Monopile Configuration Development

Design decision impact assessment

Aashraya Shankar, Engineer

Overview

- Multi-objective design optimisation process for foundations
  - A process that enables us to explore the design space of substructure configurations and assess the impact of input variables on the final design solution in a short space of time
  - A process that will help inform decisions taken throughout the design phases of a project to ensure an optimised final design for a project and its stakeholders

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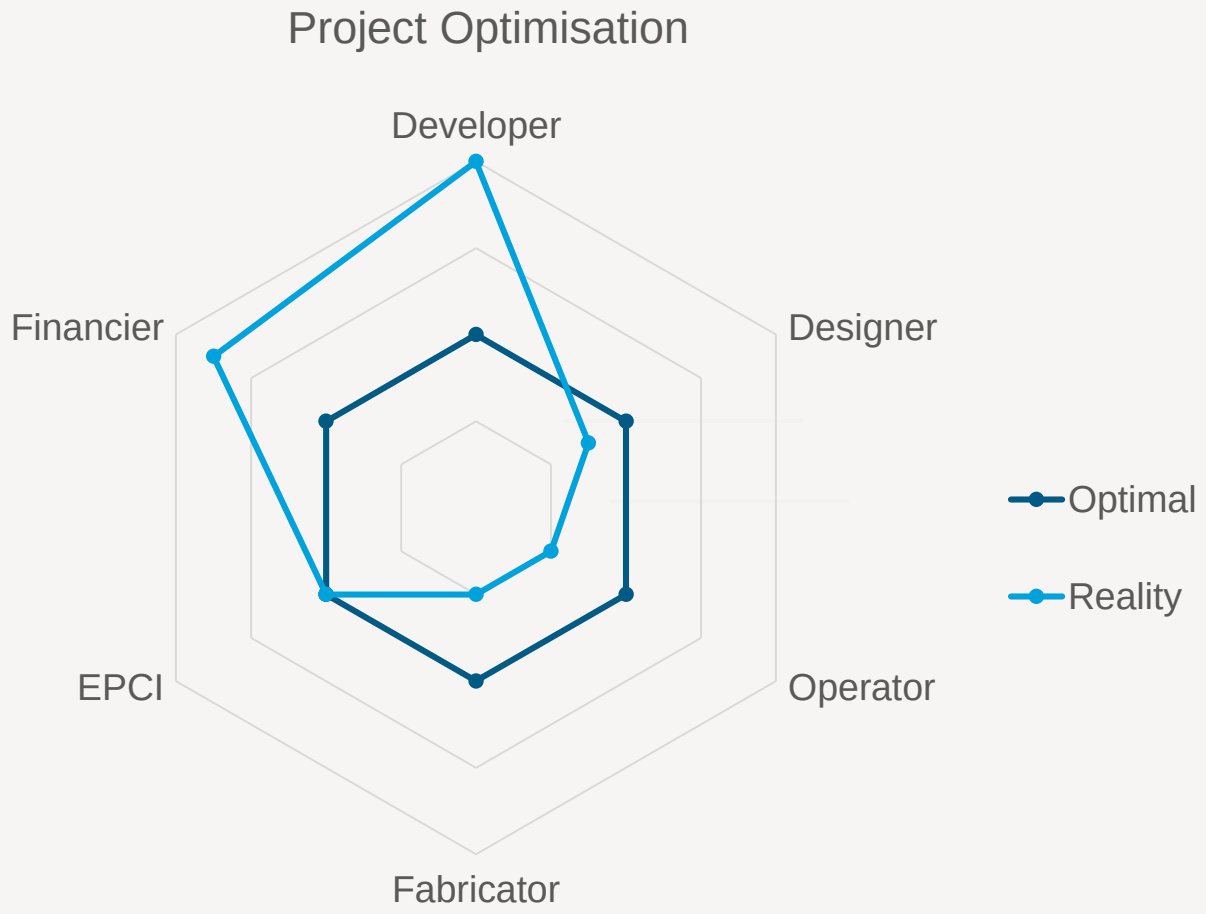
Optimisation: what does it mean?

