and attributes for the mining areas, where not constrained within Quantm and instead used to isolate areas that required further consideration in future studies.



(Fig 6.e) Defining existing Mining leases such as Cannington Mine, Queensland to avoidance will result in the system generating all alignments around these sensitive areas.

6.7 Geology

Data defining various geological regions was sourced, however due to the preliminary nature of this study was not utilized. It was noted that the real geological cost influence on the rail alignment would be site specific, and for this stage the geology could only be used to determine major obstacles as opposed to actual costs influences. Further fieldwork will be necessary to determine the relative properties of these different geological formations. For the purposes of this study a single default geology was used across the entire study area.

(Fig 6.f) Varying Geological Formations across Study Area.

6.8 Data Application

During this Pre-feasibility work, the primary data set that was used to generate corridor alternatives was the digital terrain model, rail geometric requirements and unit construction costs. The data sets pertaining to land use land ownership, roads, water courses, geology and mining leases etc were not used to influence the location of the corridors during this stage of the investigation. At this stage, these data sets were however used to note and highlight specific issues, opportunities and constraints that will be addressed in subsequent work.

7.0 MAJOR ASSUMPTIONS AND UNCERTAINTIES

7.1 Cost Estimates

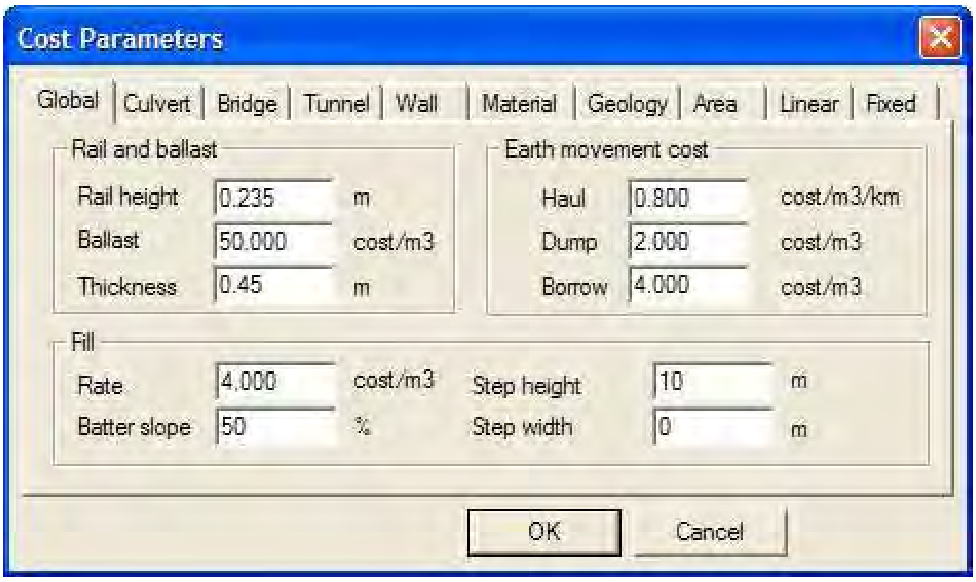
7.1.1 Global costs

Global costs are those that are applied over the entire study area and do not vary locally. A linear cost of $750/m was used throughout the study to cover track materials supply and track laying costs.

Other global cost rates include:

- Fill placement: $4.00/m^3
- Borrow material (import): $4.00/m^3
- Dump material (export): $2.00/m^3
- Haulage: $0.80/m^3/km
- Ballast supply & placement: $50.00/m^3

For the purpose of this study, and for comparative purposes in alignment selection, it was assumed that unit costs were independent of any variability in materials transport logistics, such as availability of suitable gravel for sub-ballast layer, crushed stone ballast, water for construction and pre-cast materials, which may vary significantly over the corridor length. Any extra costs for construction in remote areas will be accounted for in overheads and special costs at a later stage. All rates are in 2006 dollars and are based on recent historical data only.



(Fig 7.a) Global costs as utilised within the Quantm system.

7.1.2 Structure costs

The Quantm system required these rates to decide where it was more economical to place a structure rather than constructing very high embankments or generate deep cuttings. Viaduct, tunnel and retaining wall rates were estimated at the following values:

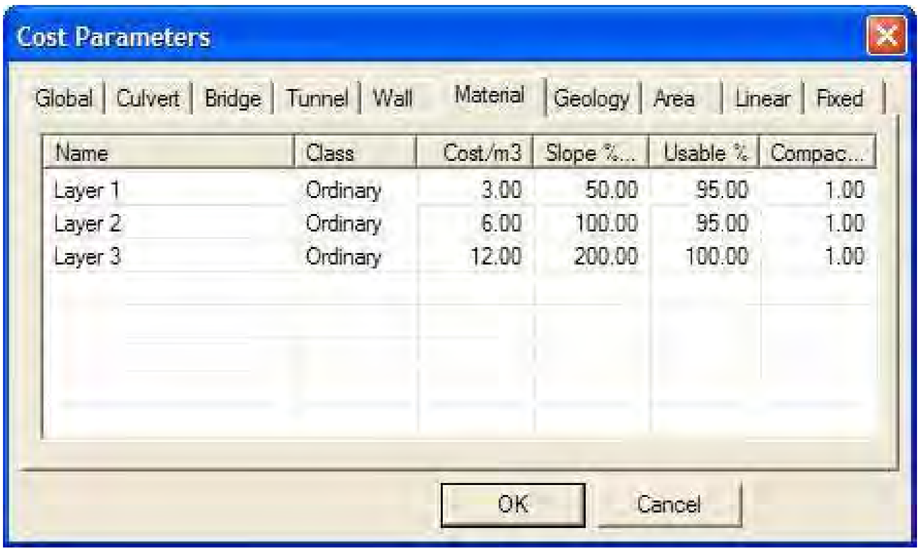
- Bridge (based on plan area): $3,000/m²
- Tunnel (linear cost): $1,000,000/m
- Retaining wall (surface area): $1,500/m²

7.2 Geotechnical Requirements

While digital data for geology had been acquired by Quantm, for this level of analysis the structure and properties of geological formations as these may impact on railway design and construction costs, were assumed to be consistent across the entire study area with respect to the global cost rates used to cost the overall capital costs.

It was noted that to a large extent, the study area was across flat terrain with isolated areas of semi-rough and sandy formations that would require further consideration in future studies.

Three separate layers of material were defined with associated excavation rates, batter slopes, compaction rates, the fraction of usable material that could be used for fill, and the unusable part to be hauled away and discarded as dump. The material costs entered into the system for each material reflected the depth of excavation and material hardness, with an easily worked surface material, overlying harder, more costly material.



Name	Class	Cost/m3	Slope %...	Usable %	Compac...
Layer 1	Ordinary	3.00	50.00	95.00	1.00
Layer 2	Ordinary	6.00	100.00	95.00	1.00
Layer 3	Ordinary	12.00	200.00	100.00	1.00

(Fig 7.b) Material structure & properties used within the Quantm system.

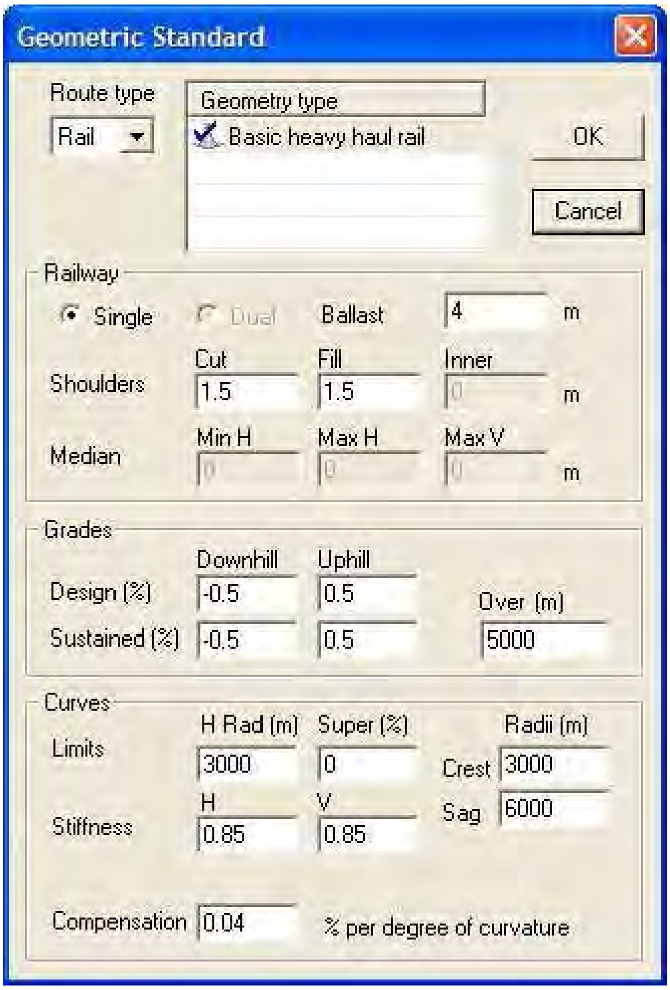
The default geology was based on three horizontal stratums, with the first starting at the natural surface and travelling down to a depth of 3m, second a further 5m deep, and the final stratum being of infinite thickness. Rail corridor cross section would requiring benching every 5m and be stepped 2m across.

(Fig 7.c) Geology used within the Quantm system.

7.3 Geometric Criteria

Preliminary estimates of rail engineering parameters for curvature and compensation were selected based on similar heavy haul rail projects. These values were reviewed and confirmed by EWLP in an email to Quantm on 15/12/06. EWLP advised that these criteria are suitable for the heavy haul standard gauge trains to operate at a design speed of 80km/hr.

- Min Horizontal Radius: 3000m
- Min Vertical Radius for Crest: 3000m
- Min Vertical Radius for Sag: 6000m
- Gradient: 0.5%
- Curve Compensation: 0.04%



(Fig 7.d) Geometric standards used within the Quantm system.

7.4 Earthwork Limits & Mass Haul Considerations

Earthwork limits restricting the maximum height of embankments and maximum depth of cut were not deemed necessary for this first stage of work. This was based on the assumption that the small sections of terrain that were not flat would not generate high/deep escarpments across the landscape and therefore would not effect corridor location on a macro scale.

With the Rail Line broken up into 200km sections it was also assumed that mass haul would be balanced at the end of each section. It was noted however that mass haulage over this distance may be too excessive and a more practical mass haul balance would require the identification of possible natural spots for mass haul barriers, sources of fill or dump sites for spoil.

7.5 Sandy Desert Crossings Requirements

There is some uncertainty associated with crossing through Western Australia where the rail corridor will need to negotiate desert crossings through sandy areas such as The Gibson Desert, Great Sandy Deserts and the Little Sandy Desert. This may involve several hundred kilometres of track through or parallel to sand ridges of varying density, reaching heights of 15-20m in some locations.

Such crossings although not given any special attention within this stage of the analysis, will require consideration due to the effects of dune instability, soil erosion and acceleration of wheel and rail wear from drifting sands, if applicable. Mitigation of these effects in future studies using Quantm may come in the form of paralleling ridges, following an existing track where possible (e.g. Talawana Track), employing a flatter more stable cross section, using a wider formation to allow for fabrication and vegetation banks, and minimising the lengths of tracks crossing these desert areas, and further detailed engineering assessment of these areas will be required during the Detailed Feasibility stage.

7.6 Dry Creeks and Floodplains

There are numerous perennial/non-perennial river systems, wetlands and lakes located throughout the study area and at this stage their impact on rail corridor location and costs is uncertain. Some of the more major drainage systems that may have some level of impact on the rail corridor include; Wokingham Creek, the upper reaches of the Diamantina, Burke and Georgina Rivers in North West Queensland, together with Lake Mackay, Napperby Creek, Hanson River, Lander and Fortescue Rivers in Western Australia.

Catchment features, water levels, channel and flow patterns, discharge distribution and flood frequency could all have a bearing on the crossing type and clearance required over these systems. Crossing clearance will need to be at levels that ensure the track remains operational during the infrequent but possibly extended periods of inundation. Some may necessitate an expensive bridge made lengthy by the requirement to reach a certain clearance at a fairly low gradient. Others such as dry lakes and floodplains may only require the use of regularly spaced culverts to allow sheet flow to pass underneath, or raising the railroad onto an embankment to meet a minimum height above expected flood levels. There may also be the need to minimize the environmental impact of crossing over the sensitive ecosystems.

7.7 Indigenous & Environmental Areas

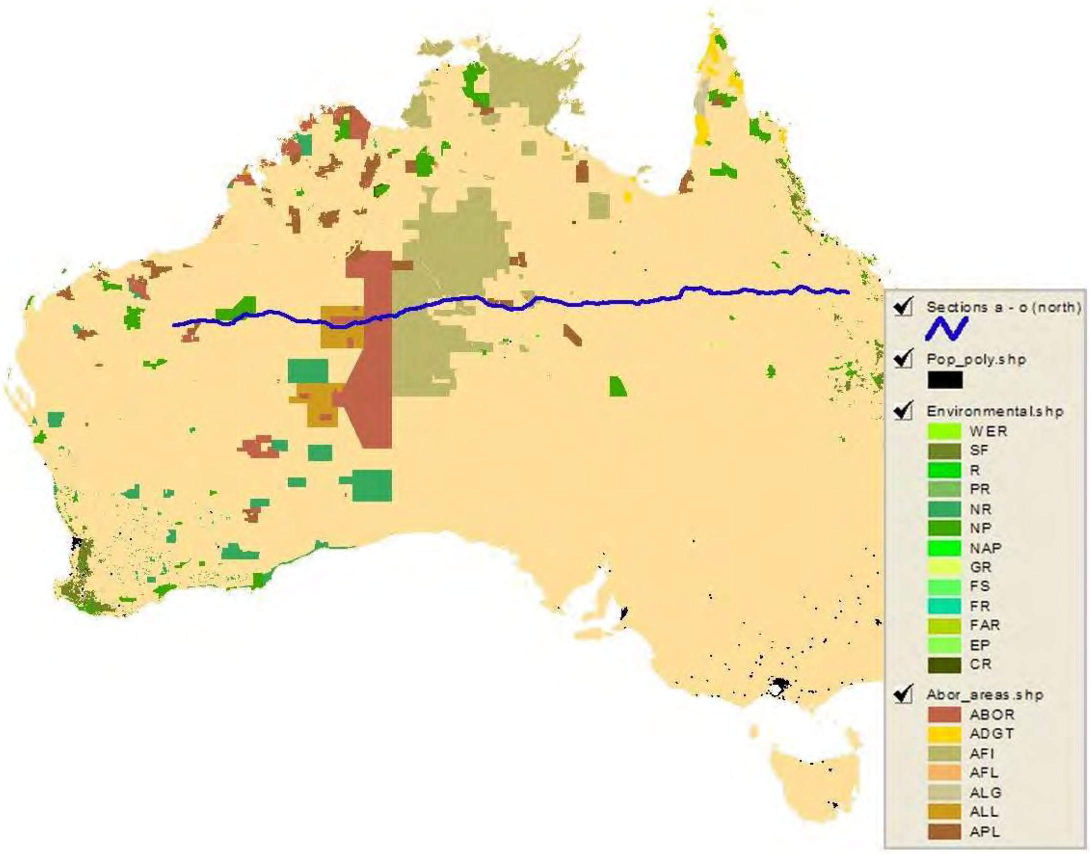
Visualisation of the GIS datasets identified various regions of land which may be affected by the proposed rail route. The two major types of regions, Indigenous and Environmental, will likely require avoidance or land access permitting in order for the railway to pass through them.

Whilst the entire corridor will be subject to need to identify and manage cultural heritage issues, and potentially be subject to Native Title claims from the traditional owners, the rail corridor will need to traverse current Aboriginal controlled lands, such as the Central Australia Aboriginal Reserve and Kiwirrkurra Aboriginal Reserve, both of which lie in Western Australia. There are also a small number of national and state reserves located across the study area including The Rudall River National Park in Western Australia and

Nairana and Bladensburg National Parks in Queensland. The impact of these social / environmental areas on the rail corridor is somewhat uncertain, and will be subject to further investigation, consultation and agreement with the various stakeholders.

There was no data included within this analysis to represent the boundaries of these sensitive constraints, however for future investigations various socially / environmentally sensitive areas can be defined as mitigation costs areas, and then changed to avoidance criteria to determine the engineering cost to protect these sensitive sites. The system can then demonstrate compliance with these criteria, and therefore demonstrate environmental consideration and avoidance to ensure a better public and environmental outcome.

The map below shows at a macro scale, where indigenous and environmental areas are located in relation to the favoured corridor. These are primarily Aboriginal controlled lands in the Northern Territory and Western Australia.



(Fig 8.b) Map showing major Indigenous and Environmental areas.

7.8 Cost Relativities

The raw corridor costs generated in this initial round of processing are based on assumed unit cost, terrain and alignment geometric requirements, for selected items used in comparative assessment of the various corridor options. They are a good guide as to the relative construction costs in 2006 dollars of the alternative corridors within the sections evaluated, but do not indicate full rail project costs such as contingences, overheads and profits, nor the impacts of remote areas and differential costs along the extended corridor.

The unit rates exclude the variable impacts of yet-to-be-determined sources of supply and the associated haul distances for major construction inputs such as water, gravel sub-ballast layers and track materials. In addition costs such as project management, detailed design, land acquisition and associated costs, train control, signaling and communications systems, and contingency provisions etc have are not included in the raw construction costs being calculated in Quantm for each of the corridors/alignments generated.

At this stage of the project development, an allowance for the total capital cost of the rail line will be the Quantm raw cost plus approximately 10% construction contingency, $500 million for bridges allowances and 65% for overheads and profit (percentages provided by EWLP). The anticipated capital costs hence total $6.4b. Note that the Quantm model and costing does not include the section from the Riverside stating point to Abbot Point.

During the next more detailed stage of alignment development factors such as:

- Drainage structures
- River crossings (culverts/bridges)
- Minor linear costs (fencing, etc.)
- Grade separated crossings of major highways/railways
- More accurate and detailed geological information and likely sources of ballast and gravel
- Design standards for crossing desert sections
- Avoidance or land mitigation of environmental areas
- Avoidance or land mitigation of other incompatible land-use areas

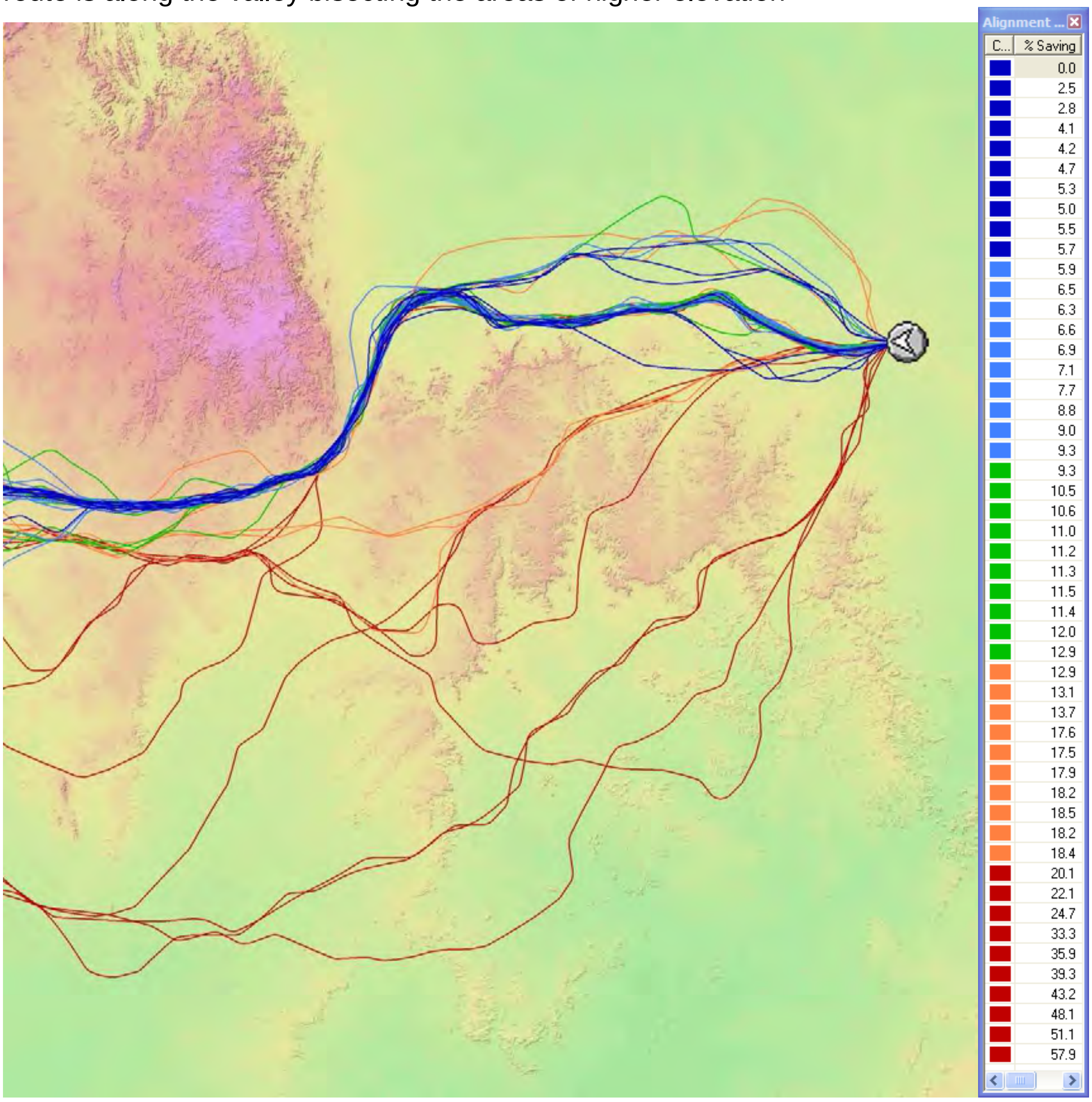
will be assessed individually as to their cost impact, which will increase the certainty and reduce the contingency factor.

8.0 CORRIDOR SEARCH

8.1 Corridor Search - Full Area

Quantm was used to perform free-to-roam searches across each of the fifteen sections comprising the study area. In free-to-roam mode, the Quantm system searches the whole terrain for low cost alternatives. The output is a range of up to fifty rail alignments spreading across the terrain model. Clumping of alignments indicates a favourable corridor. Colour coding the alignments in order of cost, highlights the lowers cost corridor. Using this functional capability of the Quantm system, provides evidence that the whole of the available area has been searched for viable corridors.

In the example below, which shows a set for results generated in Section D1, the lowest cost corridor is shown by the clumping of blue alignments. It can be seen that the cheapest route is along the valley bisecting the areas of higher elevation



(Fig 8.a) Example results set from Section D1 of 50 alignments coloured by cost.

8.2 Corridor Descriptions

Analysis of these results showed the key driver of corridor location to be grade related. The overall trend in the results is that the low cost corridors tended to favour the most direct route from section to section. Deviations from a straight line were forced by the very low maximum grade which resulted in to the corridors deviating to avoid any rough or mountainous terrain.

After the initial low cost corridors that met the geometric and grade constraints were identified, a collaborative review was carried out between Quantm and EWLP. The purpose of this was to identify any macro level features of importance which could impact the more favoured corridor alternatives. Each of these significant features will require special attention at the next level of investigation to modify the corridor in those specific areas to address each issue. These features have been summarised in the following table.

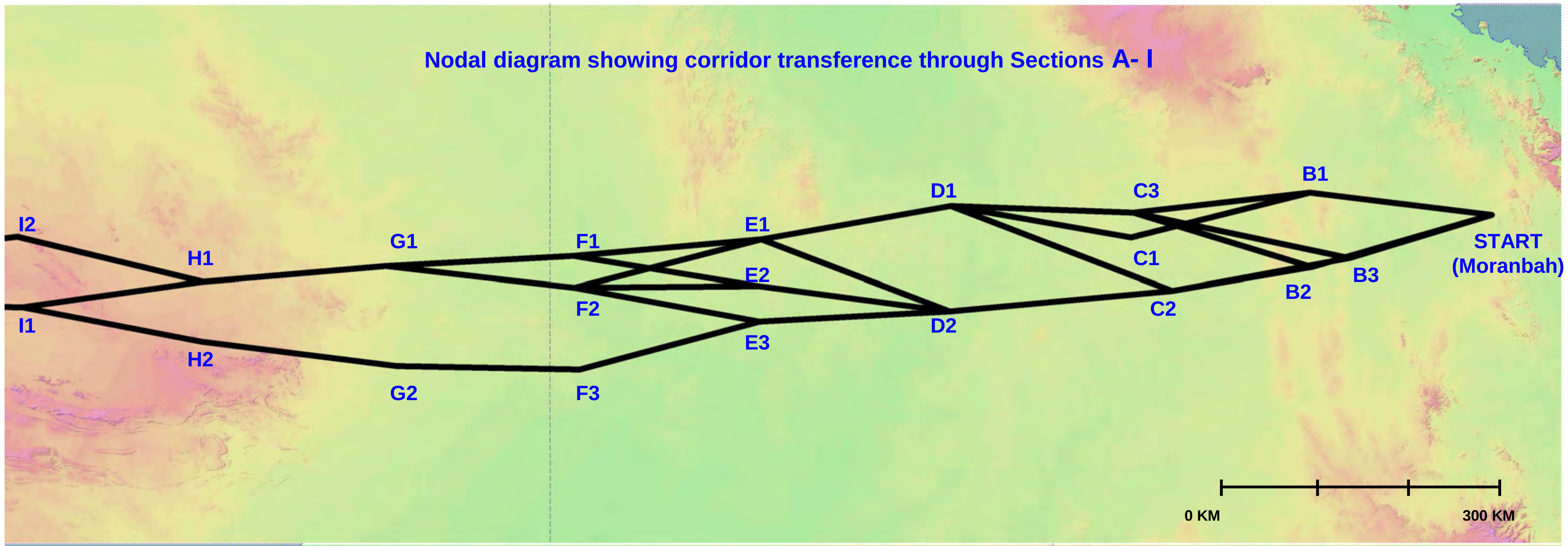
Table 8.a: Summary of Length, Cost and Significant features for Corridor Sections.

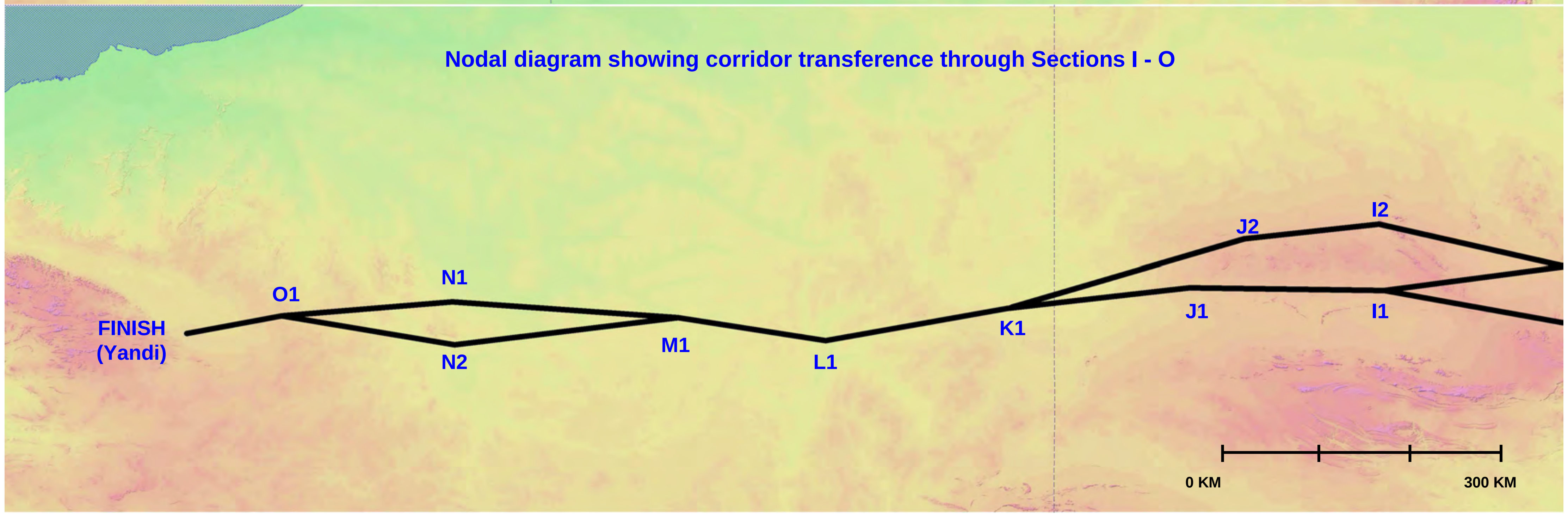
Corridor Section	Distance (km)	Raw Cost* ($)	Significant Features
A – B1	216.2	$238M.	Consideration to existing Mining leases, Gregory Developmental Road, Nairana National Park
A – B2	212.7	$232M.	Gregory Development Road, Twin Hills
A – B3	169.9	$179M.	Gregory Development Road, Twin Hills
B1 – C1	218.5	$215M	Small Dry Lakes, Lake Buchanan, Landsborough Creek
B1 – C3	224.9	$217M	Landsborough Creek
B2 – C2	172.6	$164M	Towerhill Creek, Lake Galilee, Lake Barcoorah
B2 – C3	228.9	$225M	
B3 – C2	217.4	$220M	
B3 – C3	264.4	$268M	
C1 - D1	222.4	$218M	Winton Highway, Winton Branch Railway, Wokingham Creek Landsborough Highway, Diamantina Creek, Winton Township
C2 – D1	273.7	$282M.	
C2 – D2	267.4	$282M.	Winton, Western River, Bladensburg National Park, Diamantina River
C3 – D1	221.0	$219M.	Kynuna
D1 – E1	246.6	$235M.	Diamantina River, Landsborough Highway, Mckinly River System, Cannington Mine (BHP), Chatsworth, Phosphate Hill Mine
D2 – E1	239.7	$236M.	
D2 – E2	231.7	$232M.	
D2 – E3	235.6	$238M.	

E1 – F1	223.4	$221M.	Phosphate Hill Mine, Diamantina Development Road, Georgina River
E1 – F2	227.0	$230M.	
E2 – F1	226.2	$236M.	
E2 – F2	213.8	$232M.	
E3 – F2	225.9	$225M.	
E3 – F3	226.8	$254M.	
F1 – G1	210.4	$198	Some Small Sand Dunes
F2 – G1	213.1	$207M.	
F3 – G2	223.0	$222M.	
G1 – H1	227.4	$217M.	Ooratippra Creek System, Sand Ridges, Bundey Creek, Sandover Highway, Sandover River
G2 – H2	225.0	$227M.	
H1 – I1	226.6	$211M.	Ti-Tree, Hanson River, Lander River
H1 – I2	223.8	$219M.	Stuart Highway, Alice Springs Darwin Railway, Darwin Gas Pipeline
H2 – I1	213.7	$199M.	
I1 – J1	216.7	$202M.	
I2 – J2	147.2	$139M.	Cockatoo Creek, Tanami Road, Yaloogarie Creek
J1 – K1	208.5	$203M.	
J2 – K1	279.6	$265M.	Sand Dunes, Lake MacKay, Central Australia Aboriginal Reserve
K1 – L1	219.0	$226M.	Kiwirrkurra Aboriginal Reserve , Sand Ridges through Gibson Desert
L1 – M1	170.9	$186M.	Patchy Sand Dunes
M1 – N1	274.2	$276M.	Rudall River National Park
M1 – N2	271.1	$293M.	Corridor not reviewed
N1 – O1	232.4	$238M.	Talawana Track, Little Sandy Desert
N2 – O1	228.3	$230M.	
O1 - Finish	105.0	$92.4M.	Fortescue River

* *Raw costs do not include contingencies, overheads, distance impacts, overheads or profits.*

In each of the following corridor drawings, the corridor marked as BLUE is the initial preferred corridor due primarily to its shorter length and lower raw cost.





No	Revisions and Issues	Date
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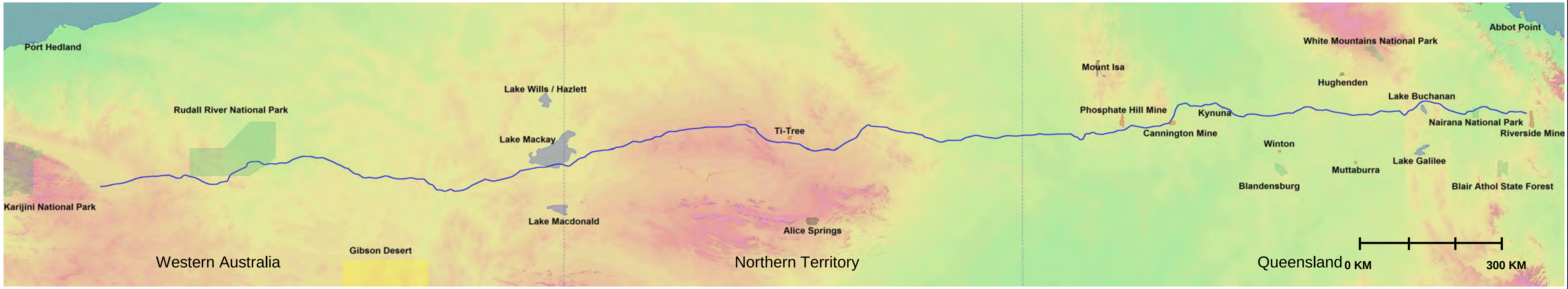
East West Line Parks Pty Ltd
Project Iron Boomerang:
Rail Corridor Identification Pre-feasibility Study

Date 5/2/2007
Scale: NTS
Drawing No PIB-RCI-01 Rev 0 – Nodal



(Figure 8.b) – Illustration showing the Preferred Northern Corridor Route.

