



**WorleyParsons**

resources & energy

EcoNomics™

# Rail

## Capability and Experience





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“There is no task so important or so urgent in our business, or our customers’ businesses, that it overrides the need to work safely...”

**John Grill, WorleyParsons CEO**

## Zero Harm is our corporate vision for health, safety & the environment (HSE).

We are committed to our vision; it applies to all of our operations, at all times, in all locations, and at all levels of responsibility.

We will actively work to align our expectations and behaviors with those required to achieve our vision through a dedication to continuous improvement.

The launch of our HSE framework, OneWay™, enables us to further align and consolidate our global systems and procedures and continue to work with our personnel to reinforce a culture that underpins our drive to achieve our corporate differentiator of industry leadership in the HSE performance.



# Corporate Overview

WorleyParsons is a leading global provider of professional services to the resources & energy sectors, and the complex process industries.

We cover the full asset spectrum, both in size and lifecycle, from the creation of new assets, to services that sustain and improve operating assets.

Our business has been built by working closely with our customers through long term relationships, anticipating their needs and delivering inventive solutions through streamlined, proprietary project delivery systems. Strong growth continues to characterize our performance both through organic development and through strategic acquisition as we strive to provide tailored services wherever our customers need us.

- Infrastructure & Environment
- Minerals & Metals
- Hydrocarbons
- Power

**38**  
countries

**EcoNomics™** Delivering profitable sustainability

EcoNomics™ is our range of services and technologies that profitably embed environmental, social and financial sustainability into project delivery, across the asset lifecycle. It is a seamless extension of our established project delivery capability in the key areas of Assessment, Efficiency and Treatment & Mitigation. We are committed to working with our customers to create solutions to meet the green challenge while staying in the black.

**118**  
offices

**32,200**  
personnel

# Rail

WorleyParsons provides total business solutions across all aspects of the rail industry in the following five key areas:

- Independent Engineers
- Strategy and Masterplanning
- Engineering and Technology
- Facilities and Logistical Infrastructure
- Rail Infrastructure

The WorleyParsons rail group brings together a team of highly motivated and skilled professionals. Understanding the business objectives of our customers is fundamental to our approach. Solutions are created to enhance the value of customers' assets through our rail specialists who have dedicated their careers to the industry.

Over the past ten years, the WorleyParsons rail team has worked with almost every owner, operator, builder, financier, regulator and legal practitioner in the rail sector in Australia. Our success derives from the combination of specialist technical expertise with a broad-ranging and detailed understanding of the rail industry.

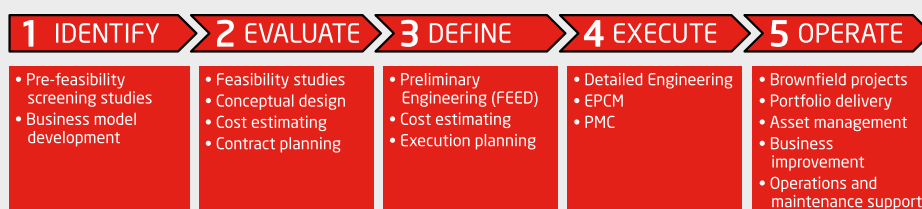
## 20+

years rail industry experience

## 100+

specialist rail personnel

## WorleyParsons' Project Phases



WorleyParsons works in all five phases of an asset's life cycle. Each phase corresponds to a customer's decision gate for project sanction.

The phased project approach is underpinned by the requirement to optimize the level of Front End Loading (FEL) and thereby maximize project value.

WorleyParsons' project systems are fully aligned to this process.



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# Independent Engineers

WorleyParsons' involvement and experience in all facets of the rail industry, at all levels, enables us to develop innovative strategies and solutions for our customers.

The rail industry, major resource companies and financial stakeholders all engage WorleyParsons for our breadth and depth of knowledge of the Australian and international rail industry. Our expertise in operations and business simulation and cost modelling enables our customers to better understand their risk exposure and develop strategies for investment and asset utilisation. In addition, our understanding of rail operations and the cost structures of rail businesses enables us to develop cost-effective asset maintenance strategies aligned with our customer's enterprise risk profile.

As a leader in the provision of engineering and project services for major projects across the world, WorleyParsons is well placed to define the interface between project and rail infrastructure requirements at the site and terminal.

With over 20 years experience in the Australian and regional rail industry, the Rail team in WorleyParsons has a strong track record in the provision of technical due diligence, lenders' engineer, asset condition assessment and asset valuation services.

Many of our technical leaders are also recognised as leaders in their respective fields. This depth of experience enables us to provide engineers of stature commensurate with the role of independent expert in incident investigations, mediation and expert witness in the legal resolution of disputes.

