

3.0 Design Development

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3.1 Data Centre Components and Arrangement

Following site analysis, the design process began by defining the operational requirements of a modern data centre and understanding how the various components relate to one another. The site plan opposite illustrates the initial site arrangement presented during Pre-Application 1, with the role and position of each component described below:

- 1 Data Halls

Data halls contain the server racks that store and process digital information and form the primary function of the data centre. They require tightly controlled and secure internal conditions, typically without windows. Their size and shape are largely dictated by the server layout, making them the least flexible element of the development. As a result, they were positioned centrally within the site and surrounded by supporting infrastructure.
- 2 Electrical Infrastructure

Electrical infrastructure receives and distributes power to the data halls. Arrangements can vary, but it must be located close to the servers for efficient power distribution. For this reason, it was grouped immediately behind the data halls.
- 3 Administration Centre

The administration centre contains the main entrance, security facilities, offices and staff welfare spaces. Its size and form are relatively flexible and so it was positioned on the site frontage and shaped to reinforce the established crescent building line.
- 4 Backup Generators

Backup generators provide emergency power if the primary electricity supply fails. They require a readily available and reliable fuel source. They were positioned at the rear of the site, alongside the electrical infrastructure they support.

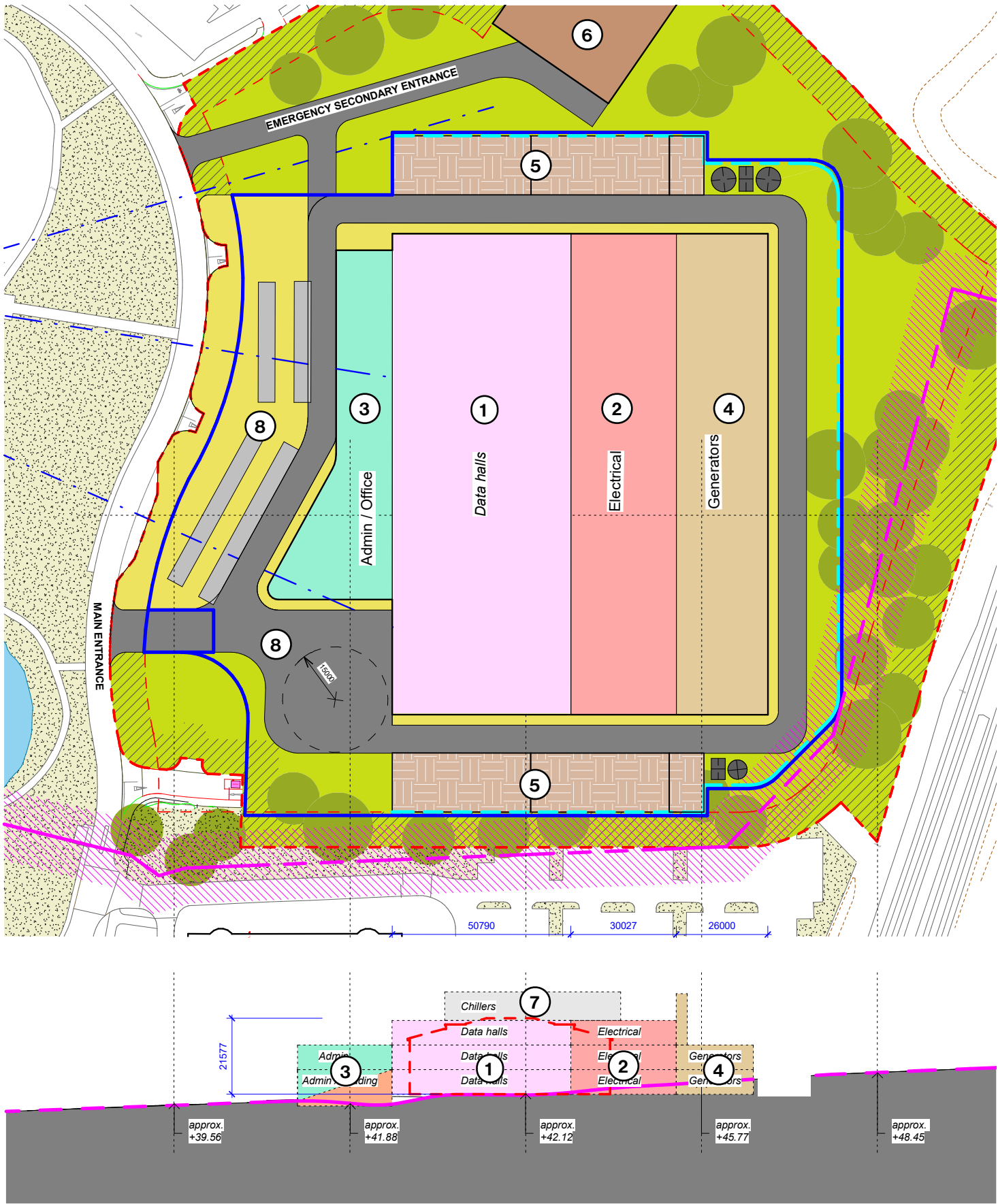
- 5 Fuel Cells

Fuel cells generate electricity from natural gas through an electrochemical process rather than combustion. They form part of the proposed power strategy, providing power from the site's high-pressure gas connection during the initial phase of development and potentially longer-term. Their size and location are flexible, allowing them to be positioned either side of the data centre in the available space.
- 6 Substation

The substation connects the development to the wider electricity network once established. Its size and location are determined by utility requirements and it is positioned in the remaining space beyond the eastern fuel cell area.
- 7 Cooling Plant

Cooling plant removes heat from the data halls, allowing them to maintain stable operating temperatures. Requiring significant space and good airflow, it was located at roof level and screened by a louvred enclosure.
- 8 Roads and Parking

Roads, loading areas and parking support the operation and maintenance of the facility. Their arrangement is driven by servicing requirements and vehicle movements, including access for large articulated vehicles. A perimeter access route was provided, with parking located close to the main entrance and a loading bay incorporated within the administration centre.



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3.2 Crescent Building Line

3.2.1 Existing Condition

The existing frontage is commonly referred to as a crescent, however, it is not formed by a continuous curved façade. Instead, the frontage is created by a sequence of five flat, articulated building façades (or facets), arranged to collectively read as a crescent through their alignment, rhythm and consistent setbacks

3.2.2 Pre-Application 1 Proposal

The Pre-Application 1 design responded to the existing frontage by reflecting the geometry of the façade facets within the proposed building form. The building line followed the arrangement of the existing facets, whilst being brought slightly forward to accommodate the depth required for the data centre behind.

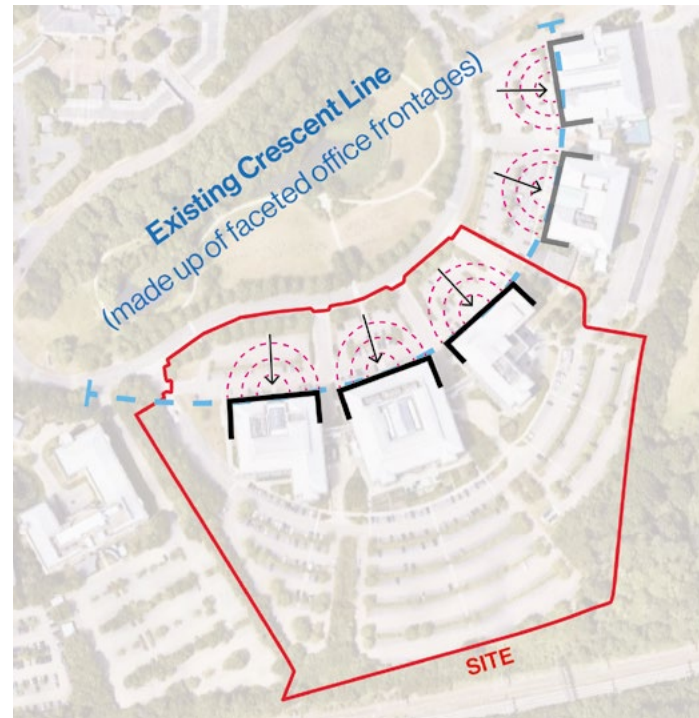
3.2.3 Pre-Application 1 Feedback

The feedback received at Pre-Application 1 advised that further consideration should be given to whether a more curved form could be adopted to reflect the existing crescent.

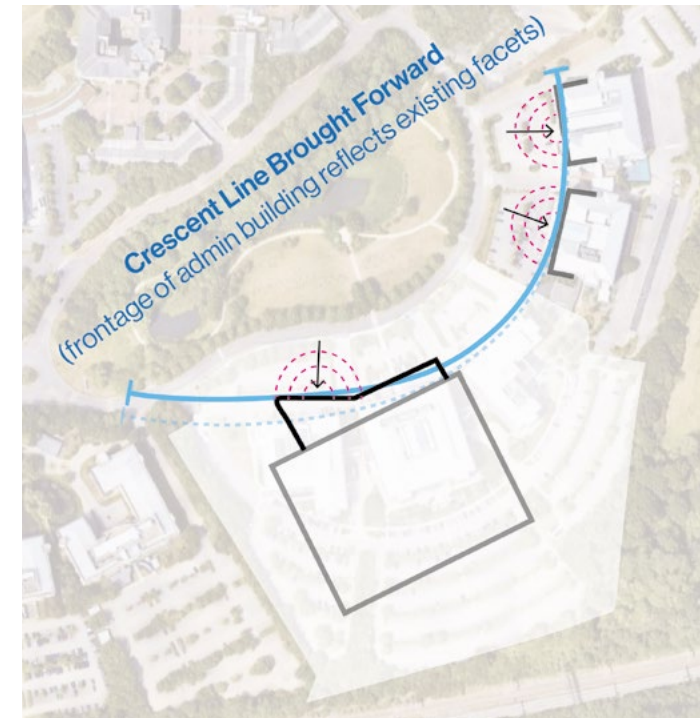
3.2.4 Pre-Application 2 Design Development

Following the feedback received at Pre-Application 1, the design was developed to adopt a less angular form, whilst retaining the underlying faceted logic of the existing frontage. The design introduces a gentler transition between the façade facets, resulting in a more continuous crescent building line that relates to the existing office buildings to the east and west.

