Innovation is finding answers to questions no one has asked

coffey
A TETRA TECH COMPANY

Incorporating Sustainability into Contaminated Land Management

Presented to EIANZ 2018 Annual Conference
November 2018

Acknowledgements

- Sustainable Remediation Forum ANZ Steering Committee
  - Paul Nathanial (LQM; Chair of ISO TC190/SC7/WG 12)
  - Peter Nadebaum (GHD)
  - John Hunt (Ventia)
  - David Tully (Contaminated Land Solutions

Contents

01

Ecological Sustainable Development (ESD)

What is sustainable development?

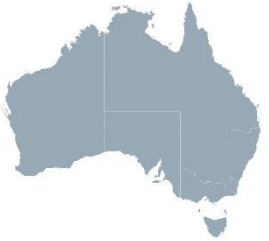
Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

World Commission on Environment and Development (the Brundtland Commission) Our Common Future (Oxford University Press, 1987)

Australia's National Strategy for Ecologically Sustainable Development (ESD) - adopted in 1992 by all levels of Government

The goal of ESD in the national strategy is:

Development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.



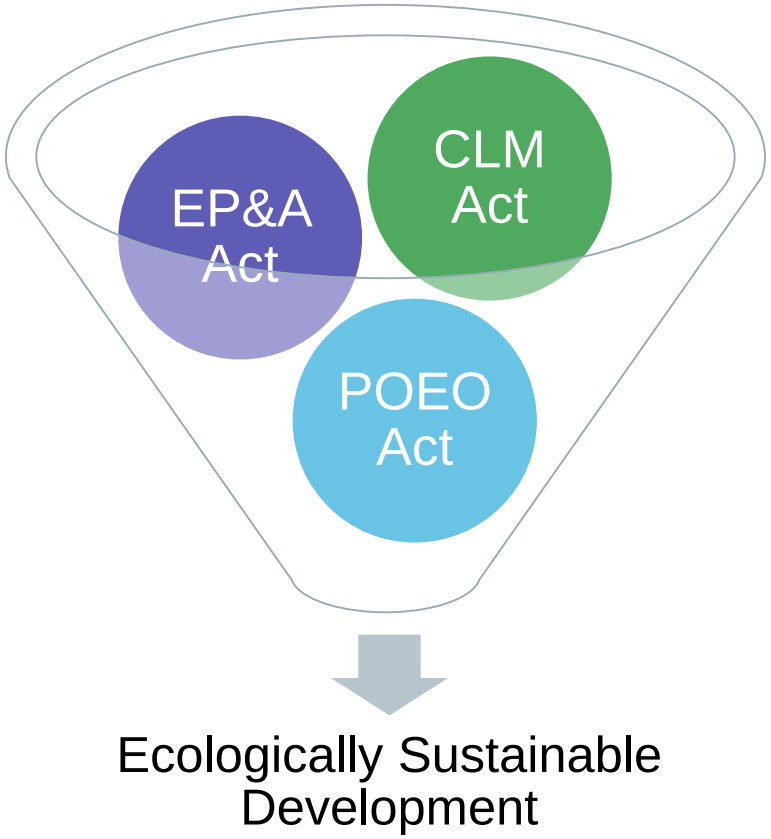
The national strategy defines ESD as:

Using conserving and enhancing the communities resources so that the ecological processes on which life depends are maintained and the total quality of life both now and in the future can be increased

02

ESD in contaminated land management in Australia

How is ESD incorporated into contaminated land management in NSW?



EP&A Act objects include:

"to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making…"

CLM Act objects include:

"to ensure that contaminated land is managed with regard to the principles of ecologically sustainable development"

