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Hanasaari B Power Station Technical Reuse Assessment Briefing Deck

3 March 2023

Building and Ground Condition is suitable for reuse

- Buro Happold has considerable experience with successfully re-purposing coal fired power stations such as Battersea and Lots Road in London and redevelopments over gas/tar works (e.g. Millennium Dome).

- **Taking all presented information into account we consider that the risk to reusing the Power Station is very low and can be readily addressed as future proposals emerge. Therefore is similar to new construction.**

- **The existing data does not indicate that ground conditions have deteriorated over time and that the building is at significant risk requiring demolition of the Power Station, now or in the future.**

- Limited testing will provide further reassurance to reusing the building for a further 100 years, it is not needed to close significant uncertainties.

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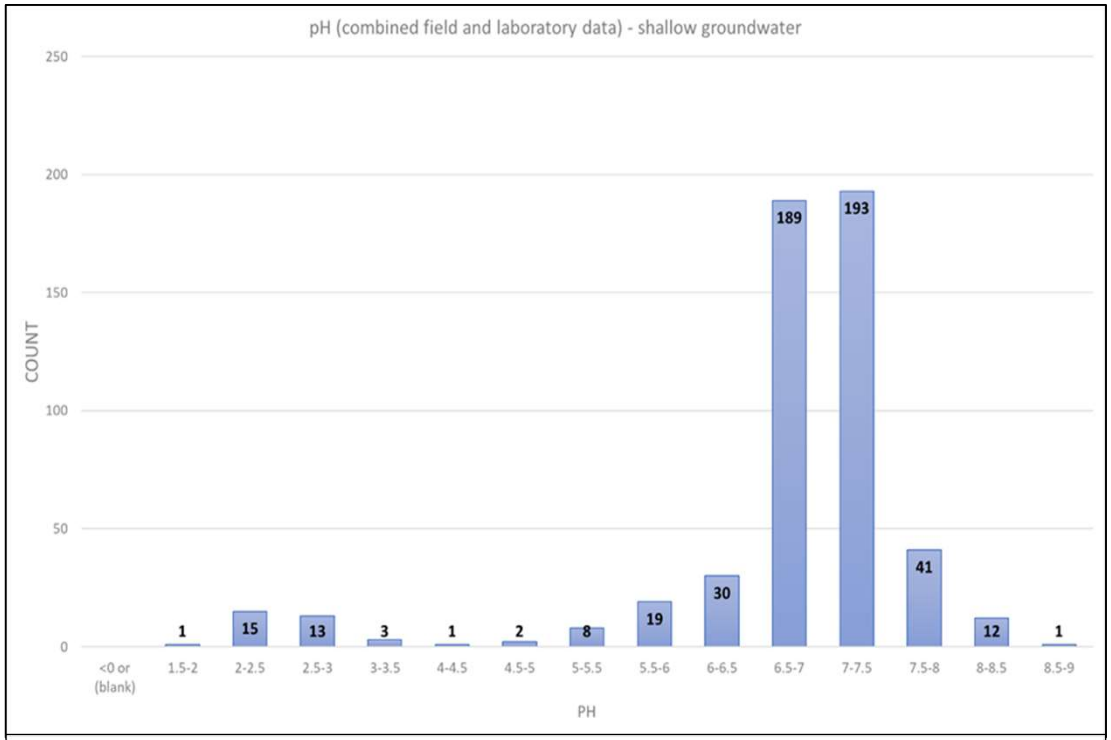
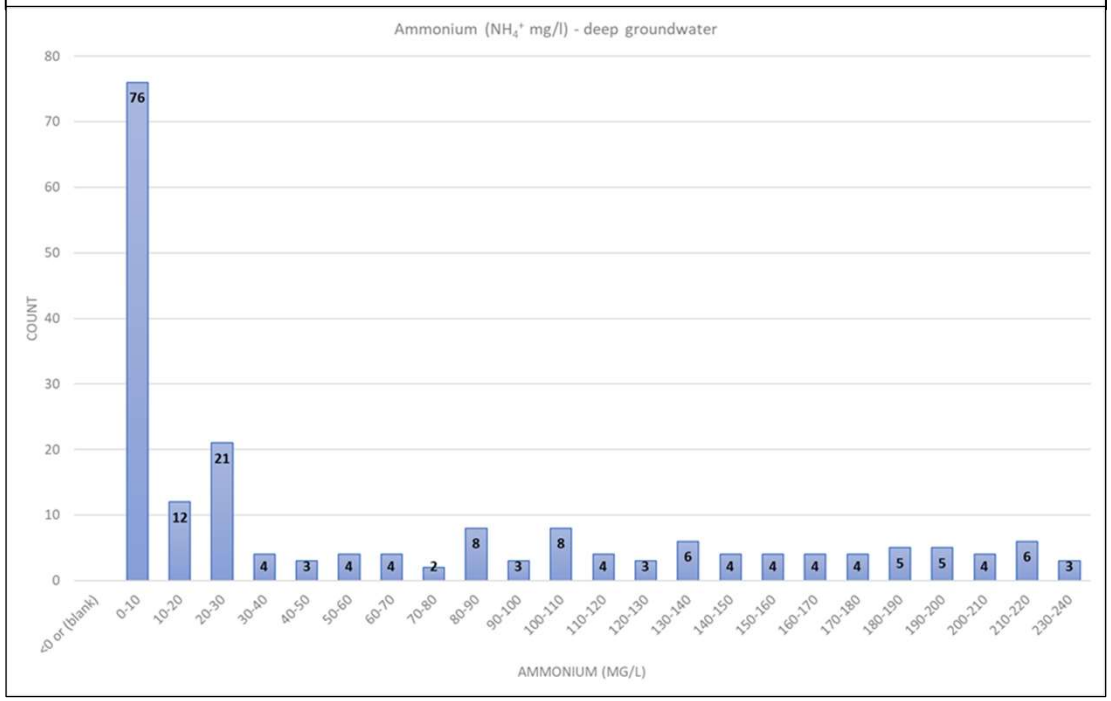
Ground Aggressivity

