COAL ASSETS
AUSTRALIA

GLENCORE

Regional Asset HSEC Protocol

Catastrophic Hazards

Document Number:	GCAA-625378177-13271
Status:	Approved
Version:	1.0
Effective:	15/03/2018
Review:	15/03/2021
Owner:	Manager-Systems and Compliance

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1 Purpose

Catastrophic events are very rare, but if they do occur, the results can be devastating when compared with more frequent but still tragic and preventable incidents such as fatal accidents and lost time injuries.

The rarity of *catastrophic events*, and past success in prevention, can lead to a loss of focus on the implementation of the controls as fewer people have first-hand experience with these sorts of events. Experience from within the industry and other sectors suggest they warrant specific attention at the highest level in the organisation. The history of major disasters, both in mining and other industries, suggests that generally the controls were known but their implementation was inconsistent.

This Protocol supports the requirements of GCAA Standard ***G HSEC POL 0010 – Glencore Corporate Risk Management*** and is also based on and aligns with Glencore Policy ***G HSEC POL 0003 – Catastrophic and Fatal Hazard Management*** and Glencore Guideline ***G HS GDL 004 - Catastrophic Hazard and Critical Controls Management.***

The purpose of this Protocol is to provide details to enable GCAA and Operations* to implement processes to manage *catastrophic hazards,* their associated controls and *critical controls*.

Personnel directly exposed, and others who have a legitimate interest in the catastrophic hazards, are to maintain knowledge and awareness of catastrophic hazards and the associated controls.

A rigorous monitoring and reporting process is essential to monitor the effectiveness of *critical controls for catastrophic hazards*. This includes reporting conformances and non-conformances to senior management with deficiencies identified and corrected.

Note

Glencore and GCAA use the term catastrophic hazards, which is equivalent to the term Material Unwanted Events (MUE) as referred to in documents by the International Council on Mining and Metals (ICMM).

2 Scope

This document provides the process for identifying and managing catastrophic hazards for GCAA and its Operations*. The requirements apply to all personnel, including managers, employees and contractors, at all levels, unless specifically excluded.

Where additional requirements or obligations are identified by an Operation they are to be included in their Health, Safety, Environment and Community (HSEC) Management System and maintained to an equivalent standard.

Note

** The term "Glencore Coal Assets Australia and its operations' includes all mines, projects and administrative support services operating as part of Glencore Coal Assets Australia.*

3 Document Map

The document map, shown in ***Figure 3-1***, provides a graphical reference of all documents directly related to catastrophic hazard management.

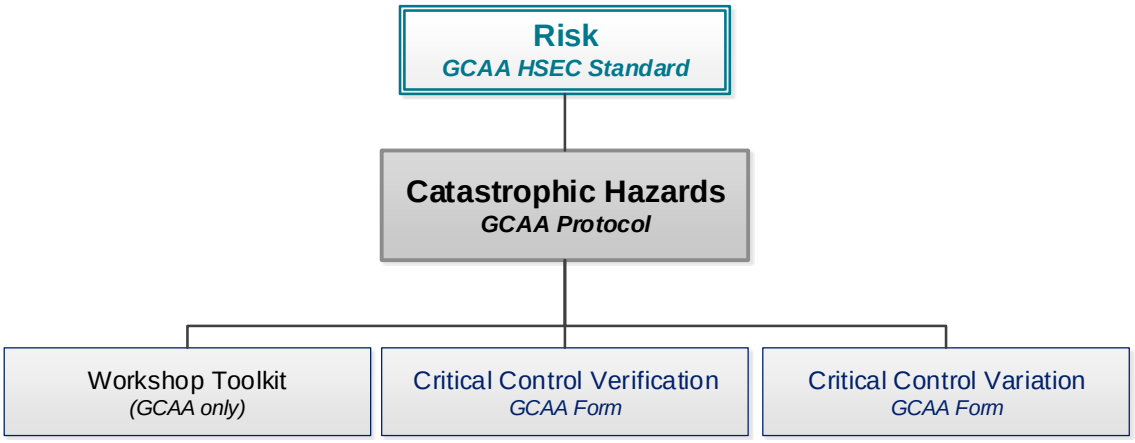


Figure 3-1 – Catastrophic hazard document map (proposed documents)

4 Catastrophic Hazard Management

Catastrophic hazards are hazards, which although very rare, could result in disastrous consequences if they do occur. Catastrophic hazards and their related risks are to be identified using thorough risk based processes. The methodology is to be consistent with the GCAA risk management framework, using tools appropriate to the situation. The process is to include the use of experienced facilitators and personnel, industry knowledge and learning's, and external expertise where appropriate.

Hazards identified through the *Broad Brush Risk Assessment* (BBRA) with a *Potential Maximum Consequence* (PMC) rating of five are categorised as *catastrophic hazards*.

An approach that places the focus on process safety, leadership, ownership and oversight, is required for the prevention of catastrophic events. Catastrophic hazards are to be controlled at all times, with clear accountabilities to manage controls where needed. *Catastrophic hazards* are to be owned by senior leaders and adopted by line managers and site personnel to become an accepted and fundamental part of work processes.

Operations are to identify and facilitate training to provide knowledge and awareness for those people directly exposed, and others who have a legitimate interest in the catastrophic hazards.

Note

Prevention of catastrophic events requires specific attention at the highest level of the organisation.

GCAA *catastrophic hazard* management includes the following key aspects:

a) A risk register that is readily available and up to date, identifying the PMC 5 events (*catastrophic hazards*) for all workplaces, which assesses catastrophic hazards associated with facilities, structures, activities or situations on a regular basis.

b) Developing a *Bow Tie Risk Analysis* for each *catastrophic hazard* for GCAA.

c) Identifying specific controls that require additional monitoring and reporting (*critical controls)* to manage *catastrophic hazards* and for implementation across all Operations where relevant.

d) Monitoring and verifying *catastrophic hazards* and *critical controls.*

A *critical control* is a control that is crucial to preventing an event or mitigating the consequences of the event. The absence or failure of a *critical control* would significantly increase the risk despite the existence of the other controls. In addition, a control that prevents more than one cause or mitigates more than one consequence is normally classified as critical.

GCAA has established a process flow for the treatment and management of catastrophic hazards, as shown in ***Appendix A - Catastrophic Hazard Process Flow***. GCAA facilitate this process, summarised in ***Table 4-1***, with representation from relevant Operations, and apply minimum standards regarding *catastrophic hazard* management. Operations review and implement the requirements as designed, through hazard management plans (refer to for ***Section 6 - Hazard Management Plans*** more details).

