

# Environmental Safety Case

## Engineering Optimisation – Current Status

WCSSG LLWR Sub Committee, 10 March 2010

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# Content

- What we have been doing
- What conclusions are emerging
- What happens next

# Background

- Development of the LLWR Environmental Safety Case
  - Last presented in 2002
  - Condition of regulatory authorisation
  - Demonstrates understanding of disposal system and controls needed to provide environmental safety
  - Next revision by 1<sup>st</sup> May 2011
- Successful ESC vital to future of LLWR

# Background

- *Optimisation* a central theme in development of the ESC (Guidance on Requirements for Authorisation)
- Choices about how environmental hazards are controlled through design, use and management of the LLWR
  - Remedial actions relating to past disposals
  - Waste conditioning and emplacement
  - Pre- and post-closure engineering
  - Post-closure management

# Optimisation Work Objectives

- Support future plans and programmes and investment for facility development, operation and closure
- Underpin assumptions made in detailed safety analyses

# Overall Approach

- Justification of overall safety strategy
  - what control measures should be provided and why?
  - what alternative ways exist for providing these controls?
  - which of these alternatives is preferred?
- Design and implementation of specific controls
  - how can the objectives of the strategy best be fulfilled?
  - how do different features/actions work together?
  - Implications for timing, detailed design etc.

# Engineering Design Optimisation

- Started early autumn 2009
- Report to WCSSG Sub-committee 9 December
- Scoping/strategy workshop 17 December
- Collection and analysis of evidence for different options
- Options evaluation workshop 23-24 February
- Currently preparing conclusions and recommendations for LLWR management review

# Safety strategy

- Provide protection against main threats to isolation and containment of the waste
- Emphasis on passive control
- Engineered barriers to release
  - Protect against disturbance so far as practicable
  - Minimise water flow through the system
  - Control gases and leachate that may be produced within the facility
  - Direct releases that may occur so as to minimise impact

## Emphasis in comparing options

- Is there is a clear preference between options from perspective of confidence in environmental safety performance?
- Would that preference be materially affected by wider considerations?

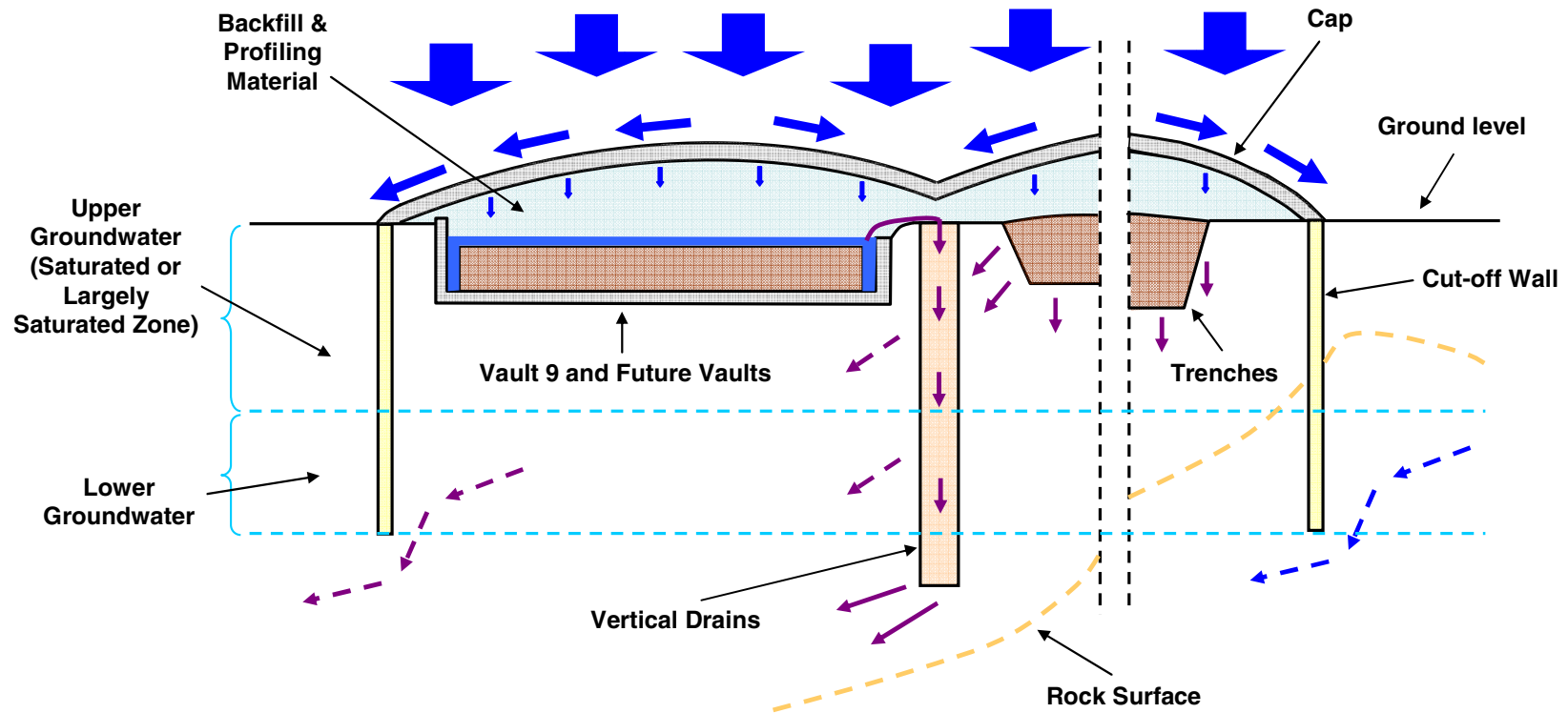
# Provisional Outcomes - Cap

- Emphasis on confidence in performance leans towards preference for 'single dome' cap
  - Implies higher than bare minimum cap height
  - 4m difference in elevation on a cap some 400m in width
  - Planning implications - need to develop illustrations of this
- No intention to take height of cap beyond what is necessary to ensure long-term performance and stability
  - But seek to make best sustainable use of available capacity for disposal provided it does not compromise safety performance
- Scheduling of construction an important consideration
  - Initial work necessary by the time Vault 10 is opened (2014)
  - Programme of monitoring to examine performance of existing trench cap
  - Understanding of likely settlement a key factor in detailed planning

# Provisional Outcomes – Vault design

- Current Vault 9 design
  - storage in the absence of a disposal authorisation
  - focused on ‘leachate containment’
  - flexibility for later conversion to a disposal design
- Best available understanding suggests long-term behaviour is difficult to predict
  - uncertain balance between cap and Vault base/wall performance
  - no obvious benefit in terms of environmental safety
- Preference for more predictable design / simpler story
  - seek to minimise contact between infiltrating water and wastes
  - maintain operational focus on collection and controlled discharge
  - post-closure focus on draining infiltrating water at vault base

# Schematic 'Leachate Containment'



## Provisional Outcomes - Other features

- No functional role for ‘vertical drains’
  - No longer required to guard against inherent weakness in double dome cap
  - No longer required to provide pathway for ‘bathtubbing’ of leachate from Vaults
- No discernable benefit gained from very deep cut-off walls
  - Approx 2m below base of Trenches/Vaults sufficient to fulfil required function

## Next Steps

- Synthesis of outcomes
- Recommendations to LLWR management
- Presentation and discussion with planning authority, regulators, other stakeholders
- Assumptions adopted as basis for safety assessments



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