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No	Revisions and Issues	Date
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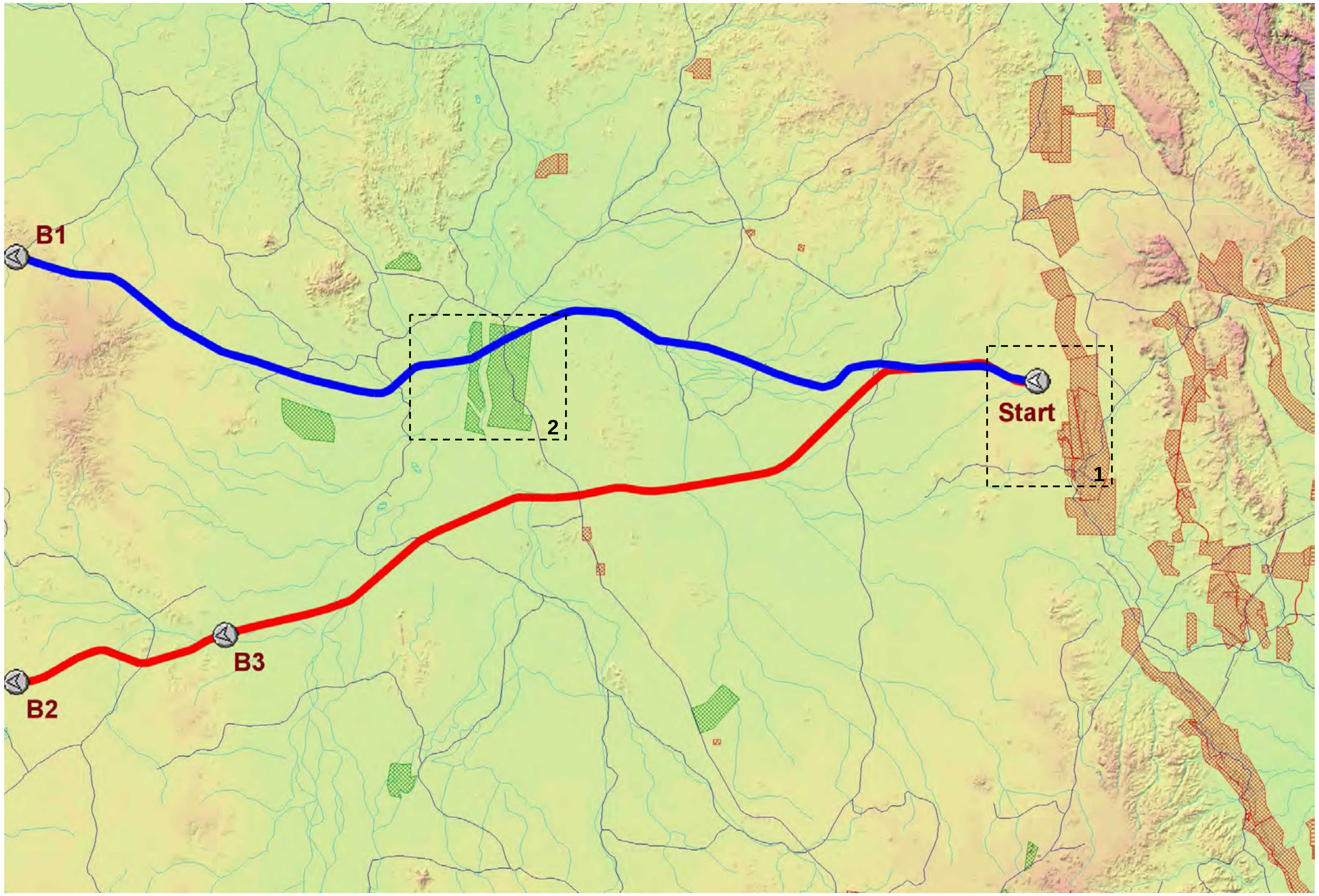
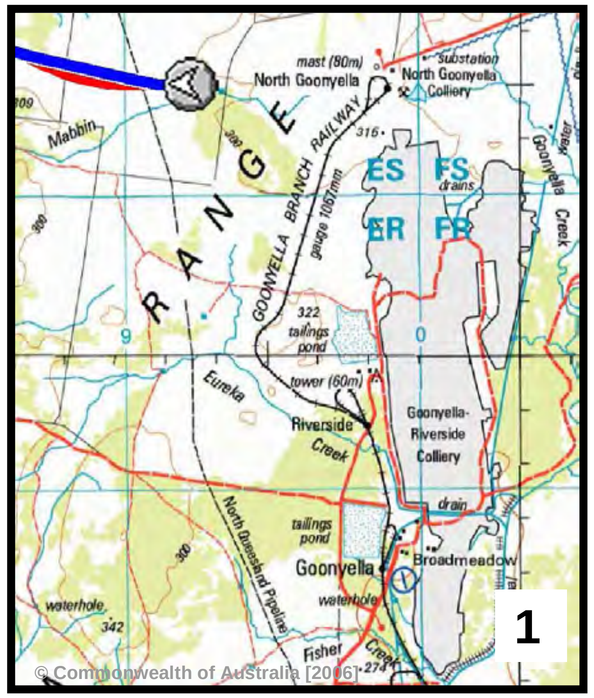
PROJECT IRON BOOMERANG
east west line parks pty ltd

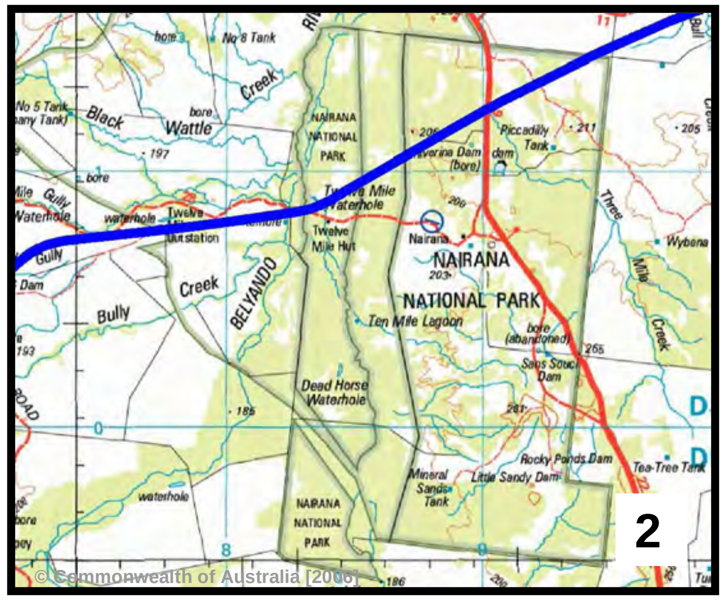
East West Line Parks Pty Ltd
Project Iron Boomerang:
Rail Corridor Identification Pre-feasibility Study

Date 5/2/2007
Scale: NTS
Drawing No PIB-RCI-01 Rev 0 – Preferred





Goonyella-Riverside Mine



Nairana National Park

QUANTM
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No	Revisions and Issues	Date
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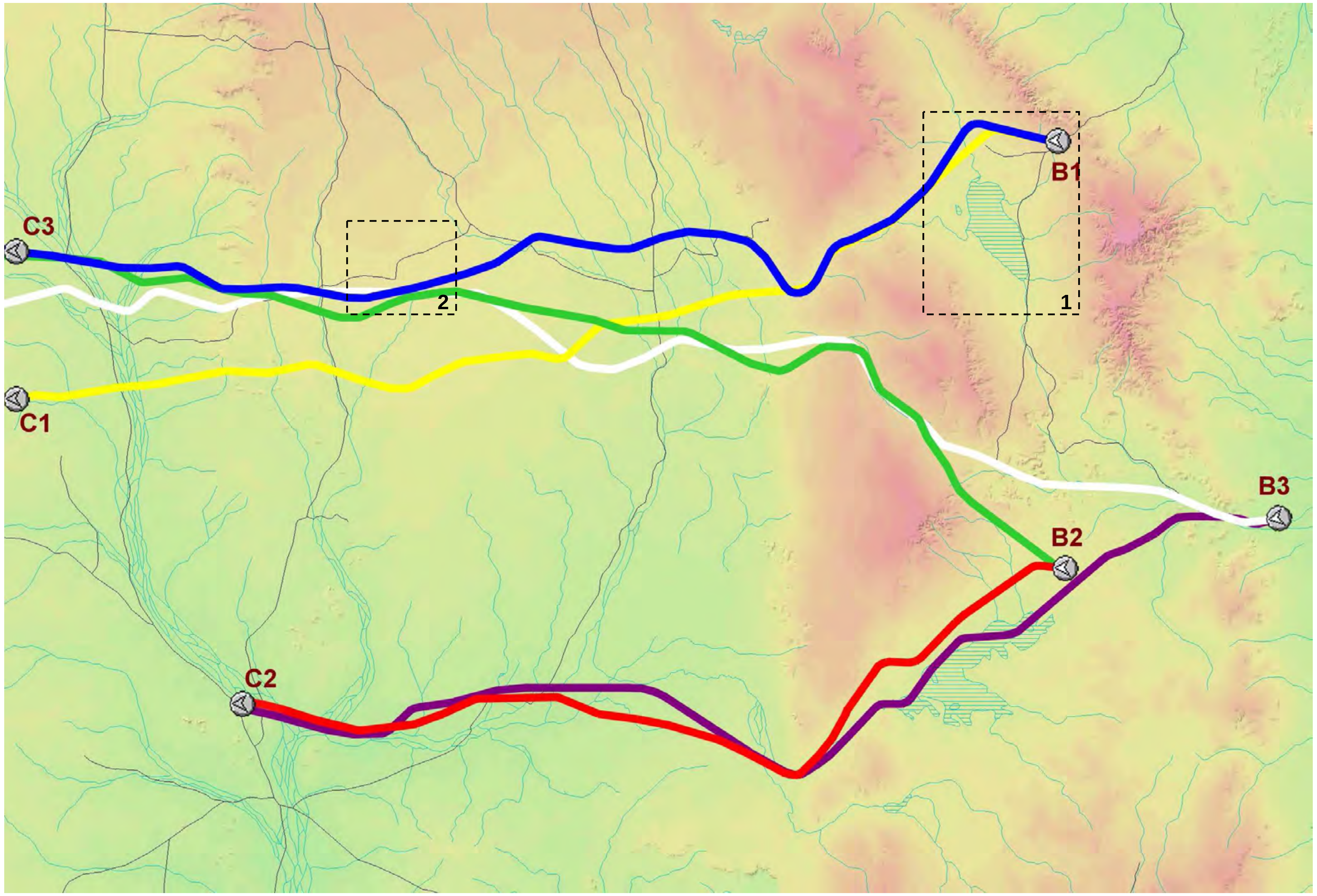
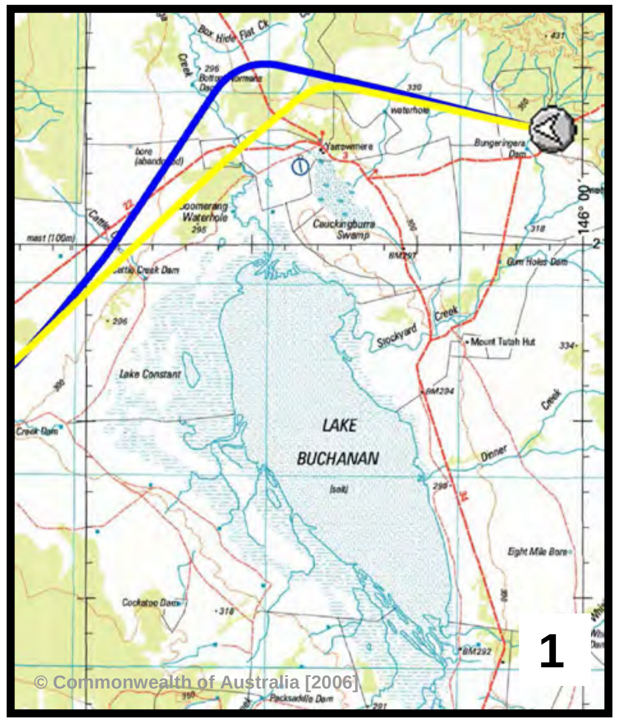
PROJECT IRON BOOMERANG
east west line parks pty ltd

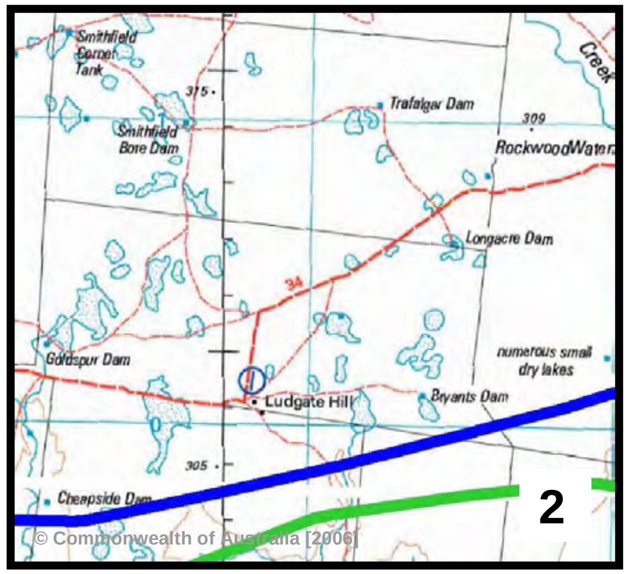
East West Line Parks Pty Ltd
Project Iron Boomerang:
Rail Corridor Identification Pre-feasibility Study

Date 5/2/2007
Scale: NTS
Drawing No PIB-RCI-01 Rev 0 – Section A





Lake Buchanan



Numerous small dry lakes

QUANTM
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No	Revisions and Issues	Date
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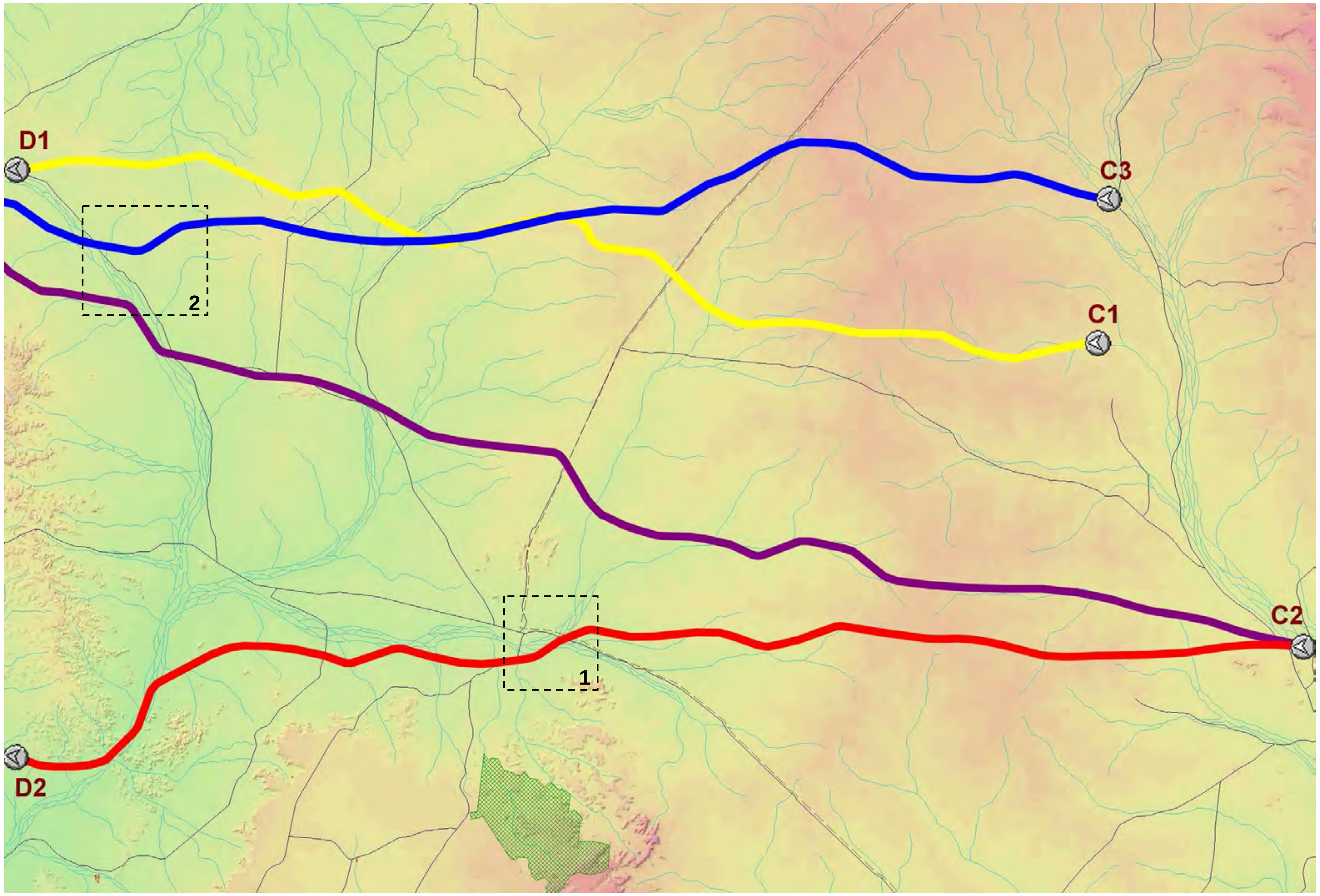
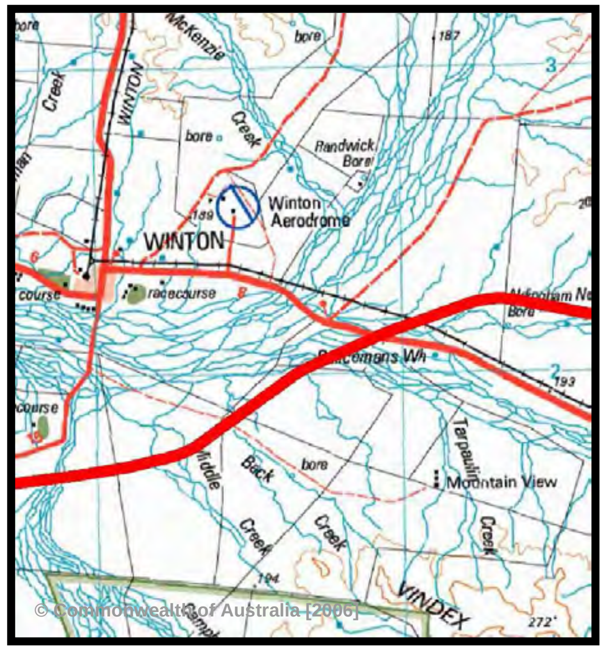
PROJECT IRON BOOMERANG
east west line parks pty ltd

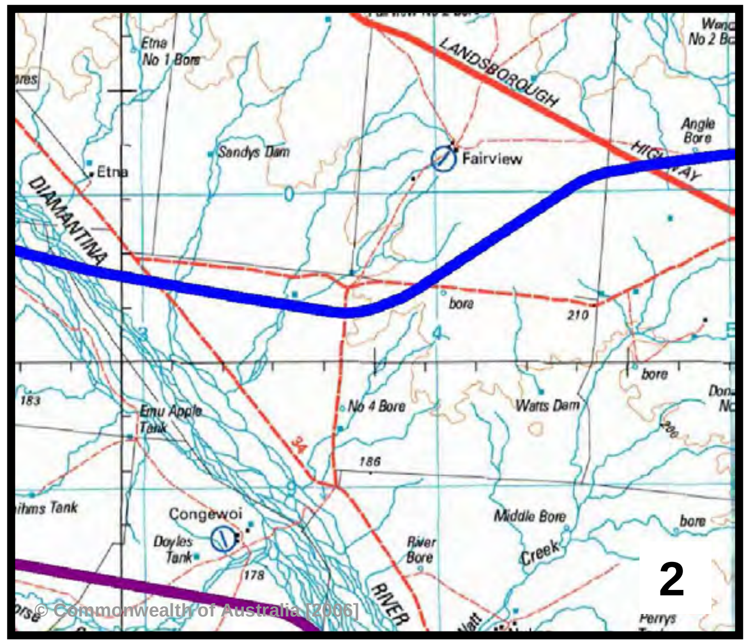
East West Line Parks Pty Ltd
Project Iron Boomerang:
Rail Corridor Identification Pre-feasibility Study

Date 5/2/2007
Scale: NTS
Drawing No PIB-RCI-01 Rev 0 – Section B





Winton Township



Diamantina River

QUANTM
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No	Revisions and Issues	Date
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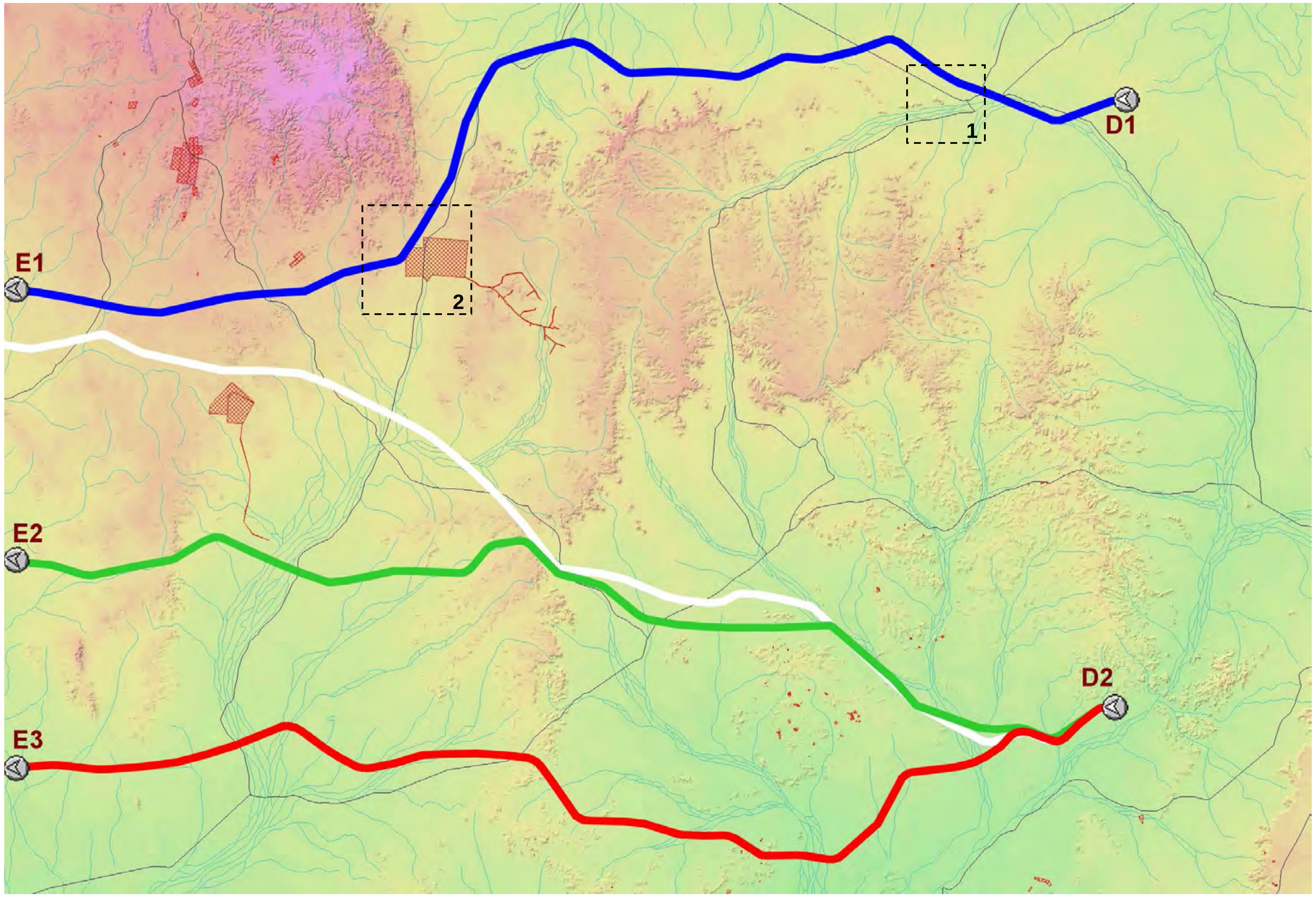
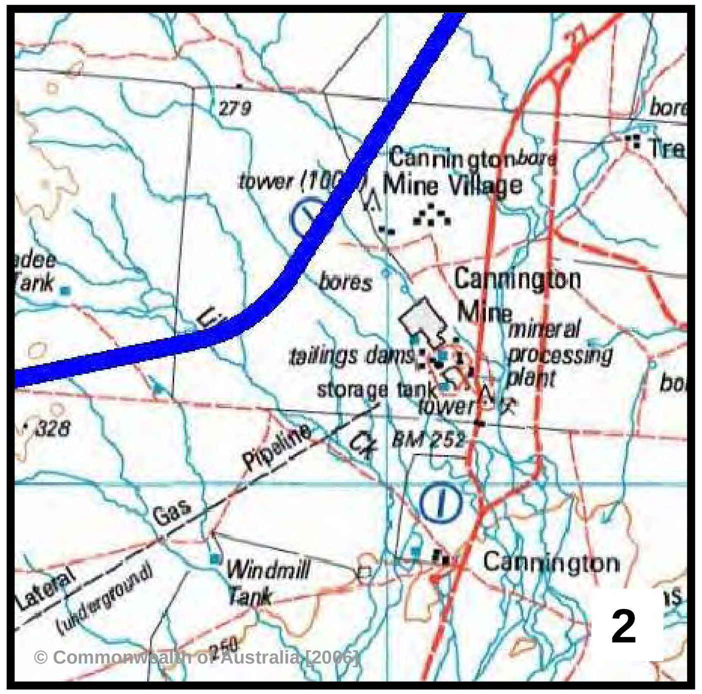
PROJECT IRON BOOMERANG
east west line parks pty ltd

East West Line Parks Pty Ltd
Project Iron Boomerang:
Rail Corridor Identification Pre-feasibility Study

Date 5/2/2007
Scale: NTS
Drawing No PIB-RCI-01 Rev 0 – Section C



Kynuna Township



Cannington Mine

QUANTM
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No	Revisions and Issues	Date
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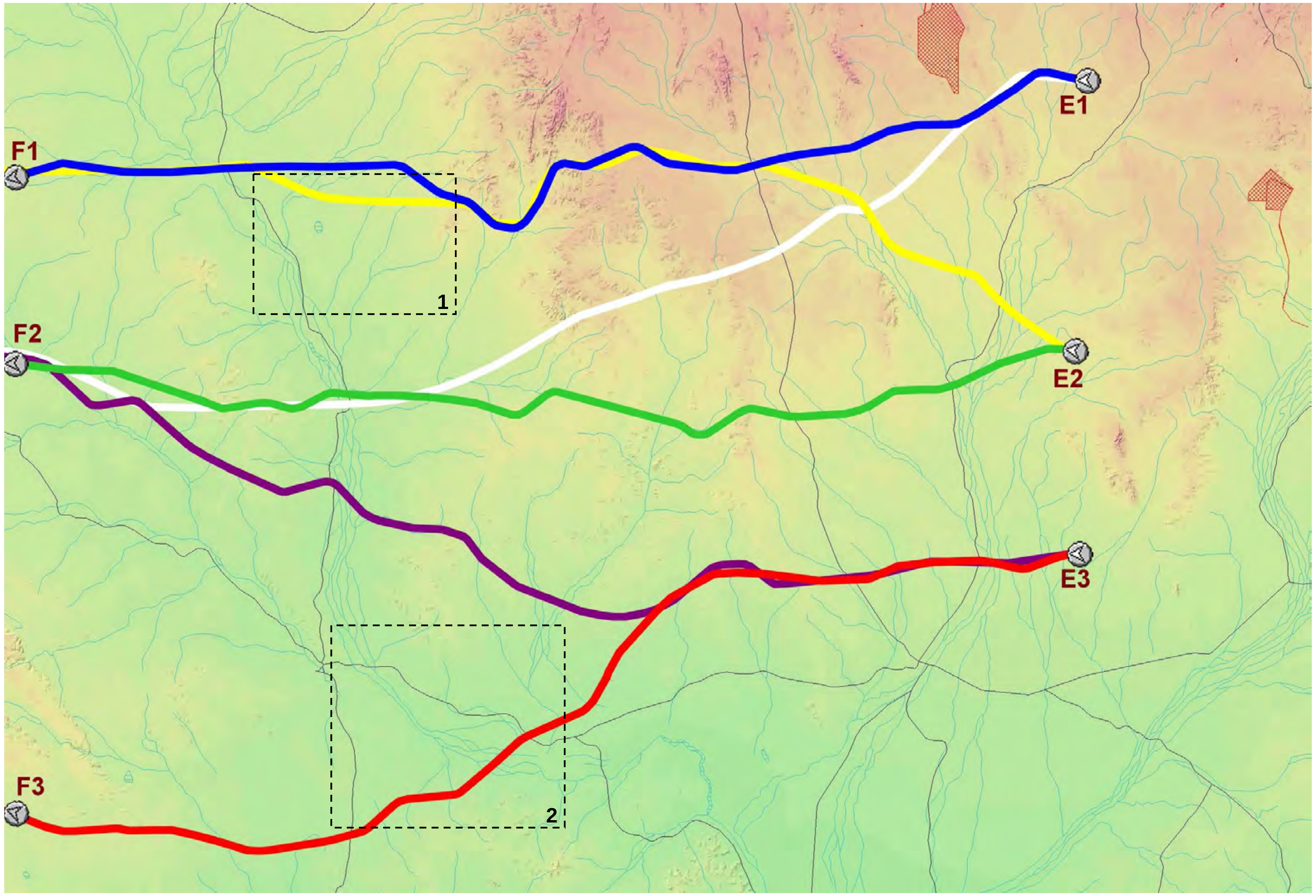
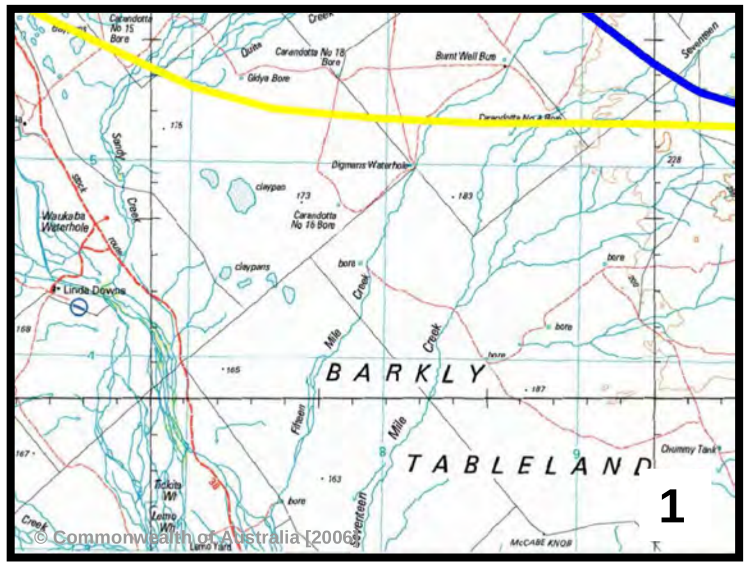
PROJECT IRON BOOMERANG
east west line parks pty ltd

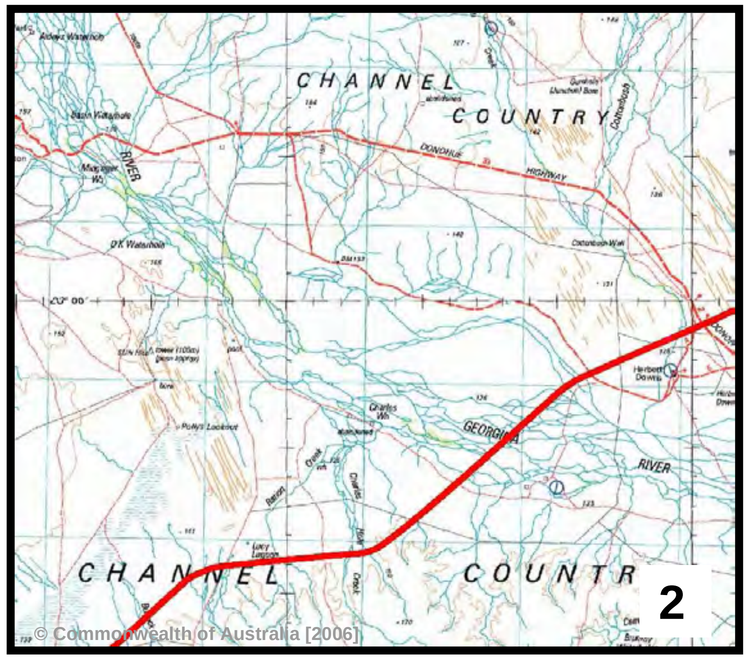
East West Line Parks Pty Ltd
Project Iron Boomerang:
Rail Corridor Identification Pre-feasibility Study

