

AURUS MINING

Water Beyond the Fence

Catchment stewardship for mines and mineral infrastructure

A background image of an industrial facility, possibly a mine or refinery, at dusk or dawn. The sky is a gradient of dark blue and orange. The facility features complex metal structures, pipes, and scaffolding, with some lights visible. The overall tone is professional and industrial.

OUR POSITION

Catchment stewardship for mines is a disciplined progression from awareness of the wider water system, to shared-risk assessment, to site and collective response, supported by a transparent evidence record that separates site performance from catchment outcomes and makes boundaries, assumptions and revision triggers explicit.

EVIDENCE FIRST | DECISIONS MADE EXPLICIT | DELIVERY CONDITIONS STATED

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Executive summary

Catchment-based water management starts by changing the unit of analysis. The operation remains important, but the question becomes how a mine and its infrastructure sit within a wider hydrological, social, environmental, economic and institutional system. In that system, the analytical boundary can differ from the operational boundary. It should account for surface water, groundwater and connected users rather than only assets inside the fence. This shift is practical because it frames both dependencies and impacts in context and identifies which changes outside the site could become material to the operation and to others who share the same water system.

Sources: WP13-02, WP13-03, WP13-04

ICMM structures catchment-based practice around a progression of awareness, assessment and response. Awareness is not limited to hydrology. It includes the physical setting, current users, relevant institutions, catchment plans and strategies, and material changes underway or expected. Stakeholder concerns and priorities belong inside the evidence for assessment rather than being treated as a communications annex. This framing supports early clarity on what the assessment must test, which risks could be shared, and which parts of the context can change the operating conditions over time.

Sources: WP13-01, WP13-04, WP13-05, WP13-12

Assessment then identifies water-related risks, their causes, pathways and consequences, and the parties able to influence them. The risk set spans quantity, quality, regulatory, reputational and shared-infrastructure dimensions. A site can be efficient and still face material catchment risk when other users, institutions or ecosystems are under pressure. This means risk owners cannot rely on site metrics alone. They need an explicit map from drivers to pathways to consequences, alongside a view of who can change each part of the chain and where the mine can realistically influence outcomes.

Sources: WP13-06, WP13-07, WP13-08

Response planning connects priority risks to actions, owners, partnerships and evidence of performance. Site controls remain necessary, but some catchment risks require collective action beyond the fence through planning participation, data sharing or collaborative risk reduction. Monitoring should distinguish site performance from catchment outcomes and name the limits of attribution, particularly where multiple users and institutions influence the same pathways. A stewardship record then holds the work together by making assumptions, boundaries, evidence, decisions and revision triggers visible so that the catchment approach can be updated as the context changes.

Sources: WP13-09, WP13-10, WP13-13, WP13-14

At a glance

Six evidence markers establish the scale, threshold or decision condition carried into the chapters that follow.

Gate

SET THE ANALYTICAL BOUNDARY BEYOND THE OPERATIONAL FENCE, INCLUDING SURFACE AND,

Source: WP13-03

Trace

MAP CAUSES, PATHWAYS, CONSEQUENCES AND PARTIES ABLE TO INFLUENCE EACH RISK CHAIN

Source: WP13-06

Scope

INCLUDE QUANTITY, QUALITY, REGULATORY, REPUTATIONAL AND SHARED-INFRASTRUCTURE 风险

Source: WP13-07

Signal

TREAT STAKEHOLDER CONCERNS AS ASSESSMENT EVIDENCE, NOT A SEPARATE APPENDIX

Source: WP13-05

Hold

SEPARATE SITE PERFORMANCE MONITORING FROM CATCHMENT OUTCOMES AND STATE LIMITS OF

Source: WP13-14

Record

KEEP ASSUMPTIONS, BOUNDARIES, DECISIONS AND REVISION TRIGGERS VISIBLE OVER TIME

Source: WP13-15

Method and boundaries

This paper is a bounded synthesis of registered public evidence. Source identifiers remain visible so that each quantitative or framework statement can be traced to its dossier row.

INTENDED READERS

- Mine and infrastructure water managers
- Operational and corporate risk owners
- Environment and social performance leads and practitioners

READING METHOD

- Read each chapter opener as a decision frame.
- Use the three section exhibits as working review instruments.
- Return to the evidence ledger before reusing any number or requirement.

BOUNDARIES

- This paper is a practice synthesis derived from an archived ICMM guide and carries no site water balance, abstraction volume, discharge result or client location. [WP13-01]
- No numerical water claim is permitted unless separately registered from an archived primary source, and none is present in the WP13 dossier. [WP13-01]
- The content must not imply legal compliance, basin authority, water rights or measured improvement for a client. [WP13-01]
- Monitoring and performance discussion is limited to frameworks that distinguish site performance from catchment outcomes and state limits of attribution. [WP13-14]
- Statements about stewardship records and evidence rooms reflect a synthesis of ICMM steps and are labelled accordingly. [WP13-15]

PUBLICATION DISCIPLINE

- No client identity or company-age claim is published.
- No Aurus delivery result is inferred from public guidance.
- Dated forecasts retain their institution and vintage.



01

CHAPTER 1

The catchment changes the question

A catchment approach reframes water management from a site-only problem to a system question, and sets up the awareness work that makes later assessment and response credible.

Awareness

START WITH CATCHMENT AWARENESS BEFORE SELECTING RISKS AND RESPONSES | WP13-01

Context

READ THE OPERATION INSIDE THE WIDER HYDROLOGICAL, SOCIAL, ENVIRONMENTAL, AND DO | WP13-02

Evidence

CAPTURE STAKEHOLDER CONCERNS AS ASSESSMENT EVIDENCE FROM THE OUTSET | WP13-05

1.1 From asset control to system context

A catchment approach changes the starting point. Instead of asking only whether the site controls water within its operational boundary, the work asks how the operation fits within the wider catchment system. That system includes hydrological connections, social and economic uses, environmental values, and the institutions that plan and regulate activity. This is not an abstract reframing. It determines which dependencies and impacts matter, which changes outside the fence could become material, and which outcomes the operation can influence alone versus only with others. It also helps prevent false comfort where internal controls look strong but external pressures are moving in the opposite direction.

WP13-02, WP13-08

ICMM structures this practice as a disciplined progression: awareness, assessment and response. The catchment lens strengthens each step by insisting that awareness work documents the context, assessment tests pathways across users and institutions, and response connects priority risks to actions and evidence. Treat the sequence as a control on scope creep. It avoids jumping to solutions before the system is understood and before the parties who influence each risk are identified. The sequence also supports governance because it gives risk owners clear stage gates for decision-making and for revisiting earlier assumptions when the catchment context shifts.

WP13-01, WP13-06, WP13-09, WP13-15

DECISION INSTRUMENT

Decision instrument: When to elevate from site framing to catchment framing

Use this gate to confirm that the water question is framed at the right system level before selecting studies and controls.

TEST	EVIDENCE READING	DECISION RESPONSE
Trigger check	Do connected users or institutions influence key dependencies or impacts?	If yes, frame the question at catchment scale, more than site scale
System completeness	Does the framing include hydrological, social, environmental, economic and institutional context?	If no, expand awareness scope before assessment
Risk comfort test	Are internal efficiency indicators being used as a proxy for catchment risk?	If yes, add assessment lines that test external pressure and shared risk
Sequence control	Has the work been staged as awareness, assessment and response?	If no, re-stage to avoid solution-first bias

Sources: WP13-01, WP13-02, WP13-08

1.2 Awareness as a technical work package

Awareness is a technical work package with defined outputs. It includes the catchment physical setting, the current and emerging set of water users, the institutions that shape decisions, and the plans and strategies that set expectations over time. It also tracks material changes, including changes in use, governance or catchment condition that could alter risk exposure. The aim is not a comprehensive description of everything in the basin. The aim is a fit-for-purpose map of context that informs what the assessment must test and which parties must be engaged. Without this, assessment tends to default to what is easy to measure at the site.

