SD07 A CLIMATE FOR CHANGE
Sustainable Development Conference

Minerals Council of Australia

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Chris Moran

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Responsible water management in the minerals industry

www.minerals.org.au/sd07

Definitions

Responsible

1. having an obligation to do something

2. being the cause of something and so able to be blamed or credited for it.

3. morally accountable for one's behaviour.

4. capable of being trusted.

5. (of a job or position) involving important duties or decisions or control over others.

6. (**responsible to**) having to report to and be answerable to.

Meeting responsibilities

1. obligation. — **Compliance**

2. cause of something. — **Accounting & linkages**

3. morally accountable. — **Intangible but very real**

4. trust. — **Intangible but very real**

5. duties or decisions. — **Operational plans and procedures**

6. report to and be answerable to. — **Audit and reporting**

Meeting responsibilities

1. obligation.

2. cause of something.

3. morally accountable.

4. trust.

5. duties or decisions.

6. report to and be answerable.

Compliance

Accounting

Intangible but very real

Operational plans and procedures

Audit and reporting

Identifying and managing risks

&

Understanding value

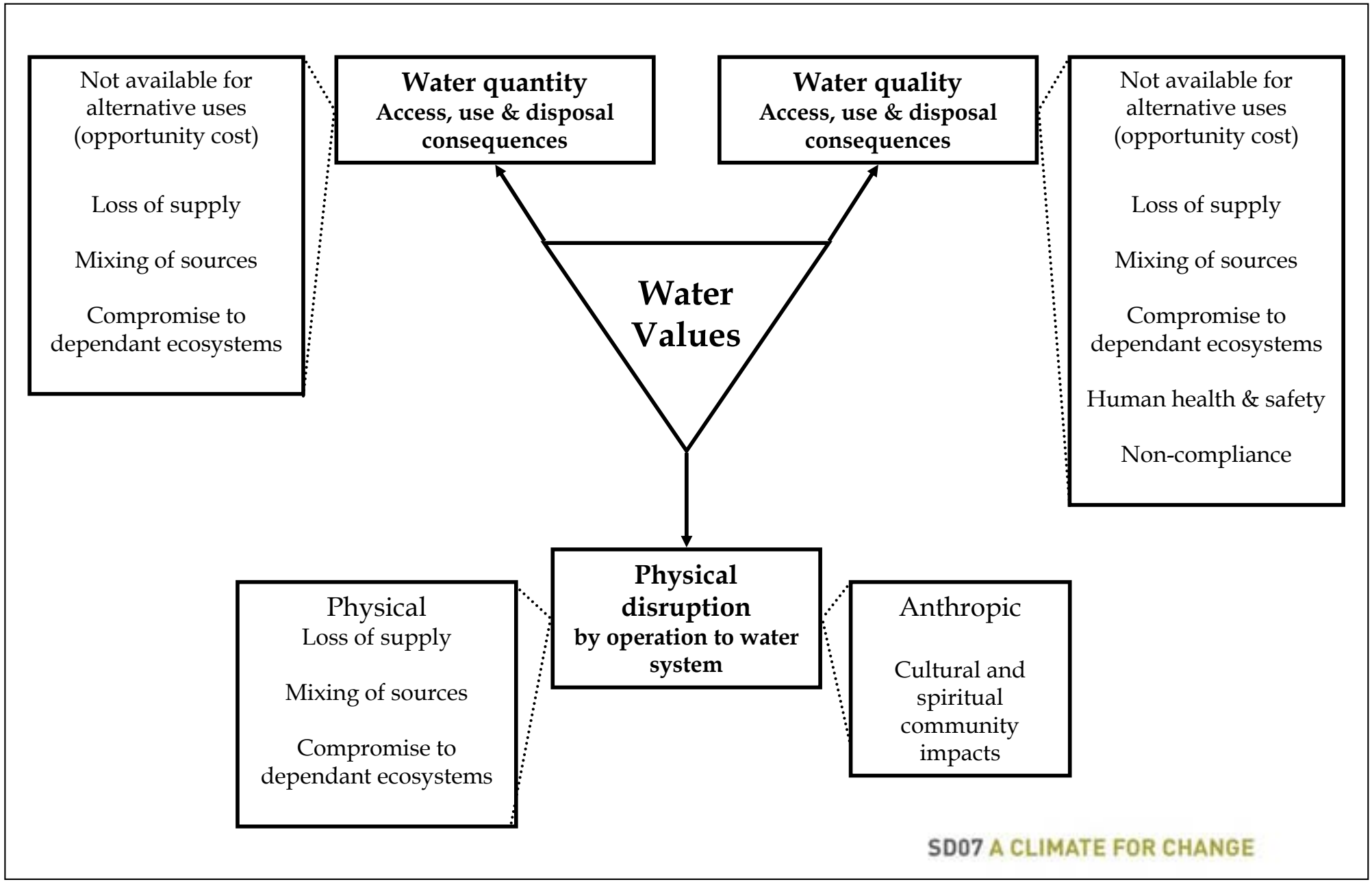
Water value and risk management a three-way collaboration