Facilitation	Implementation
GCAA	Operations
• Develop and maintain the GCAA H&S risk register • For each *catastrophic hazard* in the risk register, conduct a bow tie risk analysis to identify controls across the Regional Asset • Identify *critical controls* and develop *critical control* verification forms outlining the performance criteria for each *critical control* • Develop a critical control reporting schedule for Operations • Report *critical control* performance to the Department through the GCAA Leadership Team	• Develop a risk register that identifies all *catastrophic hazards* at the Operation • Complete a risk assessment, considering the GCAA bow tie risk analysis, for each identified catastrophic hazard • Develop, implement and maintain a documented management plan which incorporates relevant controls, *critical controls* and the minimum requirements outlined in the hazard protocol. • Report critical control performance internally and to GCAA as per the GCAA Critical Control Schedule

Table 4-1 – Catastrophic hazard process overview

5 Critical Control Management

Critical control management is only relevant for *catastrophic hazards* and includes verification of effectiveness as a key step in preventing a catastrophic event.

The GCAA approach to *critical control* management follows the nine-step ICMM process, as shown in ***Figure 5-1***. The steps are divided between planning (a GCAA function) and implementation (at each Operation), with feedback and review a key part of the process. These steps are described in the following sections.

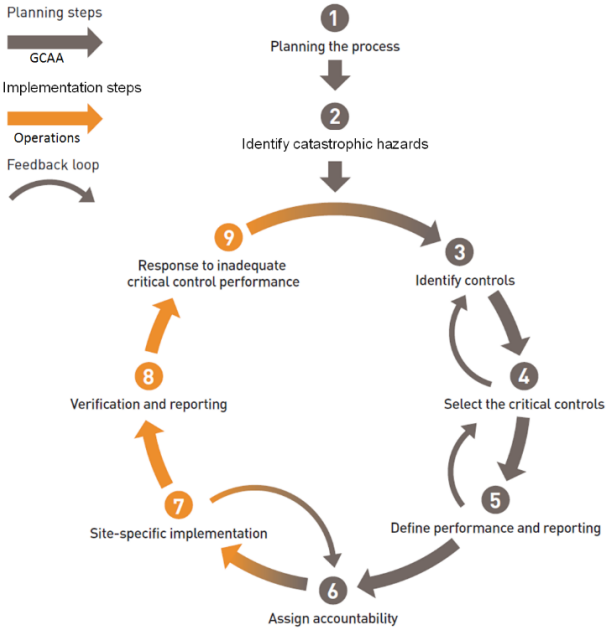


Figure 5-1 – ICMM nine-step process

5.1 Planning the Process

Planning involves key actions to develop a plan that describes the scope of the project which includes:

a) Relevant context.

b) Objectives and key deliverables.

c) Responsibilities.

d) Resources to be involved.

The plan is also required to identify processes for use during the project to:

a) Identify potential hazards and catastrophic events.

b) Assess and rank the risk of each hazard.

c) Review *catastrophic hazards;*

   i. Identify and select *critical controls.*

   ii. Identify objectives and performance criteria, and develop critical control verification activities.

d) Investigate, action and report any underperforming *critical controls.*

e) Identify ownership and accountability.

5.1.1 Resourcing

During planning and implementation of *catastrophic hazard* management, the following resources are critical to the success of the project and suitable personnel are to be identified and appointed as part of the planning process:

a) Steering Committee (selected from the GCAA Leadership Team).

b) GCAA Catastrophic Hazard Project Manager and facilitator.

c) Technical experts (relevant to each identified catastrophic hazard).

d) Catastrophic Hazard Owners (at GCAA and each Operation).

e) Catastrophic Hazard Site Champion (at each Operation).

f) Critical Control Owner (at each Operation).

g) Other Key Stakeholders

GCAA are to use a consultative workgroup approach to review *catastrophic hazards* and identify *critical controls*. The workgroup is to include representation from a cross-section of relevant Operations, where the hazard exists at the Operation, and will include internal and external technical experts.

5.1.1.2 Catastrophic Hazard Owner

Each catastrophic hazard is to be assigned to an owner by GCAA and at each Operation (where the *catastrophic hazard* is applicable at the operation).

GCAA Catastrophic Hazard Owner

The GCAA Chief Operating Officer is to nominate the *GCAA* c*atastrophic hazard owner* who is to be a member of the GCAA *Senior Leadership Team*.

The GCAA *catastrophic hazard owner* is responsible for:

a) reviewing and approving the bowtie, controls, critical controls and verification activities, in conjunction with the technical expert.

b) overseeing the *catastrophic hazard* and associated *critical control verification* process for their particular catastrophic hazard.

c) reviewing and approving any changes or updates submitted by an Operation.

Site Catastrophic Hazard Owner

Each Operations Manager is to delegate a *catastrophic hazard owner* for the Operation, who is to be a member of the *leadership team*. The Operation's *catastrophic hazard owner* is accountable for:

d) Overseeing the *catastrophic hazard* management process for their assigned *catastrophic hazard*. This includes maintaining an understanding of the *catastrophic hazard critical control* health for their Operation, as relevant.

e) Reviewing verification activity findings for the applicable catastrophic hazard.

f) Assisting with reviews and updates to applicable catastrophic hazard documentation including critical controls.

g) Assisting with the analysis of trends specific to the catastrophic hazard.

The site *catastrophic hazard owner* is to assist with the development and submission of any suggested changes or updates. The GCAA *catastrophic hazard owner* is responsible for reviewing and approving variation requests submitted by Operations

5.1.1.1 GCAA Technical Expert

The GCAA *technical expert* is to be a relevant technical subject matter expert for the specific *catastrophic hazard*. This role is identified by members of the GCAA Senior Leadership Team and may vary for each *catastrophic hazard*. The technical expert's role is to:

a) Provide technical expertise and guidance for the specific subject.

b) Participate in *catastrophic hazard* review and *critical control* development processes.

c) Make decisions where there is a difference of opinion, or to resolve any issues, as they arise.

d) Participate in change management activities.

e) Participate in the review and assessment of *Critical Control Variation* requests.

