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GDF – Design Delivery

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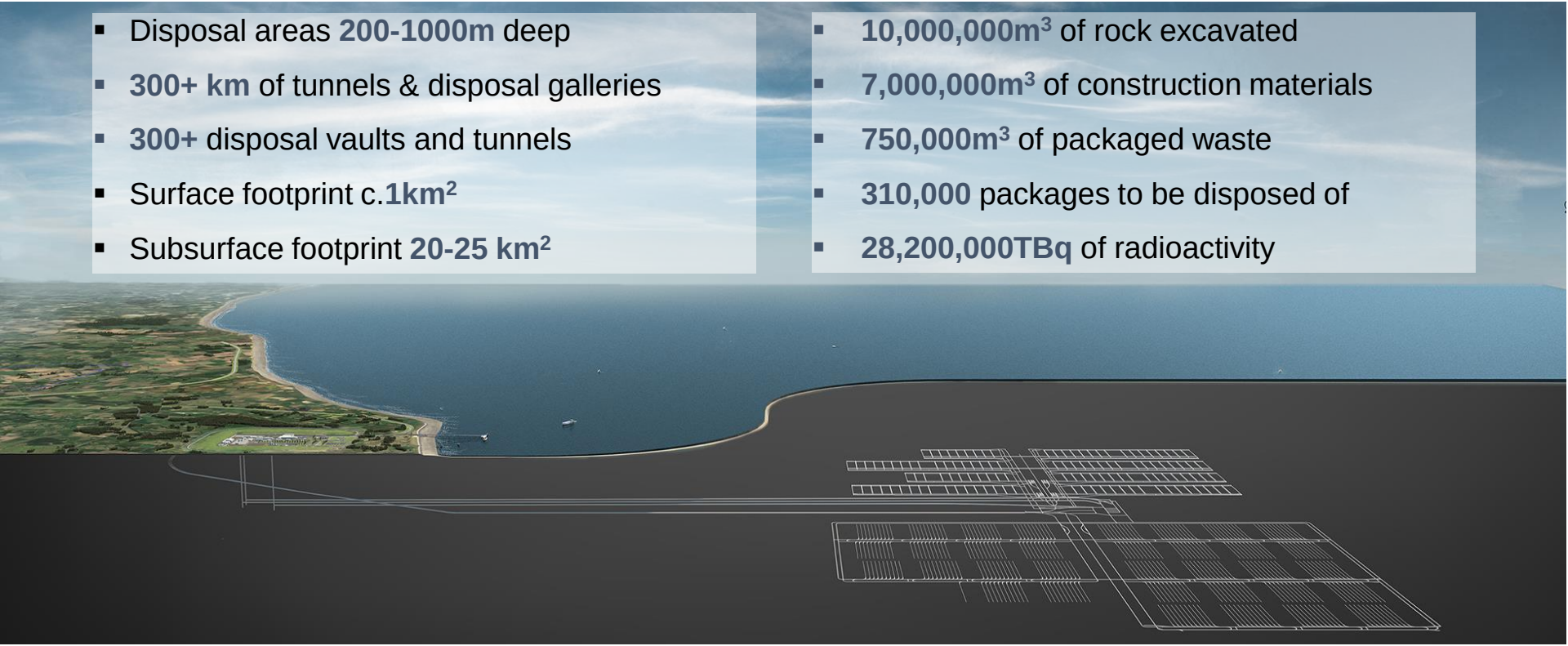
The GDF megaproject…

- Disposal areas **200-1000m** deep
- **300+ km** of tunnels & disposal galleries
- **300+** disposal vaults and tunnels
- Surface footprint c.**1km^2**
- Subsurface footprint **20-25 km^2**

- **10,000,000m^3** of rock excavated
- **7,000,000m^3** of construction materials
- **750,000m^3** of packaged waste
- **310,000** packages to be disposed of
- **28,200,000TBq** of radioactivity