- The key risks to continued use of the existing foundations comes from elevated sulphate, chloride and ammonium, as well as low (acidic) pH levels.
- These contaminants can lead to dissolution, expansion, corrosion and loss of strength in persistent high concentrations over time.
- Low pH is localised to 1-2% of the samples tested and in isolation is not a significant concern.
- Elevated sulphate concentrations are generally within limits for typical buried concrete design mixes using sulphate resistant cement.
- Elevated ammonium was recorded in about 40% of groundwater samples recorded at depth.





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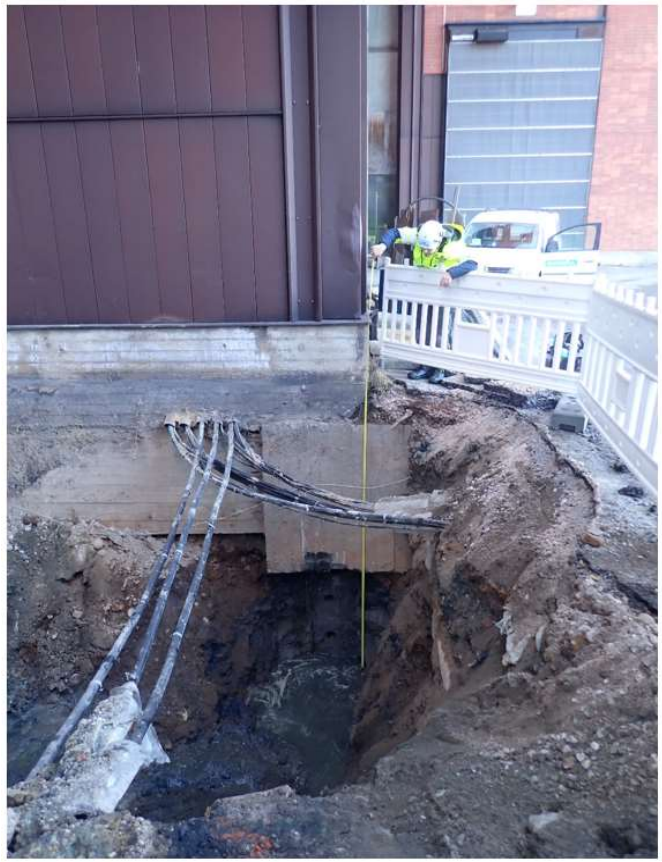
Condition of Existing Foundations

- There are a number of positive findings from the composition of the existing concrete cores that provide protection against aggressive ground:
  - A sacrificial layer of 50-70mm protects the foundation reinforcement which shows no sign of corrosion
  - The microgranite aggregate is non alkaline
  - The existing concrete contains a reasonably high cement content, low porosity and a number of key inhibitors such as furnace slag
  - Visual inspection of existing concrete shows limited sign of degradation over 50 years

There is no evidence of structural or foundation movement over 50 years



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Principles of Reusing Foundations

- Repurposing should optimise localised new and existing foundations to reflect a change of use
- Design of new foundations should align with BRE SD1 Class AC5 or local equivalent
- For preliminary design it is recommended that existing foundations assume a safe load of 75% of historic loading – this is more than adequate given the high existing loads

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Good Condition to Building Structure

- There is significant void space below the ground slab where foul smelling harmful vapours have been recorded.
- Alternatives to replacing the ground slab (as recommended) include new membrane on top of slab with adequate venting of the below slab void. Raising the floor by 1m for flood protection will be beneficial.
- The chimney is in good condition and only needs minor repair
- The concrete frame and steel roof trusses are in good condition.
- Cleaning and decommissioning should be done as a single exercise.

Façade Reuse

- There are 2 types of precast façade panels – steel facing or brick slip
- The façade is a significant architectural feature providing notable character
- The façade is not airtight, is locally damaged and lacks adequate insultation for indoor use
- In discussion with local experts we understand identical replacements could be sourced with better frost protection and insulation.
- A more detailed cost study is required to assess the replacement options for meanwhile and future use scenarios

Validation Testing

- Inspection and testing of existing foundations should run parallel with decommissioning
- Limited focused testing, particularly around the building perimeter
- Chemical testing of soil, water and gas adjacent to foundations
- Concrete tests to determine physical and chemical properties and long terms durability
- Limited chemical testing to ensure long term degradation risk is minimal
- Selected integrity testing to determine as built condition of piles
- Implement basic structural movement monitoring ahead of decommissioning to validate baseline

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Key Future Reuse Interventions

- New raised ground floor slab, vapour membrane and sub floor ventilation
- New window openings in the existing façade
- Additional new floor levels for commercial uses
- Roof truss strengthening and lightwells

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Supporting studies

- Carry out embodied carbon study to support building reuse
- Carry out a meanwhile use assessment as well as future use studies
- Further studies needed to determine flood risk, minimum floor levels, protection measures and evacuation plans
- Carry out a review of the decommissioning proposals including:
  - Identification of heritage artifacts
  - Identification of retained building elements such as gantries and staircases
  - Ensuring that soft strip and decommissioning works do not adversely impact reuse, e.g. residual asbestos dust

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