Development of Risk Criteria for Water Management Aspects of Mine Closure

Guidance for the Mining Industry for the Management of Post-Closure Water Management Risks over the Full Life-Cycle of a Mining Operation

W Pulles

WATER RESEARCH COMMISSION

TT 628/15

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Report to the
Water Research Commission

by

Golder Associates Africa (Pty) Ltd

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Obtainable from

Water Research Commission
Private Bag X03
Gezina 0031
South Africa

orders@wrc.org.za or download from www.wrc.org.za

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FOREWORD

This document provides a record of events that should be maintained over the life-cycle of the mining operation in order to demonstrate that the correct post-closure water management planning process was employed by the mine as a precursor to the approval of a mine closure application, and to give the mine assurance that risk management measures have been identified and implemented at all the necessary stages of the mining project.

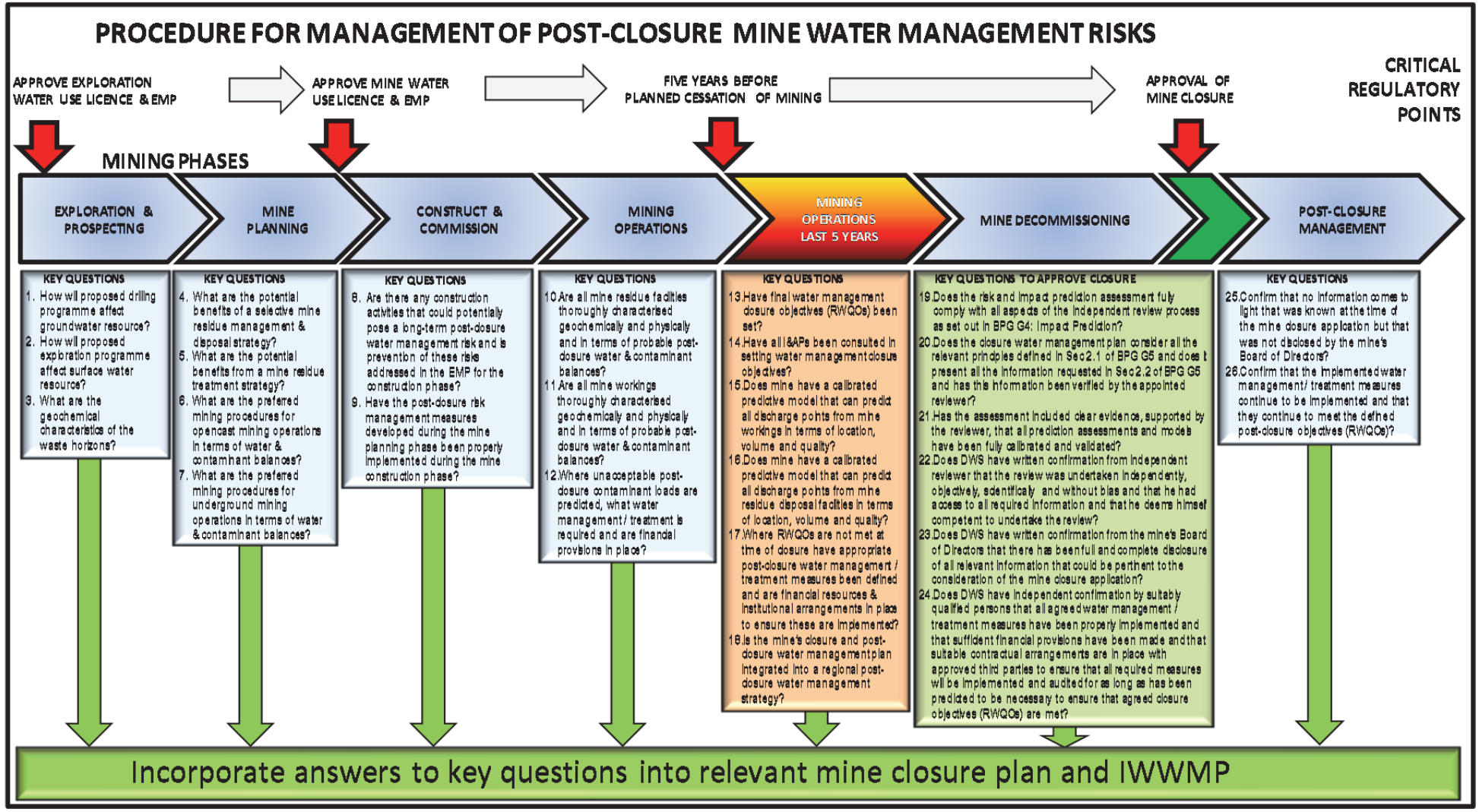
This guidance document deals with the assessment and management of the major risks associated with mining projects that may affect post-closure risk and financial liability from a water management perspective. The primary focus is on risks associated with mine residue deposits and mine workings (underground and open cast).

This document defines the technical aspects and procedures that need to be followed in order for mines to be able to manage and minimise their long term risks and liabilities and to provide the regulator with the requisite information to be able to review and approve a post-closure water management plan. The risk criteria are aligned with the revised GN704 regulations and were developed based on extensive stakeholder engagement with the DWS Best Practice Guideline G4:Impact Prediction (BPG G4) and Best Practice Guideline G5: Water Management Aspects for Mine Closure (BPG G5), international practice, and the application of sound scientific principles.

Best Practice Guideline G4: Impact Prediction (BPG G4) is available from the Department of Water and Sanitation website: https://www.dwa.gov.za/Documents/Other/WQM/BPG_G4ImpactPrediction.pdf

Best Practice Guideline G5: Water Management Aspects for Mine Closure (BPG G5) is available from the Department of Water and Sanitation website:
https://www.dwa.gov.za/Documents/Other/WQM/BPG_G5WaterManagementAspecsForMineClosure.pdf

By following the processes and methodology described in this report and the BPGs G4 and G5, the mine will have undertaken the appropriate risk management process to understand, manage and minimise its long term exposure to risk and liability associated with post-closure water impacts. If the questions defined in this guidance document are answered using the methodology set out in the relevant BPGs then there is no technical or scientific reason for the regulator to not approve the post-closure water management plan at the end of mine life.


PROCEDURE FOR MANAGEMENT OF POST-CLOSURE MINE WATER MANAGEMENT RISKS
APPROVE EXPLORATION WATER USE LICENCE & EMP
APPROVE MINE WATER USE LICENCE & EMP
FIVE YEARS BEFORE PLANNED CESSATION OF MINING
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MINING PHASES
EXPLORATION & PROSPECTING
MINE PLANNING
CONSTRUCT & COMMISSION
MINING OPERATIONS
MINING OPERATIONS LAST 5 YEARS
MINE DECOMMISSIONING
POST-CLOSURE MANAGEMENT
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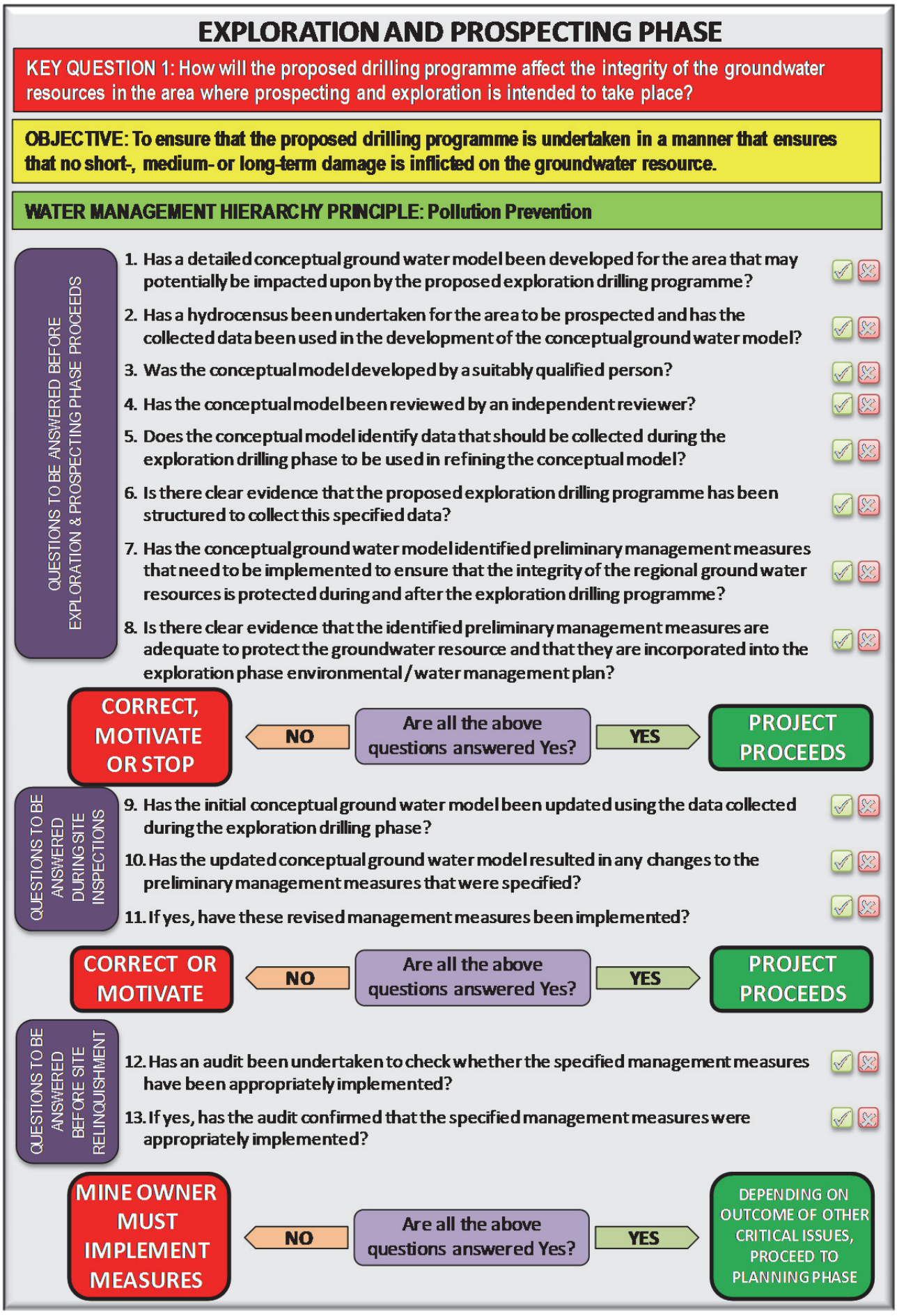
1. How will proposed drilling programme affect groundwater resource?
2. How will proposed exploration programme affect surface water resource?
3. What are the geochemical characteristics of the waste horizons?
KEY QUESTIONS
4. What are the potential benefits of a selective mine residue management & disposal strategy?
5. What are the potential benefits from a mine residue treatment strategy?
6. What are the preferred mining procedures for opencast mining operations in terms of water & contaminant balances?
7. What are the preferred mining procedures for underground mining operations in terms of water & contaminant balances?
KEY QUESTIONS
8. Are there any construction activities that could potentially pose a long-term post-closure water management risk and is prevention of these risks addressed in the EMP for the construction phase?
9. Have the post-closure risk management measures developed during the mine planning phase been properly implemented during the mine construction phase?
KEY QUESTIONS
10 Are all mine residue facilities thoroughly characterised geochemically and physically and in terms of probable post-closure water & contaminant balances?
11 Are all mine workings thoroughly characterised geochemically and physically and in terms of probable post-closure water & contaminant balances?
12 Where unacceptable post-closure contaminant loads are predicted, what water management / treatment is required and are financial provisions in place?
KEY QUESTIONS
13 Have final water management closure objectives (RWQOs) been set?
14 Have all I&APs been consulted in setting water management closure objectives?
15 Does mine have a calibrated predictive model that can predict all discharge points from mine workings in terms of location, volume and quality?
16 Does mine have a calibrated predictive model that can predict all discharge points from mine residue disposal facilities in terms of location, volume and quality?
17 Where RWQOs are not met at time of closure have appropriate post-closure water management / treatment measures been defined and are financial resources & institutional arrangements in place to ensure these are implemented?
18 Is the mine's closure and post-closure water management plan integrated into a regional post-closure water management strategy?
KEY QUESTIONS TO APPROVE CLOSURE
19 Does the risk and impact prediction assessment fully comply with all aspects of the independent review process as set out in BPG G4: Impact Prediction?
20 Does the closure water management plan consider all the relevant principles defined in Sec 2.1 of BPG G5 and does it present all the information requested in Sec 2.2 of BPG G5 and has this information been verified by the appointed reviewer?
21 Has the assessment included clear evidence, supported by the reviewer, that all prediction assessments and models have been fully calibrated and validated?
22 Does DWS have written confirmation from independent reviewer that the review was undertaken independently, objectively, scientifically and without bias and that he had access to all required information and that he deems himself competent to undertake the review?
23 Does DWS have written confirmation from the mine's Board of Directors that there has been full and complete disclosure of all relevant information that could be pertinent to the consideration of the mine closure application?
24 Does DWS have independent confirmation by suitably qualified persons that all agreed water management / treatment measures have been properly implemented and that sufficient financial provisions have been made and that suitable contractual arrangements are in place with approved third parties to ensure that all required measures will be implemented and audited for as long as has been predicted to be necessary to ensure that agreed closure objectives (RWQOs) are met?
KEY QUESTIONS
25 Confirm that no information comes to light that was known at the time of the mine closure application but that was not disclosed by the mine's Board of Directors?
26 Confirm that the implemented water management / treatment measures continue to be implemented and that they continue to meet the defined post-closure objectives (RWQOs)?
Incorporate answers to key questions into relevant mine closure plan and IWWMP

