SLR

global environmental solutions

LAND CONTAMINATION

Company Background - Overall Service Capabilities

SLR Consulting is a progressive firm of consulting engineers and scientists providing services in the following specialist engineering and environmental fields:

- Environmental Management
- Climate-Meteorology Analysis
- Air Quality / Dust / Odour
- Hazardous Materials
- OHS / Occupational Hygiene
- Wind Engineering
- Expert Evidence
- Environmental Monitoring
- Structural Dynamics
- Water Quality
- Site Remediation
- Lighting Studies
- Risk Assessment
- Community Consultation
- Acoustics & Vibration
- Energy Efficiency / ESD
- Ground Contamination
- CFD & Ventilation Studies
- Solar Studies
- FE Analysis, Fatigue
- Policy Development

Our consultants apply advanced technologies and innovation to manage risks, optimise opportunities and enhance the cost-effectiveness of project solutions. Guidance is provided from planning and design through to compliance assessment and the ongoing operational stages of industrial, transportation, building, construction, minerals extraction, infrastructure development, defence and aerospace projects.

With offices in Brisbane, Canberra, Melbourne, Newcastle, Perth, Sydney, Singapore, Townsville and Wollongong, SLR Consulting is able to provide specialist resources for projects in all states of Australia, New Zealand, Papua New Guinea, South East Asia and the Middle East. Whether the project is large or small our consultants pride themselves on providing a high standard of prompt, reliable and practical service and technical expertise.

Land Contamination Investigations

A contaminated site contains hazardous substances that occur at concentrations above background levels and where assessment indicates it poses, or is likely to pose, a hazard to health or to the environment.

SLR Consulting are members of the Australia Contaminated Land Consultants Association (ACLCA) and have a wide range of Contaminated Land Investigation, Assessment, Remediation and Specialist Hazardous Materials expertise.

Reasons for an Investigation

The extent of an investigation depends largely on its purpose. If it is to meet Council requirements for a development, particularly if a change in zoning is involved, then a detailed investigation is usually required. If a potential purchaser requires an investigation then there are no clear guidelines as to how extensive the investigation should be and the extent of the investigation is a risk management exercise; the more detailed the investigation, the less likely is the purchaser to be involved in an unforeseen costly clean up operation.

Site contamination assessments are conducted for a number of reasons including:

- **State Environmental Authority (SEA) Requirements**
  For sites known or suspected to be contaminated the SEAs can require an investigation
- **Site Development**
  Councils may require an assessment prior to giving development approval
- **Due Diligence**
  Companies require assessments to check that they are meeting their environmental responsibilities
- **Buying/Selling/Financing**
  An assessment can provide comfort to a purchaser or financier that there are no unanticipated environmental liabilities
- **Neighbouring Site Contamination**
  Assessments to determine whether a site is being polluted by its neighbour and vice versa

General Scope of Land Contamination Investigations & Remediation

Land Contamination Investigations are designed to determine the type, level and extent of potential contamination and provide appropriate data on which to manage or remediate a site and meet regulatory or other stakeholder requirements. While nomenclature for processes in Land Contamination Investigation can be different across states, as can the detail of legislative drivers, the route can be summarised into the following key activities:

Stage 1 – Preliminary Site Investigation

The purpose of the Preliminary Site Investigation (PSI) is to become familiar with historic and current site operations, understand the ground conditions and site topography and note any relevant features such as possible contaminant sources, either on the site or nearby.

Understanding the history of a site provides invaluable information related to potentially contaminating activities. Site history can be defined through the review of aerial photographs, Council, Land Titles Office and State Environmental Authorities (SEAs) records, through, discussions with past occupants and other information sources.

Stage 2 – Detailed Site Investigation

The PSI is used to provide a guide for any required further investigation, including an indication as to what contaminants should be tested for. The Detailed Site Investigation (DSI) takes the findings of the PSI and gathers site specific data on soils, groundwater, air, dust or any other concern raised by the PSI.

Entirely driven by the findings of the PSI and any specific regulatory or other stakeholder requirements the DSI generally involves the collection of soil and groundwater samples for analysis and assessment. SLR Consulting staff have expertise in the development of appropriate sampling and analysis plans, contractor management, site investigation supervision and data assessment, focussed on the successful delivery of DSI's to a high standard.

