



Science and  
Technology  
Facilities Council

Scientific Computing



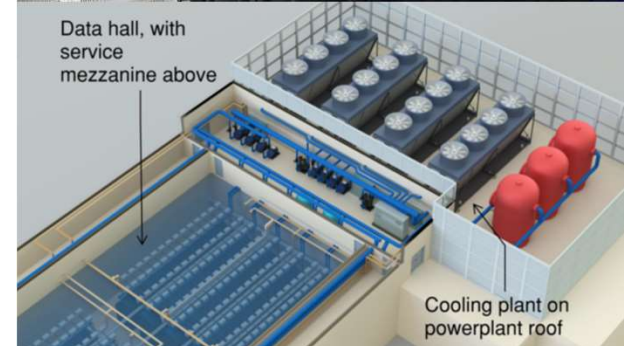
## Research Computing Center (RCC)

### A new Data Center for UKRI

Nick Hill

# Agenda

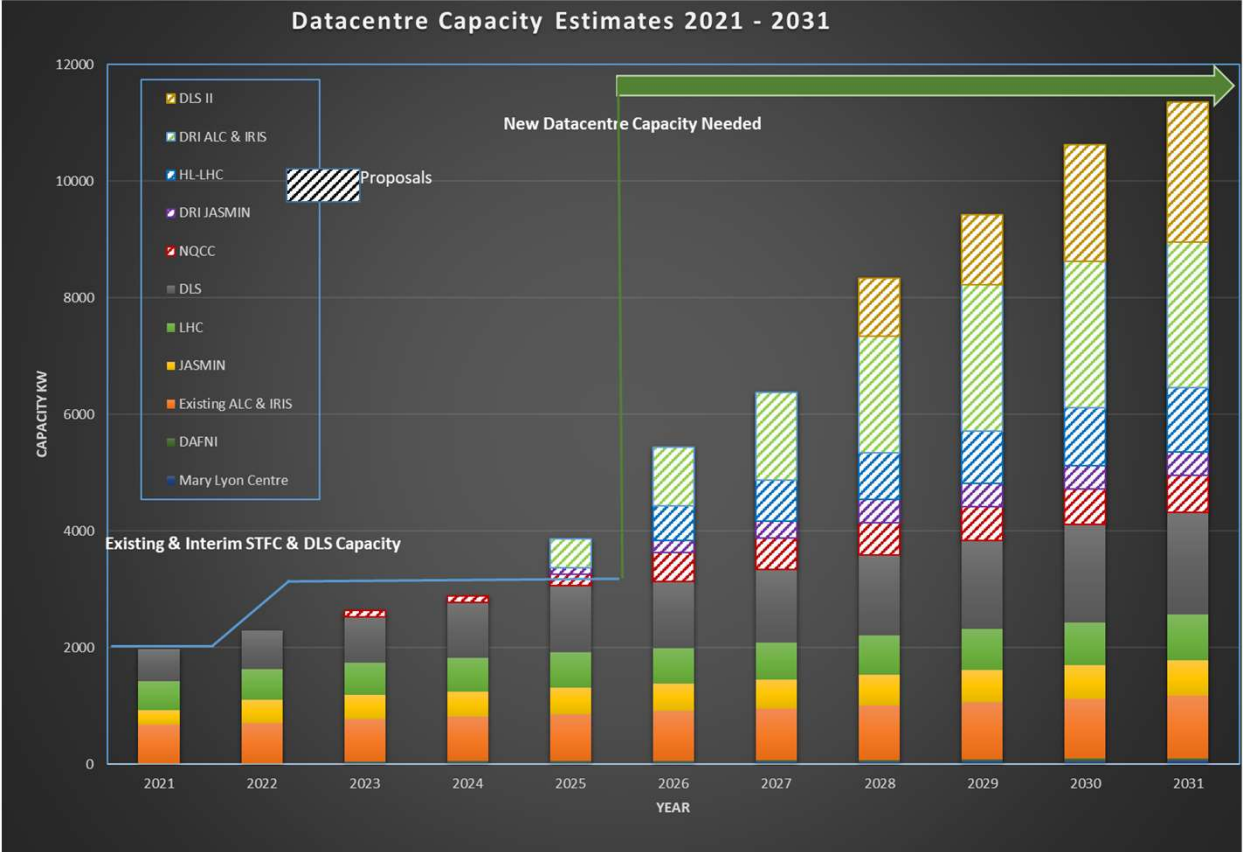
- Requirements
- History/Timelines
- Design Options