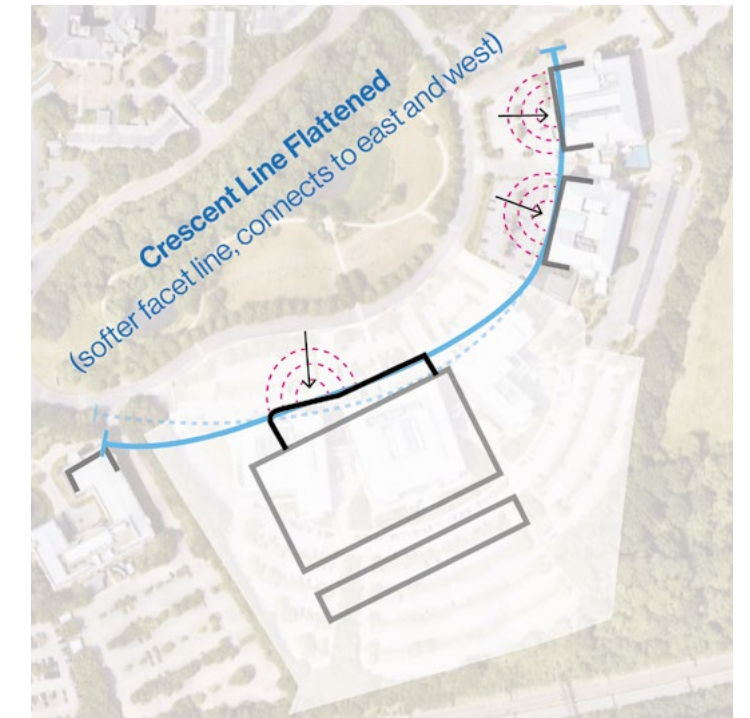
Existing Crescent Frontage



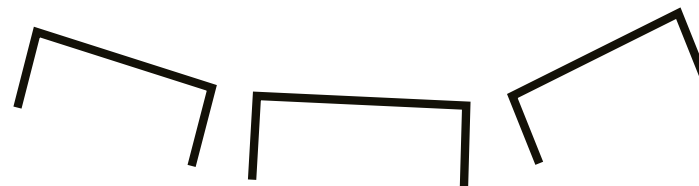
Pre-Application 1 Design



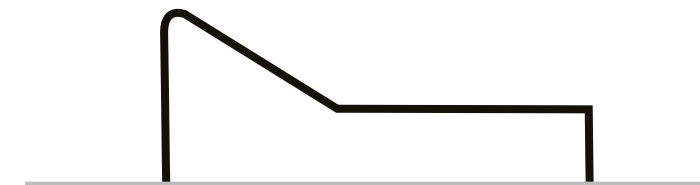
Design



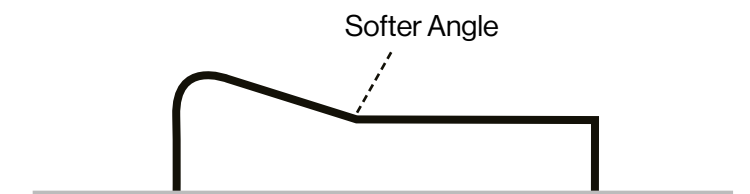
Existing Crescent Frontage Outline



Pre-Application 1 Admin Building Outline



Admin Building Outline



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3.3 Building Storey Options

3.3.1 2-Storey & 3-Storey Options (Pre-App 1)

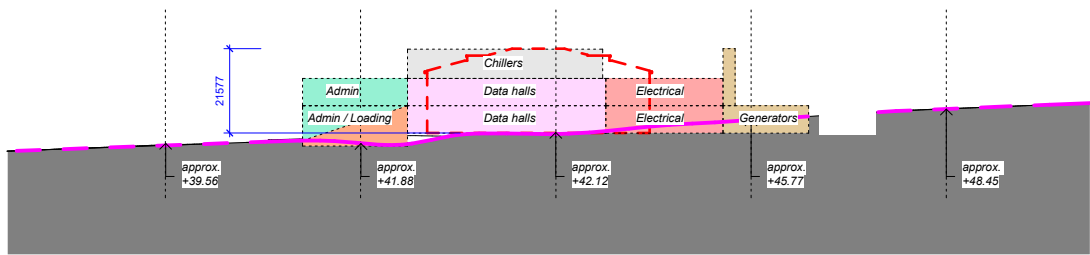
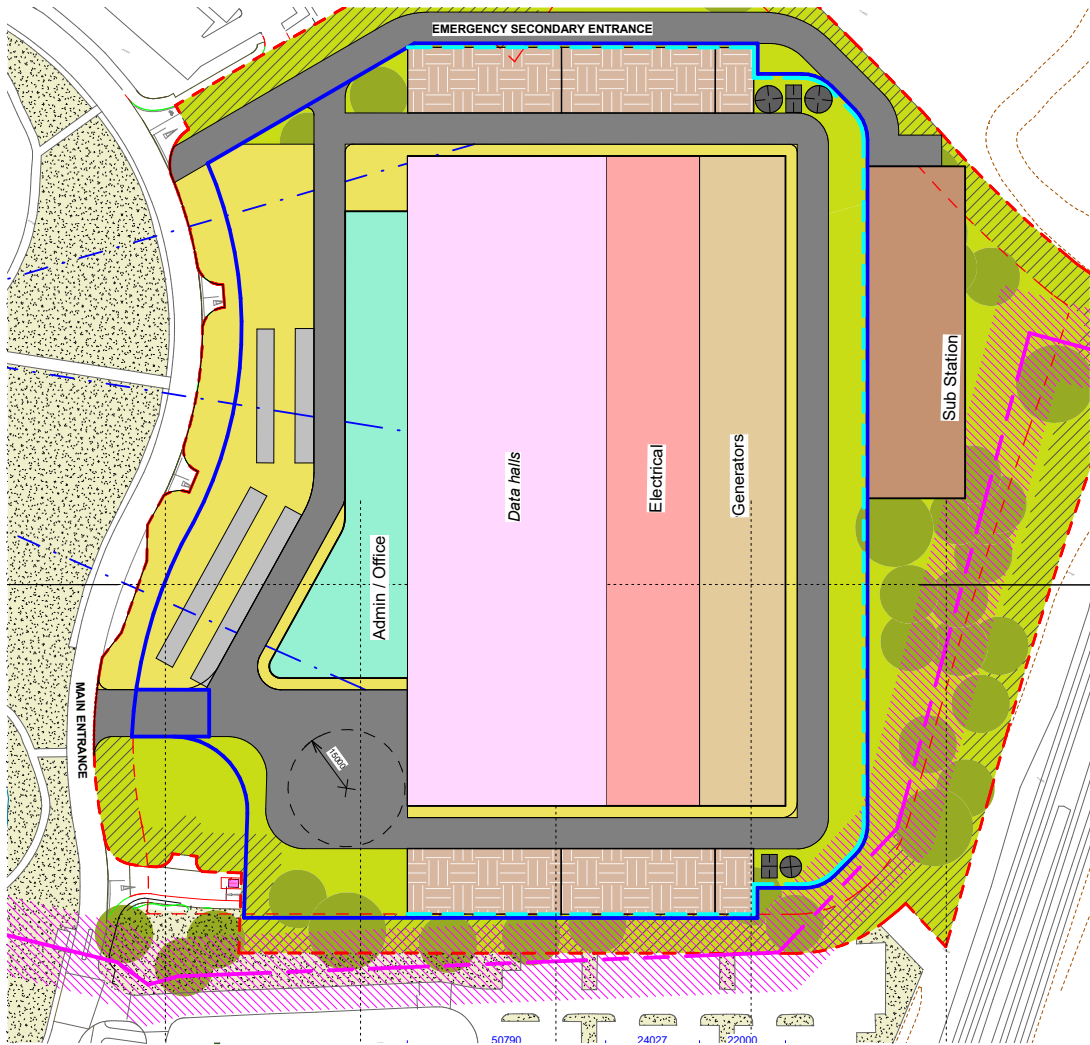
During Pre-App 1, two design options were developed for the data centre:

- **Option 1:** 2-Storey Data Centre
- **Option 2:** 3-Storey Data Centre

It was proposed that the data centre ground floor level will align with Building 2 (+42.50m AOD). The site levels was modified to accommodate the development, with a retaining wall created along the cyan line to enable the change in level.

The proposed car parking provision was reduced from the existing level and located at the front of the site. The landscape buffer at the rear of the site was enhanced to support the Biodiversity Net Gain (BNG) requirement.

