



KUMBA IRON ORE

Water Stewardship at Kumba Iron Ore

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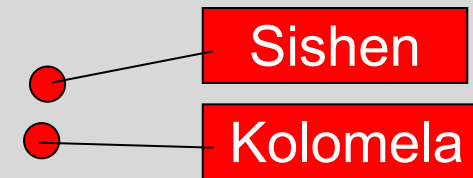
Overview

- Context
- ICM Water Stewardship Framework
- Kumba Water Management Strategy
 - Increased predictive capabilities
 - Adaptive water management
 - Stabilization of dewatering networks at operations
 - Optimization of dewatering distribution at operations
- Strategic Dewatering & Implementation Plans
- Adaptive Water Management
 - Proactive stormwater management
- Applying Water Stewardship Principles at Kumba
 - Hierarchy of use
 - Beneficial use



Context

- Sishen & Kolomela are 2 of the largest active dewatering operations globally
- Groundwater abstracted in advance of mining to facilitate safe mining
- Bulk of groundwater is supplied to regional water scheme (VGWSS) & Gamagara Municipality
- Mines are situated in the Northern Cape Province, water scarce areas, semi-arid
- 2nd largest water resource in the Province after Orange & Vaal rivers
- Kumba takes its role as a responsible water steward very seriously
- This presentation will elaborate on Kumba's water stewardship journey



ICMM Water Stewardship Framework

1. Be transparent and accountable	2. Engage proactively and inclusively	3. Adopt a catchment-based approach	4. Effective water resource management
Publicly report material water risks, management activities and performance.	Engage stakeholders in an open and transparent manner to understand their priorities, share plans and collaborate on solutions.	Understand the social, cultural, economic and environmental value of water at the catchment scale to identify material water stewardship risks and provide context for corporate and operational water management.	Manage operational water (quantity and quality) inputs, use and outputs to maximize resource sustainability, operational flexibility and economic benefit

“Global water resources are under increasing pressure and it is widely recognized that a holistic approach to water management is required to achieve resource sustainability and secure future access”

Kumba Water Management Strategy

The Kumba Water Management Strategy was revised in 2024 to align with:

- ICMM Water Stewardship Framework
- Anglo American guidelines, standards, frameworks, policies etc.
- Sustainable Mining Plan (SMP) objectives
- Initiative for Responsible Mining Assurance (IRMA)

The Kumba WM Strategy focuses on 4 strategic elements:

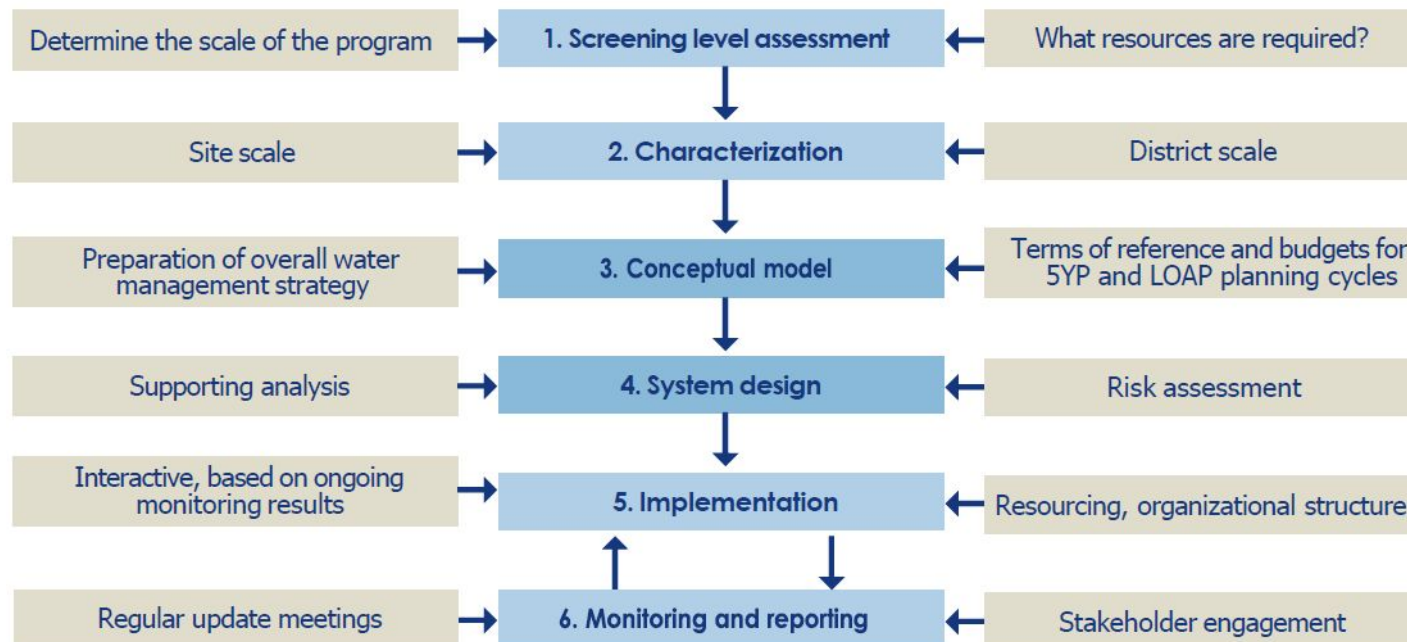
1. Increased predictive capabilities
2. Adaptive Water Management
3. Stabilization of dewatering networks at operations
4. Optimization of dewatering distribution at operations