SMI
Rio Tinto
WWF

APPROACH

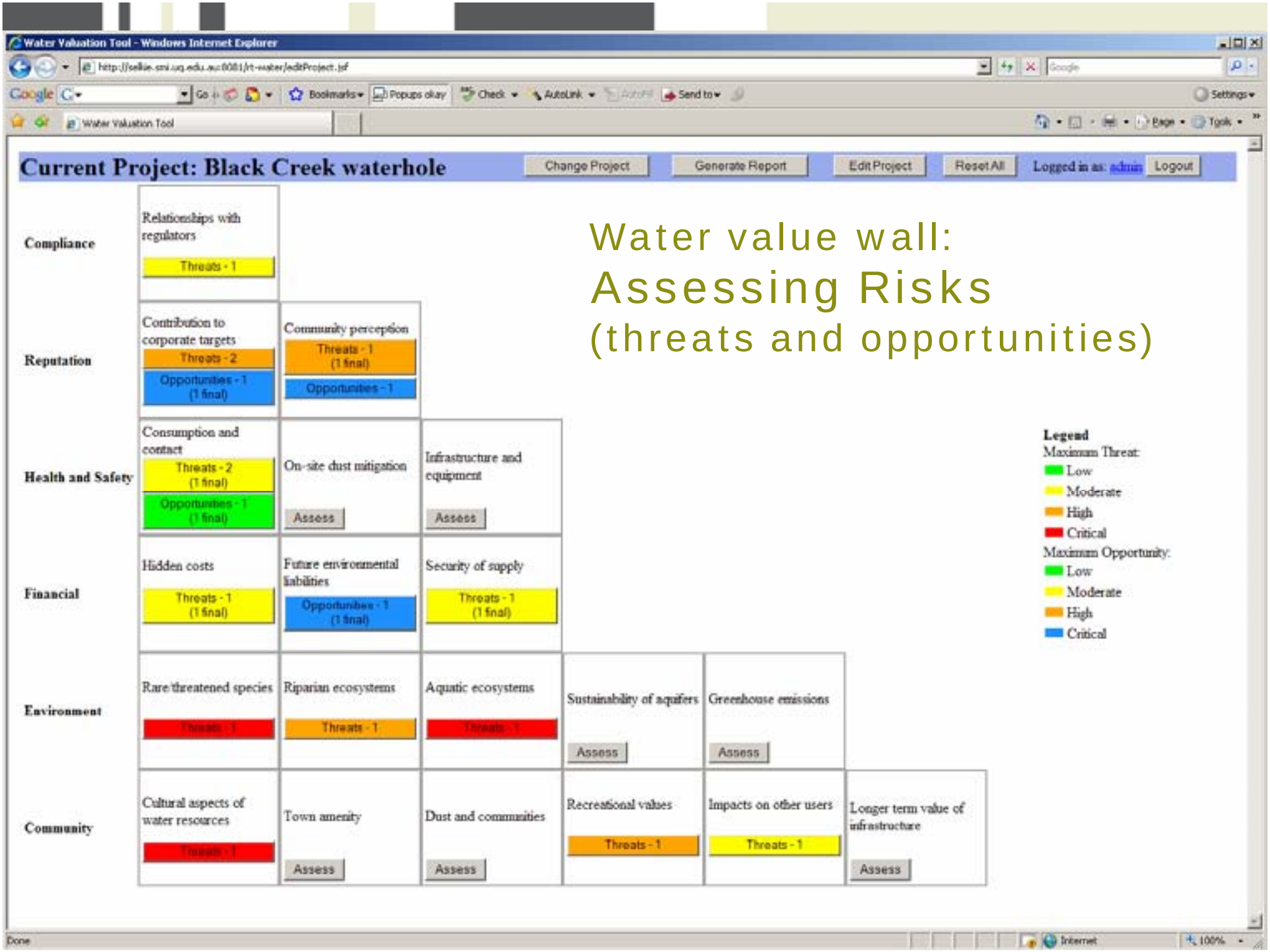
- Advisory Group – internal & external
- Reviews
  - Markets and policy
  - Water valuation methods
- Case Studies
  - Interviews
  - Site visits
  - Specification of requirements for a workable “tool”
- Compendium of “difficult to value” issues
- Tool development
- Valuing water – “insights”

WATER VALUES - Physical



Water Value Wall

Compliance	Relationships with regulators Assess					
Reputation	Contribution to corporate targets Assess	Community perception Assess				
Health and Safety	Consumption and contact Assess	On-site dust mitigation Assess	Infrastructure and equipment Assess			
Financial	Hidden costs Assess	Future environmental liabilities Assess	Security of supply Assess			
Environment	Rare/threatened species Assess	Riparian ecosystems Assess	Aquatic ecosystems Assess	Sustainability of aquifers Assess	Greenhouse emissions Assess	
Community	Cultural aspects of water resources Assess	Town amenity Assess	Dust and communities Assess	Recreational values Assess	Impacts on other users Assess	Longer term value of infrastructure Assess