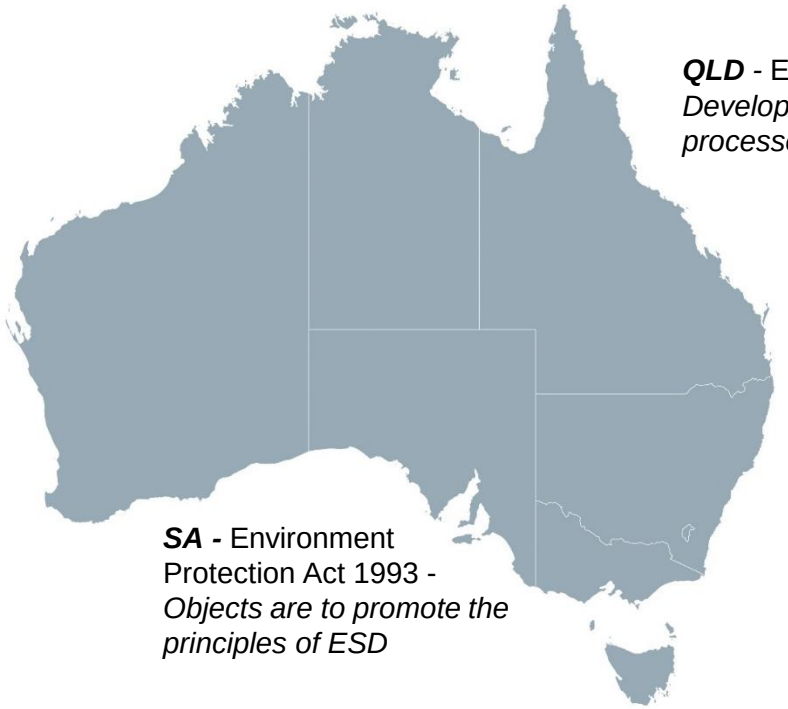
POEO Act objects include:

"to protect, restore and enhance the quality of the environment in New South Wales, having regard to the need to maintain ecologically sustainable development"

ESD in other Australian state contaminated land legislation and guidance

WA *- Assessment and Management of Contaminated Sites Guideline (2014) - DER supports consideration of sustainability issues: at the planning stage for a project (as the remediation solution may influence the project design and vice versa); and when evaluating and selecting the remedial strategy/options* (and refers to SuRF ANZ paper)

NT *- Waste management and Pollution Control Act 1998 - Objectives include to encourage ecologically sustainable development*



QLD - Environmental Protection Act 1994 - *Development .... that maintains the ecological processes on which life depends*

ASC NEPM 2013 Principal 16 - options for site clean-up and/or management included insertion of:

"*When deciding which option to choose, the sustainability (environmental, economic and social) of each option should be considered, in terms of achieving an appropriate balance between the benefits and effects of undertaking the option*"

ACT - Environment Protection Act 1997 - *Promote the principles of ecologically sustainable development*

SA - Environment Protection Act 1993 - *Objects are to promote the principles of ESD*

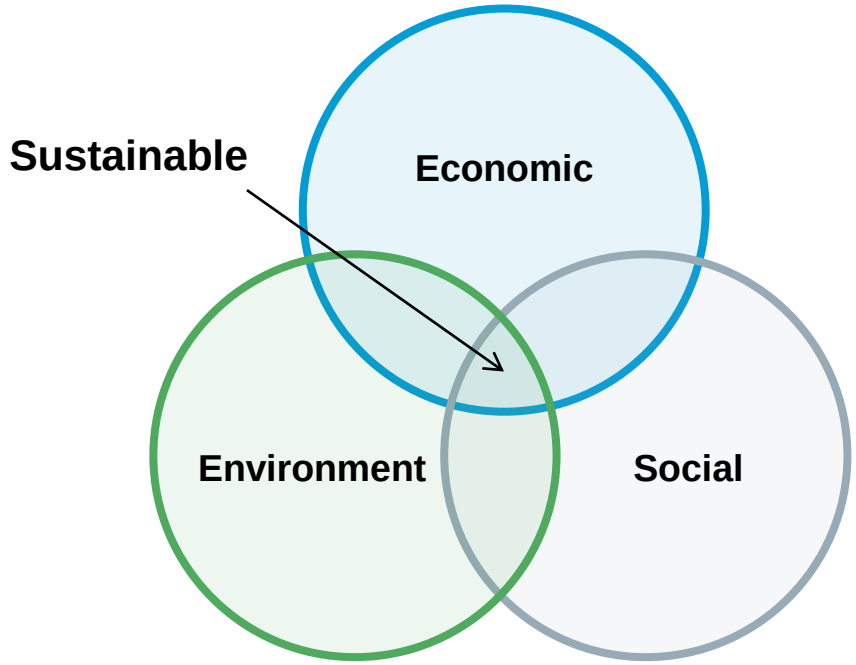
VIC - Environmental Protection Act 1970 - *Integration of economic, social and environment considerations*

CRC CARE – NRF Final Draft - *integrated assessment of the environmental, economic, and social impacts of remedial activities … meet the needs of the present without compromising the ability of future generations to meet their own needs.*

TAS *- Environmental Protection and Control Act 1994 - Objectives are to promote sustainable development*

What makes a remediation approach sustainable?

- Balanced and net overall benefit in terms of economic, environmental and social factors.