WP13-04, WP13-12

Stakeholder concerns and priorities are part of awareness evidence, not a public affairs annex. This matters because concerns can be an early indicator of shared-infrastructure risk, reputational exposure, or misalignment with catchment plans and institutional expectations. Recording them as evidence also allows later decisions to be traced back to what was heard and how it was tested in assessment. The discipline is to capture concerns as statements that can be evaluated against pathways and consequences, and to keep the record transparent about what is inside scope, what is outside scope, and what assumptions were made at the time.

WP13-05, WP13-07, WP13-15

DECISION INSTRUMENT

Decision instrument: Awareness deliverable checklist

Confirm that awareness outputs are sufficient to support a risk assessment that includes shared context.

TEST	EVIDENCE READING	DECISION RESPONSE
Physical setting	Catchment physical setting documented at a level matched to the decision	Proceed to assessment when fit-for-purpose, not exhaustive
Users map	Key water users and connections identified	If gaps remain, target data collection and engagement
Institution map	Institutions, plans, strategies and decision forums identified	If unclear, pause and clarify governance context
Change log	Material changes in use, condition or governance recorded	Define revision triggers for future updates
Concerns register	Stakeholder concerns captured as assessment inputs	Translate concerns into testable risk hypotheses

Sources: WP13-04, WP13-05, WP13-12, WP13-15

1.3 Engagement boundaries and transparency

Engagement is part of catchment work, but it must be proportionate to the issue and transparent about the operation’s dependencies, impacts and limits. Proportionate engagement means matching effort to the severity and plausibility of the risk pathways under consideration, rather than applying a fixed engagement template. Transparency means stating what the operation relies on, what it can control, and what it cannot. This reduces the risk of engagement being mistaken for a promise of outcomes that depend on other users or institutions. It also supports more credible joint problem definition, which is a prerequisite for any later collective response beyond the fence.

WP13-10, WP13-11

The same transparency applies internally. A catchment approach can create pressure to claim influence where the mine has limited control. Good practice is to keep a clear distinction between commitments that are within site control and intentions to participate in shared processes. This distinction should be explicit at the awareness stage because it shapes which risks are assessed and how evidence of performance will be defined later. When engagement produces new information, record how it changes assumptions, boundaries, or the prioritisation of risks. That record creates continuity across staff changes and across changes in catchment institutions and plans.

WP13-11, WP13-15

DECISION INSTRUMENT

Decision instrument: Engagement proportionality gate

Set engagement scope and transparency statements before entering assessment.

TEST	EVIDENCE READING	DECISION RESPONSE
Issue proportionality	Engagement effort matched to the risk pathway severity and plausibility	Scale up only where pathways suggest material consequences
Dependency disclosure	Operation’s key water dependencies stated clearly	Publish or share as appropriate to the engagement forum
Impact disclosure	Potential impacts and limits of control stated clearly	Avoid implying outcomes that depend on other parties
Record discipline	New information triggers updates to assumptions and boundaries	Log revisions and define next review point

Sources: WP13-11, WP13-15, WP13-06

02

CHAPTER 2

Boundaries and the water system

Effective catchment stewardship depends on boundary decisions that include connected surface and groundwater systems and reflect the users and institutions that influence risk pathways.

Boundary

ALLOW THE ANALYTICAL BOUNDARY TO DIFFER FROM THE OPERATIONAL BOUNDARY | WP13-03

Connected

INCLUDE SURFACE WATER, GROUND-WATER AND CONNECTED USERS IN SCOPE | WP13-03

Plans

IDENTIFY CATCHMENT STRATEGIES AND RESPONSIBLE INSTITUTIONS AS CONTEXT | WP13-12

2.1 Analytical boundary versus operational boundary

In catchment-based practice, the boundary for analysis may differ from the operational boundary. The analytical boundary exists to capture the system that drives water risks and opportunities, not to mirror property lines. It should account for surface water, groundwater and connected users where those linkages influence dependencies, impacts, or the ability to manage consequences. The boundary decision is therefore a technical and governance decision. It must be explicit, because later claims about risk, response and performance depend on what was included. A weak boundary choice is a common failure mode: it pushes material pathways outside scope and leaves the site to manage symptoms instead of causes.

WP13-03, WP13-06, WP13-15

Boundary setting also protects effort. A catchment can be large, and a mine cannot study everything at equal resolution. The discipline is to define a boundary that is wide enough to include relevant connections and users, but narrow enough to support clear analysis and decisions. The boundary should be revisited when awareness identifies new users, new institutions, or material changes in catchment plans and strategies. Recording the boundary logic and revision triggers is part of a stewardship record that keeps the work auditable and prevents untracked drift in assumptions between teams and reporting cycles.

WP13-04, WP13-12, WP13-15

DECISION INSTRUMENT

Decision instrument: Boundary setting worksheet

Use these prompts to define and document a defensible analytical boundary.

TEST	EVIDENCE READING	DECISION RESPONSE
Hydrological connectivity	Surface and groundwater connections that influence the site identified	Include connected systems in the analytical boundary
User connectivity	Users connected to the same systems identified	Include users whose actions alter pathways or consequences
Institutional reach	Institutions and plans that shape the system identified	Include governance units that influence relevant decisions
Effort control	Resolution matched to decision needs	Prioritise areas linked to plausible, material pathways
Revision triggers	Events that force boundary review defined	Update boundary when changes in users, plans or conditions occur

Sources: WP13-03, WP13-04, WP13-12, WP13-15

2.2 System mapping across water, people and institutions

A catchment approach reads the operation in a wider system, which means the map must include more than flow paths. The system map should cover the hydrological setting and its connections, the set of water users and their interactions, the environmental and economic uses that influence values, and the institutions that allocate, plan and resolve disputes. This map does not need to resolve every detail. It must support the assessment step, which asks for causes, pathways and consequences and for the parties able to influence those chains. A system map that omits institutions often fails later because response options depend on who can act and where decisions are made.

WP13-02, WP13-04, WP13-06

Catchment management strategies and responsible institutions shape the operating context over time. Identifying them early clarifies which parts of the system are stable and which are contested or changing. It also helps align site actions with the direction of catchment planning and reduces the chance that the mine pursues improvements that do not reduce shared risk. Where multiple strategies or plans exist, record them and treat conflicts as a risk input rather than trying to reconcile them in isolation. Engagement can then be targeted to the forums that influence the relevant pathways and consequences.

WP13-12, WP13-11, WP13-06

DECISION INSTRUMENT

Decision instrument: System map completeness check

Confirm the map includes the minimum elements required for assessment and response planning.

TEST	EVIDENCE READING	DECISION RESPONSE
Hydrological layer	Surface water and groundwater systems represented	If absent, add hydrological connectivity before assessment
User layer	Water users and interactions represented	If incomplete, focus on users linked to key pathways
Institution layer	Institutions, plans, strategies and forums represented	If unclear, identify responsible institutions and decision cycles
Value layer	Social, environmental and economic values represented at a fit level	Use values to frame consequence definitions in assessment

Sources: WP13-02, WP13-03, WP13-04, WP13-12

2.3 Documenting what is in scope and why

Boundary and system decisions must be documented, not held as tacit knowledge. A water-stewardship record should make assumptions, boundaries, evidence, decisions and revision triggers visible. This is a control on quality because it allows reviewers to test whether the boundary captured the pathways that later drove response choices. It is also a practical control on turnover and contractor interfaces, since catchment work often spans years and multiple teams. Documentation should include why particular areas, users, or institutions were included or excluded, and what evidence supported that choice. The record should also list what would trigger a boundary update, such as a material change in users or plans.

WP13-15, WP13-04, WP13-12

This documentation discipline matters for monitoring and reporting. Monitoring should distinguish site performance from catchment outcomes and should name the limits of attribution. Those limits usually depend on boundary choices and on which other users and institutions influence the same pathways. If the boundary is unclear, monitoring can drift into implied claims about catchment improvement that cannot be attributed. A clear record provides a defensible basis for saying what the site can measure and manage directly, what it can contribute to through collective action, and what sits outside its influence but remains part of the risk context.