Due diligence on

**\$4.3b**

of rail assets



**Project: Technical Due Diligence for Acquisition of FreightCorp and National Rail Corp.****Customer: Toll and Patrick****Phases:** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Australia

In 2001 the NSW and Federal governments offered FreightCorp and National Rail Corporation for sale.

A vigorous and detailed tendering process ensued with the consortium comprising Toll Holdings and the Patrick Corporation engaging WorleyParsons to conduct the technical due diligence. The entity resulting from the sale to Toll and Patrick became Pacific National Limited or PNL.

WorleyParsons provided:

- Asset capability and performance assessments
- Asset condition inspection and valuations
- Asset residual life estimations
- Capital and operational expenditure forecasts
- Contingent liability assessments
- General technical advice

**Project: Alice Springs to Darwin Railway****Customer: Senior Debt Banks (ANZ, NAB, RBS, ABN-Amro, SG)****Phases:** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Australia

WorleyParsons was retained as lenders' engineer by Senior Debt Banks for the 1,420 km extension of the central Australian North-South railway from Alice Springs to Darwin. The project included new track, numerous new bridges, the installation and commissioning of new signalling equipment, integration of the new line with the existing port facilities in Darwin and the design, manufacture and commissioning of new rolling stock. WorleyParsons was involved in both pre and post financial close phases, to provide independent technical advice for all aspects of the project including infrastructure, rolling stock, terminals and operations. A variety of services are still being provided to this project, including risk assessment of the design and construction contracts.

**Project: Engine Failure Investigation****Customer: Confidential****Phases:** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Australia

A large destructive engine failure occurred and the customer wished to understand the failure mechanism and causes of the failure. A range of investigations including process mapping, tribology, fracture analysis, metallurgy and chemistry established the failure mode and cause of failure. WorleyParsons used its in-house resources and those of its alliance partners to investigate the failure. Valuable information was established to enable the engine owners to modify processes and eliminate the cause of failure.





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# Strategy and Master Planning

WorleyParsons provides strategic advice for planning, implementation, operation, utilisation and maintenance of rail assets in all facets of the rail business.

Our strategy and masterplanning capabilities include:

- The collection, evaluation and analysis of operational and maintenance data and the development of solutions to address identified problems.
- Analysis of route capacity, train planning and service planning and the determination of rolling stock requirements to maximise terminal capacities
- Innovative designs of optimum rolling stock to maximise efficiency within the limitations often set by antiquated infrastructure.
- Compliance with engineering, safe working and operating standards were set by the respective Government Rail Authorities.
- Fleet management, financial valuations and cost benefit analyses of rolling stock.
- Evaluation and costing of alternative routes for railways, pipelines and other infrastructure.
- Cost estimates for rolling stock and infrastructure, and revenue/profit projections for rail businesses.

# \$25b+

of railway corridors investigated



**Project: Independent Advisor on Railway Infrastructure**  
**Customer: Auckland Regional Transport Authority (ARTA)**

**Phases:** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

New Zealand

**WorleyParsons is the independent adviser on rail infrastructure and operations to the Auckland Regional Transport Authority and its antecedent organisation since October 2003.**

This appointment has led WorleyParsons to provide a wide range of advisory services on the upgrading of the Auckland Rail system including reviewing the railway business plan, writing briefs for engagement of consultants, evaluating tenders, reviewing studies, developing project cost estimates, reviewing engineering design, operation modelling and timetable analysis, providing independent oversight of a study on electrification, concept planning for Newmarket Station Upgrading and generally management consulting and support to senior ARTA executives as needed.



**Project: New Liverpool Range Rail Alignment - Route Selection Study**

**Customer: Australian Rail Track Corporation (ARTC)**

**Phases:** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Australia

The original 1877 Liverpool Range rail alignment had steep grades and tight curves. With the impending expansion of export coal mining in the Gunnedah Basin, ARTC decided to examine new alignments suitable for operation of coal trains up to 10,000 tonnes. WorleyParsons was appointed as lead consultant to undertake a route selection study, managing an expert team of consultants in geotechnics, railway and tunnel engineering, and construction cost estimating, to analyse the 20 km corridor between Murrurundi and Willow Tree. WorleyParsons identified a surface alignment and three tunnel alignments. The study will assist ARTC in making the commercial decision of whether, when and in what form to proceed to design and construction of a new railway alignment over the Liverpool Range.