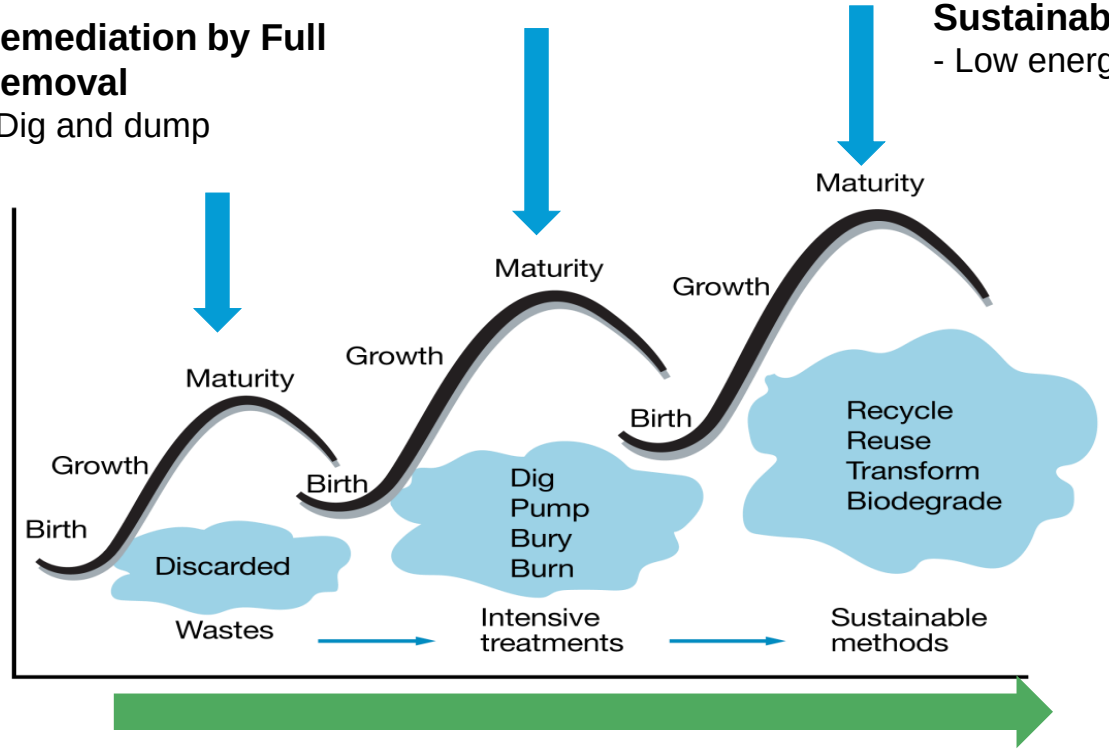


Why is sustainable remediation a relatively new concept?

Risk Based Remediation
- Remediation technologies

Remediation by Full Removal
- Dig and dump

Sustainable Remediation
- Low energy & in-situ technologies



- Development of science
- Development of risk assessment and remedial technologies
- Recognition of scale
- World developments in stewardship of the environment

Modified from Hans Slender and Dr Dominic Darmendrail – NICOLE/SURF and Common Forum on Contaminated Land)

Development of sustainable remediation - adoption has been slow

‘Integrating Sustainable Principles, Practices and Metrics into Remediation Projects’ White Paper (2009)

ISRA - Global alliance of SuRF groups

Sustainable Remediation Forum (SuRF) 2006

Development of measurement tools, metrics and case studies

International expansion of SuRF

Brazil, Canada, China, Columbia, Japan, Italy, Netherlands, Taiwan, UK and USA

Australian regulatory support and Australia National Remediation Framework

Adoption of sustainable remediation has been held back by lack of a recognised, easy usable approach