WP13-14, WP13-15, WP13-10

DECISION INSTRUMENT

Decision instrument: Stewardship record minimum fields for boundaries

Set a standard record structure so boundary decisions remain testable over time.

TEST	EVIDENCE READING	DECISION RESPONSE
Boundary statement	Analytical boundary defined and described	Do not proceed without an explicit statement
Inclusion logic	Evidence and rationale for included systems and users	Keep link to assessment hypotheses
Exclusions	Items excluded and why	State residual risk created by exclusions
Assumptions	Assumptions used to simplify system map	List uncertainty and planned validation
Revision triggers	Events that force review of boundary and assumptions	Schedule review aligned to changes in plans, users, or conditions

Sources: WP13-15, WP13-03, WP13-14

03

CHAPTER 3

Users, institutions and values

Awareness must surface the user set, the institutions that shape decisions, and the values that define consequences, while keeping stakeholder concerns as assessment evidence.

Users

IDENTIFY WATER USERS AND CONNECTED USERS AS PART OF AWARENESS | WP13-04

Institutions

IDENTIFY CATCHMENT STRATEGIES AND RESPONSIBLE INSTITUTIONS EARLY | WP13-12

Concerns

TREAT STAKEHOLDER CONCERNS AS EVIDENCE FOR ASSESSMENT | WP13-05

3.1 Mapping users and dependencies

Awareness includes identifying water users and their relationships to the systems the mine depends on or affects. Users include those connected through surface water and groundwater linkages, more than those adjacent to the operation. The purpose of mapping is to support later risk assessment: it helps identify who can influence a pathway, who experiences consequences, and where dependencies overlap. This map should also note shared infrastructure dimensions of water risk, since infrastructure can connect users even where hydrology appears separate. The work remains evidence-based and bounded. It should focus on users that plausibly influence or are influenced by the priority water pathways under consideration, rather than attempting an exhaustive catalogue.

WP13-04, WP13-03, WP13-07, WP13-06

Dependencies and impacts should be stated plainly in engagement and in internal decision forums. Engagement should be transparent about the operation's dependencies, impacts and limits. This transparency reduces misunderstanding and improves the quality of information received. It also makes it easier to ask targeted questions about how other users' actions and institutional decisions might change risk exposure. Keep the logic consistent: list the dependency or impact, the connected users, and the potential interaction mechanism. This structure later supports response planning because it clarifies where site controls can address a dependency directly and where the operation must work through institutions or partnerships to influence shared risks.

WP13-11, WP13-10, WP13-06

DECISION INSTRUMENT

Decision instrument: User and dependency register template

Structure user mapping so it feeds directly into risk pathway assessment.

TEST	EVIDENCE READING	DECISION RESPONSE
User identification	User connected to relevant surface or groundwater system recorded	Include if connection affects dependency, impact, or consequence
Interaction mechanism	How the user influences or experiences pathways stated	Convert to assessment hypothesis
Shared infrastructure note	Any shared infrastructure dimension recorded	Flag for shared-risk assessment
Information source	Evidence basis for entry documented	Retain traceability in stewardship record

Sources: WP13-03, WP13-04, WP13-06, WP13-07, WP13-15

3.2 Institutions and the operating context

Catchment stewardship requires an explicit view of institutions. Awareness includes the institutions, plans and strategies that shape the operating context over time. These elements can be as influential as hydrology because they govern allocation decisions, planning priorities, data requirements, and the forums through which disputes are resolved. Identifying responsible institutions early supports two practical outcomes. First, it clarifies where decisions are made and how often they are revisited, which affects the timing of response planning. Second, it helps avoid designing site actions that are misaligned with catchment strategies or that ignore institutional constraints that later block implementation.

WP13-04, WP13-12

Institution mapping also supports proportional engagement. Engagement should be proportionate to the issue and transparent. A well-grounded institution map allows the operation to choose the right forum for each risk pathway and to state clearly what it can commit to. It also clarifies where other parties have decision authority and where collective action is required. This is essential for shared-risk management because the assessment step asks more than what the risk is, but which parties are able to influence causes, pathways and consequences. Without institutions in view, influence is often misassigned and response plans become lists of actions without viable owners.

WP13-11, WP13-06, WP13-10, WP13-12

DECISION INSTRUMENT

Decision instrument: Institution and plan relevance screen

Prioritise institutions and plans that shape pathways, owners and response options.

TEST	EVIDENCE READING	DECISION RESPONSE
Decision influence	Does the institution influence relevant causes or pathways?	If yes, include in assessment and response planning
Plan alignment	Do catchment plans or strategies set relevant objectives or constraints?	Record as context and test in risk consequences
Forum access	Is there a forum for participation or data sharing?	Consider as a response option where collective action is needed
Change sensitivity	Are strategies or responsibilities changing?	Set a revision trigger in the stewardship record

Sources: WP13-12, WP13-06, WP13-13, WP13-15

3.3 Values and stakeholder concerns as evidence

Consequences in water risk assessment depend on values, and values extend beyond technical. A catchment approach reads the operation within social, environmental and economic systems, so the assessment must define consequences in terms that reflect those systems. Stakeholder concerns and priorities are evidence inputs for this work. They can signal where the mine’s framing of consequences is incomplete, where a shared-infrastructure dimension is present, or where reputational risk could arise even if site performance is stable. The discipline is to capture concerns in a way that can be assessed: what is the claimed change, who is affected, what pathway is implied, and what evidence is offered.

WP13-02, WP13-05, WP13-07, WP13-06

Treating concerns as evidence does not mean accepting them untested. It means placing them inside the assessment logic so they are evaluated against causes, pathways and consequences. This is also where transparency matters. Engagement should be clear about dependencies, impacts and limits, so that stakeholders understand what the operation can change and what requires institutional or collective action. Recording concerns and how they were tested supports the stewardship record and prepares the ground for monitoring that distinguishes site performance from catchment outcomes. It also helps define where attribution will be limited and where contribution is a more accurate performance claim.

WP13-05, WP13-11, WP13-14, WP13-15

DECISION INSTRUMENT

Decision instrument: Converting concerns into assessment inputs

A structured way to treat concerns as evidence that can be tested in assessment.

TEST	EVIDENCE READING	DECISION RESPONSE
Concern statement	Concern expressed as a clear claim about change and impact	Rewrite ambiguous statements before assessment
Implied pathway	Link to a plausible cause and pathway	Include as an assessment hypothesis
Affected parties	Who experiences the consequence identified	Use to define consequence categories
Influence check	Which parties can influence cause, pathway, consequence	Direct response planning to viable owners
Attribution note	Where multiple users influence the outcome	Flag for monitoring with stated limits of attribution

Sources: WP13-05, WP13-06, WP13-11, WP13-14

04

CHAPTER 4

Risk pathways

Assessment is a pathway discipline: define causes, pathways, consequences and influence, and keep the risk set broad enough to include non-physical and shared dimensions.

Pathway

IDENTIFY CAUSES, PATHWAYS AND CONSEQUENCES FOR WATER-RELATED RISKS | WP13-06

Dimensions

COVER QUANTITY, QUALITY, REGULATORY, REPUTATIONAL AND SHARED-INFRASTRUCTURE RISK | WP13-07

Influence

IDENTIFY PARTIES ABLE TO INFLUENCE EACH RISK CHAIN | WP13-06

4.1 Building risk chains that can be managed

Catchment risk assessment is not a list of issues. It is a set of risk chains with causes, pathways and consequences. ICMM describes the assessment task as identifying water-related risks, their causes, pathways and consequences, and the parties able to influence them. This structure supports management because it shows where controls can be applied and where they cannot. It also makes assumptions visible. When the cause is uncertain, the pathway mapping should state the uncertainty and identify what evidence would confirm or refute the chain. Keep the analysis grounded in the awareness outputs: physical setting, users, institutions, and material changes. That linkage prevents a generic risk register that does not reflect the actual catchment context.