To empower our water stakeholders through meaningful engagement to ensure the beneficial use of Kumba's water resources for all

Strategic dewatering and implementation plans

Kumba's mature approach & success in active mine dewatering was used as the foundation to develop the Anglo American

Strategic Dewatering Plan: Development & Implementation Framework



STEP 1: Screening-level assessment

- Assessment of the required scale of the program
- Planning of the required resources

STEP 2: Characterization of the geological and hydrological conditions

- District scale
- Site Scale

STEP 3: Development of a conceptual model and strategic planning

- Development of the overall water management strategy, including dewatering options and trade-off analysis
- Preparation of the terms of reference (ToR) and budgets for the 5 year (5YP) and life of asset plan (LOAP) planning cycles

STEP 4: Mine dewatering system design

- Analytical and/or numerical supporting analysis
- Assessment of risks

STEP 5: Implementation

- Progressive installation of the system based on the mine plan (LOAP)
- Interactive adjustment based on the on-going monitoring results
- Definition of staff, roles and organizational structure

STEP 6: Monitoring and reporting

- Feedback loop to optimize the implementation
- Strategy and implementation review by stakeholders and experts

Adaptive Water Management

Proactive surface water management

Step 1: Define a clear vision and strategic objectives

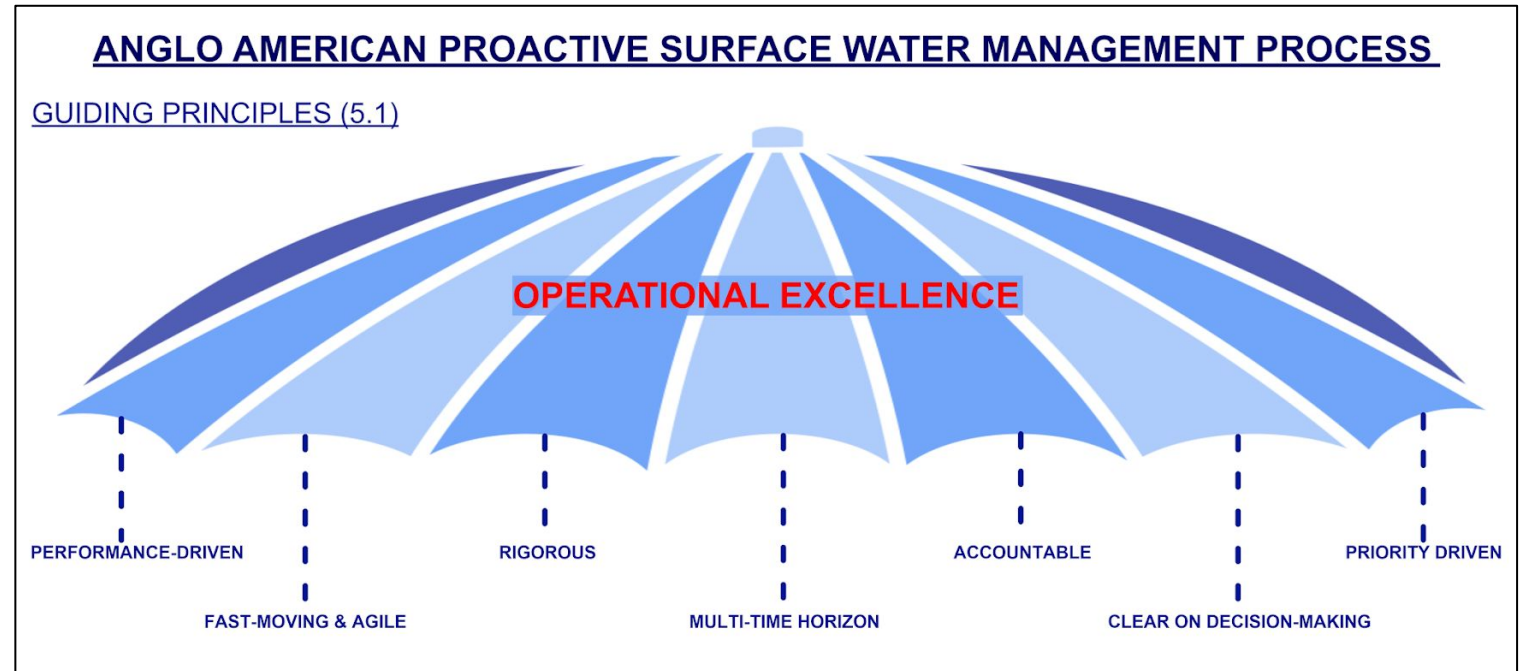
Step 2: Set the business expectations

Step 3: Commence operational planning

Step 4: Work management

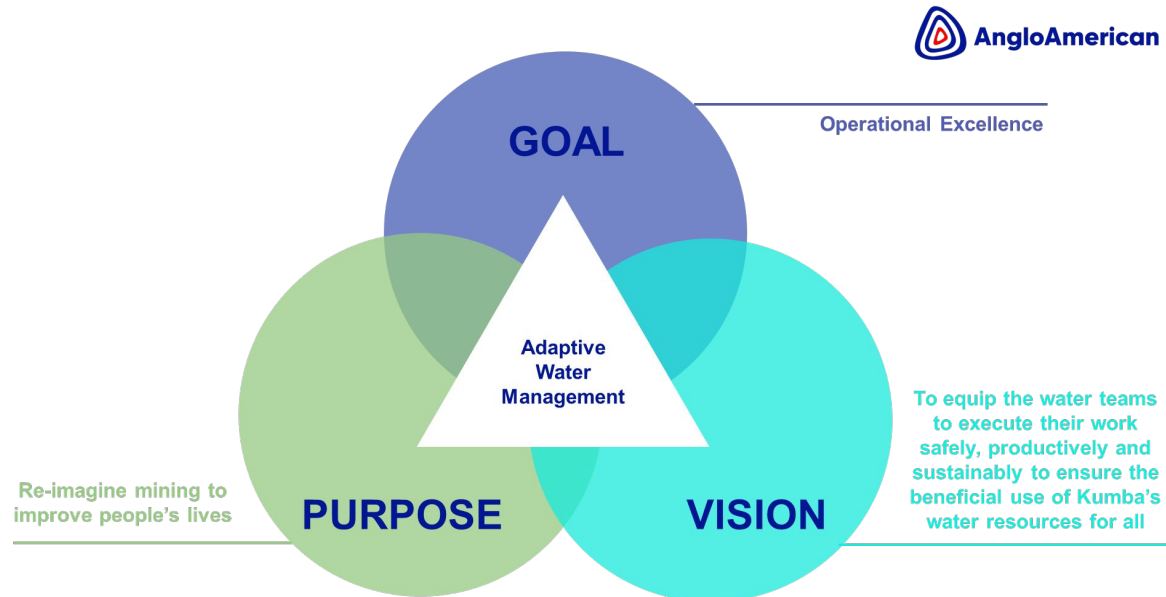
Step 5: Feedback and communication

Step 6: Performance monitoring



Adaptive Water Management

Proactive surface water management (continued)



OPERATING MODEL PROCESS FOR PROACTIVE SURFACE WATER MANAGEMENT

SETTING BUSINESS EXPECTATIONS

The source-pathway-receptor principle is applied to determine risk appetite and priorities

FEEDBACK

Feedback is given regularly to maintain alignment to the objectives and vision of the operation

PROCESS PERFORMANCE MONITORING

The operational vulnerability dashboard is updated on a weekly basis and communicated to the relevant stakeholders to drive action and communicate results

OPERATIONAL PLANNING

The objective of operational planning is to ensure work is planned, scheduled and resourced adequately to enable the RIGHT WORK to take place at the RIGHT TIME and be completed the RIGHT WAY.