ISO 18504:2017 Soil Quality – Sustainable Remediation

2006

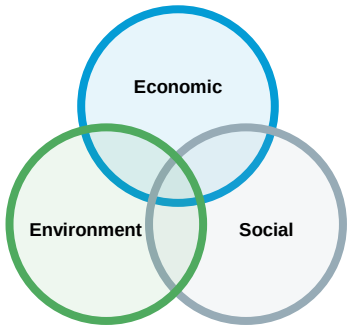
2018

03

ISO 18504:2017 Soil Quality – Sustainable Remediation

ISO 18504:2017 soil quality – sustainable remediation - scope

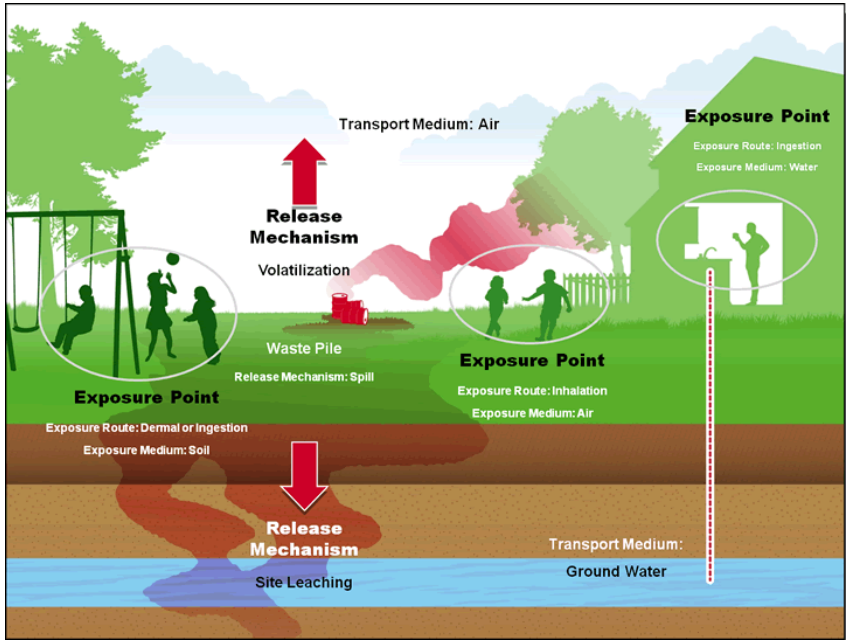
- Provides:
  1. Standard methodology, terminology and information about key components and aspects of sustainable remediation assessment
  2. Informative advice on the assessment of the relative sustainability of alternative remediation strategies
- Promotes consideration of sustainable remediation throughout the planning design and implementation process
- Flexible and allow options
- Informative (descriptive) and not normative (prescriptive) - not intended to prescribe methods of assessment, indicators or weights to use



ISO 18504:2017 - what is sustainable remediation?

"Elimination and/or control of unacceptable risks in a safe and timely manner whilst optimising the environmental, social and economic value of the work"

- Remediation – that demonstrably breaks the source – pathway – receptor linkages
- Remediation – that complies with local regulatory polices and requirements
- Sustainable remediation **is not**
  - a "do nothing approach"
  - Green remediation or green and sustainable remediation - technology is selected and then look at how to "green" the chosen technology



ISO 18504:2017 - not just a technology selection

Planning

- Spatial planning
- Master planning
- Land use planning

Characterisation

- Site characterisation of contamination giving consideration to sustainability and land use

Remediation planning

- Remediation strategy selection
- Comparing alternative strategies against common baseline
- Adopting indicators and metrics that capture all benefits
- Tiered approach proportion to project
- Incorporating stakeholder opinion and perspectives

- Holistic approach to sustainability
- Integrating remediation into the redevelopment process to exploit synergies
- Not a separate process

ISO 18405:2017 sustainable remediation - tiered assessments

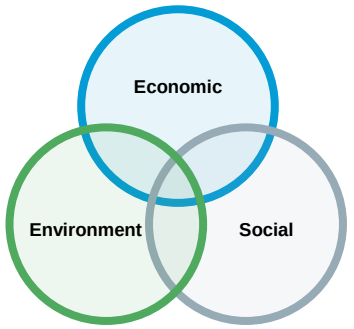
- Simple qualitative approaches are the default and most commonly used
  - Simple or relatively clear-cut problems require only simple sustainable remediation assessment
  - Simplest form of assessment that allows a robust decision should be adopted
- More complex (semi-quantitative or quantitative) tiers
  - only applied when a more quantitative approach using measurable indicators may be necessary to reach robust and reliable decision

Qualitative	Semi-quantitative	Quantitative
Narrative analysis	Pair-wise comparison	Cost Benefit Analysis
Non-parametric ranking	Multi-criteria-analysis	Life cycle analysis
		(Environmental) foot print analysis
		Cost effectiveness (economic) analysis

ISO 18504:2017 - tiered assessment frameworks

In all tiers the initial considerations are the same

- Confirm project objectives
- Confirm shortlist of remediation strategies
- Identify relevant stakeholders
- Identify project boundaries
- Select sustainable remediation indicators
- Determine how indicators will be characterised
- Agree assessment techniques