5.1.1.2 Catastrophic Hazard Site Champion

The operations *catastrophic hazard site champion* (*site champion*) is to be a member of the *leadership team*, reporting directly to the Operations Manager. They are responsible for facilitating the implementation of the catastrophic hazard management process. This role is identified by the Operations Manager. The ***site champion's*** role is to:

a) Provide an initial point of contact for the *catastrophic hazard* management process.

b) Oversee and coordinate the implementation of the catastrophic hazard and critical controls at the operation.

c) Provide support and assistance to *site catastrophic hazard* and *critical control owners.*

d) Coach and train operational personnel in catastrophic hazard management including critical controls.

e) Assist with the completion and submission of *Critical Control Variation* requests, where applicable.

f) Coordinate change management with the respective owner for any changes to *critical controls* applicable to their Operation.

g) Report and provide feedback on *catastrophic hazard* and *critical control* performance to the site leadership team.

h) Provide feedback to promote continuous improvement.

5.1.1.3 Critical Control Owner

The Operations Manager at each Operation is to delegate responsibility for every GCAA *critical control* to appropriate site owners. The *critical control owner* should not be the Operations Manager. The owner is to have relevant system technical knowledge of the *critical control*. The critical control owner could also be the Catastrophic Hazard Owner.

The nominated *critical control owner* for each *critical control* is accountable for:

a) the completion of all verification activities for the *critical control* to meet identified reporting timeframes, including entry into CMO.

b) Monitoring, and where needed reporting trends or verification activities that are close to trigger points, with the support of the Health Safety Training Manager or delegates.

c) Reporting any non-conformances and raising appropriate corrective actions.

d) Identifying any changes or reviews to *critical controls.*

For new or updated GCAA *critical controls*, the *critical control owner* is to review all supporting GCAA change management information and complete a site-based change management before implementation. For additional information, refer to GCAA Standard ***HSEC – Change*** and GCAA Procedure ***HSEC – Change Management***.

5.1.1.4 Other Key Stakeholders

Other tasks that support the *critical control* system are performed by key individual as part of their daily activities. This may include:

a) Supervisors, including deputies.

b) ERZ controllers.

c) Ventilation officers.

d) Engineers.

e) Specialist personnel (control room, dispatcher, or similar).

5.2 Identify Catastrophic Hazards

The GCAA risk management process identifies *catastrophic hazards* from the HSEC *broad brush risk assessment*. *Catastrophic hazards* are prioritised by their rating in the risk register, based on their potential maximum consequence rating. Refer to GCAA Standard ***FIN – Risk Management*** for process details. An extract from the Glencore Risk Manager Database is shown in ***Figure 5-2***.

PMC	Current	Title
Cat 5	High	Explosion - underground
Cat 5	High	Inrush - gas or liquids
Cat 5	High	Mobile equipment including pedestrian interactions
Cat 5	Medium	Aviation
Cat 5	Medium	Fire Underground
Cat 5	Medium	Major environmental impact
Cat 5	Medium	Natural disaster
Cat 5	Medium	Outburst (UG Coal)
Cat 5	Medium	Shaft, winders and lift incidents
Cat 5	Medium	Significant community miscontent
Cat 5	Medium	Structural failure
Cat 5	Medium	Surface ground or slope failure
Cat 5	Medium	Toxic or irrespirable atmosphere
Cat 5	Medium	Underground Strata failure
Cat 5	Medium	Tailings Dam failure

Figure 5-2 – GCAA Catastrophic Hazard Register (current as of March 2018)

Identification of the *catastrophic hazard* is to include specific details of:

a) The unwanted event, for example the catastrophic hazard or loss of control event (such as ignition of gas, loss of control of vehicle, or similar).

b) The hazard that leads to the unwanted event.

c) The causes or mechanisms of release of the hazard.

d) The consequences (primary and secondary).

5.3 Identify Controls

Note

Inappropriate controls, such as management plans, processes, and similar controls, lead to unnecessarily complex bow ties that dilute the attention from actual controls. This has a direct impact on preventing or mitigating the catastrophic event.

Bow tie methodology is used to analyse GCAA catastrophic hazards. The consultative workgroup approach is used to develop the *catastrophic hazard* bow tie to identify new or existing controls related to the causes and consequences for the *catastrophic hazard*.

The format of a bow tie, shown in ***Figure 5-3,*** identifies causes and consequences as branch lines with controls identified along the branch. The hazard is identified in the centre of the bow tie with the unwanted event, or top event, related to the hazard.

Figure 5-3 – Example bow tie analysis

Each proposed control is to be reviewed against the control decision tree, shown in ***Appendix B - Control Decision Tree***. This decision tree provides a set of filters to determine if it is a control.

Once the bow tie is developed, the workgroup completes a review for adequacy of the overall bow tie and the controls. The review is to include:

a) Confirmation that the controls are appropriate and relevant for each cause or consequence branch.

b) Assessment against the hierarchy of controls to identify if there is any overdependence of people-type controls over engineering controls.

c) Verification that sufficient controls exist on each branch line to manage the risk or mitigate the consequence.

If the controls are considered to be inadequate, additional controls are to be identified or the issue is to be escalated to the relevant *catastrophic hazard owner* for review.

5.4 Select Critical Controls

Once controls are identified, the workgroup is to select the *critical controls* for each catastrophic hazard, as part of the *catastrophic hazard* review.

The final set of *critical controls* should represent the critical 'few' controls that can effectively manage the *catastrophic hazard*.

Each control is to be validated against the *critical control decision tree*, shown in ***Appendix C - Critical Control Decision Tree***. This decision tree provides a standard set of filters used to validate if a control meets the definition of a *critical control*. Only controls meeting all the criteria are to be selected as a *critical control*. This may be an iterative process.

Identification of each critical control is to include specific details of the objective or intent, the performance requirements and how to measure the control.

The critical controls are to be identified on the full bow tie for the catastrophic hazard. The critical controls should be grouped into layers of defence to confirm the selected *critical controls* are evenly distributed to minimise exposure based on time, where possible. ***Figure 5-4*** shows an example of layers of defence grouping.