Water Valuation Tool - Windows Internet Explorer
Current Project: Black Creek waterhole
Change Project
Generate Report
Edit Project
Reset All
Logged in as: admin
Logout
Water value wall:
Assessing Risks
(threats and opportunities)
Compliance
Relationships with regulators
Threats - 1
Reputation
Contribution to corporate targets
Threats - 2
Opportunities - 1 (1 final)
Community perception
Threats - 1 (1 final)
Opportunities - 1
Health and Safety
Consumption and contact
Threats - 2 (1 final)
Opportunities - 1 (1 final)
On-site dust mitigation
Assess
Infrastructure and equipment
Assess
Financial
Hidden costs
Threats - 1 (1 final)
Future environmental liabilities
Opportunities - 1 (1 final)
Security of supply
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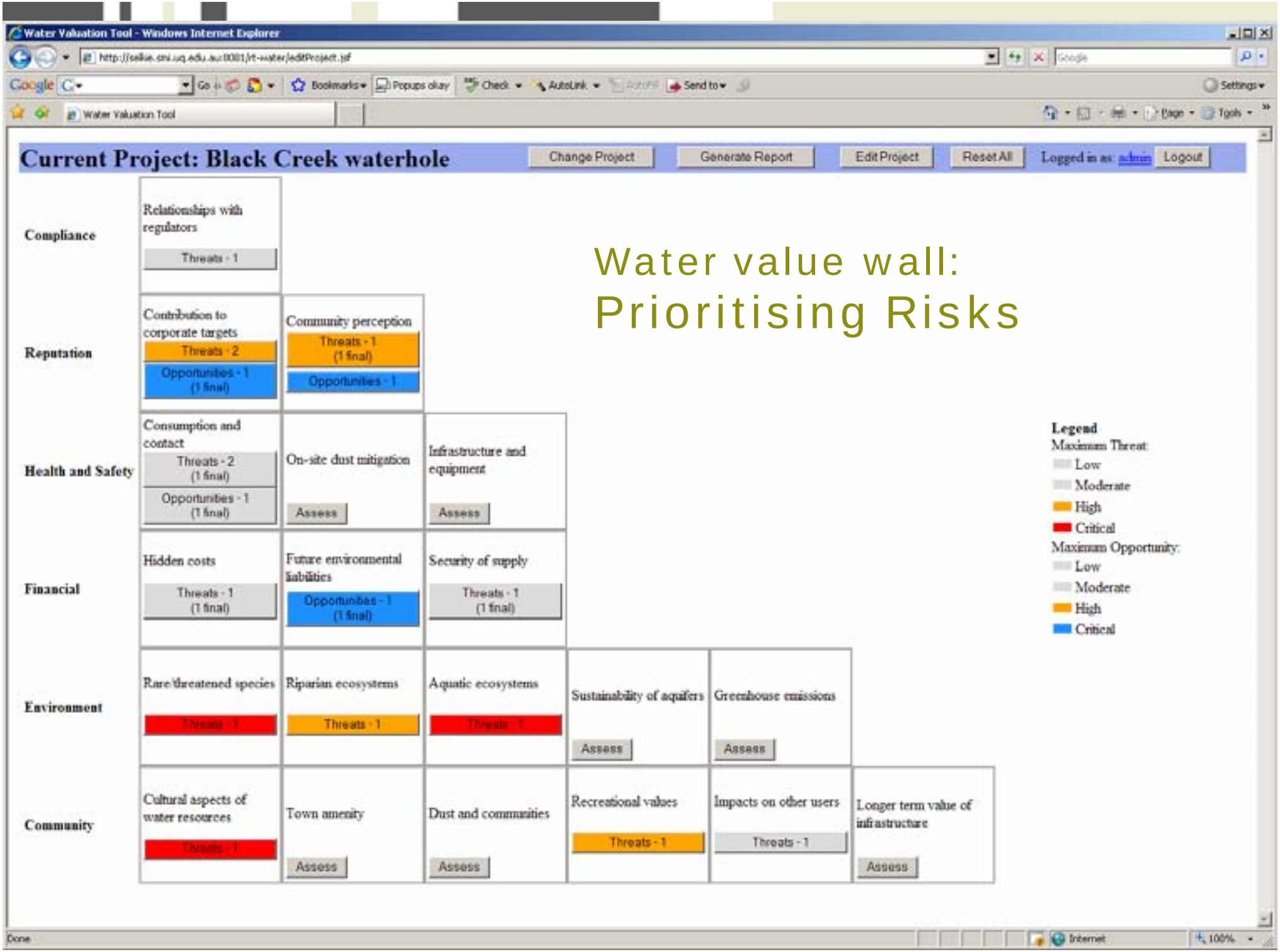
Cultural aspects of water resources
Town amenity
Assess
Dust and communities
Assess
Recreational values
Threats - 1
Impacts on other users
Threats - 1
Longer term value of infrastructure
Assess
Legend
Maximum Threat:
Low
Moderate
High
Critical
Maximum Opportunity:
Low
Moderate
High
Critical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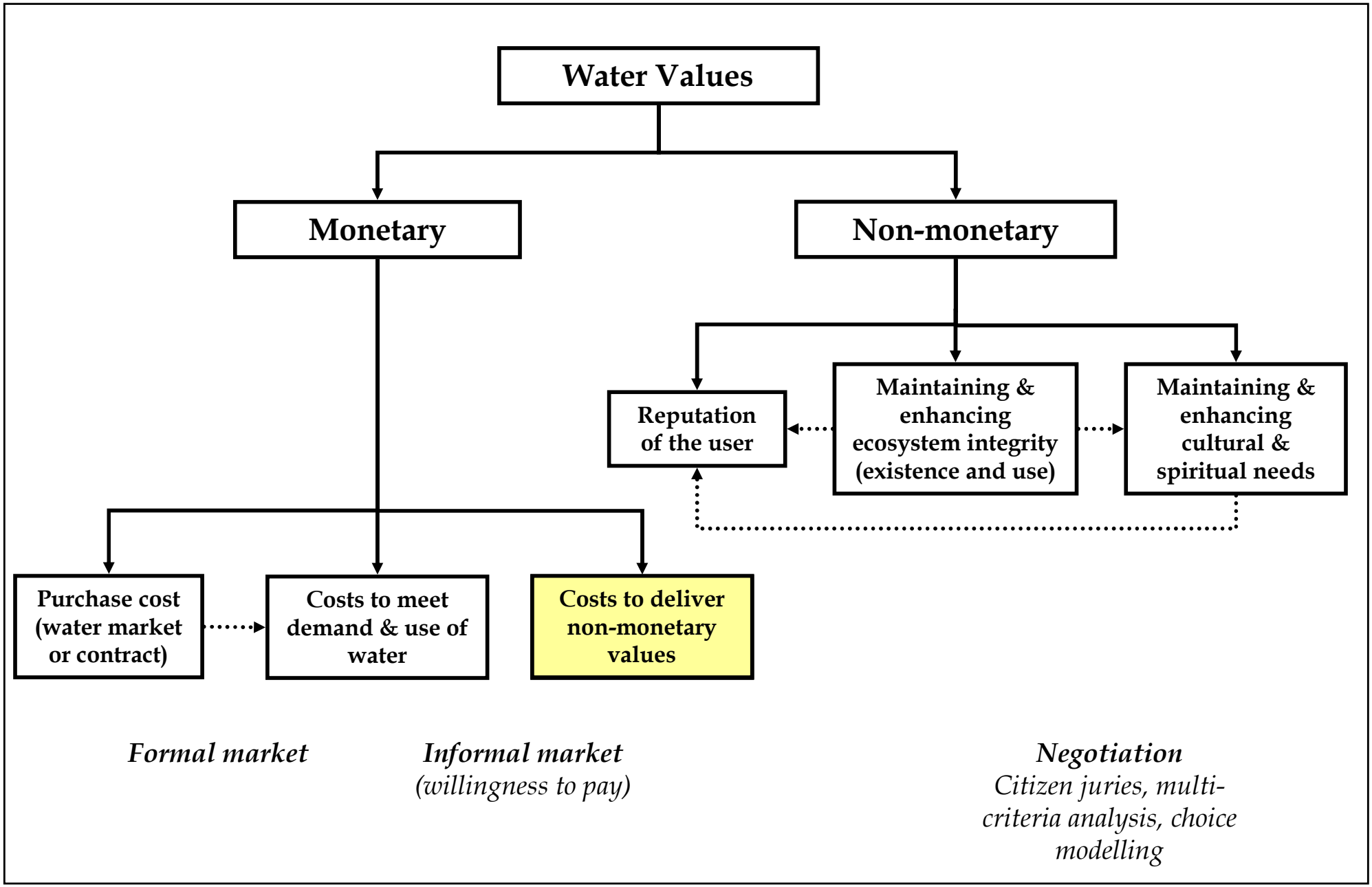
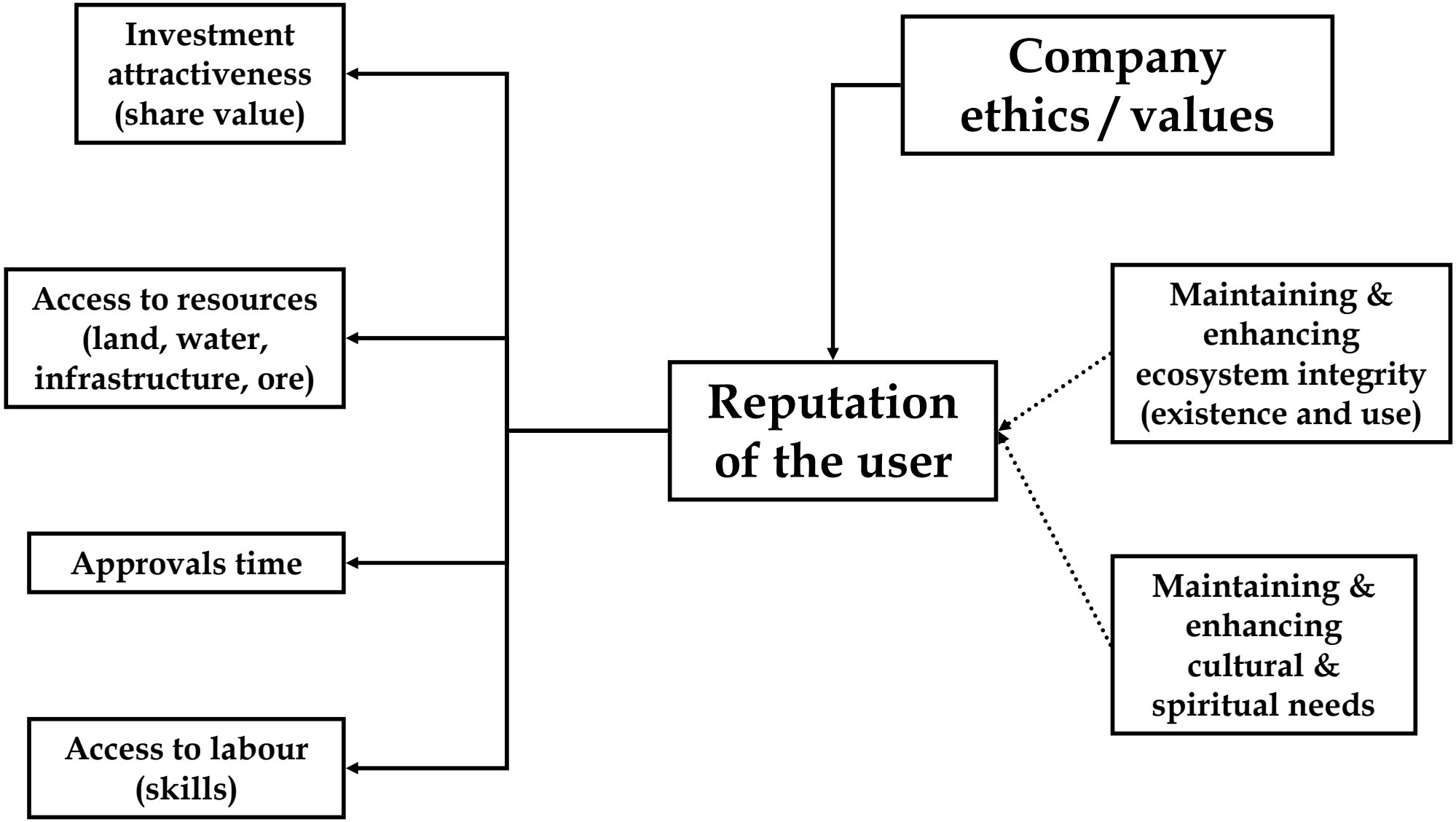
Water value wall:
Prioritising Risks