**Project: East Coast Very High Speed Train Phase 1 Study**

**Customer: Department of Transport and Regional Services**

**Phases:** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Australia

In 2001, WorleyParsons was appointed by the Commonwealth Department of Transport and Regional Services to lead a multi disciplinary study into the feasibility of creating very high speed train (VHST) links and services over the 2,000 km corridor from Melbourne via Canberra to Sydney and Brisbane. The team led by WorleyParsons advised on policy issues, VHST technologies, international VHST developments, alignments, environmental issues, capital and operating costs, financing strategies, regional development potential, financial and economic feasibility, and national interest issues. WorleyParsons also advised on the conditions under which such a transport system could be commercially viable and whether there could be a place in Australia's transport future for such a high speed rail system.





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# Engineering and Technology

**WorleyParsons has unrivalled experience in freight and passenger rolling stock engineering.**

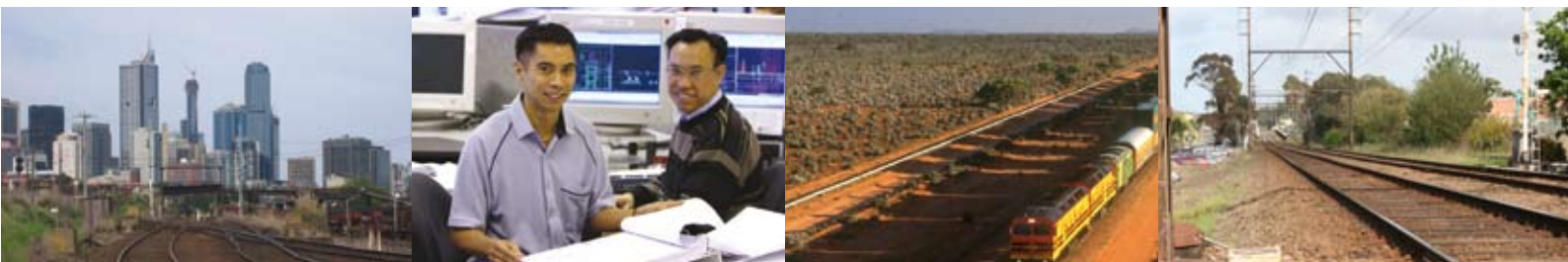
Our team has been responsible for the conceptual and detailed design and project management of 80% of the new wagons commissioned in Australia over the last decade – all innovative and robust designs that provide owners and operators with a competitive edge.

WorleyParsons has specialist expertise in engineering the refurbishment of both light and heavy rail passenger rolling stock. These projects enable operators to quickly and economically service increased patronage as demand continues to grow.

Our technical expertise and thorough understanding of rail operations, infrastructure and rolling stock, maintenance practices and rail safety legislation, enable us to provide informed, authoritative and expert advice and services in the areas of:

- Rolling stock design, development, testing and commissioning
- Locomotive and passenger car specification and refurbishment
- Railway safety accreditation and track access services
- Train systems and brake engineering
- Asset management
- Railway operations and maintenance management systems
- Railway control systems

Completed designs for  
**10,000**  
wagons in service



**Project: Narrow Gauge Articulated Container Wagons for Queensland****Customer: Pacific National****Phases:** IDENTIFY >> EVALUATE >> DEFINE >> EXECUTE >> OPERATE

Australia

WorleyParsons was engaged by Pacific National to assist with its new intermodal freight business along the Queensland narrow gauge north-south rail corridor from Brisbane to Cairns.

Along with its existing standard gauge operation, this allows Pacific National to provide a seamless service linking the far corners of the country.

The project was of a high risk nature given no existing rail operation could be used as a fallback position. Careful management of rolling stock design, accreditation, procurement and commissioning was critical to the successful start up of the new business. This is the first time in the world that articulation technology has been successfully applied to narrow gauge container wagons.

**Project: GSR Fleet Expansion Project - Rolling Stock Engineering Consultancy Services****Customer: Great Southern Railway (GSR)****Phases:** IDENTIFY >> EVALUATE >> DEFINE >> EXECUTE >> OPERATE

Australia

GSR is embarked on a fleet expansion program to increase its capacity in 2007 due to growth in demand. Additional capacity is being created to accommodate future growth in order to supplement the rolling stock currently used on The Ghan train. WorleyParsons has been commissioned to provide design and engineering services to refurbish existing non operational rolling stock. The new train set will comprise a dining car, lounge car and several accommodation cars. Refurbishment will provide a very high level of comfort with attention to function and form, redefining the available space whilst incorporating modern fixtures and fittings, and utilising the latest range of fabrics and finishes. All refurbishment is being carried out to upgrade the rolling stock to comply with current safety standards and regulator requirements.