EXPLORATION AND PROSPECTING PHASE



EXPLORATION AND PROSPECTING PHASE

KEY QUESTION 2: How will the proposed exploration programme affect the surface water resources in the area where prospecting and exploration is intended to take place?

OBJECTIVE: To ensure that the proposed exploration programme is undertaken in a manner that ensures that no short-, medium- or long-term damage is inflicted on the surface water resource.

WATER MANAGEMENT HIERARCHY PRINCIPLE: Pollution Prevention

QUESTIONS TO BE ANSWERED BEFORE EXPLORATION & PROSPECTING PHASE PROCEEDS

1. Has a detailed hydrological and water quality assessment been undertaken for the area that may potentially be impacted upon by the proposed exploration programme?
2. Have all wetland areas been identified, defined and clearly demarcated on a site plan for the area where exploration activities will be undertaken?
3. Has all proposed infrastructure, access roads, etc been clearly shown on the site plan?
4. Is there a comprehensive site management & rehabilitation plan that ensures that there will be no lasting impacts on the surface water resource after site rehabilitation?
5. Have the above assessments and site management and rehabilitation plan been reviewed by an independent reviewer?

Are all the above questions answered Yes?

NO → CORRECT, MOTIVATE OR STOP

YES → PROJECT PROCEEDS

QUESTIONS TO BE ANSWERED DURING SITE INSPECTIONS

6. Has the site management plan been implemented and complied with during the exploration and prospecting phase of the project?

Are all the above questions answered Yes?

NO → CORRECT OR MOTIVATE

YES → PROJECT PROCEEDS

QUESTIONS TO BE ANSWERED BEFORE SITE RELINQUISHMENT

7. Has the site rehabilitation plan been implemented and complied with during the exploration and prospecting phase of the project?
8. Has an audit been undertaken to check whether the specified rehabilitation measures have been appropriately implemented?
9. If yes, has the audit confirmed that the specified management measures were appropriately implemented and that there are no long-term residual impacts on the surface water resource?

Are all the above questions answered Yes?

NO → MINE OWNER MUST IMPLEMENT MEASURES

YES → DEPENDING ON OUTCOME OF OTHER CRITICAL ISSUES, PROCEED TO PLANNING PHASE

EXPLORATION AND PROSPECTING PHASE

KEY QUESTION 3: What are the geochemical characteristics of the waste horizons that will be generated should the planned mine proceed and how should this mine residue be managed?

OBJECTIVE: To ensure that appropriate data is collected to enable the pollution potential of the different mine waste (residue) streams to be assessed during the mine planning phase, in order that mine residue disposal options can be investigated that minimise the long-term and post-closure risks associated with the mine residues

WATER MANAGEMENT HIERARCHY PRINCIPLE: Pollution Prevention

QUESTIONS TO BE ANSWERED BEFORE EXPLORATION & PROSPECTING PHASE PROCEEDS

1. Does the drilling programme make provision to take samples of the horizons above / between / below the extractable minerals for geochemical analyses for all drill cores?
2. Has the geochemical analytical programme for these waste horizon samples been developed by a suitably qualified geochemist in accordance with BPG G4?
3. Can a suitably qualified geochemist confirm that the developed analytical programme makes provision for both static and kinetic geochemical assessments in accordance with BPG G4 and that the timeframe for the kinetic sampling programme, with or without preservation, takes account of the mine planning schedule and allows sufficient time for the kinetic tests to be completed and the results thereof incorporated into the mine residue management programme?
4. If samples are not to be analysed immediately has an appropriate sample preservation protocol been developed and approved by a suitably qualified geochemist?
5. Has the mine provided written confirmation, signed by a person with the appropriate authorisation, that the sampling / analytical / preservation programme will be implemented?

Are all the above questions answered Yes?

NO → CORRECT OR MOTIVATE

YES → PROJECT PROCEEDS

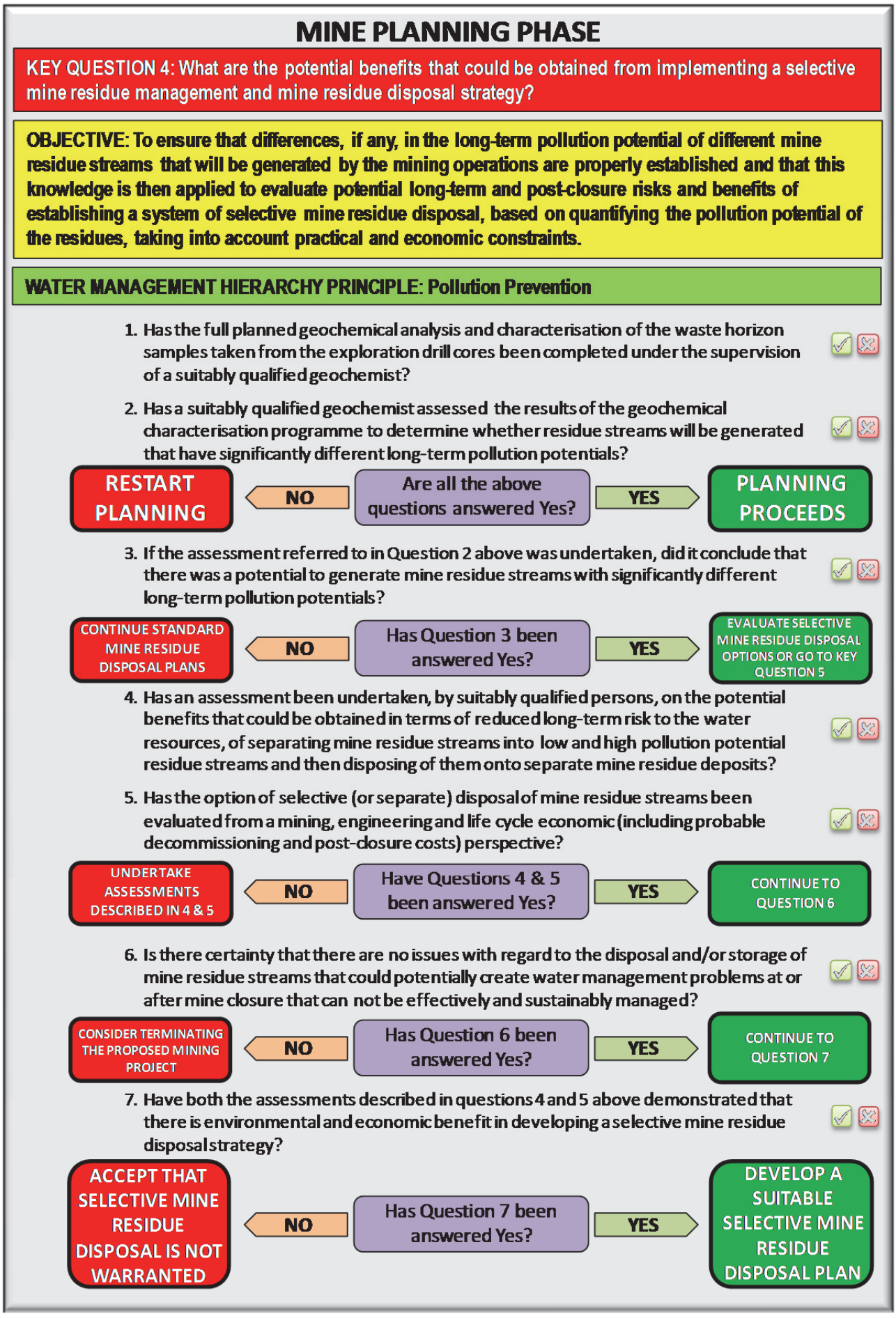
QUESTIONS TO BE ANSWERED DURING SITE INSPECTIONS

6. Can it be confirmed that the drilling programme did take the agreed number of samples?
7. Can it be confirmed in writing, by a suitably qualified geochemist, that the analytical programme that should have been implemented is on track?
8. Can it be confirmed in writing, by a suitably qualified geochemist, that samples that should have been preserved have been and continue to be properly preserved?

Are all the above questions answered Yes?