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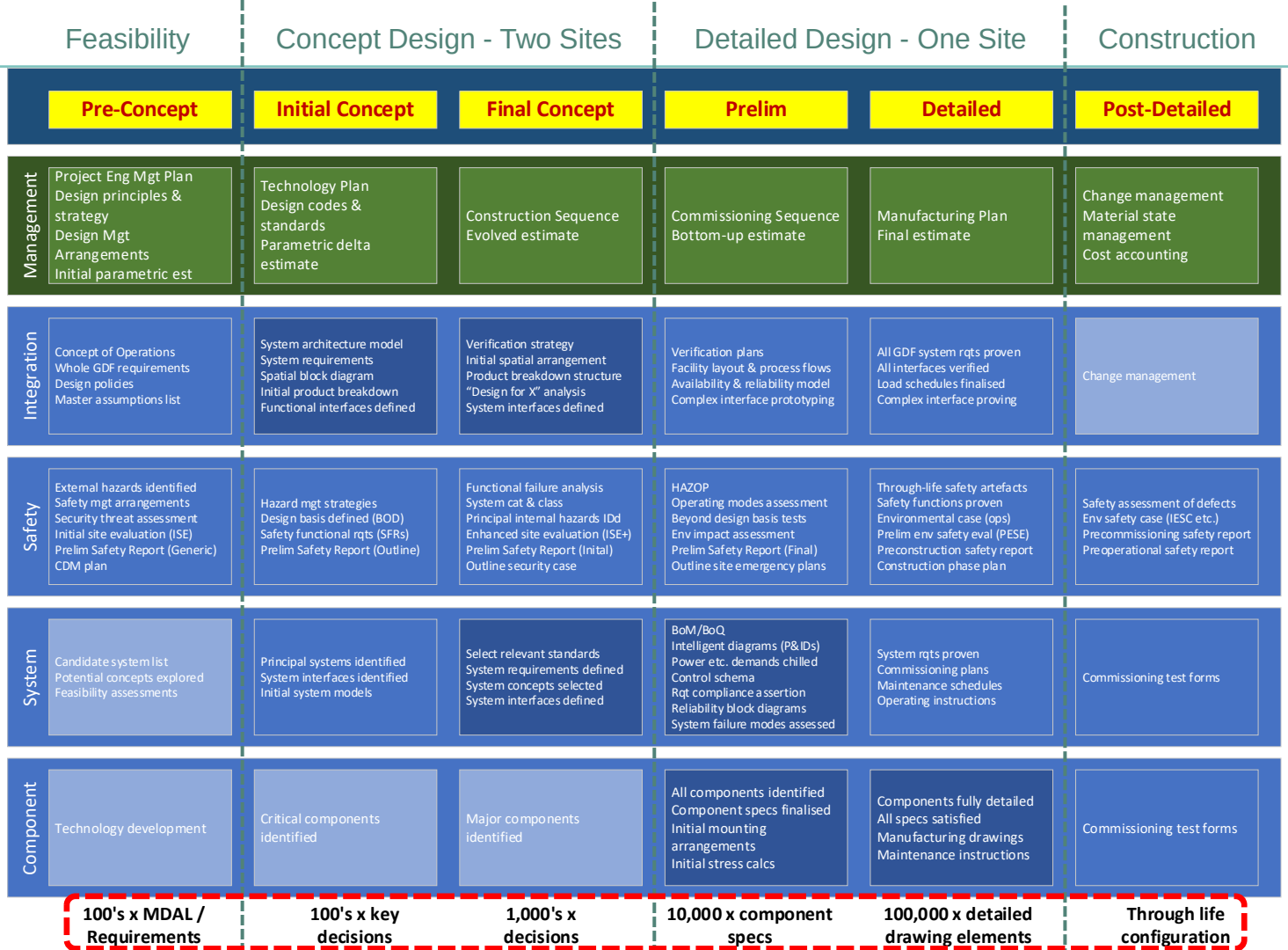

What is a design?

- Wide range of products
- Digitised – twin / BIM
- Reconciles complex requirements
- System of systems
- Significant integration
- Hazard management
- Significant safety functions
- Physical and non-physical
- Not a "GDA" implementation