Date 5/2/2007
Scale: NTS
Drawing No PIB-RCI-01 Rev 0 – Section D

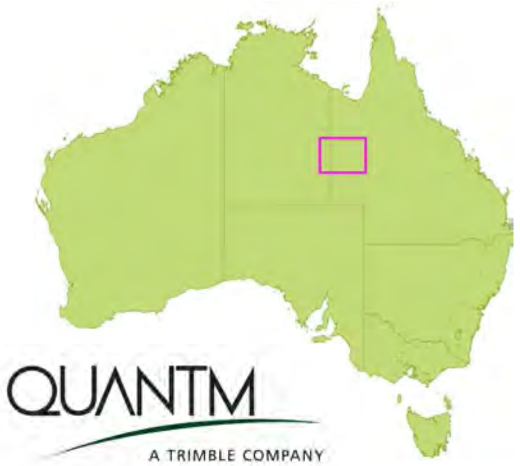




Barkly Tableland



Channel Country



QUANTM
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No	Revisions and Issues	Date
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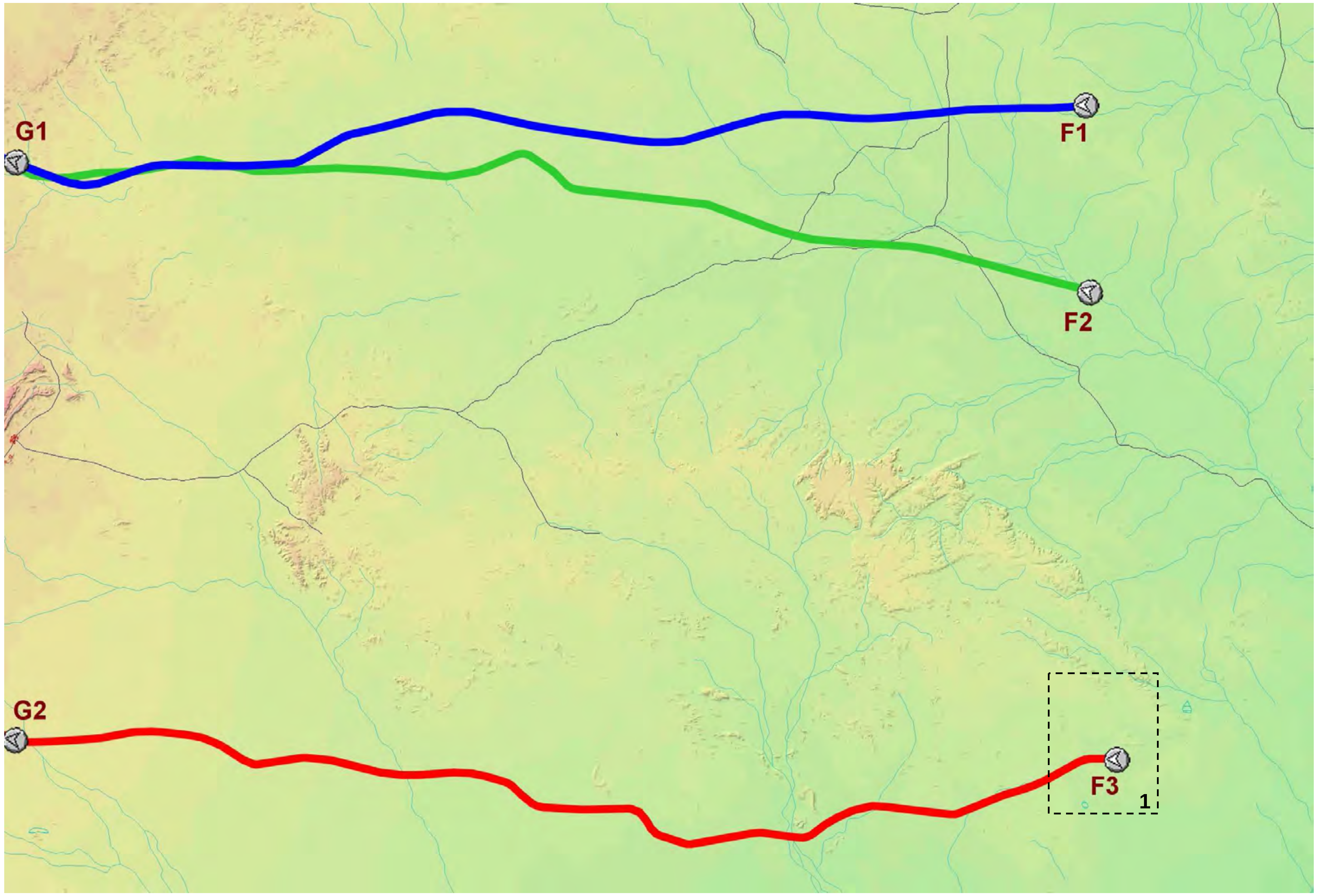
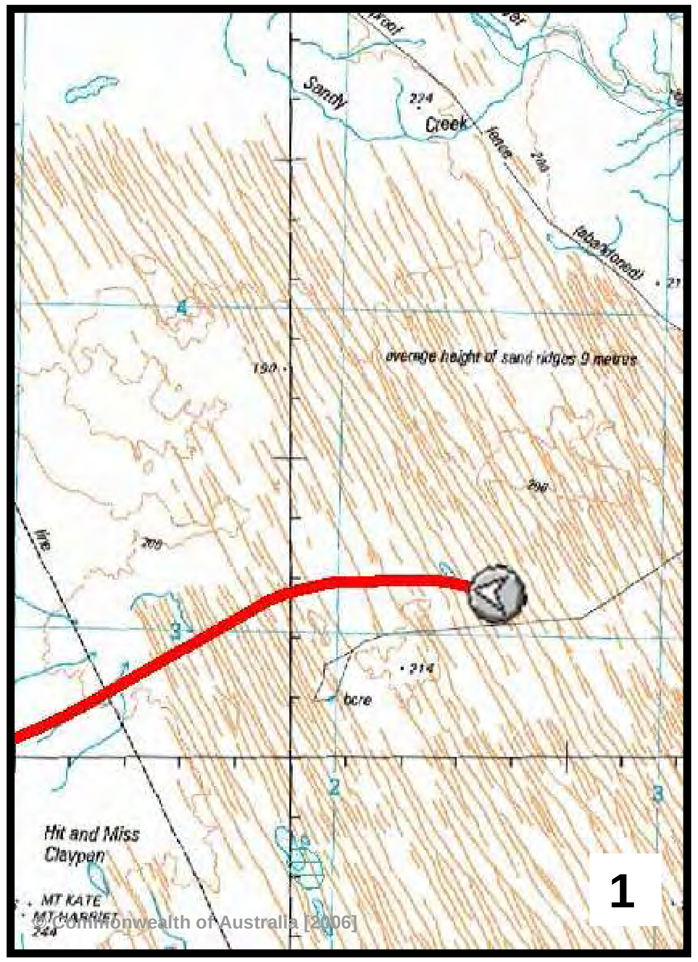
PROJECT IRON BOOMERANG
east west line parks pty ltd

East West Line Parks Pty Ltd
Project Iron Boomerang:
Rail Corridor Identification Pre-feasibility Study

Date 5/2/2007
Scale: NTS
Drawing No PIB-RCI-01 Rev 0 – Section E





Simpson Desert

QUANTM
A TRIMBLE COMPANY

No	Revisions and Issues	Date
2		
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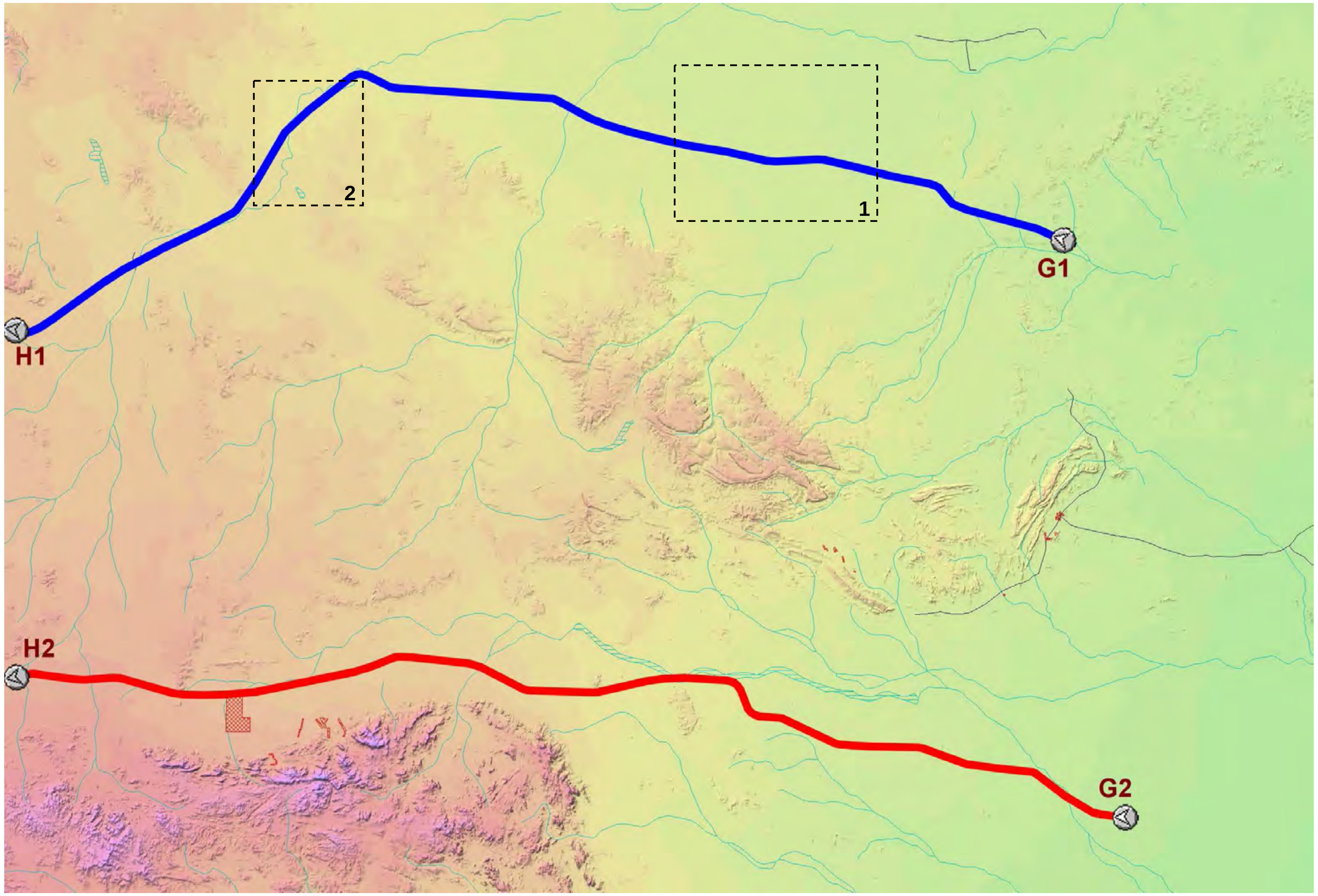
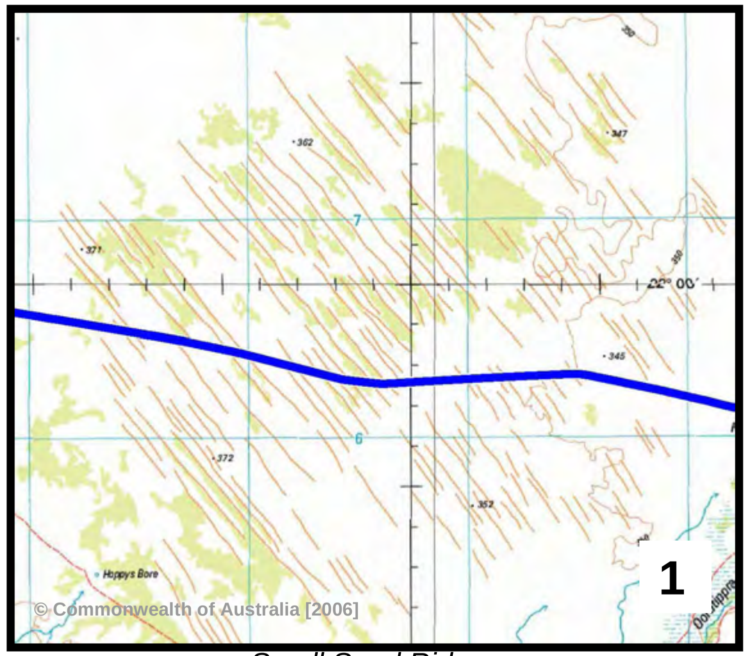
PROJECT IRON BOOMERANG
east west line parks pty ltd

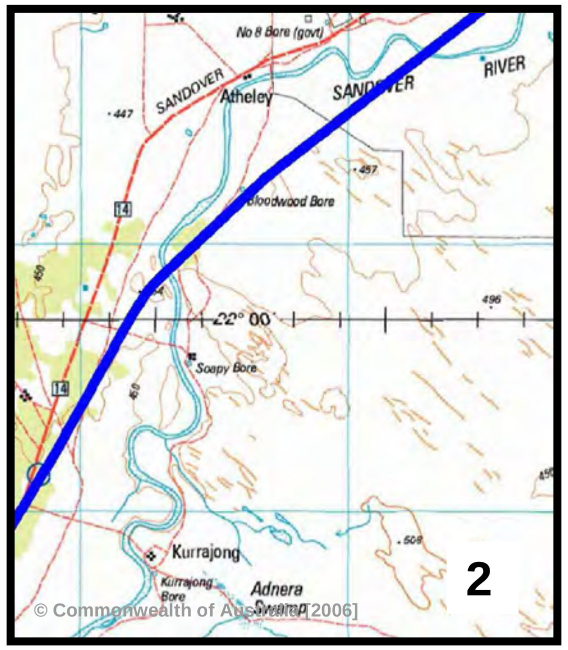
East West Line Parks Pty Ltd
Project Iron Boomerang:
Rail Corridor Identification Pre-feasibility Study

Date 5/2/2007
Scale: NTS
Drawing No PIB-RCI-01 Rev 0 – Section F

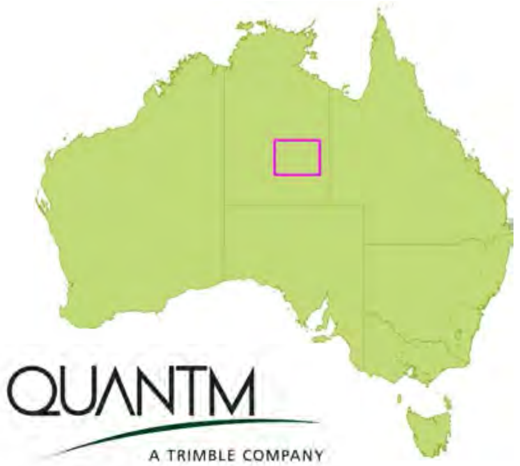




Small Sand Ridges



Sandover River



QUANTM
A TRIMBLE COMPANY

No	Revisions and Issues	Date
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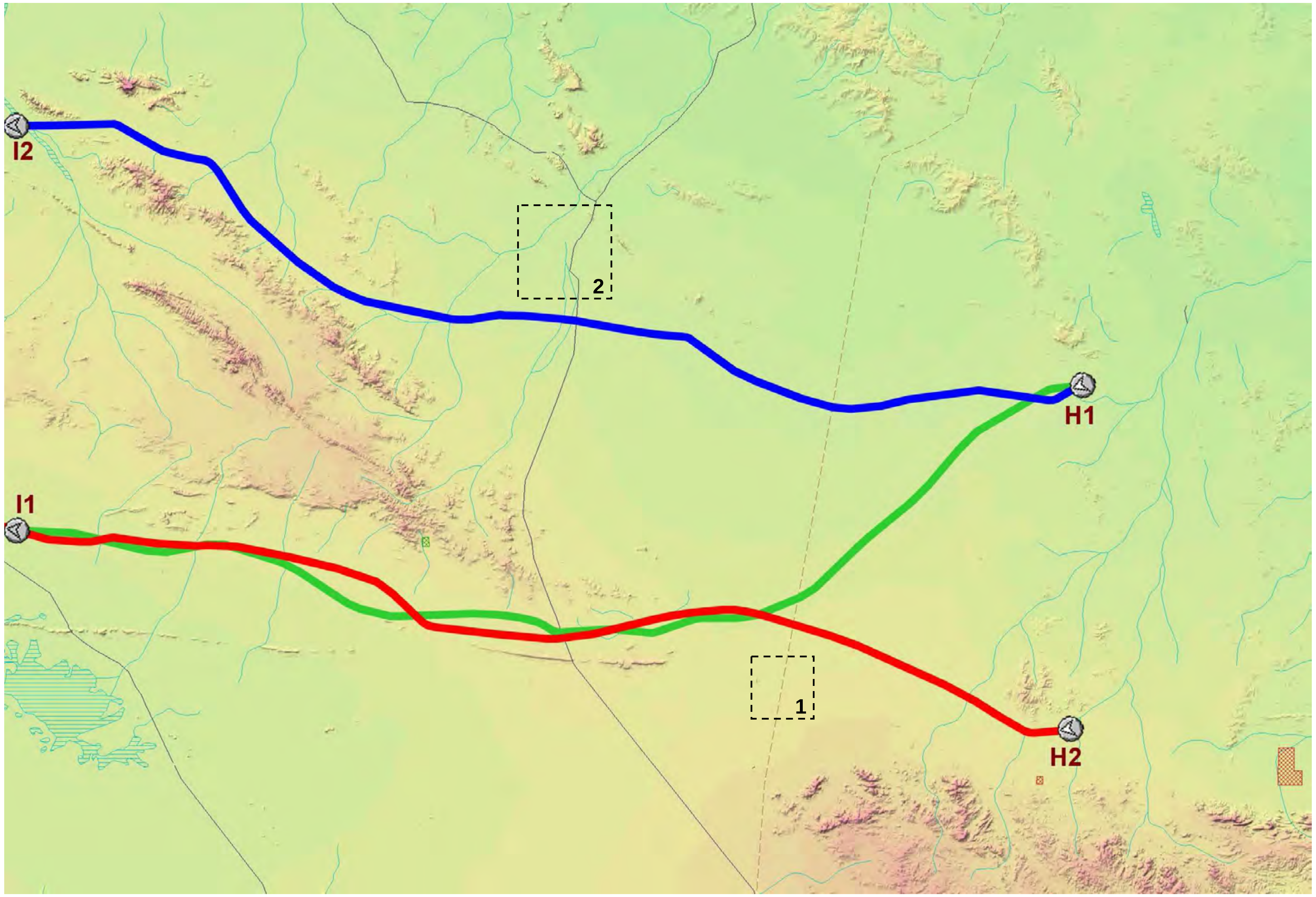
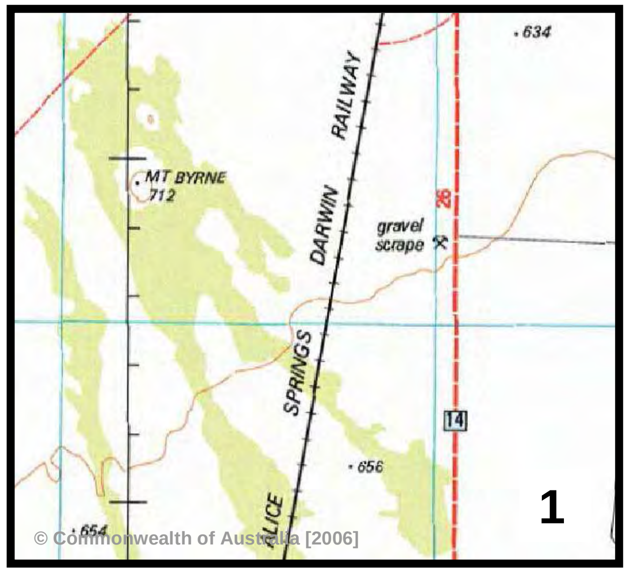
PROJECT IRON BOOMERANG
east west line parks pty ltd

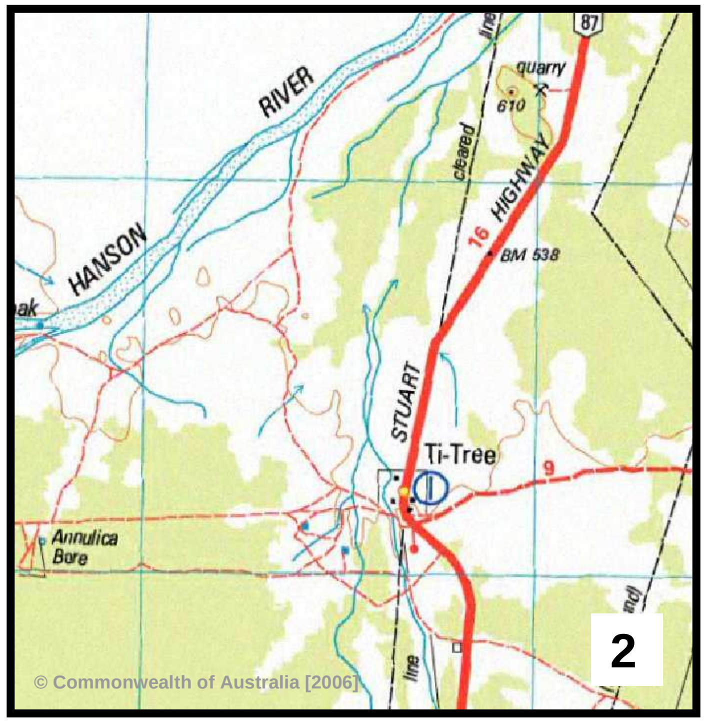
East West Line Parks Pty Ltd
Project Iron Boomerang:
Rail Corridor Identification Pre-feasibility Study

Date 5/2/2007
Scale: NTS
Drawing No PIB-RCI-01 Rev 0 – Section G

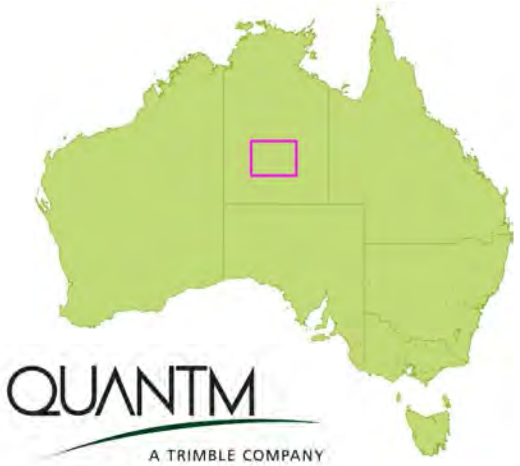




The Ghan



Ti-Tree Township



QUANTM
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No	Revisions and Issues	Date
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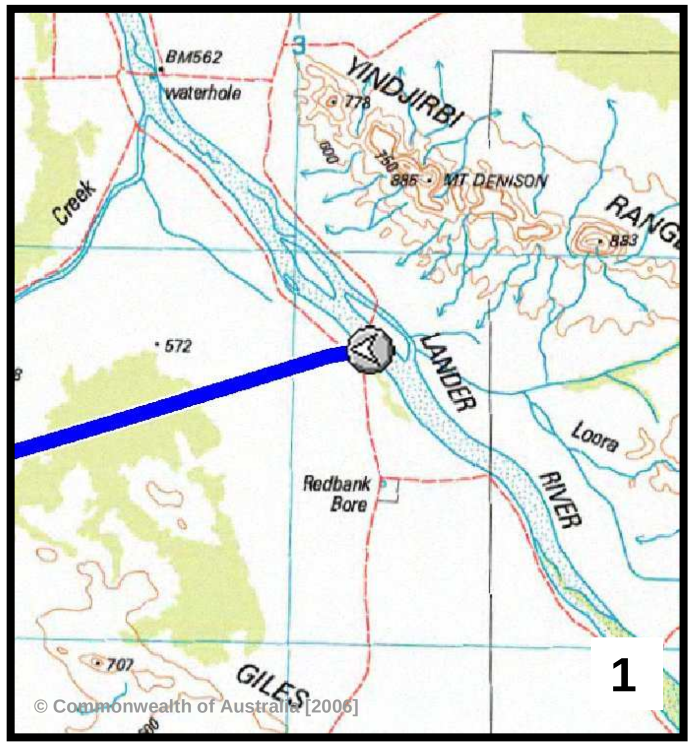
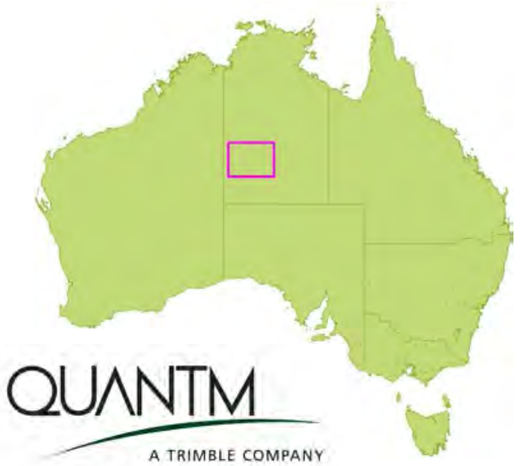
PROJECT IRON BOOMERANG
east west line parks pty ltd

East West Line Parks Pty Ltd
Project Iron Boomerang:
Rail Corridor Identification Pre-feasibility Study

Date 5/2/2007
Scale: NTS
Drawing No PIB-RCI-01 Rev 0 – Section H



Lander River



QUANTM
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No	Revisions and Issues	Date
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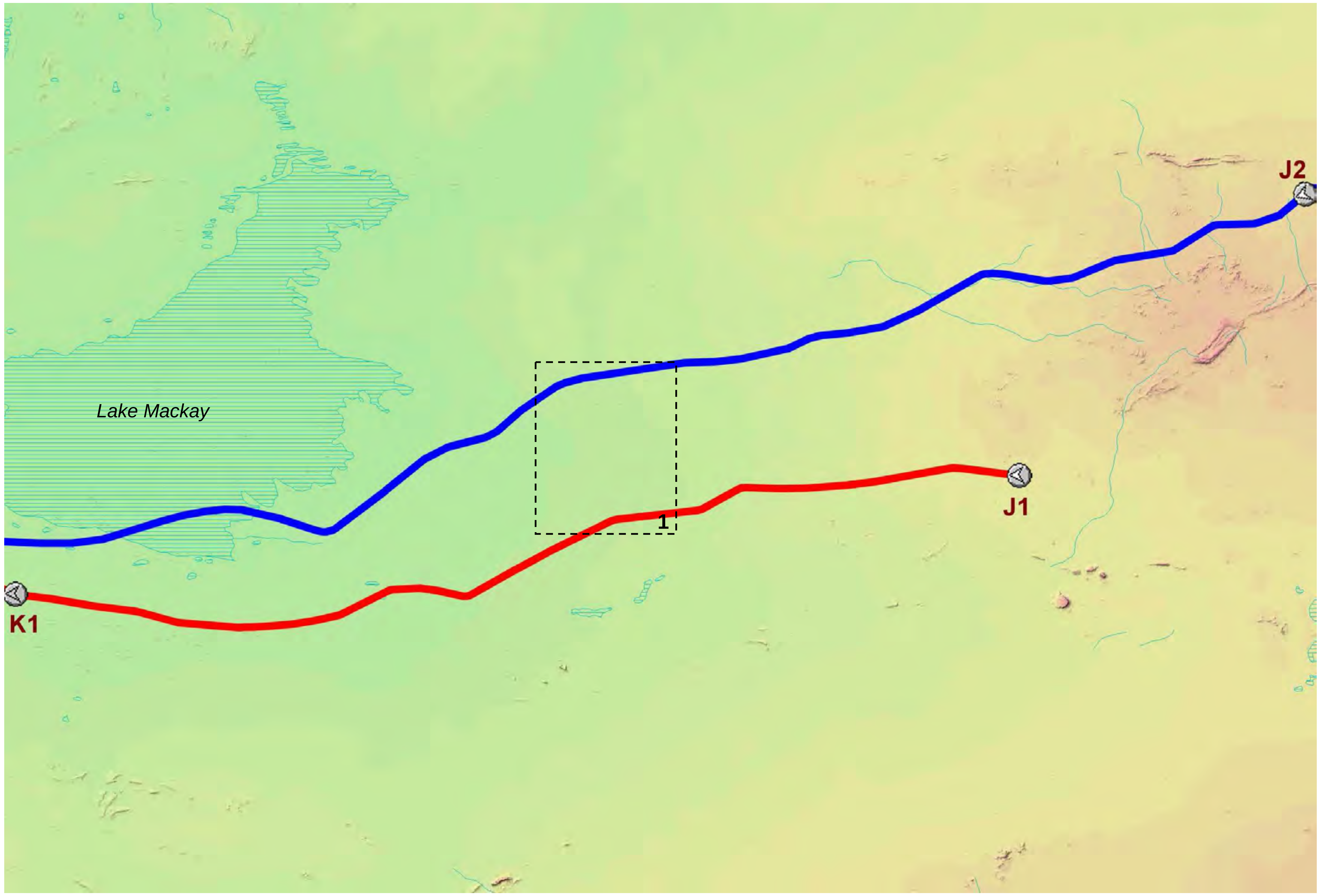
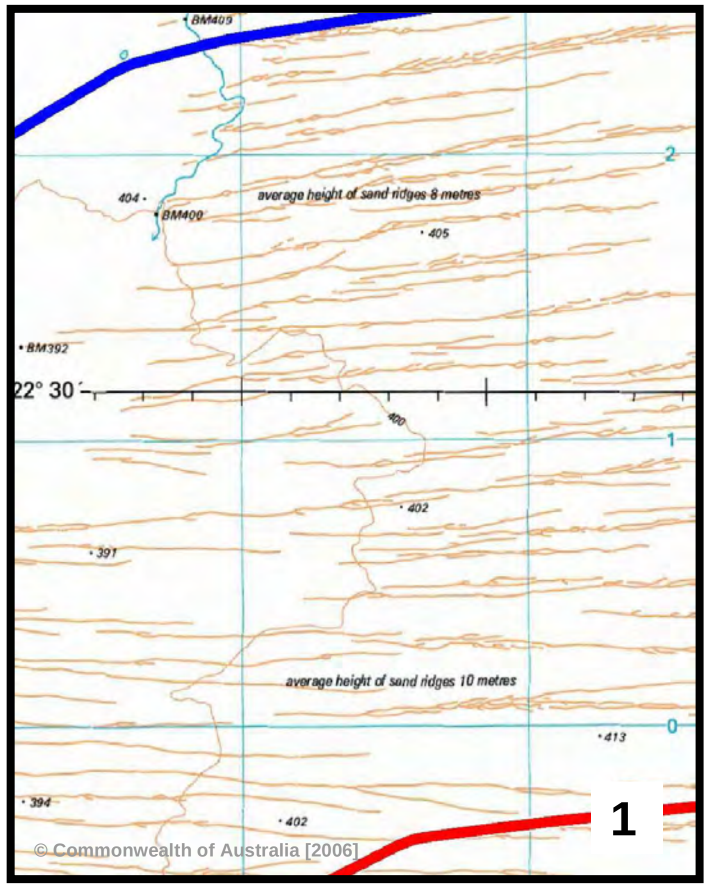
PROJECT IRON BOOMERANG
east west line parks pty ltd

East West Line Parks Pty Ltd
Project Iron Boomerang:
Rail Corridor Identification Pre-feasibility Study

Date 5/2/2007
Scale: NTS
Drawing No PIB-RCI-01 Rev 0 – Section I





Sand Ridges

QUANTM
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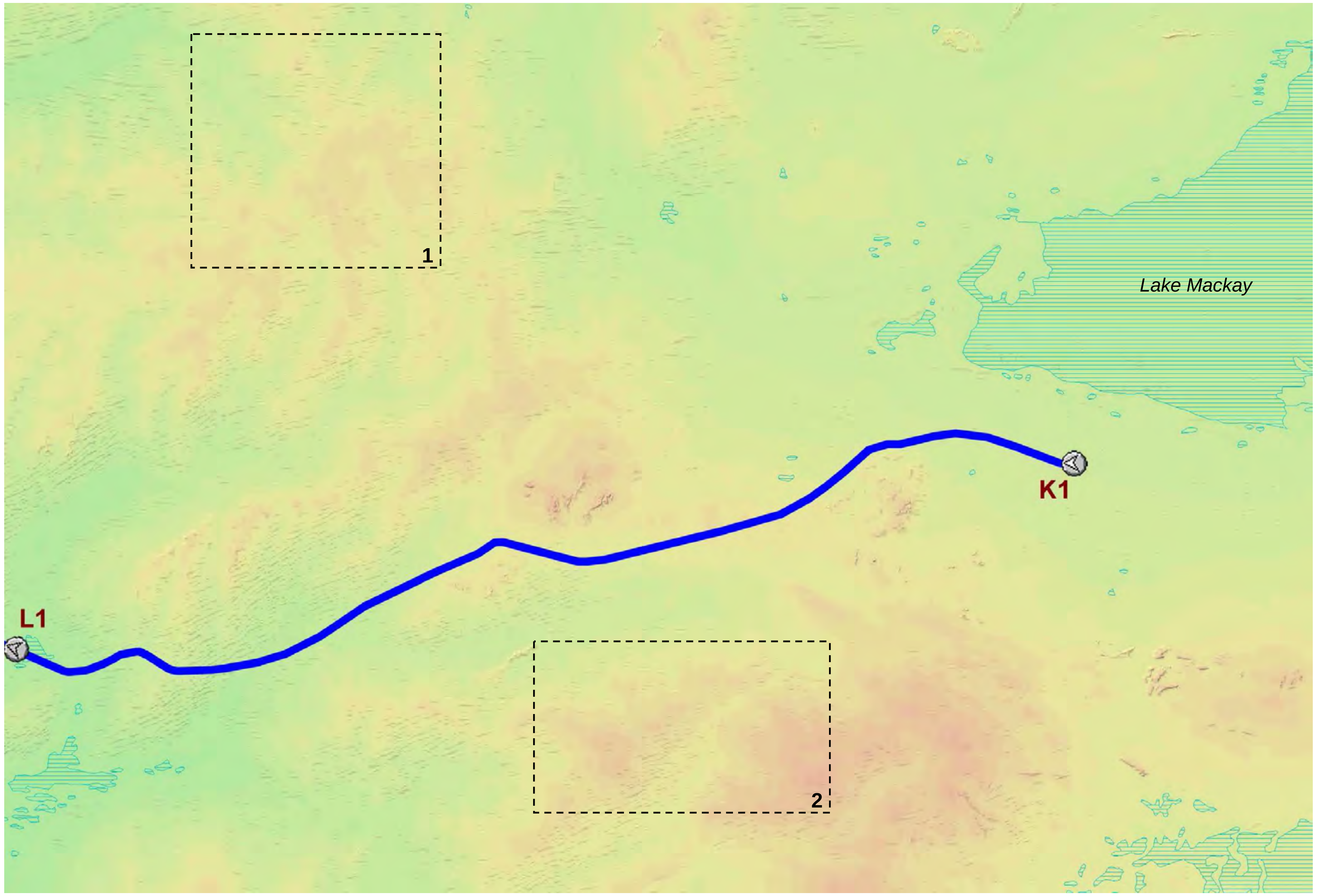
No	Revisions and Issues	Date
2		
1		

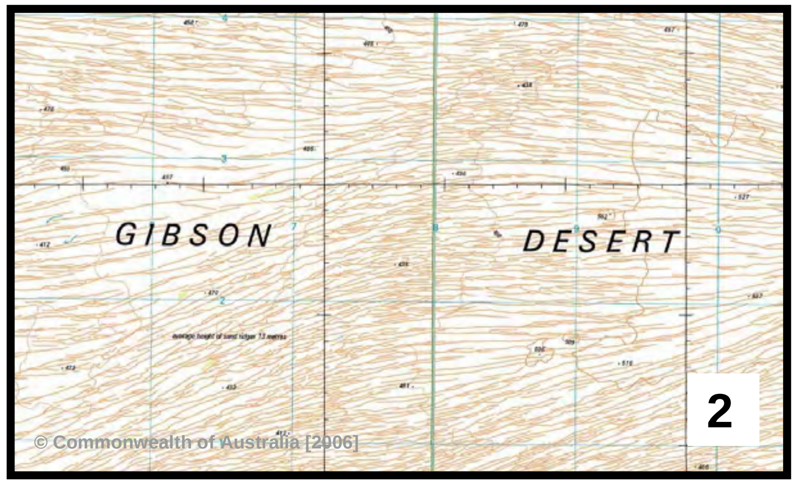
PROJECT IRON BOOMERANG
east west line parks pty ltd