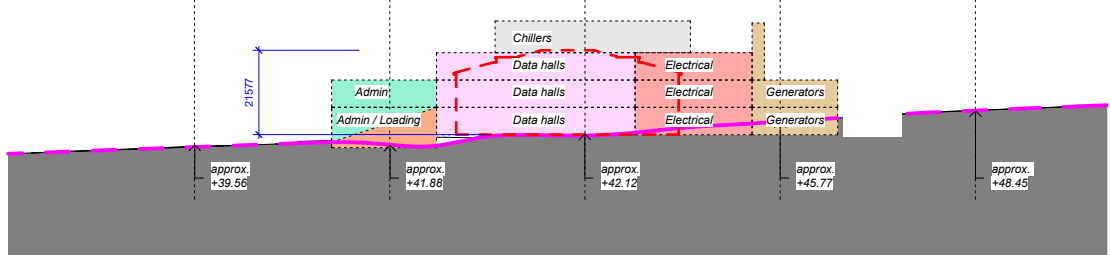
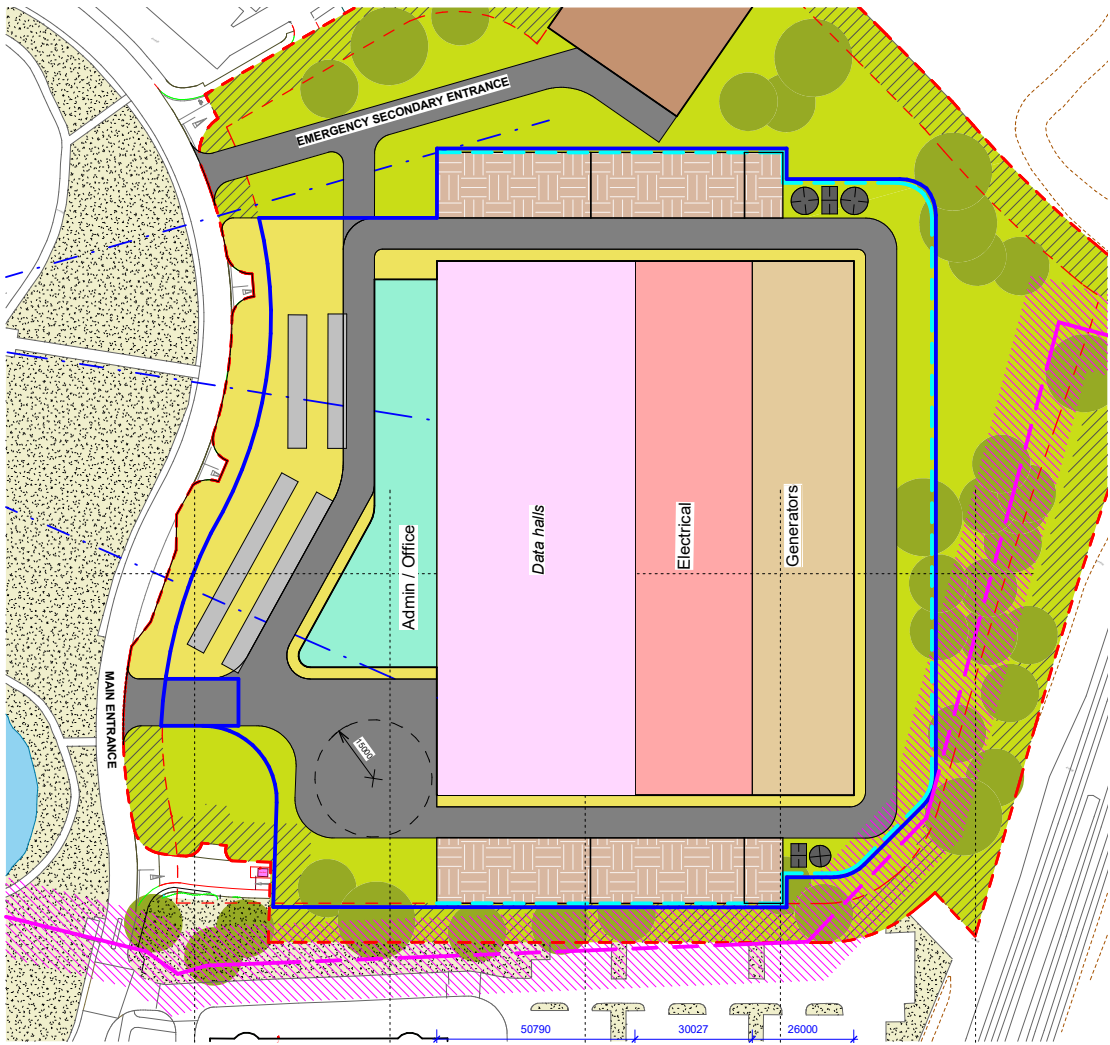
A perimeter security fence (blue) was proposed around the data centre. The main vehicular entrance incorporated a security kiosk and barriers to control access to and from the site. A second emergency road provided an alternative access point and access to the substation.



Option 1: 2-Storey Data Centre

This option comprised two-storeys of data halls and associated plant, with mechanical plant located at roof level. The overall height was similar to the existing office buildings, as shown by the red line on the section.

The administration office building was located on the site frontage and was approximately 15m high. The data halls and associated plant were set back from the frontage. A service road was provided around the data centre to enable maintenance access.



Option 2: 3-Storey Data Centre

This option had a smaller footprint than option 1 but was taller and at the rear of the site, its height exceeded the existing office buildings. The red line on the section indicates the silhouette of the existing office buildings.

Apart from the differing height, the overall layout and design principles reflected option 1.

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3.3 Building Storey Options

3.3.2 3-Storey Design Option (Pre-App 2)

Following a review of the Pre-App 1 feedback and client requirements, the 3-storey design option was selected for the following reasons:

Reduced Building Footprint

Although taller, the 3-storey option results in a smaller plan footprint. This provides greater flexibility for the siting of power infrastructure, reduces potential impacts on the rear woodland edge, and allows greater provision at the site frontage, including parking.

More Efficient Use of the Site

The 3-storey option achieves a higher IT power capacity compared with the two-storey option.

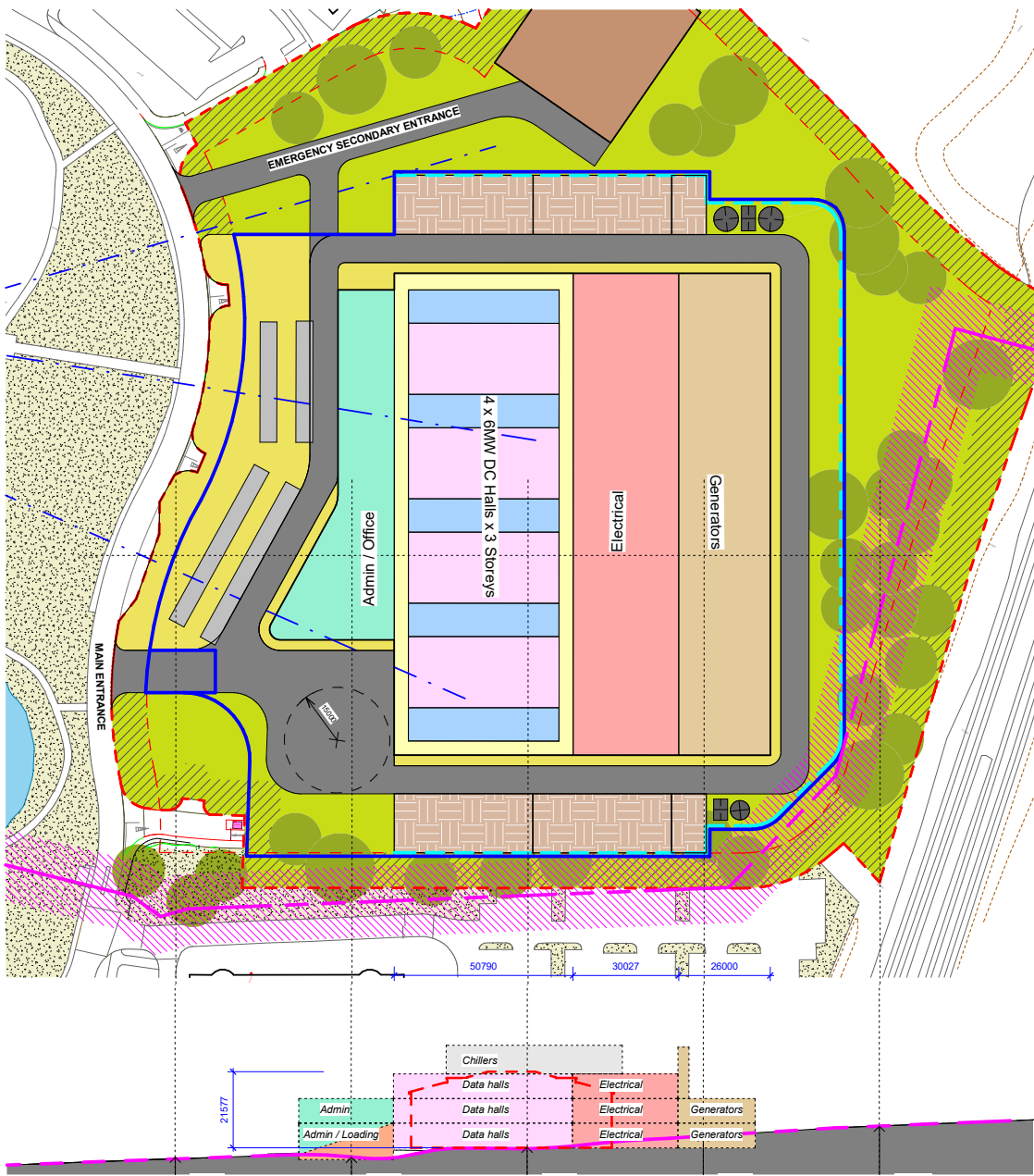
Comparable Massing and Visual Impact

Wokingham Borough Council officers advised that both the 2-storey and 3-storey options could be acceptable, subject to further assessment.

