



UK Efforts towards Site End State

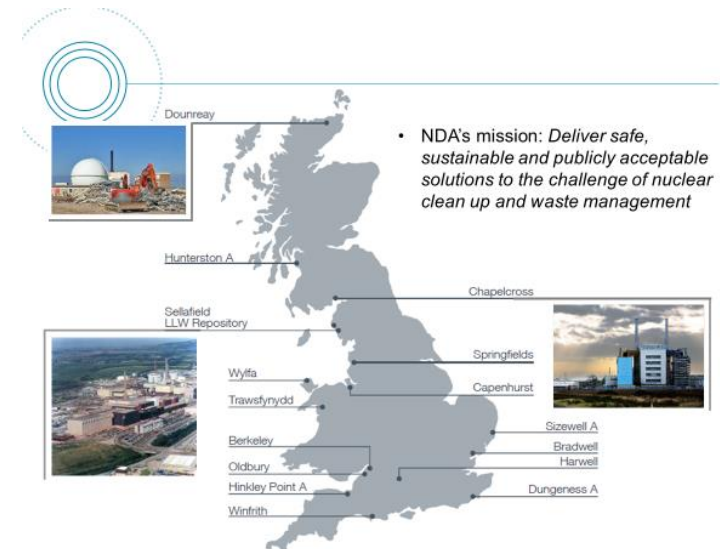
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UK Civil Nuclear Remediation

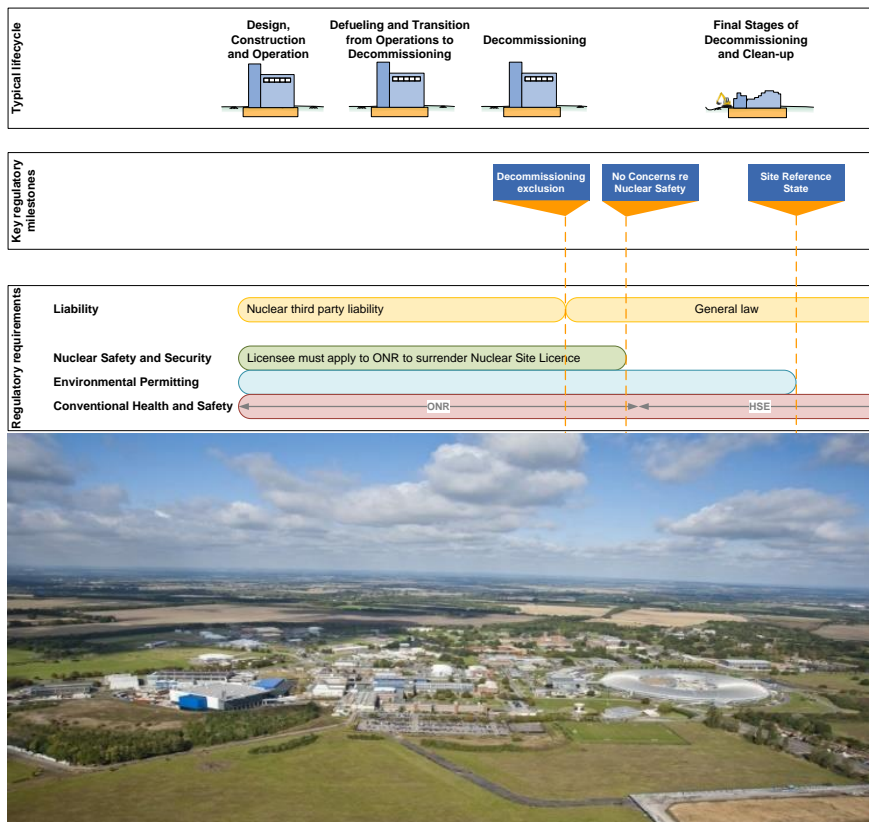
Restoration of the UK's civil nuclear legacy sites

- The NDA is responsible for the clean-up for the UK's 17 oldest civil nuclear sites
- Soon to expand with inclusion of the UK's AGR fleet
- Specific mandate to consider the social impact of the end of mission
- Specific requirements to consider and consult with interested and affected parties



What is the Aim?

Remove the hazard. Release from Regulation. Regenerate and Reuse.