NO → MINE OWNER TO TAKE CORRECTIVE ACTIONS

YES → DEPENDING ON OUTCOME OF OTHER CRITICAL ISSUES, PROCEED TO PLANNING PHASE


MINE PLANNING PHASE
KEY QUESTION 4: What are the potential benefits that could be obtained from implementing a selective mine residue management and mine residue disposal strategy?
OBJECTIVE: To ensure that differences, if any, in the long-term pollution potential of different mine residue streams that will be generated by the mining operations are properly established and that this knowledge is then applied to evaluate potential long-term and post-closure risks and benefits of establishing a system of selective mine residue disposal, based on quantifying the pollution potential of the residues, taking into account practical and economic constraints.
WATER MANAGEMENT HIERARCHY PRINCIPLE: Pollution Prevention
1. Has the full planned geochemical analysis and characterisation of the waste horizon samples taken from the exploration drill cores been completed under the supervision of a suitably qualified geochemist?
2. Has a suitably qualified geochemist assessed the results of the geochemical characterisation programme to determine whether residue streams will be generated that have significantly different long-term pollution potentials?
RESTART PLANNING
NO
Are all the above questions answered Yes?
YES
PLANNING PROCEEDS
3. If the assessment referred to in Question 2 above was undertaken, did it conclude that there was a potential to generate mine residue streams with significantly different long-term pollution potentials?
CONTINUE STANDARD MINE RESIDUE DISPOSAL PLANS
NO
Has Question 3 been answered Yes?
YES
EVALUATE SELECTIVE MINE RESIDUE DISPOSAL OPTIONS OR GO TO KEY QUESTION 5
4. Has an assessment been undertaken, by suitably qualified persons, on the potential benefits that could be obtained in terms of reduced long-term risk to the water resources, of separating mine residue streams into low and high pollution potential residue streams and then disposing of them onto separate mine residue deposits?
5. Has the option of selective (or separate) disposal of mine residue streams been evaluated from a mining, engineering and life cycle economic (including probable decommissioning and post-closure costs) perspective?
UNDERTAKE ASSESSMENTS DESCRIBED IN 4 & 5
NO
Have Questions 4 & 5 been answered Yes?
YES
CONTINUE TO QUESTION 6
6. Is there certainty that there are no issues with regard to the disposal and/or storage of mine residue streams that could potentially create water management problems at or after mine closure that can not be effectively and sustainably managed?
CONSIDER TERMINATING THE PROPOSED MINING PROJECT
NO
Has Question 6 been answered Yes?
YES
CONTINUE TO QUESTION 7
7. Have both the assessments described in questions 4 and 5 above demonstrated that there is environmental and economic benefit in developing a selective mine residue disposal strategy?
ACCEPT THAT SELECTIVE MINE RESIDUE DISPOSAL IS NOT WARRANTED
NO
Has Question 7 been answered Yes?
YES
DEVELOP A SUITABLE SELECTIVE MINE RESIDUE DISPOSAL PLAN

MINE PLANNING PHASE

KEY QUESTION 5: What are the potential benefits that could be obtained from implementing a mine residue treatment strategy to remove/reduce the pollution potential of the most reactive mine residue streams?

OBJECTIVE: To ensure that differences, if any, in the long-term pollution potential of different mine residue streams that will be generated by the mining operations are properly established and that this knowledge is then applied to determine whether or not there are any benefits to be gained, in terms of long-term and post-closure risks, from treating those mine residue streams that have the highest pollution potential in order to reduce their pollution potential, taking into account practical and economic constraints.

WATER MANAGEMENT HIERARCHY PRINCIPLE: Pollution Prevention

1. Have questions 1, 2 and 3 of the Checklist for Key Question 4 for the Mine Planning Phase been answered with a Yes?

FIRST UNDERTAKE ASSESSMENTS TO ENABLE YES ANSWER ← NO ← Are all the above questions answered Yes? → YES → PROCEED TO INVESTIGATE RESIDUE TREATMENT OPTIONS

2. Has an assessment been undertaken, by suitably qualified persons, to determine the potential benefits that could be obtained in terms of reduced long-term risk to the water resources, of treating all or a portion of the mine residue streams such that they present a lower pollution potential and then disposing of them onto separate or combined mine residue deposits?

3. Has the option of partial or total treatment and disposal of mine residue streams been evaluated from a mining, engineering and life cycle economic (including probable decommissioning and post-closure costs) perspective?

UNDERTAKE ASSESSMENTS DESCRIBED IN 2 & 3 ← NO ← Have Questions 2 & 3 been answered Yes? → YES → CONTINUE TO QUESTION 4

4. Have both the assessments described in questions 2 and 3 above demonstrated that there is environmental and economic benefit in developing a partial or total mine residue treatment and disposal strategy?

ACCEPT THAT TREATMENT OF MINE RESIDUES IS NOT WARRANTED ← NO ← Has Question 4 been answered Yes? → YES → DEVELOP A SUITABLE MINE RESIDUE TREATMENT & DISPOSAL PLAN

MINE PLANNING PHASE

KEY QUESTION 6: Based on evaluation of a most likely operational and post-closure pit water and contaminant balances, what are the preferred mining procedures for any planned opencast mining operations?

OBJECTIVE: To ensure that mines that are planning to mine using surface (opencast) mining methods, evaluate and assess alternatives with regard to their long-term and post-closure risks and benefits.

WATER MANAGEMENT HIERARCHY PRINCIPLE: Pollution Prevention

1. Is there an existing regional post-closure water management strategy in place for the area in which the intended mining operation is located?

PROCEED WITH THE KNOWLEDGE THAT THERE ARE UNKNOWN RISKS FROM ADJACENT MINES ← NO ← Has Question 1 been answered Yes? → YES → INCORPORATE REGIONAL STRATEGY INTO MINE PLANNING ACTIVITIES

2. Has a detailed conceptual groundwater model been constructed for the area that will be mined?
3. Has a preliminary groundwater model been developed for the area that will be mined that is capable of producing a provisional post-closure mine water balance?
4. Has question 1 in Key Question 4 for the Mine Planning Phase been answered yes?
5. Has the information referred to in the above 3 questions been utilised to develop a model capable of predicting the potential long term quality of water that may decant from the opencast workings after planned mine closure?
6. Has the model referred to In Question 4 above been used to evaluate the long-term potential decant positions, volumes and qualities of alternative opencast mining options?
7. Can it be demonstrated that the information generated in Question 5 was considered in evaluating and deciding on a preferred opencast mining method?
8. Is the selected opencast mining method deemed appropriate, based on a review of the information generated by questions 5 and 6 above?
9. Have appropriate financial provisions been included in the mine's closure fund to deal with projected post-closure water management impacts for the selected and preferred opencast mining method?

MINE PLAN HAS NOT ADEQUATELY CONSIDERED POLLUTION PREVENTION ← NO ← Have all the above questions been answered Yes? → YES → MINE PLAN HAS CONSIDERED POLLUTION PREVENTION ALTERNATIVES

10. Is there certainty that there are no issues with regard to the planned opencast mining operations that could potentially create water management problems at or after mine closure that can not be effectively and sustainably managed?

CONSIDER TERMINATING THE PROPOSED MINING PROJECT ← NO ← Has Question 10 been answered Yes? → YES → PROCEED WITH MINE PLANNING

MINE PLANNING PHASE

KEY QUESTION 7: Based on evaluation of a most likely operational and post-closure water and contaminant balances, what are the preferred mining procedures for any planned underground mining operations?

OBJECTIVE: To ensure that mines that are planning to mine using underground mining methods, evaluate and assess alternatives with regard to their long-term and post-closure risks and benefits.

WATER MANAGEMENT HIERARCHY PRINCIPLE: Pollution Prevention

1. Is there an existing regional post-closure water management strategy in place for the area in which the intended mining operation is located?

PROCEED WITH THE KNOWLEDGE THAT THERE ARE UNKNOWN RISKS FROM ADJACENT MINES ← NO ← Has Question 1 been answered Yes? → YES → INCORPORATE REGIONAL STRATEGY INTO MINE PLANNING ACTIVITIES

2. Has a detailed conceptual groundwater model been constructed for the area that will be mined?
3. Has a preliminary groundwater model been developed for the area that will be mined that is capable of producing a provisional post-closure mine water balance?
4. Has a preliminary ground subsidence model been developed for the area that will be mined that is capable of predicting the probable extent of subsidence that could occur during and after mining operations?
5. Have the models referred to in Questions 2&3 been used to evaluate the long term potential for different underground mining options to impact on the integrity of surface and ground water resources that may be affected by the planned mining?
6. Has question 1 in Key Question 4 for the Mine Planning Phase been answered yes?
7. Has the information referred to in the above 4 questions been utilised to develop a model capable of predicting the potential long term quality of water that may decant from the underground workings after planned mine closure?
8. Has the model referred to In Question 5 above been used to evaluate the long-term potential decant positions, volumes and qualities of alternative underground mining options?
9. Can it be demonstrated that the information generated in Questions 3 and 6 was considered in evaluating and deciding on a preferred underground mining method?
10. Is the selected underground mining method deemed appropriate, based on a review of the information generated by questions 3, 6 and 7 above?
11. Have appropriate financial provisions been included in the mine's closure fund to deal with projected post-closure water management impacts for the selected and preferred underground mining method?

MINE PLAN HAS NOT ADEQUATELY CONSIDERED POLLUTION PREVENTION ← NO ← Have all the above questions been answered Yes? → YES → MINE PLAN HAS CONSIDERED POLLUTION PREVENTION ALTERNATIVES

12. Is there certainty that there are no issues with regard to the planned underground mining operations that could potentially create water management problems at or after mine closure that can not be effectively and sustainably managed?

CONSIDER TERMINATING THE PROPOSED MINING PROJECT ← NO ← Has Question 12 been answered Yes? → YES → PROCEED WITH MINE PLANNING

MINE CONSTRUCTION PHASE

KEY QUESTION 8: Are there any construction activities that could potentially pose a long-term post-closure water management risk and is prevention of these risks addressed in the EMP for the construction phase?

OBJECTIVE: To ensure that construction activities will be undertaken in a manner that does not result in any water management impacts or risks that may persist till and after mine closure and that an environmental management plan (EMP) for the construction phase does address any such potential risks.

WATER MANAGEMENT HIERARCHY PRINCIPLE: Pollution Prevention

1. Is there an assurance that all earthworks associated with the construction of the project, including roads, road embankments, river crossings, storage and pollution control dams, footprints for office, plant or other infrastructure will only use material that has been geochemically assessed to ensure that there are no long-term water quality issues associated with the use of such material?
2. Is there an assurance that the physical location of all construction infrastructure such as site offices, access roads, river crossings, storage yards, diesel and oil storage, vehicle storage and maintenance facilities, sanitation facilities and all other construction infrastructure has been evaluated to ensure that effective site rehabilitation after construction has been completed, can be assured?
3. Is there an assurance that all wetlands have been delineated by a suitably qualified person and that all planned mine infrastructure and construction infrastructure and activities are outside the specified exclusion zones for these wetlands?