WATER VALUES - Economic View



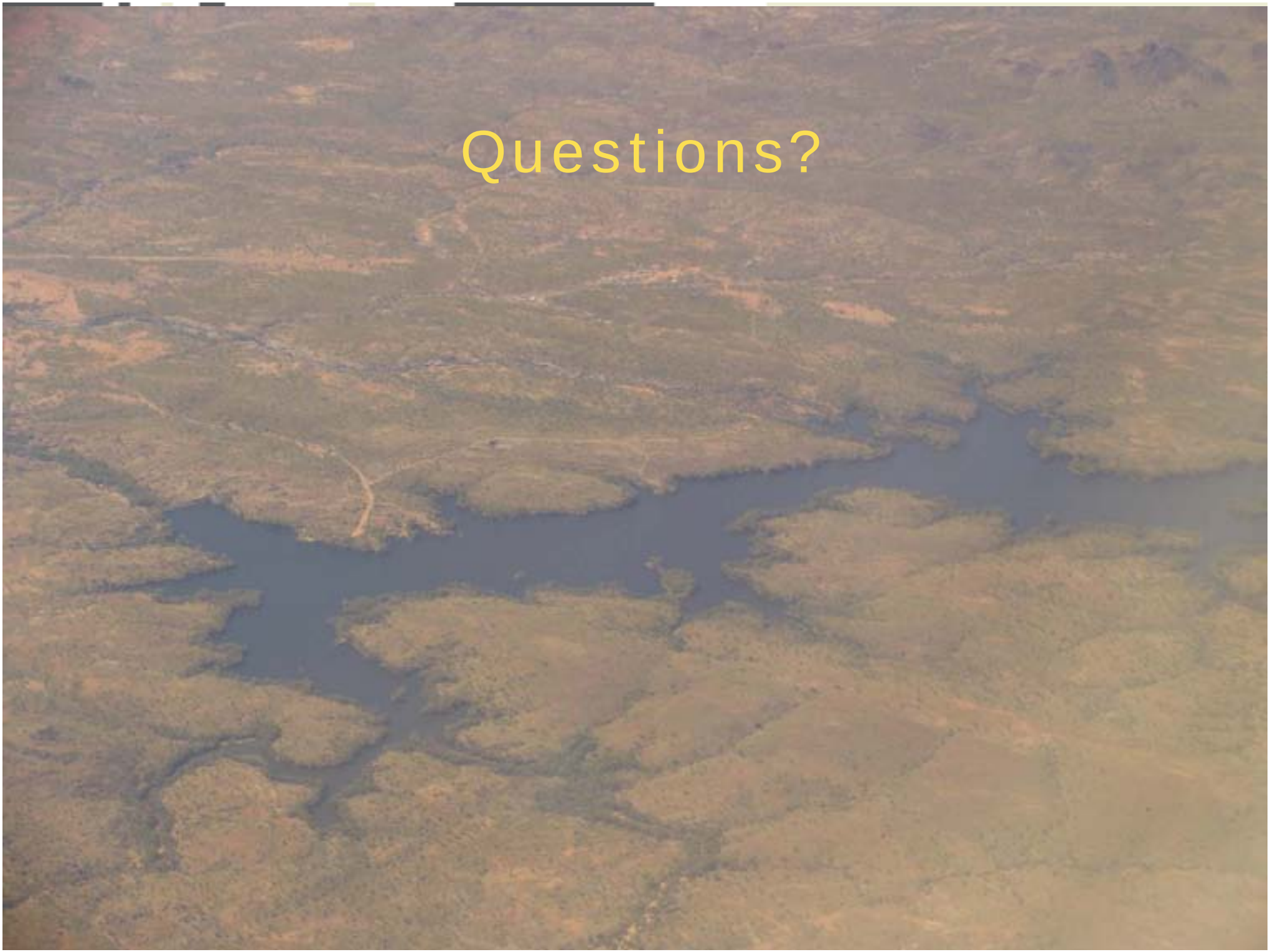
WATER VALUES – Business Case

(economic efficiency = conversion of value(s) to money)



A climate for change

- Increasing attention to water measurement and accounting 
- More co-management (integration) of quantity and quality
- Risk-based approach to water needs
- Community engagement – scrutiny & competition
- Climate change
  - Changing availability
  - Changing local circumstances
  - Changing statistics: Event frequency and intensity (infrastructure)
  - Changing precipitation and evaporation


Questions?

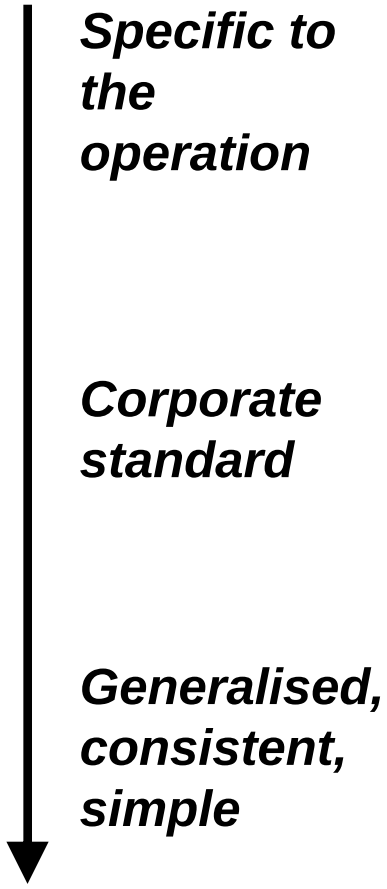
Water Accounting - 1

- What is it?
  - Knowing the ins and outs as in a financial account
    - A static view of your water balance
  - Knowing the forward commitments as in a business account
    - A static but prospective view of your water balance
- What use is it?
  - Operational: decision support
  - Strategic: Do I need to reconsider the site water system?
  - Comparisons: How does my operation compare with yours?
  - Communication: I am a wise use of a precious resource.
- How do I get it?
  - MCA Water Working Group