Beyond Safety

Understanding Value

- Capital sale of land
- Employment
- Natural capital
- Demolition materials. Not everything is waste. Both commercial and non commercial value
- Amenity
- Confidence
- Reuse for other national strategic requirements. E.g. low carbon energy

Understanding Detriment

- Holistic health and safety
- Environmental Cost
- Nuisance to communities
- Capital Cost of projects



Site End State - UK

The condition to which the site (land, structures and infrastructure) will be taken at the end of the decommissioning process

- It Must be:
 - Safe
 - Sustainable
 - Publicly Acceptable
- Enable beneficial reuse as early as possible
- Controls may be used to protect people and the environment from residual hazards where necessary
- Assumptions at this stage due to future uncertainty. Enough to set direction and focus future work

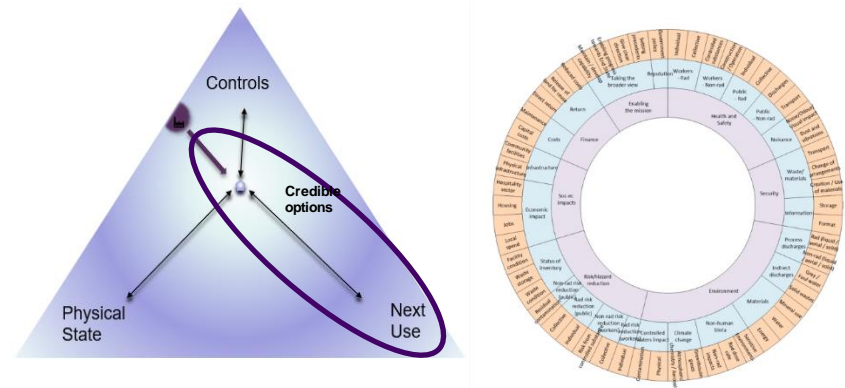
Optimisation

Decision Making – A Holistic Approach – Practical Application of Sustainability

- Is the selected waste management solution safe?
 - Approach is well understood for making case (radiological protection).
- What is the balance between controls, physical state and next use.
- What is the optimal pace and priority of doing the work
- Is the solution optimal in the broadest sense? (taking account of all sources of risk and of lifecycle impacts on environment, society and economy)
 - optimal waste management
 - Environmental benefits vs detriments of doing the work
 - Social Value
 - Circular Economy
 - The importance of non radiological and conventional risks
- NDA as developed a Value Framework to define these factors

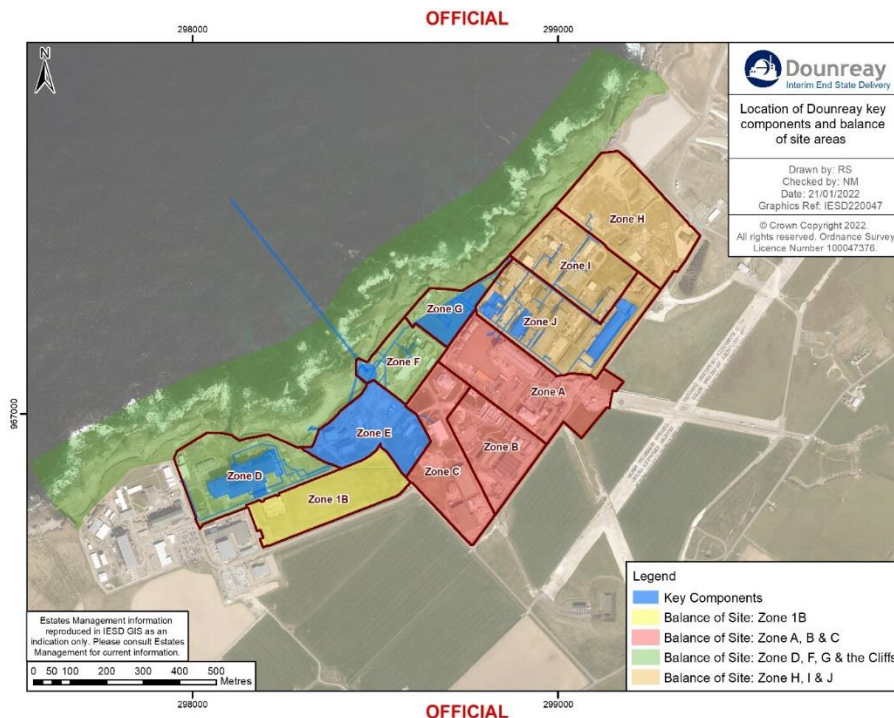
HMG Policy Consultation:

“We want sustainability to be hard wired into thinking on the management of radioactive substances and how nuclear decommissioning is carried out”

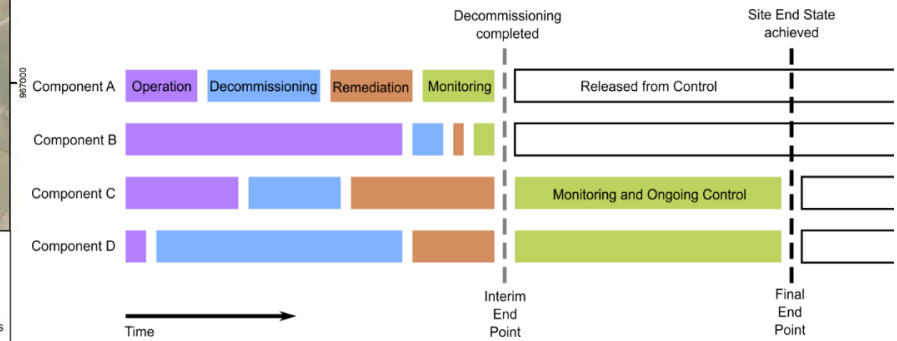


Decision making on Multi Facility Complex Sites

Application of a component approach



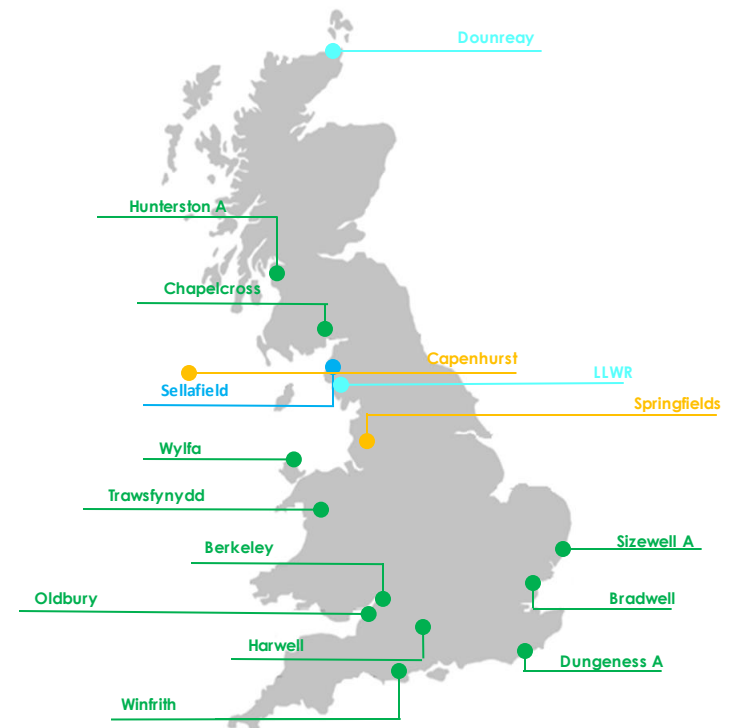
- How do you eat an elephant?
- Identify discrete facilities, installations disposals, part of site
- Rank preferred assumptions. The best for the individual may not be on site balance
- “key components “ will be those that influence the rest of site