FIRST UNDERTAKE ASSESSMENTS TO ENABLE YES ANSWER ← NO ← Are all the above questions answered Yes? → YES → PROCEED TO QUESTION 4

4. Is there a suitable construction phase EMP that explicitly addresses the aspects raised in Question 1-3 above?

FIRST DEVELOP THE APPROPRIATE CONSTRUCTION EMP ← NO ← Is the above question answered Yes? → YES → PROCEED TO QUESTION 5

5. Is there a suitably qualified construction phase environmental officer who has responsibility for ensuring compliance with the construction phase EMP?

ENSURE THAT A SUITABLE PERSON MANAGES THE EMP ← NO ← Is the above question answered Yes? → YES → PROCEED TO QUESTION 6

6. Are there systems in place to ensure that deviations from the construction phase EMP are identified and that corrective actions are implemented to prevent recurrences and to mitigate where necessary?

INCORPORATE EMP COMPLIANCE INTO MANAGEMENT SYSTEMS ← NO ← Has Question 6 been answered Yes? → YES → ENSURE ONGOING REVIEW & UPDATE OF EMP

MINE CONSTRUCTION PHASE

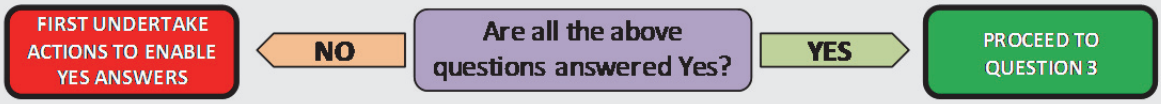
KEY QUESTION 9: Have the post-closure risk management measures developed during the mine planning phase been properly implemented during the mine construction phase?

OBJECTIVE: To ensure that inputs to the mine planning phase with regard to mine development and management/disposal of residues that were aimed at minimising the long-term post-closure risks and liabilities are properly implemented as planned.

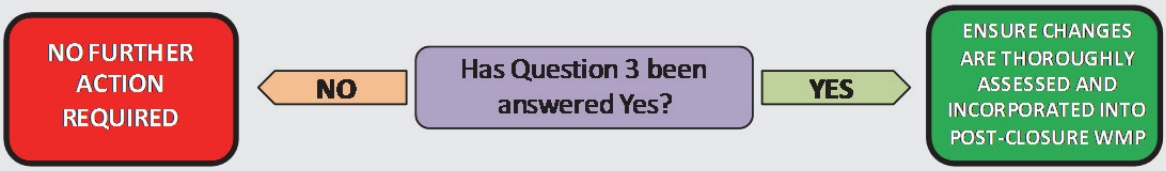
WATER MANAGEMENT HIERARCHY PRINCIPLE: Pollution Prevention

1. Is there management co-ordination between the mine planning personnel and the environmental / closure planning personnel to ensure that decisions taken during the mine planning phase are fully implemented during the mine construction phase?

2. Are there management systems in place to ensure that should site conditions encountered during construction necessitate a deviation from the decisions taken during the mine planning phase, that such deviations are subjected to the same assessments as set out in Key Questions 4–7 to ensure that revised decisions are still optimised as far as possible with regard to minimising long-term post-closure risks?



3. Were changes made to the decisions taken during the mine planning phase that could have a bearing on post-closure risk and liability?



MINE OPERATIONAL PHASE

KEY QUESTION 10: Are all mine residue facilities thoroughly characterized geochemically and physically and in terms of probable post-closure water and contaminant balances in a manner appropriate to the remaining life of mine?

OBJECTIVE: To ensure that mines continuously collect the required data and use the data to update and refine the predictions of long-term post-closure impact of mine residue facilities to the point where a high degree of confidence can be associated with the predictions. The improved predictive ability should then be used to evaluate alternative rehabilitation and closure options for these facilities from the perspective of meeting the defined post-closure water management objectives. The most appropriate options that will ensure that post-closure water management objectives are met should then be specified in detail and appropriate financial provisions should be included in the closure fund. The level of detail of the assessment and confidence in the predictions will increase as the mine approaches end of mine life.

WATER MANAGEMENT HIERARCHY PRINCIPLE: Pollution Prevention

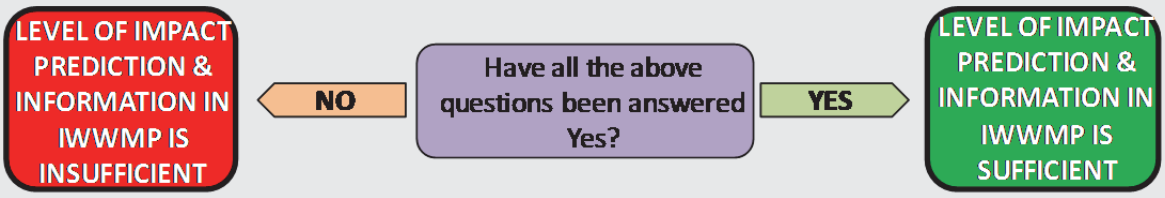
If the length of time that the mine has already been in operation is:

- less than 2 years **or** less than 10% of the total planned mine life, then go to Section A
- greater than 2 years but less than 5 years **or** greater than 10% but less than 25% of the total planned mine life, then go to Section B
- greater than 5 years **or** greater than 25% of the total planned mine life then go to Section C

SECTION A IMPACT PREDICTIONS

(for all mine residue facilities that are planned to persist till mine closure)

1. Has a basic conceptual model been developed for each mine residue facility that is planned to persist till mine closure, in accordance with BPG G4?
2. Have a minimum of 20 samples been taken of field-weathered material from each mine residue facility that is planned to persist till mine closure and have these samples been subjected to geochemical assessment in accordance with BPG G4 (ABA, detailed mineralogy and humidity cell tests as a minimum) under the supervision of a suitably qualified geochemist?
3. Have the results of the geochemical assessment been evaluated by a suitably qualified geochemist, in accordance with BPG G4, using either equilibrium or simple kinetic geochemical models, using at least the 90th percentile worst case data from the geochemical assessments, to determine potential levels of contaminants of concern that may develop in leachate from these mine residue facilities?
4. Have the results from Question 3 been evaluated to identify those mine residue facilities where the leachate quality may potentially exceed the provisional post-closure water quality objectives?
5. For all those mine residue facilities where the leachate quality may exceed the provisional post-closure water management objectives, has a detailed plan of action been developed to subject such mine residue facilities to a SECTION B impact prediction?
6. Have all the above assessments been documented in the mine's most recent IWWMP?



MINE OPERATIONAL PHASE

KEY QUESTION 10 - CONTINUED

SECTION B IMPACT PREDICTIONS

(for all mine residue facilities that are planned to persist till mine closure AND that have been assessed in a SECTION A impact prediction as having the potential to generate leachates that exceed the post-closure water management objectives)

7. Has an impact prediction been undertaken for each identified (as per Question 4 in SECTION A) mine residue facility in accordance with the methodology shown in Figure 4.1 of BPG G4 and under the guidance of a suitably qualified geochemist and an independent reviewer?

8. Has a statistical review of the collected data confirmed that sufficient samples have been taken and analysed to demonstrate that there is a 90-95% confidence that the true mean value of the parameters being assessed lies within the range of values determined from the sampling?

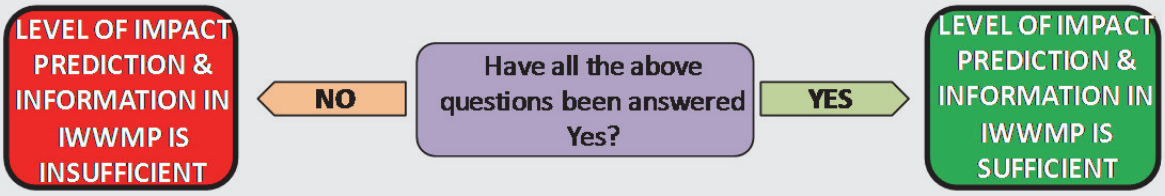
9. Have the results from the sampling and analytical programme been incorporated into an updated and final conceptual model report that has been accepted by the independent reviewer and that has been presented to and accepted by DWS?

10. Have the uncertainties associated with the impact prediction process for the unrehabilitated mine residue disposal facilities been evaluated either by way of undertaking probabilistic modelling or, as a minimum, by undertaking appropriate sensitivity analyses to define key parameters that affect the predicted outcome?

11. If the outcome of Question 10 reveals that the leachate from any of the unrehabilitated mine residue disposal facilities will not enable the mine to meet its post-closure water management objectives, have a range of suitable rehabilitation and management measures been identified to undergo predictive review for those particular mine residue disposal facilities?

12. Have appropriate data collection and monitoring programmes been developed to enable the base case predictive model to be validated and calibrated and to enable sensible review of alternative rehabilitation and management options in the subsequent SECTION C impact predictions and have these been agreed to by the independent reviewer?

13. Have all the above assessments been documented in the mine's most recent IWWMP?



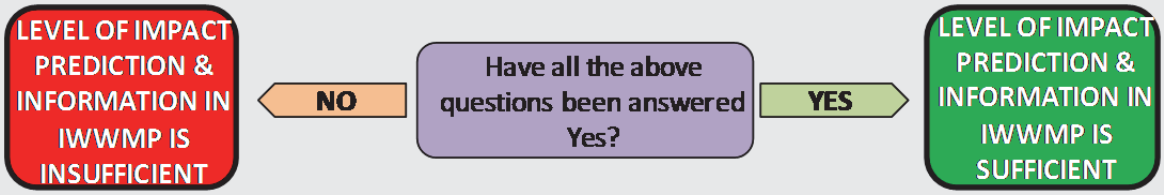
MINE OPERATIONAL PHASE

KEY QUESTION 10 - CONTINUED

SECTION C IMPACT PREDICTIONS

(for all mine residue facilities that are planned to persist till mine closure AND that have been assessed in a SECTION B impact prediction as having the potential to generate leachates that exceed the post-closure water management objectives)

14. Has an impact prediction been undertaken for each identified (as per Question 11 in SECTION B) mine residue facility in accordance with the methodology shown in Figure 4.1 of BPG G4 and under the guidance of a suitably qualified geochemist and an independent reviewer, to evaluate the beneficial effects of the identified rehabilitation and management options on the leachate from the mine residue disposal facilities?
15. Based on the outcome of the assessments undertaken to answer Question 14, has a preferred rehabilitation and/or management option been identified for each mine residue disposal facility that will enable the mine to meet its post-closure water management objectives and has the suitability of the selected options been confirmed by the independent reviewer and by DWS?
16. Have the uncertainties associated with the ability of the selected rehabilitation and/or management options to meet the post-closure water management objectives been evaluated either by way of undertaking probabilistic modelling or, as a minimum, by undertaking appropriate sensitivity analyses to define key parameters that affect the predicted outcome?
17. If the outcome of Questions 15 and 16 reveal that there is a risk that the leachate from the mine residue disposal facilities, after application of the selected rehabilitation and/or management options will not enable the mine to meet its post-closure water management objectives, have suitable measures been defined to intercept the leachate for appropriate water treatment that can be evaluated in terms of Key Question 12 for the Mine Operations Phase?
18. Have appropriate data collection and monitoring programmes been developed to enable predictive models to be regularly validated and calibrated as the mine progresses through its operational phase?
19. Is there clear evidence that the specified data is being collected and that the predictive models are being validated and calibrated at a frequency at least equivalent to every second update of the IWWMP?
20. Are the selected rehabilitation and management options for the mine residue disposal facilities being implemented concurrently with mining and in accordance with their design specifications?
21. Have appropriate financial provisions been included in the mine's closure fund to implement the specified rehabilitation and/or management measures for the mine residue facilities, to monitor their success and to maintain these measures such that they continue to perform in accordance with their specified duty?
22. Have all the above assessments been documented in the mine's most recent IWWMP?