Objectives:

- Minimise LCOEs
- Maximise Energy Yield
- Minimise CAPEX
- Minimise OPEX
- Minimise programme risk
- Ease of fabrication
- Minimise structural weight



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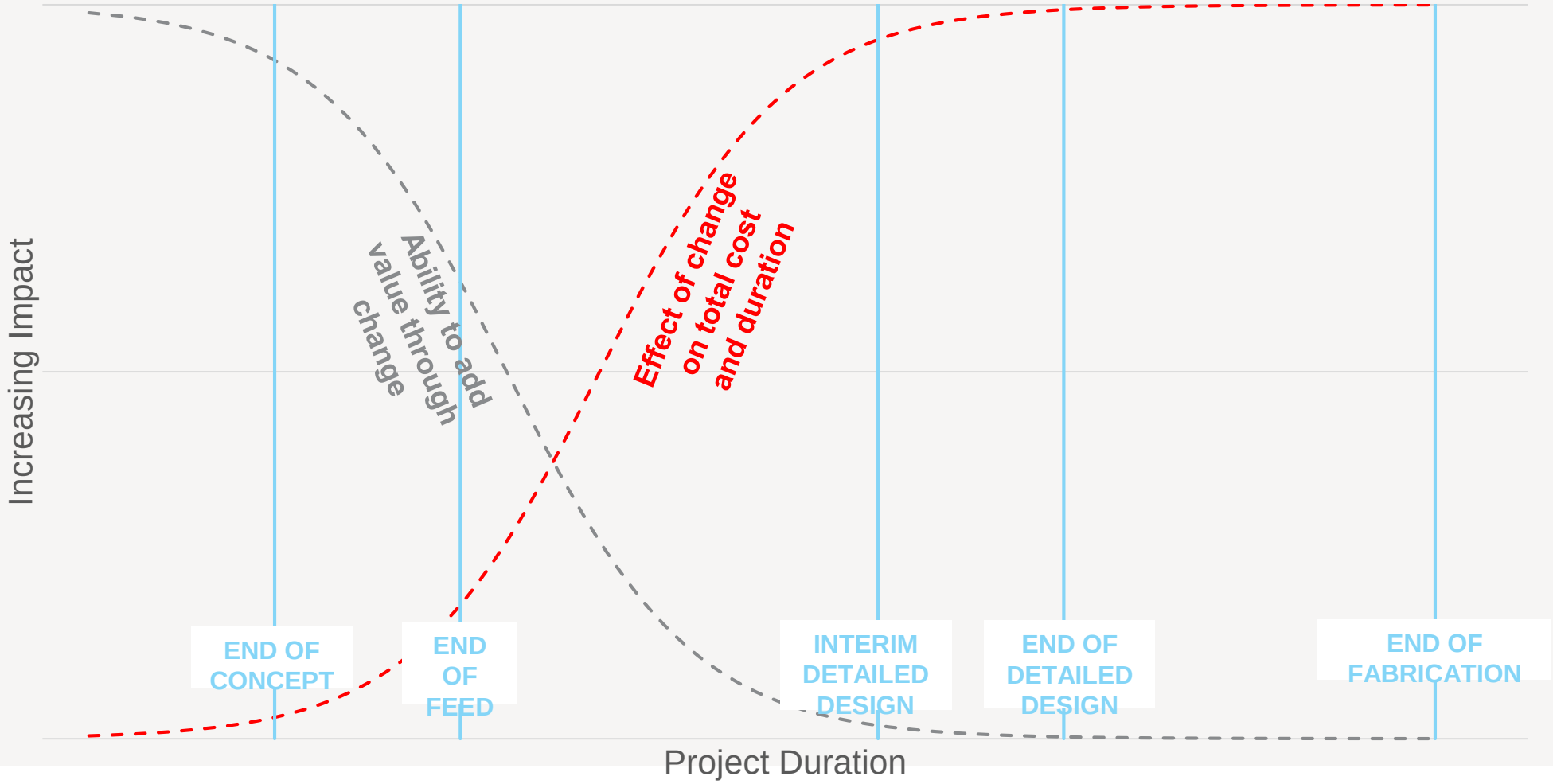
Ability to add value