East West Line Parks Pty Ltd
Project Iron Boomerang:
Rail Corridor Identification Pre-feasibility Study

Date 5/2/2007
Scale: NTS
Drawing No PIB-RCI-01 Rev 0 – Section J



Great Sandy Desert



Gibson Desert

QUANTM
A TRIMBLE COMPANY

No	Revisions and Issues	Date
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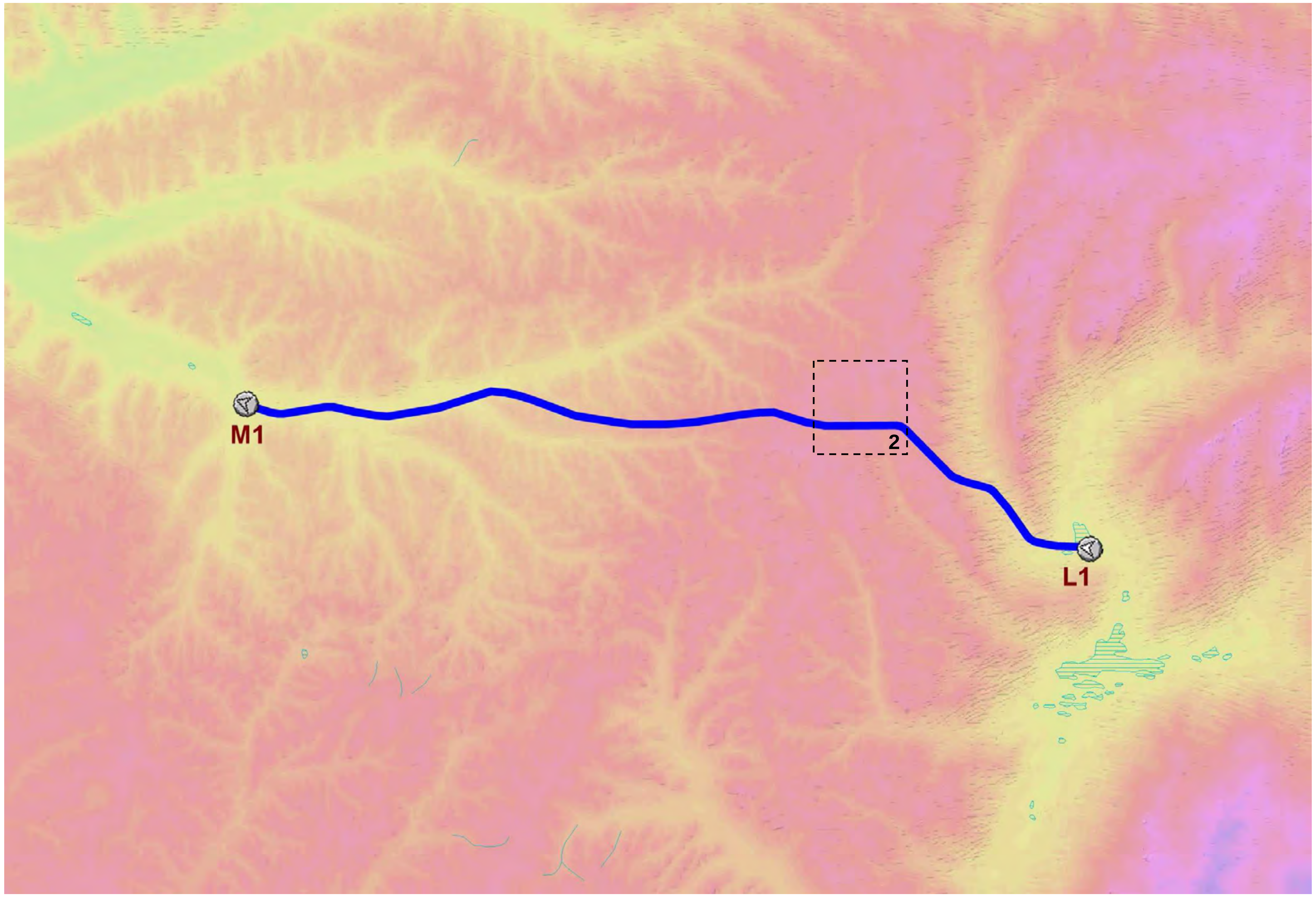
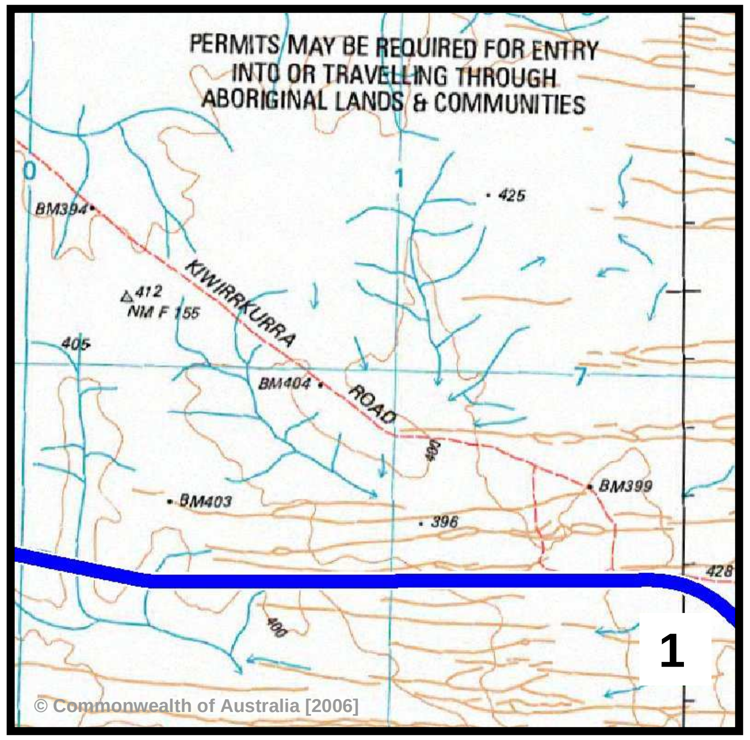
1		

PROJECT IRON BOOMERANG
east west line parks pty ltd

East West Line Parks Pty Ltd
Project Iron Boomerang:
Rail Corridor Identification Pre-feasibility Study

Date 5/2/2007
Scale: NTS
Drawing No PIB-RCI-01 Rev 0 – Section K





Kiwirrkurra Road

QUANTM
A TRIMBLE COMPANY

No	Revisions and Issues	Date
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PROJECT IRON BOOMERANG
east west line parks pty ltd

East West Line Parks Pty Ltd
Project Iron Boomerang:
Rail Corridor Identification Pre-feasibility Study

Date 5/2/2007
Scale: NTS
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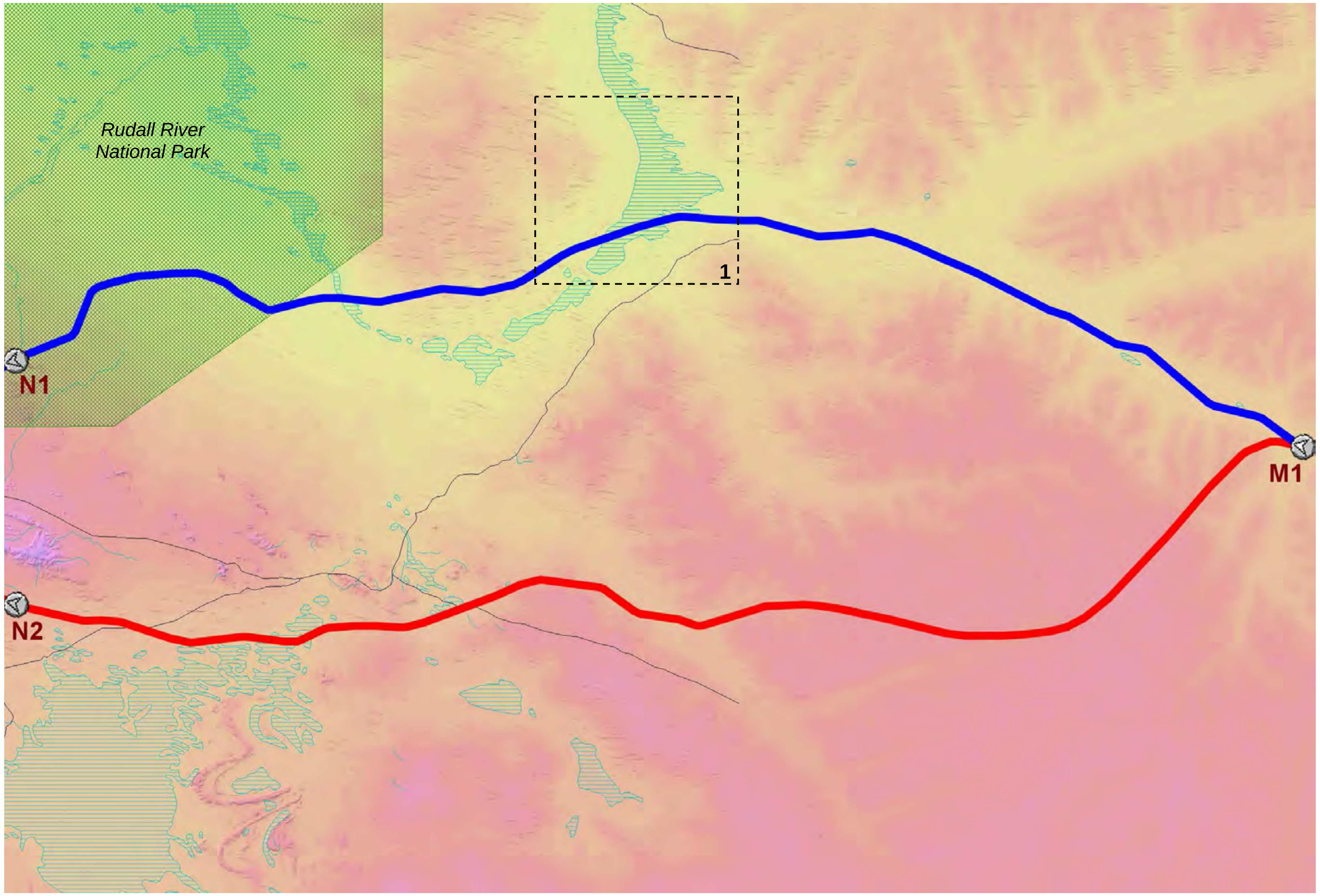
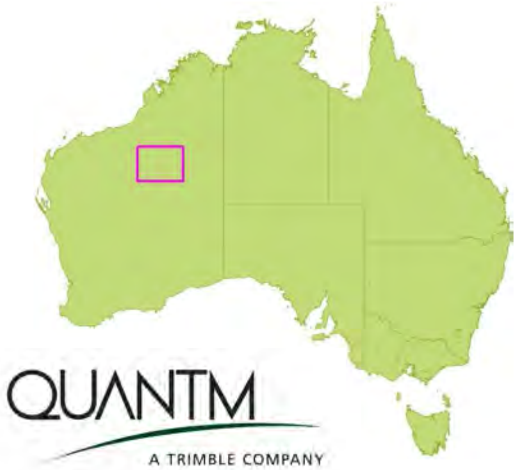


Lake Auld



QUANTM
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No	Revisions and Issues	Date
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PROJECT IRON BOOMERANG
east west line parks pty ltd

East West Line Parks Pty Ltd
Project Iron Boomerang:
Rail Corridor Identification Pre-feasibility Study

Date 5/2/2007
Scale: NTS
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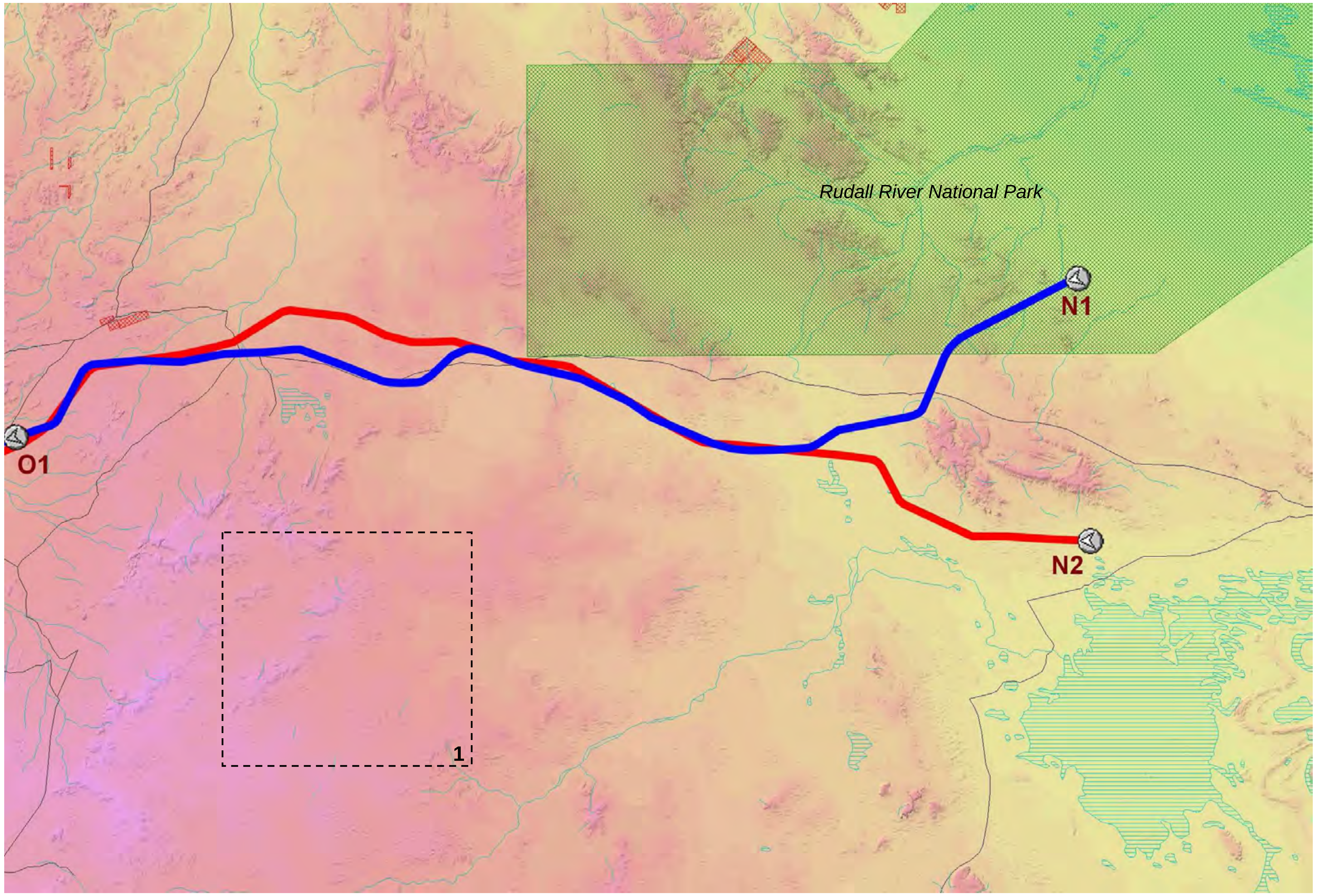

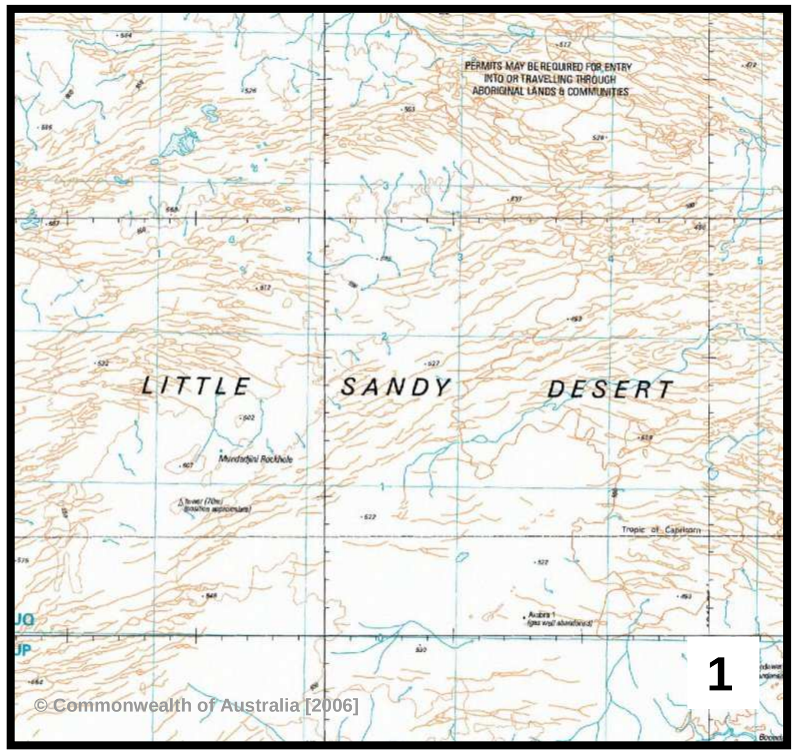

Little Sandy Desert

QUANTM
A TRIMBLE COMPANY

No	Revisions and Issues	Date
2		
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PROJECT
IRON BOOMERANG
east west line parks pty ltd

East West Line Parks Pty Ltd
Project Iron Boomerang:
Rail Corridor Identification Pre-feasibility Study

Date 5/2/2007
Scale: NTS
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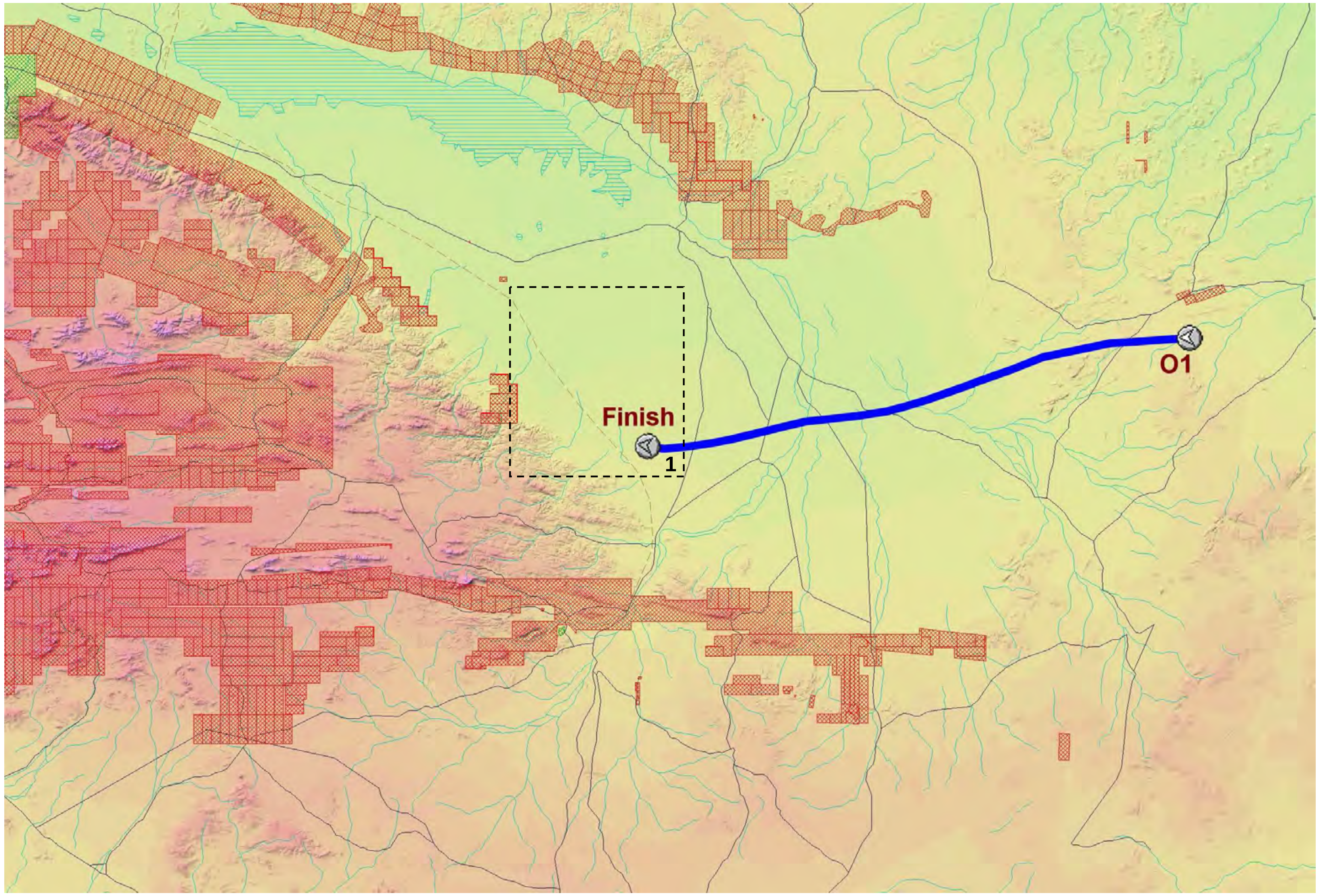

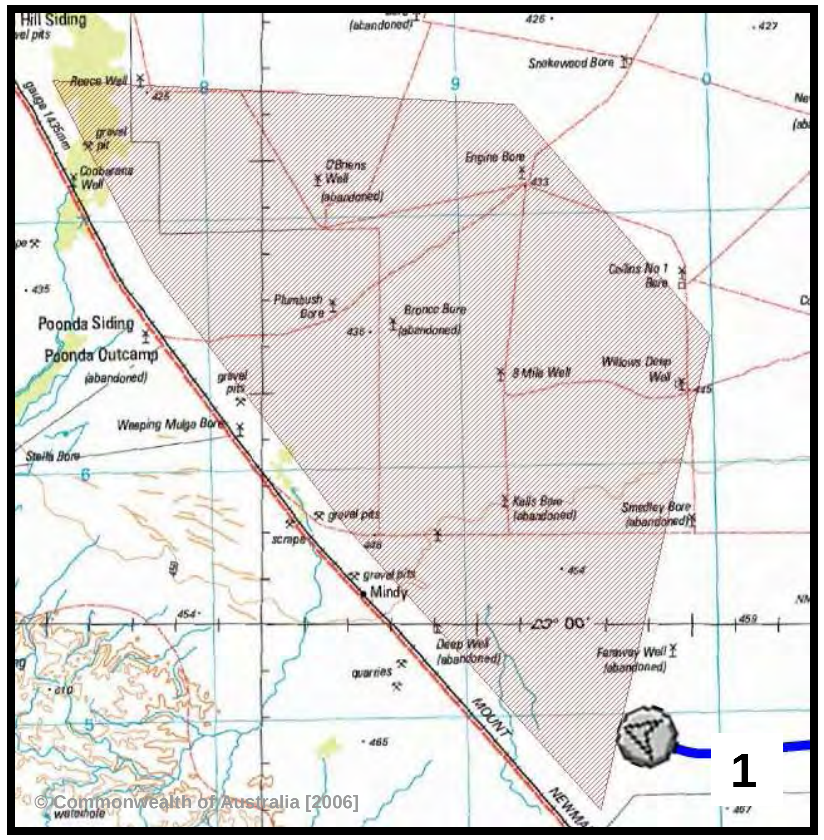

Proposed location of Newman Smelter Park

QUANTM
A TRIMBLE COMPANY

No	Revisions and Issues	Date
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PROJECT IRON BOOMERANG
east west line parks pty ltd

East West Line Parks Pty Ltd
Project Iron Boomerang:
Rail Corridor Identification Pre-feasibility Study

Date 5/2/2007
Scale: NTS
Drawing No PIB-RCI-01 Rev 0 – Section O

9.0 TYPICAL ALIGNMENT CHARACTERISTICS

9.1 Preferred Corridor

During the session held between Quantm and EWLP on the 23/01/2007, the results and outcomes for each corridor section were presented to the team. This revealed that a comprehensive search of the terrain model had already identified a number of favourable corridors. Alternatives were individually reviewed and critiqued within the Quantm software. Strategic construction cost comparisons were made on each, while their localised impact on macro scale environmental and land-use constraints were investigated by viewing the options super-imposed over topological maps. This led to the selection of the northern corridor route being preferred over others, mainly due to it meeting more of the project requirements and criteria for an early stage rail corridor route. The alignments shown in blue in the sectional drawings represent the EWLP preferred corridor (*refer to Section 8.3*).

The northern route was chosen for the following reasons:

- Exhibited minimal impacts on river systems, national parks, townships and existing mining leases. Those that were impacted could be easily constrained and avoided in further more detailed studies.

- More suitable site for the railway crew change, maintenance and refuelling depots along the route, in the vicinity of existing settlements (for example near Ti Tree in the Northern Territory and Kynuna in NW Queensland).

- Achieved the economic objective of minimising construction costs, with the 3120 km route having an approximate total raw construction cost of $3.3 billion AUD.

- In comparison to some of the other corridor options, the preferred route exhibited less intrusion across the sensitive deserts of Western Australia.

- Preferred route commenced immediately east of the Riverside Mine and finished near Poonda Siding on the Mt Newman rail system, within the proposed smelter park precinct. The EWL will utilise the existing Queensland Rail corridor from near the Riverside initiation point to access Abbot Point (via the Newlands Railway and the approved Northern Missing Link from North Goonyella to Newlands). This section was not evaluated by the Quantm model as it follows the existing rail corridor.

- Showed compatibility with the engineering requirements of heavy haul rail, such as maximum gradient and minimum horizontal and vertical curvature. At this early stage the key geometric requirement from an operational viewpoint is maintaining a 1:200 gradient (0.5%) in both directions. The Quantm generated route achieved this, with the majority of the route being under 0.2% grade.

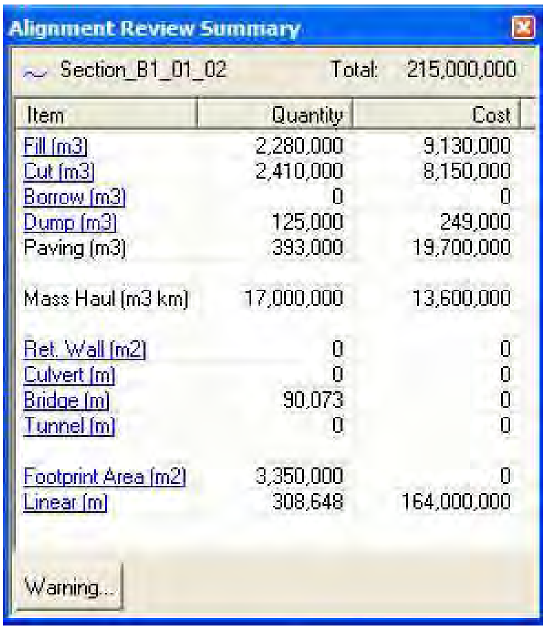
(Table 9.a) Break down of Gradient for Preferred Northern Route.

Category	Grade (%)*	Distance (km)
I	0.500 to 0.201	480
II	0.200 to 0.051	885
III	0.050 to -0.050	520
IV	-0.051 to -0.200	720
V	-0.201 to -0.500	500
	Total	**3120**

9.2 Civil works raw cost summary & reports

The Quantm system provides a much improved ability to analyse corridors and alternatives. To investigate rail corridors at a more detailed scale the Alignment Review Summary was used as a cost estimation tool to review the breakdown of construction quantities and costs. A number of consistent observations along the route where noted:

- Cut and Fill quantities provided a close balance within most sections.
- Mass Haul was not extensive in the context of the total comparative construction cost, indicating the system had minimised where possible excess cut and deficits of fill.
- There were very few, if any structures (bridge, tunnel and retaining wall) generated along the route, however this will change significantly when the impact of flooding is considered.
- Typically 70%-75% of construction cost was attributed to the linear cost which is the rail, sleepers and ballast. Due to this high cost penalty, the system tended to straighten out alignments where possible to minimise the route distance, which is also a desirable outcome for trip duration, crew shift considerations and fuel consumption.



Alignment Review Summary

Section_B1_01_02 Total: 215,000,000

Item	Quantity	Cost
Fill (m3)	2,280,000	9,130,000
Cut (m3)	2,410,000	8,150,000
Borrow (m3)	0	0
Dump (m3)	125,000	249,000
Paving (m3)	393,000	19,700,000
Mass Haul (m3 km)	17,000,000	13,600,000
Ret. Wall (m2)	0	0
Culvert (m)	0	0
Bridge (m)	90,073	0
Tunnel (m)	0	0
Footprint Area (m2)	3,350,000	0
Linear (m)	308,648	164,000,000

Warning...

(Fig 9. a) Alignment Review Summary Window.

In addition to the summary window, the system also has comprehensive reporting capabilities detailing location, geometrics, quantities and costs within user-defined intervals. In this study these were used to analyse the gradient along the route. The reporting functionality was also used to create a seamless composite route of the northern preferred corridor from each of the individual corridor sections.

Quantm Alignment Customised Report
Date: 02/07/07 17:55:50

Project: East-West Coal Line
Project ID: 941
Scenario: Section_B1_01
Alignment: Section_B1_01_02

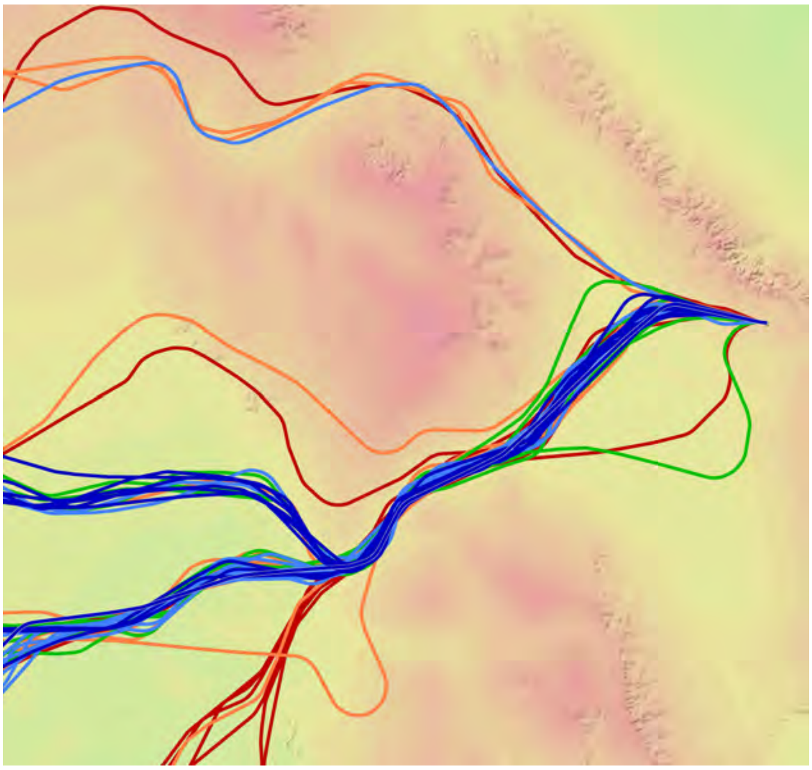
										Local quantities									
Dist 2D (m)	Dist 3D (m)	X (m)	Y (m)	R.E. (m)	Land (m)	R.E-Land (m)	Bearing (degrees	Grade (%)	H Radius (m)	V Radius (m)	Fill (m3)	Cut (m3)	Pavement (m3)	Mass Haul (m3 km)	Area (m2)	Wall (m2)	Culvert (m)	Bridge (m)
0	0	4232560	6754646	352.2	344.115	8.085	275	-0.31	-14365	581889	0	0	0	0	0	0	0	0
100	100	4232460	6754655	351.8984	344.075	7.824	275.3	-0.297	-14365	581889	15649	0	180	6820	3606	0	0	0
200	200	4232361	6754665	351.614	344.196	7.418	275.7	-0.28	-14365	581889	14518	0	180	8303	3477	0	0	0
300	300	4232261	6754675	351.3467	344.391	6.956	276.1	-0.263	-14365	581889	12954	0	180	9639	3292	0	0	0
400	400	4232162	6754686	351.0967	344.41	6.687	276.5	-0.246	-14365	581889	11813	0	180	10844	3152	0	0	0
500	500	4232063	6754698	350.8638	343.684	7.18	276.9	-0.229	-14365	581889	11915	0	180	12018	3169	0	0	0
600	600	4231963	6754711	350.6481	343.883	6.765	277.3	-0.211	-14365	581889	12525	0	180	13274	3241	0	0	0
700	700	4231864	6754724	350.4472	343.707	6.741	278	-0.198	-6624	837706	11583	0	180	14447	3124	0	0	0
800	800	4231765	6754739	350.2583	343.625	6.633	278.9	-0.186	-6624	837706	11623	0	180	15610	3128	0	0	0
900	900	4231667	6754756	350.0813	344.6	5.481	279.7	-0.174	-6624	837706	9659	0	180	16644	2864	0	0	0
1000	1000	4231568	6754774	349.9163	345.35	4.566	280.6	-0.162	-6624	837706	6444	0	180	17362	2387	0	0	0

(Fig 9. b) Alignment Report generated at 100m intervals.

9.3 Alignment sections: Plan, profile and cross sections

The Quantm system has an extensive reviewing capability that allows the operator to display the optimised rail alignment in plan, profile and dynamically in cross section. In this macro-level study these were predominantly used to identify low cost areas of the terrain and other patterns of alignments which can reveal much about potential corridors and the need to stick to certain locations and the freedom to deviate.

For example the figure below shows the rail alternatives clumping into two distinct corridors as they pass through the Great Dividing Range in Queensland. This strongly suggests that, from this particular start point, there are only two narrow passes available to negotiate the range at reasonable costs, however west of this there is more scope to deviate.

