



WorleyParsons

resources & energy

EcoNomics™

Infrastructure & Environment

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

118
offices

32,200
personnel

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.

Infrastructure & Environment

WorleyParsons delivers infrastructure solutions to customers around the globe focused on three subsectors:

- Resources and Energy
- Transport
- Water and Wastewater

Our work in these subsectors, and for customers in other businesses, is based on the following world class capabilities:

- Environmental
- Water resources
- Coastal and marine
- Geotechnical
- Rail
- Civil and structural
- Advanced analysis
- Master planning and program management

WorleyParsons' Infrastructure group has the proven ability to deliver technically outstanding, cost effective solutions to some of the most challenging projects in the world. These projects span the entire project life cycle from feasibility through decommissioning and have been completed in diverse geographic and cultural settings.

Our comprehensive engineering and scientific capabilities, hands-on knowledge and experience, understanding of project issues and customer-focus have formed the foundation for project success. Our emphasis on long term solutions comes from our commitment to safety, constructibility, operability and sustainability.

WorleyParsons is an experienced EPCM provider and uses an integrated team approach to successfully implement optimum project solutions with the lowest total life cycle costs.

WorleyParsons has delivered successful solutions for both new projects and infrastructure upgrades, in addition to providing the complete engineering infrastructure platform for global resource development projects. From local municipalities to global energy companies, our customers have seen the benefits that the WorleyParsons' group can provide.

50+

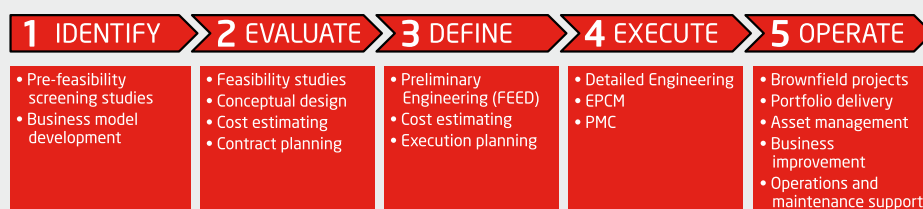
years experience in infrastructure

Assignments in

16+

countries

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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Sectors Serviced

Resources and Energy

Development of infrastructure for the resource and energy sectors requires detailed understanding of the primary process, appreciation of the impact of infrastructure solutions on the performance of the underlying asset and a comprehensive skill base to deliver the optimum infrastructure solution. WorleyParsons is uniquely positioned to provide complete solutions to customers in the resources and energy sectors.



Transport

WorleyParsons is a leading service provider of transportation solutions to both the private and public sectors. Our capabilities cover all aspects of the transportation sector including rail, maritime (ports and harbours), roads, highways and intermodal transport. With a proven track record of delivering innovative solutions, WorleyParsons has built a substantial portfolio of challenging projects that meet public and private sector needs.



Water and Wastewater

WorleyParsons provides expertise in all areas of water source development, supply, treatment and distribution for major utilities as well as smaller users. Our engineers also design wastewater treatment processes and disposal systems for municipal and industrial wastewater.



Capability Overview

Environmental

WorleyParsons provides solutions for the environmental challenges facing our customers including the integration of environmentally sustainable design, construction and operation practices. We offer the complete range of environmental services needed during the entire project life cycle.



Water Resources

WorleyParsons' scientists are actively leading research and development in water resources and focus on the sustainable development and management of water resources, and resource protection and restoration. We have delivered safe, reliable and consistent water supplies while effectively monitoring environmental quality.



Coastal and Marine

As a world leader in maritime engineering, WorleyParsons provides comprehensive design, project management and construction supervision services for port, harbour and coastal works. These engineering activities can deliver a complete marine project from initial concept to full operation.



Geotechnical

Engineering geology, geotechnical and hydrogeological engineering are fields in which WorleyParsons has extensive expertise. The Geotechnical group's understanding of the key risks of working on, in and with soil, rock and groundwater provide the foundation from which a complete engineering infrastructure can be developed.



Rail

With extensive experience in all areas of rail assets and operations, WorleyParsons can provide rolling stock and infrastructure design, project management testing and commissioning. Specialist capabilities include incident investigation, operations simulation, due diligence and owner's engineer.



Civil and Structural

WorleyParsons' comprehensive global civil and structural capability spans remote greenfield sites, established industrial estates, facilities in population centres and brownfield re-use sites. Our experience extends from complex civil structures to structural inspection and commissioning.



Advanced Analysis

WorleyParsons Advanced Analysis provides engineering/scientific simulation and computation services to offer a comprehensive range of products from resource mapping, through engineering optimization to failure analysis. These complex computational tools are used to improve and optimize engineering design and facility operation.



Program Management and Master Planning

By combining skills from all infrastructure capabilities in a single cohesive project vision, WorleyParsons is able to provide master planning for global scale resource development projects and major urban development projects. In addition, WorleyParsons is one of the world's largest providers of program management consultancy (PMC) services.





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Resources and Energy

WorleyParsons has demonstrated particular success integrating multidiscipline engineering skills and project management expertise to deliver innovative and cost saving solutions for resource-based customers.

WorleyParsons has a reputation as a provider of quality engineering and project services to the resources and energy sectors, recognized for the design of complex processing plants and the integration of port, road and rail facilities.

There has been particular success in integrating multidisciplinary engineering expertise with licensed technology and hands-on operational skills.

WorleyParsons continues to combine robust engineering capability with unrivalled industry knowledge and experience and maintains a focus on long-term alliances with customers in order to deliver outstanding results.