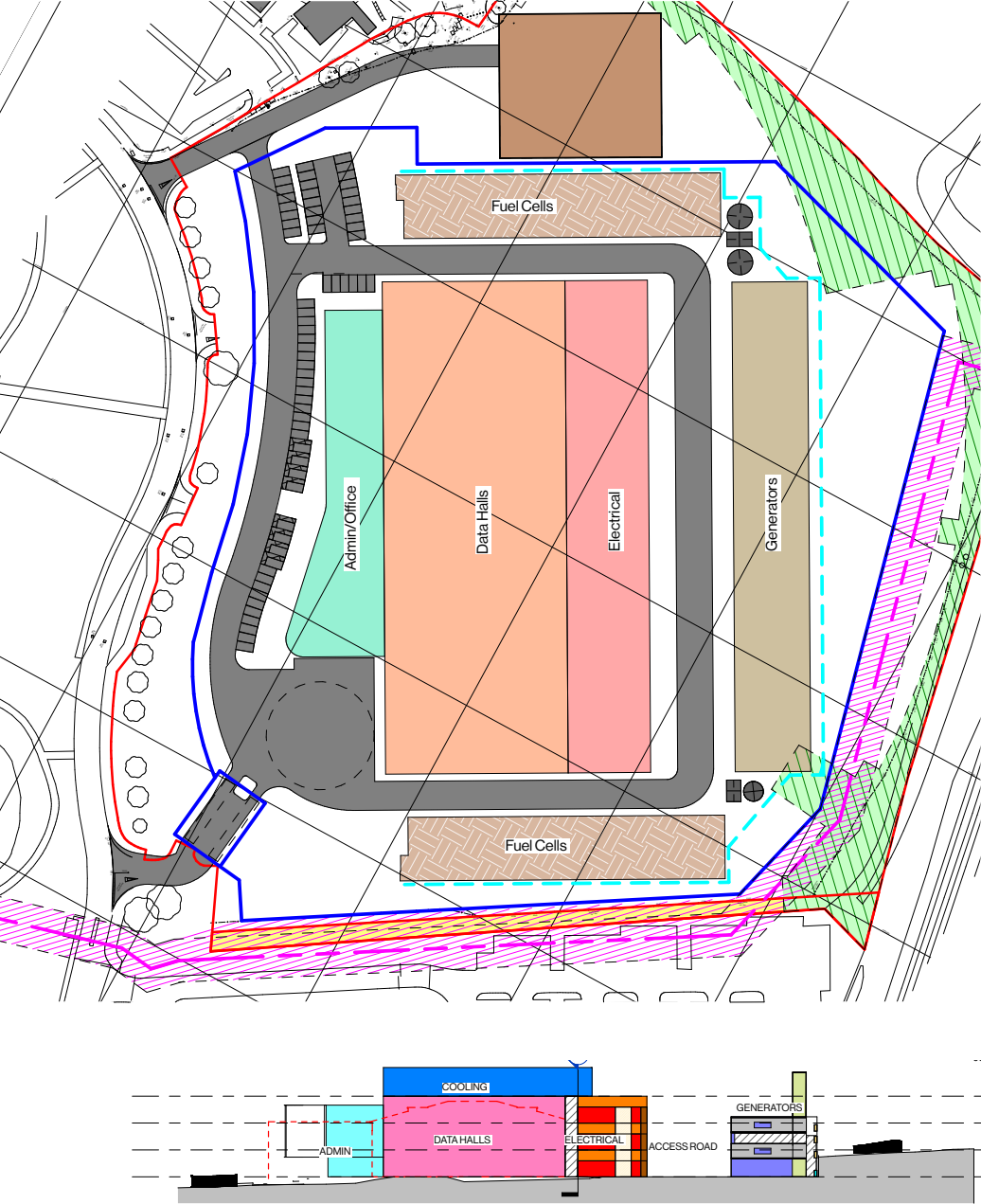
The design was developed through further assessment of massing, layout, architectural approach and technical considerations.

Following Pre-Application 2, the Council's feedback identified that the remaining matters largely relate to further assessment, detailed design, mitigation and implementation rather than fundamental constraints to development.

Pre-App 1 Design



Pre-App 2 Design



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3.4 Massing

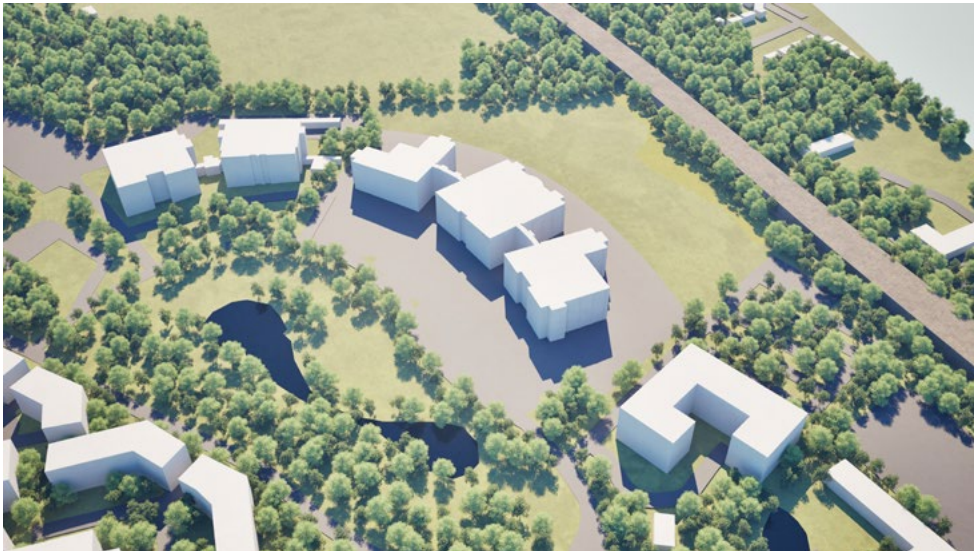
3.4.1 Pre-Application 1 Proposal

The initial massing established the overall arrangement of the administration building, data halls, supporting plant and associated infrastructure.

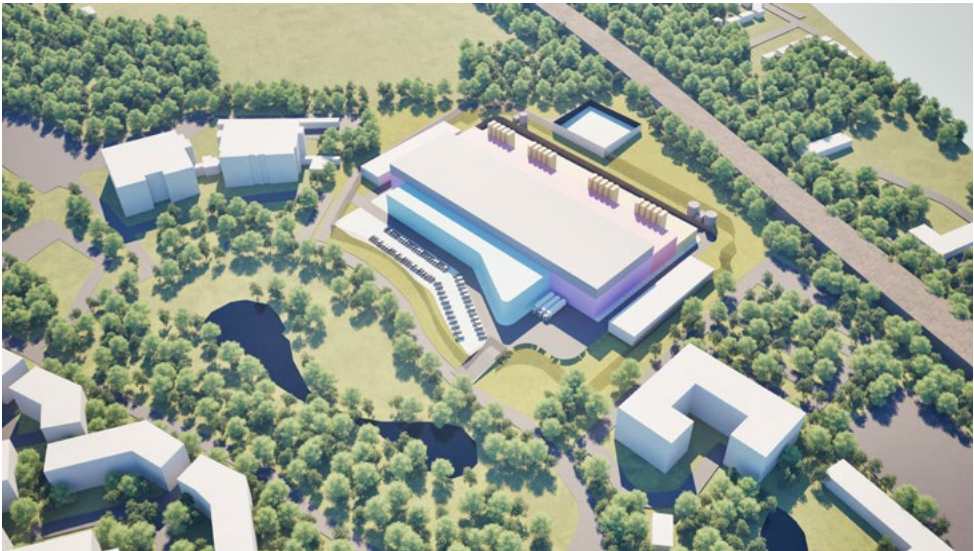
3.4.2 Pre-Application 1 Feedback

The feedback received at Pre-Application 1 advised that further consideration should be given to the scale, height, massing and layout of the proposed development.

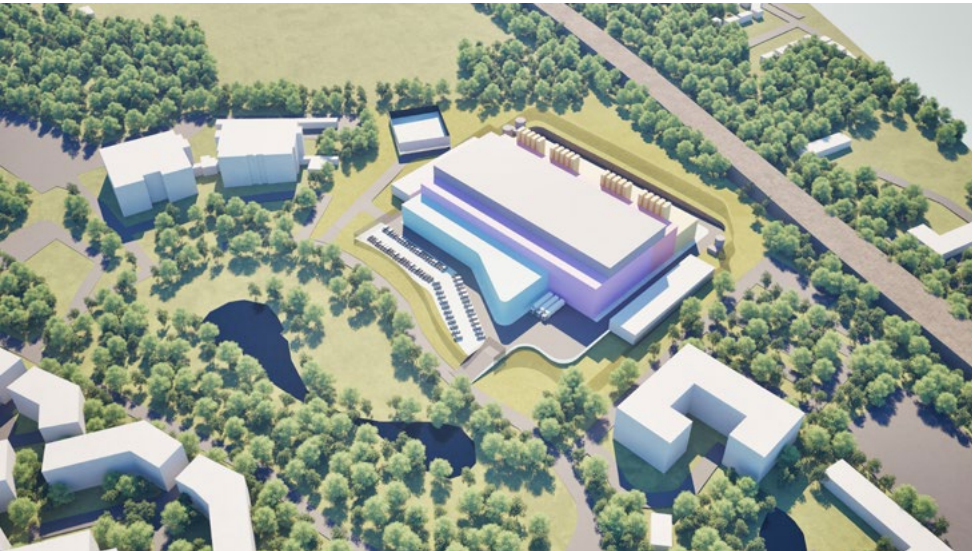
Existing Office Buildings



Option 1: 2-Storey Data Centre



Option 2: 3-Storey Data Centre



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3.4 Massing

3.4.3 Pre-Application 2 Design Development

Following Pre-Application 1, the massing was developed as follows:

① Central Access Road

The access road was relocated from the rear of the site to a central position between the backup generators and electrical areas. This improves emergency access and maintenance whilst enabling a more efficient internal layout.

② Three-Storey Administration Building

An additional storey was introduced to the administration building to provide access to all data halls. This reduced the building footprint and increased the height of the administration building to approximately 22.5m.

③ Fuel Cells

The fuel cell buildings are defined at approximately 16.5m in height. Initial CFD analysis identified potential heat interaction with rooftop plant, leading to their relocation further towards the rear of the site.

④ Mechanical Roof Plant

The rooftop mechanical plant comprises mechanical equipment located behind an external louvred/mesh façade. This provides screening whilst allowing airflow. The mechanical plant was repositioned towards the front of the building to reduce heat interaction with the fuel cells. The plant height was defined at 8m, resulting in a maximum building height of approximately 30.5m.