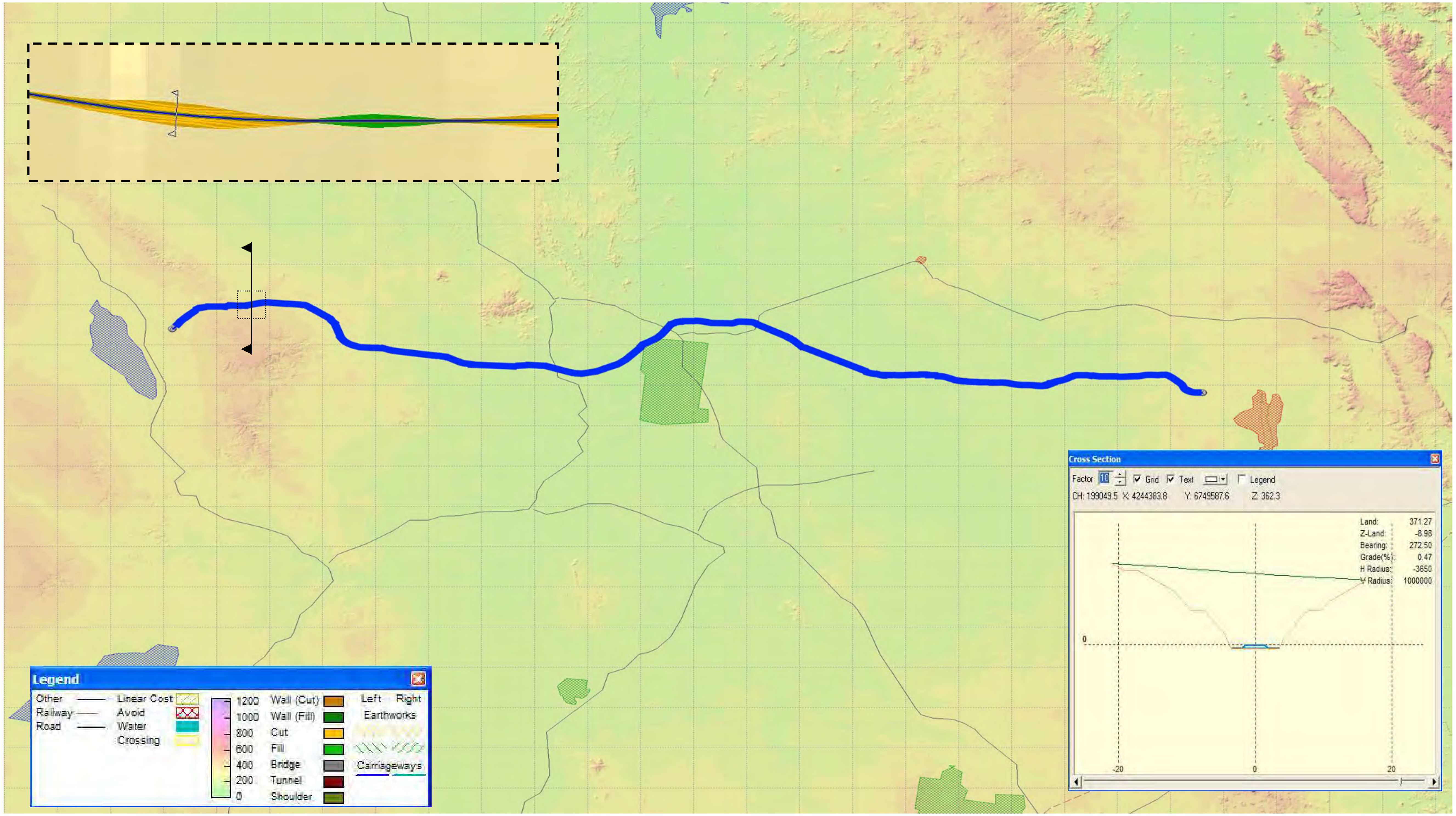


(Fig 9. c) Two corridors traversing different valleys in Section B.

In general rail routes converging into a narrow corridor indicates its importance in containing costs, whereas where routes fan out (such as across the deserts areas in Western Australia) indicates that cost is not an important driver in the alignment in plan and therefore provides more flexibility to satisfy other criteria with minimal impacts to costs.

Rail corridor cross sections were studied along the route using the Dynamic Cross Section tool. This allowed the altitude of the centreline to be viewed in relation to the natural surface and provided values of bearing, gradient, radius and horizontal curvature at any chainage along the route. During this study this information was mainly used to gain insight into where rail alternatives were approaching the maximum gradient when traversing difficult terrain, or tight corridor where the minimum radius was being approached.

Mass haul diagrams can also be generated within the Quantm System for each rail alternative showing the magnitude and direction of mass haul. This allows the rail engineer to gain insight into the dispersion of material throughout the alignment and determine where the balance points are. Figure 10.c shows a typically mass haul diagram generated from an alignment representing the northern corridor in section B. This could be used in future work to identify areas of surplus material or deficit of fill and therefore be used to designate areas for borrow and dump pits.



(Fig 10.d) Section A of the northern preferred corridor showing alignment in plan and dynamically in cross section.

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No	Revisions and Issues	Date
2		
1		

PROJECT IRON BOOMERANG
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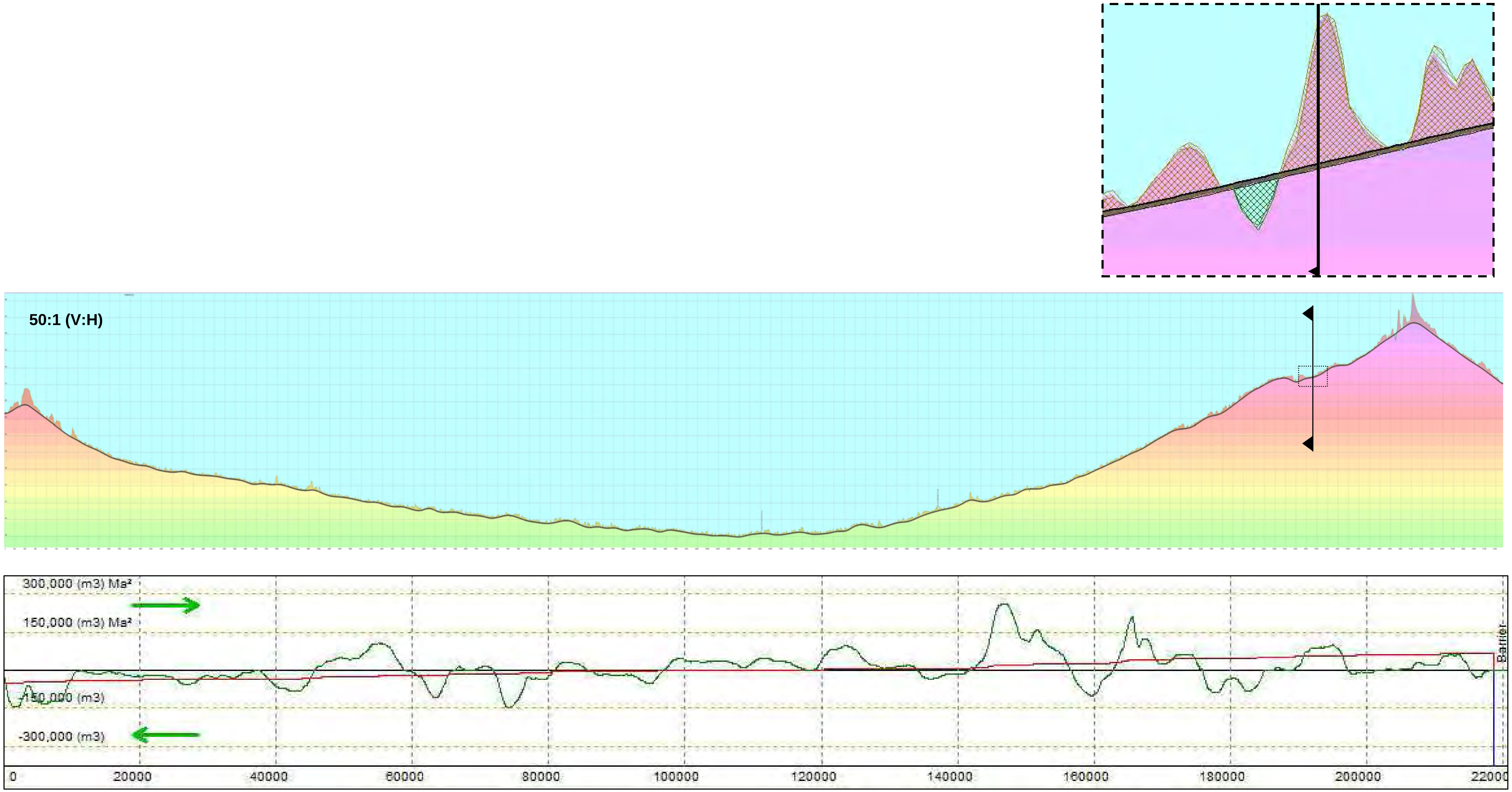
East West Line Parks Pty Ltd
Project Iron Boomerang:
Rail Corridor Identification Pre-feasibility Study

Date 5/2/2007
Scale: NTS
Drawing No PIB-RCI-01 Rev 0 – Plan



(Fig 10.e) Section B of the northern preferred corridor showing alignment in profile and mass haul movement underneath

No	Revisions and Issues	Date
2		
1		

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PROJECT IRON BOOMERANG
east west line parks pty ltd

East West Line Parks Pty Ltd
Project Iron Boomerang:
Rail Corridor Identification Pre-feasibility Study

Date 5/2/2007
Scale: NTS
Drawing No PIB-RCI-01 Rev 0 – Profile

10.0 Conclusion

10.1 General Conclusions

The Quantm system has been used to demonstrate the engineering feasibility of the PIB rail project and had identified key to environmental, geological, mining and land-use constraints. The PIB provides for 3,120km of heavy standard gauge railway from Moranbah in Queensland to near Newman in Western Australia, at a maximum grade of 1:200 and a design speed of 80 km/hr.

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Monday, 10 March 2008

Report to:

PROJECT IRON BOOMERANG

Pre-Feasibility Evaluation and Strategic Comment – Energy

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Executive Summary

Hill Michael has offered its services to East West Line Parks Pty Ltd in support of Project Iron Boomerang (PIB) to undertake an initial pre-feasibility investigation into the energy requirements, associated infrastructure and strategic considerations of energy inputs and outputs.

This report has been prepared based on Hill Michael's knowledge of the energy industry in Australia and the energy infrastructure in each region.

The aim of the report is to provide validation of the fundamental feasibility and natural advantages of the PIB proposal. The report does not provide recommendations on the optimum energy configuration, or other detailed solutions, but does provide investigative support to the PIB concept, and illustrate the feasibility and high conceptual value of the project.

The energy equation for the PIB development is driven by the relative availability of coal for coking and thermal purposes in Queensland and the availability of gas in Western Australia (WA).

The relatively small size of the connected demand for electricity in WA, and the large market available from the National Electricity Market (NEM) in Queensland encourages the development of coking plant and heat recovery generation in Queensland rather than WA.

The sale of electricity in WA is likely to yield a higher price. The larger sales in Queensland will require intelligent selling arrangements to manage the price and volume risks associated with the national market pool and the relatively short term contracts market.

The cost of electricity network infrastructure required to connect the quantity of electricity likely to be produced will be significantly less in Queensland because of the close proximity of the smelter park to a major transmission network node at Strathmore. In WA, the economics of displacing relatively small quantities of isolated load will determine the quantity of electricity that can be sold into that market.

This study concludes that the coking plants, based on capability to dispatch electricity generated, should be considered for Queensland and the blast furnaces should be shared between Queensland and WA. This will result in some imbalance in the material flows between WA and Queensland and therefore the overall PIB system will require optimisation.

Electrical Infrastructure and demand for electricity is unlikely to be a constraint in Queensland for export and sale of electricity. The detailed economics of connecting isolated electrical loads will be important to establish the optimum energy balance in WA.

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1 Introduction

Hill Michael has offered its services to East West Line Parks Pty Ltd in support of Project Iron Boomerang (PIB) to undertake an initial pre-feasibility investigation into the energy requirements, associated infrastructure and strategic considerations of energy inputs and outputs.

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Hill Michael is a specialist electrical networks consulting business, focused on developing strategies to manage the connection of large-load and generation projects to the electricity supply network. Hill Michael also has considerable expertise in energy market and fuel sectors and provides strategic advice for the feasibility evaluation of generation and heavy industry projects.

2 Scope

The overall Scope of this report is to undertake high-level evaluation as a Stage 1 review of the energy requirements, balance (inputs and outputs) and infrastructure investment requirements. This investigation will provide a basis for commenting on the core energy issues and characteristics of PIB.

More specifically, the Scope will include:

- A summary of the energy balance (inputs and outputs) for the key energy-related components.
- Comment on the energy infrastructure requirements.
- Initial design and development of a fundamental structure for a whole-of-project energy model to enable detailed energy and financial modelling (this does not involve actual development of this model at this stage).
- Comment on the key energy procurement requirements.
- Comment on the key energy sale opportunities and relevant markets.
- Suggested progression options and proposed 'next steps'.
- Comment on regulatory implications for the energy procurement and sale from PIB.

It should be noted that at present a number of plant configuration and geographical options are being considered for PIB; as such this investigation has not focused on any single solution or attempted to identify optimum solutions. The Scope of this report is focused on providing validation of the fundamental energy-related feasibility of the PIB concept for reference by the project team, investors and other stakeholders.

3 Pre-Feasibility Analysis & Outcomes

3.1 General

Hill Michael has focused investigation of the feasibility of PIB based on 3 core energy drivers:

1. Energy Inputs (All types of fuel/inputs).
2. Energy Outputs (Primarily energy which must be dispersed).
3. Infrastructure Requirements.

For each of these drivers, critical technical commercial and regulatory issues have been considered.

While variation in Capital Costs (CAPEX), energy efficiency, regulatory approvals and environmental approvals is inevitable and dependant on various project configuration options, Hill Michael find no energy-related fatal flaws in the PIB concept. There are many energy benefits and market opportunities for the project, in electricity, carbon/emissions and input/fuel acquisition.

One fundamental constraint is the ability to sell / export the electricity generated from waste-heat in the Iron manufacture process. The differing nature of electricity network infrastructure and markets between Queensland and Western Australia makes Queensland the preferable location for high-volume electricity generation. The Queensland network has a maximum demand of over 8,000MW and is growing significantly. Connection in Queensland also provides access to the National Electricity Market (NEM) with an additional opportunity to sell around 1,100MW across the inter-connectors into New South Wales (NSW). Connection to the National Grid and therefore the NEM, can be achieved for around $220M via connection to the Powerlink Queensland (Powerlink) 275kV substation at Strathmore.

The physical size of the WA market into which PIB can sell its electricity output is currently limited to approximately 850MW including isolated mining loads, which is expected to grow to 1,000MW in the medium term. Growth in this region is hard to evaluate given the influence of large project-related loads which increase the load in significant increments depending on the success or otherwise of major project investment.

The introduction of major new loads in either market – such as an aluminium smelter or LNG plant – would have a beneficial impact on the prospects of PIB however the benefits should not be over emphasised. Such a load would increase the market size in Western Australia and be of significant benefit to PIB. Such a load in Queensland would absorb some of the existing and planned cheap base load generation. In both cases the price that highly energy intensive loads (such as aluminium smelters) can afford to pay for electricity makes them unattractive as direct customers of PIB.

At present PIB are considering a number of configurations for the precincts in both Queensland and Western Australia. To provide PIB and stakeholders with an advanced understanding of the energy-related feasibility of the project, while acknowledging various configuration options are still being considered, Hill Michael structured its investigation to focus on external factors influencing each of the three feasibility drivers defined above, within the bounds of reasonably likely project inputs and outputs.

The primary variables considered are determined by the 'mix' of the primarily plant component options, the project 'Building Blocks', being:

1. Coking Plant
2. Blast Furnace

The environmental variables (specifically carbon emissions) have not been considered in this report.

3.2 Energy Inputs

3.2.1 General Plant Options and Resultant Input Requirements

Hill Michael has developed a spreadsheet model to readily identify project inputs (coal, coke, gas, electricity and water) required at the smelter parks for combinations of "raw" steel (or pig iron) production elements termed Building Blocks. The spreadsheet will also provide an estimate of the outputs of the Smelter Parks (pig iron, electricity, and coke).

Initially it will be used to give the project team an idea of the effects of using the different technologies and how different combinations fit into the perceived "constraints" of each area.

Potentially, it could be used as part of the optimisation process once resource, product, production and transport costs and availability are known.

PROJECT IRON BOOMERANG

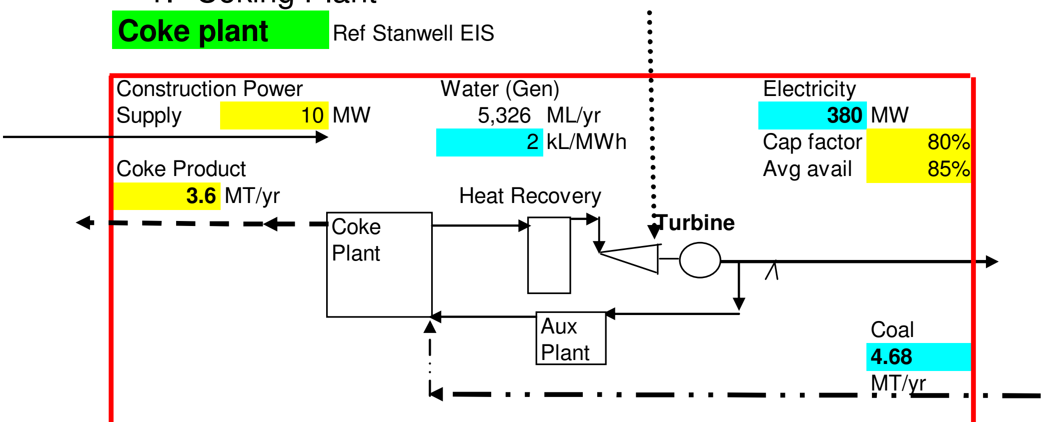
HILL MICHAEL

Pre-feasibility Investigation - Energy

Production 'Building Blocks', as noted above, are discussed in more detail below. At this stage of the project it is necessary to use some assumed relationships between inputs and outputs as these will vary with manufacturer, process and resource economics and value of outputs. Also, there may be applicable environmental/planning/regulatory constraints to consider.

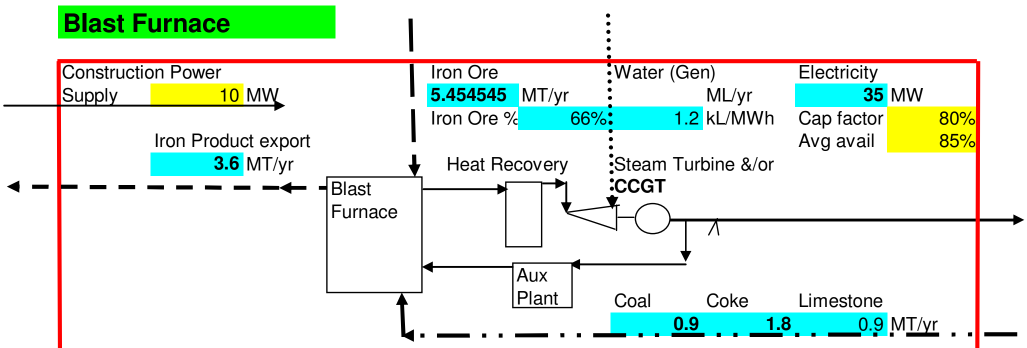
An assumed base-case for each Building Block is given below.

1. Coking Plant



No. Plants		Inputs				Outputs/Plant	
	Gas PJ	Coal MT/yr	Water ML/yr	Aux MW		Coke MT/y	MW
1		4.7	5,326	26		3.6	380
Specific Relationships/T Coke		1.3	2				

2. Blast Furnace



No. Plants	Inputs							Outputs/Plant	
	Gas PJ/yr	Coal MT/yr	Coke MT/yr	Iron MT MT/yr	Aux MW	Water ML/yr	Limestone MT/yr	Iron MT/yr	Electricity MW
1		0.9	1.8	5.5	11	294	0.9	3.6	35
Specific Relationships/T Iron		0.25	0.5	1.5			0.25		

The base case configuration involves six blast furnaces and six coke plants at Bowen and six blast furnaces in Western Australia. The arguments supporting this base configuration are developed below.

3.2.2 Fuel Availability & Cost – Queensland

Coal

Queensland has vast resources of steaming and coking coal and can be assumed to be in "limitless" supply at world competitive prices.

Gas

The Bowen region gas is potentially available from either the coal seam gas fields around Moranbah or via the proposed pipeline from the Bowen Basin to Gladstone. The PNG gas pipeline project was an alternative in the initial stages of the Iron Boomerang Project but the PNG pipeline project has been abandoned. The Moranbah field currently produces approximately 18 PJ/yr (refer RLMS map) which is delivered to Townsville for power generation (predominantly) and metal processing.

With each blast furnace potentially requiring up to 5 PJ/yr, this demand would require further exploration and drilling. The current field has a large potential and an extra 20 + PJ/yr is seen as possible. The potential price of gas is in the order of $3.70 - $4.20 /GJ delivered at Bowen, whether it is sourced from Moranbah or the wider Queensland gas network. In general, the availability of gas in Queensland is considered acceptable as evidenced by the four LNG Project currently under investigation in Queensland.

In the assumptions provided by PIB (spreadsheet A Input-Output Qtys 20Jul 06) up to 5.8 PJ per year (1 PJ = 1,000,000 GJ) can be used as a heat source in a 1.6 MT/yr blast furnace in lieu of coal. Assuming gas could be delivered at $3.50/GJ the cost of gas per blast furnace would be $20.3 M/yr.

Steaming coal landed at Bowen should be available for about $2 – 2.5 /GJ depending on rail costs. The cost of coal per blast furnace (for the same heat input i.e. 5.8 PJ/yr) at $2/GJ would be around $11.6M/yr.

The use of coal will normally incur higher capital and operating costs (excluding the fuel itself). Much of the materials handling infrastructure should already exist for the coking coal being delivered. Whether it can be effectively used will depend on how separate or simultaneous the handling operations have to be.

The use of coal will usually involve higher plant maintenance (wear) and possibly higher manning levels. Additionally, steaming coal typically contains 15 - 25 % ash which will need to be disposed of (either stored or recycled or both) and will require additional flue gas cleaning equipment to filter out the "fly" ash.

The decision to use gas or coal will be complex and affected by fuel cost, environmental (potential Carbon Trading) costs and gas availability. Initial research indicates that only a few countries seem to use gas to add extra heat, possibly due to cost. The value PIB could add to the project and the decision making processes of the iron makers (where it rests) is by either themselves, or encouraging a pipeline developer, to scope out and possibly "permit" a connecting pipeline into Bowen. This then gives real fuel choices with added certainty.

In summary the optimised use of coal and gas for fuel will be a balance between transport economics of coal, environmental impacts and costs and product quality.

3.2.3 Fuel Availability & Cost – Western Australia

Coal

It is assumed all coal would be railed from Queensland although some coal deposits exist in Western Australia. Therefore, apart from the tonnage that could benefit from backhaul freight rates it is assumed that coal is better utilised in Queensland.

Gas

Natural gas is plentiful in North-West Western Australia. Existing research conducted by members of PIB with expertise in the Western Australian gas industry supports the economic availability of natural gas, and Hill Michael support this view. The WA Smelter Park is less than 100km from the Goldfields Pipeline.

3.2.4 Water Requirements

Hill Michael has focused primarily on the water requirements for electricity generation. The water requirements of other plant is not within the scope of this report. The water pre-feasibility investigation suggests consumption will be in the order of:

- Steam turbine plant
  - Wet cooled i.e. cooling towers – 2 KL/MWh
  - Dry Cooled i.e. radiators – 0.2 KL/MWh (with a 3-5% efficiency impost and up to 20% capacity impost in summer)
- Combined Cycle Gas Turbine
  - Wet cooled i.e. cooling towers – 1.2 KL/MWh
  - Dry Cooled i.e. radiators – 0.1 KL/MWh (with a 2-5% efficiency impost and up to 20% capacity impost in summer)

In general, while water supplies are theoretically high in both regions (artesian water in WA and via the Burdekin Dam in Queensland), Hill Michael do note the high scrutiny placed on water consumption in Australia at present, and suggest it would be important to manage the regulatory expectations and water efficiency aspects of the project closely.

Recent debate about water in eastern Australia has highlighted the significant amount of water available in tropical north Queensland. It is likely that there will be considerable investment in water harvesting and transport in the north and hence the availability of water for major industrial developments should increase.

3.3 Energy Outputs – Export Capacity and Market Value

Hill Michael has developed a spreadsheet model using the "building blocks" referred to earlier. Below is a discussion on electricity output that is based on iron ore production at each smelter park of approximately 20 MT per year (Scenario 2 in the model), which is in line with the PIB briefing material. .The base case configuration is based on 6 blast furnaces in both WA and Bowen and 6 coke plants in Bowen serving both sets of blast furnaces. It should be noted that the material balance (eg: the relative haulage tonnages) has not been considered here nor has any optimisation. Scenario 1 (utilising Corex plants) in the model produces a closer east – west material balance in terms of tonnages.

The cost of generation will be similar in both Queensland and Western Australian locations. If it is assumed that the steam is available from the iron production process at zero cost then the three major components of the "cost of sales" for electricity will be the cost of the capital used to fund the generating plant development, the connection costs to the point of sale and operations and maintenance costs.

Costs of capital should be similar for both Queensland and Western Australian locations. The project will carry the CAPEX for steam turbines, generators and associated EHV equipment. This assumes minimal steam conditioning plant prior to steam delivery to the turbines. No supplementary fuels are assumed.

Costs to connect to the point of sale will vary between Western Australia and Queensland and these variations are dealt with below.

Operations and maintenance costs should be relatively small because there is no fuel used in the power station end – no coal handling or gas combustion.

For the purposes of the pre-feasibility study and based on the assumption that the steam is available to the generation plant at zero cost then the cost of electricity production is in the order of $20/MWh.

Connection to the national or regional network and NEM participation costs are additional to this.

3.3.1 Queensland

Export Capacity and Maximum Demand

In this scenario the Bowen Smelter Park would consist of six blast furnaces (3.6 MT/yr each) and six coke plants (also 3.6 MT/yr each). Three coke plants are required to support the blast furnaces in Queensland and three would "export" coke to the WA Smelter Park.

The electricity export from the Bowen Smelter Park could be up to 2500 MW.

The Bowen Smelter Park generating plant would export electricity to the Australian NEM, via connection at Powerlink's Strathmore 275kV substation in north Queensland. Refer Section 3.4.1 on infrastructure requirements to connect to the National Electricity Grid.

Queensland electricity demand and energy consumption is predicted to grow strongly over the years between 2006 and 2015, in the order of 350 – 400 MW per year. This will have a positive impact on the ability to dispatch the generation, although some network constraints will exist these are not considered to change the fundamental feasibility of the generation proposal.

Based on this load projection the total output of the Park would take 6 to 8 years of forecast growth to absorb. The PIB development is likely to stimulate increased demand in north Queensland and hence the output would be absorbed sooner. Other generation projects will continue to be developed and the older existing generators (particularly coal plant in Central Queensland) will be retired. The Queensland system will be able to absorb the PIB output to an extent that makes the project feasible.

The forecast Queensland electricity demand and energy growth is shown in the Powerlink graphs 3.7 and 3.8 below (Powerlink Queensland, Statement of Opportunities, 2006).

The average economic growth in Queensland for the High, Medium and Low Growth Scenarios developed by NIEIR over the period 2006/07 to 2016/17 are:

Economic Growth

	HIGH	MEDIUM	LOW
Australian Gross Domestic Product (average growth p.a.)	4.0%	3.0%	2.1%
Queensland Gross State Product (average growth p.a.)	5.0%	3.9%	2.9%

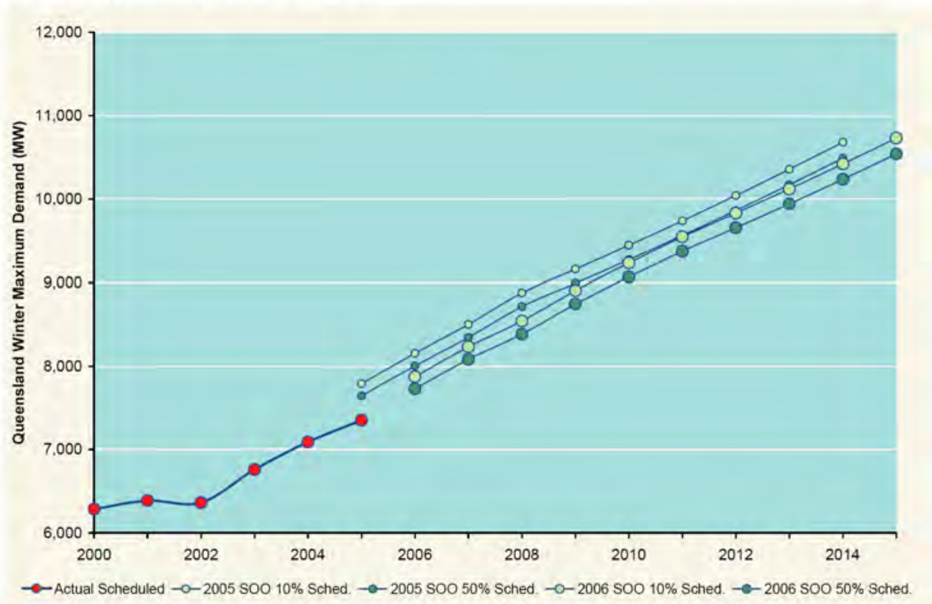
For Queensland these updated growth rates are slightly higher for the high growth scenario, un-changed for the medium growth scenario and slightly lower for the low growth scenario compared to the NIEIR prediction outlined in the Powerlink 2006 Annual Planning Report (APR).

Powerlink Queensland provided the maximum demand projections and supporting information for the Queensland region.

The winter maximum demand (Powerlink Fig 3.7) for Queensland is projected to increase over the forecast period (commencing in 2006) by an average of:

- 3.5% each year under the medium-growth scenario; and
- 5.7% and 1.8% under the high and low-growth scenarios, respectively.

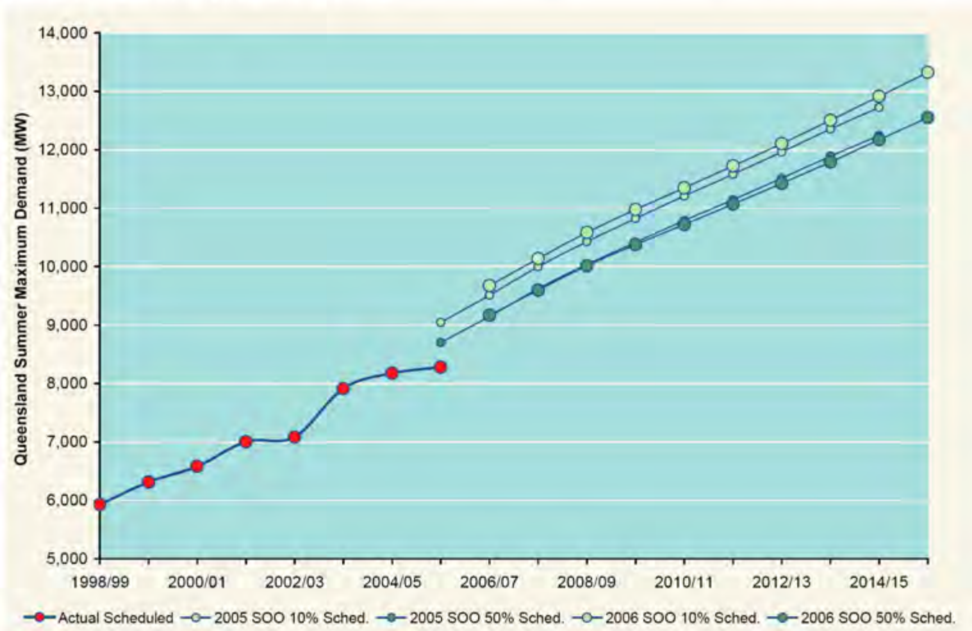
Figure 3.7 Comparison of Actual Queensland Winter Scheduled MD with the Previous and Current Projections (Medium Growth)



The summer maximum demand (Powerlink Fig 3.8) for Queensland is projected to increase over the forecast period (commencing in 2006/07) by an average of:

- 3.6% each year under the medium-growth scenario; and
- 5.6% and 2.4% under the high and low-growth scenarios, respectively.

Figure 3.8 Comparison of Actual Queensland Summer Scheduled MD with the Previous and Current Projections (Medium Growth)



Value of Electricity in Queensland

In the Queensland market the value of electrical energy is largely determined by the National Electricity Market. This is encouraging for the PIB because the market must deliver a return on generation investment over the long term. On this basis the value of base load electricity in Queensland can be conservatively forecast to be set by the cost of cheap coal plant. Extracting additional value is largely dependant on the strategy employed for sale. The NEM in eastern Australia provides some flexibility in contracting arrangements unlike in Western Australia where arrangements are generally bilateral contracts.

The short term (daily/monthly) value of wholesale electricity sold in the Queensland market depends on the short term supply / demand balance at the time. The physical electricity market has a complementary derivatives market which allows participants to effectively manage the price risk associated with short and medium term supply / demand imbalance – either over or under-supply

There are alternative sale strategies to accommodate the appetite for risk and these are briefly discussed below.

1. *Pool Sales Strategy:* Electricity can be sold directly into the NEM Pool resulting in all electricity being consumed, with no obligation to supply any fixed volume. The annual revenue received would be the average Queensland Regional Reference Node (RRN) NEM Pool price, weighted for volume. The Queensland RRN price to date (2007-08 financial year to 7 March 2008) is $59.85/MWh. The full year average is expected to be around $50/MWh. Based on a maximum export of 2,500MW, total annual revenue would be in the order of $876M (assumes 80% capacity factor[1]). Pool based revenue could vary between $438M/yr and $1000M/yr from historic averages between 2005 and 2007.

2. *Longer-term Contracting through the derivatives market:* Revenue can be received through long-term contracting for electricity. Along with a fixed revenue stream at an increased price per unit, this arrangement also comes with the volume risk of having to deliver electricity, or incur a liability associated with the cost of not producing electricity. At present a long-term (5 to 15 years) contract price would be in the order of $38-$40/MWh without allowance for carbon costs. Based on a maximum export of 2,500MW, total revenue would be in the order of $680M (assumes 80% capacity factor[2]).