WP13-06, WP13-04, WP13-15

Use the risk chain to avoid category errors. Quantity and quality risks may be physical, but regulatory, reputational and shared-infrastructure risks often arise from institutional decisions and stakeholder expectations rather than from hydrology alone. Those risks still have causes and pathways. For example, a shared-infrastructure pathway can connect one user’s change to another user’s consequences even when direct hydrological connectivity is unclear. A reputational pathway can arise when concerns are not treated as evidence or when transparency about limits is weak. This is why assessment needs both system mapping and engagement inputs. The risk chain is the place where these threads are tested, not a narrative afterthought.

WP13-07, WP13-05, WP13-11, WP13-06

DECISION INSTRUMENT

Decision instrument: Risk chain template

A standard structure for assessment that supports later response planning and monitoring design.

TEST	EVIDENCE READING	DECISION RESPONSE
Risk statement	Risk defined in terms of consequence and receptor	Reject statements that describe only a hazard
Cause	Primary drivers and contributing factors listed	Identify evidence gaps and validation actions
Pathway	Mechanism linking cause to consequence described	Include hydrological, institutional and shared-infrastructure pathways
Consequence	Quantity, quality, regulatory, reputational or infrastructure consequence defined	Assign consequence category and severity logic
Influence map	Parties able to influence cause, pathway or consequence identified	Use to assign response owners and partnership needs

Sources: WP13-06, WP13-07, WP13-13

4.2 Shared risk and the efficiency trap

A site can be efficient and still face material catchment risk if other users, institutions or ecosystems are under pressure. This is a common trap when internal water metrics are taken as proof that exposure is controlled. Catchment assessment avoids this by testing how external drivers and shared conditions affect consequences. The mine may depend on a water system that is stressed by other users or by governance gaps. It may also be seen as part of the problem even if its direct footprint is well controlled, creating reputational and regulatory exposure. The assessment should therefore test risk chains that start outside the fence and enter the site through dependencies, as well as chains that start at the site and affect others.

WP13-08, WP13-07, WP13-06

Shared risk is also about influence. Assessment requires identifying the parties able to influence causes, pathways and consequences. This includes institutions that set strategies and plans, users who share the water system, and the operation itself. The output should not overstate the mine’s control. It should state where site controls are necessary but insufficient and where collective response is needed. This framing also supports engagement that is proportionate and transparent because it allows the operation to describe what it can do alone and what it can only do by participating in shared planning, data sharing or collaborative risk reduction. Those response options come later, but the influence map belongs in assessment.

WP13-06, WP13-10, WP13-12, WP13-11

DECISION INSTRUMENT

Decision instrument: Efficiency trap test

A check to ensure catchment assessment is not reduced to site efficiency indicators.

TEST	EVIDENCE READING	DECISION RESPONSE
External pressure check	Are other users or ecosystems under pressure in the same system?	If yes, include shared-risk pathways in assessment
Institutional check	Do institutions and plans constrain or change operating context?	If yes, include regulatory and planning pathways
Reputational check	Are concerns and priorities recorded as evidence?	If no, capture and test them before scoring risk
Influence realism	Is influence assigned to the parties who can act?	If unclear, revisit institution and user mapping

Sources: WP13-08, WP13-07, WP13-05, WP13-06, WP13-12

4.3 Prioritisation that leads to response

Assessment output must support response planning, so prioritisation should be tied to decision needs and to viable action. ICMM links response planning to priority risks, actions, owners, partnerships and evidence of performance. The assessment should therefore produce a ranked set of risk chains and an initial view of which response types are feasible: site operational improvements, participation in planning, data sharing, or collaborative risk reduction. Keep the method transparent. Record the criteria used to prioritise risks and any assumptions about consequences or likelihood, because these assumptions often change with new awareness information or with changes in catchment institutions and plans. The stewardship record should show why one risk moved ahead of another and what would trigger reprioritisation.

WP13-09, WP13-13, WP13-15

Design monitoring requirements in parallel with prioritisation. Monitoring should distinguish site performance from catchment outcomes and should name the limits of attribution. This matters because a highly ranked shared-risk pathway may not be measurable as a site outcome, and a site outcome may not indicate catchment improvement. When prioritising, record whether the intended performance evidence is a site metric, a contribution to a shared process, or a catchment indicator where attribution is limited. This keeps response planning honest about what can be claimed and helps set realistic expectations in engagement. It also prevents later disputes about whether a response was effective when the monitoring was never designed to answer the right question.

WP13-14, WP13-09, WP13-11

DECISION INSTRUMENT

Decision instrument: Prioritisation to response linkage table

A practical way to ensure prioritised risks connect to feasible response types and evidence forms.

TEST	EVIDENCE READING	DECISION RESPONSE
Risk chain ID	Risk chain defined with cause, pathway, consequence	Only prioritise complete chains
Primary response type	Operational improvement, planning participation, data sharing, or collaboration	Select at least one feasible response type
Owner and partners	Internal owner and external parties able to influence identified	Assign owners based on influence map
Evidence form	Site performance metric, contribution evidence, or catchment indicator with limits	State attribution limits at selection time
Reprioritisation trigger	Change in users, institutions, plans or conditions	Set review date and triggers in record

Sources: WP13-06, WP13-09, WP13-13, WP13-14, WP13-15



05

CHAPTER 5

The site water balance

Site controls remain necessary. A catchment approach strengthens site water balance work by linking it to boundary choices, pathways, and evidence that separates site performance from catchment outcomes.

Necessary

SITE CONTROLS REMAIN NECESSARY EVEN WHEN COLLECTIVE ACTION IS NEEDED | WP13-10

Boundary

SITE ANALYSIS SHOULD REFLECT THE ANALYTICAL BOUNDARY AND CONNECTED SYSTEMS | WP13-03

Attribution

MONITORING MUST DISTINGUISH SITE PERFORMANCE FROM CATCHMENT OUTCOMES | WP13-14

5.1 Placing the site water balance inside the catchment frame

A catchment approach does not replace site water management. Site controls remain necessary, and a site water balance remains a core tool for operational decision-making. The catchment frame changes how the water balance is interpreted. It places site inflows and outflows within an analytical boundary that may extend beyond the fence and that accounts for surface water, groundwater and connected users. This helps prevent narrow optimisation that shifts risk elsewhere or ignores dependencies that are controlled by external users or institutions. The practical implication is that water balance assumptions, boundary definitions and key sensitivities should be aligned to the catchment awareness and assessment work, not developed in isolation as a purely internal engineering product.

WP13-10, WP13-03, WP13-02, WP13-15

Use the risk pathway assessment to test whether the site water balance captures the right interactions. If a pathway depends on a groundwater connection or on a shared-infrastructure constraint, the water balance should make that dependency explicit, even if the site cannot control it. Where the site can control aspects of the pathway, those controls should be visible as decision levers linked to response planning. Keep the claims disciplined: the dossier does not provide measured water volumes or outcomes, so the objective here is to structure the decision logic and evidence trail, not to imply performance. Monitoring design will later separate what the site can measure as performance from what remains a catchment outcome with limited attribution.

WP13-06, WP13-03, WP13-09, WP13-14

DECISION INSTRUMENT

Decision instrument: Site water balance alignment check

Confirm that site water balance work is aligned to catchment boundaries and priority pathways.

TEST	EVIDENCE READING	DECISION RESPONSE
Boundary alignment	Water balance boundary consistent with analytical boundary logic	If inconsistent, reconcile or document reasons
Connected systems	Surface and groundwater connections represented where relevant	Add connections that affect priority pathways
User interactions	Dependencies influenced by other users noted	Flag for shared-risk response planning
Decision levers	Controllable site levers linked to pathway mitigation	Tie levers to response actions and owners
Assumptions log	Key assumptions recorded with revision triggers	Maintain in stewardship record

Sources: WP13-03, WP13-06, WP13-09, WP13-15

5.2 Operational improvements as response options

Response options include operational improvements, and these often begin with site water controls informed by assessment priorities. Operational improvements should be selected because they interrupt a risk pathway, reduce exposure to a consequence, or improve the reliability of evidence, not because they are standard items. The catchment frame helps by showing whether an operational improvement addresses a material risk or only improves an internal metric while shared pressures remain. Where risks include quantity, quality, regulatory, reputational or shared-infrastructure dimensions, operational improvements may address only part of the chain. The assessment influence map should therefore be used to check whether a site-only response is sufficient or whether it must be paired with institutional participation, data sharing, or collaborative action beyond the fence.