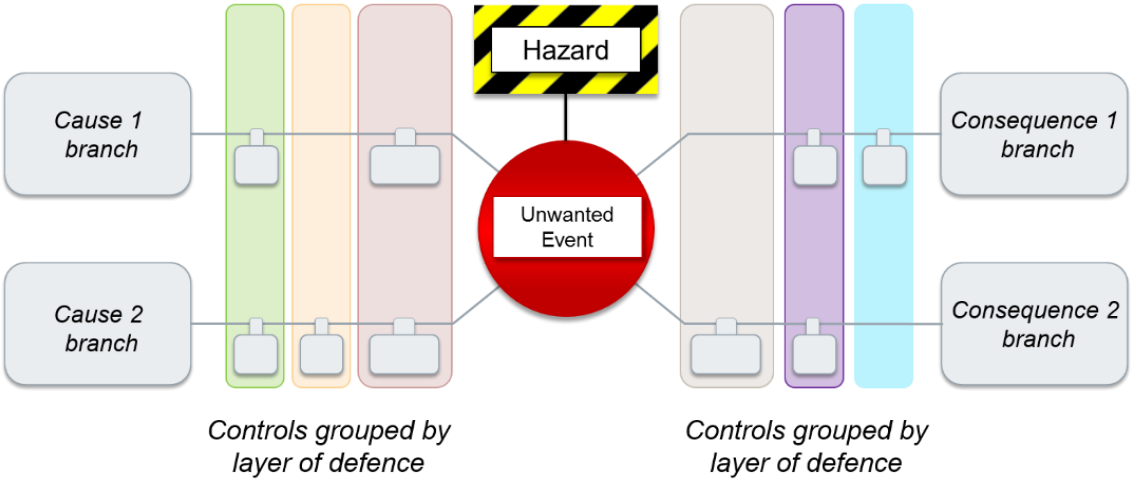


Figure 5-4 – Example critical control bow tie analysis including layers of defence

The workgroup is to review the selected *critical controls* against the hierarchy of controls. This is to identify that the most appropriate and highest level *critical controls* are selected. Senior management approve the selected *critical controls* for each *catastrophic hazard*.

5.4.1 Critical Control Identification Reference Number

As part of the development, each *critical control* is to be allocated a unique identification reference number to provide a link between the *catastrophic hazard*, the bow tie and the critical control verification form. The reference numbers are to be displayed on the GCAA *catastrophic hazard bow tie* and each *Critical Control Verification* form (GCAA Form ***HSEC – Critical Control Verification***). The reference number is derived from the *critical control bow tie* and includes the following details:

a) GCAA *catastrophic hazard* bow tie reference number (the unwanted event/knot).

b) Critical control number.

5.5 Define Performance and Reporting Criteria

Critical controls are actively monitored or verified against their defined performance criteria which is based on the following aspects:

a) Specification – the objective and expected performance of the critical control

b) Erosion factors – factors that lead to the failure of a control, whether immediate or over a period of time.

c) Control supports – tasks conducted to support the implementation and integrity of the control. They support the control objective and are driven by the management systems and processes relevant to the *critical control*.

d) Verification activities – scheduled activities by management personnel using sampling based techniques to verify the control is performing to the required objectives and to confirm it will operate as planned, when or if the control is needed. This includes what, who, how and when verification activities are conducted and reported.

The performance criteria is recorded using GCAA Form ***HSEC – Critical Control Verification***, which also includes details of the *catastrophic hazard* owner and the *critical control* owner.

5.5.1 Performance Triggers

The performance expectations of the *critical controls* are identified in the verification form to assess the performance against the specification requirements and objective. Performance triggers provide guidance to personnel when to stop, when to escalate an issue, or when to include additional monitoring. These triggers are to be reported immediately and action taken to address the issue. Refer to ***Section 5.8 - Verify and Report***.

5.5.2 Control Effectiveness

The measurement of a control's effectiveness is based on the operational performance of the control. The appraisal assists to determine control adequacy and the overall effectiveness of the control in managing the catastrophic hazard.

Control effectiveness has three components:

a) The ability of the control to function as required.

b) The availability and use of the control when required.

c) The extent to which the control eliminates or minimises exposure to a cause or mitigates the severity of a consequence.

Controls are specifiable, measurable, and auditable. The critical control effectiveness should be determined quantitatively where possible. A quantitative approach may not be possible for all controls so a range of methods are available to determine effectiveness. ***Figure 5-5*** provides a process for assessing control effectiveness.

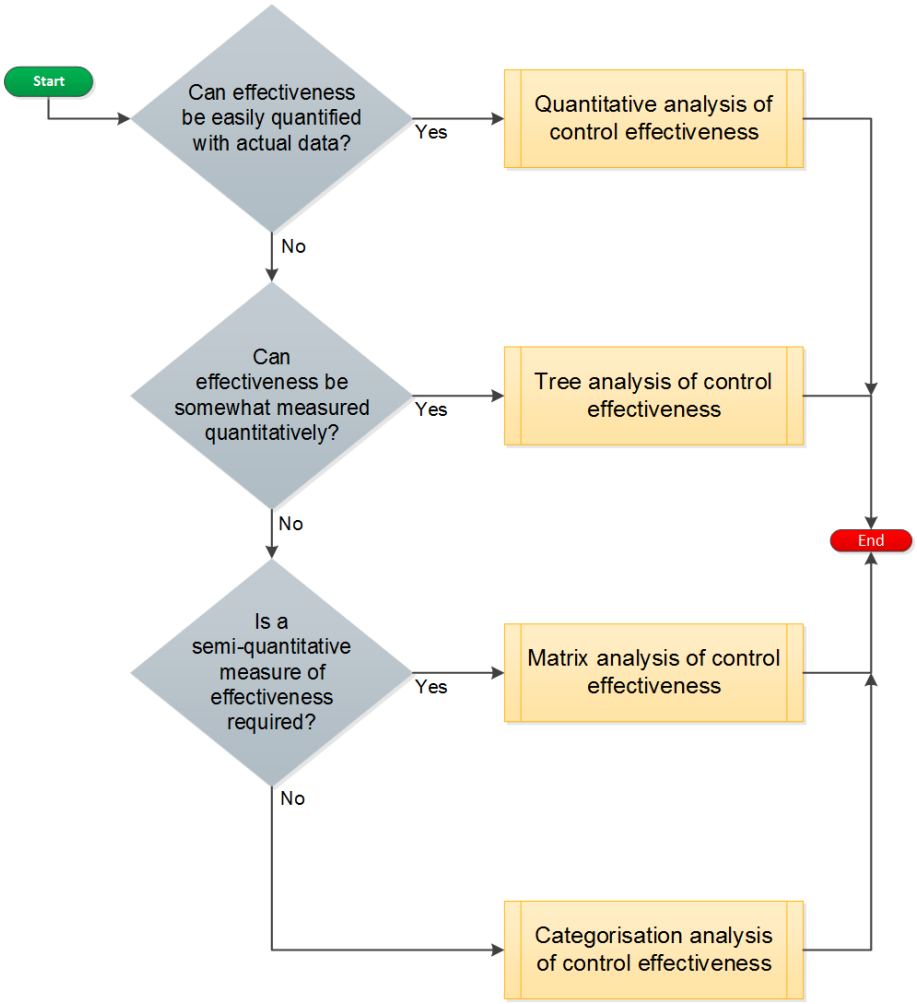


Figure 5-5 – Examples of control effectiveness methods

Control effectiveness can be measured over a period of time to validate the ability of the control to function and be available when needed.