3. *Inter regional trading*: Inter-Regional Settlement Residue is the difference between the value of energy in one region and the value of that energy once it has been transferred to another region. This difference in value is primarily due to the price difference between regions. The price differences can be due to the applications of inter-regional transmission constraints or (to a lesser extent) the marginal loss factors that apply between regions. The Settlement Residue Auctions are intended to improve the efficiency of the NEM by promoting inter-regional trade. By making the settlements residue available to the market place, the risks of trading between regions can

[1] Capacity Factor refers to the proportion of time the power station is generating and exporting electricity.
[2] Capacity Factor refers to the proportion of time the power station is generating and exporting electricity.

be better managed. Along with a revenue stream, this arrangement also comes with the price risk that may impact the bottom line of the business. A generator portfolio of 2,500MW in Queensland would be likely to participate in the Residue auction to manage Queensland price risk.

4. *Revenue Optimisation:* Through a combination of long-term contracting, short-term contracting and derivative trading, revenue from the sale of electricity can be optimised to match the risk profile of the project proponents.

In the Queensland region of the NEM there are adequate opportunities to find power station developers and operators when the project is at an advanced stage. Existing generators in Queensland will have a vested interest in containing the level of new generation and hence are not logical partners at the feasibility stage. Once past feasibility these organisations can vie for a role in the trading and operation of the new capacity to manage the impact on their current portfolios.

For the Queensland electricity sales the key issue in the feasibility process is not who the generator is but understanding the market value. Contracts with major users for a portion of the output may add value from a financing perspective. The very recent sale of the government controlled retail sector to Origin Energy and AGL means that they become the largest off-takers in the state. There are a small number of large customers who are also potential counterparties.

The electricity sector has seen the emergence of the 'gen-tailer', significant companies bullish in their development of the retailer + generation business, who would be very enthusiastic about the potential acquisition of this generation capability, and who would provide a risk management mechanism for PIB. These players are best introduced when the project has certainty so that PIB extracts most value from a competitive energy market in Queensland.

Strategy to Generation Development

The Queensland generation market is dominated by four Queensland government owned enterprises (GOC). Each GOC has particular strengths. The main issue for each of these generators is that the state government is reluctant to invest more government money into generation and is encouraging private sector participation.

The generator GOC's and the major private sector generators all have a vested interest in restricting further capacity development because it will put downward price pressure and reduce returns on their existing assets.

There are large amounts of capital available for generation development and there will be no shortage of potential constructors / operators. The key issue is for PIB to develop its trading strategy to optimise electricity based revenues. This process will also identify the potential partners required to implement the strategy.

Regulatory Constraints for Electricity Sale

It is reasonable to assume that no significant regulatory hurdles would prevent the development of a power station in conjunction with PIB. Whatever entity developed the electricity generation capability would need to satisfy NEMMCO generation registration performance standards, and also obtain an electricity retail license. Hill Michael could see no reason why these registrations would not be obtained via the typical process.

There are also similar regulatory approvals required by the Queensland Government, however these are typically closely related to the NEMMCO requirements and for this purpose can be assumed to be satisfied if the project can satisfy NEMMCO requirements.

3.3.2 Western Australia

Export Capacity and Maximum Demand

In conjunction with Resource and Land Management Services (RLMS) and the information supplied by PIB the capacity of the Western Australia electricity market that can be readily reached by the project is estimated and allocated in 2 distinct groups:

- Connected Loads - North Western Interconnected System (NWIS).
- Isolated loads.

Table 1

Asset Name	Owner/ Developer	Comm Date	Capacity (MW)	Plant Type	Fuel Type
Port Hedland	Alinta Limited	1996/98	180	Gas Turbine	Natural Gas
Cape Lambert	Robe River Iron	n/a	105	Steam Turbine	Natural Gas
Mt Newman (BHP)	Alinta Limited	1996	108	Gas Turbine	Natural Gas
Dampier - Woodside	Woodside Petroleum	n/a	120	Gas Turbine	Natural Gas
Dampier 'C' - Hamersley	Hammersley Iron	n/a	120	Steam Turbine	Natural Gas
Paraburdoo	Hammersley Iron	n/a	20	Gas Turbine	Natural Gas
Telfer Gold Mine	Newcrest Mining	n/a	135	Gas Turbine	Natural Gas
Plutonic	Plutonic Resources	1997	16	Reciprocating	Natural Gas
Broome	Horizon Power	n/a	19	Reciprocating	Oil / Distillate
Carnarvon	Horizon Power	1981	15	Reciprocating	Natural Gas / Distillate

Onslow	Modra Electric	1999	3.6	Reciprocating	Natural Gas
DESTEC Energy	DESTEC Energy	n/a	660	Gas Turbine	Natural Gas
Exmouth Advanced	Verve Energy	2002	7.04	Wind Turbine / Diesel	Wind / Distillate
Broome	Horizon Power	2007	0	Gas Turbine	Natural Gas
Wodgina	Sons of Gwalia	2001	8.82	Reciprocating	Natural Gas

Pending detailed analysis of the economics of connecting loads to the WA smelter park it would appear that a potential load of approximately 850 MW exists, of which about 500 MW is connected to the NW Interconnected System (NWIS).
Other potential loads such as pipeline compressors may increase the total load available to approximately 1,000 MW.

Value of Electricity in Western Australia

In Western Australia, as an isolated system, there are limited trading opportunities for the electricity produced in the Western Australian smelter park precinct. The contracting arrangements will most likely be bilateral contracts with off-takers. These off-takers may be local retail entities in the NWIS or individual loads.

The likely value of the electricity in NWIS, and the surrounding areas can be assumed to be the cost of the existing generation that would be displaced. For the purposed of initial analysis it will be assumed that the heat rate of existing diesel or gas fired plant is 10 GJ/MWh. Gas price will vary from between an estimated $3/GJ on the coast to $4.50/GJ at the mines. Diesel is estimated at $15 /GJ. The amortised capital cost of gas/diesel engines or simple cycle gas turbines will vary between $10 – $20 /MWh.
O&M for gas and diesel generation is estimated at $10-$15 /MWh.

This puts the cost of efficient grid connected gas fired generation at $50 – 60 /MWh and remote gas fired generation at up to $80 /MWh. This compares to between $170 – 200 /MWh for diesel generation depending on diesel price.

The output from PIB is extremely attractive even after the connection costs are added. Capturing 100% of an existing market is very difficult because there will be other influences on buying decisions. Some loads may have long term contracts for gas / or electricity which may not be abandoned easily. Also the incumbent generators may respond to competition with prices that discount their capital because the plant already exists.

In Scenario 2 with only blast furnaces in the WA smelter park approximately 200 MW would be available for export. If sold at an average of $70/MWh it would produce revenue of approximately $100M (at 85% capacity factor).

Regulatory Constraints for Electricity Sale

The regulatory framework in Western Australia is slightly different to that applied in Queensland as Western Australia is not part of the NEM. The Western Australian Electricity Market (WAEM), and associated regulatory bodies and structures are of similar nature to the NEM, and for the purpose of this investigation be can be assumed that our conclusion that electricity generated by PIB would satisfy the Western Australian regulatory tests given that it will satisfy the tests applied in the NEM.

3.3.3 Strategies for Optimising Export Capacity & Market Value

General

Hill Michael has undertaken a high-level review of the export electricity opportunities from PIB in both geographical markets to identify where to increase export capacity and market value may exist.

Western Australia

Unlike Queensland, the export capacity of any power station in Western Australia can only be influenced by two events; Interconnection of the NWIS and other Shared Networks in the region, and/or; new connection of individual significant loads.

The presently known loads are shown in Table 1 and total about 340MW. In the next phase of the project Hill Michael will undertake a cost/benefit analysis for these local isolated loads to extend the NWIS, in conjunction with PIB and the load users.

The economics of connecting the other loads would require detailed analysis, and is dependant on the loads' willingness to contribute and the extent to which they value reliability. Most mines would be connected at 66 kV at a cost of approximately $300,000/km.

The market value of electricity for isolated loads in the Pilbara region of Western Australia is not easy to determine without being privy to actual generation costs, however they would be expected to be in the order of $90-$110/MWh. The value of electricity in the NWIS is likely to be in the order of $70-$90/MWh. Given this high electricity cost, and the need for PIB to displace these loads to ensure off-take demand, it is unlikely the value of electricity can be increased from this high price level.

Queensland

Export capacity in Queensland is essentially “unlimited” due to the ability to bid low into the NEM and have generation dispatched to meet the demand in Queensland. However, the practical limit may be in the order of 1,500 to 2,500 MW due to market growth, other generators coming online and possible transmission line constraints discussed below. Hill Michael suggest there is no requirement to consider strategies to minimise or maximise the export capacity of the power station within this range.

As discussed above, there is a great deal of scope for the optimisation and maximisation of revenue from electricity generation. The NEM is very efficient and it will be difficult to achieve any arbitrage or abnormal returns from electricity sales. Important for PIB will be optimising the revenue from electricity, balancing the important drivers of pricing risk in the Pool and volume risk in the contracts market .

3.4 Energy Infrastructure Requirements

3.4.1 Electricity Transmission & Connection Assets

Western Australia

For PIB, the most essential electrical infrastructure required in Western Australia is connection of PIB to the NWIS. This will be done via a 200 km (approximately) 220 kV double circuit line, at an estimated cost of $100M to $150M. A double circuit 220 kV line would have a capacity of about 600 MW. This would be sufficient to supply all existing loads on the NWIS.

As noted above, subject to economics and the willingness of other loads in the region to take supply via PIB generation, further infrastructure would be required. This infrastructure could be customer specific or create small shared networks in the region.

Queensland

A connection of this size (1,500 to 2,500 MW) directly into the transmission network will be significant.

As noted above, the most appropriate connection point for large quantities of generation (ie > 100 MW) is Strathmore substation near Collinsville, about 80km from Bowen.

In Powerlink's Annual Planning Report 2007, it identified that the combined capability of the CQ-NQ transmission network and local North Queensland generators will be fully utilised by summer 2007/08. Further augmentation is required by this time to ensure customers continue to receive a reliable electricity supply consistent with Powerlink's mandated reliability obligations.

In late 2005, Powerlink finalised regulatory processes for the following new large network assets to ensure supply reliability is maintained:

- Stage 1 - Construction of a 275kV transmission line between Broadsound and Nebo Substations, and 275kV static VAr compensator at Strathmore Substation by summer 2007/08;
- Stage 2 - Construction of a 275kV transmission line between Nebo and Strathmore Substations by summer 2008/09; and
- Stage 3 - Construction of a 275kV transmission line between Strathmore and Ross Substations by summer 2010/11 (now timed for summer 2009/10).

The higher forecast demand includes specific load developments at the coal handling facility at Dalrymple Bay, new and expanding coal mines and increases to industrial plant in Townsville. These development will strengthen the grid and improve the ability of the grid to absorb new generation.

With the current strengthening of the North Queensland transmission system by Powerlink Queensland as noted above, it could be possible to inject up to 2000 MW into Strathmore. Detailed technical analysis is required to model any potential grid constraints in either directions (north or south) as there are some stability limit across CQ to NQ corridor as well as further south. It may be the location of this generation near Strathmore will alleviate some of these limits but this needs to be investigated. This can be carried out by Hill Michael in conjunction with Powerlink, Queensland's transmission entity.

PIB would require connection to Strathmore by one double circuit 275 kV line, for each 700 MW and a cost of approximately $0.5 to 1 M/km. Therefore, for 2,500 MW three or four 275 kV double circuit lines would be required at a total cost of approximately $240 M. At the full 2,500 MW export capacity Powerlink may also need to strengthen the Grid north and/or south of Strathmore. This may add to the overall cost.

3.4.2 Gas Transmission & Connection Assets

Western Australia

The proposed location for the PIB smelter park in Western Australia is east-south-east of Yandi. Hill Michael estimate the precinct is less than 100km from the primarily Goldfields Pipeline (350, 400mm Natural Gas).

Queensland

Gas delivery to Bowen would require an approximately 100 km long pipeline connecting to the North Queensland Gas Pipeline (NQGP) at an estimated cost of approximately $50M. The NQGP has an estimated capacity of 20+ PJ/yr in its present configuration which may be able to be augmented with in-line compression.

4 Methodology

Below is set out the primary methodology characteristics employed in this report:

- Investigation has been based on industry standards and accepted and validated publicly available research.
- Modelling has been based on establishing feasible energy solutions for the developments in Bowen and Western Australia. There has been no attempt to optimise the solution for energy, transport and process efficiency.
- No energy market simulations or forecasts have been undertaken which assume PIB is operating.
- All estimates are provided in today's dollars.

5 Conclusions, Findings & Recommendations

- Electricity – Fundamental Drivers
    - Volume – The Queensland market and growing load will accommodate large electrical capacity associated with COREX and coking plants.
    - Price – Electricity sales will probably be more highly priced per unit in WA. The limitation in WA will be the volume of the market for electricity.

- Fundamental Infrastructure
    - Infrastructure - The amount of infrastructure required for the quantity of electricity produced will be less in Queensland. In WA, the economics of displacing relatively small quantities of isolated load will determine the quantity of electricity that can be sold into that market.

- Conclusions
    - COREX and coking plants should be considered for Queensland
    - Blast furnaces should be considered for WA
    - Electrical Infrastructure and load is unlikely to be a constraint in Queensland.
    - The detailed economics of connecting isolated electrical loads will be important in WA.

6 Next Steps

Progression of the feasibility investigation for PIB relies heavily on the effectiveness of integrating energy investigation, modelling and optimisation with the other key parameters of the project. Hill Michael would suggest the development of a single PIB energy model is fundamental to the effective determination of project feasibility. The PIB energy model can then provide the defining variables for expert review of such issues as carbon balance/benefit, fuel economics (electricity/gas/water) and infrastructure requirements.

End.

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1.0 INTRODUCTION

Project Iron Boomerang (Iron Boomerang) is planning to develop an east-west railroad across Australia to link the world-scale coal deposits in the Bowen Basin of Queensland with the similarly massive iron ore deposits in the Pilbara Region of Western Australia.

At each end of the railroad, it is proposed to develop a smelter park to accommodate iron smelters owned by international steelmakers. East West Line Parks Pty Ltd, the promoter of Iron Boomerang, intends to procure, construct and operate a suite of shared services for the smelter parks, e.g. power, water, car dumpers, stockpiles.

The proposed location of the Pilbara Smelter Park is approximately 55km north of Newman which is more than 400km inland. The proposed location for the Queensland Smelter Park is a few kilometres from the existing port at Abbot Point. These are two fundamentally different locations that will exhibit different logistics, environmental, quality and safety issues that will impact the project execution and cost. In previous projects of a similar size and nature, cost and schedule parameters have been considerably improved by reducing the amount of "stick-build" construction and adopting a modular approach to construction.

A critical life cycle cost for Iron Boomerang is the capital expenditure necessary to design, procure, install and commission the railroads, smelters services and smelters. The constructability life cycle costs are specifically tied to the choice between modular construction versus stick-build facilities. Operability and maintainability are also important issues which will be addressed in deriving an optimum development solution.

When modularising major industrial plant, there are two general types of modules, viz. offshore modules and onshore modules. Offshore modules are generally linked to the offshore hydrocarbons industry. These modules are generally heavier than onshore modules and lifted or floated over the intended final destination.

Refer to Table 1 (Offshore and Onshore Modules) for a brief explanation of modules.

Most major industrial projects can derive substantial cost and schedule benefits through a modularisation approach when the plant is in a remote area, close to the sea and/or where limited support infrastructure exists. Modularisation also limits land disturbance and/or environmental damage caused by stick build construction activities.

For smelter parks' services and multiple smelter units, it is proposed that modularisation be examined very early in the Feasibility Study phase of the project. The design will be Front End Loaded (FEL) to identify benefits early and avoid rework at a later point in the project schedule. An important issue will be the use of off-site (overseas) pre-assembly and modularisation. The emphasis will be on modules and pre-assembled units (PAU) that may be taken by sea to a suitable module offloading facility (MOF) for subsequent land transportation using self-propelled motorised transporters (SPMT). Where possible, onshore heavy lifting equipment will be minimised to capture the benefits of modularisation and pre-assembly.

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Table 1 Offshore and Onshore Modules

OFFSHORE MODULES	ONSHORE MODULES
• Weights and sizes are usually determined by the lifting capacity of the derrick barges (northern hemisphere only) which install the modules at the offshore locations. Due to the notable absence of derrick barges in the southern hemisphere a more sophisticated approach known as a "float over" is sometimes used. • Weights are usually in the range of 500 - 11,000 tonnes. However, there have been many smaller and larger modules built. Large modules are often considered to be "integrated decks". These may vary in size, e.g. 25m x 10m x 8m to 100m x 40m x 35m. • There is no definitive upper limit on the size of offshore modules since the onshore transport route is usually very short, e.g. less than 500m from the construction foundations onto the transportation barge and most fabrication yards have a well prepared (and short) transport route to skid modules to a suitable quay. Photo1 (overleaf) shows an examples of large North Sea modularised decks for oil production. This type of module is too large, heavy and wide for road transportation to the smelter parks. These modules need more sophisticated delivery systems than are available in Australia.	• Onshore modules have historically been used for petrochemical plants or mining developments located in remote areas with limited labour or construction facilities. Smelter services, power plant and iron smelters may be considered to be in this category. • Onshore modules are usually jacked onto pre-prepared foundations. • Onshore modules typically may weigh between 30 tonnes and 2,500 tonnes. They are often limited by the size and shape of the ship transporters. However, larger modules for onshore application have been shipped by motorised or dumb barges. • The transport route (and carrier) is generally the governing factor for module weight and physical dimensions. Some large modules have been transported overland for more than 100km. • The use of large modules for the Pilbara Smelter Park is likely to be a world first for distance (in the Pilbara) and difficulty. Photo 2 (overleaf) shows examples of modules constructed onshore for delivery by sea to a remote location and subsequent road transportation to the final destination. These are the type of long, high and narrow modules which may used to construct smelters and associated services.

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Photo 1 Offshore Integrated Deck - Large and Complex[1]

Photo 2 Onshore modules - delivered by sea for road transportation to site

<table>
<tr><td>
Transportable[2] biodiesel plant (420 tonne module) constructed by AGC at Henderson WA (2006) for sea transportation to Darwin and delivery using SPMTs.</td><td>
Portion[3] of an LNG plant arriving in Sakhalin for delivery to its onshore final destination by road.</td></tr>
</table>

[1] Source: www.oilrig-photos.com - The Captain Platform 68km north-east of Aberdeen. Photographed by Garve Scott-Lodge on 8th November 2006.
[2] Source: www.landcorp.com.au - LandCorp is the owner of the construction facility near Perth, WA.
[3] Source: www.sakhalinenergy.com via Google Images - Sakhalin is located in Eastern Siberia.

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2.0 DEFINITIONS

Some special words and acronyms are used to describe the activities and elements of a project that uses a modularised approach to construction. The definitions below are offered as a guide:

Module
This is usually the largest transportable unit or component of a facility and is the result of a series of remote assembly operations. A module is a volume fitted with all the structural elements, finished, and process components which are designed to occupy that space. It may contain elements of different distributed systems, be designed for multiple functions and be constructed by multiple crafts. Modules may contain prefabricated components or pre-assemblies, and are generally constructed away from the job site.

Short-form The result of a complex prefabrication and pre-assembly effort assembled remote from its final destination.

Prefabrication
This is a manufacturing process which generally takes place at a specialised facility and entails joining various materials to form a component part of the final installation. Prefabricated components often involve the work of a single craft.

Pre-assembly
This process joins together various materials, prefabricated components and/or equipment items at a remote location for subsequent installation as a unit. Completion of the pre-assembled unit (PAU) may involve additional work operations at the site away from the final point of installation. Pre-assembly often involves decoupling of sequential activities into parallel activities. Pre-assemblies typically contain portions of systems and require work by multiple crafts.

Block Construction
This comprises construction of separate elements at ground level adjacent to the site for stacking into the final plant configuration. It allows simultaneous work at several locations and decreases the risk of accidents.

Pre-assembled Unit (PAU)
A PAU is a section of a process unit complete with items such as process equipment, piping, pipe supports, valves, steelwork, instruments, electrical, lighting, paint, tracing, insulating material and fireproofing.

The Engineering Contractor generally carries out the full design and supplies drawings and materials to the Fabrication Contractor in accordance with the agreed modularisation strategy. Assembly and testing is at the Fabrication Contractor's yard. The Fabrication Contractor generally prepares steelwork working drawing (although this often an automated part of the design process) and supplies piping test materials.

Precommissioning is maximised at the Fabrication Yard.

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Pre-assembled Rack (PAR)
A PAR is a section of plant complete with items such as piping, pipe supports, valves, steelwork, instruments, lighting, paint, tracing, insulating material and fireproofing.

The Engineering Contractor generally carries out the full design and supplies drawings and materials to the Fabrication Contractor in accordance with the agreed modularisation strategy. Assembly and testing is at the Fabrication Contractor's yard. The Fabrication Contractor generally prepares steelwork working drawing (although this often an automated part of the design process) and supplies piping test materials.

Precommissioning is maximised at the Fabrication Yard.

Vendor Assembled Unit (VAU)
A VAU is an item of equipment where the Vendor's normal scope is extended to include items such as piping, pipe supports, valves, steelwork, instruments, lighting, paint, tracing, insulating material and fireproofing.

The Engineering Contractor carries out the full design and supplies drawings to the Vendor. Material may either be purchased by the Vendor or supplied by the Engineering Contractor.

An example of a VAU may be a fully dressed tower in the oxygen plant feeding the smelter complete with all its platforms, piping, insulating material, instruments and lighting.

Vendor Packaged Unit (VPU)
A VPU is an item of equipment where the Vendor designs a module, supplies all materials and fully assembles and tests it in a working condition.

The Vendor or manufacturer groups all of their components into a single plant unit. This assigns single responsibility for the process function, testing in the Vendor's shop and limits installation effort to making the external connections.

Examples of VPUs are skid mounted compressors and metering skids.

Pre-assembled Steelwork (PAS)
A PAS is a section of steelwork designed by the Engineering Contractor and assembled in the Fabrication Yard.

Skid Mounted
Skid mounting is mounting of several components (or a complete system) on a common base frame. This is common when assigning responsibility for the complete system to a Vendor or responsibility for several vendor-supplied items of equipment. Costs saving are achieved by the use of standard designs, shop fabrication, alignment and testing prior to the delivery date.

Examples of skid mounted plant include water treatment systems, lube oil systems, pumps, compressors and specialised process systems.

Transport and Heavy Lift Contractor (THLC)
The THLC is a contractor which specialises in transporting, shipping and lifting heavy and large loads.

Barge Mounted
This means construction of a complete plant on a barge for towing to the final seaboard location. Installation is limited to grounding or anchoring the barge and making connections.

This type of plant is unlikely to be included in Iron Boomerang. However, it could be considered as a preliminary offshore wharf arrangement for transfer of slab offshore as the final part of the export system.

Battery Limits
Battery Limits are boundaries which identifies the design "break" between the main industrial plant and external site services. The location known as Inside Battery Limits (IBL) normally contains the main process plant and is able to be isolated from the external site services, firewater, utilities, ancillaries and control locations. Most modularised plant would lie within the IBL.

The steelmaking companies would consider the smelting activities to be IBL and the support services and related activities of East West Line Parks Pty Ltd to be Outside Battery Limits (OBL).

3.0 MODULARISATION

There are three basic reasons to consider modularisation:

a) Improve, protect and accelerate the schedule.

b) Reduce capital expenditure.

c) Reduce peak site construction labour force.

Schedule
Modularisation protects or can improve the schedule because:

- Civil and mechanical works can be carried out in parallel;
- Many workfaces are available at hook-up commencement;
- Commissioning time at site can be shortened;
- Weather conditions have less impact on construction works.

Capital Expenditure
Modularisation entails both cost increases and cost decreases. It is the extent to which modularisation is employed that is the key to ensuring the overall costs are reduced by the construction and delivery methodologies.

Refer to Table 2 (Modularisation - Costs/Benefits/Labour) for more detail.

Peak Site Construction Labour Force

Modularisation removes workscope from the plant site. This reduces the total hours and peak workforce deployed at the construction site.

Additional Benefits

Prudently applied modularisation will also deliver general project benefits in:

- Safety;
- Quality;
- Project environmental impact;
- Benefits through the application of newer and higher technology.

The extent to which the additional benefits are delivered is incremental across many activities of a modularised project.

Table 3 provides a general view of the cost impacts on the project budget caused by modularisation.

Table 4 provides an overview of the general project advantage of modularisation.

Table 5 provides an overview of the general project disadvantages of modularisation.

4.0 CONCLUSION

Modularisation and pre-assembly will deliver substantial savings inside and outside the smelter parks. For the steelmakers and East West Line Parks Pty Ltd, there will be considerable cost and schedule benefits through front end loading the design of smelters and smelter utilities. Not all parts of the project may be modularised, e.g. the civil engineering component may comprise 23-35% of the overall project cost.

Modularisation of smelters and shared smelter utilities is considered relatively novel but a highly valuable component of Iron Boomerang. A Scoping Study will be the initial front end loading component of the design since it will identify:

- Elements of the project suited to modularisation and pre-assembly;
- Capital cost benefits that may be delivered through avoidance of stick-building;
- Life cycle costs that may be delivered through innovative design and construction;
- Environmental benefits of avoidance of stick-building;
- Social benefits derived through the use of less fly-in fly-out (FIFO) labour.

Modularisation and pre-assembly can dramatically reduce project schedule. Inevitably, this will accelerate delivery of initial slab production and front end revenue for all project participants.

Table 2 Modularisation - Costs/Benefit/Labour

COSTS	BENEFITS	PEAK SITE LABOUR
Significant areas of extra cost associated with modularisation are: • Increases engineering hours; • Increases steelwork material and offsite fabrication; • Increases handling costs.	Cost benefits are delivered in many ways. These can be significantly greater than the extra costs involved in engineering and offsite fabrication. Principal benefits are: • Better conditions in the fabrication shop; • Improves productivity; • Better QA leading to less rework; • Less QA/QC required on site; • More stable workforce; • Offsite labour is cheaper than site labour; • More familiarity with work procedures; • Improves safety; • Reduces temporary weather protection at site location; • Reduces weather downtime; • Reduces site installation scaffolding costs; • Reduces potential for industrial disputes.	Reducing the peak labour force on site delivers the following benefits: • Reduces camp and temporary construction facilities leading to reduced site costs and reduced land disturbance; • Reduces site supervision and consequently indirect overheads; • Improves safety through reduced site congestion; • Reduces scaffolding requirements; • Reduces camp population which reduces environmental impact on locality; • Reduces stress on local community and health services; • Reduces travel and other costs associated with fly-in fly-out (FIFO) construction operations; • Reduces exposure to skills shortage at site location.

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Table 3 General Costs Effects of Modularisation

ACTIVITIES	ISSUES	IMPACT
Engineering	Increases detail.	**UP**
Civils	Access roads, labour and materials.	**UP**
Concrete	Slight decrease due to smaller footprint	**DOWN**
Structural steel	Approximately 2.5 times extra	**UP**
Buildings	Less required	**DOWN**
Machinery and equipment	Slight increase due to shipping costs	**UP**
Piping	Decrease (maybe 15%)	**DOWN**
Electrical	Slight decrease	**DOWN**
Instruments	Slight decrease	**DOWN**
Coating and scaffolding	Better labour efficiency	**DOWN**
Insulation	Slight decrease	**DOWN**
Testing and Precommissioning	Better managed in shop environment	**DOWN**
International expenses	Slight reduction	**DOWN**
Temporary construction facilities	Marked decrease in all site facilities	**DOWN**
Transportation	Significantly higher costs	**UP**
Construction (services and supplies)	Marked reduction in all field activities	**DOWN**
Field staff (subsistence and expense)	Reduction but not linear	**DOWN**
Payroll (bed and board)	Substantial reduction	**DOWN**
Construction equipment	Less required at field location	**DOWN**

Table 4 General Project Advantages of Modularisation

ADVANTAGE	IMPACT
Reduces schedule Improves productivity	Work is done in an offsite location that will allow other activities on site to proceed.
Reduces labour congestion	Concurrent work being done in different locations.
Increases craft productivity	Work can be done in an environment more suited to the work and/or a controlled environment resulting in better quality and higher safety outcomes.
Reduces labour rates	Work can be done in a location where the market is more competitive and lower labour rates. This may include construction in countries with lower hourly rates.
Reduce impact on local culture	Less impact on local community, e.g. less dependent on local suppliers, less traffic movements, less stress on local social infrastructure.
Reduces site risk	Workshop environment mitigates possible impacts of issues related to weather, labour and materials.
More ground level work	Increased ground level work improves safety outcomes.
Reduces site construction	Reduced infrastructure required on site.
Lowers overall costs	For Iron Boomerang, it is the combination of the above that will deliver lower overall project costs.

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Table 5 General Project Disadvantages of Modularisation

DISADVANTAGE	IMPACT
Increases engineering and home office costs	More detailed engineering is required at front end of project to accelerate procurement and construction.
Increases structural material requirements	Modules require to be robust for transportation and setting.
Requires early fix on process, basic data and work scope	Schedule is dependent on early design freeze for all discipline interfaces.
Requires early "no change policy" in engineering	Late changes have serious cost and schedule implications for a modularised project.
Requires an early fix on plot plan and equipment arrangement plans	Detailed engineering for plant and module sizes IS dependent on known plant site parameters.
Requires tight control of schedule activities	Activities become more crucial with little room for slippage due to interdependencies between modules.
Number of participants increases	More and varied roles become part of the project's critical path. In addition, more site teams for module fabrication yards.
Fewer fabrications yards	The choice of fabrication yards may be limited within reasonable distance of the job site. Australia is a long way from Asia.
Increases cranage	Requirements and cost of cranage is increased particularly for heavy loads.
Increases transportation	Land and sea transportation are increased with inherent risk of losses.
Increases management focus	Module design and construction requires a constant focus of design and construction teams to police progress.

EAST WEST LINE PARKS PTY LTD

"The Australian East-West Line & Global Smelting Parks Project"

Members, Advisors & Officers Profiles

Shane Condon:
Project Founder and Team Leader

Work Qualifications & Experience Brief.

- **Contract Food Industry Management Consultancy-Australia and Asia/South Pacific: 20-years**
- **Leadership, Strategic Planning and Implementation Management Responsibilities:**
  - New and Existing Business; Project Development Efficiency/Expansion-Critical Process/Supply Chains-Recovery & Turnarounds.

- **New and Established Business Development and Growth:**
  Operations-Marketing-Product Development-Process/Quality & Product Improvement/Development-Efficiency-Analysis-Reports-Strategic Business and Operational Budget Financial Planning-Investigation-Project Management & Implementations. Agro and Fisheries Economic Development Programmes Asia/South Pacific "Government and Private Sectors".
- **Founded N- Australia Export/Domestic Seafood & Meat Business:**
  - **Award "Marketing & Business Excellence", Confederation of Industry and Government.**
  - Harvesting- Processing- Operations- Domestic and Export Processing, Marketing-Trading Business.
  - 120-staff and direct dependent contractors. $6 Mil internal + $5 Mil contract Marketing =$11 Mil pa.
- **Three successful Food Industry Turnaround Consultancies:** "Crisis Management & Leadership".
- **10 years USDA Registered Export Meat and seafood Industry Management Experience:**
  - Progressive early management career base experience from trainee-cadet to management of all key operations divisions. Boning Room-80 staff; Slaughter Floor-40 Staff; Export Cold Storage & Shipping; 5-Retail & Wholesale Butcher Shops; Large Pasture Farm (10,000 acre)-Grain Cropping, Intensive Piggery & Cattle Stud-up to 25 staff; Establishment of New Prawn Processing Factory & Prawn Trawler Fleet, Operations + Induction Training.
  - Export Market Research/Development/Implementations - Japan, USA, South America and SE Asia.
    - Reports to Executive Management and Board of Directors.
- **Aquaculture**: **Pioneered Australia's First Prawn Farm**, Port Roper NT. *Private project!*
- **International Packaging Awards** nominated "original" design concept as Australia's entry**.**
- **Establishment of "Leading" Worlds Best Practice Food Industry Product Standards:** "Quality/Price" for continuous leading benchmark product, process & operational standards.
- **Education Philanthropy Project Establishment – Pre-School, Fiji.** A Condon family philanthropy project to initiate, organise co-sponsor and jointly seed finance, with the Australian Embassy-Foreign Aide, to establish run and operate a much needed education gap facility - Church multiracial pre-school, accommodating over 80 Preschool Children in two daily sessions. Still operating.

Education:

- **2006: MBA, University of Queensland (near completion)**

  Three High Distinction major report marks to date!
- **2002: P-Grad Cert Degree. "Management" University of Queensland**

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Members, Advisors & Officers Profiles

Gordon Thomson:
Deputy Project Leader and Western Australia Team Leader

BSc (Hons), MBA, F Fin

Engineer & Business Developer:
Process Engineering, Facilities Design, Project Management, Marketing, Business Development and Technical Authoring.

Career:
Commenced engineering career with Shell International in 1974 with a three-year posting to the offshore oil/gas production operations in Qatar.

- **30 years as an Engineer and Business Developer** in UK North Sea, Norway, Brunei Darussalam and Australia.
- **Last 17 years to Present**: Operated a family-owned Perth & WA based private consultancy company as an independent contractor/consultant.

Clients:
Fluor-Daniel, Government of Western Australia, Technip France, Technip-Coflexip, Kimberley Oil, Amira International, UK Government, Water Corporation of Western Australia, BHPB Billiton Iron Ore and BHP Billiton Petroleum and Monadelphous Engineering.

Academic:
1974 Batchelor of Science (Hons) in Mechanical Engineering
University of Strathclyde, Glasgow, Scotland.

1989 Master of Business Administration
South Australian Institute of Technology, Adelaide, Australia.

2000 Graduate Diploma in Applied Finance and Investment
Securities Institute of Australia, Perth, Australia.

Memberships:
Fellow of the Financial Services Institute of Australasia
Member of the Petroleum Club of Western Australia

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"The Australian East-West Line & Global Smelting Parks Project"

Members, Advisors & Officers Profiles

Saul Eslake:
Leader, Economics Marketing & Business, Media and Political

Chief Economist ANZ "Australia and New Zealand Banking Group" from Aug 1995**.**

- Member – Group Asset & Liability Committee: Mgt of ANZ's Bal/Sheet.
- Chairman of ANZ Cover – Internal Crime, Fraud & Prof/Indemnity Insur/Cover.
- Member – Corp. & Institutional Bank's Sustainability Steering Committee: Environmental & Social Issues.