**Project: Brisbane to Cairns Automatic Train Protection****Customer: Queensland Rail****Phases:** IDENTIFY >> EVALUATE >> DEFINE >> EXECUTE >> OPERATE

Australia

Queensland Rail is designing and installing an Automatic Train Protection (ATP) system over 1,200 km with train control split between three centres in Brisbane, Rockhampton and Townsville. WorleyParsons provided specialist ATP design support for Queensland Rail and the overall project management for the design and roll out of the track side system. The new design provides long term benefits to the customer due to reduced maintenance and more accurate fault finding.





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# Facilities and Logistical Infrastructure

The WorleyParsons rail team is supported by global resources in civil, transportation, structural, coastal, marine, power, water and road engineering. This enables us to provide integrated planning, engineering and project management services for stations, workshops, maintenance facilities, yards, intermodal and seaboard terminals.

Rail systems require a variety of infrastructure to allow them to fulfil their core purpose of transporting large volumes of people, goods and materials.

Urban railways need stations at which passengers can access the system and a range of logistical infrastructure to permit the efficient operation and maintenance of the rolling stock fleets.

Freight railways require facilities that are highly integrated with other transport modes and logistical operations such as mine outloading points, container transfer points and seaboard terminals for export bulk materials.

WorleyParsons delivers innovative solutions which are aligned to the customer's business objectives. We build multi-disciplinary teams to plan and design railways facilities, working with professionals in industrial architecture, facilities planning, health and safety, industrial engineering and information technology.

We provide whole-of-life cost effective solutions using a range of sophisticated tools - both customised and proprietary - to analyse the total operation of railways and how they interact with other systems.

# 150+

Mtpa of bulk materials capacity engineered



**Project: Pilbara Iron Ore and Infrastructure Project - Marine Structures****Customer: Fortescue Metals Group (FMG)****Phases:** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Australia

**WorleyParsons is undertaking the procurement and construction management after successfully completing the definitive feasibility study for Fortescue Metal Group's planned Pilbara Iron Ore and Infrastructure Project.**

The project includes the marine facilities to enable export of 45Mtpa of iron ore through Port Hedland, in the northwest of Western Australia. The marine structures component of the project comprises conveyor trestles traversing 1,400m over poor ground conditions, a 600m long approach jetty, two dolphin berths to accommodate vessels up to 300,000dwt and a shiploader support structure.

With an overall berth length of approximately 750m, Berth No. 1 will be used as the loadout berth, with Berth No. 2 as layby. The facility has been designed to enable future expansion. The feasibility study included definition of the overall layout of the facilities, ship handling simulation (undertaken externally) dynamic mooring analysis, modelling of local wind and water current, geotechnical modelling and structural design.

**Project: Project Management for SCSA on Southern Cross Station Redevelopment Project****Customer: Southern Cross Station Authority****Phases:** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Australia

WorleyParsons provided expert project management skills and project programming skills to assist the SCSA in delivering the project for the state government of Victoria. WorleyParsons is currently conducting a study for the use of roof captured water and providing ongoing project management skills for numerous of small projects. WorleyParsons also reviewed constructability, and the design of the roof as well as setting up the completion and hand-over process of the station. Services and expertise provided by WorleyParsons included: project management, program review, operator sign-off, construction verification, and buildability and design reviews.

**Project: Electrical System Capacity of the Suburban Network****Customer: MainCo****Phases:** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Australia

As part of its preparations for the 2006 Commonwealth Games, MainCo engaged WorleyParsons to assess the electrical capacity of the Melbourne suburban train network. During the Games, the intent was to operate an enhanced timetable which effectively expanded the peak hour timetables for this period. The electrical load generated by such a timetable potentially placed parts of the electrical system under stress. WorleyParsons was engaged to undertake this assessment. The system components in the assessment included supply elements as well as traction distribution and traction delivery.





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# Rail Infrastructure

WorleyParsons offers an integrated engineering capability for rail infrastructure for the concept, definition, detailed design and construction management phases of rail infrastructure projects, resulting in capital cost savings and construction efficiencies for our customers.

Our rail infrastructure capabilities include:

- Hydrogeology and geotechnical investigations and assessments
- Route alignment and terrain modelling
- Complete track geometry design
- Interfacing and integrating rail infrastructure design with operational performance and time-tabling modelling
- Integrating heritage and environmental issues into all infrastructure design work
- Design of traction power infrastructure including modelling and simulation of power characteristics and other electrical transmission variables
- Integration of utility services into rail infrastructure designs
- Advice on cost effective construction methodologies

WorleyParsons provides a specialist service to rail access providers and regulators, focusing on maintenance and capital costs, which are essential components of the access charge applicable to networks. This facilitates the establishment of transparent access regimes, encouraging utilisation of the networks and bringing confidence to the users, while ensuring access providers receive fair compensation.