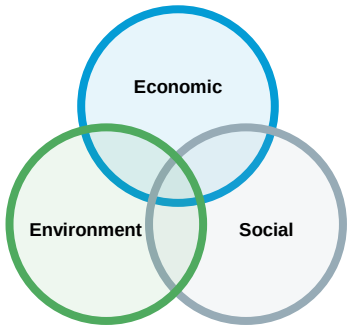
ISO 18504:2017 - indicators and metrics

Indicators

- Allow comparison of characteristics between candidate remediation strategies allowing evaluation of relative performance between remediation strategies
- Need to be site specific and relevant to remediation strategies being assessed
- Balanced across the 3 dimensions i.e. should have same number of indicators for each dimension
- Adopt, discard and add indicators as necessary
- Need to be agreed with stakeholders at outset
- SuRF UK (2009) published a review of sustainability indicator sets

Metrics

- Measure indicators
- e.g. air quality mg/m3



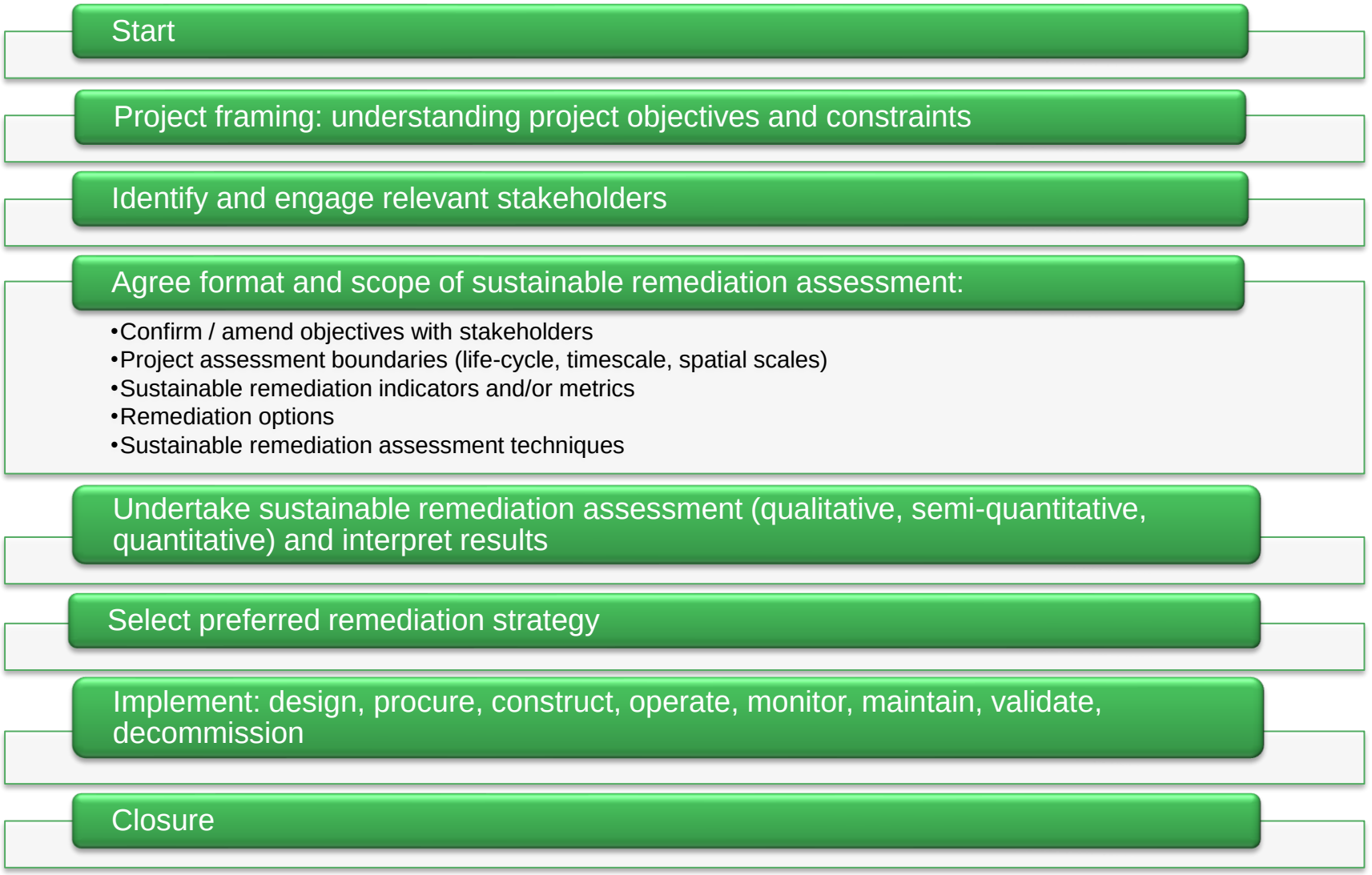
ISO 18405: 2017 - indicators

Examples of sustainable remediation indicators

Economic	Social	Environment
Direct economic costs and benefits	Human health & safety	Air
Indirect economic costs and benefits	Ethnics and equality	Soil and ground conditions
Employment and employment capital	Neighbourhood and locality	Groundwater and surface water
Induced economic costs and benefits	Communities and community involvement	Ecology
Project lifespan and flexibility	Uncertainty and evidence	Natural resources and waste