Previous Positions:
1991-95: **Chief Economist** (Int) National Mutual Funds Management (now AXA Insur Group)
1981-86: **Chief Economist** Stockbroking Firm Mc Intosh Securities Ltd. (now Merrill Lynch)
< 1981: **Economist** Australian Government, including 2 years with Treasury.

Education: Hons Economics; Dip Applied Finance and Investment; 2003 Senior Executive Programme at Columbia Graduate School of Business, USA.

Current Fellowships & Memberships:
The Australian Government: Foreign Affairs Council / Trade Policy Advisory Council / World Trade Org Advisory Group / Tourism Forecasting Committee.
Other: Non-Exec Dir Aust Housing & Urban Research Institute; Dir University of Tasmania Foundation; Securities Institute of Australia; Assoc Aust/Institute of Management; Aust/Institute of Company Directors; USA National Association of Business Economists; The Australian Representative on the Int/Conference of Commercial Bank Economists.

Services to Australian / State Governments & Institutions:
CEO Victorian Gov. (Vic) Commission of Audit; Director Gascor – (Vic/Gov-Gas & Hospitals); Invited & Accepted March 2005 – To Chair the Independent Project Management Committee for the City of Launceston, Tasmania. -To develop a vision for the community for the year 2020!

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EAST WEST LINE PARKS PTY LTD

"The Australian East-West Line & Global Smelting Parks Project"

Members, Advisors & Officers Profiles

David Graham Russell RFD QC:
Corporate Legal Business Facilitation Advisor

Called to the Bar in 1977, having been admitted as a solicitor in 1974.

Admitted to practise in New South Wales, Queensland, Victoria, the Northern Territory, the Australian Capital Territory and Papua New Guinea, David took silk in 1986 and holds that office in all the above jurisdictions, except Papua New Guinea.

He has served as a Judge Advocate and is a Wing Commander in the RAAF Legal Reserve.

David's principal area of practice is Revenue Law, which requires an understanding of commercial and administrative law. He has acted for Commonwealth and State Governments as well as individuals and corporations. David's other areas of expertise include: **Constitutional Law - Corporate Law - Equity**

David was President of the **Taxation Institute of Australia** (1993-5), and of the **Asia Oceania Tax Consultants' Association** (1996-2000). David served as Chairman of the National Education (1991-3) and International Relations (1995-2001) Committees of the Institute, is a member of its National Technical Committee and the **Law Council of Australia Business Law Section** Taxation Committee. He has been appointed an Honorary Adviser of the Asia Oceania Tax Consultants' Association. He served as a member of the Ministerial Consultative Committee for the Tax Law Improvement Project from 1994 to 1997 and as a member of the Steering Committee for the National Review of Standards for the Tax Profession in 1993 and 1994. From 1991 to 1995 he was a member of the National Tax Liaison Group.

David is the author of many published **articles and conference papers**, both inside and outside Australia, and is a member of the Advisory Editorial Board of **Australian Tax Practice.** He also lectures at the University of Queensland for the Master of Laws course, is an Adjunct Professor of the **Faculty of Business, Economics and Law** of the University of Queensland and is a member of the Industry Advisory Board of that University's **Australian Centre for Commerce and Taxation**. He is also an Advisory Board Member for Griffith University's **Key Centre for Ethics, Law, Justice and Government**.

He has been a member of the Management Committee **Australia - Japan Society, Queensland** since 1994, its Vice President in 1995-6 and President from 1996-2001. He was President of the **National Federation of Australia Japan Societies** from 2001 to 2005 and is a member of the Executive Committee for the **2006 Australia Japan Year of Exchange**.

David is actively involved in the operations of his family's business, Russell Pastoral Company. He is the third generation of his family to do so. **Russell Pastoral Company** carries on business at Dalby, Cunnamulla and Blackall. Its flagship property, **Jimbour**, is one of Queensland's oldest stations, dating back to 1841. In addition to pursuing the Company's interests in the cattle, wool, grain, wine and tourism industries, David has served as a director of the **Queensland Wine Industry Association**, the peak wine industry body for the state, and from 2002 served as its President. In 2003 he became a Committee member of the **Australian Regional Winemakers Forum**, and in 2004 was elected its Vice President and one of the members of the Council of the **Winemakers Federation of Australia**.

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EAST WEST LINE PARKS PTY LTD

"The Australian East-West Line & Global Smelting Parks Project"

Members, Advisors & Officers Profiles

Prof Robert G (Jerry) Bowman, PhD, CPA:
Chief Financial Officer

PhD, Stanford University.

Emeritus Professor of Finance at The University of Auckland.

- **Bank of New Zealand Professor of Finance**
- **Certified Public Accountant** (California, inactive).
- **University of Oregon, 1974-1987.**
- **Visiting Academic Positions**: Australian Graduate School of Management, University of Queensland, Southern Methodist University, National University of Singapore and Hong Kong Polytechnic University.
- **Published** numerous articles in international journals in Finance, Accounting and Economics.

Presentations and Awards:

- Invited guest presenter at numerous universities and international conferences.
- Awards for teaching and research.
- Executive education presentations for major corporations.

Appointments and Positions:

Head of Department and Head of Finance for most of academic career.

- Chair in Finance at the University of Auckland, 1987 to present.
- Head of Finance at the University of Auckland - 12 years;
  - Developed finance from no dedicated staff or curriculum into one of the top finance groups in Australasia.
- Head of the Department of Accounting and Finance - 3 years.
- Head of the Department of Accounting at the University of Oregon while on that faculty.

Substantial commercial consulting and management experience.

Prior to Academic Career

- **Audit manager** with Arthur Young & Company, USA
- **Treasurer and Chief Financial Officer** of Cohu, Inc., USA, diversified high technology company, then listed on the American Stock Exchange.

Subsequent to Beginning of Academic Career

- **Consultant and expert witness** for major companies in New Zealand, Australia, Fiji, Italy, Singapore and the United States.
- **Consulting engagements** primarily for regulated businesses and in three areas: Cost of Capital; Valuation; and Mergers and Acquisitions.
- **Advisor** to the National Competition Council (Australia); Ministry of Economic Development (New Zealand); Office of the Rail Access Regulator (Australia); Research work for the New Zealand Treasury.
- **Major Engagements** with Australian rail firms (Railways, Freightways, Northern Territories Rail, Queensland Rail, Rail Access Corporation and Western Australia Rail)

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Professor Art Shulman:
Leader, Best Practice, Project Editorial and Education Development Facilitation

Professor of Business Griffiths University: Art is a leading researcher, teacher and consultant in Knowledge Management, Innovation and Commercialisation Alliances (policy and practices).
Duties Griffith University: Administrative responsibilities within the Pro Vice Chancellor (Business and Law) office for ensuring that all facets of the School meet or exceed International best practice standards.
Academic: 39 PhDs supervised to completion, authored or co-authored over 100 publications.

Research Tasks: Focuses on improving public sector- private sector alliances.

Recent Work Grants

- **Australian Research Council grants**, LWRRDC and GRDC grants and competitive contracts from Government organisations including IPPA (Qld), HIC, PHARM, Murray Darling Basin Commission, QDPI, RTA-NSW, NSW Treasury,
- **Private sector consultancies** with Merck, Telstra, National Mutual, and Suncorp Metway.

Business Advisor and Reviewer:
- Research programs, corporate strategies, stakeholder communication practices and policy
- Commonwealth and State government agencies and collaborative research Centres in Australia and elsewhere. Scholarship recognised internationally.

Awards
- Fellowship status by the American Psychological Society for work in research methodology and fellowship status by the Board of Governors of the Communication Institute of Australia

Honours:
- Inaugural Ashworth Fellow- University of Melbourne, where he led a team of researchers in research with Telecom Australia developing methodologies for evaluating the social and economic impact of new telecommunication systems.
- Visiting Fellow appointments at the University of London, AGSM-UNSW, MIT best
- Published research paper awards.

Presentations: World Congress on Total Quality, at three National R&D Forums, the National Agricultural Systems Purchasers Forum, and for the Malaysian Ministry of Health sponsored WHO meetings on improving Medicine policies and practices.

Previous:
- Associate Professor of Management at the University of Queensland,
- Principal Research Fellow of the Communication Research Institute of Australia,
- Director of PHD programs in Organisational Behaviour and Social Psychology, Washington University, St Louis, Mo.USA.

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Members, Advisors & Officers Profiles

Stephen Kennedy:
Leader, Business Development Marketing/Planning Pre-and Feasibility Studies

Senior Consultant – Investment and Business Planning

- Experience of market and strategic studies within the non-ferrous and ferrous metals industries and financial modelling experience of process industry projects.
- Currently working with financial institutions, commodity traders and facility owners on corporate assessments from London, covering Europe, Russia & CIS, Africa, USA and the Middle East.
- Over 15 years experience on complex multi-disciplined energy, metals, minerals and infrastructure projects. Project roles have developed a strong capability in project management systems, contract management, cost engineering and scheduling. Strong foundation in the planning and design of mine infrastructure, major roadwork's and railways from various civil engineering roles.

Key Skills:

- Technical due diligence / reviews
- Pre-feasibility and feasibility studies
- Competent person's report
- Market studies
- Strategy development
- Financial modelling
- Valuations
- Project management
- Contract administration
- Cost engineering
- Planning and scheduling
- Mine infrastructure planning and design
- Major road infrastructure planning and design
- Railway planning and design

Previous Positions:

2002-03: **Consultant – Investment & Business Planning** Hatch Associates Limited (London)
2000-01: **Senior Project Engineer** Hatch Associates Limited
1998-99: **Senior Project Engineer** BHP Engineering Limited (now Hatch)
1996-97: **Civil Engineer** BHP Engineering Limited
1986-95: **Civil Engineering Technical Officer** – various roles with leading consulting engineering firms

Education:

Master of Business Administration - University of Queensland (2001)
Bachelor of Engineering (Civil) with Honours - Queensland University of Technology (1996)
Associate Diploma Civil Engineering - Queensland Institute of Technology (1987)

Current Fellowships & Memberships:

Member of the Institution of Engineers, Australia – Civil

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Clem Tisdell:
Environmental & Economics, Editorial Support

Professor Emeritus, School of Economics
The University of Queensland

Previous Positions:

1989-2004	Professor of Economics The University of Queensland
1972-1989	Professor of Economics The University of Newcastle, NSW
1964-1972	Reader in Economics, Australian National University. Plus other positions in Economics

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Education:
B. Com with 1st Class Hons in Economics and University Medal, UNSW
PhD (ANU)

Fellowships etc:
- Fellow of the Academy of Social Sciences in Australia (FASSA)
- Honorary Professor, People's University of China

Publications, Consultancies etc:
Author of more than 60 books and over 700 articles, many dealing with environmental economics. Wide range of consultancies completed for Australian and international clients.

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"The Australian East-West Line & Global Smelting Parks Project"

Members, Advisors & Officers Profiles

Anton Michielsen:
Leader, Rail Line Planning & Construction

Leighton Contractors Pty Ltd,
Design Director, Gateway Upgrade Project, Leigthon Abigroup Joint Venture
Member of the Executive Management Team for LAJV's $1.88 billion Gateway Motorway and Bridge Upgrade Project (GUP) for the Queensland Motorways Ltd. As Design Director he led the projects strategic direction with respect to value engineering, design and construction delivery and project risk assessments. He engaged and directed a team of LAJV Design Managers and consultants, with over 250 people involved, in the preparation designs for tender, detailed design and construction plans. This combined inputs of from construction cost estimators, builders and consultants to develop innovative competitive tenders to client's specifications. The project is under construction and due for completion mid 2010.

Within Leighton Contractors (LCLP) the projects he has been involved in include;

- Gateway Upgrade Project D&C, $1880 mil, 20km motorway and 1700m long bridge in the Brisbane CBD
- Adviser to BLJV North-South Bypass Tunnel BOOT Project tender, $3000mil for Brisbane City Council
- Adviser to LCPL Airport Link Tunnel BOOT Project tender, for Qld Gov.

Previous Positions:

Feb 2005 till July 2005 MetTRIP Network Program Manager, Queensland Rail
SEQIPP*Rail* (formerly MetTRIP) is a recent Qld Department of Transport program of major infrastructure capacity enhancements of the Brisbane Metropolitan Rail System. As Program Manager he was a member of the MetTRIP Steering Committees and he devised and promoted the program of project alliance agreements which were adopted for the delivery of QR's major metropolitan rail program.

1987 to 2005 Maunsell-AECOM , ANZAME region– Director from 1997, Engineer from 1987
Industry Director, Major Projects for Maunsell–AECOM, a US publicly listed engineering and professional services company with a turn over US$ 4000mil. He participated at a senior level in major transport projects in Australia and throughout Asia, including Singapore, Hong Kong, Philippines and Delhi, India. He was accountable and responsible for the project management and technical aspects of many complex multi-disciplinary transport facilities, motorways, transits, metro's, railways, freight stations . Major projects include;

- Delhi Metro MC1a D&C in India, 4 km underground metro in the northern sector of Dehli, US $500mil
- Urban Motorways and tunnels in Australia, Mitcham-Frankston Tollway, Pacific Motorway, Brisbane Inner City by-pass which won the national engineering excellence award in 2002.

1983 to 1987 Hughes Trueman Ludlow Pty Ltd – Engineer
Engineering design and contract administration of civil works, roads, sub-divisions and buildings

Education:
MBA at University of Queensland, 2005
B.E Civil Engineering (Hons), University of Adelaide. 1982
Engineering Contract Management, Bruce TAFE, ACT. 1985

Affiliations:
Member Engineers Australia, NPER No. 183898
Registered Professional Engineer of QLD RPEQ 6016

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Members, Advisors & Officers Profiles

Ross Hunter:
Leader, Precincts & Infrastructure Developments & Government Support Services

Senior Consultant – Project Management: Rail Infrastructure

- Extensive experience (30 years plus) major rail projects planning and delivery - new railways - major rollingstock acquisition projects.
- Registered Project Director (PMRC)
- Ten years as capital works program director for Queensland Rail, overseeing A$6 billion expenditure on infrastructure and rollingstock projects. Project Director/Manager major individual projects - Gold Coast Railway, Mainline Upgrade, Inner City Quadruplication, Cairns Tilt Train and Coal Rollingstock Projects.
- Four years overseeing engineering resources of Queensland Rail, comprising 500 engineering and technical staff covering all rail-engineering disciplines.
- Currently Senior Coal Transport Advisor to the Queensland Government, covering planning and integration of a major expansion of rail and port transport capacity within the Queensland coal supply chain.

Key Skills

- Rail transport planning; Project Director/Project Manager; Feasibility studies; Investment evaluation
- Capital works program management.

Previous Positions

- 2003-6**: Senior Consultant** – Coal Transport Advisor to Queensland Government;

  : Director - Ranbury Management Group (project management specialist consultancy group)
- 1999 – 2003: Group General Manager Technical Services, Queensland Rail
- 1990 – 1999: General Manager Projects, Queensland Rail
- 1972 – 1990: Various engineering and management positions, Queensland Rail, focussed on major project planning and delivery

Education:

- Bachelor of Civil Engineering (Honours)– University of Queensland (1972)
- Various post-grad subjects and courses

Current Professional Affiliations:

- Member Australian Institute of Project Management; Member Railway Technical Society of Australia
- Registered Professional Engineer of Queensland.

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Members, Advisors & Officers Profiles

David Belham
Executive General Manager & Project Member

Membership Duties:
International Investor Facilitation - Management & Co-ordination – Communications Including Media Project Spokesperson - Logistics' - Administration & Marketing.

Career:

- **Appointed by the Premier of Queensland to establish and open the Queensland Government Trade and Investment Office – India.**
- **2004 – 2007, Commissioner, Queensland Government Trade and Investment Office – India**, responsible to represent State of Queensland and for all Queensland Government activities in India.
- **Director, Information Management, Queensland Government 1998 - 2004**.
- Responsible for planning and implementation of economic and aid development projects throughout the South West Pacific and South East Asia 1992 -1998 for Federal Government.
- Senior officer in the United Nations Transition Authority in Cambodia during 1993.
- Extensive experience in the military, government and international affairs, including 25 years as a Department of Defence international communications specialist.

Education:

- Graduate, Army Command and Staff College 1991
- Graduate Diploma Management Studies, Canberra ACT 1994
- Bachelor of Professional Studies (Major Asian Studies) University of New England, Armidale NSW 1995

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Members, Advisors & Officers Profiles

Daniel Dezentje

Associate Member: Infrastructure Planning Management and Surveying.

Current work position:
Director, Intercontinental Project Management

15 years of construction / development experience in Projects up to $3 Billion including refineries, railways, infrastructure, buildings, utilities and services.

Career:

- 2005-2008 Contracts / Project Manager and Principles Representative - Rio Tinto Alcan.
- 2004-2005 Consultant – Gold Coast City Council.
- 2003-2004 Construction / Project Manager – Ardmore Construction
- 2001-2003 Project Manager – Thiess Infraco.
- 2000 Project Manager – Coby Constructions
- 1993-1999 Various Construction / Development positions in Australia - BHP, Rio Tinto Coal (Coal & Allied), Queensland University of Technology, Tweed Shire Council – and in the United Kingdom - Christiani & Neilson / May Gurney JV, Davies Middleton & Davies, Interserve Project Services (ex - Tilbury Douglas), McNicholas Plc, etc.

Key Strengths

- Project Management.
- Commercial Management.
- Contract Management
- Engineering Management.
- Procurement Management
- Construction Management.
- Principles Representative
- Management of external agencies, contractors, suppliers and consultants in project development, execution and commissioning, etc.
- Management of multiple operations both on/off Site.
- Risk Analysis & Feasibility Studies.
- Financial propositions for Project development.

Education

- Grad. Dip. of Project Management - Queensland University of Technology, Australia
- Bach. of Surveying - Queensland University of Technology, Australia
- Cert. of Engineering/Construction - Yeronga College of TAFE, Australia
- Cert. of Computer Aided Drafting - Yeronga College of TAFE, Australia

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Matthew Magin
Central Queensland Business Coordination and Development

Current work position: Regional Relationship Manager Abbot Point (Contract position with Ports Corporation of Queensland)

Career:

- 12 years Federal & State Govt experience both political &bureaucratic
- 5 years CEO of a regional economic development organisation
- 10 years self employed in business I started from scratch
- 20 years senior management experience in retail industry

Career Highlights/Achievements

- Ongoing investment Attraction-CHALCO Aluminum Smelter ($2-3b)
- Sino- Australia Coal Summit
- Regional Housing Summits
- $5M grant for Mining Simulator Training and R&D Centre for Mackay region
- $28M grant for Mackay Water Re-use scheme
- $2M grant for new library @ CQU Mackay campus
- $4M grant Mackay Aquatic Centre
- Development of Bowen Economic Development Strategy
- Aquaculture Industry development in the Mackay region
- Formation of International Education & Mining Services Industry Clusters
- Conduct overseas trade missions & facilitate inbound trade missions
- Manage > $2.5 M in State Development grants since 1998
- Development of the Mackay Regional Water Resource Strategy
- Attraction and retention of Queensland Mining Exhibition for Mackay region

Key Strengths

- Networking/ Establish & maintain internal & external relationships
- Strategic leadership skills
- Organisation, co-ordination & facilitation skills
- Senior and general management

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Haruhiko (Haru) Kinase:
Japan/Asia Business Officer
& Precinct Engineering & Environmental Planning Services.

Education:

- **Master of Business Administration:** Anaheim University, USA, 2004.
- **Master of Engineering:** Chiba University, Japan, 1996.
- **Bachelor of Engineering:** Chiba University, Japan, 1994.

Career:

- **1996 to 2007: Mechanical Engineer with Asahi Shimbun, Tokyo – 11 years;**

  A Japanese newspaper company with a circulation of over 8 mil newspapers per day and with more than 5,500 employees in Japan. Haru's main role was in operating, repairing and maintaining the printing presses and other printing equipment.

  - **2004 - 2007: Positioned as a key member of the project team to renew and upgrade the existing printing press and other printing equipment**; the project costs more than A$20million.
  - **2004 - 2007: Member/Director of the Environmental Management System (ISO 14001) project at Asahi Shimbun.** As the Director of ISO14001, Haru managed and oversaw 20 project team members. The purpose of the project was to increase energy and resource saving as well as reduce waste. The project successfully set up and carried out PDCA (Plan- Do-Check-Action) cycle and ensured the continued ISO 14001 certification for the company.
  - **2006 - 2007: Member - Japanese Newspaper Association** which edited and published over 5,000 copies of "Newspaper Printing handbook" for distribution amongst the Japanese Newspaper Association to raise the level of technical skill and knowledge.

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"Nick" Fei Meng:
Project Officer (China Asia-Pacific Trade Economist and Marketing)

Education: BEc, MBA

- **Master of Business Administration,**
  Business School, The University of Queensland, Australia.
- **Advanced English,**
  Edinburgh's Telford College, UK;
  International student representative.
- **Bachelor of Economics in Foreign Trade,**
  Business School, Dalian University, China;
  Editor of "Campus Monthly"

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Nick Fei MENG completed his MBA in 2005 with a part-time position as Assistant Marketing Manager, Anti Wave International, 2003-2004, with responsibility for expanding business into the Chinese market, ensuring collaboration between the company and its Chinese subsidiary company, and building and managing relationships with Chinese customers, including the China 2008 Olympic Committee. Nick has honed his skills in marketing, import and export, customer service and management through his varied and international experiences.

Previous Positions:
1998-2002: China -Business Branch Manager of Korean Mega Trading Limited.
1996-98: China-Commercial Representative MINMETALS (Liaoning) Import & Export Ltd.

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Yi-Ling Chan:
Project Officer, Project Administrator & Co-ordinator

Education:

- Master of Business Administration,
  University of Queenland, Australia.

- Bachelor of Arts (Geography and Psychology majors),
  National University of Singapore, Singapore

Previous Positions:

2001 – 2006: Joined **American International Group Pte Ltd, Singapore** in August 2001 and rose to the position of Head of Customer Service Centre in June 2003. Responsible for recruiting, training and managing graduate customer service executives; evaluating the change process and providing feedback to Management on the progress in addressing project objectives and managing customer complaints in relation to product liability. Spearheaded the design, development, re-location and successful launch of a new customer service centre with a double capacity volume and increased performance targets by 30% by re-engineering work processes to improve productivity. Job rotation in February 2005 to Compliance Department to understudy corporate audit procedures and regulatory requirements.

2000 – 2001: appointed Assistant Customer Service Manager with **JTC Corporation, Singapore** a quasi Singapore government land-lease organization.

1991 – 1997: Fund-raiser at **National University of Singapore, Singapore.**

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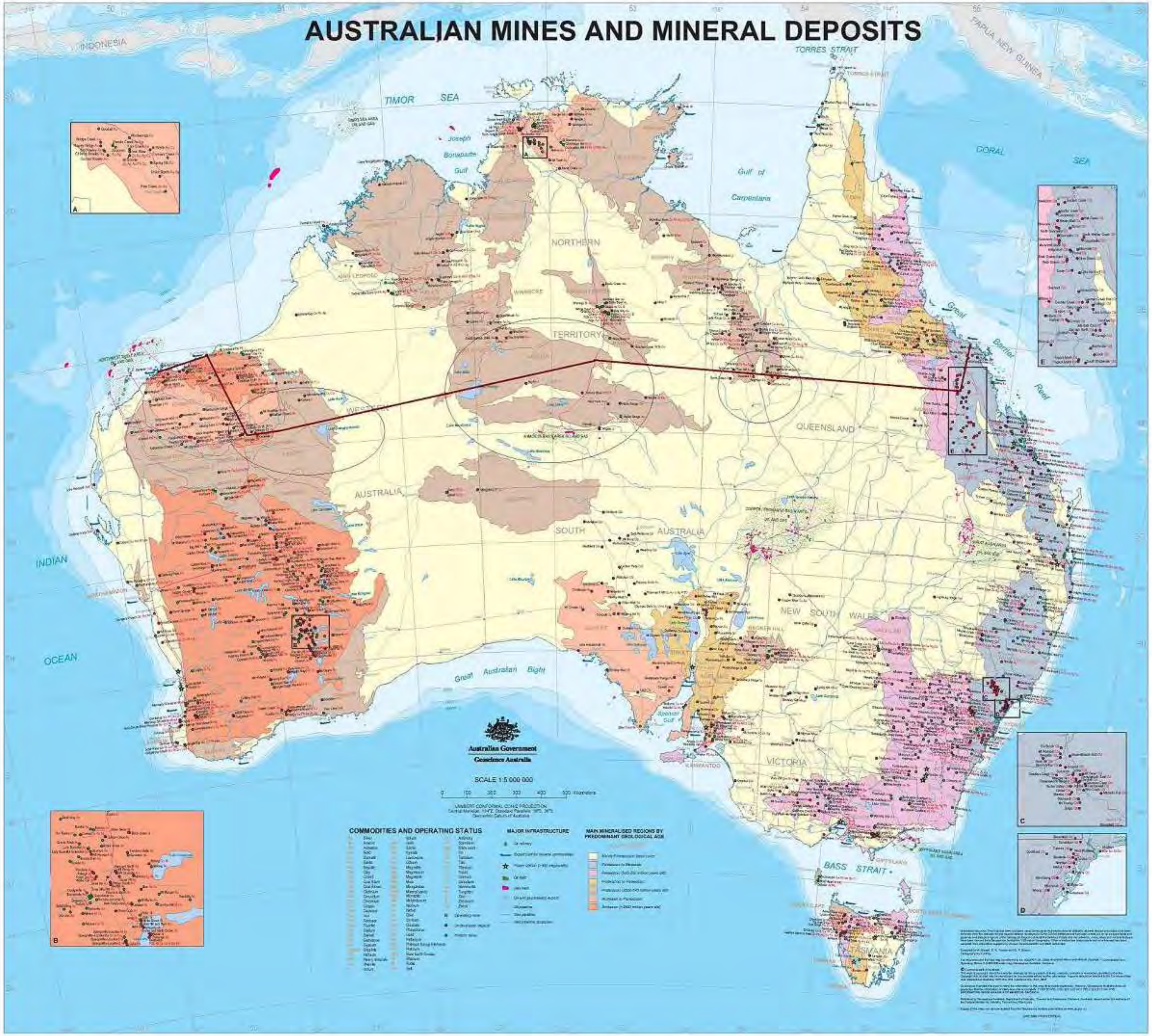
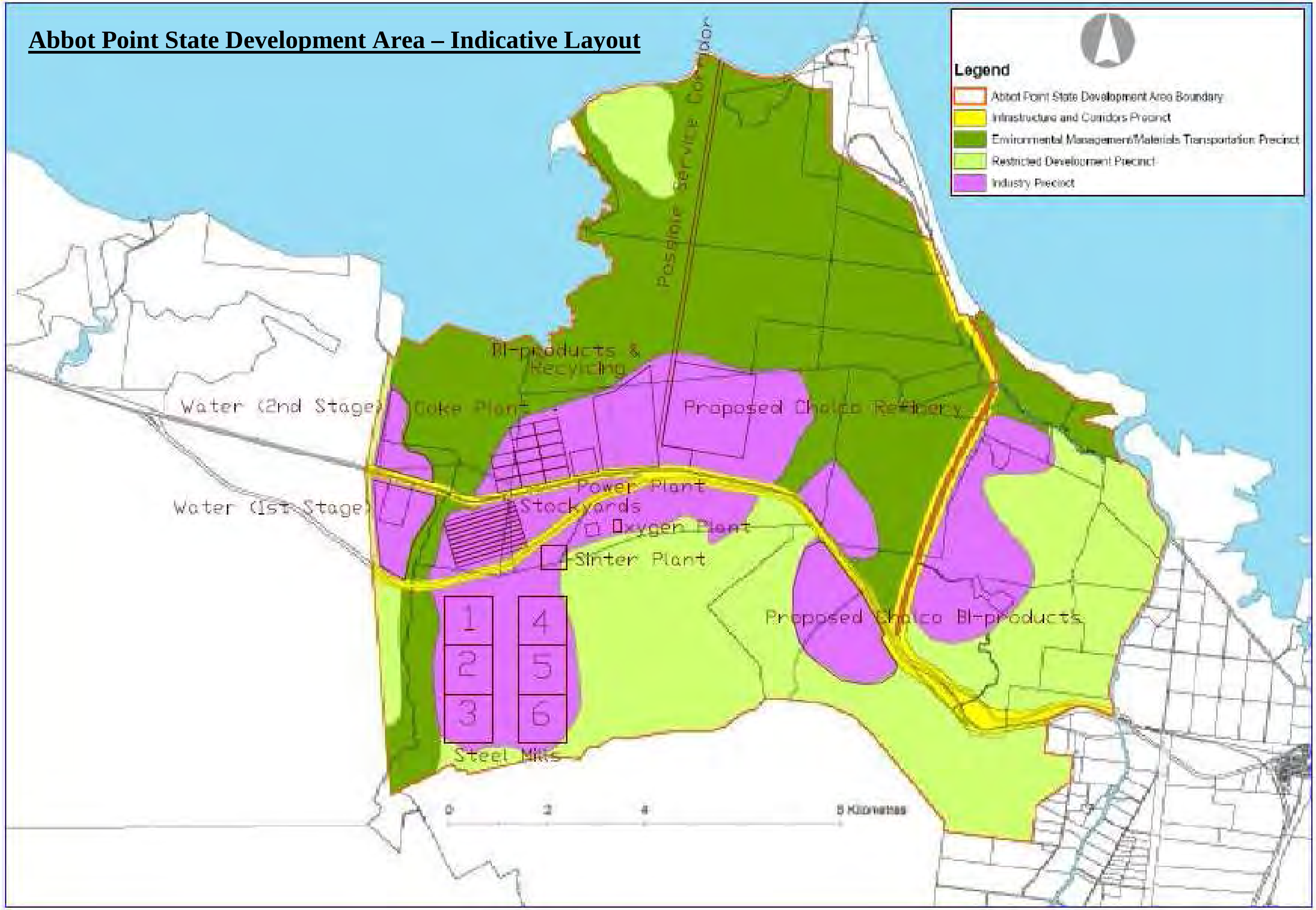
Project Iron Boomerang Trans Continental Line Crossing New Mines and Mineral Deposits





Note: Illustrative purposes only. Compiled from Queensland Department of Infrastructure & Planning records.

Initial Scoping Study approximate areas:

- **Steel Mills** (BF, BOF, CC) – 6 no. 100 Ha Blocks, with a 500m wide Service Corridor. (Each 1000m x 1000m).
- **Power Station** – 1 no. 25 Ha. Block (500m x 500m).
- **Stockyards** – 10 no. 15 Ha. Blocks (Each 1500m x 100m).
- **Coking Plant** – 13 no. 12 Ha. Coke Batteries. (Each 500m x 250m).
- **Air Plant Area** – 1 no. 6 Ha. Block. (250m x 250m).
- **Water** (1st Stage) – Approx 150 Ha.
- **Water** (2nd Stage) – Approx 100 Ha.
- **Bi-products and Recycling** – Approx 200 Ha.
- **Sintering Plant Area** – 1 no. 25 Ha. Block (500m x 500m)

Total PIB Scoping Area + buffer zones: 1,500 to 2,000 Ha.
Other:

- Proposed Chalco Refinery (Bauxite to Alumina) – Approx 300 Ha.
- Proposed Chalco Bi-products – Approx 375 Ha.

Note on PIB Steelmaking CO_2 in comparison with a major national Steelmaker.

The CO_2 big picture issue below for Bluescope Steel as Australia premier steelmaker is an emulated example major case issue for most of the worlds steelmakers and their Governments to face in various "plus or minus degrees" in regards to national and steel industry economically efficient economies. Steel is 87% of all metals used by the world (IISI).

In world CO_2 terms, the big 4 emitters are a) Fossil fuels, b) Coal Fired Power Stations, c) Steelmaking and d) Cement. The PIB concept and strategy can practically and dramatically effect and reduce all four categories. CEO Paul O'Malley's carefully constructed summary and succinct debate case hereunder is very well put; and thus for the many worldwide steel companies facing similar national and global serious business and social broad based economic effect issues of great future consequence.

As a Brownfield plant cost it is a major expense for Bluescope, by applying their figures to EWLP PIB as a "greenfield" project the following conclusion and equation may apply.

Brownfield Co-Gen upgrade 5m tpy plant capex Au$1Bn for a 1m tpy of CO_2 savings.

PIB has already indentified 8.7m tpy of CO_2 as a greenfield project therefore indicating a saving of $8.7bn (using the Bluescope figures) and it can also be argued that with a greenfield entry expense that this major $1bn capex expense is negated.

The Australian http://www.theaustralian.news.com.au/

Bluescope Steel warns on carbon scheme

Matt Chambers | *September 13, 2008*

BLUESCOPE Steel, one of the nation's biggest carbon emitters, has warned that the Government's proposed emissions trading scheme risks shutting down local steel production if Australia acts alone.

Addressing business representatives in Melbourne yesterday, Bluescope chief executive Paul O'Malley joined the growing chorus of industry voices opposed to the emissions trading scheme, though he applauded the push to reduce carbon emissions and the Government's consultation with industry.

"If we don't get a global solution and it's only an Australian solution, I think we'll lose our competitive advantage and you'll see the CO2 made somewhere else and the steel made somewhere else," Mr O'Malley told an American Chamber of Commerce lunch.

"Getting the policy right, so you get an actual reduction in CO_2, not just a headline, is very important," he said, adding that reducing Australian steel would result in imported steel made by worse emitters. Bluescope would be one of the hardest-hit Australian companies if an emissions trading scheme is introduced, with the steel-making process producing lots of carbon dioxide when it burns coal to remove impurities from iron ore.

Mr O'Malley also indicated an emissions trading scheme could threaten its proposed $1 billion-plus co-generation plant, which he said would be the "single largest CO_2-reducing project in Australia" and reduce emissions by as much as 1 million tonnes.

"To fund a project like that, you need to have a successful and healthy balance sheet and you need to be competitive in the market, still selling your product so you can actually get the cash," he said.

The co-generation plant, which Bluescope has previously said would reduce emissions by 800,000 tonnes, would take surplus gas from iron and steel making at the Port Kembla steel works and produce extra processing steam and power.

Bluescope has finished a feasibility study on the plant but says Government policy on trade-exposed industry is a critical part of its decision.

The Government is scheduled to make known the details of its carbon pollution reduction scheme in December and is currently taking submissions on a green paper.

The emissions trading scheme is proposed to start in 2010.

Mr O'Malley stressed he was encouraged by the Government's consultation on the issue.