# Summary

## Science Drivers

Recognised that major new cross council Digital Research Infrastructure (DRI) required to fully exploit science infrastructure



# RCC: Cross Council Scientific Research

- RCC will need to host a variety of equipment such as
  - Large scale data storage
  - High Throughput Computing (HTC)
  - High Performance Data Analytics (HPDA)
  - High Performance Computing (HPC) and
  - Specialist computing hardware, for example Machine Learning (ML)
- This encompasses a broad range of power requirements up to 100kW+/rack.
- RCC is the datacentre only and NOT the compute & data resources
  - Computing/Data equipment purchases are driven by major scientific programmes/projects/facilities
- Analysis of requirements indicates the need for 11MW of computing load by 2030 and 20MW by 2035.
  - Phased delivery, with 6.6MW IT load capability by 2025/6, option to install more capacity
  - Capacity in excess of 6.6MW would follow an additional review of requirements and funding request
  - Meet critical requirement for DLS, STFC, NERC by 2025/6 and DLS II from 2027
- Part of a UKRI eco-system of datacentres
  - Complementing Hartree Centre and national capabilities such as ARCHER 2 and Exascale.
- Retain R89 and phase out R26



# Complex Multistage Timeline

## ■ Approvals routes

- Viability case
- Outline Business Case
  - Gateway Review
  - EB approvals
  - IAWG Approval
  - EXCO Approval
  - Programme CAB
  - Programme PIC Funding Approval
  - HM Treasury Approval
- Full Business Case

## ■ RIBA work stages

- 0 - Strategic definition.
- 1 - Preparation and briefing.
- 2 - Concept design.
- 3 - Spatial coordination.
- 4 - Technical design.
- 5 - Manufacturing and construction.
- 6 - Handover.
- 7 - Use.

The plan was: Viability case in March 21 --- Available for use July 2025

# Rough Timeline to Here..

- 2019: external review of STFC Scientific Computing Department (SCD)
  - New SCD Strategy in Jan 2020
  - Start capturing longer term programme requirements
- 2020: DLS-II plans highlight the urgency of capacity issues
- STFC Council in September 2020
  - Strong encouragement to combine DLS +STFC requirements
  - Strong encouragement to support UKRI + others on Harwell Campus
- March 2021: Viability Case (STFC) reviewed
  - The Panel agreed that the strategic case for the UKRI-RCC was strong and recommend that the project should proceed into the Outline Business Case (OBC) stage.
- April 2021: Presented to UKRI cross Council Digital Research Infrastructure Committee
  - Strong support for data centre for Harwell Facilities, cross council collaboration, and leadership in sustainability
- December 2021: Gateway2 Review
  - Endorsed preferred option of new research data centre at Harwell
- February 2022: IAWG
  - Endorsed preferred option of new research data centre at Harwell
  - Updates to the business case needed
- April 2022 STFC Executive Board
  - Reviewed updated business case and approved for submission to IAWG
- July 2022: STFC Executive Board
  - Reviewed RIBA Stage 2 and Power availability. Agreed to proceed with 6.6MW Computing load
- August 2022: IAWG
  - Need to identify budget before proceeding to ExCO and BEIS PIC



# Workshops and Studies

- Requirements capture with stakeholders set the growth figures
- Engaged with external designers and architects
- Analysis for hosting options
  - At STFC-RAL
  - On Harwell campus
  - Other sites e.g. Culham
  - Cloud Hosting, JISC datacentres etc
- RAL Site deemed to be the best option
- Complications due to availability of power to Harwell Campus