We are able to offer a full range of services to the resources and energy sectors including:

- Conceptual and feasibility studies
- Process optimization and value engineering
- Project delivery services including EPCM
- Operations support including alliancing
- Engineering design
- Project management
- Due diligence

3,000+

global personnel engaged in the delivery of resource infrastructure projects

50+

Mtpa of new materials handling capacity



Project: Raz Az Zawr Minerals Industrial City
Customer: Ma'aden (Saudi Arabian Mining Company)

Phases: IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Saudi Arabia

This landmark project creates an international profile for both the WorleyParsons Infrastructure and Minerals and Metals business in greenfields project delivery.

Ma'aden recently announced the award of a US\$133 million program management services contract for the provision of master planning engineering and project management services for this phosphate project. It covers the development of the phosphate mine at Al-Jalamid in the north and the chemicals complex, town site and related infrastructure at Raz Az Zawr on the Arabian Gulf including an 1,800km rail link from the mine to the coast. The infrastructure will also support Ma'aden's aluminium project and further industrial development in the new Minerals Industrial City. The project, together with the related infrastructure, represents an investment of US \$2.5b.



Project: Pilbara Iron Ore and Infrastructure Project

Customer: Fortescue Metals Group

Phases: IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Australia

WorleyParsons has completed the definitive feasibility study, Front-End Engineering Design (FEED) and EPCM delivery of the mine and port site ore handling infrastructure for this 45MTPA Stage 1 iron ore project. This greenfields project, which is currently in the final stages of commissioning and the EPCM delivery phase, challenges all traditional delivery schedules and technical solutions. The materials handling scope includes a mine truck dump pocket, crushing plant, stockpile areas, train loadout facility and all interconnecting conveyors, transfers and associated infrastructure, port and rail loop, train unloader, train unloading stockpiles, stackers and reclaimers, screening plant, blending stockyard, sampling facilities and shiploading wharf.



Project: Gorgon Development Project

Customer: Chevron

Phases: IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Australia

WorleyParsons has been involved with the Gorgon project infrastructure both in its current Barrow Island and alternate Burrup Peninsula sites. WorleyParsons was commissioned to provide civil and marine engineering advice from site selection to final concept definition, including cost estimates and scheduling for Phases 1 and 2 CDEP for Chevron. Following this, the scoping of the FEED studies and investigations required for the FEED were prepared. As part of the Phase 3 scope, WorleyParsons provided a preliminary geological and geotechnical assessment for the new LNG plant, site and associated marine facilities. An accommodation strategy was developed for the construction workforce (4,000) and operational workforce (200).



Project: PNG Gas Project

Customer: ExxonMobil / Oil Search Australia

Phases: IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Papua New Guinea

WorleyParsons, in the EOS joint venture, has completed the Select phase and FEED, and is now moving into the EPCM phase for the infrastructure, gas field developments, gas processing, export compression facilities and gas export pipeline from the Southern Highlands in PNG to landfall at Cape York in Australia. The road and bridge infrastructure is strategic for the country's oil and gas and minerals developments in the highlands. WorleyParsons has completed route selection, detailed design and cost estimation for approximately 345km of roads in varied terrain including many culverts and bridges across fast flowing rivers. Challenges included the remoteness of the site, the terrain and surface runoff.





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Transport

WorleyParsons is positioned as a leading service provider of transportation solutions to both the private and public sectors. The company's capability covers all aspects of the transportation sector including rail, maritime (ports and harbors), roads, highways and intermodal transport. With a proven track record of delivering innovative solutions, WorleyParsons has built a substantial portfolio of challenging projects that meet public and private sector needs.

Multidiscipline teamworking lies at the heart of our approach to transportation projects. We form integrated teams that combine transport planners, land use experts, environmental and geotechnical specialists, civil and coastal engineers, architects, systems specialists and economic experts. WorleyParsons' transport capabilities include:

Transport and Urban Planning - Developing strategic and sustainable policies, plans and processes to ensure that transport meets future economic, social and environmental expectations.

Transport Solutions - Resolving transport challenges through the design and application of innovative technical and engineering solutions.

Transport Modeling - Modeling and simulating traffic flows to optimize traffic movement.

Traffic Management - Continually improving strategic road and highway networks, ports and harbors and associated public assets to minimize traffic congestion.

800+

man-years of
transport engineering
experience

\$4.3b

of rail assets



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

Australia

This rail project represents the next step in the development of heavy haul railways being the world's first to be designed for a 40 tonne axle load.

The 282 kilometres of new heavy haul railway track joins the mine to the unloading loop at Port Hedland. The project includes a new unloading loop with marshalling yards and a maintenance workshop as well as 11 bridges and 20km of roads, procurement of 800 ore cars and 15 locomotives, obtaining safety accreditation and the provision of maintenance and operational control facilities to support the reliable transportation of 45 MTPA of iron ore. WorleyParsons completed the pre-feasibility, FEED and supported the construction phase as part of an integrated team, responsible for the Engineering, Procurement and Construction Management of the mine, rail and port ore processing and infrastructure.

**Project: Port Hedland Port Planning Study****Customer: Port Hedland Port Authority****Phases:** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Australia

Port Hedland is one of Australia's largest export ports by tonnage. Trade at the port is expected to increase by 30 million tonnes in the next 3 to 5 years and double within the next 20 years. WorleyParsons developed a master plan for the future development of the port and surrounding area, including the nearby Boodari industrial estate. The model has allowed a framework for the future development of the port to be defined, including the optimum expansion path, considering available land area, adjacent land uses, environmental, engineering and heritage issues. This expansion will cater for the proposed further development of the Pilbara mining and minerals processing industries.