"The process embarked on by the Government has actually been very inclusive. We feel like we've been able to put our point of view across," he said. "We feel like we've got feedback (and) we've changed our view based on that," he added, not expanding on what had changed.

Mr O'Malley said conversations with global peers saw European steel makers being very interested in reductions, though they had not been penalised for carbon emissions yet, while the growing economies of China, India and Russia were not so keen.

"With India and China, it is absolutely about the fact that 'you guys have had your day in the sun, you've emitted a lot of CO_2, now it's our turn and we're going to industrialise and we're going to urbanise'," he said, adding they were still willing to talk about reductions, though it would take a lot of time and work for progress. "If you move through Russia -- they're not interested," he said.

Steel mills in Latin America saw the opportunity to supply Europe, partly because there was lower potential CO_2 cost.

Listen to synchronised presentations from the Excellence in Mining and Exploration Conference (Sunday-Tuesday): Richard Brescianini, Arafura Resources GM; John Bishop, Icon Resources and Focus Minerals MD; Ralph De Lacey, Consolidated Tin Mines MD. www.theaustralian.com.au/business. Boardroom Radio

EAST WEST LINE PARKS PTY LTD

"The Australian East-West Line & Global Smelting Parks Project"

Members, Advisors & Officers Profiles

Shane Condon:
Project Founder and Team Leader

Work Qualifications & Experience Brief.

- **Contract Food Industry Management Consultancy-Australia and Asia/South Pacific: 20-years**
- **Leadership, Strategic Planning and Implementation Management Responsibilities:**
  - New and Existing Business; Project Development Efficiency/Expansion-Critical Process/Supply Chains-Recovery & Turnarounds.

- **New and Established Business Development and Growth:**
  Operations-Marketing-Product Development-Process/Quality & Product Improvement/Development-Efficiency-Analysis-Reports-Strategic Business and Operational Budget Financial Planning-Investigation-Project Management & Implementations. Agro and Fisheries Economic Development Programmes Asia/South Pacific "Government and Private Sectors".
- **Founded N- Australia Export/Domestic Seafood & Meat Business:**
  - **Award "Marketing & Business Excellence", Confederation of Industry and Government.**
  - Harvesting- Processing- Operations- Domestic and Export Processing, Marketing-Trading Business.
  - 120-staff and direct dependent contractors. $6 Mil internal + $5 Mil contract Marketing =$11 Mil pa.
- **Three successful Food Industry Turnaround Consultancies:** "Crisis Management & Leadership".
- **10 years USDA Registered Export Meat and seafood Industry Management Experience:**
  - Progressive early management career base experience from trainee-cadet to management of all key operations divisions. Boning Room-80 staff; Slaughter Floor-40 Staff; Export Cold Storage & Shipping; 5-Retail & Wholesale Butcher Shops; Large Pasture Farm (10,000 acre)-Grain Cropping, Intensive Piggery & Cattle Stud-up to 25 staff; Establishment of New Prawn Processing Factory & Prawn Trawler Fleet, Operations + Induction Training.
  - Export Market Research/Development/Implementations - Japan, USA, South America and SE Asia.
    - Reports to Executive Management and Board of Directors.
- **Aquaculture**: **Pioneered Australia's First Prawn Farm**, Port Roper NT. *Private project!*
- **International Packaging Awards** nominated "original" design concept as Australia's entry**.**
- **Establishment of "Leading" Worlds Best Practice Food Industry Product Standards:** "Quality/Price" for continuous leading benchmark product, process & operational standards.
- **Education Philanthropy Project Establishment – Pre-School, Fiji.** A Condon family philanthropy project to initiate, organise co-sponsor and jointly seed finance, with the Australian Embassy-Foreign Aide, to establish run and operate a much needed education gap facility - Church multiracial pre-school, accommodating over 80 Preschool Children in two daily sessions. Still operating.

Education:

- **2006: MBA, University of Queensland (near completion)**

  Three High Distinction major report marks to date!
- **2002: P-Grad Cert Degree. "Management" University of Queensland**

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"The Australian East-West Line & Global Smelting Parks Project"

Members, Advisors & Officers Profiles

Gordon Thomson:
Deputy Project Leader and Western Australia Team Leader

BSc (Hons), MBA, F Fin

Engineer & Business Developer:
Process Engineering, Facilities Design, Project Management, Marketing, Business Development and Technical Authoring.

Career:
Commenced engineering career with Shell International in 1974 with a three-year posting to the offshore oil/gas production operations in Qatar.

- **30 years as an Engineer and Business Developer** in UK North Sea, Norway, Brunei Darussalam and Australia.
- **Last 17 years to Present**: Operated a family-owned Perth & WA based private consultancy company as an independent contractor/consultant.

Clients:
Fluor-Daniel, Government of Western Australia, Technip France, Technip-Coflexip, Kimberley Oil, Amira International, UK Government, Water Corporation of Western Australia, BHPB Billiton Iron Ore and BHP Billiton Petroleum and Monadelphous Engineering.

Academic:

1974 Batchelor of Science (Hons) in Mechanical Engineering
University of Strathclyde, Glasgow, Scotland.

1989 Master of Business Administration
South Australian Institute of Technology, Adelaide, Australia.

2000 Graduate Diploma in Applied Finance and Investment
Securities Institute of Australia, Perth, Australia.

Memberships:
Fellow of the Financial Services Institute of Australasia
Member of the Petroleum Club of Western Australia

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Members, Advisors & Officers Profiles

Saul Eslake:

Leader, Economics Marketing & Business, Media and Political

Chief Economist ANZ "Australia and New Zealand Banking Group" from Aug 1995**.**

- Member – Group Asset & Liability Committee: Mgt of ANZ's Bal/Sheet.
- Chairman of ANZ Cover – Internal Crime, Fraud & Prof/Indemnity Insur/Cover.
- Member – Corp. & Institutional Bank's Sustainability Steering Committee: Environmental & Social Issues.

Previous Positions:
1991-95: **Chief Economist** (Int) National Mutual Funds Management (now AXA Insur Group)
1981-86: **Chief Economist** Stockbroking Firm Mc Intosh Securities Ltd. (now Merrill Lynch)
< 1981: **Economist** Australian Government, including 2 years with Treasury.

Education: Hons Economics; Dip Applied Finance and Investment; 2003 Senior Executive Programme at Columbia Graduate School of Business, USA.

Current Fellowships & Memberships:
The Australian Government: Foreign Affairs Council / Trade Policy Advisory Council / World Trade Org Advisory Group / Tourism Forecasting Committee.
Other: Non-Exec Dir Aust Housing & Urban Research Institute; Dir University of Tasmania Foundation; Securities Institute of Australia; Assoc Aust/Institute of Management; Aust/Institute of Company Directors; USA National Association of Business Economists; The Australian Representative on the Int/Conference of Commercial Bank Economists.

Services to Australian / State Governments & Institutions:
CEO Victorian Gov. (Vic) Commission of Audit; Director Gascor – (Vic/Gov-Gas & Hospitals);
Invited & Accepted March 2005 – To Chair the Independent Project Management Committee for the City of Launceston, Tasmania. -To develop a vision for the community for the year 2020!

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Members, Advisors & Officers Profiles

David Graham Russell RFD QC:
Corporate Legal Business Facilitation Advisor

Called to the Bar in 1977, having been admitted as a solicitor in 1974.

Admitted to practise in New South Wales, Queensland, Victoria, the Northern Territory, the Australian Capital Territory and Papua New Guinea, David took silk in 1986 and holds that office in all the above jurisdictions, except Papua New Guinea.

He has served as a Judge Advocate and is a Wing Commander in the RAAF Legal Reserve.

David's principal area of practice is Revenue Law, which requires an understanding of commercial and administrative law. He has acted for Commonwealth and State Governments as well as individuals and corporations. David's other areas of expertise include: **Constitutional Law - Corporate Law - Equity**

David was President of the **Taxation Institute of Australia** (1993-5), and of the **Asia Oceania Tax Consultants' Association** (1996-2000). David served as Chairman of the National Education (1991-3) and International Relations (1995-2001) Committees of the Institute, is a member of its National Technical Committee and the **Law Council of Australia Business Law Section** Taxation Committee. He has been appointed an Honorary Adviser of the Asia Oceania Tax Consultants' Association. He served as a member of the Ministerial Consultative Committee for the Tax Law Improvement Project from 1994 to 1997 and as a member of the Steering Committee for the National Review of Standards for the Tax Profession in 1993 and 1994. From 1991 to 1995 he was a member of the National Tax Liaison Group.

David is the author of many published **articles and conference papers**, both inside and outside Australia, and is a member of the Advisory Editorial Board of **Australian Tax Practice.** He also lectures at the University of Queensland for the Master of Laws course, is an Adjunct Professor of the **Faculty of Business, Economics and Law** of the University of Queensland and is a member of the Industry Advisory Board of that University's **Australian Centre for Commerce and Taxation**. He is also an Advisory Board Member for Griffith University's **Key Centre for Ethics, Law, Justice and Government**.

He has been a member of the Management Committee **Australia - Japan Society, Queensland** since 1994, its Vice President in 1995-6 and President from 1996-2001. He was President of the **National Federation of Australia Japan Societies** from 2001 to 2005 and is a member of the Executive Committee for the **2006 Australia Japan Year of Exchange**.

David is actively involved in the operations of his family's business, Russell Pastoral Company. He is the third generation of his family to do so. **Russell Pastoral Company** carries on business at Dalby, Cunnamulla and Blackall. Its flagship property, **Jimbour**, is one of Queensland's oldest stations, dating back to 1841. In addition to pursuing the Company's interests in the cattle, wool, grain, wine and tourism industries, David has served as a director of the **Queensland Wine Industry Association**, the peak wine industry body for the state, and from 2002 served as its President. In 2003 he became a Committee member of the **Australian Regional Winemakers Forum**, and in 2004 was elected its Vice President and one of the members of the Council of the **Winemakers Federation of Australia**.

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Members, Advisors & Officers Profiles

Prof Robert G (Jerry) Bowman, PhD, CPA:
Chief Financial Officer

PhD, Stanford University.

Emeritus Professor of Finance at The University of Auckland.
- **Bank of New Zealand Professor of Finance**
- **Certified Public Accountant** (California, inactive).
- **University of Oregon, 1974-1987.**
- **Visiting Academic Positions**: Australian Graduate School of Management, University of Queensland, Southern Methodist University, National University of Singapore and Hong Kong Polytechnic University.
- **Published** numerous articles in international journals in Finance, Accounting and Economics.

Presentations and Awards:
- Invited guest presenter at numerous universities and international conferences.
- Awards for teaching and research.
- Executive education presentations for major corporations.

Appointments and Positions:
Head of Department and Head of Finance for most of academic career.
- Chair in Finance at the University of Auckland, 1987 to present.
- Head of Finance at the University of Auckland - 12 years;
  - Developed finance from no dedicated staff or curriculum into one of the top finance groups in Australasia.
- Head of the Department of Accounting and Finance - 3 years.
- Head of the Department of Accounting at the University of Oregon while on that faculty.

Substantial commercial consulting and management experience.
Prior to Academic Career
- **Audit manager** with Arthur Young & Company, USA
- **Treasurer and Chief Financial Officer** of Cohu, Inc., USA, diversified high technology company, then listed on the American Stock Exchange.

Subsequent to Beginning of Academic Career
- **Consultant and expert witness** for major companies in New Zealand, Australia, Fiji, Italy, Singapore and the United States.
- **Consulting engagements** primarily for regulated businesses and in three areas: Cost of Capital; Valuation; and Mergers and Acquisitions.
- **Advisor** to the National Competition Council (Australia); Ministry of Economic Development (New Zealand); Office of the Rail Access Regulator (Australia); Research work for the New Zealand Treasury.
- **Major Engagements** with Australian rail firms (Railways, Freightways, Northern Territories Rail, Queensland Rail, Rail Access Corporation and Western Australia Rail)

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Professor Art Shulman:
Leader, Best Practice, Project Editorial and Education Development Facilitation

Professor of Business Griffiths University: Art is a leading researcher, teacher and consultant in Knowledge Management, Innovation and Commercialisation Alliances (policy and practices).
Duties Griffith University: Administrative responsibilities within the Pro Vice Chancellor (Business and Law) office for ensuring that all facets of the School meet or exceed International best practice standards.
Academic: 39 PhDs supervised to completion, authored or co-authored over 100 publications.

Research Tasks: Focuses on improving public sector- private sector alliances.

Recent Work Grants

- **Australian Research Council grants**, LWRRDC and GRDC grants and competitive contracts from Government organisations including IPPA (Qld), HIC, PHARM, Murray Darling Basin Commission, QDPI, RTA-NSW, NSW Treasury,
- **Private sector consultancies** with Merck, Telstra, National Mutual, and Suncorp Metway.

Business Advisor and Reviewer:
- Research programs, corporate strategies, stakeholder communication practices and policy
- Commonwealth and State government agencies and collaborative research Centres in Australia and elsewhere. Scholarship recognised internationally.

Awards
- Fellowship status by the American Psychological Society for work in research methodology and fellowship status by the Board of Governors of the Communication Institute of Australia

Honours:
- Inaugural Ashworth Fellow- University of Melbourne, where he led a team of researchers in research with Telecom Australia developing methodologies for evaluating the social and economic impact of new telecommunication systems.
- Visiting Fellow appointments at the University of London, AGSM-UNSW, MIT best
- Published research paper awards.

Presentations: World Congress on Total Quality, at three National R&D Forums, the National Agricultural Systems Purchasers Forum, and for the Malaysian Ministry of Health sponsored WHO meetings on improving Medicine policies and practices.

Previous:
- Associate Professor of Management at the University of Queensland,
- Principal Research Fellow of the Communication Research Institute of Australia,
- Director of PHD programs in Organisational Behaviour and Social Psychology, Washington University, St Louis, Mo.USA.

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Members, Advisors & Officers Profiles

Stephen Kennedy:
Leader, Business Development Marketing/Planning Pre-and Feasibility Studies

Senior Consultant – Investment and Business Planning

- Experience of market and strategic studies within the non-ferrous and ferrous metals industries and financial modelling experience of process industry projects.
- Currently working with financial institutions, commodity traders and facility owners on corporate assessments from London, covering Europe, Russia & CIS, Africa, USA and the Middle East.
- Over 15 years experience on complex multi-disciplined energy, metals, minerals and infrastructure projects. Project roles have developed a strong capability in project management systems, contract management, cost engineering and scheduling. Strong foundation in the planning and design of mine infrastructure, major roadwork's and railways from various civil engineering roles.

Key Skills:

- Technical due diligence / reviews
- Pre-feasibility and feasibility studies
- Competent person's report
- Market studies
- Strategy development
- Financial modelling
- Valuations
- Project management
- Contract administration
- Cost engineering
- Planning and scheduling
- Mine infrastructure planning and design
- Major road infrastructure planning and design
- Railway planning and design

Previous Positions:
2002-03: **Consultant – Investment & Business Planning** Hatch Associates Limited (London)
2000-01: **Senior Project Engineer** Hatch Associates Limited
1998-99: **Senior Project Engineer** BHP Engineering Limited (now Hatch)
1996-97: **Civil Engineer** BHP Engineering Limited
1986-95: **Civil Engineering Technical Officer** – various roles with leading consulting engineering firms

Education:
Master of Business Administration - University of Queensland (2001)
Bachelor of Engineering (Civil) with Honours - Queensland University of Technology (1996)
Associate Diploma Civil Engineering - Queensland Institute of Technology (1987)

Current Fellowships & Memberships:
Member of the Institution of Engineers, Australia – Civil

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Members, Advisors & Officers Profiles

Clem Tisdell:
Environmental & Economics, Editorial Support

Professor Emeritus, School of Economics
The University of Queensland

Previous Positions:

1989-2004	Professor of Economics The University of Queensland
1972-1989	Professor of Economics The University of Newcastle, NSW
1964-1972	Reader in Economics, Australian National University. Plus other positions in Economics

Education:
B. Com with 1st Class Hons in Economics and University Medal, UNSW
PhD (ANU)

Fellowships etc:
- Fellow of the Academy of Social Sciences in Australia (FASSA)
- Honorary Professor, People's University of China

Publications, Consultancies etc:
Author of more than 60 books and over 700 articles, many dealing with environmental economics. Wide range of consultancies completed for Australian and international clients.

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Members, Advisors & Officers Profiles

Anton Michielsen:
Leader, Rail Line Planning & Construction

Leighton Contractors Pty Ltd,
Design Director, Gateway Upgrade Project, Leigthon Abigroup Joint Venture
Member of the Executive Management Team for LAJV's $1.88 billion Gateway Motorway and Bridge Upgrade Project (GUP) for the Queensland Motorways Ltd. As Design Director he led the projects strategic direction with respect to value engineering, design and construction delivery and project risk assessments. He engaged and directed a team of LAJV Design Managers and consultants, with over 250 people involved, in the preparation designs for tender, detailed design and construction plans. This combined inputs of from construction cost estimators, builders and consultants to develop innovative competitive tenders to client's specifications. The project is under construction and due for completion mid 2010.

Within Leighton Contractors (LCLP) the projects he has been involved in include;
- Gateway Upgrade Project D&C, $1880 mil, 20km motorway and 1700m long bridge in the Brisbane CBD
- Adviser to BLJV North-South Bypass Tunnel BOOT Project tender, $3000mil for Brisbane City Council
- Adviser to LCPL Airport Link Tunnel BOOT Project tender, for Qld Gov.

Previous Positions:

Feb 2005 till July 2005 MetTRIP Network Program Manager, Queensland Rail
SEQIPP*Rail* (formerly MetTRIP) is a recent Qld Department of Transport program of major infrastructure capacity enhancements of the Brisbane Metropolitan Rail System. As Program Manager he was a member of the MetTRIP Steering Committees and he devised and promoted the program of project alliance agreements which were adopted for the delivery of QR's major metropolitan rail program.

1987 to 2005 Maunsell-AECOM , ANZAME region– Director from 1997, Engineer from 1987
Industry Director, Major Projects for Maunsell–AECOM, a US publicly listed engineering and professional services company with a turn over US$ 4000mil. He participated at a senior level in major transport projects in Australia and throughout Asia, including Singapore, Hong Kong, Philippines and Delhi, India. He was accountable and responsible for the project management and technical aspects of many complex multi-disciplinary transport facilities, motorways, transits, metro's, railways, freight stations . Major projects include;
- Delhi Metro MC1a D&C in India, 4 km underground metro in the northern sector of Dehli, US $500mil
- Urban Motorways and tunnels in Australia, Mitcham-Frankston Tollway, Pacific Motorway, Brisbane Inner City by-pass which won the national engineering excellence award in 2002.

1983 to 1987 Hughes Trueman Ludlow Pty Ltd – Engineer
Engineering design and contract administration of civil works, roads, sub-divisions and buildings

Education:
MBA at University of Queensland, 2005
B.E Civil Engineering (Hons), University of Adelaide. 1982
Engineering Contract Management, Bruce TAFE, ACT. 1985

Affiliations:
Member Engineers Australia, NPER No. 183898
Registered Professional Engineer of QLD RPEQ 6016

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Members, Advisors & Officers Profiles

Ross Hunter:
Leader, Precincts & Infrastructure Developments & Government Support Services

Senior Consultant – Project Management: Rail Infrastructure

- Extensive experience (30 years plus) major rail projects planning and delivery - new railways - major rollingstock acquisition projects.
- Registered Project Director (PMRC)
- Ten years as capital works program director for Queensland Rail, overseeing A$6 billion expenditure on infrastructure and rollingstock projects. Project Director/Manager major individual projects - Gold Coast Railway, Mainline Upgrade, Inner City Quadruplication, Cairns Tilt Train and Coal Rollingstock Projects.
- Four years overseeing engineering resources of Queensland Rail, comprising 500 engineering and technical staff covering all rail-engineering disciplines.
- Currently Senior Coal Transport Advisor to the Queensland Government, covering planning and integration of a major expansion of rail and port transport capacity within the Queensland coal supply chain.

Key Skills

- Rail transport planning; Project Director/Project Manager; Feasibility studies; Investment evaluation
- Capital works program management.

Previous Positions

- 2003-6**: Senior Consultant** – Coal Transport Advisor to Queensland Government;

  : Director - Ranbury Management Group (project management specialist consultancy group)
- 1999 – 2003: Group General Manager Technical Services, Queensland Rail
- 1990 – 1999: General Manager Projects, Queensland Rail
- 1972 – 1990: Various engineering and management positions, Queensland Rail, focussed on major project planning and delivery

Education:

- Bachelor of Civil Engineering (Honours)– University of Queensland (1972)
- Various post-grad subjects and courses

Current Professional Affiliations:

- Member Australian Institute of Project Management; Member Railway Technical Society of Australia
- Registered Professional Engineer of Queensland.

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EAST WEST LINE PARKS PTY LTD
"The Australian East-West Line & Global Smelting Parks Project"

Members, Advisors & Officers Profiles

David Belham
Executive General Manager & Project Member

Membership Duties:
International Investor Facilitation - Management & Co-ordination – Communications Including Media Project Spokesperson - Logistics' - Administration & Marketing.

Career:

- **Appointed by the Premier of Queensland to establish and open the Queensland Government Trade and Investment Office – India.**
- **2004 – 2007, Commissioner, Queensland Government Trade and Investment Office – India**, responsible to represent State of Queensland and for all Queensland Government activities in India.
- **Director, Information Management, Queensland Government 1998 - 2004**.
- Responsible for planning and implementation of economic and aid development projects throughout the South West Pacific and South East Asia 1992 -1998 for Federal Government.
- Senior officer in the United Nations Transition Authority in Cambodia during 1993.
- Extensive experience in the military, government and international affairs, including 25 years as a Department of Defence international communications specialist.

Education:

- Graduate, Army Command and Staff College 1991
- Graduate Diploma Management Studies, Canberra ACT 1994
- Bachelor of Professional Studies (Major Asian Studies) University of New England, Armidale NSW 1995

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Matthew Magin
Central Queensland Business Coordination and Development

Current work position: Regional Relationship Manager Abbot Point (Contract position with Ports Corporation of Queensland)

Career:

- 12 years Federal & State Govt experience both political &bureaucratic
- 5 years CEO of a regional economic development organisation
- 10 years self employed in business I started from scratch
- 20 years senior management experience in retail industry

Career Highlights/Achievements

- Ongoing investment Attraction-CHALCO Aluminum Smelter ($2-3b)
- Sino- Australia Coal Summit
- Regional Housing Summits
- $5M grant for Mining Simulator Training and R&D Centre for Mackay region
- $28M grant for Mackay Water Re-use scheme
- $2M grant for new library @ CQU Mackay campus
- $4M grant Mackay Aquatic Centre
- Development of Bowen Economic Development Strategy
- Aquaculture Industry development in the Mackay region
- Formation of International Education & Mining Services Industry Clusters
- Conduct overseas trade missions & facilitate inbound trade missions
- Manage > $2.5 M in State Development grants since 1998
- Development of the Mackay Regional Water Resource Strategy
- Attraction and retention of Queensland Mining Exhibition for Mackay region

Key Strengths
- Networking/ Establish and maintain internal & external relationships
- Strategic leadership skills.
- Organisation, co-ordination & facilitation skills
- Senior and general management

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"Ryan" Hoyeon Jang:
EWLP - Korea/Asia Business Facilitation Officer

Education:
- **Bachelor of Economics**
- **Advanced English & Business Course**
- **Defence Forces Operations/Training**
  - Execution Responsibility & Leadership.

Career:
- **2006 to 2008: Black & White Cabs Pty Ltd, Australia**
  Primary engagement to learn local Australian Culture, Dialect and Speaking English. Direct fast-track exposure to adapt and understand the different Australian culture.

- **2005 - 2006: Shop Manager, 'Fish On Ice' Westfield Shopping Centre, Australia**
  Managed a team of 6 staff to ensure smooth, efficient and timely delivery of service. Main duties included staff training, daily scheduling of resources, managing the shop's finance, marketing and sales whilst facilitating friendly customer service.

- **2003 - 2004: Language Teaching English/Korean**
  Casual English language teaching position in a middle and high school at Hansem Academy to assist students with their English.

- **2001 - 2002:** National Military Service, S-Korea Guard Post, Demilitarized Zone (DMZ) in Gangwondo, Korea.
  Military training included basic training programmes, ambush, patrol, infiltration, repelling from helicopters and assault.
  Assistant in mobile combat unit where I had to train and lead a team of 8 soldiers to be combat ready.

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Haruhiko (Haru) Kinase:
Japan/Asia Business Manager
& Precinct Engineering & Environmental Planning Services.

Education:
- **Master of Business Administration:** Anaheim University, USA, 2004.
- **Master of Engineering:** Chiba University, Japan, 1996.
- **Bachelor of Engineering:** Chiba University, Japan, 1994.

Career:

- **1996 to 2007: Mechanical Engineer with Asahi Shimbun, Tokyo – 11 years;**

  A Japanese newspaper company with a circulation of over 8 mil newspapers per day and with more than 5,500 employees in Japan. Haru's main role was in operating, repairing and maintaining the printing presses and other printing equipment.

  - **2004 - 2007: Positioned as a key member of the project team to renew and upgrade the existing printing press and other printing equipment**; the project costs more than A$20million.
  - **2004 - 2007: Member/Director of the Environmental Management System (ISO 14001) project at Asahi Shimbun.** As the Director of ISO14001, Haru managed and oversaw 20 project team members. The purpose of the project was to increase energy and resource saving as well as reduce waste. The project successfully set up and carried out PDCA (Plan- Do-Check-Action) cycle and ensured the continued ISO 14001 certification for the company.
  - **2006 - 2007: Member - Japanese Newspaper Association** which edited and published over 5,000 copies of "Newspaper Printing handbook" for distribution amongst the Japanese Newspaper Association to raise the level of technical skill and knowledge.

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"Nick" Fei Meng:
Project Manager (China Asia-Pacific Trade Economist and Marketing)

Education: BEc, MBA

- **Master of Business Administration,**
  Business School, The University of Queensland, Australia.
- **Advanced English,**
  Edinburgh's Telford College, UK;
  International student representative.
- **Bachelor of Economics in Foreign Trade,**
  Business School, Dalian University, China;
  Editor of "Campus Monthly"

Nick Fei MENG completed his MBA in 2005 with a part-time position as Assistant Marketing Manager, Anti Wave International, 2003-2004, with responsibility for expanding business into the Chinese market, ensuring collaboration between the company and its Chinese subsidiary company, and building and managing relationships with Chinese customers, including the China 2008 Olympic Committee. Nick has honed his skills in marketing, import and export, customer service and management through his varied and international experiences.

Previous Positions:
1998-2002: China -Business Branch Manager of Korean Mega Trading Limited.
1996-98: China-Commercial Representative MINMETALS (Liaoning) Import & Export Ltd.

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Matthew (Myung Hyo) Kang
EWLP Project Director & Member

Key Duties:
Business Strategy Planning Advisor.
International Investor Facilitation
Management & Co-ordination – Communications

Career:

- **Appointed by the Premier of Queensland to establish and open the Queensland Government Trade and Investment Office – Korea**
- **Commissioner, Inaugural and Successful Queensland Government Trade and Investment Office In Korea 2000-2009.** Facilitation trade investment between QLD and Korea, responsible to represent State of Queensland and for all Queensland Government activities in Korea.
- A special advisor, QLD government. Facilitate Korean investment 1999-2000.
- Immigrated to Australia in 1989, became a Australian Citizen in 1996.
  Support migrants from Korea to settle in Australia as a private Ambassador.
- **MD, Saudi Arabia Project, Korean Conglomerate-more than 10 projects.**
- **Director, Publicity and Government Relationship, Korean Conglomerate, 15years.**
- A special correspondent of the AP Reuters in Korea
- A reporter for AFP(Agency French Press) in Korea

Education:

- Bachelor, Master of Arts
- Bachelor of English Literature

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Rod Welford:
EWLP Project Member & Division Director/Leader.

Key Duties:
Business Strategy Planning & Environmental Sustainability Division – Legal, Political & Regulatory Advisor.

Current Position:
Chief Executive of the Australia Council of Recyclers, the national peak industry body for the recycling industry.

Other Portfolio's:
- **Member, the National Advisory Committee of the 1st Asia Pacific Conference on E-waste**
- Board Member, National Centre of Excellence in Desalination, Murdoch University
- Board Member, International River Foundation
- Chair of AstiVita Renewables Limited
- Managing Director of Integrated Resource Planners.

Previous Positions:

Retired March 2009 **State Parliament of Queensland** - 20 years as a legislator and policy maker. As a member of the Queensland Government held the following positions:
- Chair, Ministerial Advisory Committee on Sports Funding
- Chair, Review of Residential Tenancy Laws
- Chair, Parliamentary Criminal Justice Committee
- Minister for Environment & Heritage and Minister for Natural Resources
- Attorney General and Minister for Justice
- Minister for Education and Training and Minister for the Arts

Education:

Qualifications:
- Bachelor of Arts (First Class Honours)
- Bachelor of Laws
- Master of Science (Environmental Management)
- Graduate Diploma of Industrial Relations
- Graduate Diploma of Legal Practice and
- Certificate in Permaculture Design.

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Thomas Michael James
Project Director and Member

Chairman and Director EWLP Project Alliance Planning, Design and Execution Team.

Previous Positions:

Tom is a leading Construction Industry executive of 30 years standing and brings significant experience in the successful planning and delivery of major infrastructure projects in Australia. Tom also brings General Management leadership experience gained whilst holding senior positions over a 24year career with Leighton Contractors Pty Limited, one of Australia's leading construction and development companies.

2008 - Jul 09: Executive General Manager, Construction Division, Leighton Contractors Pty Limited. Accountable for business performance in the Northern Region with annual turnover exceeding AUD1.3Billion and overseeing major projects such as the Clem 7 tunnel, the Gateway Upgrade Project and other infrastructure works of significant value.

2005 – 2008: Project Director, LAJV, Gateway Upgrade Project. Leading the design and construction team to deliver this major road and bridge project in Queensland, worth in excess of AUD1.8Billion.

2000 – 2005: Civil Business Manager, Northern Region, Leighton Contractors Pty Limited Overseeing the development and execution of many successful infrastructure projects in Queensland, including the Port of Brisbane FPE Seawall, AMCI coal mine site preparations, Aldoga site preparations, Port of Brisbane Motorway, remote sections of the Barkly Highway, the Wivenhoe Dam upgrade and key parts of the Pacific Motorway and Brisbane's Inner Northern Busway.

1990 – 2000: Senior Project Manager delivering various infrastructure projects in Victoria and Queensland including Moorabool River Diversion and Western Ring Road projects in Victoria and the Optus inter-capital Fibre Optic Cable roll out.

Key Strengths and Experiences:

- General Management leadership
- Planning and delivery of major infrastructure
- Respected figure in the construction industry
- Builds strong teams and values innovative solutions

Education:
- Bachelor of Engineering (Civil)
- Graduate, JMW Leader of the Future program.

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Phil Shapiro: EWLP Member

Project Leader, Information Technology & Communications; Chief Information Officer

Experience:
30+ years of experience encompassing focus in Tier 1 public and private enterprises from strategy development, to full lifecycle planning, design, delivery, sustainment and management of information technology systems and communications networks. The extent of the enterprise systems and networks covers the spectrum of national, state and city wide.

Work Qualifications:
Phil brings to EWLP a pragmatic information technology and communications (IT&C) experience and knowledge base. He has a balanced enterprise perspective gained from IT&C demand and supply side experiences spanning

Key Strengths:
- Trusted technology adviser
- Leadership roles at technology and professional service organisations
- Management roles in global multinational technology companies
- Business management roles with A$30 M P & L accountability
- Co founding a technology services organization and exiting to a global multinational

Previous Positions:
- Principal, Mocuity Pty Ltd - an ICT Consultancy strategic focus on Mobility and Unified Communications
- Territory Manager, ANZ - Symbol Technologies global innovator on Enterprise Mobility
- Practice Director APAC Delivery Centre, Avanade - a Microsoft/Accenture global software Joint Venture
- Cofounder GM, DCG Pty Ltd - a Microsoft managed partner software engineering Development Company
- Regional Manager, Enterprise Networks, Ericsson Australia
- State Manager, Private Networks, Business Communications Division, Siemens Industries Ltd
- Principal Consultant, Telecom Australia

Clients:
Fujitsu Australia Ltd, Australia Post, Powerlink, TAB Corp, Department of Defence, RLM Systems . JORN,
Central Qld Ports Authority, Bundaberg Sugar Ltd, Gold Coast City Council, Northern Rivers Health, Qld
Health, Australian Broadcasting Corporation, BHP Moranbah, Qld Rail,

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David D Trude: EWLP Board of Directors Profile

EWLP Board of Directors "Non-Executive Board Member" (appointment from February 2010)

Current 2009 Position:

- **Country Manager and CEO Credit Suisse in Australia since 1999; Managing Director and Chairman of the Australian Executive Committee; Member of the Asia Pacific Operating Committee and Asia Pacific Country Management Committee.**
- **Board Member of E.L.& C. Baillieu, prominent Australian Retail Stockbroker (Credit Suisse owns 25%);**
- **Director and Board Member of the Stockbrokers Association of Australia.**

Previous Positions:

1995 - 1998
Director, Global Head of Research Sales and Chief Operating Officer for Australia
First Pacific Stockbrokers Limited, Sydney, Australia
(25% owned by CS First Boston)

1988 - 1995
First Boston Corp. (later CS First Boston), Sydney, Australia
Investment Bank; Took over MacNab Clarke Limited in 1988
Director - Research Sales and Sydney Branch Manager;
Opened and Head of Australian desk in NY for CSFB; Head of Global Sales for Australian product and Chief Operating Officer for business, Sydney

1983 - 1988
Sydney Managing Partner *(Director on incorporation)* **), MacNab Clarke & Co** (later MacNab Clarke Limited), Melbourne

1980 - 1983
Manager of Sydney Branch Office and Research Salesman, Clarke & Co (Stockbrokers), Melbourne

1975 – 1980
Investment Analyst (Banks), Sydney; Portfolio Manager, Sydney; NZ Investment Manager, Wellington, New Zealand; Senior Portfolio Manager, Sydney
Westpac Bank (formerly Bank of New South Wales), Sydney
Investment Division – Australia and New Zealand

1972 - 1974
International Portfolio Manager, Central Board of Finance of the Church of England, London, United Kingdom

1970 - 1971
Investment Analyst, Corser Henderson & Hale (Stockbrokers), Brisbane

Education:
Bachelor of Commerce, University of Queensland, Brisbane, Queensland

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