# Evolution – 1 North Car Park





# Evolution -2 Change of Location

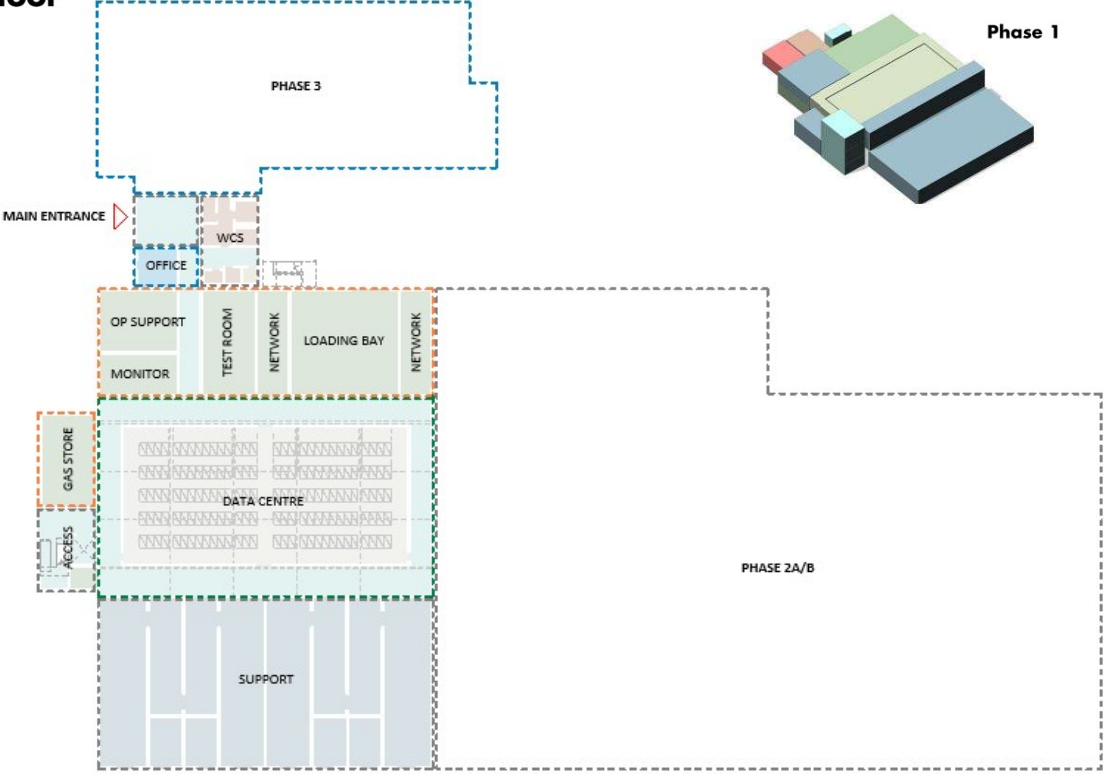