For underperforming critical controls refer to Section ***5.9 - Respond to Underperforming Critical Controls***.

5.6 Assign Accountability

Accountability is to be assigned for *catastrophic hazards* and *critical controls* at GCAA and each Operation. For role requirements refer to Section ***5.1.1 - Resourcing*** for specific details.

5.7 Site Implementation

Catastrophic hazard and critical control implementation is to include *change management* as part of business as usual. GCAA are to provide the *change management* and supporting information to each Operation for review as part of site implementation for each *catastrophic hazard*. Supporting information may include:

a) Bowtie and critical controls

b) Verification form for each critical control

c) Gap analysis tool to assist with implementation and change management

d) Communication and educational materials for the catastrophic hazard.

The site implementation *change management* process is to include specific information relating to:

e) Assessment of applicability of the *catastrophic hazard* and *critical controls* to the Operation, supported by a risk assessment.

f) Variation request(s) and supporting documentation, if variations are required.

g) Implementation gap analysis, action plan and timeframes.

h) Accountabilities and responsibilities for each catastrophic hazard and associated *critical controls*.

i) Communication and education strategy for all associated changes.

j) System documentation updates supported by change management.

The *leadership team* at the operation are responsible for leading and driving the site implementation phase. Line managers should be involved with implementing the catastrophic hazard process to assist with their understanding of the process as well as embedding the process into operational systems.

5.7.1 Variation Requests

Note

No changes are permitted to catastrophic hazard and critical control management without a completed variation request. The request process includes a technical review before approval or changes to monthly reporting.

All GCAA identified *catastrophic hazards* and *critical controls* are mandatory, however, GCAA recognise there may be situations where some *catastrophic hazards* or *critical controls* may not be relevant to a particular Operation. GCAA recognise that an Operation may require a variation to a *critical control* due to a unique situation or condition. In addition, an Operation may identify a new *critical control* or new processes to manage *critical control*s. To accommodate this the variation process, as shown in ***Appendix D - Variation Process***, provides the ability for Operations to:

a) Request a waiver to an existing GCAA *critical control* or performance criteria.

b) Propose a new *critical control* including new or modification to performance criteria.

c) Request a waiver to a GCAA *catastrophic hazard*.

Any additions, modifications, or exemptions to the GCAA *critical controls* are to be identified as part of each Operation's *change management* process, and supported by risk assessment. The Operation is to complete GCAA Form ***HSEC - Critical Control Variation Request*** for any variation as described above. This is to include consultation with relevant site personnel such as the General Manager, Operations Manager, Health Safety Training Manager (or *site champion*), and technical experts. The request is to include suitable justification and appropriate evidence that the particular issue, risk, or infrastructure does or does not exist at that Operation. Operations are to retain a copy of the completed variation requests as a site record.

The relevant GCAA *catastrophic hazard owner*, in consultation with the GCAA Technical Expert is responsible for approving variation requests. The identified GCAA Technical Expert, is to assist with the review and provide any additional guidance and recommendations. The GCAA *catastrophic hazard owner* may need additional information or consultation to make a determination.

The GCAA *catastrophic hazard owner* is to inform the relevant accountable personnel of the variation request outcomes. Completed forms are to be retained as a record and a copy provided to the originating Operation.

5.8 Verify and Report

The person completing the *verification activity* is to be a senior member of the Operation, which includes coordinators, superintendents and managers. They are responsible for:

a) Completing *critical control* verification activities and associated reporting within the identified timeframes.

b) Reporting any inadequate performance or non-conformances to the *critical control owner/catastrophic hazard owner*.

c) Identifying any improvement opportunities to the *critical control owner/catastrophic hazard owner*.

Verification reporting activities are rated based on Glencore's performance triggers as follows:

a) Red - an issue was identified in a *critical control* which:

   i. identified an exceedance of the threshold defined in the *critical control* performance specification and was not acted upon or rectified.
   ii. may have allowed a catastrophic event to occur in certain circumstances.
   iii. involved the continuation of an amber event over two reporting periods.

b) Amber - an issue was identified in a *critical control* that:

   i. was rectified immediately and did not increase the probability of a catastrophic event,
   ii. or where a scheduled critical control was not verified within its reporting period.

c) Green – no issues identified.

GCAA are to develop a schedule of *verification activities* as part of the process, which is to be based on the *Verification Form* criteria. This schedule is to be reviewed when catastrophic hazards are reviewed, or when triggered by change management.

Verification activity findings are to be recorded in CMO at the required frequency. Where red or amber ratings are recorded, actions are to be raised to:

a) Rectify the immediate issue found.

b) Investigate the failure to establish whether systemic issues need to be managed.

Where a *critical control* verification activity was not conducted within the defined schedule, it should be reported as such.

Where a control support task initiates a stop trigger, an incident report is to be completed and recorded against the *catastrophic hazard* and *critical control*. It is to be reported as an amber or red, depending on the incident.

For underperforming critical controls refer to Section ***5.9 - Respond to Underperforming Critical Controls***.

5.8.1 Monthly Reporting (Operation)

The Health, Safety and Training Manager or *site champion* at each Operation is responsible for the management and coordination of *critical control* reporting to GCAA, in conjunction with the Operations Manager. Their role includes:

a) Overseeing and managing the *critical control* reporting database for completion of verification activities.

b) Assisting site personnel with the effective completion of verification activities, including assistance with the development and tracking of action management for any non-conformances.

c) Completing reviews against the site *Health Safety Management System* (or equivalent) and embedding the critical control management processes.

d) Assisting *catastrophic hazard owners* and *critical control owners* in the identification of any trends and completing performance reviews of critical controls.

Monthly critical control reports are to include the following information:

a) Rating of each critical control (red, amber, or green).

b) Number of scheduled verifications.

c) Number of verifications not carried out on schedule.

d) Percentage of verifications not carried out on schedule.

e) *Critical control* corrective actions open.

f) *Critical control* corrective actions overdue.

5.8.2 GCAA Reporting

The *Health, Safety and Training Monthly Report* is to include Operational monthly critical control reporting. The report is to include a thirteen-month overview of the rating of each *catastrophic hazard*, *critical control* failures, and any actions the Operation has assigned to address issues.

The General Manager - Health, Safety and Training is responsible for the *catastrophic hazard* and *critical control* reporting to Glencore Coal. The quarterly report is to include the following information:

a) Red and amber rated catastrophic hazards.

b) Percentage of verifications not carried out on schedule.

c) Actions taken, when required.