MINE OPERATIONAL PHASE

KEY QUESTION 11: Are all mine workings thoroughly characterized geochemically and physically and in terms of probable post-closure water and contaminant balances in a manner appropriate to the remaining life of mine?

OBJECTIVE: To ensure that mines continuously collect the required data and use the data to update and refine the predictions of long-term post-closure impact of mine workings to the point where a high degree of confidence can be associated with the predictions. The improved predictive ability should then be used to evaluate alternative closure management options for the mine workings from the perspective of meeting the defined post-closure water management objectives. The most appropriate options that will ensure that post-closure water management objectives are met should then be specified in detail and appropriate financial provisions should be included in the closure fund. The level of detail of the assessment and confidence in the predictions will increase as the mine approaches end of mine life.

WATER MANAGEMENT HIERARCHY PRINCIPLE: Pollution Prevention

If the length of time that the mine has already been in operation is:

- less than 2 years or less than 10% of the total planned mine life, then go to Section A
- greater than 2 years but less than 5 years or greater than 10% but less than 25% of the total planned mine life, then go to Section B
- greater than 5 years or greater than 25% of the total planned mine life then go to Section C

SECTION A IMPACT PREDICTIONS
(for all underground and surface mine workings/voids)

1. Has a basic conceptual model been developed for each mining operation (open pit, rehabilitated pit and/or underground mine workings) in accordance with BPG G4?
2. Have a minimum of 20 samples been taken of material that is representative of the material expected to remain in the mine workings after mine closure and have these samples been subjected to geochemical assessment in accordance with BPG G4 (ABA, detailed mineralogy and humidity cell tests as a minimum) under the supervision of a suitably qualified geochemist?
3. Have basic hydrological and/or geohydrological models been employed to assess the conceptual model and provide a first-order post-closure mine water balance?
4. Have the results of the geochemical, hydrological and geohydrological assessments been evaluated by a suitably qualified person, in accordance with BPG G4, using either equilibrium or simple kinetic geochemical models, using at least the 90th percentile worst case data from the geochemical assessments, to determine potential levels of contaminants of concern that may develop in drainage from these mine workings?
5. Have the results from Question 4 been evaluated to identify those mine workings where the drainage quality may potentially exceed the provisional post-closure water quality objectives?
6. For all those mine workings where the drainage quality may exceed the provisional post-closure water management objectives, has a detailed plan of action been developed to subject such mine workings to a SECTION B impact prediction?
7. Have all the above assessments been documented in the mine's most recent IWWMP?

Have all the above questions been answered Yes?

NO → LEVEL OF IMPACT PREDICTION & INFORMATION IN IWWMP IS INSUFFICIENT

YES → LEVEL OF IMPACT PREDICTION & INFORMATION IN IWWMP IS SUFFICIENT

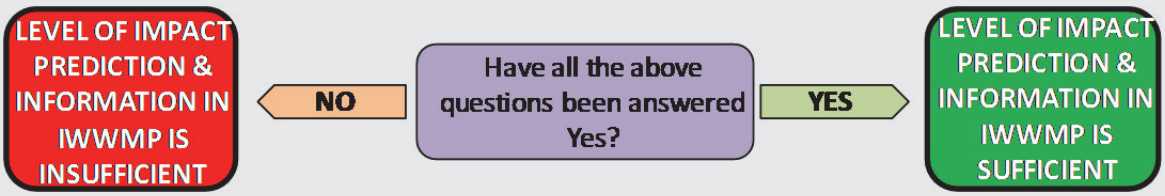
MINE OPERATIONAL PHASE

KEY QUESTION 11 - CONTINUED

SECTION B IMPACT PREDICTIONS

(for all mine workings that are predicted to decant after mine closure AND that have been assessed in a SECTION A impact prediction as having the potential to generate drainage that exceeds the post-closure water management objectives)

7. Has the potential for the mine workings to decant after mine closure been assessed within the context of a regional post-closure mine water strategy and with knowledge of the water balances of adjacent mines?
8. Has an impact prediction been undertaken for each identified (as per Question 5 in SECTION A) mine workings that could decant after closure, in accordance with the methodology shown in Figure 4.1 of BPG G4 and under the guidance of a suitably qualified person and an independent reviewer?
9. Has a statistical review of the collected data confirmed that sufficient samples have been taken and analysed to demonstrate that there is a 90-95% confidence that the true mean value of the parameters being assessed lies within the range of values determined from the sampling?
10. Have the results from the sampling and analytical programme been incorporated into an updated and final conceptual model report that has been accepted by the independent reviewer and that has been presented to and accepted by DWS?
11. Have the uncertainties associated with the impact prediction process for the mine workings been evaluated either by way of undertaking probabilistic modelling or, as a minimum, by undertaking appropriate sensitivity analyses to define key parameters that affect the predicted outcome?
12. If the outcome of Question 11 reveals that the decant/drainage from any of the mine workings will not enable the mine to meet its post-closure water management objectives, have a range of suitable rehabilitation and management measures been identified to undergo predictive review for those particular mine workings?
13. Have appropriate data collection and monitoring programmes been developed to enable the base case predictive model to be validated and calibrated and to enable sensible review of alternative rehabilitation and management options in the subsequent SECTION C impact predictions and have these been agreed to by the independent reviewer?
14. Have all the above assessments been documented in the mine's most recent IWWMP?



MINE OPERATIONAL PHASE

KEY QUESTION 11 - CONTINUED

SECTION C IMPACT PREDICTIONS

(for all mine workings that are predicted to decant after mine closure AND that have been assessed in a SECTION B impact prediction as having the potential to generate drainage that exceeds the post-closure water management objectives)

15. Has an impact prediction been undertaken for each identified (as per Question 12 in SECTION B) mine workings in accordance with the methodology shown in Figure 4.1 of BPG G4 and under the guidance of a suitably qualified person and an independent reviewer, to evaluate the beneficial effects of the identified rehabilitation and management options on the drainage from the mine workings?

16. Based on the outcome of the assessments undertaken to answer Question 15, has a preferred rehabilitation and/or management option been identified for each mine workings that will enable the mine to meet its post-closure water management objectives and has the suitability of the selected options been confirmed by the independent reviewer and by DWS?

17. Have the uncertainties associated with the ability of the selected rehabilitation and/or management options to meet the post-closure water management objectives been evaluated either by way of undertaking probabilistic modelling or, as a minimum, by undertaking appropriate sensitivity analyses to define key parameters that affect the predicted outcome?

18. If the outcome of Questions 16 and 17 reveal that there is a risk that the drainage from the workings, after application of the selected rehabilitation and/or management options will not enable the mine to meet its post-closure water management objectives, have suitable measures been defined to intercept the drainage for appropriate water treatment that can be evaluated in terms of Key Question 12 for the Mine Operations Phase?

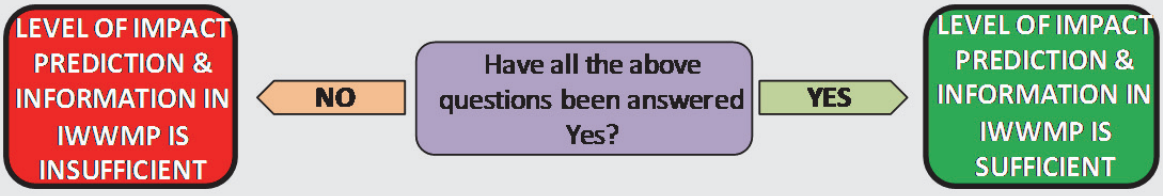
19. Have appropriate data collection and monitoring programmes been developed to enable predictive models to be regularly validated and calibrated as the mine progresses through its operational phase?

20. Is there clear evidence that the specified data is being collected and that the predictive models are being validated and calibrated at a frequency at least equivalent to every second update of the IWWMP?

21. Are the selected rehabilitation and management options for the mine workings being implemented concurrently with mining and in accordance with their design specifications?

22. Have appropriate financial provisions been included in the mine's closure fund to implement the specified rehabilitation and/or management measures for the mine workings, to monitor their success and to maintain these measures such that they continue to perform in accordance with their specified duty?

23. Have all the above assessments been documented in the mine's most recent IWWMP?



MINE OPERATIONAL PHASE

KEY QUESTION 12: Where unacceptable post-closure contaminant loads are predicted, what water management / treatment is required and are financial provisions in place?

OBJECTIVE: To ensure that in cases where planned rehabilitation and management measures to be applied to mine workings and mine residue disposal facilities do not enable such facilities to meet post-closure water management objectives, that appropriate facilities for the collection, treatment and disposal of leachates and/or decants is specified and financially provided for.

WATER MANAGEMENT HIERARCHY PRINCIPLE: Water Treatment

1. Have the assessments undertaken as part of Key Questions 10 and/or 11, indicated that there is a risk that applied management and/or rehabilitation measures will not succeed in enabling the mine residue disposal facilities and/or mine workings leachates and/or decants from meeting the anticipated post-closure water management objectives?

THERE IS NO ASSESSED NEED FOR WATER TREATMENT ← NO ← Has Question 1 answered Yes? → YES → PROCEED TO QUESTION 2

2. Have the assessments undertaken as part of Key Questions 10 and/or 11, indicated the duration over which the leachates and/or decants will exceed the post-closure water management objectives and is there a credible prediction of the water quality and quantity for such leachates and/or decants?

UNDERTAKE MORE DETAILED STUDIES TO OBTAIN A YES ANSWER ← NO ← Has Question 2 answered Yes? → YES → PROCEED TO QUESTION 3

3. Have the procedures set out in Chapter 8 of BPG G5: Water Management Aspects for Mine Closure been applied to determine the extent of water treatment required?