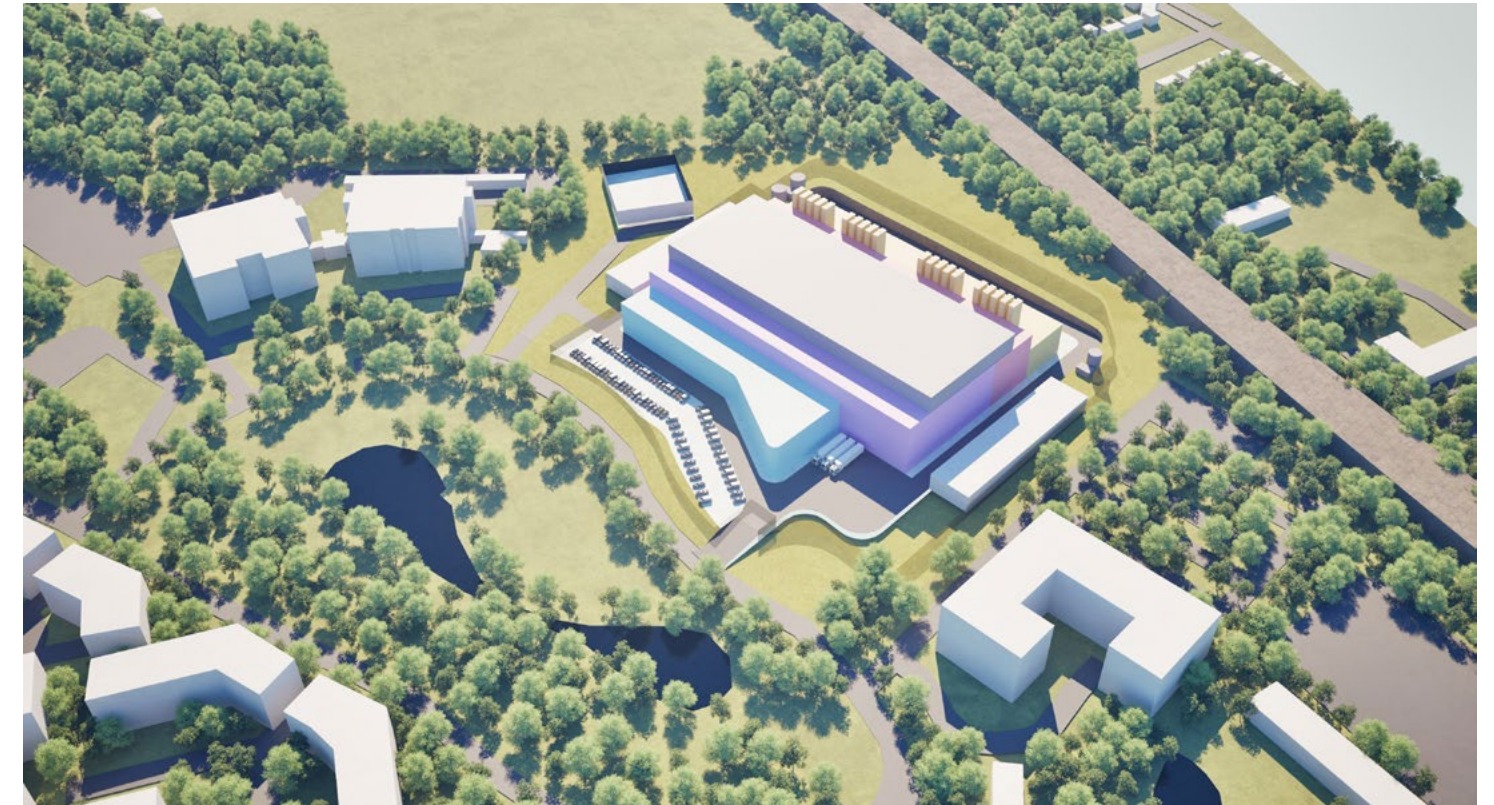
⑤ Substation (Indicative Volume)

The power strategy remained in development. The volume shown was indicative in terms of both massing and external appearance.

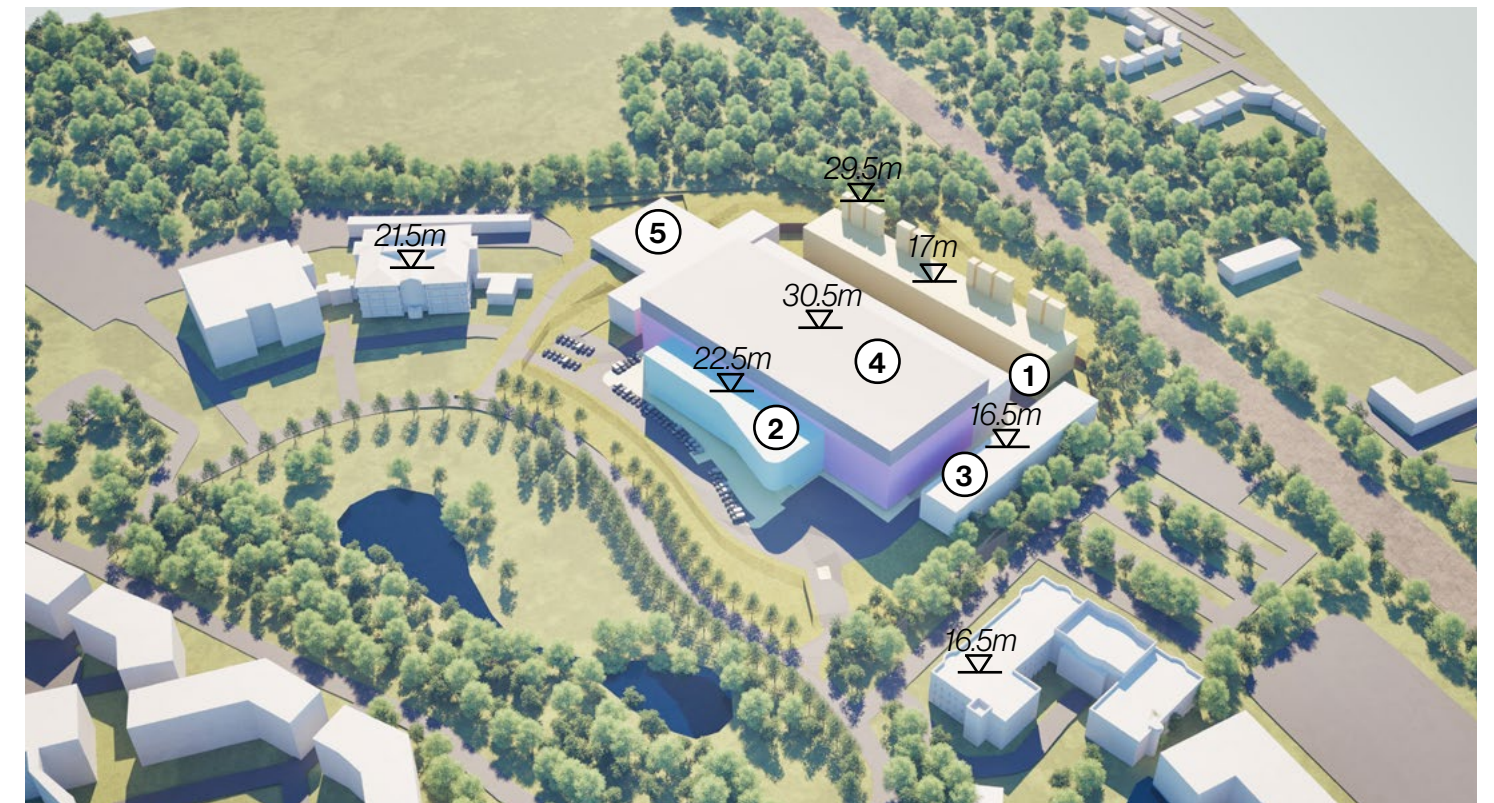
3.4.4 Pre-Application 2 Feedback

The revised three-storey massing approach was considered capable of being accommodated on the site. Officers acknowledged that the applicant had responded positively to the matters raised during Pre-Application 1, including the evolution of the crescent frontage and articulated building forms.