On completion of the DSI site works and laboratory analysis our staff use the data collected to prepare a factual and interpretative report. The format of these reports are designed to meet regulatory requirements and also to provide conclusions and recommendations that are understandable and solution focussed.

Stage 3 – Risk Assessment

The role of risk assessment in Land Contamination Investigations is critical and this therefore forms a major element of all investigations from the PSI through DSI stages. Risk assessment considerations continue through to the very end of a project where aspects of a site are assessed and re-assessed as part of standard best practice that is aimed at ensuring that work carried out meets the requirements of stakeholders.

SLR Consulting adopt a graphical method for presenting risks identified on a site, backed up with data collected as part of the Stage 1 and Stage 2 Investigations. This allows for a logical step-by-step process to be followed that takes each level of detail to provide a firm base for any required follow-up work to be continued from.

The SEAs guidelines use similar reference materials on which to define the extent of investigations and assessment on potentially contaminated sites. The NEPM Guidelines set out how an investigation should be undertaken, what levels of contamination are acceptable for a particular site usage, and what levels require further investigation and/or remediation action.

Different levels of contamination are allowable for different site uses. For example, the maximum allowable level of lead in the soil for a single dwelling residential site is much lower than that allowed on an industrial site. The initial assessment of risk uses a qualitative approach where recorded concentrations of contaminants are assessed against generic criteria. However, in the event that exceedence of those levels are reported SLR Consulting can complete additional Site Specific Quantitative Risk Assessments that define target levels specific to the subject site.

Stage 4 – Remediation

Having completed the investigations and risk assessments SLR Consulting develop Remedial Action Plans (RAPs) that consider the numerous, potential remediation techniques available. Selected techniques depend on the nature of the contamination, the time frame allowed for the clean up and target contamination in soils and groundwater.

The preceding components of work are key to ensuring that any required remedial strategy will satisfy stakeholders. On selection of the RAP, through consultation with Stakeholders, the implementation of the RAP is gauged against the findings of the Risk Assessment.

Validation

After remediation, it is necessary to validate that the site is now clean. The extent of the validation exercise is generally included and agreed with Stakeholders as part of the RAP development. SLR Consulting have experience in the completion of detailed RAP Validation, including the investigation of soils and groundwater samples.

Key Factors in Land Contamination Investigation & Remediation

Regulatory

As with most human activities, there are numerous laws, regulations, guidelines and codes of practice governing contaminated sites and, as would be expected, each State and Council has its own regulations. Fortunately however, they have largely relied on the same information source when formulating policies.

Where a site has suspected or known contamination present, the onus is on the land owner to comply with State Regulation and submit necessary forms on which the Regulators can assess the site and categorise the site condition and any requirements for further work.

Stakeholders

States Environmental Authorities (SEAs) regulate activities that interact with the environment. In each State, the SEA provide various guidance documents to interested parties for the investigation and rehabilitation of contaminated land.

Local Councils typically approve development applications. These applications frequently trigger a demand for a site assessment and audit, these requests are commonly done in consultation with the SEA.

The Consultant

The Consultants undertake the assessments, supervise the remediation and validate the site once it has been cleaned up.

In some instances the consultant and the remediation contractor may be the same organisation. There is a potential conflict of interest in this situation as the consultant has a responsibility to represent the client's interest and not that of the clean up contractor. The argument in favour of a combined consultant/contractor is that it offers a package deal. A package which contains both the supervisor and operator in the one role may not be a satisfactory solution for the client.

The Auditor

SLR Consulting undertake work in general accordance with State Guidelines and present plans, where appropriate, for agreement and SLR Consulting therefore recognise the importance for including discussions with site auditors whenever practicable. In some cases the consultant's report will need to be audited by a registered Contaminated Sites Auditor for the SEA to provide an independent review of the consultant's investigations and/or validation. There are detailed State Guidelines covering how the audit should be undertaken and auditors report to the SEAs on completed audits.

The Contractor

The contractor undertakes the remediation program under the supervision of the consultant. The skills required will depend on the particular situation. Some projects are largely earth moving projects, others require specialised technology.