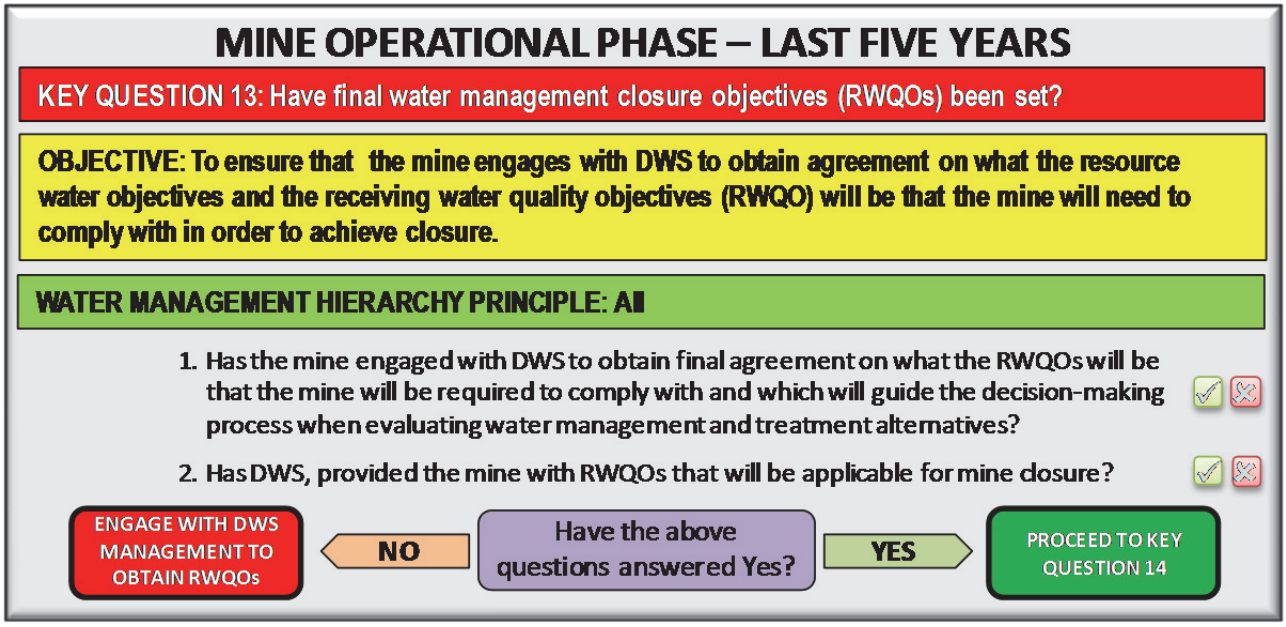
4. Have the procedures in BPG H4: Water Treatment and/or the services of a suitably qualified person been applied to specify the type of leachate and or drainage interceptions systems that will be required and the type and duty of water treatment plant that will be required in order to ensure that post-closure water management objectives are met?

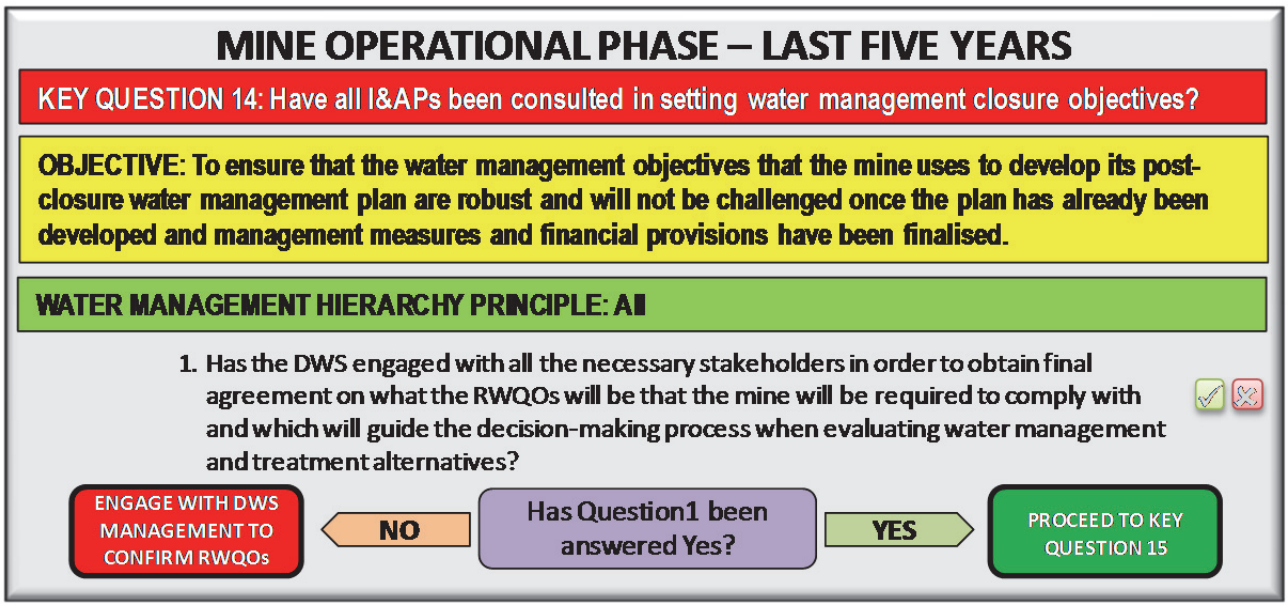
UNDERTAKE MORE DETAILED STUDIES TO OBTAIN A YES ANSWER ← NO ← Have Questions 3 and 4 answered Yes? → YES → PROCEED TO QUESTION 5

5. Have financial calculations been undertaken by a suitably qualified person to determine the capital and operating costs of the required water interception and treatment systems for as long as they are predicted to be required, in accordance with Chapter 8 of BPG G5?

UNDERTAKE THE NECESSARY STUDIES TO OBTAIN A YES ANSWER ← NO ← Has Question 5 been answered Yes? → YES → INCLUDE THE RESULT OF THE QUESTION 5 STUDIES INTO THE MINE'S FINANCIAL PROVISIONS

MINE OPERATIONAL PHASE - LAST FIVE YEARS





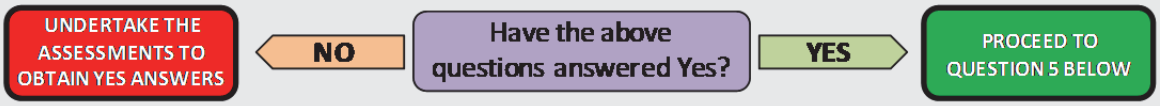
MINE OPERATIONAL PHASE – LAST FIVE YEARS

KEY QUESTION 15: Does the mine have a calibrated predictive model that can predict all discharge points from mine workings in terms of location, volume and quality?

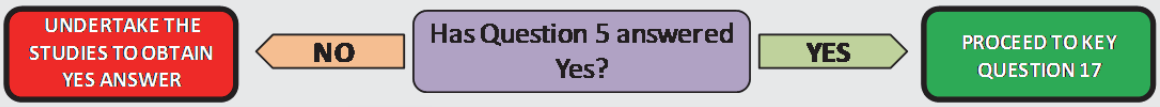
OBJECTIVE: To ensure that the assessments described in Key Question 11 have been completed at a Section C level, that all predictions have been fully calibrated and validated and that an integrated water and contaminant balance for all the mine workings has been compiled, taking cognisance of the final post-closure water management objectives as finalised in terms of Key Questions 13 and 14.

WATER MANAGEMENT HIERARCHY PRINCIPLE: Pollution Prevention

1. Have all the mine workings (underground and/or open cast) been assessed as set out in Section C of Key Question 11?
2. Are the RWQOs that were used to guide the answers to Questions 15, 16 and 18 in Section C of Key Question 11 the same as those agreed to by way of Key Questions 13 and 14?
3. Have all the assessed mine workings and the models used therefore been fully calibrated and validated in terms of Question 20 in Section C of Key Question 11?
4. Have the financial provisions determined in Question 22 in Section C of Key Question 11 been prepared in compliance with the above questions 1, 2 and 3 of this Key Question 15?



5. Have the outputs from the assessments of all the mine workings been combined into an integrated post-closure water and contaminant balance showing locations, qualities and timeframes of exceedance of post-closure RWQOs for all decants / discharges?



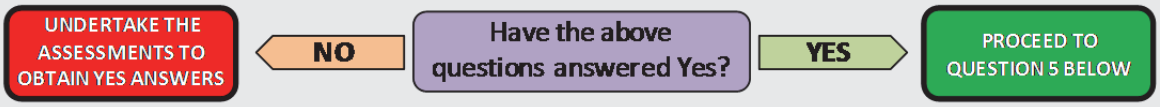
MINE OPERATIONAL PHASE – LAST FIVE YEARS

KEY QUESTION 16: Does the mine have a calibrated predictive model that can predict all discharge points from mine residue disposal facilities in terms of location, volume and quality?

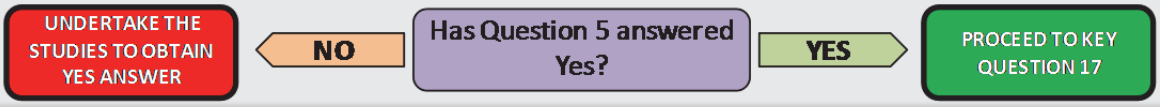
OBJECTIVE: To ensure that the assessments described in Key Question 10 have been completed at a Section C level, that all predictions have been fully calibrated and validated and that an integrated water and contaminant balance for all the mine workings has been compiled, taking cognisance of the final post-closure water management objectives as finalised in terms of Key Questions 13 and 14.

WATER MANAGEMENT HIERARCHY PRINCIPLE: Pollution Prevention

1. Have all the mine residue deposits (placed on surface and/or in mine workings) been assessed as set out in Section C of Key Question 10?
2. Are the RWQOs that were used to guide the answers to Questions 15, 16 and 17 in Section C of Key Question 10 the same as those agreed to by way of Key Questions 13 and 14?
3. Have all the assessed mine workings and the models used therefore been fully calibrated and validated in terms of Question 19 in Section C of Key Question 10?
4. Have the financial provisions determined in Question 21 in Section C of Key Question 10 been prepared in compliance with the above questions 1, 2 and 3 of this Key Question 15?



5. Have the outputs from the assessments of all the mine residue deposits been combined into an integrated post-closure water and contaminant balance showing locations, qualities and timeframes of exceedance of post-closure RWQOs for all discharges?