Pre-App 1 Design



Pre-App 2 Design

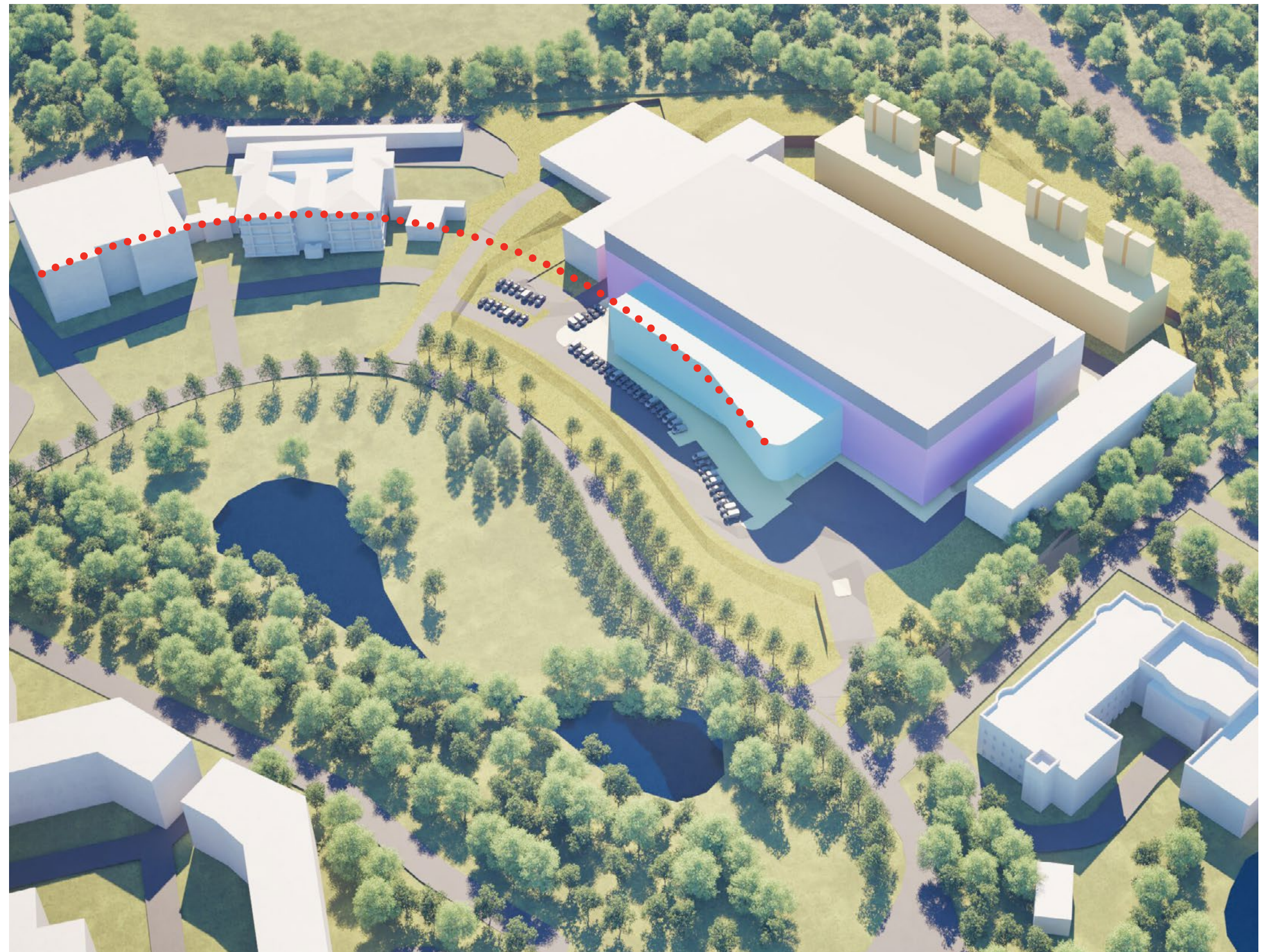


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3.4 Massing

3.4.5 Crescent Building Line Massing

This 3D massing demonstrates that the proposed building aligns with the established crescent building line at roof level. The roof datum of the administration building is comparable with that of the neighbouring office buildings to the east, maintaining continuity along the frontage.



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3.4 Massing

3.4.5 Design

The Pre-Application 3 proposals retain the massing principles established at Pre-Application 2.

① Central Access Road

The central access road provides access to the backup generators, electrical areas and fuel cells.

② Three-Storey Administration Building

The administration building provides access to all data halls. The roof level is approximately 22.5m and is consistent with the neighbouring office buildings.

③ Fuel Cells

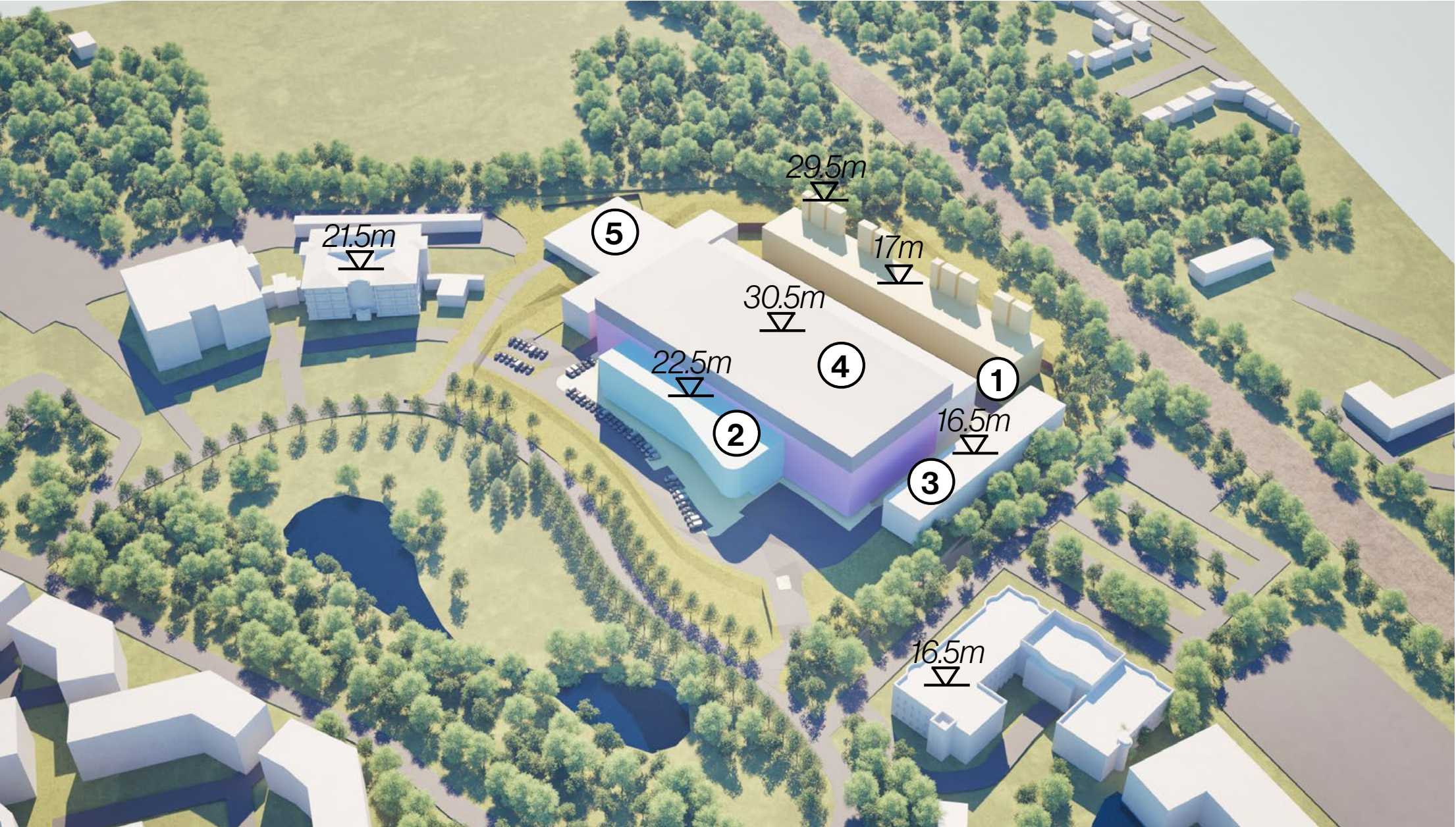
The fuel cell buildings remain approximately 16.5m in height.

④ Mechanical Roof Plant

The rooftop mechanical plant remains enclosed behind an external louvred/mesh façade to provide screening while allowing airflow. The plant height remains 8m, resulting in a maximum building height of approximately 30.5m.

⑤ Substation (Indicative Volume)

The power strategy remains in development and is covered in more detail later in this document. The volume shown remains indicative in both massing and external appearance.



The Pre-App 3 massing retains the principles from the Pre-App 2 design.

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3.5 Massing Articulation & Setbacks

3.5.1 Existing Condition

The office buildings to the east display a consistent massing articulation that contributes to the crescent frontage. This articulation is expressed through:

- A set-back ground floor
- A more prominent middle section accommodating the office floors
- A set-back upper storey

The neighbouring office building also articulates its principal entrance through a setback in plan framed by projecting wings.

3.5.2 Pre-Application 2 Proposal

The Pre-Application 2 proposals responded to this established articulation by incorporating similar setbacks, an active ground floor and articulated upper accommodation.

The main entrance was articulated through a curved building form at the north-west corner of the site. Upper storeys project beyond the ground floor to create a covered entrance.

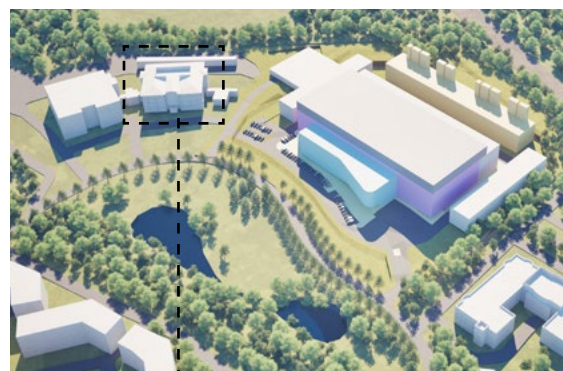
3.5.3 Pre-Application 2 Feedback

Officers supported the principle of the articulated building form and considered the approach capable of delivering a high-quality contemporary architectural response. Further consideration was requested regarding material quality and detailed façade development.

3.5.4 Design

The massing articulation and entrance arrangement established at Pre-Application 2 have been retained within the Pre-Application 3 proposals.