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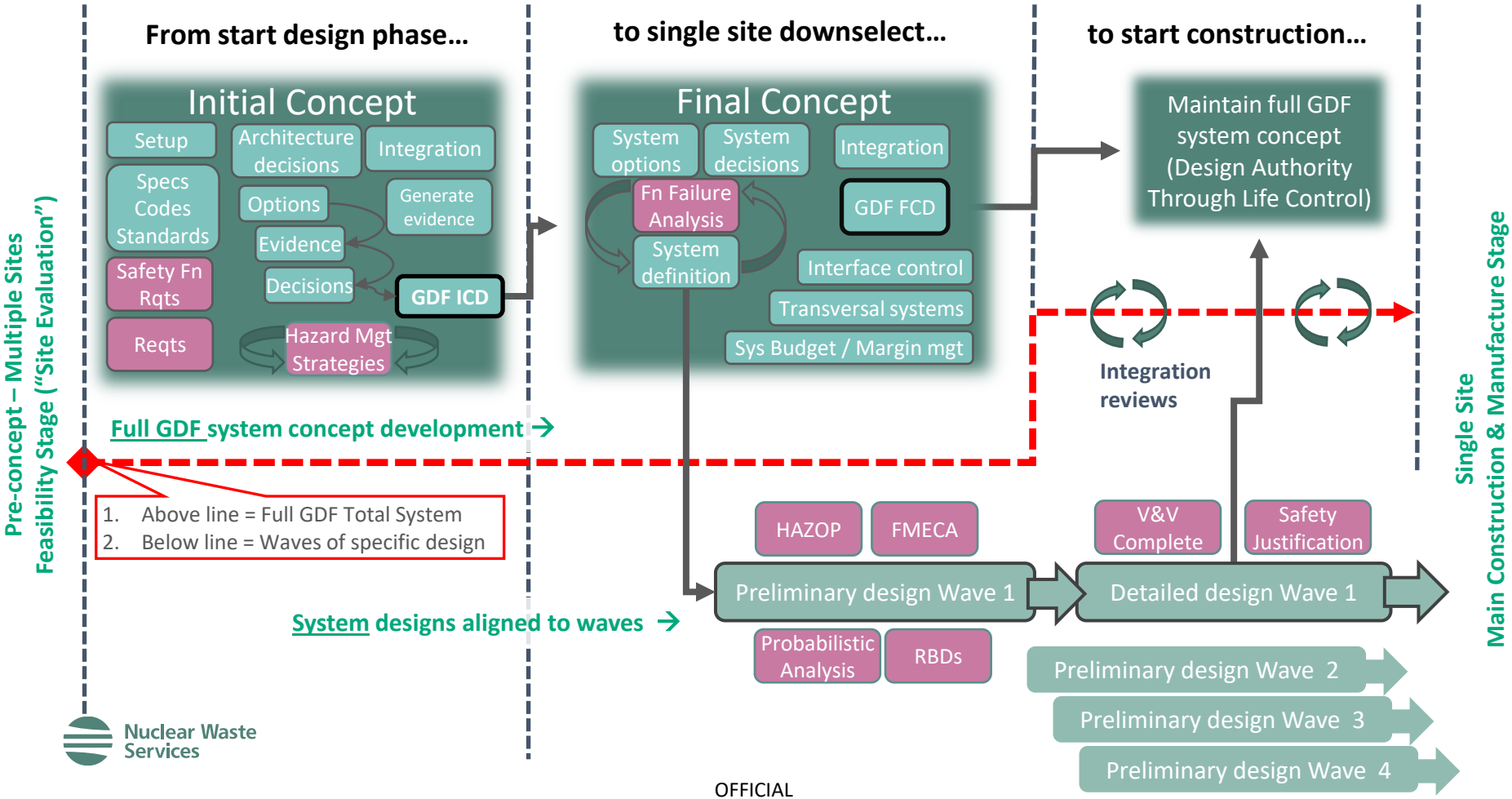
The design process…



Potential waves & associated permissions

Wave 0: Deep boreholes & other site characterisation work

- DCO1 & Initial Site Evaluation: qualitative, the feasibility of constructing a GDF at the potential site

Wave 1: To safe (non-rad) human access at repository depth

- DCO2 & Preliminary Environmental Safety Evaluation: qualitative arguments supported by assessments based on available site knowledge and data, high confidence in credible disposal concept [infeasible conceptualisations ruled out]

Wave 2: To active repository (First Waste Emplacement)

- Initial Environmental Safety Case: enough evidence to inform a decision on whether disposal can be authorised *in principle*, environmental permit to construct first disposal area based on high-confidence EBS design [design underwritten, long-term post closure case not yet concluded]
- Pre-Operational Environmental Safety Case: final hold point before waste is placed in the disposal facility, adequately underwritten post-closure case updated to take account of knowledge and understanding gained during underground operations

Wave 3: To completion of [first category]: e.g. ILW

Wave 4: To completion of [second category]: e.g. HHGW

Wave 5(+): Mid-life upgrades; future capability; closure

Plus: associated works (external infrastructure: transport, power, etc.)