Other examples of indicators given in ISO 18504 and SuRF-UK (2009) Annex Indicator Set for Sustainable Remediation Assessment

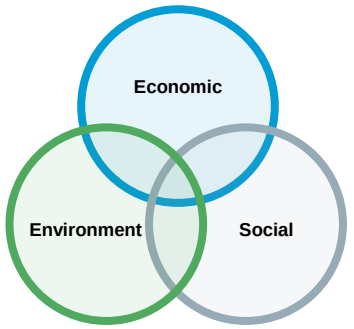
ISO 18405: 2017 sustainable remediation – stages of execution



From Figure 1 – Stages of sustainable remediation strategy assessment, selection and implementation

Key principles of decision making

- Legal requirements for the remediation are identified
- No unacceptable risks to human health or environment after remediation
- No unacceptable risks to workers or community safety during remediation
- Transparent decision making
- Good governance
- Stakeholder engagement and involvement
- Select relevant indicators - adopt, discard, add during decision making
- Assessment of agreed indicator set
- Selection and implementation
- Communication and promotion



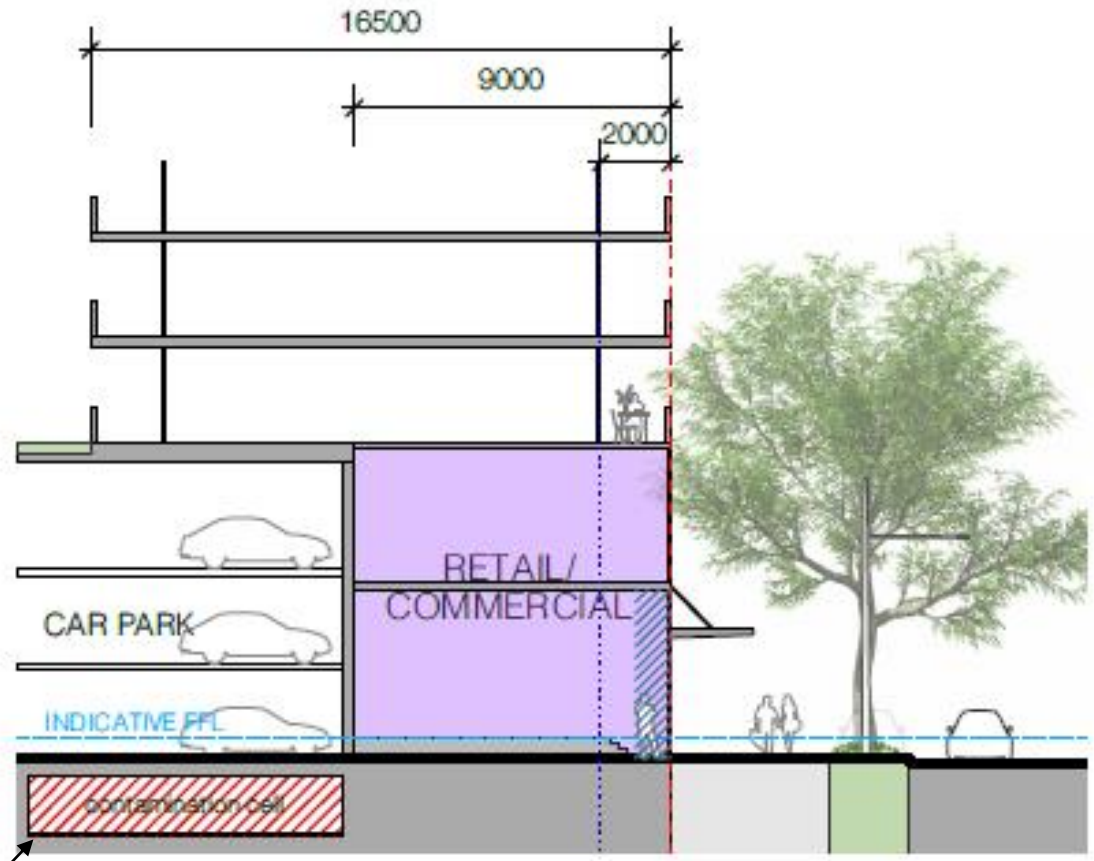
ISO18504:2017 - sustainable remediation tools