Water Accounting - 2

- Multiple accounts
  - Necessary to have the right account for the right purpose

- Site operational decision making
- Site strategic decision making
- Corporate reporting
- Industry statements – *"Australian steel…"*
- Global reporting and comparisons



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Leading Practice Water Management in the Australian Mining Industry – A Handbook

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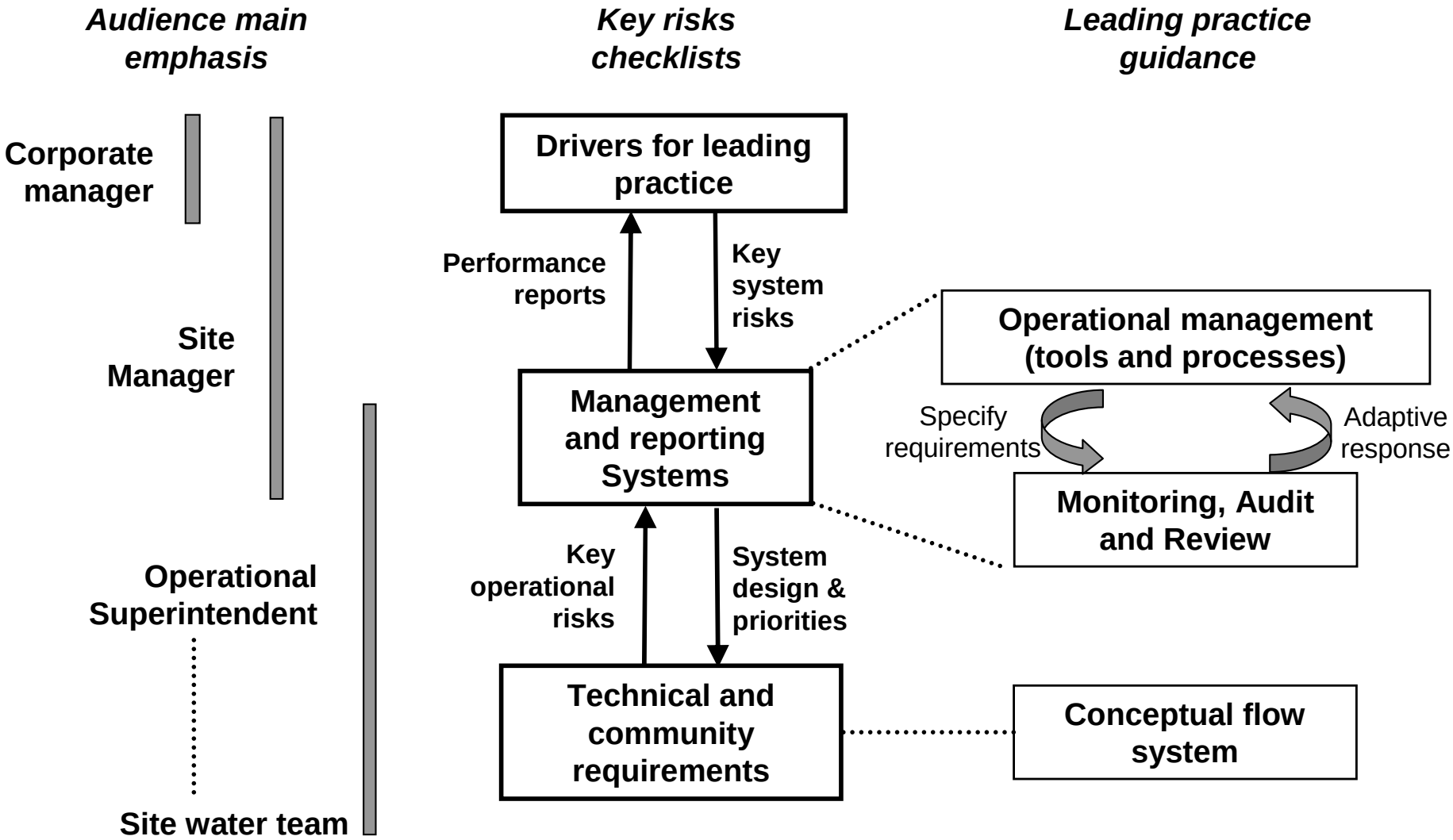
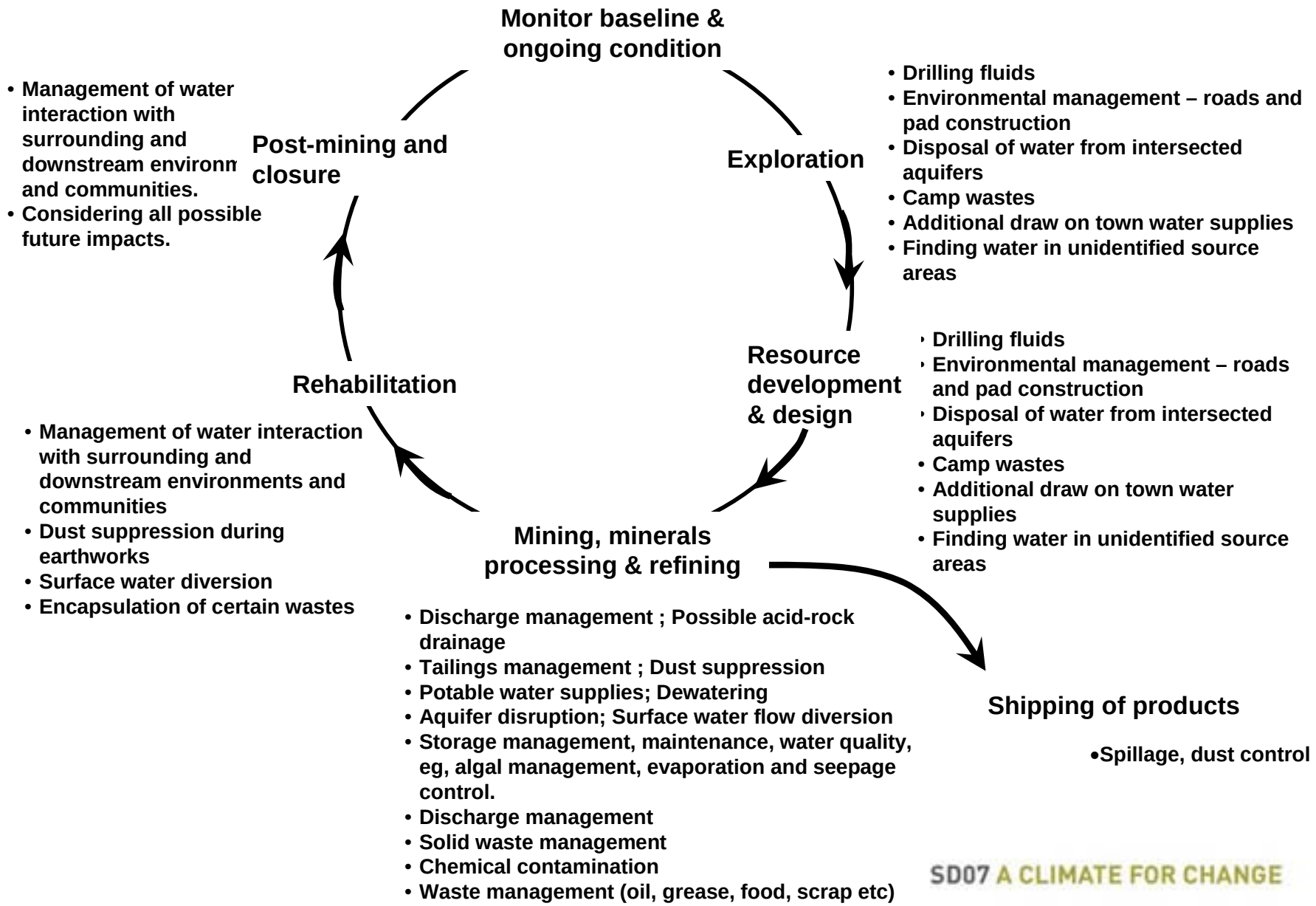
Framework and audience