**Project: King Abdullah Economic City – Millennium Seaport****Customer: EMAAR Properties****Phases:** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Saudi Arabia

The King Abdullah Economic City near Rabigh, north of Jeddah, is a US\$26.6 billion development covering over 55 million m² along a 35km shoreline on the Red Sea. The port will have an integrated transport system with seamless high speed transition from sea to rail, road and air, making the city the main gateway to the Central and Eastern Provinces as well as the entire Kingdom. The port, with its close proximity to holy cities, will have a dedicated Haj terminal (with adjoining hotels and other world class amenities) to accommodate over 500,000 pilgrims every season. WorleyParsons performed the initial planning for the port and developed the port concept and provided a detailed estimate of construction costs. The planning phase included the design of a state-of-the-art container port with a throughput capacity of up to 6 million TEU/year.

**Project: Acacia Ridge Intermodal Terminal Capacity Study****Customer: Pacific National Limited/Clayton Utz****Phases:** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Australia

WorleyParsons executed a major multi-disciplinary study of the capacity of the Acacia Ridge Intermodal Terminal, located near Brisbane, Australia. The study included assessment of rail schedules, track and storage configurations to determine the ability of the yard to meet future demand and accommodate other users. The team, including rail and logistics specialists and a modeling team, developed a computer model of the terminal. The model allowed the operation of the terminal to be evaluated, bottlenecks identified and the capacity for growth estimated. The computer model and the overall capacity analysis were subject to detailed legal scrutiny and the model was successfully validated against operational data.





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Water and Wastewater

WorleyParsons process engineers and scientists have a broad and fundamental knowledge of water and wastewater treatment processes. This skill set is complemented by other engineering disciplines and enables complete water and wastewater projects to be delivered. This encompasses not only the treatment stage, but also upstream source development and downstream distribution or disposal schemes.

WorleyParsons' engineering capabilities span the full spectrum of services including feasibility studies, conceptual design, process evaluations, detailed engineering design, project and construction management and commissioning, and in some cases, ongoing operation of the constructed asset.

With leading-edge water and wastewater technologies, WorleyParsons is capable of developing highly integrated management systems including conventional processes for iron, manganese, color and turbidity removal, physical, chemical and biological treatment systems, and membrane and thermal processes for desalination.

We can provide advanced treatment processes for the removal of organics and disinfection by products, thickening and sludge dewatering processes, ion exchange, and specialist services for corrosion mitigation in cooling water, ultra-pure water and steam circuits.

In addition, disinfection, tertiary treatment for secondary effluent reuse, zero effluent discharge systems, bio-solids processing, and compost systems for the recovery of usable bio-solids and nutrients are services that WorleyParsons will deliver.

Using specialist expertise, innovation and a multidisciplinary and committed approach, we deliver the best outcomes for our customers.

20+

years providing water treatment solutions

200+

treatment plants fully designed and installed



Project: Perth Seawater Reverse Osmosis Desalination Plant**Customer: Multiplex Degremont Joint Venture (for the Water Corporation)****Phases:** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Australia

This is the first large seawater desalination plant in Australia producing potable water for a large city. The environmental monitoring is amongst the most comprehensive applied to a large desalination facility and sets a benchmark for future plants.

WorleyParsons was selected as the engineering consultant by the Multiplex Degremont JV to initially develop the technical proposal and thereafter the detailed engineering for a 140 ML/d seawater reverse osmosis plant to produce potable water for Perth, Western Australia. The scope also incorporated seawater intake and brine outfall, pre-treatment, stabilization, disinfection and treated water pumping. This plant is one of the largest seawater reverse osmosis plants in the world and provides 17% of Perth's water demand.

**Project: The "Subiaco Alliance"****Customer: Water Corporation****Phases:** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Australia

WorleyParsons participated in a joint venture with John Holland to deliver this project in an alliance with the Water Corporation. WorleyParsons undertook all work associated with engineering design and equipment specification. Key engineers were also based on site during the construction phase to take a lead role in construction activities. The scope of work involved the covering of all process units and ducting 110,000 m³/h of vent gases to a comprehensive odor control plant designed and constructed by the Alliance. Other work associated with the project was a comprehensive upgrade of the treatment process to obtain biological nitrogen removal and replacement of equipment that was at the end of its asset life. The throughput of the plant was also increased to 62.4 ML/day.

**Project: Jordan Valley Integrated Waste Management****Customer: Canadian International Development Agency, Government of Jordan****Phases:** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Jordan

WorleyParsons provided design engineering and project management for this Build-Own-Operate-Transfer (BOOT) septage treatment facility. The facility treats municipal septage to provide irrigation water for crops grown on-site. The detailed engineering design of the wastewater system included a septage receiving station, inlet screening and grit separation, biological trickling filter, extended aeration, secondary clarification, ultraviolet disinfection, duckweed wetland system, biosolids composting system, and an irrigation distribution system. Also completed were an environmental and socioeconomic impact assessment, community participation, gender equity, training, technology transfer and stakeholder management.

**Project: Contaminated Groundwater Treatment System****Customer: Shell Canada Limited****Phases:** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Canada

This project at the Shell Wateron Complex was designed to contain, extract, treat and return impacted groundwater to the environment. Responsibilities included pilot testing, design, procurement, construction management and commissioning. Groundwater in the area was profiled with hydrogeological investigations, modeling and monitoring and extraction wells. Extracted groundwater will be pumped to a tertiary wastewater treatment facility. WorleyParsons worked with Shell to retrofit out-of-service portions of an existing facility to treat the contaminated groundwater. Additional treatment processes were added to achieve high levels of treatment.