5.9 Respond to Underperforming Critical Controls

If a *critical control* performance indicator is reported outside the performance criteria, the *critical control owner* is to take immediate actions to rectify or isolate the condition, relevant to the critical control. An incident is to be initiated including an investigation to identify the cause of the inadequate performance. For incident reporting details refer to GCAA Procedure ***HSEC – Incident Reporting and Investigation***.

The Health, Safety and Training Manager, or the *site champion* at each Operation is responsible for monitoring *critical controls* and action management. This is to include analysis to identify:

a) Trending.

b) Leading indicators.

c) Inadequate critical control performances and identified causes.

d) Incomplete actions from previous reporting periods.

e) Potential systemic related causes or events.

For any HSEC incident with a potential or actual maximum consequence rating of five, the Health, Safety, Training Manager is to determine if a *critical control* failed or contributed to the incident. The causes of the failure are to be established and suitable corrections applied, including a review or update of the applicable *critical control* if applicable. The review should include the adequacy of the *critical control* and whether there is a more suitable control or additional *critical controls* are needed.

6 Hazard Management Plans

Each Operation is to review their Health and Safety Management System (or similar) and implement the requirements of the catastrophic hazards. A management plan is to be developed and maintained for all relevant catastrophic hazards. This may be part of an existing document, not necessarily an additional document for each hazard. The system is to identify the following elements, as a minimum for each catastrophic hazard:

a) Bow tie risk analysis (causes, consequences and controls).

b) Critical controls identified.

c) Accountabilities and responsibilities related to the catastrophic hazard.

d) References to supporting processes and procedures.

e) Training and competency requirements.

f) Monitoring and review processes.

Note

Catastrophic hazards and associated critical controls are to be incorporated into existing site documentation where applicable, not created as an additional stand-alone document.

7 Communication and Training

Operations are to identify any specific *catastrophic hazard* and *critical control* training in the site *Training Needs Analysis*. Records are to be created of regular communications (internal and external) and training of persons so they are aware of the hazards, and associated critical controls. Training is to provide information to develop an understanding of how the catastrophic hazards are created and released, and why particular actions are required to control them.

It is important to develop and coach our leaders and workers in the processes to fully integrate the management of catastrophic hazards into the way we do business. Awareness packages will be developed for the GCAA *catastrophic hazard* and *critical control*s. The packages address the roles and responsibilities for workers, supervisors and managers

Refer to GCAA Standard ***HSEC – Training*** for specific details.

Training is to include processes to assess all levels of training for understanding and awareness, such as competency assessments and safety interactions.

The model shown in ***Figure 7-1*** outlines the *catastrophic hazard* and *critical control* management relationship between senior leaders, managers and workers.

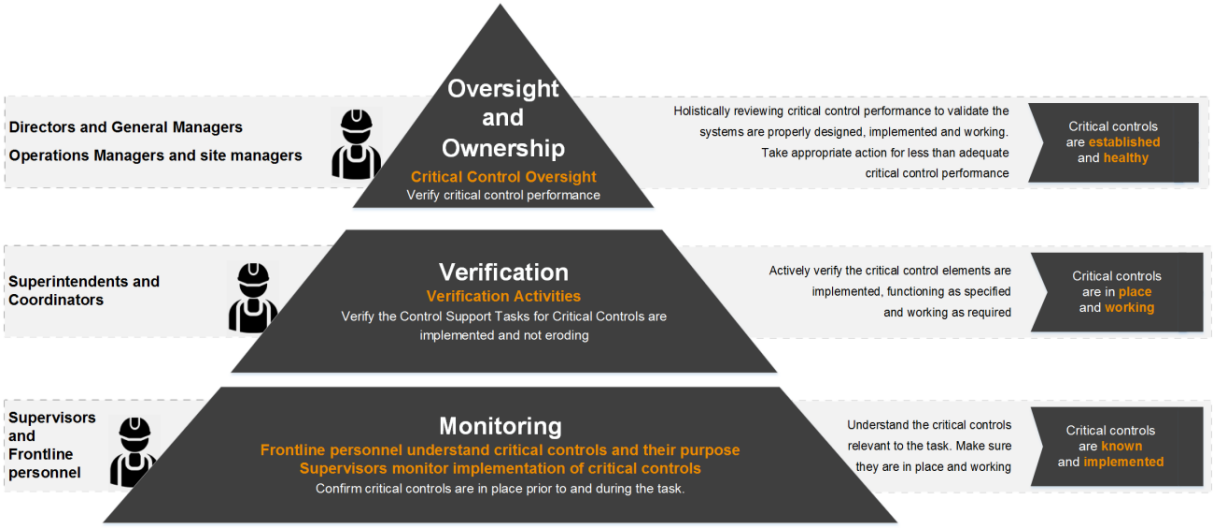


Figure 7-1 – Resource responsibilities

8 Monitor, Review, and Assure

The GCAA General Manager - Health, Safety, and Training is accountable for facilitating a review of all *catastrophic hazard bow ties* on a two-yearly basis, unless triggered earlier. A review may be triggered by:

a) A potential or actual catastrophic incident within GCAA, Glencore or the Industry.

b) A change or impact to the risk profile at an Operation or GCAA.

c) Trending or performance leading indications.

The reviews are to include a technical workgroup of subject matter experts for that particular *catastrophic hazard*. The workgroup is to include representation from Operations where the *catastrophic hazard* is applicable, the GCAA *technical expert* and representation from relevant support areas (for example, engineering, health and safety).

A post implementation verification activity will be conducted to review the implementation at each Operation to confirm:

a) Implementation of the *catastrophic hazard* process, as per this protocol and associated system.

b) Completion of a *change management*, including a gap analysis for the *catastrophic hazards*.

c) Identification and delegation of *critical control* owners.

d) Completion of verification activities and reporting at the specified frequencies.

9 Document Information

Related documents and reference information in this section provides a single reference point to develop and maintain site compliance information.

9.1 Definitions

All terms and definitions are detailed in a single GCAA Register ***HSEC - Definitions and Terms***. This is a common document to provide standardised terminology across all areas.

9.2 Related Documents

Table 9-1 lists internal documents directly related to or referenced from this document.