Neighbouring Massing Articulation

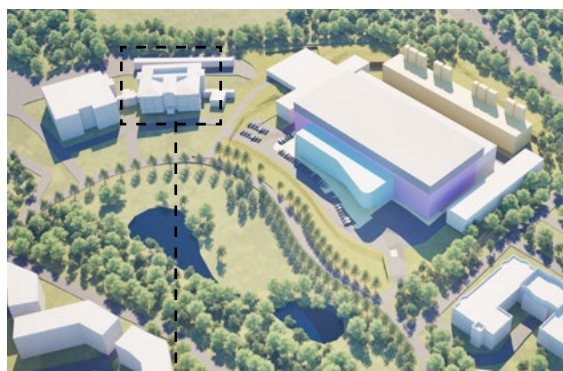


Set-back upper storey

Prominent middle section

Set-back ground floor, active frontages

Neighbouring Entrance Articulation

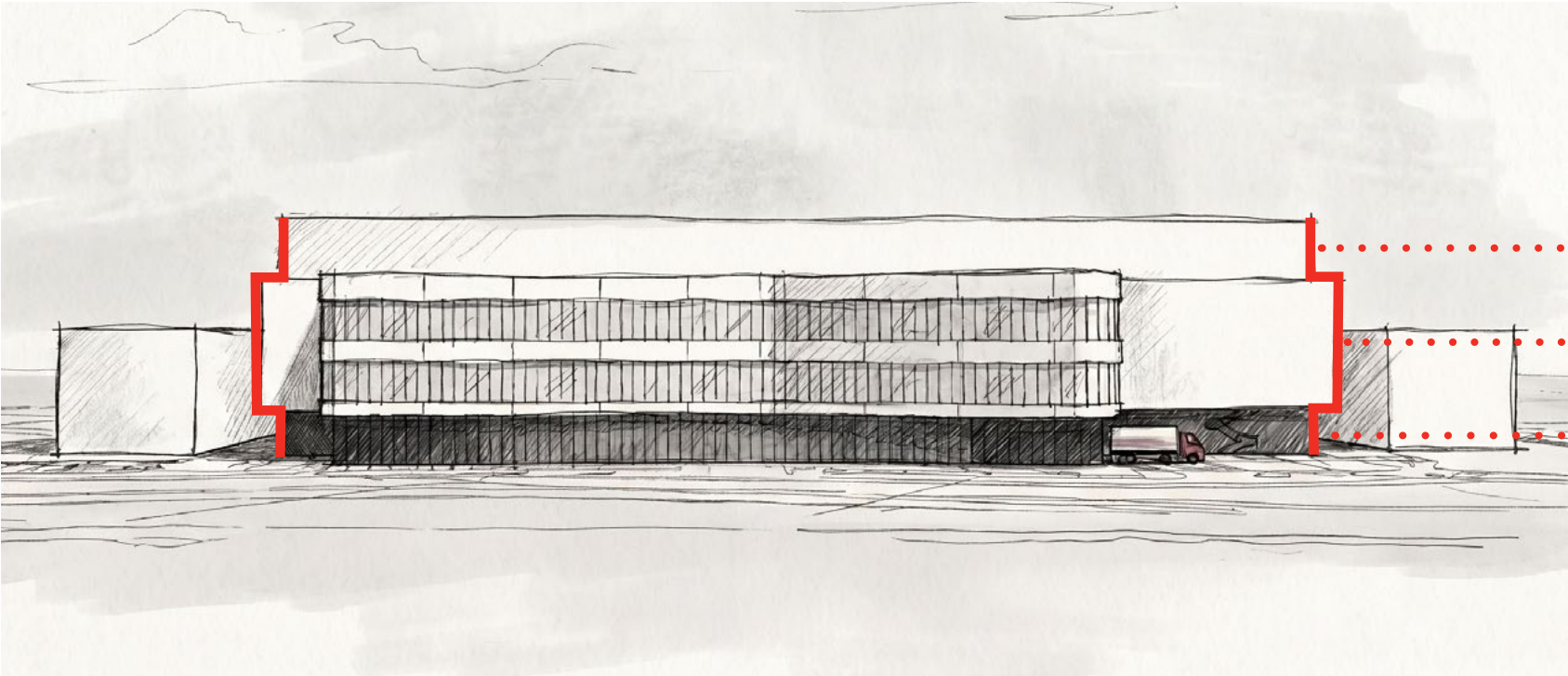
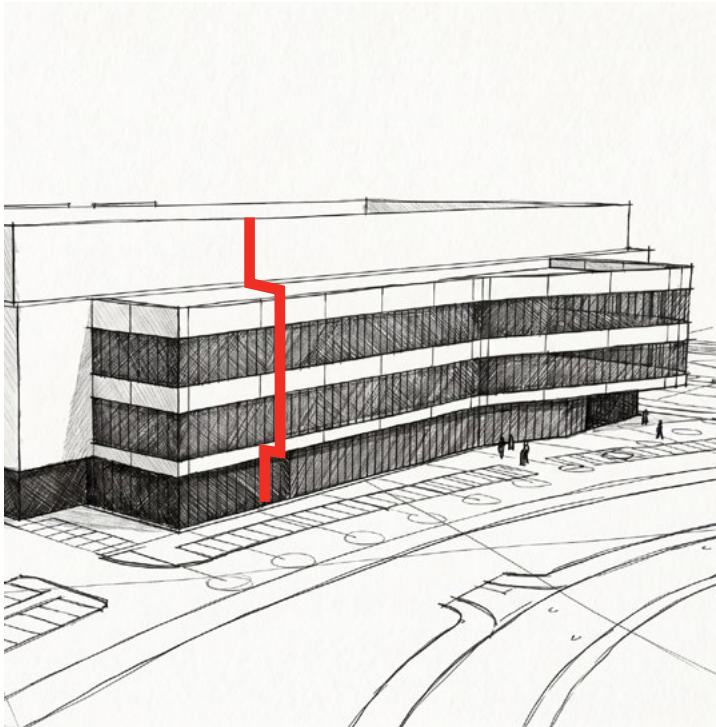


Entrance articulated through set-back

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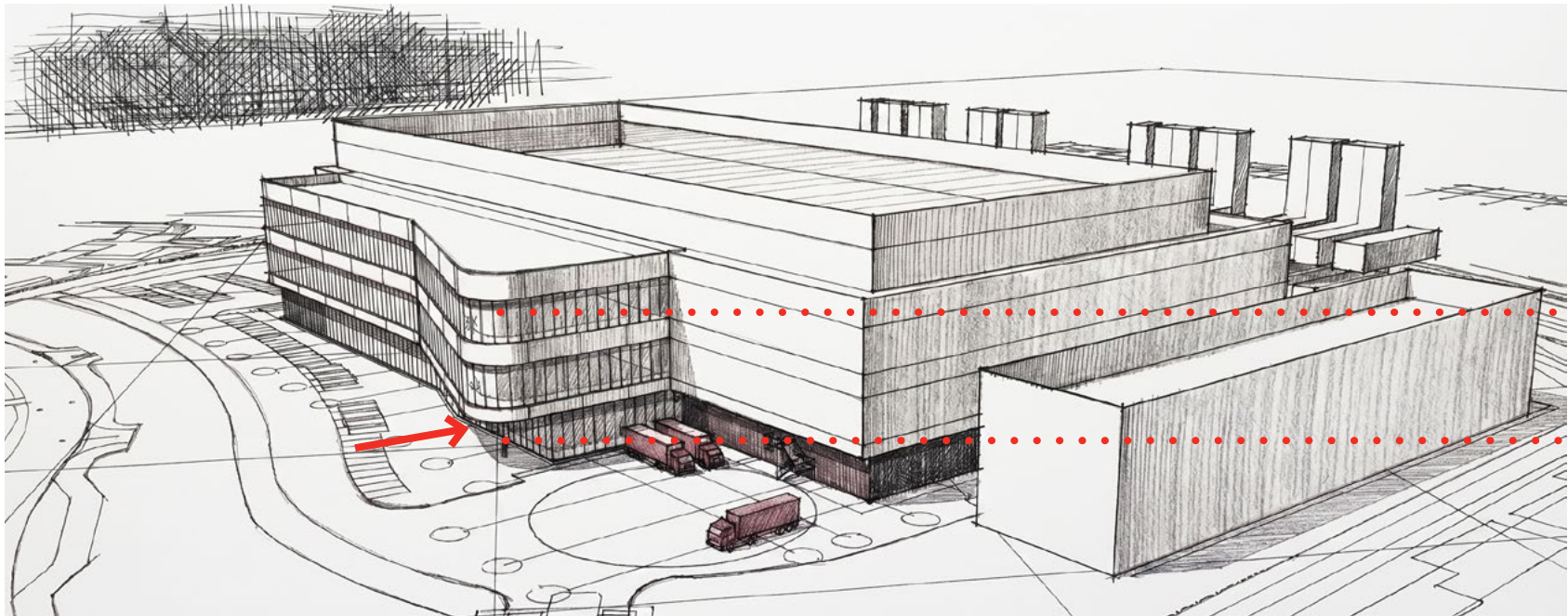
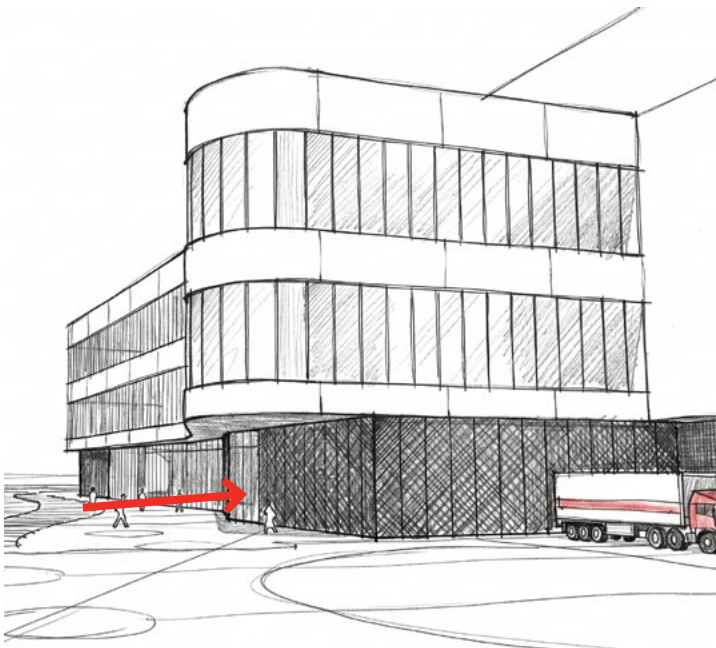
3.5 Massing Articulation & Setbacks

Proposed Articulation & Setbacks



- Setback upper plant storey
- Prominent middle section
- Set-back ground floor, active frontages

Proposed Entrance Articulation



- Entrance articulated through projecting building feature
- Setback, covered entrance region

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3.6 High-Tech Facade Design

3.6.1 Pre-Application 1 Feedback

The feedback received at Pre-Application 1 supported a contemporary high-tech architectural approach appropriate to the character of Thames Valley Business Park. The feedback also advised that the façade should be of a high quality and well-integrated, avoiding a utilitarian or industrial appearance.