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Environmental

WorleyParsons provides sustainable environmental solutions to engineering challenges for all industry sectors. The group offers services covering the entire project life cycle from feasibility studies right through to maintaining environmental integrity during operations.

Environmental capabilities of WorleyParsons include:

Contaminated Sites

WorleyParsons has completed contaminated sites investigations at thousands of sites, many of which have lead to remediation, risk assessments and/or liability assessments. Contaminated sites services offered by WorleyParsons cover Phase I, II and III environmental assessments, remedial planning and implementation, and health and risk assessments.

Environmental and Social Impact Assessment

Providing expertise in impact assessment, WorleyParsons addresses social licence, regulatory approvals, shareholder support and sustainability. Through an interdisciplinary process and strong project management, we can assist customers in enhancing corporate relations, managing stakeholder needs, exceeding shareholder expectations and ensuring projects meet the triple bottom line.

Environmental Strategy and Liability

WorleyParsons provides customers with high-level environmental strategic services to assist in business, financial and economic decisions.

Completed

10,000+

contaminated sites projects

Assessed environmental liabilities for

\$10b+

total assets

1,000+

environmental and geosciences staff worldwide



Project: Contaminated Land, Groundwater Investigation & Remedial Strategy**Customer: National Grid Property Ltd. (Formerly British Gas)****Phases:** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

United Kingdom

This former gasworks site in south east England carries high environmental liability to the customer due to its location above a major aquifer and proximity to a major public water supply well and Class A river.

This project presented several challenges, including conceptualization of source-pathway-receptor linkages, protection of the environment during and after the proposed remediation, and meeting requirements and objectives of site owners, EA, local authority and the water utility. WorleyParsons has developed a rigorous remediation design development strategy that involves ex-situ soil washing and bioremediation, plus in-situ surfactant-enhanced aquifer remediation.

**Project: Impact Assessment for the New Quito Airport****Customer: Corporación Quiport, S.A. / Aecon Group Inc.****Phases:** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Ecuador

WorleyParsons prepared a full Environmental and Social Impact Assessment for the construction of the new airport which met the requirements of four different international financial institutions. The study included a social baseline report, demographic analysis, social impact assessment and social management plan. WorleyParsons has developed the final Socio-Environmental Management Plan that will be used during construction and operations of the New Quito Airport.

**Project: Environmental Impact Assessment for Seismic Exploration****Customer: Maersk, Repsol, Staatsolie, Hardman Resources****Phases:** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Suriname

Several EIAs were completed by WorleyParsons on behalf of four operators in the waters off Suriname and Guyane. The EIAs for the proposed seismic surveys included the preparation of an Initial Environmental Risk Assessment followed by a full Environmental Impact Assessment report. Field studies supplement information collected in desk studies and provided opportunity to consult with key stakeholders and forge relationships with government departments. Environmental components included migratory routes for birds, whales, cetaceans and turtles and the implications for designated marine sites, tourism, navigation and fisheries on the proposed survey schedule.

**Project: Due Diligence and Liability Assessment of Acquisition Assets****Customer: British Gas International Limited****Phases:** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Canada

WorleyParsons was retained to identify environmental issues and evaluate environmental costs associated with the assets of El Paso Oil and Gas Canada Inc being considered for purchase by British Gas. WorleyParsons completed a Phase I environmental investigation and an estimation of environmental liabilities. Challenges included the asset locations in three different provinces with unique regulatory requirements, extreme winter conditions for assessments and British Gas's very meticulous due diligence. The diverse base of experts of WorleyParsons, our knowledge of local environmental laws through our regional offices and advanced technologies enabled us to meet these challenges successfully. Our evaluations helped provide necessary information for British Gas to make an informed decision regarding the El Paso acquisitions.





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Water Resources

WorleyParsons scientists are actively leading research and development in water resources. We focus on the sustainable development and management of water resources and resource protection and restoration.

WorleyParsons' capabilities in this area focus on identification, development and delivery of safe, reliable and consistent water supplies and the monitoring, assessment and restoration of marine, surface and groundwater resources. We have completed quality and quantity (availability) assessments considering both human health and ecological receptors. Our capabilities include:

Assessment

Advanced geophysical and geomatic tools are used by WorleyParsons to supplement field mapping and monitoring programs in the assessment of water resources. We have completed assessments for water availability (quantity) and quality, both chemical and ecological.

Development

WorleyParsons has developed water resources for municipal, industrial, agricultural and recreational purposes, as well as for habitat restoration and preservation. This work has included the design and installation of water supply wells, surface intakes, wetlands and marine habitats, as well as urban runoff diversion and control systems.

Restoration

Remediation and restoration programs have been completed by WorleyParsons for a variety of impacted water resources. These have included groundwater supplies contaminated with industrial pollutants, spill response, polluted urban runoff, erosion and sediment control, beach water polluted with fecal bacteria and degraded wetland systems. We have utilized natural and engineering programs, such as constructed wetlands and a variety of physical/chemical processes for water treatment.

Management

WorleyParsons uses advanced computer modeling and database tools in the assessment and management of water resources. We have developed watershed management plans, groundwater basin protection plans, urban water quality master plans and habitat preservation plans.

4,000+

groundwater projects

1,000+

water specialists



Project: Water Resources and Management Study**Customer: United Nations, Nexen, Government of Yemen****Phases:** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Yemen

WorleyParsons achieved a major breakthrough in water exploration in the Yemeni desert by unravelling the subtle secrets of structurally-controlled groundwater resources.