For Proactive Surface Water Management this includes:

- Long Term Rain Forecasts
- Vulnerability Index Definition
- Dynamic Surface Water Management Infrastructure Design
- Identification & Prioritization of Critical Mining Areas
- Surface Flood Risk Modelling
- Baseline Schedule & Vulnerability Dashboard Development

WORK MANAGEMENT

The Work Management applies to those tasks during the implementation phase of Proactive Surface Water Management during the lead up to and during the rainy season at the operation, and includes:

- Daily weather forecasts & rainfall tracking
- Equipment scheduling and tracking
- Schedule tracking for sump & pipeline installation
- Execution of work

Adaptive Water Management

Proactive surface water management (continued)



KUMBA IRON ORE

SISHEN IRON ORE MINE RAIN READINESS

PUSHBACK STATUS OVERVIEW

WEEK ENDING: **31-10-21**

SISHEN IRON ORE MINE 6-DAY WEATHER IMPACT FORECAST

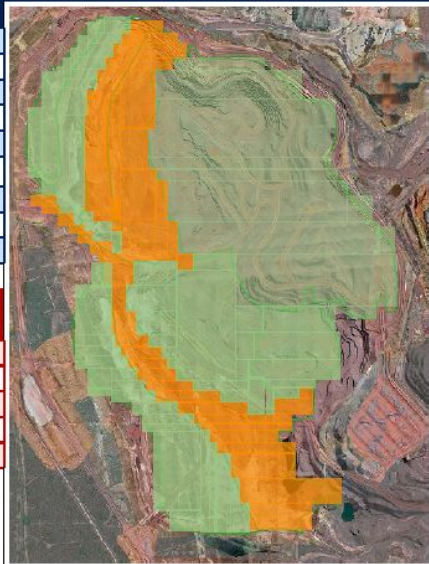
Forecast Parameter	Mon, 25-Oct-21		Tue, 26-Oct-21		Wed, 27-Oct-21		Thu, 28-Oct-21		Fri, 29-Oct-21		Sat, 30-Oct-21	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Rainfall Amount (mm)	<1		1-5		<1		10-20		20-40		<1	
Heavy Rainfall Risk	0.0	0.0	0.2	1.4	0.0	0.0	0.0	1.2	2.9	3.1	4.6	0.1
Source: http://fs.sishen.angloam.com/ ■ High Risk Severe Thunderstorms Rainfall Rate >2.0 mm/hr ■ Medium Risk Moderate Thunderstorms Rainfall Rate 0.2 - 2.0 mm/hr ■ Low Risk Mild/No Thunderstorms Rainfall Rate <0.2 mm/hr												

MINING PUSHBACK RAIN READINESS STATUS

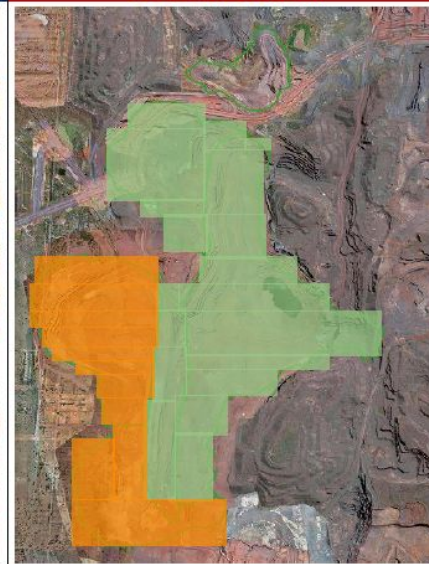
North Mine		
Priority	Pushback	Vulnerability Status
1	Pushback 8	Vulnerable, Controlled
2	Pushback 4	Vulnerable, Controlled
3	Pushback 3	Vulnerable, Controlled
4	Pushback 12	Low Vulnerability, Controlled
5	Pushback 7	Low Vulnerability, Controlled
6	Pushback 6	Low Vulnerability, Controlled
7	Pushback 2	Low Vulnerability, Controlled
8	Pushback 9	Low Vulnerability, Controlled
9	Pushback 5	Low Vulnerability, Controlled