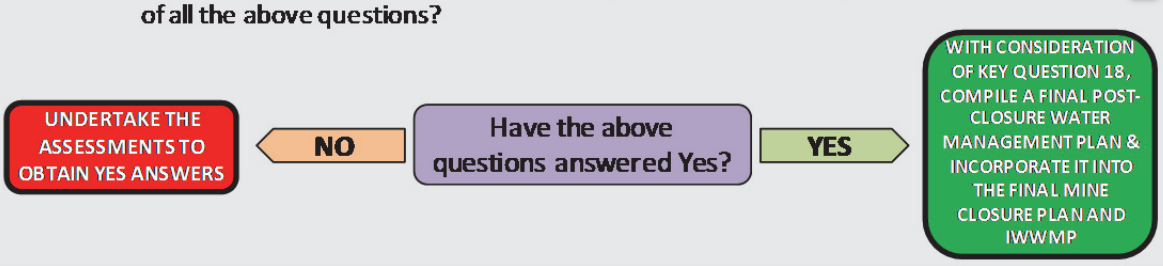
MINE OPERATIONAL PHASE – LAST FIVE YEARS

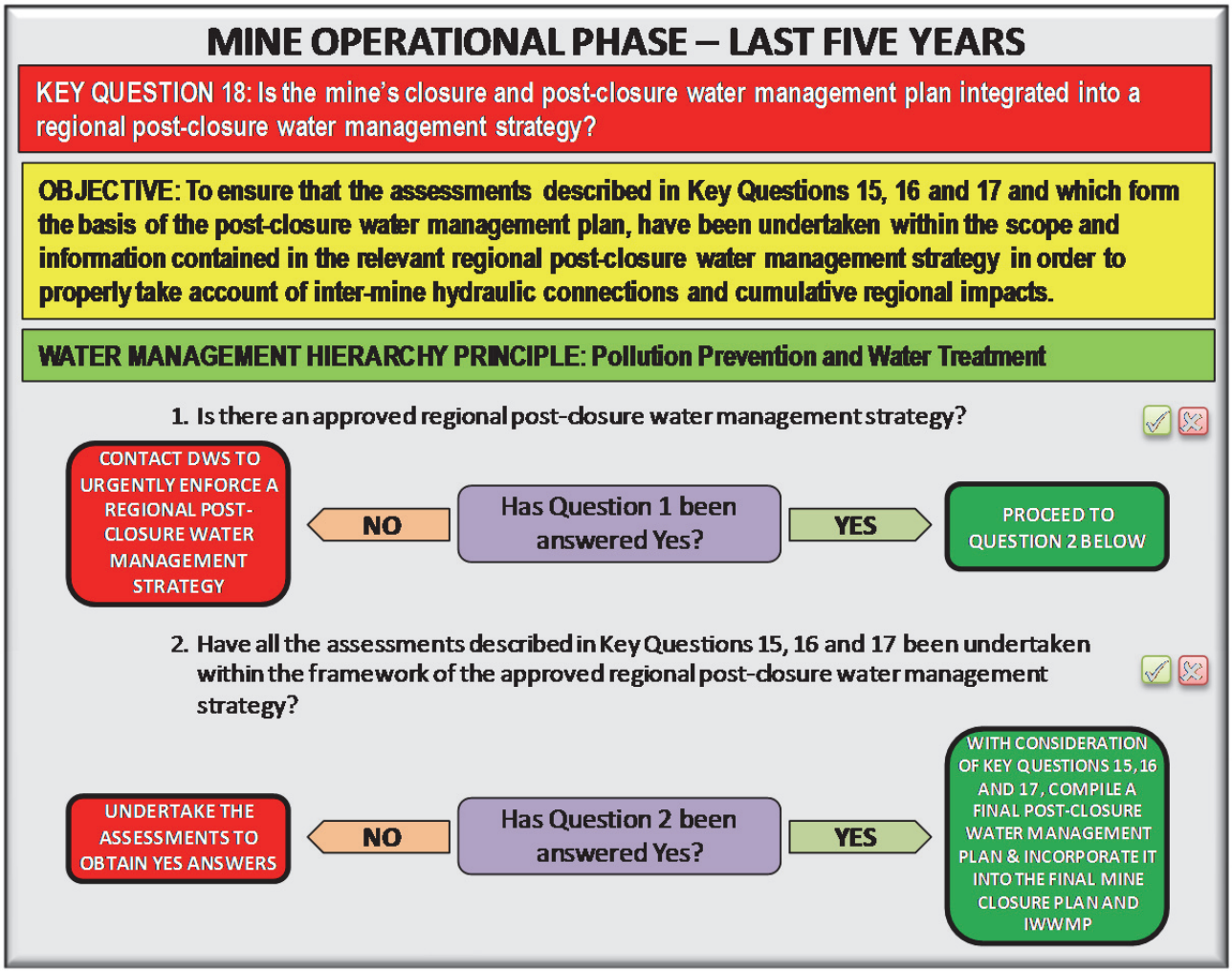
KEY QUESTION 17: Where RWQOs are not met at time of closure have appropriate post-closure water management / treatment measures been defined and are financial resources & institutional arrangements in place to ensure these are implemented?

OBJECTIVE: To ensure that the assessments described in Key Question 12 have been completed on the basis of the outcome of the assessments described in Key Questions 15 and 16 and with consideration of an integrated water and contaminant balance for all the mine workings and mine residue facilities, taking cognisance of the final post-closure water management objectives as finalised in terms of Key Questions 13 and 14.

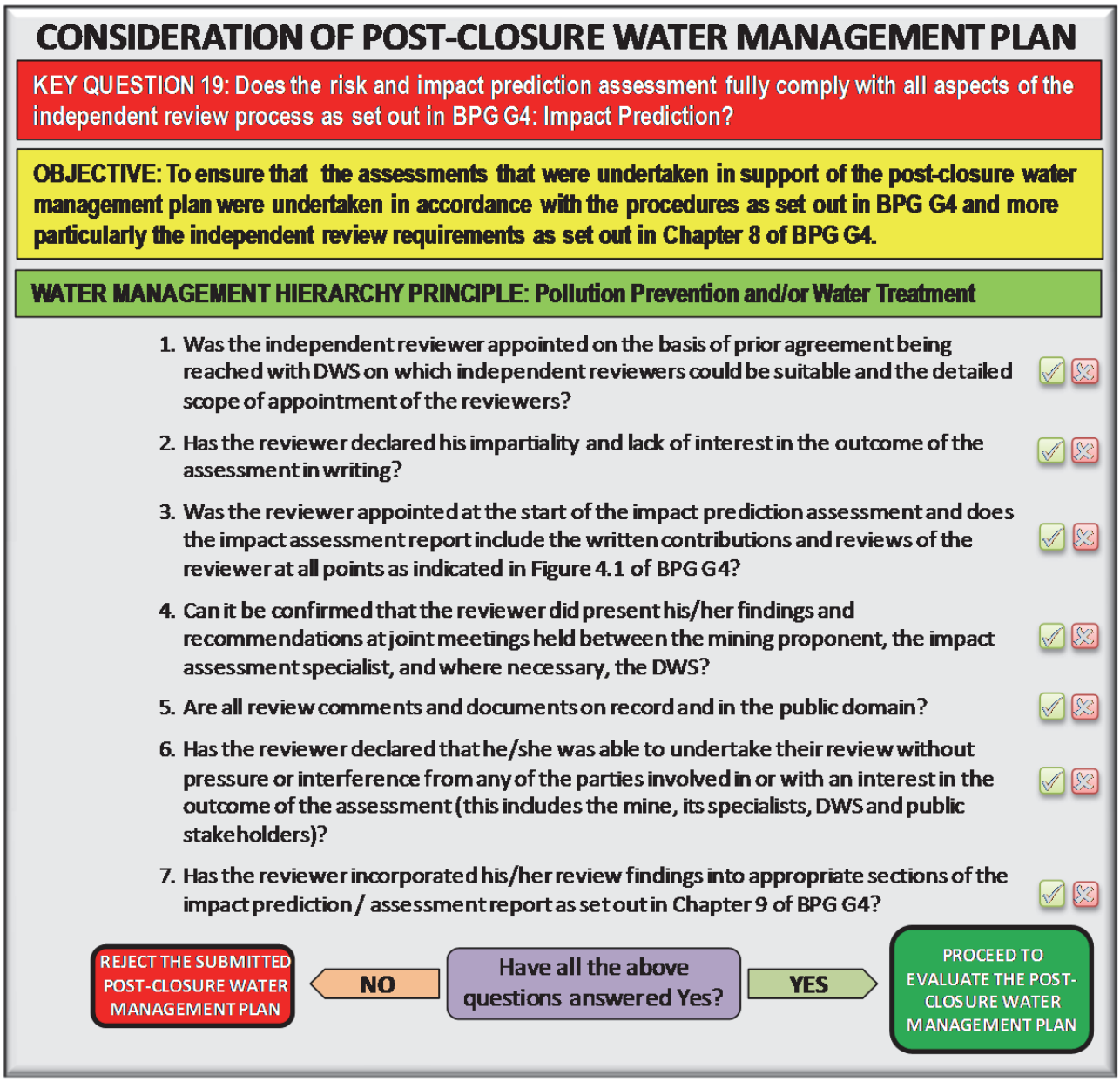
WATER MANAGEMENT HIERARCHY PRINCIPLE: Pollution Prevention and Water Treatment

1. Have all the assessments described in Key Question 12 been undertaken using the outcome of the assessments described in Key Questions 15 and 16 and taking cognisance of the final post-closure water management objectives (RWQOs) as agreed in Key Questions 13 and 14?
2. Have all the assessments described in Key Question 12 been undertaken with consideration of an integrated water and contaminant balance for all discharge points from mine workings and residue disposal facilities?
3. Have all the assessments described in Key Questions 12, 15 and 16 been undertaken within the framework of the regional post-closure water management strategy as described in Key Question 18?
4. Have the assessments in Key Questions 12, 15 and 16 been incorporated into an appropriate catchment water quality model to confirm that proposed management measures will meet the specified post-closure water management objectives, with due consideration of the effects of foreseeable worst case events on the management measures and the achievable downstream RWQOs?
5. Have the financial provisions for post-closure water management / treatment measures as described in Question 5 of Key Question 12 been updated to take account of all the above questions?




MINE OPERATIONAL PHASE – LAST FIVE YEARS
KEY QUESTION 18: Is the mine's closure and post-closure water management plan integrated into a regional post-closure water management strategy?
OBJECTIVE: To ensure that the assessments described in Key Questions 15, 16 and 17 and which form the basis of the post-closure water management plan, have been undertaken within the scope and information contained in the relevant regional post-closure water management strategy in order to properly take account of inter-mine hydraulic connections and cumulative regional impacts.
WATER MANAGEMENT HIERARCHY PRINCIPLE: Pollution Prevention and Water Treatment
1. Is there an approved regional post-closure water management strategy?
CONTACT DWS TO URGENTLY ENFORCE A REGIONAL POST-CLOSURE WATER MANAGEMENT STRATEGY
NO
Has Question 1 been answered Yes?
YES
PROCEED TO QUESTION 2 BELOW
2. Have all the assessments described in Key Questions 15, 16 and 17 been undertaken within the framework of the approved regional post-closure water management strategy?
UNDERTAKE THE ASSESSMENTS TO OBTAIN YES ANSWERS
NO
Has Question 2 been answered Yes?
YES
WITH CONSIDERATION OF KEY QUESTIONS 15, 16 AND 17, COMPILE A FINAL POST-CLOSURE WATER MANAGEMENT PLAN & INCORPORATE IT INTO THE FINAL MINE CLOSURE PLAN AND IWWMP

CONSIDERATION OF POST-CLOSURE WATER MANAGEMENT PLAN



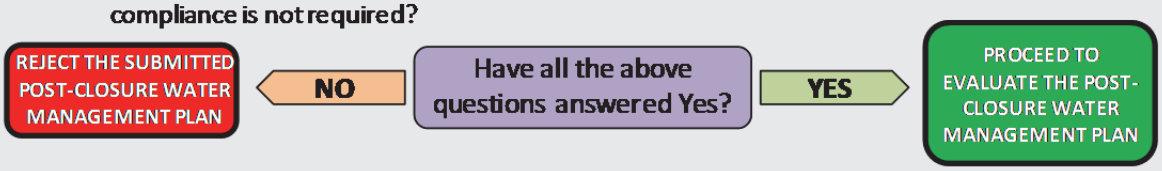
CONSIDERATION OF POST-CLOSURE WATER MANAGEMENT PLAN

KEY QUESTION 20: Does the post-closure water management plan consider all the relevant principles defined in Section 2.1 of BPG G5 and does it present all the information requested in Section 2.2 of BPG G5 and has this information been verified by the independent reviewer?