A comprehensive investigation by WorleyParsons in the Hadramout region of south western Yemen succeeded in discovering previously untapped groundwater resources. The program included rehabilitation of existing measurement infrastructure and installation of new infrastructure, groundwater and surface water modeling, water quality sampling and analysis, remote sensing, geophysical investigations for identification of water resources, drilling and water well installations, pumping tests, and geographic information systems.

**Project: Water Supply for Aceh Tsunami Relief****Customer: UNICEF****Phases:** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Indonesia

WorleyParsons has demonstrated a high strike rate in the successful exploration for water around the world and found water where others have not. UNICEF put WorleyParsons in charge of the rehabilitation of groundwater supplies in Sumatra's Aceh province, one of the regions most impacted by the 2004 tsunami. The work included a geophysical and drilling program. WorleyParsons then engineered a large-scale groundwater extraction scheme to source water for the municipal water treatment system.

**Project: Karstic Wetland Characterization****Customer: Environmental Protection Agency - Ireland****Phases:** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Ireland

The unique hydrology and ecology of Ireland's turlough wetlands have required national and European conservation designations and therefore their characterization and protection is critical. WorleyParsons was retained under an Irish Environmental Protection Agency research contract in Ireland. The project required the development of a methodology of characterizing karstic wetlands according to pan-European water management policies. Turloughs (dry lakes) are unique to Irish karstic wetlands and flood and drain annually with flooding from surface water and groundwater inputs and draining via sinkholes or artificial surface water channels.

**Project: Hydrologic and Geotechnical Study of Basins Adjacent to a Gold Mine****Customer: Minera Barrick Misquichilca S.A. / Piteau Associates****Phases:** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Peru

A portion of the natural flows of two basins adjacent to the Pierna open gold mine is diverted through a network of canals and buried pipes to supply water to thirteen different communities with a combined population of about 2,000 people. The open pit and associated facilities will change surface and groundwater flow regimes. Piteau Engineering and WorleyParsons were retained to conduct a geotechnical and hydrological study of the drainage basins below the open pit in order to identify changes and provide modeling tools to assist in predicting both qualitative and quantitative changes to affected watersheds.





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Coastal and Marine

WorleyParsons is a world leader in maritime engineering providing comprehensive design, project management and construction supervision services for port, harbor and coastal works.

WorleyParsons' diverse marine capability and understanding of complex port requirements and environmental, coastal and geotechnical constraints, enables consistent delivery of integrated and cost effective solutions.

Globally, WorleyParsons has provided solutions for a wide range of customers including port site selections for greenfield projects, ongoing upgrades and optimization work.

Key capabilities in this area include site selection and feasibility studies, port and harbor master planning and operations, preparation of basis of design requirements, bulk handling facilities, integrated design solutions, dredging and reclamation including approvals, metocean design criteria development.

WorleyParsons has extensive experience in vessel mooring analysis and design, jetties, wharves and specialist structures, intake and outfall siting and design, coastal zone management and hazard assessment, marine impact modeling and assessment, marina, waterfront and canal design and coastal structure design.

WorleyParsons can provide a full range of services from multi-user harbor environments to project specific remote sites and is a leading solution provider for this complex and critical development area.

Marine and coastal facilities projects completed in

20+
countries

150+
Mtpa of new port capacity engineered



Project: Oakajee Port**Customer: Department of Resources and Development****Phases:** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Australia

This project, located at the mouth of the Oakajee River near Geraldton, required all aspects of port planning from site selection, evaluation of design criteria, dredging of variable calcarenite materials in a severe wave climate, quarry potential, harbor layout design and cost estimates.

A critical component of the project consisted of balancing the breakwater and dredging requirements to provide the required level of tranquillity and basin depth. The project formed the basis for port facilities for the mid west iron ore mining groups with associated downstream iron and steel developments. Designs were progressed to suitable level for inclusion in BOOT tender process for which WorleyParsons completed associated documentation.

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

Australia

This turnkey project included extensive marine facilities to enable export of 45MTPA of iron ore through Port Hedland, comprising conveyor trestles traversing 1,400m over complex ground conditions, a 90m approach jetty, two dolphin berths to accommodate vessels up to 250,00dwt and a shiploader support structure. The expansion of the ship manoeuvring area, departure area and berthing basin included some 4.5 million m³ of dredged silt and sandstone used in strategic reclamation of the stockyard area. Work included full delivery of all marine structures, shiploading equipment, dredging, stockyard areas and rail interfaces.

**Project: Island Processing Co. Intake and Outfall****Customer: West Coast Reduction Ltd.****Phases:** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Canada

WorleyParsons staff provided total engineering services for the construction of a cooling water intake and process water outfall for a fish waste processing plant near Nanaimo, British Columbia. Discharge modeling prior to construction was conducted to ensure that the discharge would meet regulatory requirements for temperature and other effluent constituents. Construction challenges included building large diameter pipelines down a vertical cliff face from the plant to the ocean. Ongoing environment monitoring and reporting are provided on a quarterly basis by WorleyParsons environmental technicians.

**Project: Boston Outfall Ventilation Study****Customer: Massachusetts Water Resource Authority****Phases:** IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

United States of America

The Boston Ocean Outfall is the world's largest tunnelled outfall, consisting of a 9.5 mile long, 24 foot diameter tunnel running approximately 230 feet below Massachusetts Bay. The outfall diffuser is 6600 feet long and consists of a series of 55 equally spaced risers connecting the tunnel to the seabed. Each 30-inch is topped by an eight-port manifold encased in a reinforced concrete structure (the diffuser head) and located in a water depth of approximately 110 feet. Horizontal oftakes were constructed from the tunnel to each of the risers. To protect against water ingress, the diffuser discharge ports were sealed and a sealing plug installed in each of the riser oftakes. During tunnel construction, ventilation was provided to the tunnel using a HVAC plant atop the onshore drop shaft and a duct running the length of the tunnel.