# Evolution -2 Artist View



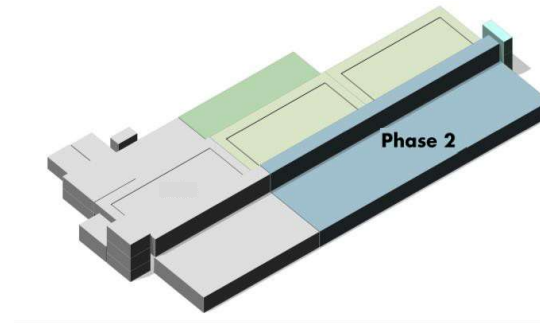
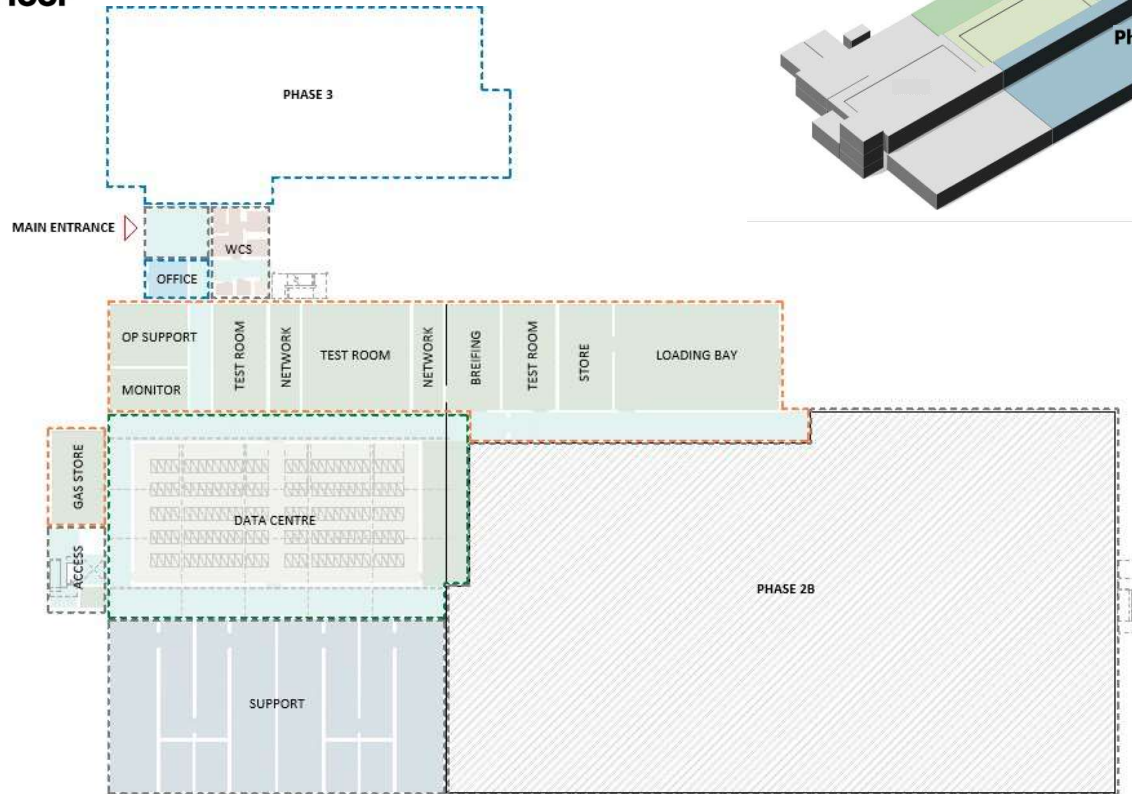
# Evolution - 3 Modular Design