OBJECTIVE: To ensure that the assessments that were undertaken in support of the post-closure water management plan were undertaken in accordance with the principles and procedures as set out in BPG G5 and that this has been verified by the independent reviewer.

WATER MANAGEMENT HIERARCHY PRINCIPLE: Pollution Prevention and/or Water Treatment

1. Does the submitted post-closure water management plan include a checklist that confirms that all the principles set out in Section 2.1 of BPG G5 have been considered and complied with, unless it is motivated why such compliance is not required?
2. Is the checklist relating to Section 2.1 of BPG G5 complete with respect to the following principles: legal compliance and best practice; risk-based approach; sustainability; consideration of regional context; consideration of social aspects; communication and public participation; consideration of timeframe; continual improvement; concurrent rehabilitation and reduction of desertification?
3. Does the submitted post-closure water management plan include a checklist that confirms that all the principles and information requirements set out in Section 2.2 of BPG G5 have been considered and complied with, unless it is motivated why such compliance is not required?



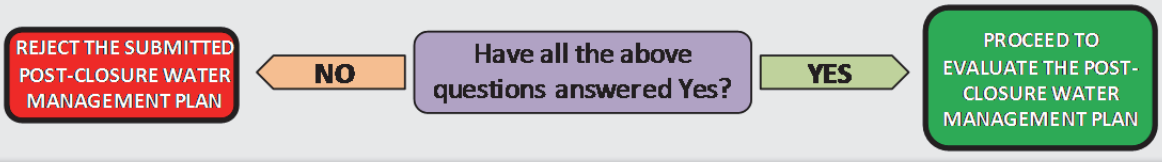
CONSIDERATION OF POST-CLOSURE WATER MANAGEMENT PLAN

KEY QUESTION 21: Has the assessment included clear evidence, supported by the reviewer, that all prediction assessments and models have been fully calibrated and validated?

OBJECTIVE: To ensure that the assessments that were undertaken in support of the post-closure water management plan are credible and that this has been verified by the independent reviewer.

WATER MANAGEMENT HIERARCHY PRINCIPLE: Pollution Prevention and/or Water Treatment

1. Does the submitted post-closure water management plan include details and results of a monitoring programme that was specifically designed to collect data to be used in the calibration and validation of prediction models?
2. Does the submitted post-closure water management plan include the results of the calibration and validation exercise to confirm the accuracy and reliability of the predictions of future impact?
3. Does the submitted post-closure water management plan include a statement on the level of uncertainty associated with the impact prediction and what confidence can be placed in the predictions by considering the contributing elements of uncertainty as set out in Chapter 8 and Section A6 of Annexure A of the WRC Report K5/2127?



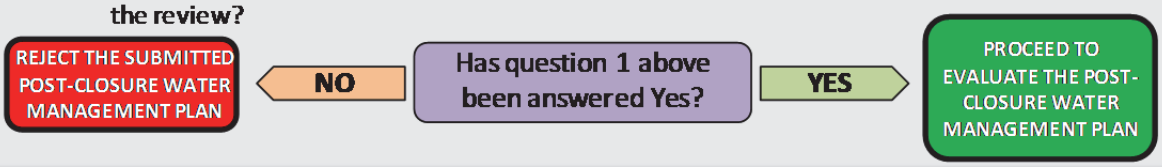
CONSIDERATION OF POST-CLOSURE WATER MANAGEMENT PLAN

KEY QUESTION 22: Does DWS have written confirmation from the independent reviewer that the review was undertaken independently, objectively, scientifically and without bias and that he had access to all required information and that he deems himself competent to undertake the review?

OBJECTIVE: To ensure that the independent review process was undertaken by a competent and truly independent person in order to enhance the credibility of the impact prediction exercise and the resultant post-closure water management plan.

WATER MANAGEMENT HIERARCHY PRINCIPLE: Pollution Prevention and/or Water Treatment

1. Is the required written declaration by the independent reviewer that his review was undertaken independently, objectively scientifically and without bias and that he had access to all required information and that he deems himself competent to undertake the review?



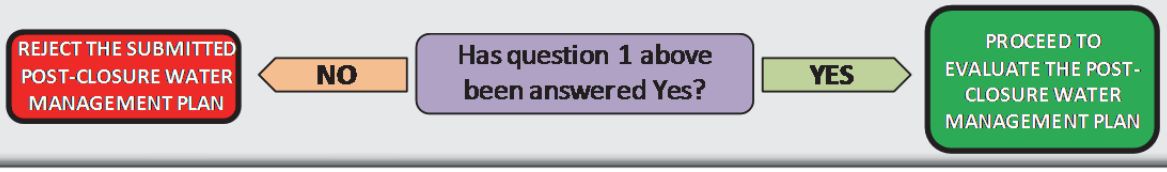
CONSIDERATION OF POST-CLOSURE WATER MANAGEMENT PLAN

KEY QUESTION 23: Does DWS have written confirmation from the mine's Board of Directors that there has been full and complete disclosure of all relevant information that could be pertinent to the consideration of the mine closure application?

OBJECTIVE: To ensure that DWS has access to all the relevant information that it requires to make a correct and informed decision to approve or reject the submitted post-closure water management plan.

WATER MANAGEMENT HIERARCHY PRINCIPLE: Pollution Prevention and/or Water Treatment

1. Is the required written declaration by the mine's Board of Directors, or a duly authorised person that all information that may be pertinent to or that may influence the decision by DWS to approve or reject the post-closure water management plan, has been fully disclosed within the post-closure water management plan?



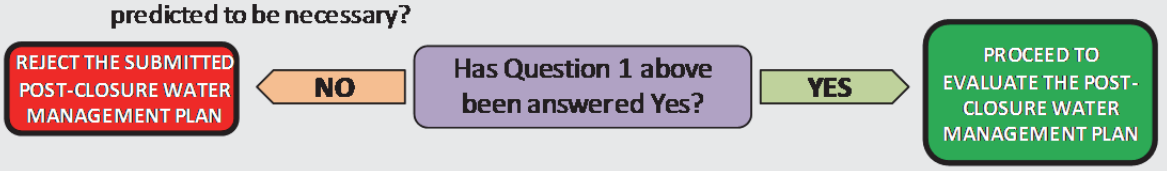
CONSIDERATION OF POST-CLOSURE WATER MANAGEMENT PLAN

KEY QUESTION 24: Does DWS have independent confirmation by suitably qualified persons that all agreed water management / treatment measures have been properly implemented and that sufficient financial provisions have been made and that suitable contractual arrangements are in place with approved third parties to ensure that all required measures will be implemented and audited for as long as has been predicted to be necessary to ensure that agreed closure objectives (RWQOs) are met?

OBJECTIVE: To ensure that the agreed water management and treatment measures that will be required to continue after approval of the post-closure water management plan are properly implemented and operational and that adequate financial resources are available to ensure that such treatment plants will be able to continue operating for as long as has been predicted to be necessary.

WATER MANAGEMENT HIERARCHY PRINCIPLE: Water Treatment

1. Has the required statement by suitably qualified persons been made regarding the implementation of the agreed water treatment measures, the availability of adequate funds and the establishment of suitable institutional and contractual arrangements to ensure that the treatment plants will be capable of operating for as long as has been predicted to be necessary?



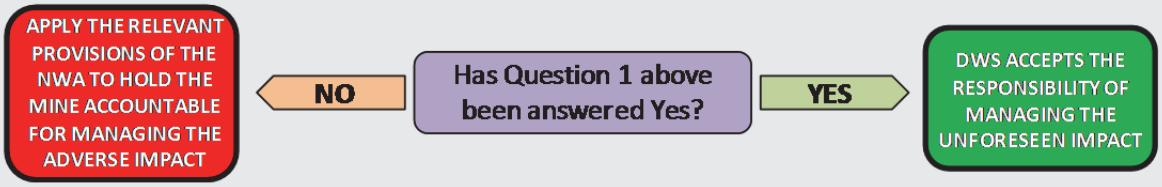
POST-CLOSURE MANAGEMENT

KEY QUESTION 25: Confirm that no information comes to light that was known at the time of the mine closure application but that was not disclosed by the mine's Board of Directors?

OBJECTIVE: To allow for a forensic audit to ensure that the full and correct information was available to the DWS when it considered the post-closure water management plan in the event of an unforeseen adverse post-closure impact arising from the mine that DWS is required to bear the liability for.

WATER MANAGEMENT HIERARCHY PRINCIPLE: Pollution Prevention and/or Water Treatment

1. In the event that an unforeseen, unpredicted and adverse impact arises from a mine where DWS has previously approved the post-closure water management plan, has a forensic audit been undertaken by suitably qualified persons to confirm that the statement made by the mine's Board of Directors in compliance with Key Question 23 was correct and truthful?



POST-CLOSURE MANAGEMENT

KEY QUESTION 26: Confirm that the implemented water management / treatment measures continue to be implemented and that they continue to meet the defined post-closure objectives (RWQOs)?

OBJECTIVE: To allow for the undertaking of regular assessments to confirm that the implemented water management/treatment measures stipulated in the post-closure water management plan and confirmed to be in place in terms of Key Question 24, continue to operate as specified.

WATER MANAGEMENT HIERARCHY PRINCIPLE: Pollution Prevention and/or Water Treatment

1. Are the institutional, contractual and financial arrangements that were put in place and confirmed as such in terms of Key Question 24 continuing to operate in accordance with design specifications for the time period stipulated in the post-closure water management plan?
2. Do implemented downstream monitoring programmes confirm that the post-closure water management objectives (RWQOs) are being met by the combination of applied water management and water treatment measures?
3. Are the answers to questions 1 and 2 above being provided to the DWS by independent auditors that were financially provided for in terms of the funding arrangements confirmed as part of Key Question 24 for the time period stipulated in the post-closure water management plan?