Projects  
completed in

**20+**  
countries



**Project: Pilbara Iron Ore and Infrastructure Project****Customer: Fortescue Metals Group (FMG)****Phases:** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Australia

WorleyParsons undertook a Definitive Feasibility Study (DFS) for the FMG Iron Ore and Infrastructure Project which consisted of new port facilities, associated materials handling, 250 km of rail and development of a new mine site.

Following completion of the DFS, and Front End Engineering, WorleyParsons has been appointed by FMG as the integrated Engineering Procurement and Construction Management (EPCM) service provider for the project including all above and below rail aspects. The project is due to become operational in Q2 2008.

The alignment for the 250 km of rail through the Chichester Ranges was selected using Quantm software. Detailed design of the rail alignment involved geotechnical investigation, earthwork optimisation, bridge design and track selection. Heritage, environmental and land rights considerations contributed to the final selection of the rail alignment.

**Project: V'Locity Stabling Project****Customer: V/Line Passenger Pty Ltd****Phases:** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Australia

V/Line Passenger expanded its rolling stock fleet to include 38 new V'Locity trainsets, marking a new era of travel across regional Victoria. Each V'Locity unit consists of two semi-permanently attached carriages, with the capability to travel at speeds of up to 160 km/h. WorleyParsons was engaged to provide project management, detailed engineering and construction management to facilitate the upgrades of various stabling yards and maintenance workshops to enable maintenance and stabling of the new rolling stock. The work scope included general civil work such as identification and implementation of required track renewals and the design and construction of new structures. The design and installation of fuelling and sanding systems as well as the design and implementation of lighting upgrades was also completed.

**Project: New Metrorail City Project****Customer: Public Transport Authority of Western Australia****Phases:** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Australia

As part of the new 72 km Perth to Mandurah suburban dual track rail network, the Western Australian Public Transport Authority is constructing 2.6 km of underground railway and associated stations in the Perth CBD. The city component of the project includes dive structures, cut and cover tunnels, twin bored tunnels and two underground stations. The bored tunnels run through the centre of Perth under existing roads and buildings.





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# Integrated Capabilities

## Risk Management

WorleyParsons Safety and Risk Management is a specialist provider of risk assessment services to a diverse customer base. As one of the first engineering and project service companies to comprehensively include risk management in its strategy and operational practices, WorleyParsons has an extensive database of risk and mitigation alternatives. The principles of the Australian and New Zealand standard for risk assessment (AS/NZS4360) are used to address threats to crucial infrastructure, operational and project risk.

## Project Development and Delivery

WorleyParsons has focused on the delivery of both minor brownfield projects and mega greenfield projects for resource and infrastructure companies in over 30 countries. The skills associated with each minor and mega project are significantly different, leading to customised processes to meet each challenge. Customers increasingly request WorleyParsons to provide a comprehensive integrated solution ranging from concept development, engineering, procurement and construction management. Through Workshare with our Beijing offices we can also provide customers with cost effective solutions through the provision of design, procurement and fabrication.

## Program Management

The ability to provide program management that oversees the development of a range of interconnected projects is held by few companies. WorleyParsons has built a worldwide reputation delivering large Program Management contracts throughout Australia, Asia, the Middle East and America. Systems and process have been developed to minimise the risk associated with the delivery of these responsibilities.

## Long Term Services Contracts

WorleyParsons has approximately 7,500 personnel working in over 70 alliances executing more than 20,000 projects annually with a capital value in excess of USD 4 billion. Our Improve projects and asset services activities generated an estimated total value to our customers in excess of USD 6 billion last year. WorleyParsons is very committed to long term service contracting and the necessary partnership culture is inherent within the company leading to the development of mutually acceptable solutions.





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## Our Vision

WorleyParsons will be the preferred global provider of technical, project and operational support services to our customers, using the distinctive WorleyParsons' culture to create value for them and prosperity for our people.

### Leadership

- Committed, empowered and rewarded people
- EcoNomics™ - Delivering profitable sustainability
- Integrity in all aspects of business
- Energy and excitement
- Minimum bureaucracy

### Relationships

- Rapport with all stakeholders
- Open and respectful
- Collaborative approach to business

### Agility

- Smallest assignment to world scale developments
- Local capability with global leverage
- Responsive to customer preferences
- Optimum solutions customized to needs

### Performance

- Zero harm
- Results for our customers and other stakeholders
- World-class resources, capability and experience



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**For further information about  
our global capability email:  
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