South Mine		
Priority	Pushback	Vulnerability Status
1	Pushback 16	Vulnerable, Controlled
2	Pushback 17	Vulnerable, Controlled
3	Pushback 14	Low Vulnerability, Controlled
4	Pushback 13	Low Vulnerability, Controlled
5	Pushback 15	Low Vulnerability, Controlled

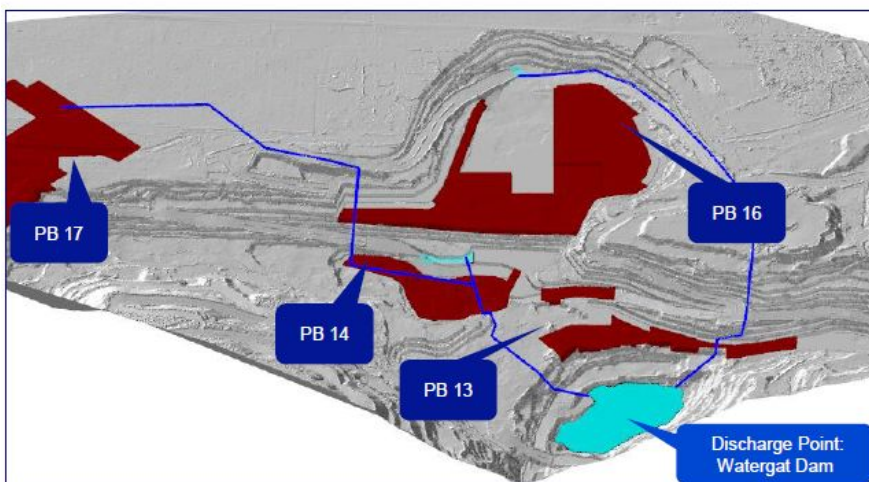
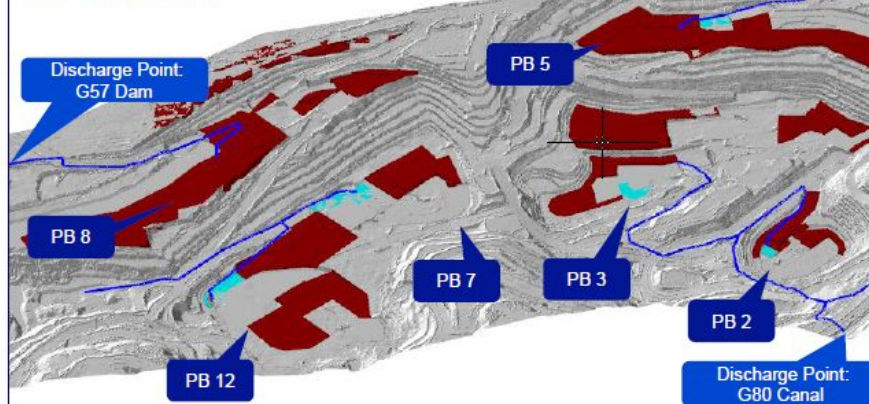
North Mine Overview