WP13-13, WP13-07, WP13-08, WP13-10

Assign owners and define evidence of performance at the time the operational response is selected. ICMC connects response planning to actions, owners, partnerships and evidence of performance. For site actions, evidence may be operational records, monitoring outputs, or verified changes in controls. However, monitoring must still distinguish site performance from catchment outcomes. If an operational improvement is claimed to reduce a catchment risk, the monitoring plan should state what can be attributed to the site and what cannot, given other users and institutions. This discipline supports credible internal assurance and avoids over-claiming in external engagement. It also makes it easier to adjust actions when the catchment context changes.

WP13-09, WP13-14, WP13-06, WP13-11

DECISION INSTRUMENT

Decision instrument: Operational response selection grid

Select site operational improvements that clearly connect to priority risk pathways and evidence requirements.

TEST	EVIDENCE READING	DECISION RESPONSE
Pathway connection	Which cause or pathway element the action changes	Reject actions without a clear pathway linkage
Risk dimension coverage	Quantity, quality, regulatory, reputational, infrastructure dimensions addressed	Identify residual dimensions needing non-site responses
Owner assignment	Named internal owner for delivery and control	Do not approve without an accountable owner
Evidence plan	What demonstrates site performance for this action	Define evidence and review frequency
Attribution statement	How action relates to catchment outcomes	State limits of attribution explicitly

Sources: WP13-06, WP13-07, WP13-09, WP13-14

5.3 Monitoring design for site performance versus catchment outcomes

Monitoring design is a decision about what questions the program must answer. ICMM notes that monitoring should distinguish site performance from catchment outcomes and should name the limits of attribution. This is critical in catchment stewardship because multiple users and institutions influence the same pathways. A monitoring plan that does not separate these layers invites implied claims that site actions caused catchment improvement. The disciplined approach is to define monitoring lines for site controls and operational performance, and separate lines for catchment indicators that may be tracked for context or for collective initiatives. Each line should be linked back to a risk chain and to a response action or partnership commitment, so the monitoring remains purposeful rather than a data collection exercise.

WP13-14, WP13-06, WP13-09

Document the monitoring logic in the stewardship record. The record should show boundaries, assumptions, evidence, decisions and revision triggers, including why each monitoring line exists and what would prompt a change. Revision triggers might include new awareness information, changes in catchment institutions and plans, or evidence that a risk pathway behaves differently than assumed. This record also supports engagement transparency. When sharing monitoring results, the operation can explain what is measured as site performance and what is tracked as catchment context, and it can state where attribution is limited. That clarity supports proportionate engagement and reduces reputational risk created by ambiguous claims.

WP13-15, WP13-12, WP13-11, WP13-14

DECISION INSTRUMENT

Decision instrument: Monitoring separation matrix

A framework to keep monitoring aligned to what the operation can control and what it can only observe or contribute to.

TEST	EVIDENCE READING	DECISION RESPONSE
Site performance line	Measures of site control performance defined	Report as performance within operational control
Catchment context line	Indicators that describe catchment conditions tracked	Report as context with limits of attribution
Contribution evidence line	Evidence of participation, data sharing, collaborative actions	Report as contribution to collective response
Attribution statement	Limits of attribution recorded for each line	Include in reporting and engagement materials
Review trigger	What changes require monitoring redesign	Set triggers in stewardship record

Sources: WP13-14, WP13-13, WP13-15, WP13-11



06

CHAPTER 6

Quality and mine-influenced water

Quality risks sit alongside quantity and other dimensions. The catchment approach requires pathway analysis, appropriate boundaries, and response planning that includes site controls and collective options where needed.

Quality

INCLUDE WATER QUALITY AS A CORE WATER RISK DIMENSION | WP13-07

Boundary

ACCOUNT FOR SURFACE WATER, GROUNDWATER AND CONNECTED USERS IN ANALYSIS BOUNDARY | WP13-03

Response

CONNECT PRIORITY RISKS TO ACTIONS, OWNERS, PARTNERSHIPS AND PERFORMANCE EVIDENCE | WP13-09

6.1 Quality in the catchment risk set

Water risk includes quality as well as quantity. In catchment-based assessment, quality risks should be treated with the same pathway discipline as other risks: define causes, pathways, consequences and the parties able to influence them. The analysis boundary must allow for surface water, groundwater and connected users where those connections could carry quality pathways. This is especially important where different users experience consequences at different points in the system or where institutions set differing expectations. Keep the scope disciplined to the dossier. This paper does not present site discharge results or measured outcomes. It focuses on structuring decisions so that quality risks are neither reduced to site-only compliance questions nor expanded into claims about catchment-wide improvement without evidence.

WP13-07, WP13-06, WP13-03, WP13-15

Quality risk chains often include regulatory and reputational dimensions alongside physical pathways. Institutions and catchment strategies can influence what consequences matter and how they are judged, and stakeholder concerns can surface priorities that affect reputational exposure. Treat these as assessment evidence and test them against the risk chain. Where quality risk is shared or contested, the influence map becomes central. It clarifies which parts of the pathway the operation can control with site measures and which parts depend on collective action, such as coordinated monitoring or joint planning discussions. Response planning should then connect each priority quality pathway to actions, owners, partnerships and evidence, while keeping attribution limits clear when outcomes depend on multiple parties.

WP13-12, WP13-05, WP13-06, WP13-09

DECISION INSTRUMENT

Decision instrument: Quality risk chain prompts

A structured set of prompts to keep quality risk assessment aligned to catchment connections and governance context.

TEST	EVIDENCE READING	DECISION RESPONSE
Connection check	Are there surface or groundwater connections that could carry quality pathways?	Set boundary to include connected systems and users
Consequence framing	What social, environmental, economic or institutional values define consequence?	Define consequence categories explicitly
Institution context	Which institutions and plans shape expectations?	Include relevant strategies in operating context
Concern inputs	Which stakeholder concerns relate to quality pathways?	Capture as testable hypotheses
Influence map	Who can influence cause, pathway, consequence?	Use to select site versus collective responses

Sources: WP13-03, WP13-02, WP13-12, WP13-05, WP13-06

6.2 Site controls and their limits in shared systems

Site controls remain necessary for quality risk management, but catchment context sets their limits. A site may implement effective operational controls and still face catchment risk if the receiving system, other users, or institutions are under pressure. The assessment should therefore test whether site controls address the priority pathway elements and whether residual risk remains because of external drivers. This framing avoids two errors. The first is treating site control performance as evidence that catchment risk is low. The second is assuming that shared risk removes the need for strong site controls. Response planning must therefore include site actions where they interrupt pathways, and also consider collective options where pathway elements sit outside the site’s influence.

WP13-10, WP13-08, WP13-06

Response options include operational improvements, participation in planning, data sharing and collaborative risk reduction. For quality risks, data sharing and coordinated monitoring can be particularly important because monitoring must distinguish site performance from catchment outcomes and name attribution limits. If multiple users influence quality outcomes, the operation should be clear about what its monitoring demonstrates and what it cannot demonstrate. Engagement should be transparent about dependencies, impacts and limits to avoid implied claims of catchment improvement. All decisions should be captured in the stewardship record so that future reviews can see what was decided, on what evidence, and what would trigger a change in the response approach.

WP13-13, WP13-14, WP13-11, WP13-15

DECISION INSTRUMENT

Decision instrument: Site versus shared response test for quality pathways

Use this test to allocate response effort between site controls and collective actions.