"Permissioning" per wave, based on maturing evidence to finalise design/safety case for remaining waste types, with hold points controlling detailed construction release within

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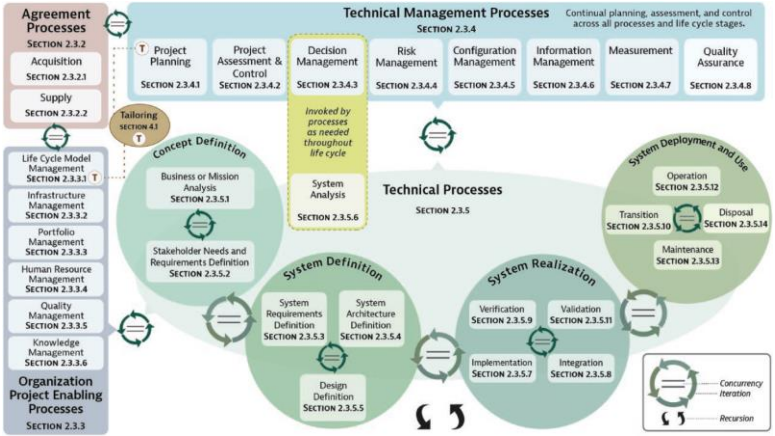
Information needs

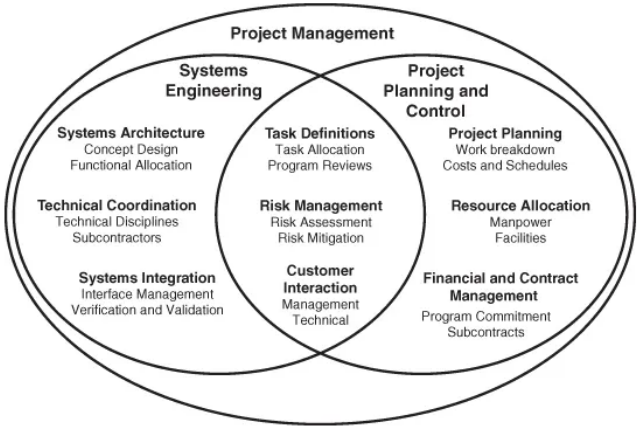
- Near-term focus on what must be done to *eliminate risk of unfeasible solution* by FCD
  - e.g. define bounding values for various geological parameters of the host and surrounding rocks
  - uncertainties in fundamental materials compatibility (container material, bentonite, backfill cement, plugs & seals)

- Detailed information needs & satisfaction approach being formalised to support ISE / DCO#1
  - both “top down” (design & safety case needs) and “bottom up” (research topic areas & borehole technical capability)
  - substantive deliverables in FY25 (info needs v1, site characterisation plans, site-specific R&D plans)

- Research need (upscaling from lab to field)
  - Surface laboratory based (e.g. on material and fluids acquired from drilling the site) and modelling
  - Sub-surface, appropriately representative – can be off-site if facility (Bure, Mont Terri, Grimsel…)
  - Sub-surface, host rock ← only *direct* interaction with GDF schedule