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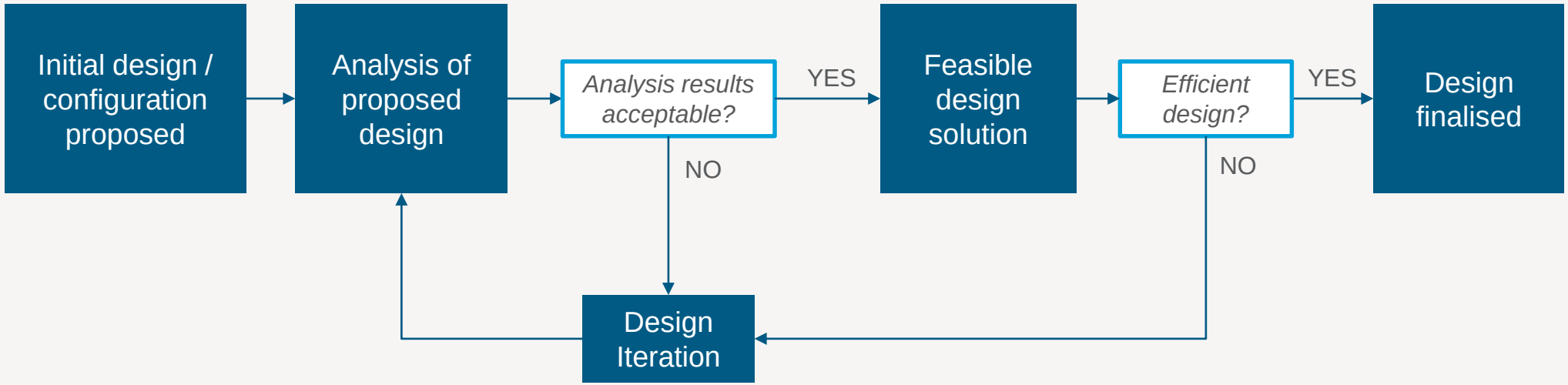
High level foundation design process



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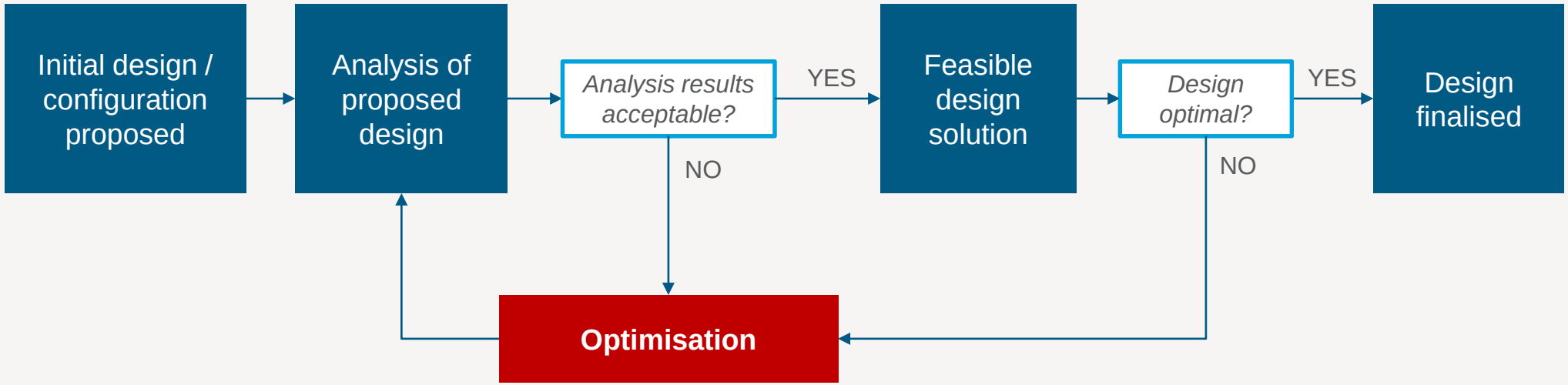