- Specific sustainable remediation assessment tools are generally quantitative and limited in both range of indicators involved and the range of remediation technologies considered
- Developed to meet specific objectives, pre-populated with indicators and metrics and often based on geographic and process specific information
- e.g. Sitewise™ developed by Battelle, the US Navy and Army Corp in response to US Defence Policy. Indicators and metrics uniquely suited for US Defence sites and maybe inadequate for other projects or objectives
- Often proprietary

- ISO18504:2017 - does not advocate for any specific sustainable remediation tools

04
Examples

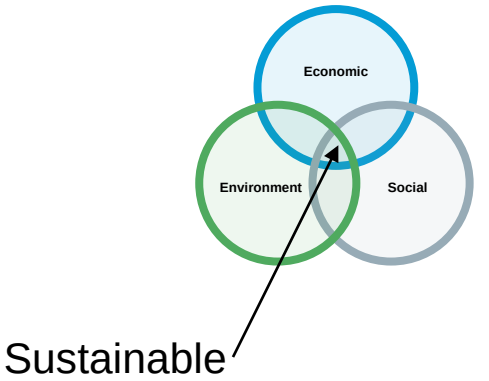
Application of sustainable remediation in planning stage - Camelia Town Centre Draft Master Plan



Containment Cell

Simple qualitative example

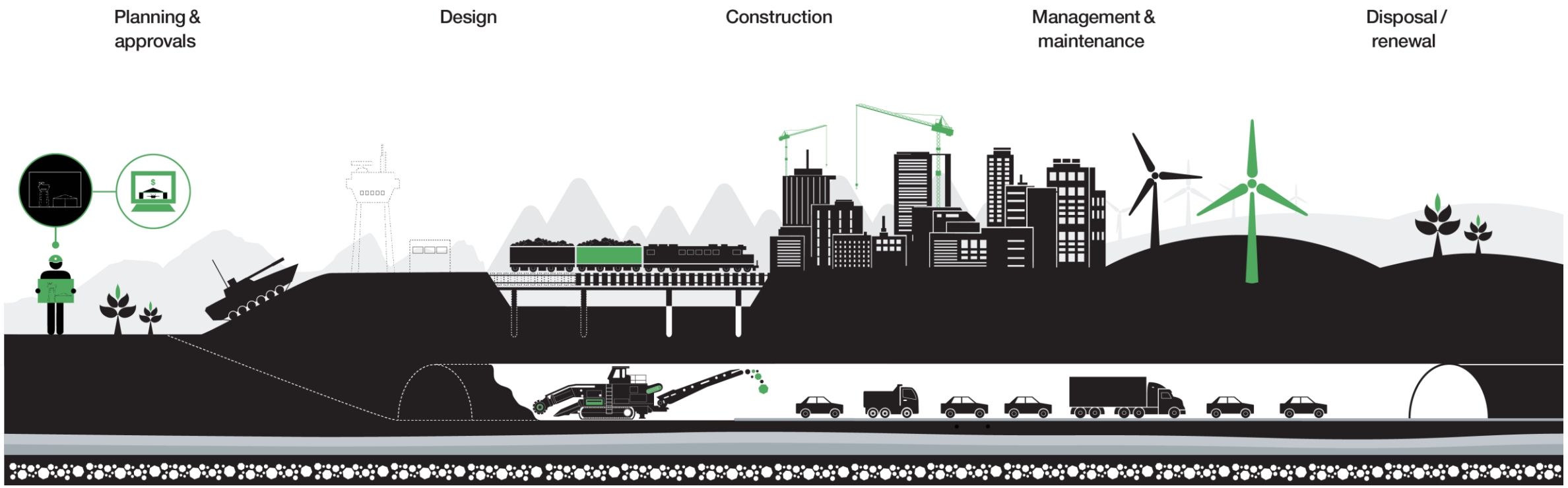
Remediation Strategy	Social		Environment		Economic	
	Indicator	Qualitative Comparison	Indicator	Qualitative Comparison	Indicator	Qualitative Comparison
Dig and dump	Disturbance to nearby residents	High	Greenhouse gas emissions	High	Capital Expenditure	High
	Community safety during remediation	Medium	Waste generation	High	Ongoing care and maintenance	Low
	Nuisance during remediation	High	Resource use	High	Land use restrictions	Low
	Ground vibrations	High	Air impacts	High	Uplift in land values	High
Insitu containment	Disturbance to nearby residents	Low	Greenhouse gas emissions	Low	Capital Expenditure	Medium
	Community safety during remediation	Low	Waste generation	Low	Ongoing care and maintenance	High
	Nuisance during remediation	Medium	Resource use	Low	Land use restrictions	High
	Ground vibrations	Medium	Air impacts	Low	Uplift in land values	Low
Excavation and encapsulation in containment cell	Disturbance to nearby residents	Medium	Greenhouse gas emissions	Medium	Capital Expenditure	Medium
	Community safety during remediation	Low-medium	Waste generation	Medium	Ongoing care and maintenance	Medium
	Nuisance during remediation	Medium – High	Resource use	Medium	Land use restrictions	Medium
	Ground vibrations	Medium - High	Air impacts	Medium	Uplift in land values	Medium