Life Cycle Scope & Main Water-Related Tasks



Responsibilities and tasks

Area	TASK
Corporate	Strategic water assessment •Engagement with government •sustainable development strategy compliance and external reporting •formulation and communication of company standard strategies, processes and plans
Mineral handling and processing	separation of mineral and gangue materials •tailings and reject management •process water return •dust suppression - stockpiles, conveyor and drainage of industrial area
Mining/operations	managing storages, roads and drainage to meet licence regulatory requirements (not necessarily – may be environment) •Water management plans and balances •water risk management •Supply/demand management •pit and advance mining dewatering •dust suppression (typically roads, stockpiles, conveyors, etc) •vehicle wash down (minor) •building and maintenance works •Fire and potable water •Engagement with TOs, etc….
Environment & community	managing storages, roads and drainage to meet licence regulatory requirements (not necessarily – may be operations) •rehabilitation planning (implementation may be ops) •Closure Planning (could be operations) •water flow and quality monitoring •on-site and surrounding ecosystems management •participating in regional and local water planning (not necessarily) •corporate reporting – internal and external

PART I
DRIVERS OF LEADING PRACTICE

Drivers of Leading Practice

- Business case
  - Corporate and operations risk management
- Governance
  - Government regulations
  - Company policies, values and targets
  - Community expectations – SLTO
- Principles (ISO14000)
  - Leadership, planning, monitoring, implementation, review

Key system risks

- Operational Risks
  - Climate:
  - Design:
  - Off-site pollution:
  - Legislative changes:
  - Reputation and social licence:
  - Efficiency
- Strategic Risks
  - Reputation: Loss of attractiveness for investment (share value)
    - Environmental non-compliance or safety incidents.
    - Loss of credibility for involvement in global SD programs.
    - Poor record of successful closure.
  - Skills attraction and retention:
  - Approvals:
  - Corporate social responsibility:

Risk	Cause(s)	Implications	
		Opportunities	Threats
Investment attractiveness	Company reputation is reduced because of poor water management Lack of attention to efficiency, environmental requirements, safety, security of supply.	Investors prefer other entities with similar financial returns but better reputation.	Company/mining industry seen as preferred investment proposition.
Access to resources	Government/regulators prefer to provide access to resources (water, ore, land) to companies with reputation for good management.	Access is given to resources without delays.	Ore bodies may become unavailable and/or approvals may be delayed.
Workforce	Work force perceive that the company is not managing water well and/or not providing them with sufficient amenity, eg, sporting and recreation green space in remote towns	Productivity is high with a content and loyal workforce	Difficulties recruiting and keeping staff. Potential to slow growth and reduce operational performance.
Infrastructure security	•Changing nature of extreme climatic events, eg, size of extreme hydrological flows •Attempts by activists to disrupt production.	•Insurance premiums may be reduced if infrastructure is clearly secure. •Lower cost overheads. •Safety more assured	•Expensive infrastructure replacement •Environmental rehabilitation costs if breach occurs •Inability to get supplies in times of scarcity because suppliers prefer to deal with competitors who are in better favour with community. •Safety potentially compromised.
Social licence to operate	Poor reputation for water management creates community pressure to exclude company/industry from access to resources. Not meeting corporate social responsibility	Community sees the mining industry as a good long term option for use of water given competitive environment for water access.	Industry viability, access to ore bodies potential slowing of approvals and difficulties with ongoing operational efficiency (loss of production time due to social disruptions).

Risk	Cause(s)	Implications	
		Opportunities	Threats
Not enough water (lack of security of supply)	•Poor planning – lack of understanding of supply reliability/capacity compared to demand. •Change in legislative arrangements change volumetric access. •Lack of attention to meeting design efficiencies creates higher than expected demand. •Insufficient attention to climate and hydrological variability/shift/changes in design and/or operations.	•Strategic control over water security provides regulator, community and investor confidence in operation/company. •Opportunities to out compete and potentially purchase operations that become non-viable because of lack of water.	•Reduction in revenue from loss of production, payment of high prices for water by trying to purchase it in dry times and/or potential loss of market share due to perception of unreliability of product supply; •Potential damage to reputation with other water users, the community generally, and workforce.
Too much water (excess supply)	•Poor design or not operating to necessary standards to deal with excess water results in environmental breach, safety or health incidents or loss of production	•Possibility of supplying third party users and/or water trading •Appropriate storage may reduce demand for raw water reducing costs and/or allowing others to access raw water	•Loss of production •Breaches of licence resulting in fines •Loss of community support for the operation •Site, company and industry reputation damaged
Water not fit for purpose (Water Quality)	•Lack of design for meeting water needs with water of appropriate quality (not defining fit-for-purpose standards). •Inattention to operational management of design. •Poor planning for extreme events. •Poor planning for hydrological and/or climate variations	•Minimises water withdrawn from the environment. •Positive reputation as good water manager	•Mineral recovery reductions, •Product quality compromises which will not be well regarded by the market, for example, the REACH provisions, •Additional costs in managing excess water on site. •Significant fiscal and reputation costs associated with impacts on environment (on- and off-site) and other users.
Closure liabilities	•Poor water planning during operations and/or not taking into account changing circumstances	•Significant reputation growth with successful closure •Community content (supportive of) other operations/expansions. •No delays on access and/or approvals.	•Poor reputation resulting in long term (possibly permanent) liabilities and associated costs

PART II
MANAGEMENT & REPORTING SYSTEMS

OPERATIONAL MANAGEMENT
(TOOLS AND PROCESSES)

Strategic plan

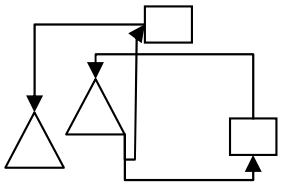
Identification of key water risks and mitigation strategies

Water management plan

Identification and characterisation of the key hydrological, environmental and community issues and sensitivities.
Key resource for activities and responsibilities for site water system.

Water circuit diagram

Indicates the inter-linkage between the water inputs and sources, water quality requirements/constraints within the different flow circuits and water outputs.



