



Risk Management for Dam Rehabilitation Projects

Daniel Johnson, AECOM, Dave Paul, HDR, Inc,
Terry Arnold, AECOM

Dan.johnson@consultant.aecom.com

Rehabilitation Risk

Design

Inadequate geology/geotechnical data, limited engineering budget, no PFMA, inaccurate or non-existent record drawings, environmental/societal impacts

Construction

Bidding, labor stability, site conditions, weather, geology, price changes, claims

Operation

Site access, staff training, unusual/extreme conditions, societal interruption



Total Design and Construction Process

- Integrate design and construction teams
 - Enable all parties to “be on same page”
- Implement formal project risk management process
 - Encourages parties to share concerns and risk management solutions
- Initiate at project start and continue through commissioning and operation
 - Conditions, issues, and approaches change throughout design and construction

Surprises – Geologic and Hydrologic



Project Risk Management

1. Risk identification and Categorization
2. Risk analysis
3. Risk mitigation
4. Risk monitoring and updating

Risk Identification

- Formal process with design/construction team
- Regularly updated through the design and construction process
- Uses current project information and lessons learned from past projects
- Develops a risk register document that is a “working product”

Risks to Consider

- Technical risks
 - Hydrologic, seismic, geology, site conditions, design errors/omissions, weather
- Contracting and construction risks
 - Bidding period challenges, pricing variability, material/labor shortages, requested changes, site condition changes, unknown conditions, safety issues, inaccurate schedule
- Other risks
 - Team member turnover, environmental requirements, regulatory demands, site access, social upheaval, site security

Risk Register

- Excellent tool for documenting initial risk workshop and follow-on risk updates – to be shared with owner, designer, and contractor
- Captured topics
 - Unique risk identifier
 - Risk description
 - Estimate of likelihood of occurrence
 - Low, moderate, high, extreme, not assessed
 - Grade of risk relative to severity of risk occurrence impact
 - Low, medium, high
 - Party responsible for managing the risk
 - Timeline to mitigate
 - Description of possible mitigation actions
 - Order of magnitude cost of risk

Risk Register

SCHEDULE RISK REGISTER										
LAKE ISABELLA DSMP										
Color Code	Status	ID	Title	Meeting Date	Assignee	Time Horizon	Impact	Risk Prob	Mitigation Strategy	
Red Alert Risk Items								No of Risk Items in this Category:		
Near Term								No of Risk Items in this Category:		
■	Closed	1	Completion Borel Canal Cap	10/1/2018	Contractor	Near Term	High	100	Waiting for test Results	
■	Open	7	Crushing Plant	25/12/2018	Contractor	Near Term	High	100	Backward Pass & Weekly Schedule Reviews	
■	Open	5	Timely Completion of QA Lab	11/20/2018	Joint	Mid Term	High	80	Kleinfelder equipment calibration and validation	
Mid Term								No of Risk Items in this Category:		
■	Open	2	Service Spillway Abutment Wall	11/14/2018	Contractor	Mid Term	High	100	FDSJV to request demo prior 1st april/excavation submittal week of the 21st Jan	
■	Open	3	Start of Aux Dam Degrade	10/1/2018	Contractor	Mid Term	High	80	Backward Pass & Weekly Schedule Reviews	
■	Open	10	Mass Concrete	3/4/2018	Contractor	Mid Term	High	80	Weekly Discussion	
■	Open	9	Labyrinth Weir	1/29/2019	Contractor	Mid Term	High	80	Discuss every week	
Yellow Alert Risk Items								No of Risk Items in this Category:		
Near Term								No of Risk Items in this Category:		
■	Closed	4	Construction of FG Extension	11/16/2018	Joint	Near Term	High	60	Waiting for test results	
Mid Term								No of Risk Items in this Category:		
■	Open	6	Construction Placement Window	8/1/2018	Contractor	Mid Term	High	60	Weekly Discussion	
■	Open	8	Dewatering Plan	8/1/2018	Contractor	Mid Term	High	60	Weekly Discussion	
Blue Alert Risk Items								No of Risk Items in this Category:		
Near Term								No of Risk Items in this Category:		
Mid Term								No of Risk Items in this Category:		

COLOR INDEX					TIME HORIZON	
Probability	21 - 40	41 - 60	61 - 80	81 - 100	Near Term	[<=90 days]
Impact	Unlikely	Possible	Likely	Almost Certain	Mid Term	[91 – 180 Days]
High	Blue	Yellow	Red	Red	Far Term	[> 180 Days]
Med	Green	Blue	Yellow	Red		
Low	Green	Green	Blue	Yellow		
Resolved	Black	Black	Black	Black		

Risk Mitigation Methods

- Avoid
 - Change scope, design, or construction procedures
- Mitigate
 - Modify design or construction procedures
- Transfer
 - Shift risk to another party for managing.
- Accept
 - Understanding that the risk is outside of risk team influence

Closing

- Dam rehabilitation involves risk
- Risk can impact scope, schedule, and budget of project
- Important for owners, engineers, and contractor to understand/communicate
- Conditions causing risk can be anticipated
- Risk management implementation to understanding surprises and manage risks will result in successful project