The Owner / Developer

The owner/developer finances the operation and has overall responsibility.

Member of Australian Contaminated Land Consultants Association

Site Investigation

Contaminated Soil

Hazardous Materials

Risk Assessment

Specialist Knowledge Areas

- Disposal of Waste – Inert, Solid, Industrial & Hazardous Waste
- Ground Water & Soil Contaminant Modelling
- Compliance Help for Businesses
- Acid Sulphate Soils
- Land Fill
- Radioactive Contaminated Land
- Crystalline Silica Monitoring & Management in the Workplace
- Explosivity
- Soil and Groundwater Investigation & Assessment
- Member of ACLCA
- NATA Certified Laboratory Analysis
- Remedial Action Plan
- Site Validations
- Off-site Airborne Migration Studies
- Project Experience in Petroleum Storage, Timber Treatment Plants, Heavy Industry & Gas Works

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ENVIRONMENTAL SERVICES

NOISE & VIBRATION	• REF, EES, EIA, EIS Studies - Road, Rail, Aircraft, Industry, Mining • Building Acoustics, BCA compliance • Mechanical Services Noise / Vibration • Construction Noise and Vibration • Environmental Management Plans	• Blast & Explosion Assessment / Control • Silencers, Attenuators, Enclosures, etc • Resilient Mounts, Vibration Isolation Mats, Tuned Mass Dampers • Community Liaison, Expert Testimony, Regulatory Authority Meetings
AIR QUALITY	• Outdoor & Indoor REF, EES, EIA, EIS Studies - Industries, Transportation & other sectors • Atmospheric Dispersion Modelling for All Airborne Pollutants and Odour • Monitoring All Major Air Pollutants / Odours	• Design/Operation of ambient Air Quality Monitoring Networks • Indoor Air Quality, Natural Ventilation • AUSPLUME, TAPM, CALPUFF, ISC3, ADMS3 CALINE4, AERMOD, FLUENT (CFD)
WATER QUALITY	• Water Quality Monitoring	• Ground Water Sampling
SITE CONTAMINATION	• Monitoring for Lead, PCBs, Silica, SMFs - All Major Contaminants	• Contaminated Site Investigations & Surveys, Due Diligence Surveys
METEOROLOGY & CLIMATE	• Monitoring for a Wide Range of Meteorological Parameters	• Wind Climate Analysis, Extreme Climate Risk Assessments
HAZARDOUS MATERIALS	• Asbestos: Identification, Monitoring, Fibre Counting, Management, Training	

ENGINEERING SCIENCE SERVICES

WIND ENGINEERING & CFD	• Wind Tunnel Testing and Expert Opinion • Full-Scale Testing of Buildings, Bridges	• CFD Simulations Using FLUENT • Natural Ventilation, Indoor Air Quality
SOLAR – ESD ENERGY STUDIES	• Energy Efficiency, Energy Audits • ESD, Sustainability Studies • Shadows, Solar Ingress, Reflectivity • Natural Lighting / Lux Level Simulations	• Energy Ratings – NatHERS, BERS, FirstRate, BASIX, AccuRate (Residential Buildings) • ABGR / GreenStar (Commercial Buildings) • BCA Section J Assessments
STRUCTURAL DYNAMICS & MECHANICAL DESIGN	• Experimental Modal Analysis • Dynamic Finite Element Analysis • Vibration Isolation Systems	• Pipe / Pulsation Analysis (PULS) • Pipeline / Valve Acoustic Induced Vibration • Fatigue / Fracture / Stress Analysis • Mechanical Systems Design

ENGINEERING SCIENCE SERVICES

OHS & OCCUPATIONAL HYGIENE PROJECT & RISK MANAGEMENT	• (Certified) OHS Surveys, Audits • Technical Due Diligence Surveys • Ergonomic & Workplace Assessments • Project Management Services	• OHS Management Systems & Training • RF Accumulation & Testing • Risk Studies to AS / NZS 4360 & • Health & Toxicology Studies
LABORATORY & R&D SERVICES	• NATA-Accredited to ISO 17025 - Air Volume Sampling, Asbestos Fibre Counting, Asbestos Identification • Research & Development	• Laboratory & Field Testing for Air & Water Quality, Acoustics, Vibration