## Building layouts - Phase 1 Ground Floor



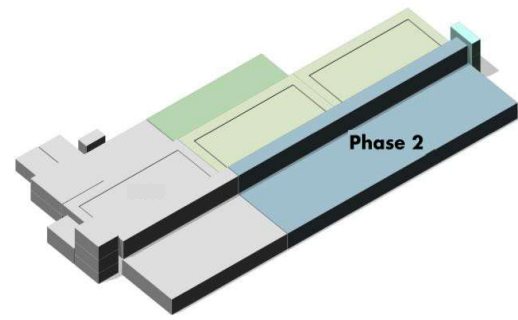
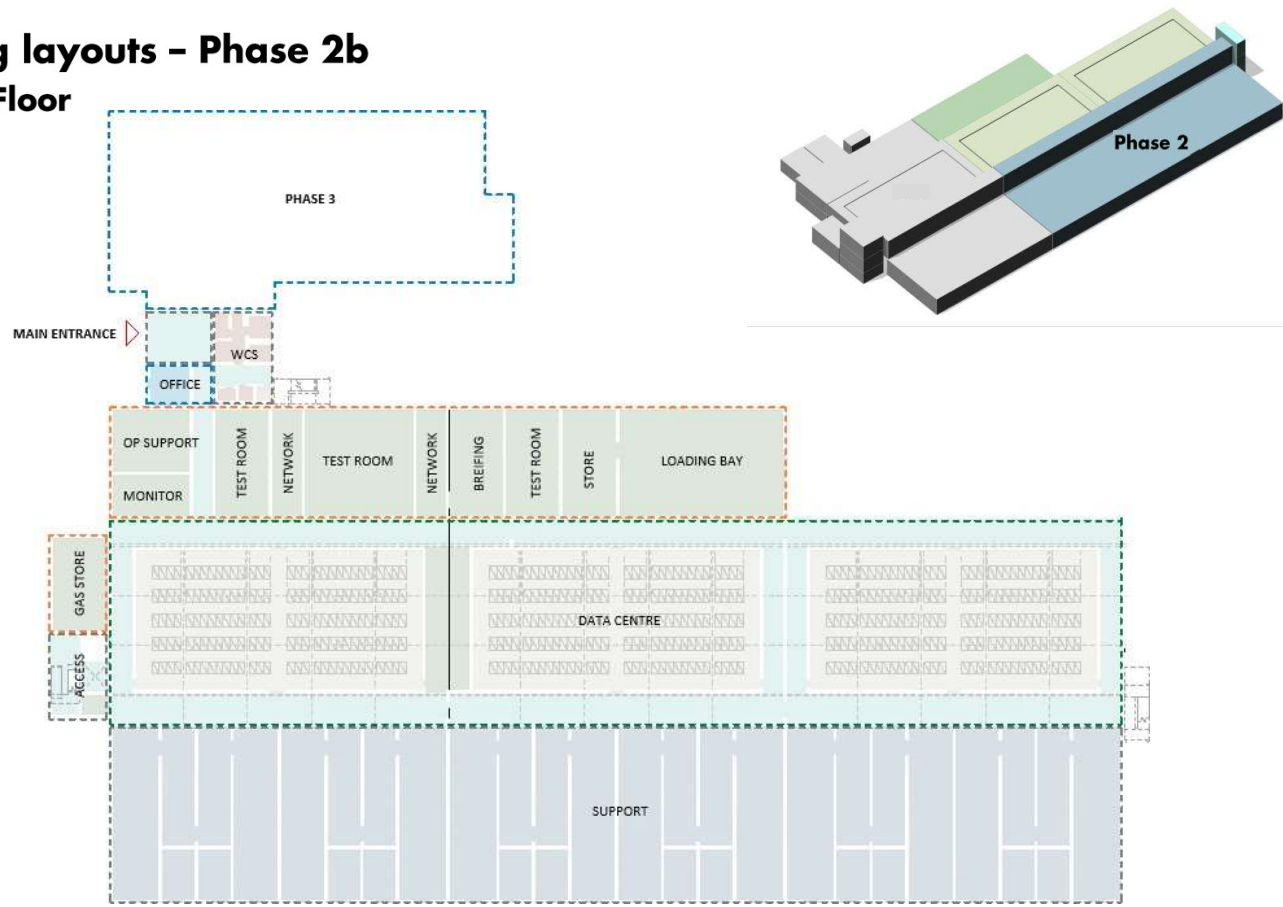
# Building layouts - Phase 2A