TEST	EVIDENCE READING	DECISION RESPONSE
Control location	Does the operation control the key pathway element?	If yes, prioritise a site control response
Residual shared risk	Do other users or institutions drive remaining pathway elements?	If yes, add collective response components
Evidence feasibility	Can site performance be evidenced without implying catchment outcomes?	Design monitoring to separate performance from outcomes
Engagement need	Is coordination needed for planning or data sharing?	Select proportionate engagement forum and message

Sources: WP13-10, WP13-06, WP13-13, WP13-14, WP13-11

6.3 Monitoring and attribution for quality outcomes

Monitoring for quality pathways needs careful attribution language. ICMM notes that monitoring should distinguish site performance from catchment outcomes and name the limits of attribution. In practice, this means specifying whether a monitoring line is intended to demonstrate performance of a site control, to provide evidence of participation or contribution in a shared initiative, or to track catchment context. A single dataset can serve more than one purpose, but the reporting statements must not blur them. Where the mine shares a water system with other users, monitoring should be designed and communicated in a way that does not imply causation beyond what the site controls can support. This is especially important where stakeholder concerns are sensitive and reputational risk is part of the risk set.

WP13-14, WP13-07, WP13-05

The stewardship record should carry the monitoring design logic, including assumptions, boundary choices, evidence sources, decisions and revision triggers. If the analytical boundary changes, or if institutions revise catchment strategies, the monitoring design may need to change. Recording triggers ensures the program is updated deliberately rather than by gradual drift. This record also supports transparency in engagement because it allows the operation to explain what it monitors, why it monitors it, and what the results do and do not mean. That transparency should be proportionate to the issue and clear about limits. It strengthens trust without making promises of outcomes that depend on other parties.

WP13-15, WP13-03, WP13-12, WP13-11

DECISION INSTRUMENT

Decision instrument: Attribution statement builder for monitoring outputs

A practical tool to draft monitoring statements that remain accurate in shared catchments.

TEST	EVIDENCE READING	DECISION RESPONSE
Performance claim scope	Is the statement about site control performance or catchment outcome?	Limit claims to site performance unless attribution is defensible
Boundary reference	Does the statement reflect the analytical boundary used?	Include boundary context or caveats as needed
Influence context	Are other users or institutions influencing the same outcome?	State limits of attribution explicitly
Revision trigger	What changes would invalidate the statement?	Link to stewardship record triggers

Sources: WP13-14, WP13-03, WP13-06, WP13-15

07

CHAPTER 7

Collective response

When pathways and influence extend beyond the fence, response planning must include collective options with clear ownership, proportionate engagement, and evidence that distinguishes contribution from outcome.

Beyond-fence

CATCHMENT RISK MAY REQUIRE COLLECTIVE ACTION BEYOND THE FENCE | WP13-10

Options

RESPONSE OPTIONS INCLUDE PLANNING PARTICIPATION, DATA SHARING AND COLLABORATION | WP13-13

Owners

RESPONSE PLANNING LINKS PRIORITY RISKS TO ACTIONS, OWNERS, PARTNERSHIPS AND EVID | WP13-09

7.1 When collective action is required

Some catchment risks cannot be managed by site controls alone. ICMM notes that site controls remain necessary, but catchment risk may require collective action beyond the fence. The assessment influence map is the primary test. If the parties able to influence key causes, pathways, or consequences include other users or institutions, a response plan that stays inside the fence will be incomplete. This is not a call for broad coalition work without purpose. It is a targeted response to specific risk chains. Collective action should be selected where it can plausibly reduce shared risk or improve the reliability of decisions, such as by improving shared understanding of pathways or by aligning actions with catchment strategies and plans.

WP13-10, WP13-06, WP13-12

Collective response must be built with clear ownership and transparent limits. Engagement should be proportionate to the issue and transparent about dependencies, impacts and limits. For collective actions, that transparency includes stating what the operation is contributing, what it expects from other parties, and what outcomes are outside its control. The response plan should connect priority risks to specific collaborative actions, identify owners and partners, and define what evidence will demonstrate participation or delivery. Monitoring must then distinguish contribution evidence from catchment outcomes and state attribution limits. This protects credibility and supports continuity when catchment institutions change or when priorities shift.

WP13-11, WP13-09, WP13-14, WP13-15

DECISION INSTRUMENT

Decision instrument: Collective action necessity test

Use this test to decide whether a priority risk requires beyond-fence actions.

TEST	EVIDENCE READING	DECISION RESPONSE
Influence gap	Key pathway elements influenced by other users or institutions	Add collective actions to the response plan
Shared risk dimension	Regulatory, reputational or shared-infrastructure dimensions present	Include institutional and stakeholder response components
Action feasibility	Forum exists for planning participation or collaboration	Select the forum and define objectives
Evidence definition	Contribution evidence can be defined without implying outcomes	Define contribution indicators and attribution statements

Sources: WP13-06, WP13-07, WP13-10, WP13-13, WP13-14

7.2 Response types: planning, data sharing, collaboration

ICMM lists response options that extend beyond operational improvements: participation in planning, data sharing and collaborative risk reduction. These options should be treated as engineered responses with a defined purpose, scope and evidence plan. Participation in planning should be linked to specific risk pathways and to identified institutions and strategies that shape the operating context. Data sharing should be designed to improve shared understanding of pathways, support coordinated monitoring, or address evidence gaps that constrain decisions. Collaborative risk reduction should target pathway elements that no single party can change alone. Each option should be traced back to the assessment logic so it remains focused on reducing priority risks rather than becoming a general engagement program.

WP13-13, WP13-12, WP13-06

Response planning connects priority risks to actions, owners, partnerships and evidence of performance. For collective response, ownership often spans internal and external parties, so it is important to define roles with care. The operation can own its participation and its data commitments, but it cannot own outcomes that depend on other users or institutions. Monitoring should distinguish site performance from catchment outcomes and name attribution limits. The response plan should therefore define two evidence streams: evidence of delivery of the operation’s commitments, and evidence of catchment context or shared indicators where attribution is limited. Capturing these distinctions in the stewardship record prevents later confusion about what was promised and what was achieved.

WP13-09, WP13-14, WP13-15

DECISION INSTRUMENT

Decision instrument: Collective response design canvas

A structured canvas to design beyond-fence responses with clear roles and evidence.

TEST	EVIDENCE READING	DECISION RESPONSE
Target risk chain	Which prioritised risk chain the response addresses	Select one chain per canvas to maintain focus
Response type	Planning participation, data sharing, or collaboration	Choose type based on influence map and evidence gaps
Partners and forums	Institutions and users involved, and the forum used	Align to identified strategies and decision cycles
Operation commitments	What the operation will do and by when	Define deliverables within operational control
Evidence plan	Participation evidence and monitoring separation logic	State attribution limits and reporting language

Sources: WP13-06, WP13-09, WP13-12, WP13-13, WP13-14

7.3 Governance, transparency and revision triggers

Collective response must anticipate change. Catchment strategies and responsible institutions shape the operating context over time, and that context can shift through plan updates, institutional restructuring, or changes in user priorities. Response plans should therefore include revision triggers. These triggers are part of a stewardship record that makes boundaries, assumptions, evidence, decisions and revision triggers visible. For collective actions, triggers can include changes in the relevant institution, shifts in catchment planning priorities, emergence of new users, or new evidence that changes the understanding of pathways. Without triggers, collective actions often persist by inertia even after they stop addressing the priority risks.

WP13-12, WP13-15, WP13-04, WP13-06

Transparency is the operating discipline for governance. Engagement should be proportionate and transparent about dependencies, impacts and limits. In collective settings, transparency also means clarity about what monitoring can and cannot attribute. Monitoring should distinguish site performance from catchment outcomes and name the limits of attribution, especially when shared indicators are discussed publicly. A clear transparency stance reduces reputational risk and improves the quality of collaboration because expectations are anchored to what each party can control. It also supports internal governance by allowing risk owners to see whether the collective response remains aligned to the assessment and whether evidence is being generated to support decisions.

WP13-11, WP13-14, WP13-07, WP13-09

DECISION INSTRUMENT

Decision instrument: Collective response governance checklist

A governance checklist to keep collective actions aligned, transparent and updateable.