Number	Type	Title
G HSEC POL 0010	Glencore Policy	Glencore Corporate Risk Management Framework
G HSEC POL 0003	Glencore Policy	Catastrophic and Fatal Hazard Management Policy
G HS GDL 0004	Glencore Guideline	Catastrophic Hazard and Critical Controls Management
GCAA-625378177-2844	GCAA FIN Standard	Risk Management
GCAA-625378177-9979	GCAA HSEC Standard	Change
GCAA-625378177-9980	GCAA HSEC Standard	Assurance
GCAA-625378177-5122	GCAA HSEC Register	HSEC Definitions and Terms
GCAA-625378177-11430	GCAA HSEC Procedure	Change Management
GCAA-625378177-10394	GCAA HSEC Procedure	Incident Reporting and Investigation
GCAA-625378177-13273	GCAA Form	Critical Control Verification
GCAA-625378177-13274	GCAA Form	Critical Control Variation

Table 9-1 – Related documents

9.3 Reference Information

Table 9-2 lists information directly related to the development of this document.

Reference	Title
ICMM	Health and Safety Critical Control Management - Good Practice Guide, 2015
ICMM	Critical Control Management – Implementation Guide, 2015
ACARP Project C23007	*Selection And Optimisation Of Risk Controls* ACARP, 01 June 2015

Table 9-2 – Reference information

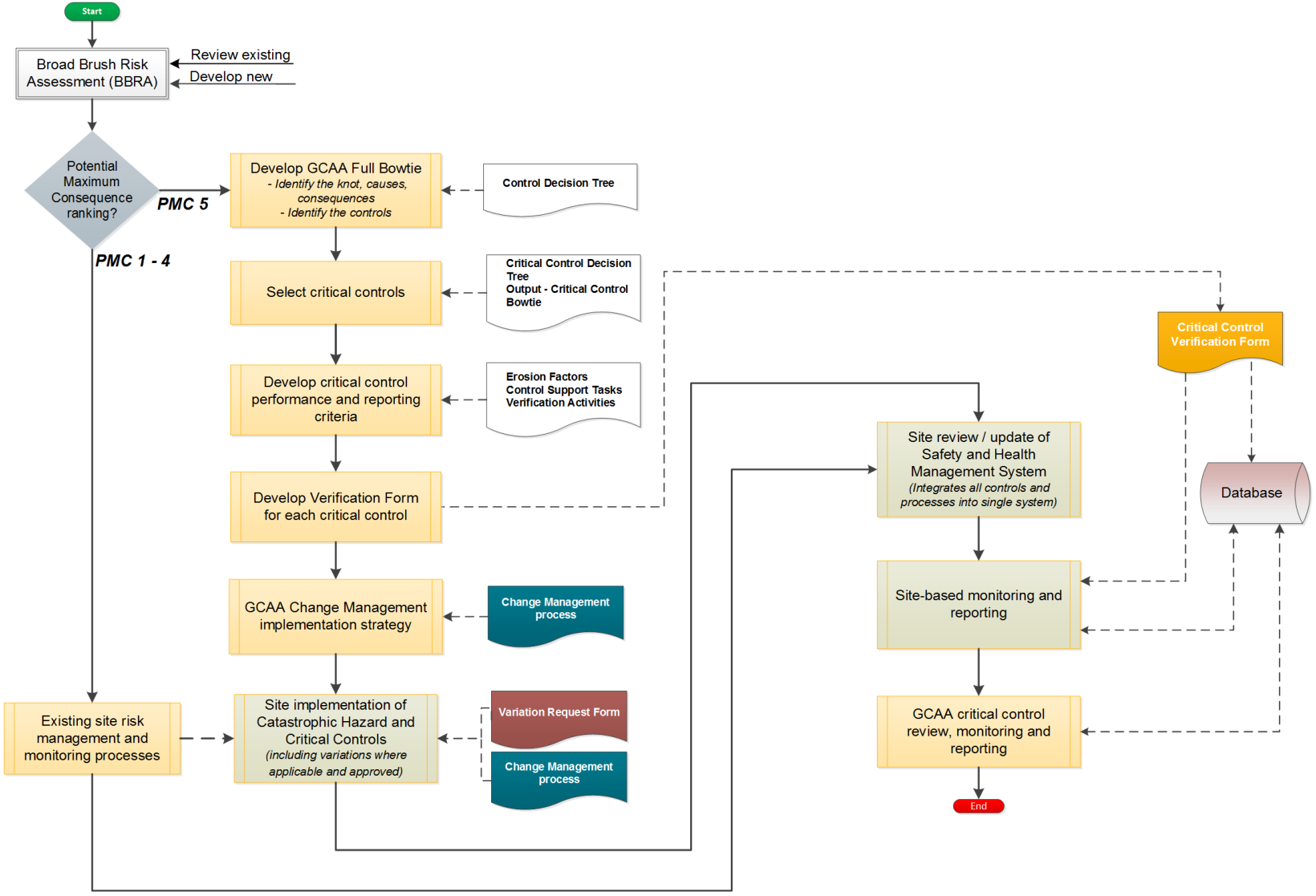
9.4 Change Information

Table 9-3 provides a summary of the current changes.