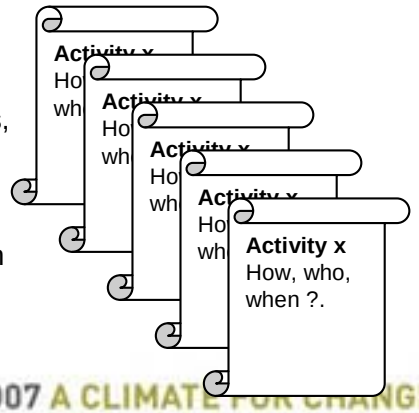
Water balance

1. Water account – what water is where and when?
2. Water balance simulation – "what if?" my system changes
3. Water forecasting and decision making

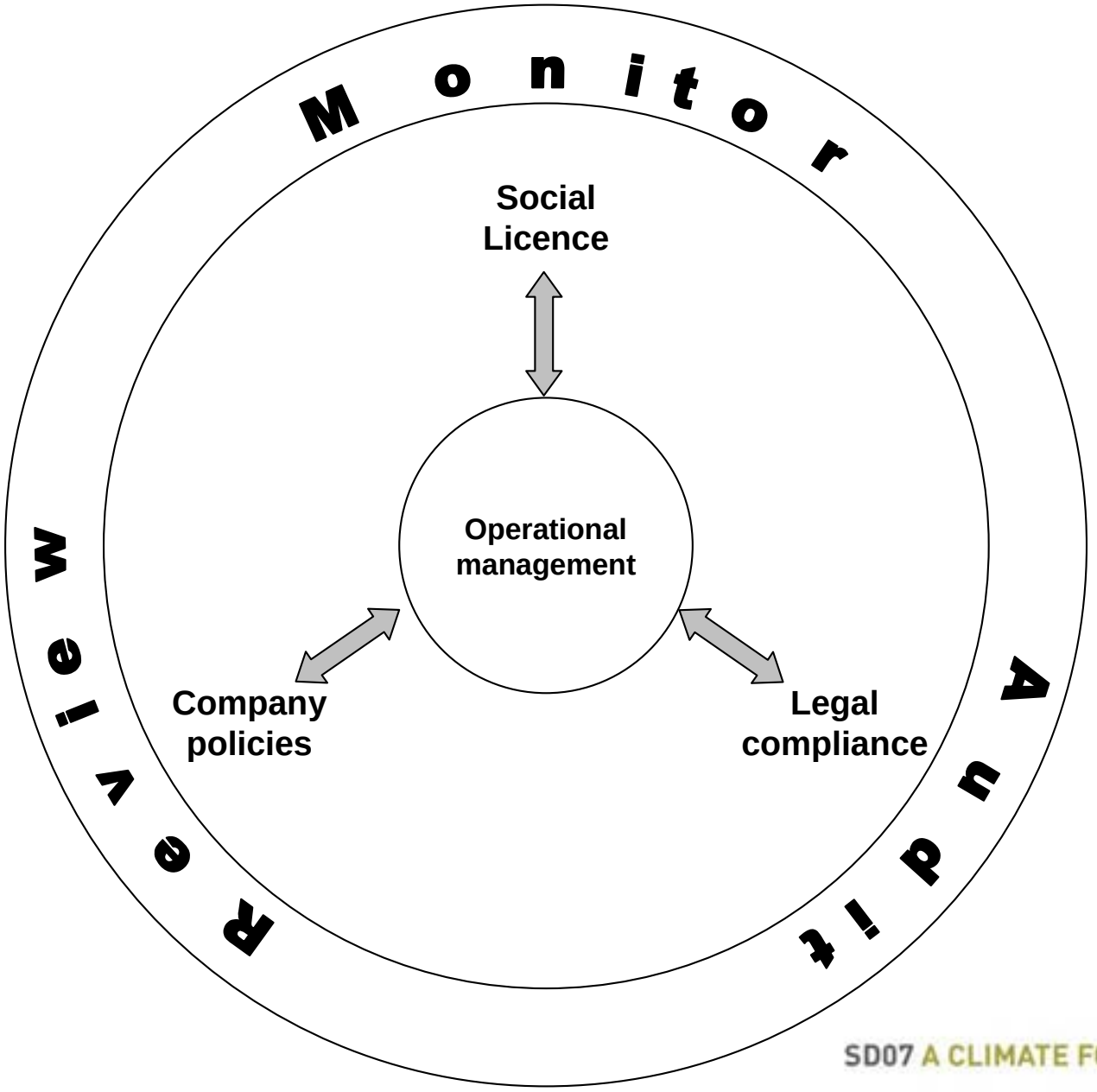
$$q = \frac{-\kappa}{\mu}\left(\nabla P - \rho g \hat{e}_z\right)$$

Operational procedures

- Operational activities, responsibilities, implementation strategies, compliance audit and records management requirements.
- List operating manuals linked to each water management activity
- Emergency procedures