## Ground Floor



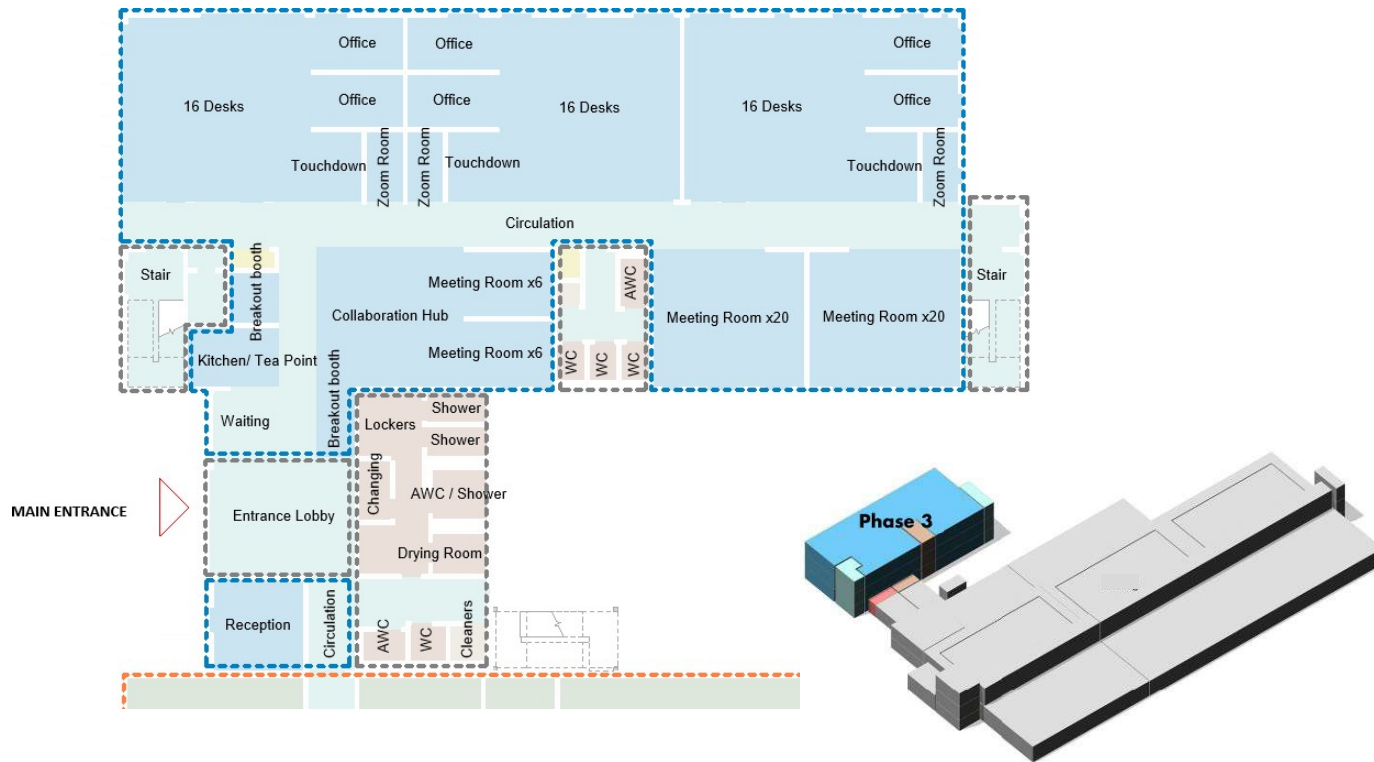
# Building layouts - Phase 2b

## Ground Floor

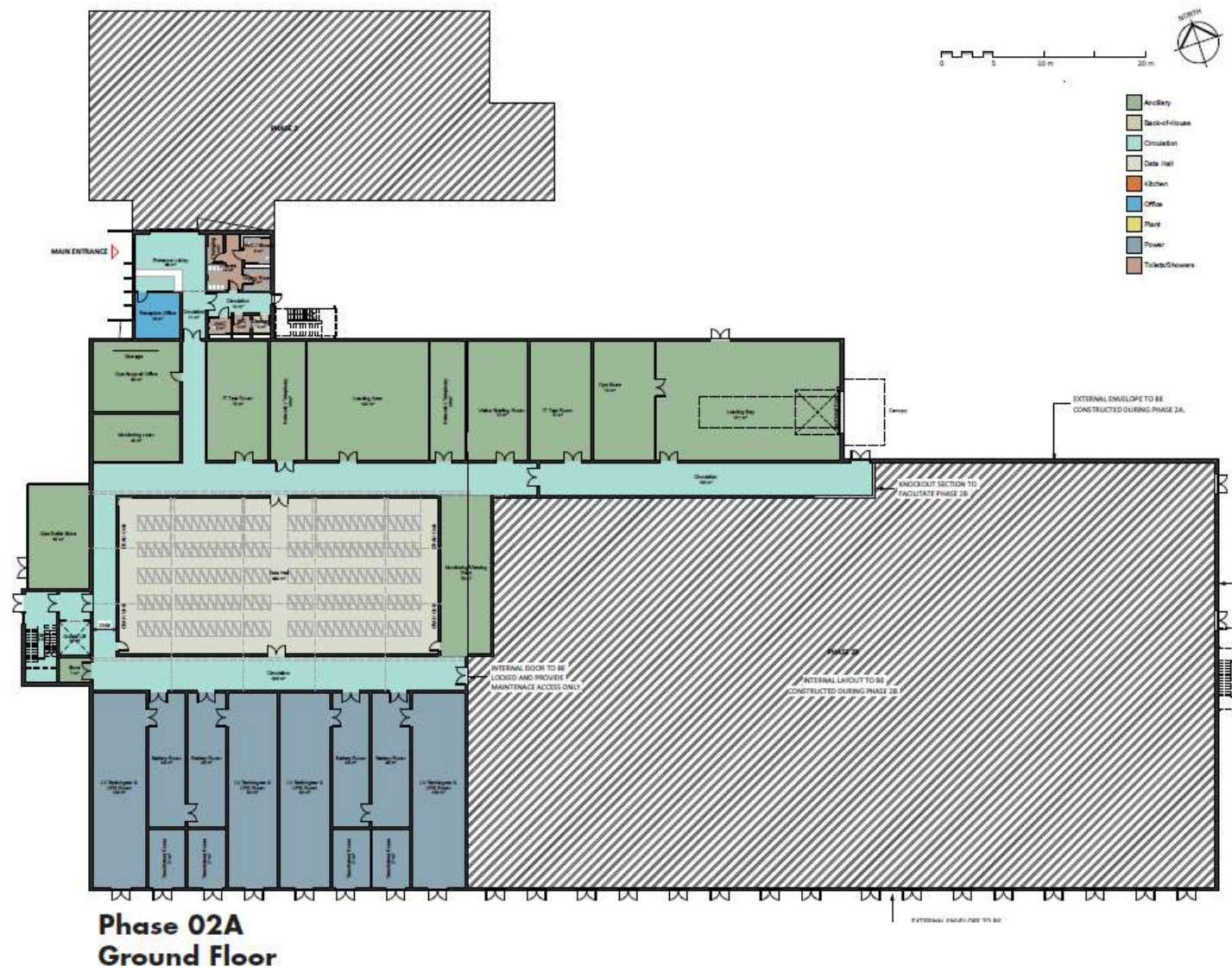


# Building layouts - Phase 3

## Ground Floor



- Summary of the RCC
  - £134m (total project cost) Tier III
  - Data hall A - 6.6 MW computing load, 150 racks each capable of up to 100kW IT load
  - Shell and core to allow expansion to 13MW and then 19MW computing load
  - To upgrade to 13MW ~+£64m (data hall B)
  - To upgrade from 13MW to 19MW ~+£64m (data hall C)



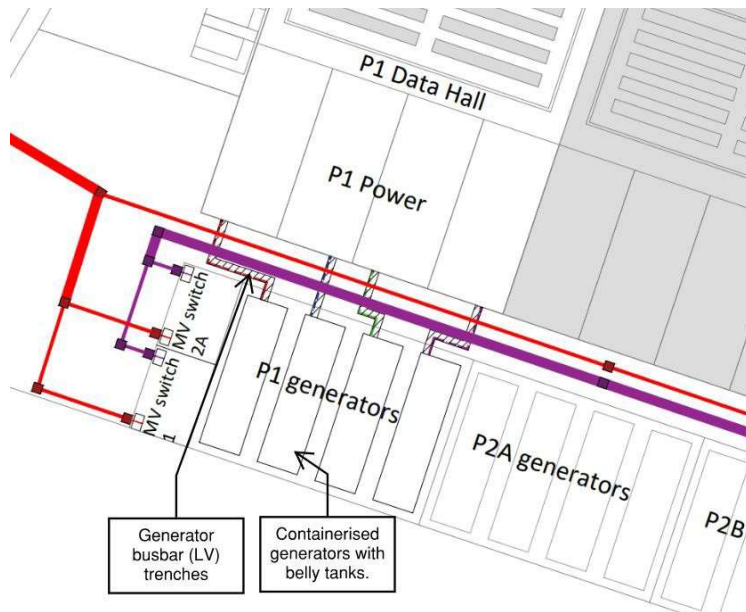
**Phase 02A  
Ground Floor**

# Datacentre Internals

On rack cooling

All power UPS backed

Aim for peak PUE ~1.18



Rack Services from above

- Power
- Cooling Water
- Networking

Wide racks

- 19inch mounts
- 42U/48U
- 750/800mm wide



**STILL AT THE OUTLINE DESIGN PHASE**



## RCC: Issues and Risks

- £134M above what was agreed at earlier stages. Is it still viable?
  - Need to review, revise and revalidate the *minimum viable product*
  - Cut back on aspirations?
  - Need more confidence in costings
- Major issue is that RAL does not have sufficient power at the moment to increase beyond 6.6MW computing load.
  - 10MVA secured to enable 6.6MW in 2025
  - Need to explore the impact of having two datacentres on different sites on SCD's ability to deliver services to users.
- Previous iterations and further reviews bring delays
  - Original operational date was Summer 2025
  - Now 1<sup>st</sup> Q 2026 .... Summer 2026?????



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**Q&A**