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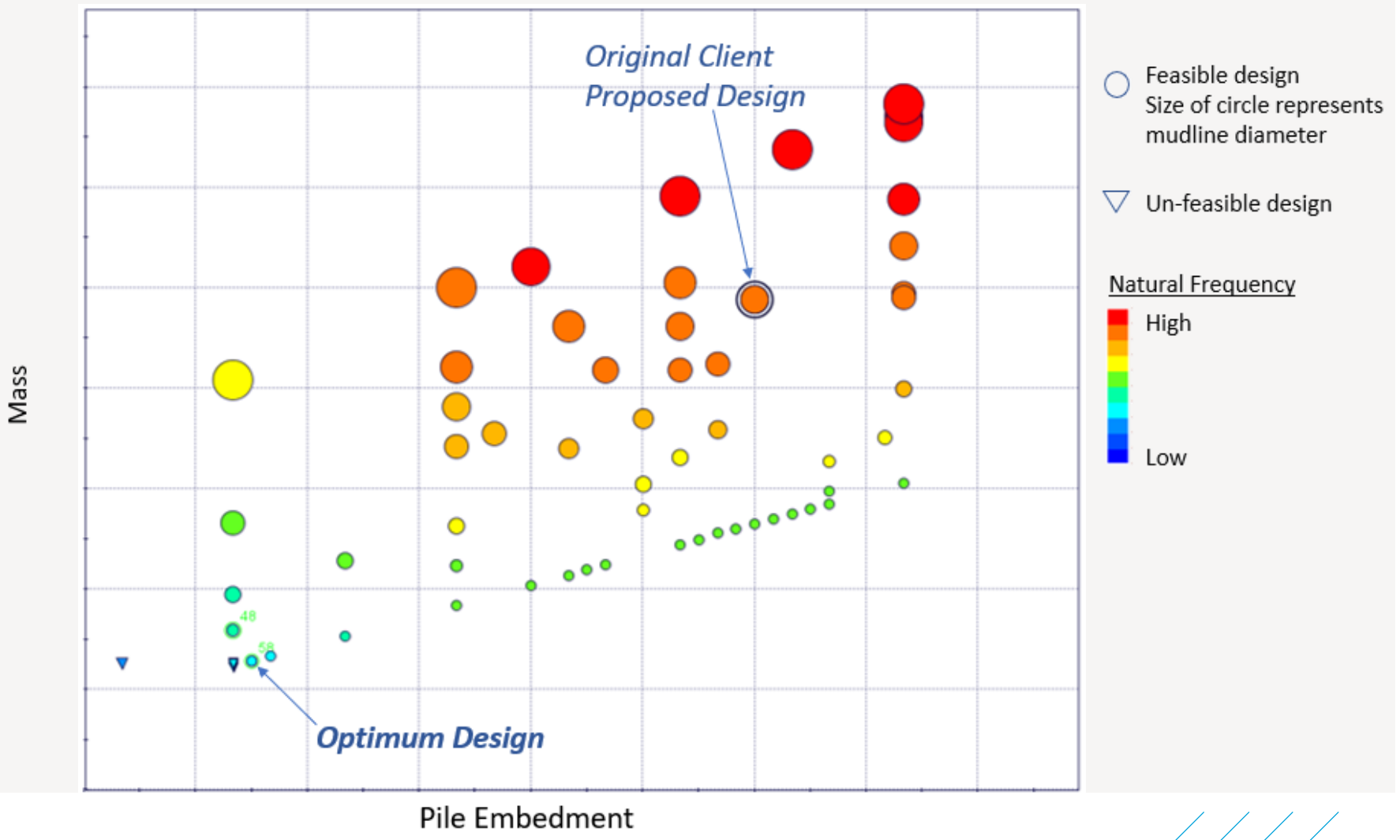
Example 1