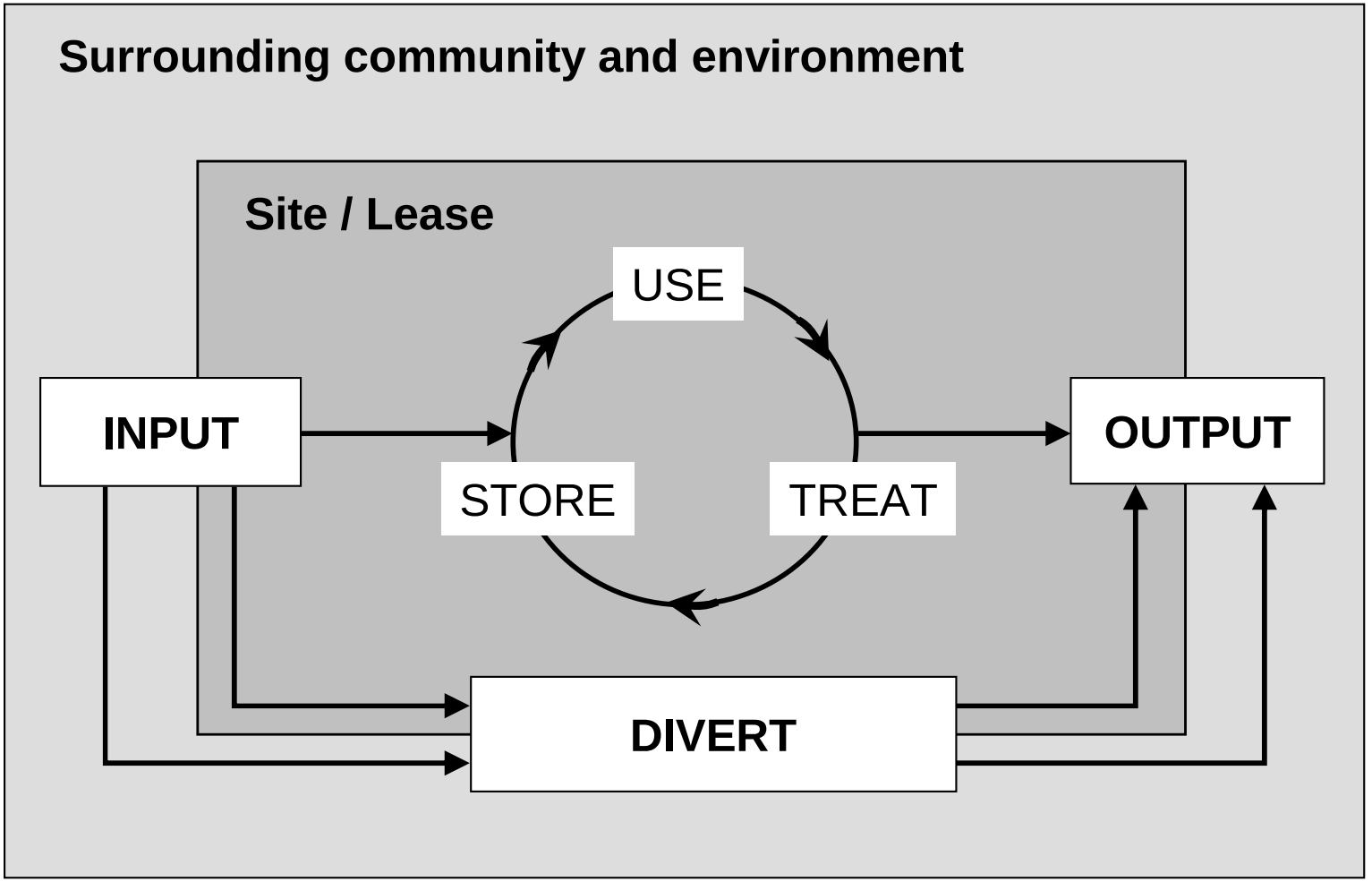


MONITOR, AUDIT & REVIEW



PART III
TECHNICAL & COMMUNITY REQUIREMENTS

CONCEPTUAL FLOW MODEL



Example: INPUT

Scope

Input: The tasks and infrastructure associated with managing water input at the interface between the operation and the surrounding environment. The boundary of this interface includes the lease (via pipelines, channels and rivers), underlying aquifers (via bores and dewatering) and the atmosphere (via rain interception).

There are two main functions for input tasks:

- Supply of water for site operations (source for the use-treat-store loop)
- Source of water that will be diverted around or through the operation.

The main tasks involved in input are water pumping, bore management (dewatering and water supply bores) and store/task management.

Example: INPUT

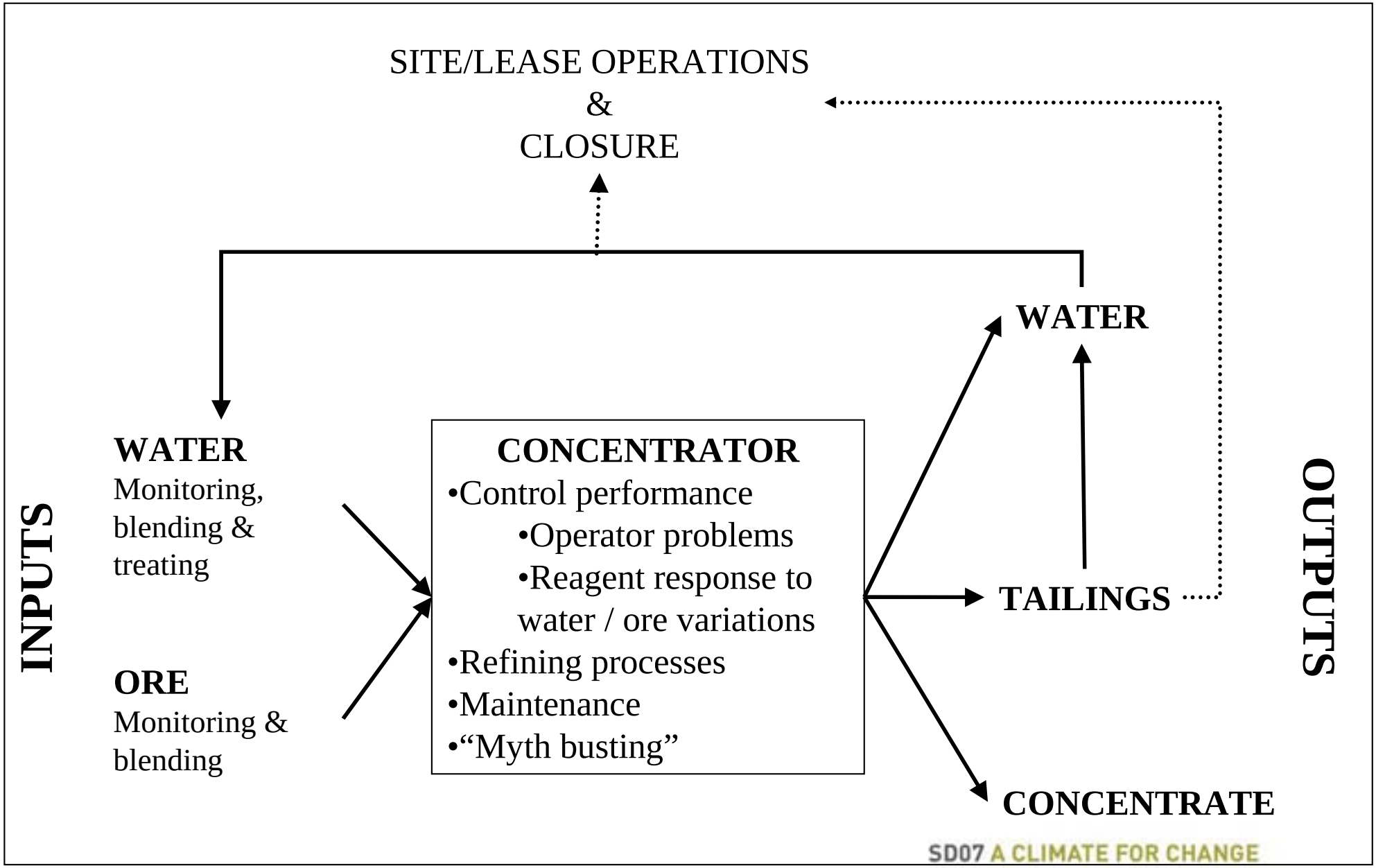
Key risks

- Security of supply:
- Effect on source environment:
- Water quality variation:
- Oversupply:
- Under supply for diversion:
- Corporate targets:
- Meeting expectations of other users/competitors
- Meeting community expectations

Leading practice control of risks

- The water demand for the operation, over its life cycle, is robustly established, ...
- Dewatering rates are determined ...
- Water quality tolerances/requirements are defined and ...
- All licence, statutory requirements and water allocation processes ...
- The capability of the source environment to deliver the demand...
- The responsibilities of the operation for meeting demands of other water users ...

Task Example – commodity concentrating



“Water Connections”

- *Climate change*: Climate change is an issue that …
- *Cumulative Impacts*: Many minerals operations exist in areas where there is a concentration of activity ...
- *Connecting issues:* Water involves use of people, materials and energy...
- *Connecting operations*: There is an increasing trend to connect operations to ...
- *Skills*: Leading practice as described in this book requires considerable skills...
- *New Knowledge*: As stated at the outset, leading practice is dynamic and evolving...