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Geotechnical

WorleyParsons has expertise in the fields of engineering geology, geotechnical and hydrogeological engineering.

WorleyParsons' Geotechnical group has worked on projects across the world in the mining, oil and gas, infrastructure, research, education, defence, building and remediation industries, and servicing private, corporate and government customers. Our customers can be confident that our group has the resources, energy and experience to address complex geotechnical challenges.

WorleyParsons' Geotechnical group provides a truly integrated solution to projects with geotechnical challenges. We do this by proactively working with customers and other disciplines to identify project requirements, prepare project briefs, undertake geotechnical studies and follow up with specialist advice.

Our geotechnical services exceed customer expectations because we provide sector and project-specific services every time. We can do this due to the depth and breadth of experience and our proactive approach to integration.

Some key areas in which WorleyParsons can provide geotechnical services include:

- Engineering geology
- Site investigation and instrumentation
- Foundation engineering and ground improvement
- Nearshore and offshore
- Slope stability and retaining systems
- Mining, waste management and containment
- Construction materials section
- Tunnelling
- Advanced analysis

10+

geotech centers
across the world

Projects to the
value of

\$11b+



Project: Gorgon Development**Customer: Chevron****Phases:** IDENTIFY >> EVALUATE >> DEFINE >> EXECUTE >> OPERATE

Australia

WorleyParsons undertook nearshore and onshore geotechnical investigations for the Gorgon gas plant, marine facilities and pipeline crossings.

A karstic hazard and risk assessment of coastal limestones was completed at the proposed plant and port site located at Town Point on Barrow Island, a Class A nature reserve. This was completed through a combination of desktop study and site mapping. Nearshore geotechnical investigations were also undertaken for LNG export marine facilities on the east coast of Barrow Island and feed gas pipeline shore crossings on the west coast. Investigations included diver-operated drilling from the seabed in up to 20m water depth and vibrocoring operations. This work formed the basis for dredging strategies and design, as well as marine facilities foundation design.

**Project: Bridge Sediment Weir Removal and Streambed Reconstruction****Customer: Imperial Oil Resources****Phases:** IDENTIFY >> EVALUATE >> DEFINE >> EXECUTE >> OPERATE

Canada

WorleyParsons completed the geotechnical and hydraulic design for the removal of a sedimentation weir and streambed reconstruction beneath a bridge that was supported with sheet pile wall abutments of unknown embedment depth. During the removal and regrade, the armoring along the toe of the sheet pile wall was reduced and its effects on the wall unknown until construction. A total of 16 electronic tiltmeters were installed to monitor the sheet pile wall movement during and after construction. The tiltmeter readings provided real-time deflection data acquisition and allowed construction to proceed with the confidence that any indications of potential wall failure would be immediately detected without impacting the structural capacity of the bridge.

**Project: Dampier to Bunbury Natural Gas Pipeline****Customer: Alinta Gas****Phases:** IDENTIFY >> EVALUATE >> DEFINE >> EXECUTE >> OPERATE

Australia

WorleyParsons has undertaken desktop studies and geotechnical site investigations for compressor stations and looping associated with the Dampier to Bunbury Natural Gas Pipeline. The investigations included site walkovers, cone penetration testing, geophysics and cored drilling techniques on a project that extended over 1,400km through often harsh terrain. Laboratory testing of encountered soils and rock was completed, interpreted and reported. Site investigation results were combined with historic data to form factual and interpretive geological data sets and models suitable for engineering analysis and cost estimation.

**Project: PNG Gas****Customer: ExxonMobil/ Oil Search Australia****Phases:** IDENTIFY >> EVALUATE >> DEFINE >> EXECUTE >> OPERATE

Papau New Guinea

The PNG Gas project involves construction of 340km of gas pipeline facilities and infrastructure extending from the southern highlands to the Gulf province. The area is seismically active with very high rainfall levels, leading to significant natural slope instability. The project alignment crosses steep, deeply incised volcanic deposits and spectacular karst and ridge terrain. WorleyParsons assessed and modelled the surface and subsurface geology and geomorphology and identified slope stability geohazards along the pipeline alignment. WorleyParsons provided design recommendations regarding slope stability for a 1 in 1,500 year seismic event.





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Rail

WorleyParsons Rail has experience in all facets of the rail industry and is able to deliver innovative rail strategies and solutions to meet our customers' needs.

Access and Regulation

WorleyParsons Rail 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 the networks. The industry benefits through the establishment of transparent access regimes encouraging utilization of the networks and bringing confidence to the users, while ensuring access providers receive fair compensation.

Rail Infrastructure

Our integrated design capability for rail infrastructure ensures optimization and coordination through the concept, definition, detailed design and construction management phases of the project. This results in capital and operating cost savings and construction efficiencies.

Rolling Stock Engineering and Project Management

With unrivalled experience in rolling stock engineering, the WorleyParsons Rail team has been responsible for the design and project management of 80% of the new wagons commissioned in Australia over the last ten years.

Rail Business Consulting and Management

WorleyParsons Rail provides a rail business consulting service involving operations cost modeling, business case development and analysis, owner's engineers / lender's engineers, tender and contract management, performance benchmarking, railway and terminal operations simulation and strategic and master planning.