Optimisation for a National Endeavour

Holistic Evaluation – Nationwide application of Sustainability

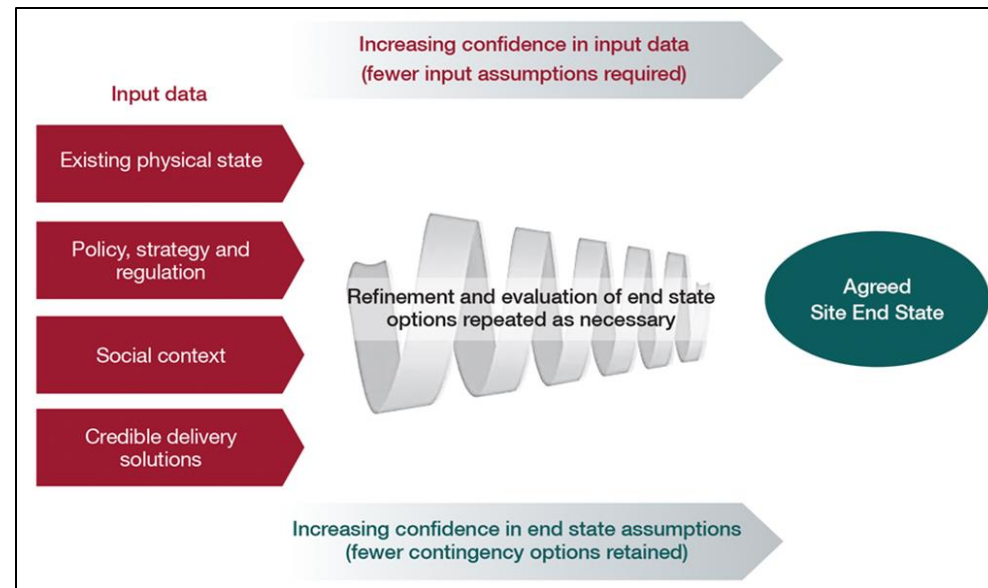
- Land Value Varies (commercial, social, habitat, value to strategic development)
- Differing community requirements
- Different political and legislative regimes
- Different environmental sensitivities (aquifers, coastal erosion, etc.)
- Regional needs may drive different local solutions