South Mine Overview



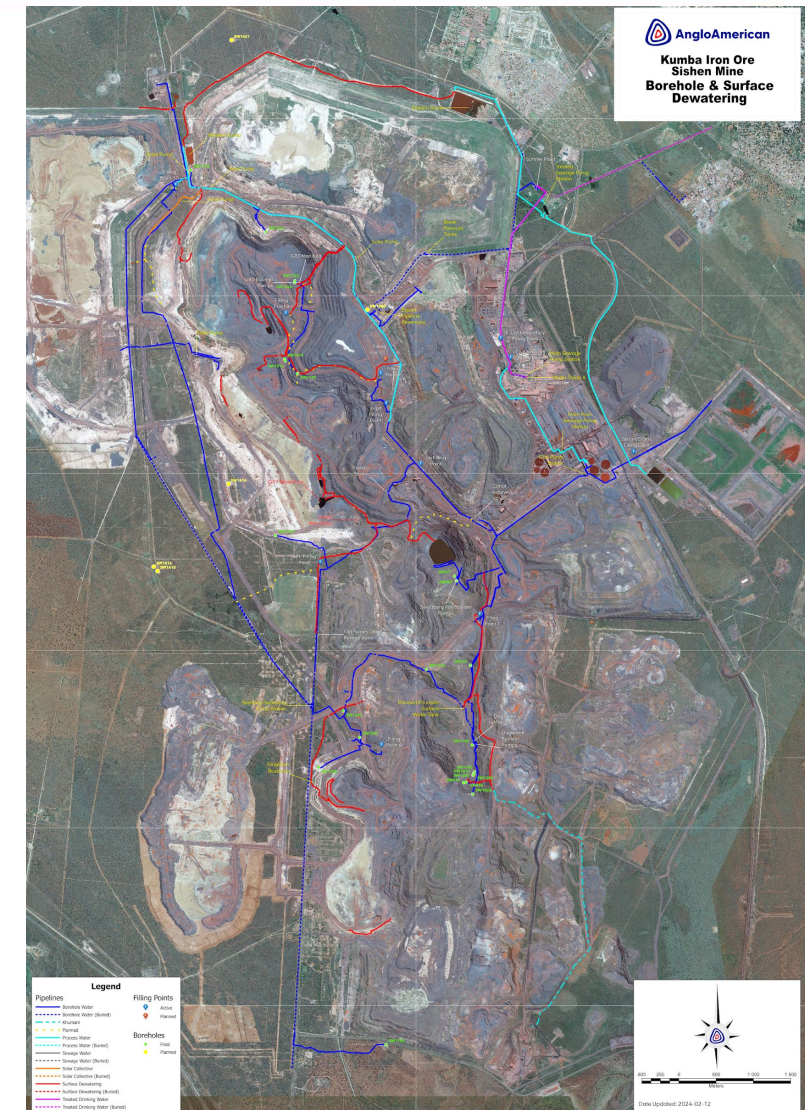
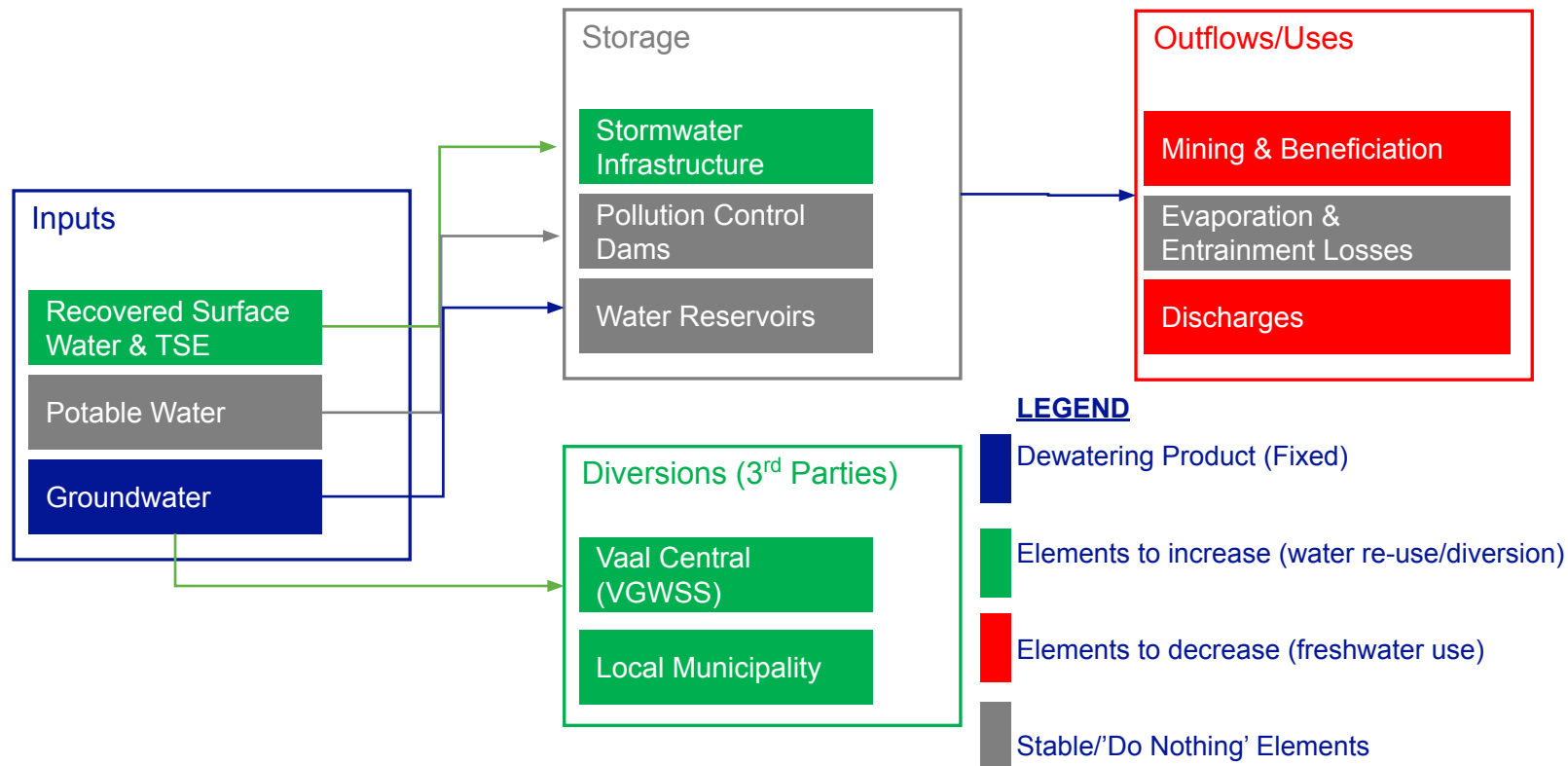
Planned Sump Positions with Infrastructure.