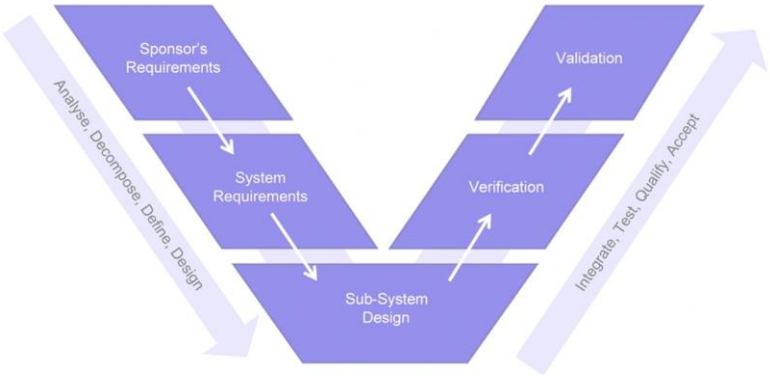
Pre-Concept Design



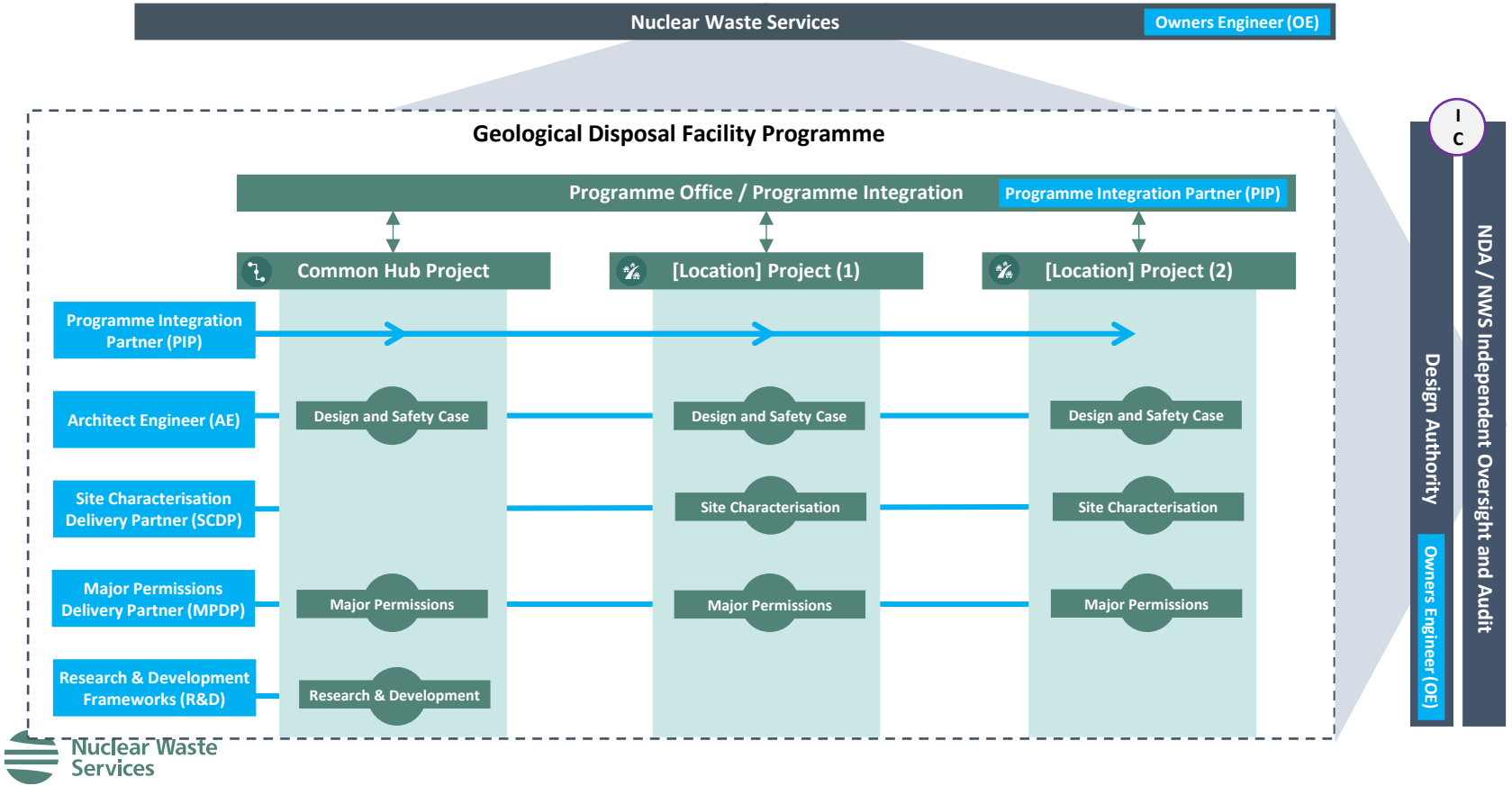


- Site(s) selected for characterisation based upon likely feasibility.
- Site Descriptive Model ready to support launch of concept design.
- Site Characterisation Plan issued to fulfil information needs.
- Initial Site Evaluation issued to demonstrate that characterisation will not compromise site integrity.

Technical Baseline



GDF Delivery Model - How might it look?



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Thank you

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