05

Another driver for sustainable remediation - sustainable development in urban renewal

Significant urban renewal around Australia – ESD is the buzz word



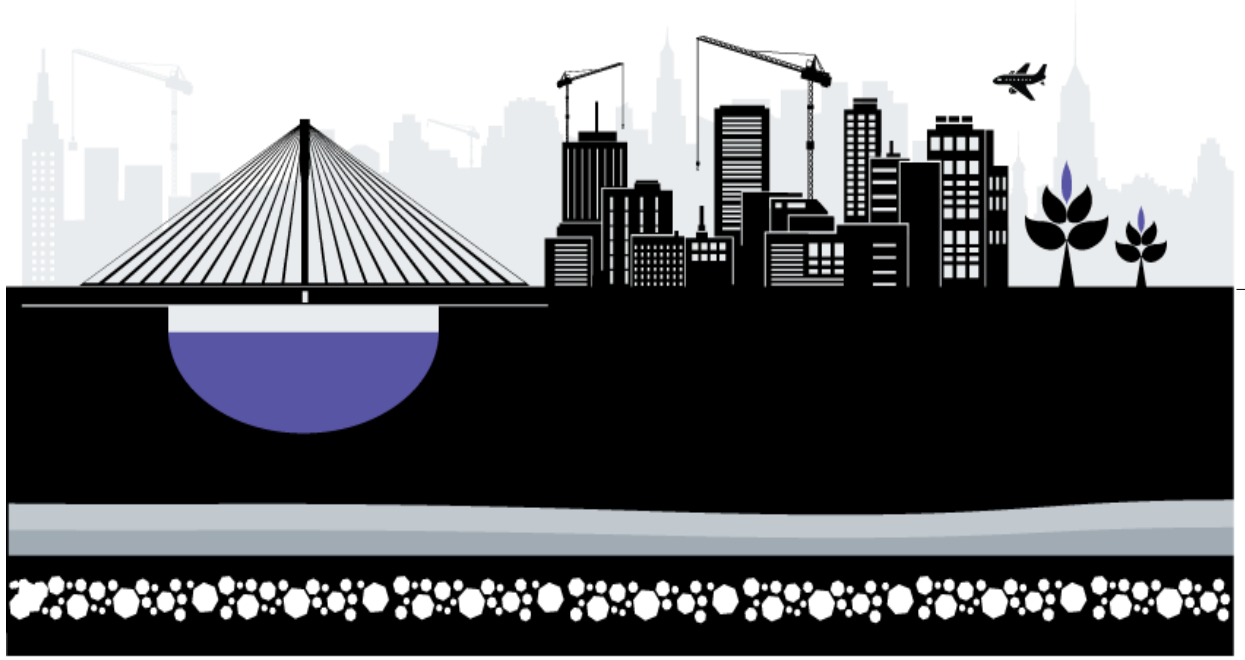
green building council australia

Green Star Rating

ISCA

IS Rating

Is contaminated land management / remediation contributing to sustainable development?

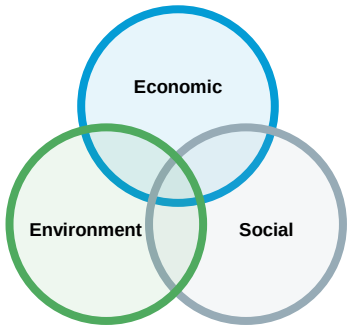


?

06
Conclusions

Conclusions

- ESD is ingrained in contaminated land legislation and guidelines around Australia
- Sustainable remediation has been developing over the last decade but a barrier has been how to assess it
- Release of ISO 18504:2017 provides an easy to use, tiered, flexible and site specific approach for assessing sustainable remediation
  - Qualitative, semi-quantitative or quantitative
- Urban regeneration or renewal of major property and infrastructure projects is providing another driver for assessing sustainability of remediation



Thank You

Tony Scott
tony.scott@coffey.com

0439 080 856