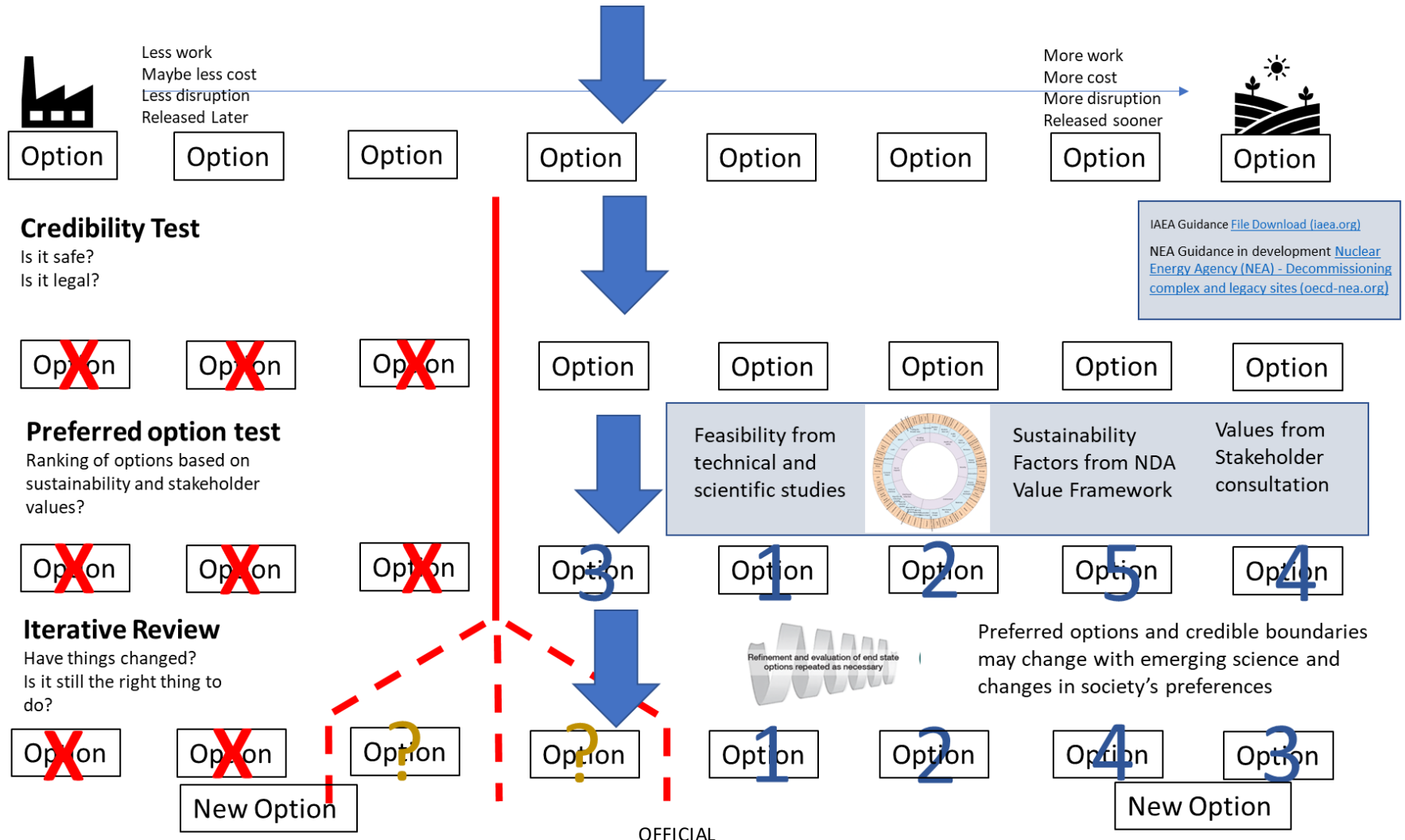
An iterative and adaptive process

Managing uncertainty and change control of decisions

- In some cases evaluation is decades before delivery
- There will be changes over time to:
 - Understanding of site condition
 - Requirement for land reuse
 - Policy on sustainable waste management
 - View of interested and affected parties
 - Social and political landscapes
- At early stages there is no right answer only an end state assumption



Identifying preferred options and managing new ones



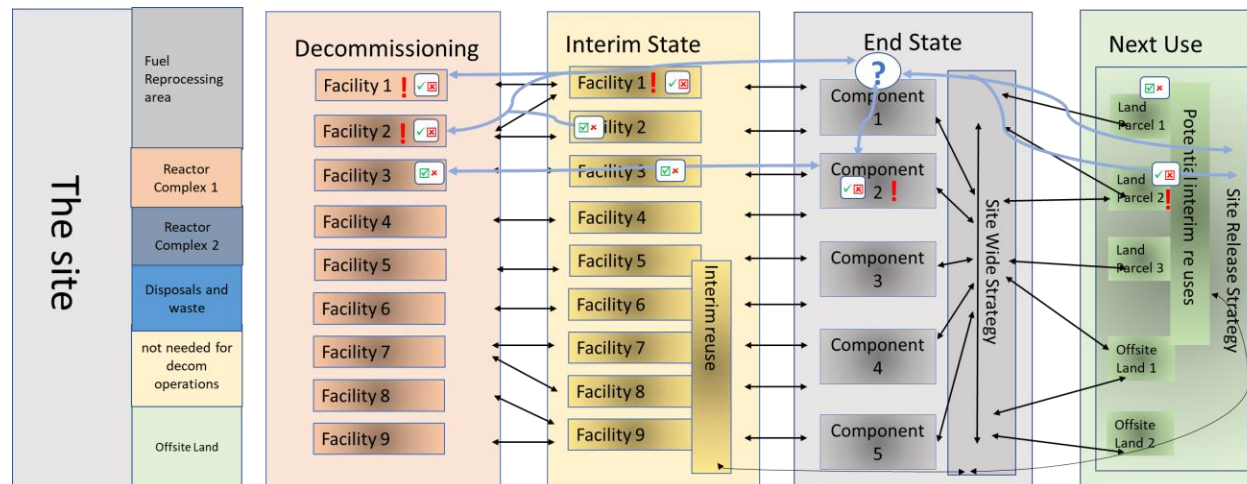
Change Control

Managing Strategic Uncertainties, Confidence and Assumptions though long delivery times

What uncertainty is reasonable?

So what?

Does it matter?



- Confidence of strategic assumptions
- Tolerance thresholds
- Uncertainty amplitude
- Is it material
- What other assumptions does this affect
- Where do we need to focus work?
- What level of programme risk is acceptable
- Planning for events and later intervention



Conclusions

What is safe vs. What is optimal

Land remediation is framed by what is safe. An environmental safety case must be made.

Optimisation and the consideration of controls is more than radiological protection:

- Environmental cost
- Worker and public safety from operations
- Social value
- Reuse of materials and assets (circular economy)
- Intergenerational equity

Good record keeping will be essential

Proactive change control should be established early to proportionately manage uncertainty



Making a difference

