



# Modern Schemes of Monitoring Objectives & System Specification

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# Outline

- What is a Scheme of Monitoring?
- Why have one?
- What do we want out of it?
- What do we want to put into it?
- System specification
- Methodologies



# The Fundamentals

Answer these questions and you are there!

- What is the problem?
- What is the hydrogeology / hydrology controlling the problem?
- Why are we monitoring?

That's all folks ...

# What is a scheme of monitoring?

- An arrangement of monitoring points to gather scientific data
- The minimum number of monitoring points to get past the EA and Planners
- An excuse to get out of the office and wander around the site
- A consultants licence to print money
- A complete and utter waste of time and money





# Why Have One?

- Because we have to
  - Because we want to
  - Because we need to
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- ROMP / RoC / Env Act Review
  - Planning consent
  - Dewatering
    - When?
    - Serious & Significant Damage
  - Environmental Permit
    - Discharge
    - Waste
    - Abstraction (when?)

# What do we want out of it?

- Permission, consent, permit, licence
- No hassle
- Cheap
- Good quality data
- Good quality science
- An extension / new site
- Compliance
- Proof
- Value



# What do you want to put into it?

- As little as possible
- Minimal management time
- Minimal operating cost





# System Specification (1)

- A good conceptual model
- Define the risk issues
- What data is
  - Critical
  - Important
  - Nice to have
- Where
  - Could we
  - Can we
  - Should we
- When
  - Start
  - End
  - Interval

# System Specification (2)

- Surface Water
  - Which range of flows (baseflow / floods)
  - Discharge rate, velocity or stage
  - Control structures, ratings, piped flow
  - Quality (which parameters)
  - Chemistry (which isn't the same as quality)



# System Specification (3)

- Groundwater
  - Which aquifer
  - Pressure & permeability
  - Borehole design / construction
  - Piezometer OR Standpipe
  - Water quality / chemistry





# System Specification (4)

- Don't Forget
  - Rainfall
  - Wind
  - $E_t$  / PE
  - Discharge (rate & total)
  - Discharge quality
  - Trigger levels
  - System control
  - KPI's ( $Q/s$  ;  $kW/s$  ;  $kW/Q$ )



# Methodologies

- Manual
  - Cheap to set up?
  - Frequency
  - QA/QC
- Semi-Automatic
  - Set up costs
  - Download frequency
  - QA/QC
- Telemetry
  - Set up costs
  - Continuous streaming
  - Error / problem reporting



# Summary

- Schemes of monitoring have a purpose
- Best value comes from best design
- Less is more
- Good data is an investment
- If the data isn't worth understanding it's not worth collecting
- If the scheme isn't right change it
- Needs change with time
- Schemes are not cast in stone
- Schemes should support the quarry/site / company not the techies & consultants
- Schemes should add to environmental protection not detract from it

# Any Questions?

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