Varying parameters

- Mudline diameter
- Pile embedment

Constraints

- Natural frequency
- Cone angle



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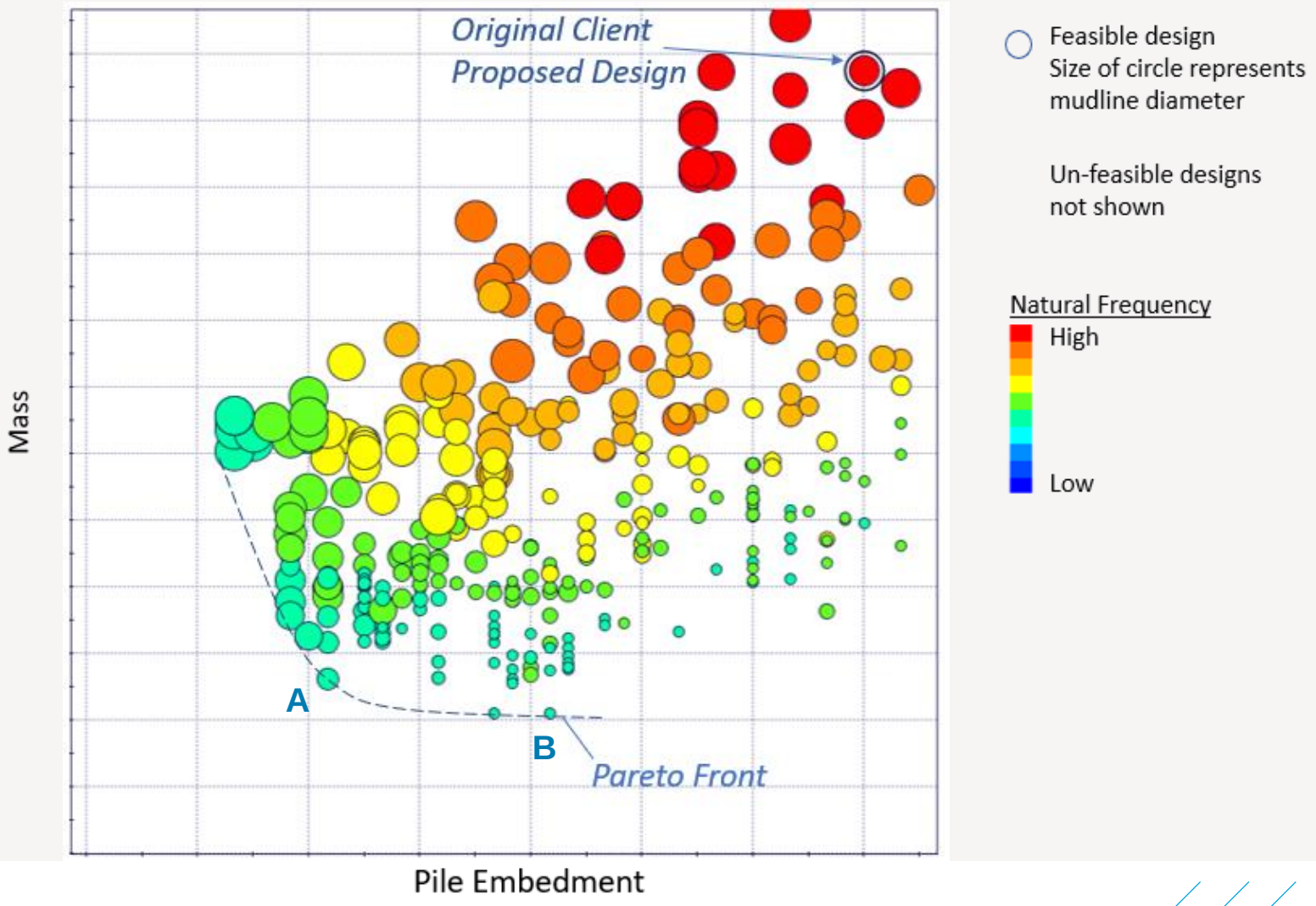
Example 2