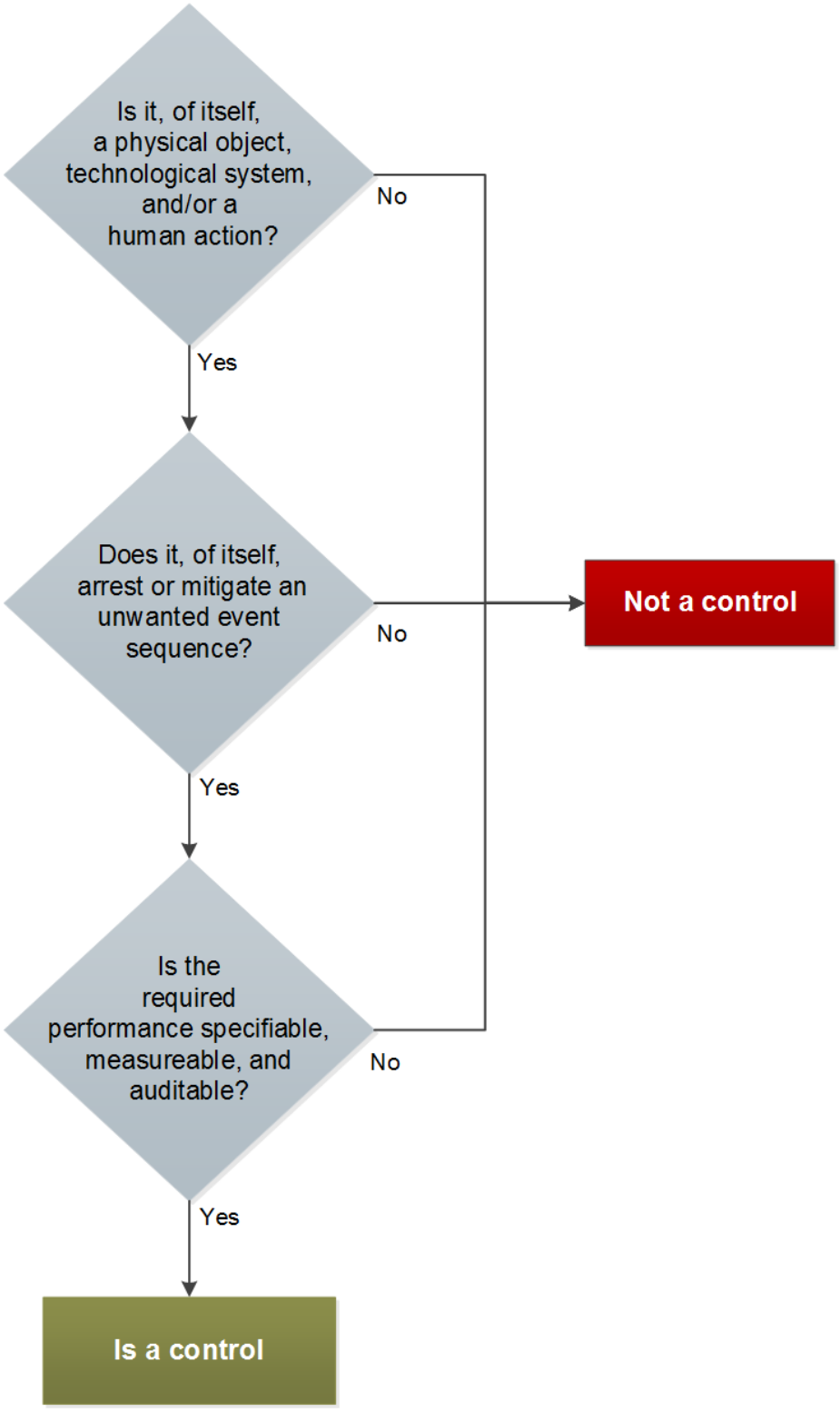
Version	Date	Details
1.0	15 March 2018	New document detailing catastrophic hazard management. Major points include: - Reference to parent Standard, procedures and forms. - Alignment with Glencore policy and guideline for catastrophic hazard and critical control management. - Includes process flows and decision trees to support the identified processes.

Table 9-3 – Change information

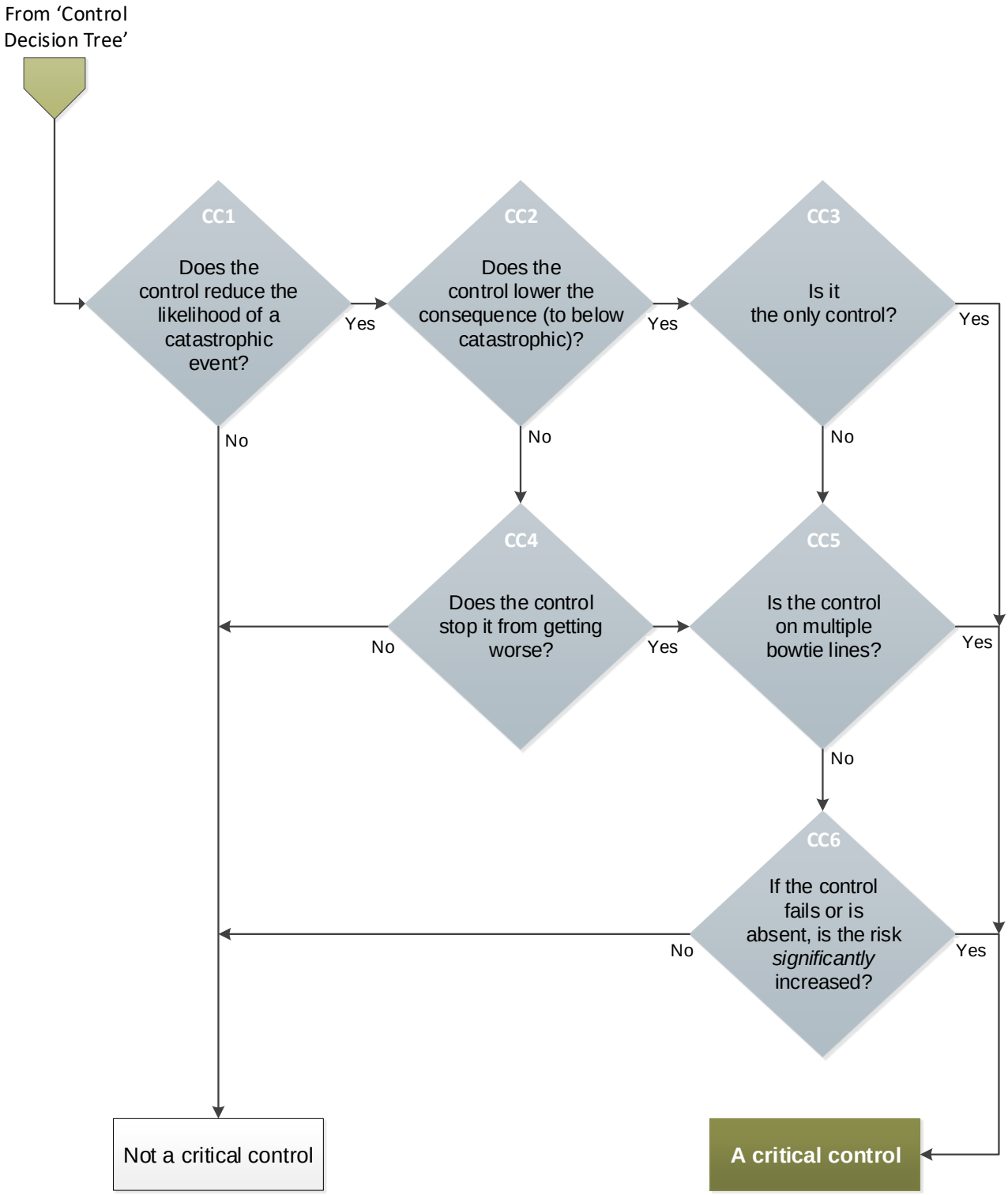
Appendix A - Catastrophic Hazard Process Flow



Appendix B - Control Decision Tree



Appendix C - Critical Control Decision Tree



Appendix D - Variation Process