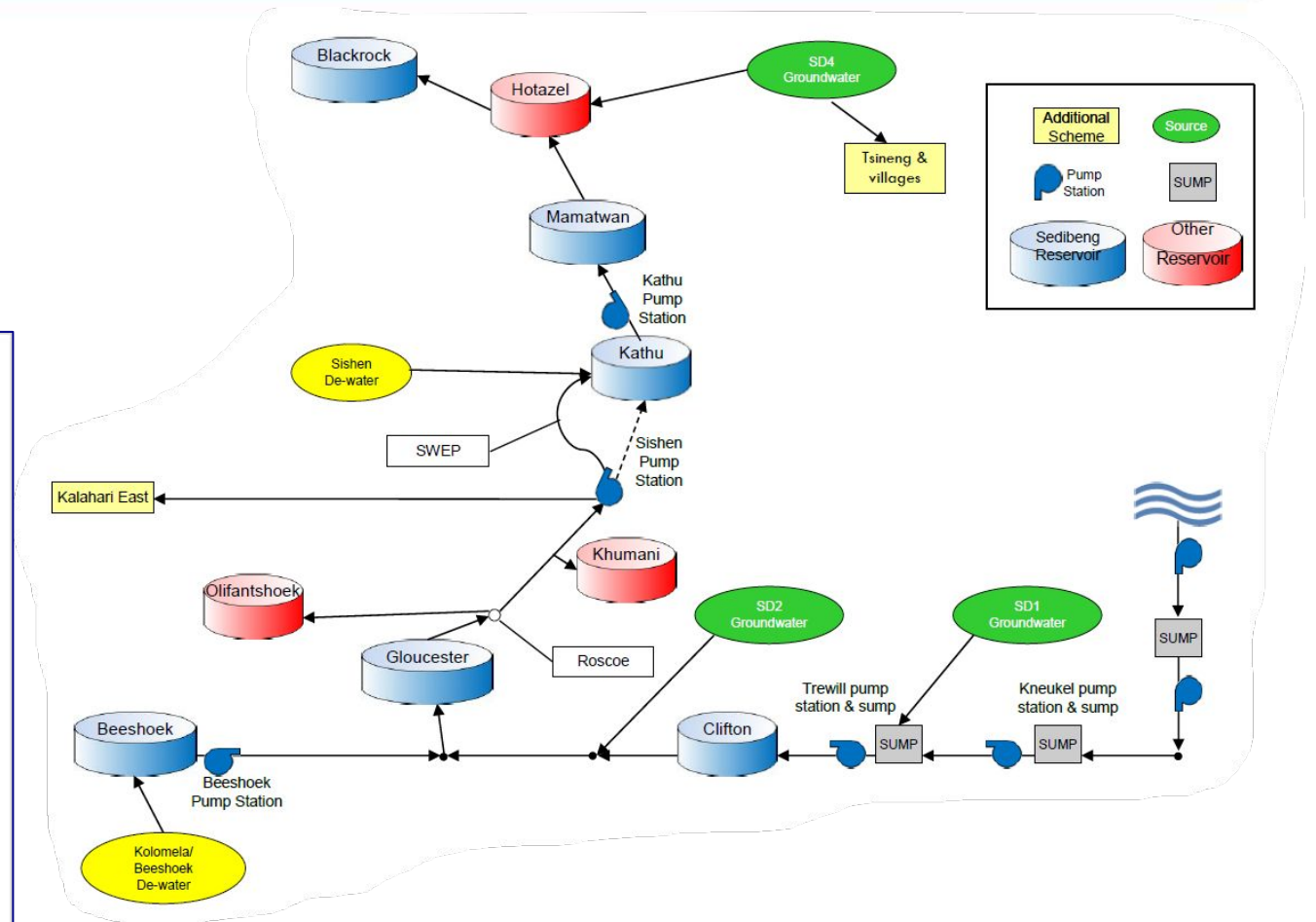
Applying water stewardship principles at Kumba