Rail Asset Management

WorleyParsons Rail offers whole of life asset management, fleet configuration control, fleet life maximization, management of systemic fleet defects maintenance analysis and planning.

2,000+

km of railway projects
in progress

10,000+

wagons in service



Project: Singapore Circle Line 4 & 5
Customer: Singapore Land Transport Authority
Phases: IDENTIFY >> EVALUATE >> DEFINE >> EXECUTE >> OPERATE

Singapore

The Circle Line is a fully underground orbital line linking all radial rail lines leading to the city. Stage 4 & 5 - Contract 856 consists of the complete construction of four underground stations and approximately 3.4km of twin bored tunnels, cut-and-cover tunnels, cross overs, emergency siding facilities and permanent emergency escape shafts.

WorleyParsons Rail is providing engineering and technical staff comprising of project engineers and technical officers for the supervision of the construction of the stations, bored tunnels and all ancillary works. Services provided by WorleyParsons Rail include advanced safety auditing, construction supervision, independent technical advice on geotechnical and tunneling issues, quality management and risk assessment and management.



Project: Design of Hamersley Iron Ore Cars

Customer: Bradken Rail

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

Australia

WorleyParsons Rail was engaged to design a new ferritic stainless steel ore car which optimized the gross-to-tare ratio and cubic capacity. Experienced rolling stock designers supplemented the design process using finite element and fatigue analysis techniques that have been refined specifically for rail car structural analysis. This has resulted in the most efficient and reliable ore car structure to operate in the Pilbara. The design exceeds previous benchmarks for gross-to-tare, cubic capacity and axle load, and over 2,000 cars to this design have now been built.



Project: Hunter Valley Project Management

Customer: Australian Rail Track Corporation

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

Australia

WorleyParsons Rail is providing project management services to the Australian Rail Track Corporation for works associated with increasing the rail capability of the Hunter Valley coal network as the tonnage is lifted over the next three years. The work involves \$250 million of rail infrastructure upgrades, new work and replacement to provide for the planned capacity increase of 50 million tons.



Project: Alice Springs to Darwin Railway

Customer: ANZ Bank

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

Australia

The extension of the central Australian north-south railway from Alice Springs to Darwin involved the laying of 1420km of 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 Rail was retained as Lender Engineer by senior debt banks, 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.





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Civil and Structural

WorleyParsons' comprehensive global civil and structural capability spans remote greenfield sites, established industrial estates and facilities in population centers.

WorleyParsons' knowledge of civil systems and design refinement is second to none. WorleyParsons has completed award winning fit-for-purpose designs in large mining, power, water and hydrocarbons environments, reflecting a solid understanding of the project needs. Identifying reliable water and power solutions, along with the need for building solutions, play a significant role in project viability and WorleyParsons is skilled at implementing these requirements.

Buildings

WorleyParsons has key capabilities in building including structural engineering design, project management, contract administration, architectural drafting and precast building systems.

In addition, the Infrastructure group has the ability to effectively plan permit and building permit applications and has experience in optimization analysis, geotechnical investigations and environmental engineering.

Site Facilities

Our capability in site facilities is evident in our experience in the design of administration, workshop and maintenance facilities, warehouses, camps and villages. Special structures and buildings are also an area of expertise including stacks, silos, control rooms and other similar facilities.

WorleyParsons has experience in water supply and water management facilities, implementing water resources strategic planning and has supplied site facilities with power including generation, transmission and distribution, fuel and storage and communications.

30+

years of buildings
and facilities
experience

1,000+

building projects
completed



Project: Port Kembla Copper**Customer: JEA****Phases:** IDENTIFY >> EVALUATE >> DEFINE >> EXECUTE >> OPERATE**Australia**

This project was to upgrade the facility to meet prevailing environmental requirements and increase throughput from 80,000tpa to 120,000tpa.

WorleyParsons acted as engineers for the Japanese Gas Corporation, through JEA, providing detailed design services for material handling systems, furnace systems, wastewater treatment plant, electrolyte refinery, dust transportation and utilities. This involved all disciplines including mechanical layouts and equipment specifications, all civil and structural design (buildings, earthworks, site drainage), piping designs (including pipe supports), electrical and instrumentation design and the coordination and production of control functional specifications.

**Project: The Met****Customer: Hotel Properties Ltd****Phases:** IDENTIFY >> EVALUATE >> DEFINE >> EXECUTE >> OPERATE**Thailand**

WorleyParsons completed civil and structural design of 3 blocks of 65-storey linked condominium buildings in the CBD area of Bangkok. The linked condominium buildings included integrated car parks, retail podium and four-storey basements founded in soft clays, located in a well developed, and hence, constrained environment. WorleyParsons provided conceptual design, detailed engineering, wind tunnel testing management and geotechnical investigation services and reporting. This project typifies our approach to providing fully integrated solutions for customer project needs.

**Project: BOC Air Separation Plant, Bulwer Island****Customer: Transfield Worley BOC Gases Australia Alliance****Phases:** IDENTIFY >> EVALUATE >> DEFINE >> EXECUTE >> OPERATE**Australia**

WorleyParsons was retained by the Transfield Worley BOC Alliance to carry out detailed design of the new 600 ton per day oxygen plant on the BP Refinery site at Bulwer Island, Queensland. The civil works presented a major challenge as the site is on delta land, subject to significant settlement. The initial scope involved liaison with the geotechnical consultants regarding surcharge loading of the site, with long term projections used to determine relative settlements for which pile-supported and ground supported structures should be designed. Civil design included drainage works which incorporated a first flush system for areas potentially affected by minor oil spillages.