Varying parameters

- Mudline diameter
- Pile embedment
- Can thicknesses

Constraints

- Natural frequency
- Cone angle



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Example 3

Varying parameters

› Mudline diameter

› Pile embedment

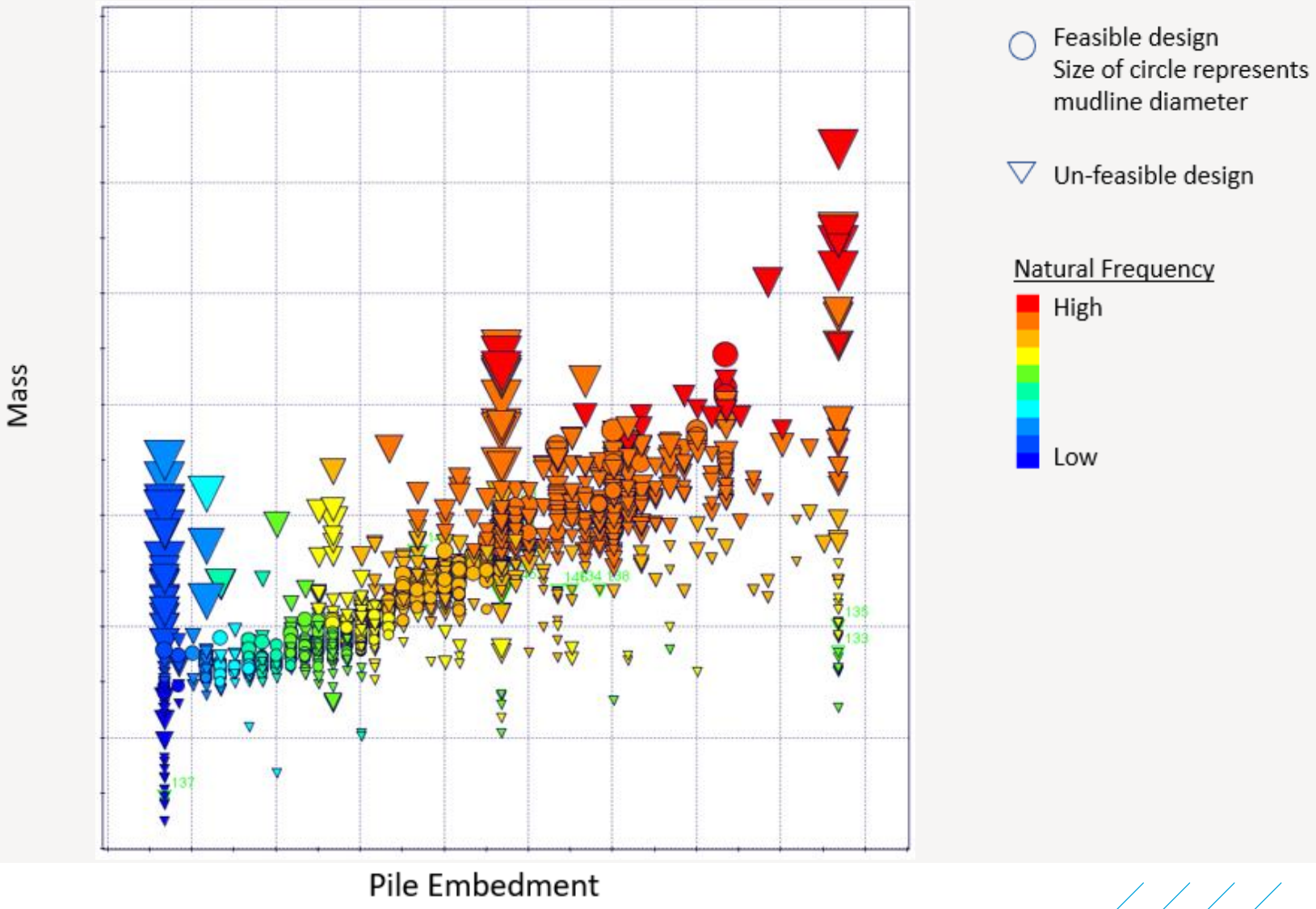
› Can thicknesses

Constraints

› Natural frequency

› Cone angle

› Fabrication limits



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Example 3

Varying parameters

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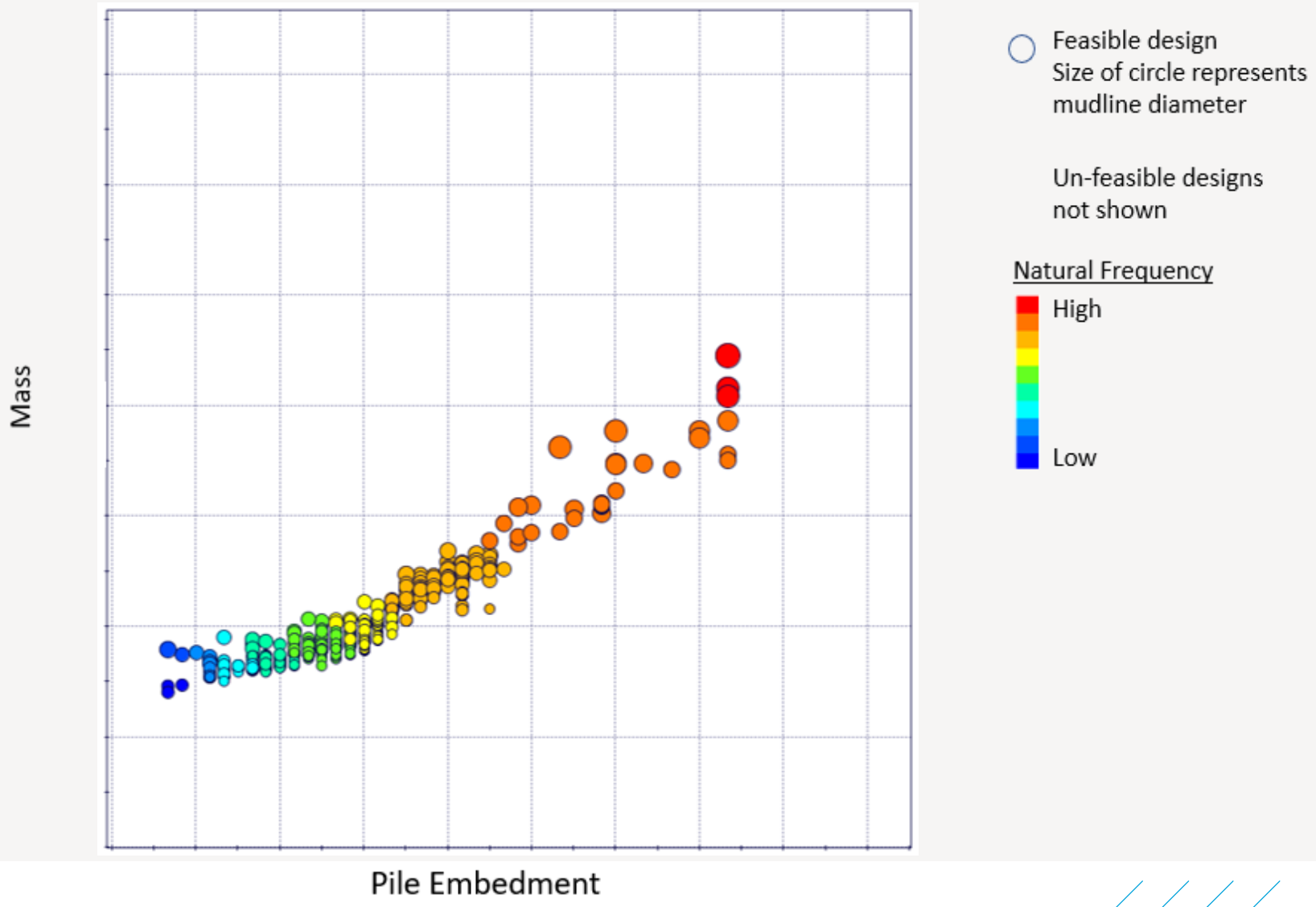

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Closing remarks

- Through our multi-objective design optimisation process, the impact of changes to multiple variables on key foundation design parameters can be assessed in a short time frame:
  - *Allows us to identify key free design variables early in the design development process*
  - *Allows us to make informed design decisions considering multiple optimisation objectives*
  - *Gives confidence that the final design is optimal*

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