Hierarchy of use

- Particularly relevant at Sishen
- Use the lowest quality water available for the process
- Maximize availability of high-quality water to divert for beneficial use



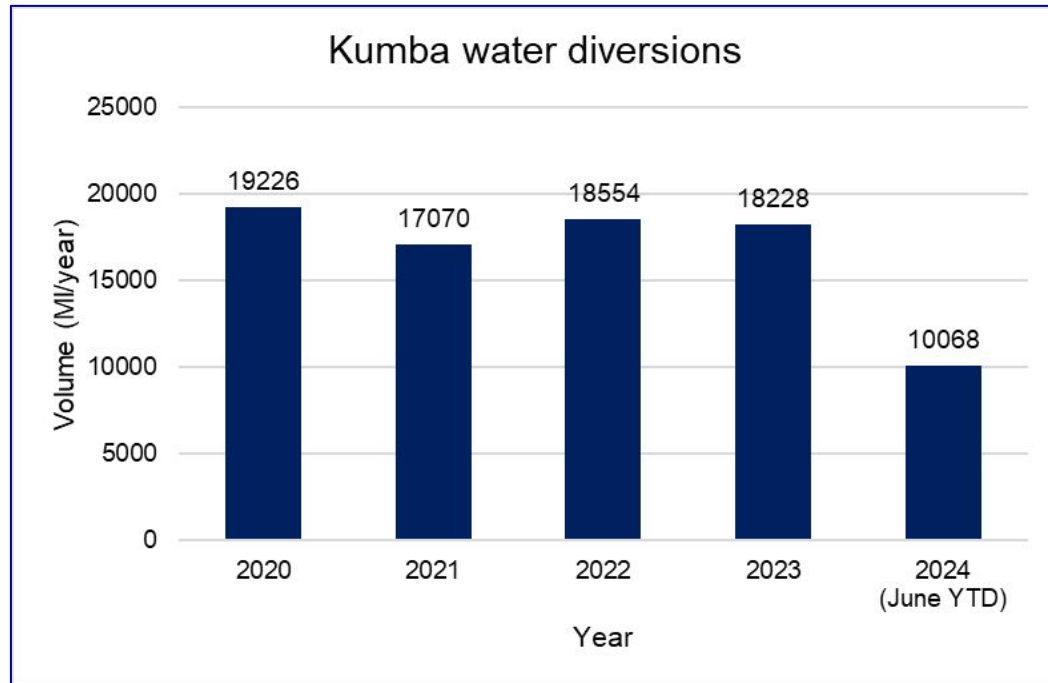
- **Linked to Kumba's water management strategy vision**
- **Diversion of surplus groundwater for beneficial use**
 - Vaal Central (regional water supply scheme – VGWSS)
 - Gamagara Municipality
 - Managed aquifer recharge (Groenwaterspruit, Khai-Appel)



Applying water stewardship principles at Kumba

Beneficial Use (diversions)

- Linked to Kumba's water management strategy vision
- Diversion of surplus groundwater for beneficial use
 - Vaal Central (regional water supply scheme – VGWSS)
 - Gamagara Municipality
 - Managed aquifer recharge (Groenwaterspruit, Khai-Appel)



Conclusion

Sishen and Kolomela play crucial roles in water supply for the region and Kumba takes this very seriously.

Kumba is committed to being a *responsible water steward* and there are active endeavors underway to further improve.

A substantial effort has gone in to developing the guidelines, strategies, standards and procedures that govern water management that are aligned with international best practices.

The principles of adaptive water management are thread throughout the way Kumba goes about business and this reflects in their achievements.

The execution of the new water management strategy will take Kumba to new heights and guarantee the vision of *empowering its water stakeholders through meaningful engagement to ensure the beneficial use of Kumba's resources for all* is realized.





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Thank You