TEST	EVIDENCE READING	DECISION RESPONSE
Alignment	Collective action linked to a prioritised risk chain	Stop or redesign actions that cannot be linked
Role clarity	Operation role, partner roles and limits stated	Publish role statements appropriate to the forum
Evidence governance	Evidence of participation and monitoring separation defined	Use contribution language where attribution is limited
Revision triggers	Triggers for review and redesign defined	Record triggers and set review cadence
Transparency standard	Dependencies, impacts and limits consistently disclosed	Apply proportionate disclosure across forums

Sources: WP13-09, WP13-11, WP13-14, WP13-15



08

CHAPTER 8

The stewardship evidence room

Credible catchment stewardship depends on an evidence room that preserves boundaries, assumptions and decisions, and that supports monitoring statements that separate performance, contribution and outcomes.

Record

MAKE ASSUMPTIONS, BOUNDARIES, EVIDENCE, DECISIONS AND REVISION TRIGGERS VISIBLE | WP13-15

Separate

DISTINGUISH SITE PERFORMANCE MONITORING FROM CATCHMENT OUTCOMES AND STATE LIMIT | WP13-14

Response-link

CONNECT PRIORITY RISKS TO ACTIONS, OWNERS, PARTNERSHIPS AND EVIDENCE OF PERFORM | WP13-09

8.1 What the evidence room contains

A catchment approach generates many artefacts: system maps, user and institution registers, risk chains, response plans, engagement records and monitoring designs. Without an organising structure, these artefacts become a set of disconnected files and the logic of decisions is lost. A water-stewardship record should make assumptions, boundaries, evidence, decisions and revision triggers visible. Think of this as an evidence room that supports review and learning. It allows an internal or external reviewer to trace from a risk decision back to the awareness evidence and boundary choices, and forward to response actions and monitoring plans. It also reduces rework because new teams can see what has already been tested, what remains uncertain, and what is out of scope by design.

WP13-15, WP13-01, WP13-06

The evidence room should reflect the awareness, assessment and response progression. Awareness artefacts include physical setting, users, institutions, plans and strategies, material changes, and stakeholder concerns treated as evidence inputs. Assessment artefacts include risk chains with causes, pathways, consequences and influence mapping across parties. Response artefacts include actions, owners, partnerships and evidence plans, including where site controls are necessary and where collective response beyond the fence is required. This structure supports governance because it aligns the evidence to the stage gates used to approve work and funding. It also supports engagement transparency by providing a consistent source of truth for what the operation depends on, impacts, and can and cannot control.

WP13-04, WP13-05, WP13-06, WP13-09

DECISION INSTRUMENT

Decision instrument: Evidence room index structure

An index template for organising stewardship evidence so decisions remain traceable.

TEST	EVIDENCE READING	DECISION RESPONSE
Awareness folder	Physical setting, users, institutions, plans, changes, concerns	Do not start assessment without a complete awareness index
Assessment folder	Risk chains, influence maps, prioritisation criteria	Require complete chains before response approval
Response folder	Actions, owners, partnerships, evidence plans	Approve only when ownership and evidence are defined
Monitoring folder	Monitoring separation matrix and attribution statements	Require attribution limits in all monitoring narratives
Revision log	Boundary changes, assumption updates, trigger events	Update log at each formal review

Sources: WP13-04, WP13-06, WP13-09, WP13-14, WP13-15

8.2 Making attribution limits explicit

Attribution is the fault line in catchment stewardship reporting. ICMM notes that monitoring should distinguish site performance from catchment outcomes and name the limits of attribution. This extends beyond a technical matter. It is also a trust matter, because overstated claims about outcomes can damage credibility with institutions and stakeholders. The evidence room should therefore carry standard attribution statements for each priority risk pathway and response. These statements should specify what is being claimed as site performance, what is being claimed as contribution to collective response, and what is being tracked as catchment context. The statements should be linked to the analytical boundary and to the influence map, so the logic is consistent and repeatable across reports and forums.

WP13-14, WP13-06, WP13-03

This attribution discipline also clarifies when new evidence is needed. If a risk pathway is shared and the operation wants to claim that a response reduced catchment risk, the evidence room should show what evidence would be required and whether it is feasible given multiple parties and institutional controls. Often, the correct claim is contribution rather than outcome. Response planning should still connect actions to evidence of performance, but the evidence should be matched to what can be attributed. Engagement should be transparent about these limits. Proportionate transparency reduces reputational risk and supports constructive collaboration because partners can see what each party is taking responsibility for and where shared indicators are still needed to understand system change.

WP13-09, WP13-11, WP13-07, WP13-14

DECISION INSTRUMENT

Decision instrument: Attribution statement checklist

A checklist to ensure attribution language is consistent with boundaries, influence and monitoring design.

TEST	EVIDENCE READING	DECISION RESPONSE
Claim type	Performance, contribution, or outcome identified	Use contribution where outcomes depend on multiple parties
Boundary consistency	Claim references the analytical boundary used	Add boundary note if audience could assume site-only scope
Influence consistency	Claim aligns with parties able to influence pathway elements	Revise claims that overstate site control
Monitoring support	Monitoring line supports the claim	Do not publish claims not supported by monitoring design
Record link	Claim linked to stewardship record evidence	Store claim text and evidence references in evidence room

Sources: WP13-14, WP13-03, WP13-06, WP13-15

8.3 Assurance and continuous revision

Catchment stewardship is exposed to change, so assurance must focus on whether the sequence and record remain intact. The awareness, assessment and response progression provides a practical audit trail: awareness establishes context, assessment tests pathways and influence, and response links actions to owners, partnerships and evidence. Assurance should test whether each stage is supported by evidence in the record, whether boundaries are explicit and defensible, and whether stakeholder concerns have been treated as assessment evidence. It should also test whether response plans acknowledge where collective action is required beyond the fence and whether engagement has been proportionate and transparent about dependencies, impacts and limits. These checks strengthen decision quality without requiring claims of quantified outcomes that are not present in the dossier.

WP13-01, WP13-05, WP13-09, WP13-10

Continuous revision is controlled by triggers, not by habit. The stewardship record should define revision triggers for boundaries, assumptions, prioritisation and monitoring. Triggers can arise from material changes in users, institutions, plans and strategies, or from new evidence that changes understanding of pathways or consequences. Monitoring should be designed to support this revision cycle by showing site performance, contribution evidence and catchment context, while stating attribution limits. When a trigger is met, the evidence room should record what changed, what decision was taken, and what new evidence is required. This discipline keeps catchment stewardship current and defensible in front of internal governance and external forums.

WP13-15, WP13-04, WP13-12, WP13-14

DECISION INSTRUMENT

Decision instrument: Stewardship assurance gate

A gate to confirm the stewardship system remains decision-ready as context changes.

TEST	EVIDENCE READING	DECISION RESPONSE
Sequence integrity	Awareness, assessment and response artefacts present and linked	Hold approvals until missing links are completed
Boundary validity	Analytical boundary documented with revision triggers	Review boundary when triggers are met
Concern handling	Stakeholder concerns recorded and tested in assessment	Reopen assessment if concerns were treated as an appendix
Collective need	Shared risks with beyond-fence influence identified	Require collective response plan where necessary
Attribution discipline	Monitoring statements separate performance and outcomes	Revise reporting language and evidence plans as needed

Sources: WP13-01, WP13-05, WP13-10, WP13-14, WP13-15

Decision checklist

Use these questions before the next gate, assurance review or capital commitment.