**Project: Radio Broadcasting Complex****Customer: US Army Engineering Division, Mediterranean Corps of Engineers****Phases:** IDENTIFY >> EVALUATE >> DEFINE >> EXECUTE >> OPERATE**Saudi Arabia**

The project consists of a radio studio building, an administration building, a power plant building, parking space for 450 vehicles and site landscaping. WorleyParsons was responsible for the design and landscape criteria, preliminary architectural concepts, soils and geological studies, topographic and utility surveys, A/E design documents, broadcasting equipment specifications and selection and the architectural model. The broadcast studio building consists of three floors and a basement (112,00 sq ft). The administration building is a high-rise office structure consisting of 17 floors and a basement (89,000 sq ft). The power plant building houses 2,000 kW of standby diesel electric generators, auxiliary electrical equipment, cooling equipment for the entire broadcast complex and offices, storerooms and shops.





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Advanced Analysis

WorleyParsons Advanced Analysis is a complete solution provider in the fields of engineering simulation and computation offering a comprehensive range of products and services.

The Advanced Analysis business consolidates the wide range of specialist analytical expertise within WorleyParsons and provides a diverse range of services including stress and dynamic analysis, computational fluid dynamics, 3D modeling and visualization and field testing.

The competitive edge of the specialist team derives from elite academic qualifications combined with extensive, practical site experience offering a comprehensive range of core simulation services including dynamic simulation and design optimization, fatigue and durability assessment including fracture mechanics and simulation of manufacturing processes including forging, casting and stamping.

In addition WorleyParsons Advanced Analysis has capabilities in:

- Underwater shock analysis
- Expert witness and forensics advice
- Pushover and platform collapse analysis
- Crash, impact, pipe whip, shock and drop test simulation
- Geotechnical and slope stability analysis
- Vessel motion and mooring dynamic analysis
- Computational fluid dynamics
- Acoustics and NVH

Through its worldwide network, many other specialized services are available such as wave diffraction analysis, advanced naval architecture and vessel simulation, electrical power systems modeling, reliability based engineering and risk management.

20+

papers published per year

10+

major FEA and CFD codes

Projects in

8

different countries



Program Management

WorleyParsons is one of the world's largest providers of program management consultancy (PMC) services.

WorleyParsons has an outstanding track record as a PMC contractor integrated with the customer's team (IPMT). As program manager, we form a working partnership to ensure that customer interests and business objectives are met in the most cost effective manner. This operational methodology produces a quality program that is safe, cost effective, technically sound, environmentally compliant and deliverable in a minimum time frame.

Master Planning

WorleyParsons is a leading provider of master planning services to a broad cross section of customers throughout Australia and internationally.

Our key strength lies in our capability to assemble multidisciplinary teams lead by experienced master planners capable of integrating all aspects of these projects. This approach allows us to successfully complete the most challenging projects for our customers achieving exceptional outcomes. Our master planning capabilities are further reinforced by our experience in detailed design engineering for a broad range of industrial and urban projects. Core master planning skills include:

- Site analysis – opportunities and constraints mapping
- Identification of industry requirements - utilities, transport, construction operation
- Arrangement and integration of compatible land uses
- Preparation of FEED and other studies to provide input to the master plan
- Optimization of infrastructure layouts
- Comprehensive documentation and mapping of project inputs and outcomes.

\$27b

in facilities managed
in 20 years

Projects to the
value of

\$70b+

Project: Ma'aden Master Planning

Customer: Ma'aden Saudi Arabian Mining Company

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

WorleyParsons is currently preparing an industrial master plan for the Ma'aden industrial area on the Arabian Gulf in Saudi Arabia. The project area encompasses a large phosphate complex processing phosphate ore, an aluminium refinery, 1800MW power station and aluminum smelter.

WorleyParsons is responsible for the preparation of a master plan optimizing the layout of industry on the site and identifying strategic infrastructure corridors for common user and private infrastructure access. The project site also include a workers village and over 1500Ha for downstream industry.

Saudi Arabia





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Long-Term Service Contracts

WorleyParsons values long-term service contracts as a mechanism for delivering new developments and supporting the ongoing operations of our customers' developed assets.

Long-term service contracts enable our customers to focus on their core competencies. These contracts also establish close working relationships with our customers that result in more efficient project delivery and allow WorleyParsons to share in both risks and rewards.

Such long-term working relationships in the development of asset-specific skills and knowledge facilitate continuous improvements in safety procedures and progressive reduction in opex and minor capex budgets through a process of rationalization and efficiency improvement. Transparency and the assurance that the investment is focused on the best business returns are further key benefits for our customers.

WorleyParsons is totally committed to long-term service contracts and we have successfully developed this style of business relationship with over 37 contracts globally in a wide variety of industries.

Customers can benefit from our global network of existing alliances with WorleyParsons continually building on the systems and capabilities from one to another, providing access to a significant pool of knowledge and best practice.

WorleyParsons' ongoing success is dependent on our customers being successful.

7,500+

personnel involved in

100+

long-term service contracts globally

Project: Muja Wastewater Treatment Plant

Customer: Verve Energy (formerly Western Power Corporation)

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

Australia

Subsequent to commissioning, WorleyParsons has successfully provided a complete operation and maintenance service for the wastewater treatment plant over a 10 year period.

During this period many plant improvements have been implemented to improve systems, improve plant safety, reduce chemical costs and optimize the plant processing capacity.





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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:
infrastructure@worleyparsons.com

www.worleyparsons.com