- | | |
|--|--|
| <p>01 Define the analytical boundary explicitly and confirm it differs from the operational boundary where needed, including surface water, ground-water and connected users. [WP13-03]</p> | <p>02 Complete awareness outputs on physical setting, users, institutions, plans, strategies and material changes before scoring risks. [WP13-04] [WP13-12]</p> |
| <p>03 Capture stakeholder concerns and priorities as assessment evidence and convert them into testable pathway hypotheses. [WP13-05][WP13-06]</p> | <p>04 Build risk chains with causes, pathways, consequences and influence mapping, covering quantity, quality, regulatory, reputational and shared-infrastructure dimensions. [WP13-06] [WP13-07]</p> |
| <p>05 Test for the efficiency trap: confirm that good site performance does not mask material catchment risk driven by external pressure. [WP13-08]</p> | <p>06 For each priority risk, select response types and assign owners and partners, including beyond-fence collective actions where site controls are insufficient. [WP13-09][WP13-10][WP13-13]</p> |
| <p>07 Design monitoring that separates site performance from catchment outcomes and state limits of attribution in reporting language. [WP13-14]</p> | <p>08 Maintain an evidence room that records assumptions, boundaries, evidence, decisions and revision triggers, and update it when triggers are met. [WP13-15]</p> |
| <p>09 Keep engagement proportionate to the issue and transparent about dependencies, impacts and limits. [WP13-11]</p> | <p>10 Review alignment with catchment strategies and responsible institutions at set intervals or when plans change. [WP13-12][WP13-15]</p> |
| <p>11 When collective action is pursued, document the operation's commitments as deliverables and track contribution evidence separately from catchment outcome indicators. [WP13-09] [WP13-14]</p> | <p>12 At each formal review, confirm that awareness, assessment and response artefacts remain linked and current. [WP13-01][WP13-15]</p> |

Evidence ledger 1 of 2

Only dossier rows used in this edition are listed. Concise excerpts identify each registered statement; the source audit retains the complete dossier reference.

ROW	REGISTERED EVIDENCE EXCERPT	REGISTERED SOURCE
WP13-01	ICMM's practical guide structures catchment-based water management around awareness, assessment and response.	ICMM, Practical Guide to Catchment-Based Water Management, 2015
WP13-02	A catchment approach reads the operation in the wider hydrological, social, environmental, economic and institutional system.	ICMM 2015, Awareness
WP13-03	The boundary for analysis may differ from the operational boundary and should account for surface water, groundwater and connected users.	ICMM 2015, Awareness
WP13-04	Awareness includes the catchment's physical setting, water users, institutions, plans, strategies and material changes.	ICMM 2015, Step 1
WP13-05	Stakeholder concerns and priorities are evidence for the assessment, not a communications appendix.	ICMM 2015, Step 1
WP13-06	The assessment identifies water-related risks, their causes, pathways, consequences and the parties able to influence them.	ICMM 2015, Step 2
WP13-07	Water risk includes quantity, quality, regulatory, reputational and shared-infrastructure dimensions.	ICMM 2015, Step 2
WP13-08	A site can be efficient and still face material catchment risk if other users, institutions or ecosystems are under pressure.	ICMM 2015, assessment logic

Evidence ledger 2 of 2

Only dossier rows used in this edition are listed. Concise excerpts identify each registered statement; the source audit retains the complete dossier reference.

ROW	REGISTERED EVIDENCE EXCERPT	REGISTERED SOURCE
WP13-09	Response planning connects priority risks to actions, owners, partnerships and evidence of performance.	ICMM 2015, Step 3
WP13-10	Site controls remain necessary, but catchment risk may require collective action beyond the fence.	ICMM 2015, Step 3
WP13-11	Engagement should be proportionate to the issue and transparent about the operation's dependencies, impacts and limits.	ICMM 2015, stakeholder guidance
WP13-12	Catchment management strategies and responsible institutions should be identified because they shape the operating context over time.	ICMM 2015, section 1.3.2
WP13-13	Response options include operational improvements, participation in planning, data sharing and collaborative risk reduction.	ICMM 2015, Response
WP13-14	Monitoring should distinguish site performance from catchment outcomes and name the limits of attribution.	ICMM 2015, response and monitoring logic
WP13-15	A water-stewardship record should make assumptions, boundaries, evidence, decisions and revision triggers visible.	Synthesis of ICMM 2015 Steps 1 to 3

Glossary

Catchment-based water management

A practice approach that reads an operation in the wider hydrological, social, environmental, economic and institutional system and structures work around awareness, assessment and response.

Analytical boundary

The boundary chosen for analysis that may differ from the operational boundary and should account for surface water, groundwater and connected users.

Awareness, assessment and response

A staged sequence in which awareness builds system context, assessment identifies risks with causes, pathways and consequences plus parties able to influence them, and response links priority risks to actions, owners, partnerships and evidence.

Risk pathway

The mechanism linking a cause to a consequence, used to structure assessment and to identify where controls and partnerships can influence outcomes.

Attribution limit

A stated limitation on claiming causation for catchment outcomes, requiring monitoring to distinguish site performance from catchment outcomes and to identify what cannot be attributed to the operation alone.

Stewardship record

A record that makes assumptions, boundaries, evidence, decisions and revision triggers visible to support traceability and review over time.

Collective response

A response beyond the fence, such as participation in planning, data sharing or collaborative risk reduction, used when site controls are necessary but insufficient to address catchment risk.

Shared-infrastructure risk

A water risk dimension that arises where infrastructure links users or creates shared constraints and dependencies within the catchment context.

Stakeholder concerns as evidence

The practice of treating stakeholder concerns and priorities as inputs to assessment rather than as a separate communications appendix.

Influence map

An assessment output that identifies the parties able to influence risk causes, pathways and consequences, used to assign response owners and partnership needs.

Catchment strategies and institutions

Plans, strategies and responsible institutions that shape the operating context over time and should be identified in awareness.

Monitoring separation

The monitoring design discipline that separates measures of site performance from catchment outcome indicators and from contribution evidence.

Response options beyond operations

Non-site response types including participation in planning, data sharing and collaborative risk reduction, used to manage shared catchment risks.

Material change (catchment)

A change in the catchment physical setting, users, institutions, plans or strategies that can affect risk exposure and can trigger a revision of boundaries or priorities.

Proportionate engagement

Engagement matched to the issue, conducted transparently about dependencies, impacts and limits.

Evidence room

An organised set of stewardship artefacts that preserves traceability from awareness evidence through assessment logic to response and monitoring decisions.

Efficiency trap

A situation where a site appears efficient but still faces material catchment risk due to external pressures from other users, institutions or ecosystems.

Contribution evidence

Evidence that an operation participated in planning, shared data or delivered agreed collaborative actions, distinct from catchment outcomes.

References and limitations

ICMM (2015)

Practical Guide to Catchment-Based Water Management. Archived source used for WP13 evidence dossier rows WP13-01 to WP13-14.

ICMM (2015)

Synthesis note derived from Practical Guide to Catchment-Based Water Management (stewardship record visibility). Registered as a synthesis statement in dossier row WP13-15; used only as labelled.

ICMM (2015)

Practical Guide to Catchment-Based Water Management, Awareness step excerpts. Cited via dossier rows WP13-02 to WP13-05 for awareness scope and stakeholder concerns as evidence.

ICMM (2015)

Practical Guide to Catchment-Based Water Management, Assessment step excerpts. Cited via dossier rows WP13-06 to WP13-08 for risk chain logic and risk dimensions.

ICMM (2015)

Practical Guide to Catchment-Based Water Management, Response and monitoring logic excerpts. Cited via dossier rows WP13-09 to WP13-14 for response planning, collective action and monitoring attribution limits.

ICMM (2015)

Practical Guide to Catchment-Based Water Management, Institution and strategy context excerpt. Cited via dossier row WP13-12 for identifying catchment strategies and responsible institutions.

USE LIMITATIONS

- This paper is a practice synthesis derived from an archived ICMM guide and carries no site water balance, abstraction volume, discharge result or client location. [WP13-01]
- No numerical water claim is permitted unless separately registered from an archived primary source, and none is present in the WP13 dossier. [WP13-01]
- The content must not imply legal compliance, basin authority, water rights or measured improvement for a client. [WP13-01]
- Monitoring and performance discussion is limited to frameworks that distinguish site performance from catchment outcomes and state limits of attribution. [WP13-14]
- Statements about stewardship records and evidence rooms reflect a synthesis of ICMM steps and are labelled accordingly. [WP13-15]

EDITION STATUS

This technical paper is an editorial synthesis for decision support. It is not a feasibility study, investment recommendation, legal opinion or project-specific assurance statement.



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Published as part of the Aurus Mining technical paper series. Mining, infrastructure, engineering and environment decisions are treated as one connected system, with evidence boundaries stated and source rows preserved.

Prepared for digital distribution in A4 format. Edition 1, 2026.

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