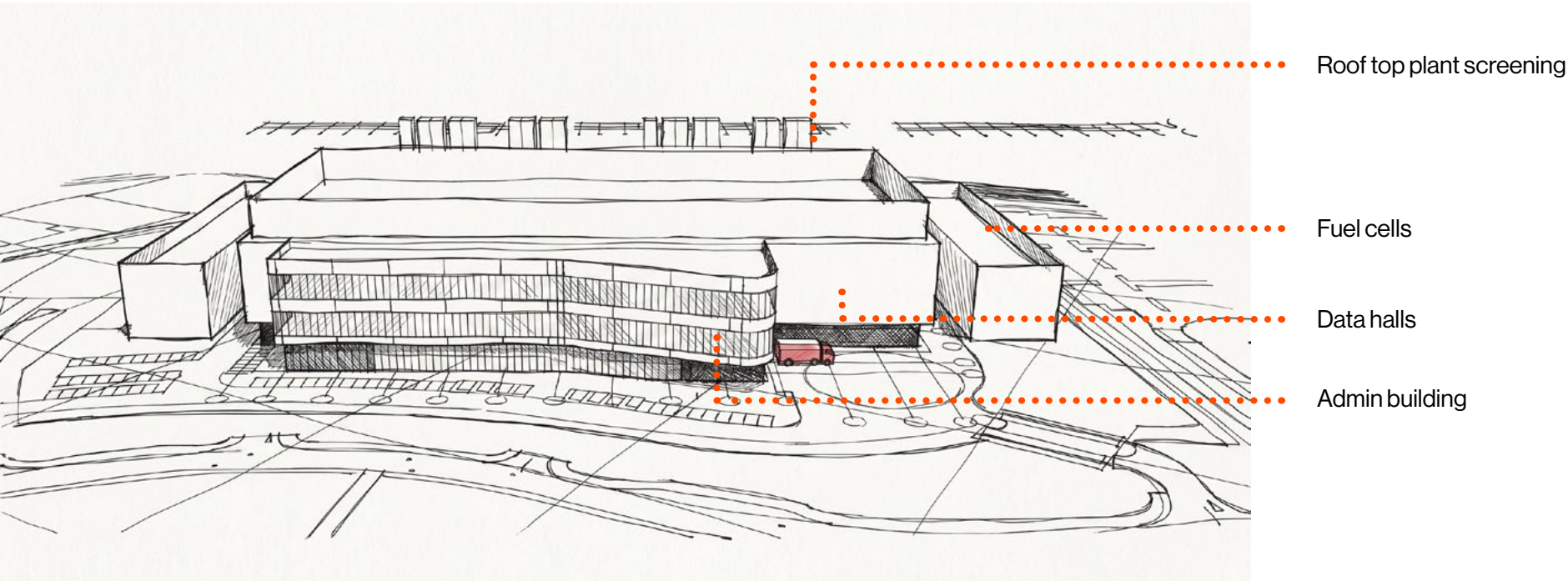
3.6.2 Pre-Application 1 Facade Response

In response to this feedback, the façade design was developed to reflect the differing functional requirements of the building elements.

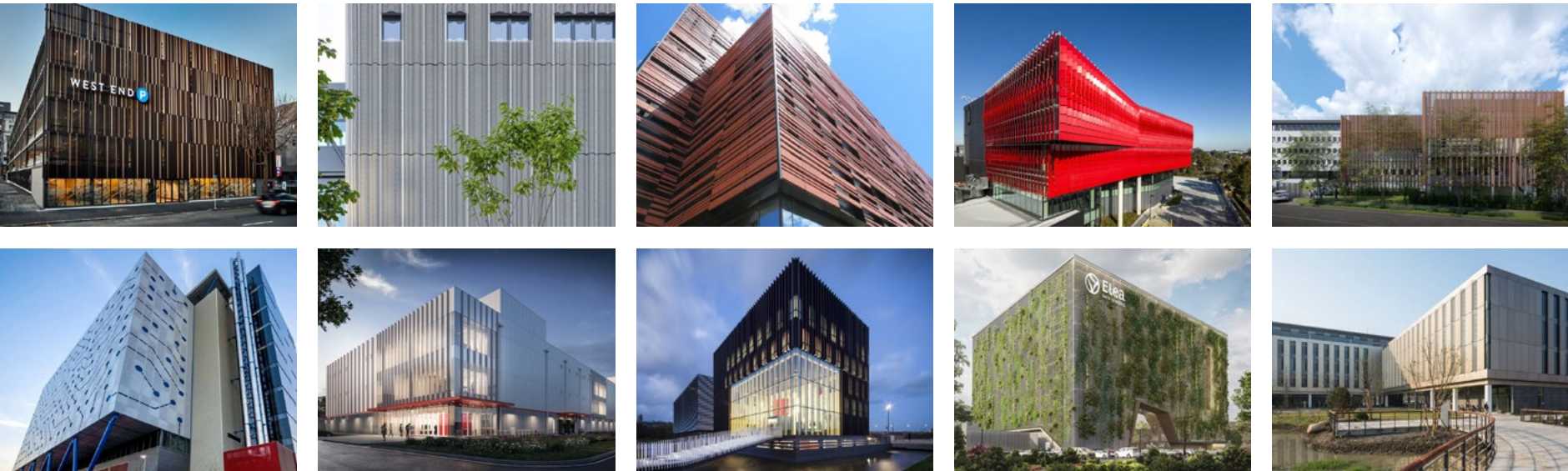
The data hall façades are driven by security, performance and maintenance requirements and do not require windows, allowing for robust façade solutions. The administration building requires glazing and a deeper wall build-up to accommodate office accommodation. The fuel cells require a high ventilation free area and are positioned to remain visually subordinate to the main building. Rooftop plant enclosures also require significant airflow and are designed to provide screening at roof level.

Precedent images of contemporary data centres were used to inform the initial design approach, with the intention of developing the façade strategy further through ongoing discussions with Wokingham Borough Council.

Facade Response by Building Function



Precedent Images



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3.6.3 Pre-Application 2 Proposal

As part of the Pre-Application 2 design development, two distinct façade concepts were explored to establish a high-tech architectural approach for the proposed development.

The intention was to develop these concepts with officer input to establish a façade design palette and framework to inform the future development of the building's external appearance:

3.6.4 Vertical Fins / Louvres Design Concept

Vertical high-tech fin or louvre systems introduce ventilation free area while establishing rhythm and scale across large façades. Their repetition and depth allow plant and servicing zones to be accommodated behind an architectural layer while responding to areas with higher airflow requirements.



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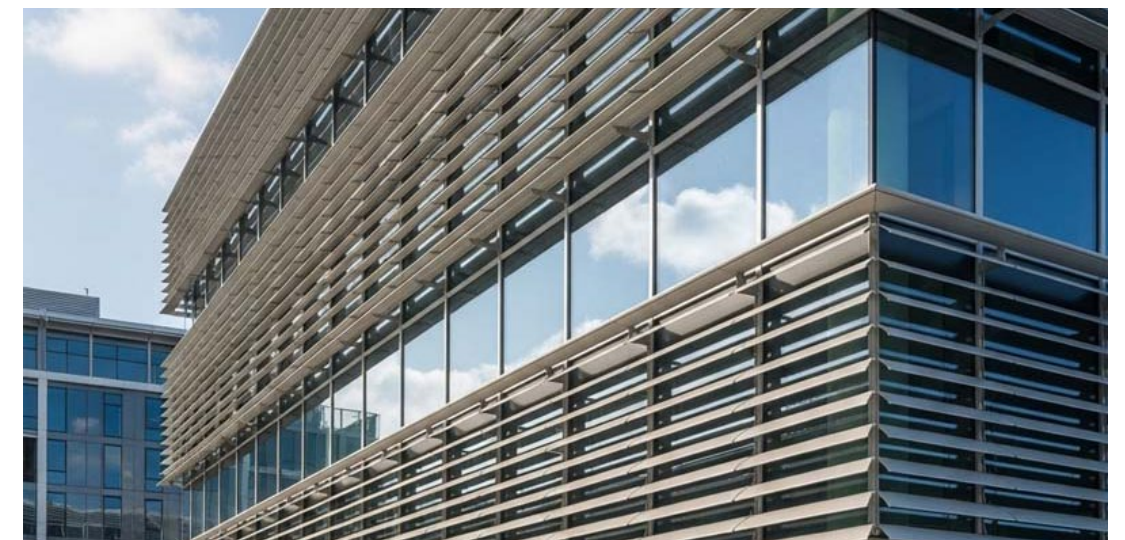
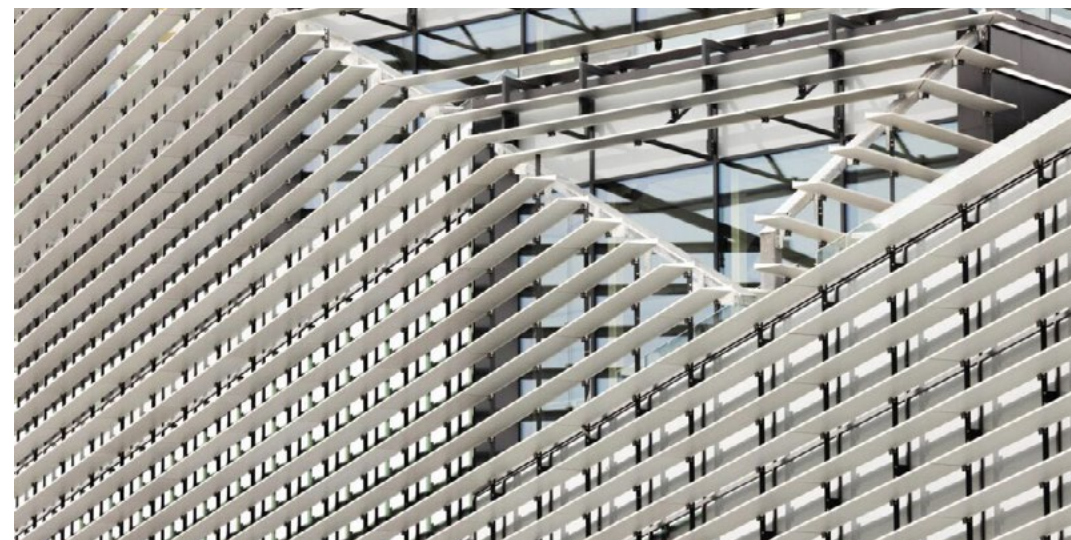
3.6.5 Facade Design Concepts- Vertical Fins / Louvres



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3.6.6 Horizontal Fins / Louvres Design Concept

Horizontal high-tech fins and louvres establish a strong horizontal datum across the building and are suited to continuous ventilation zones, such as plant enclosures or upper levels. This approach integrates ventilation free area within a horizontal composition.



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3.6.7 Facade Design Concept - Horizontal Fins / Louvres

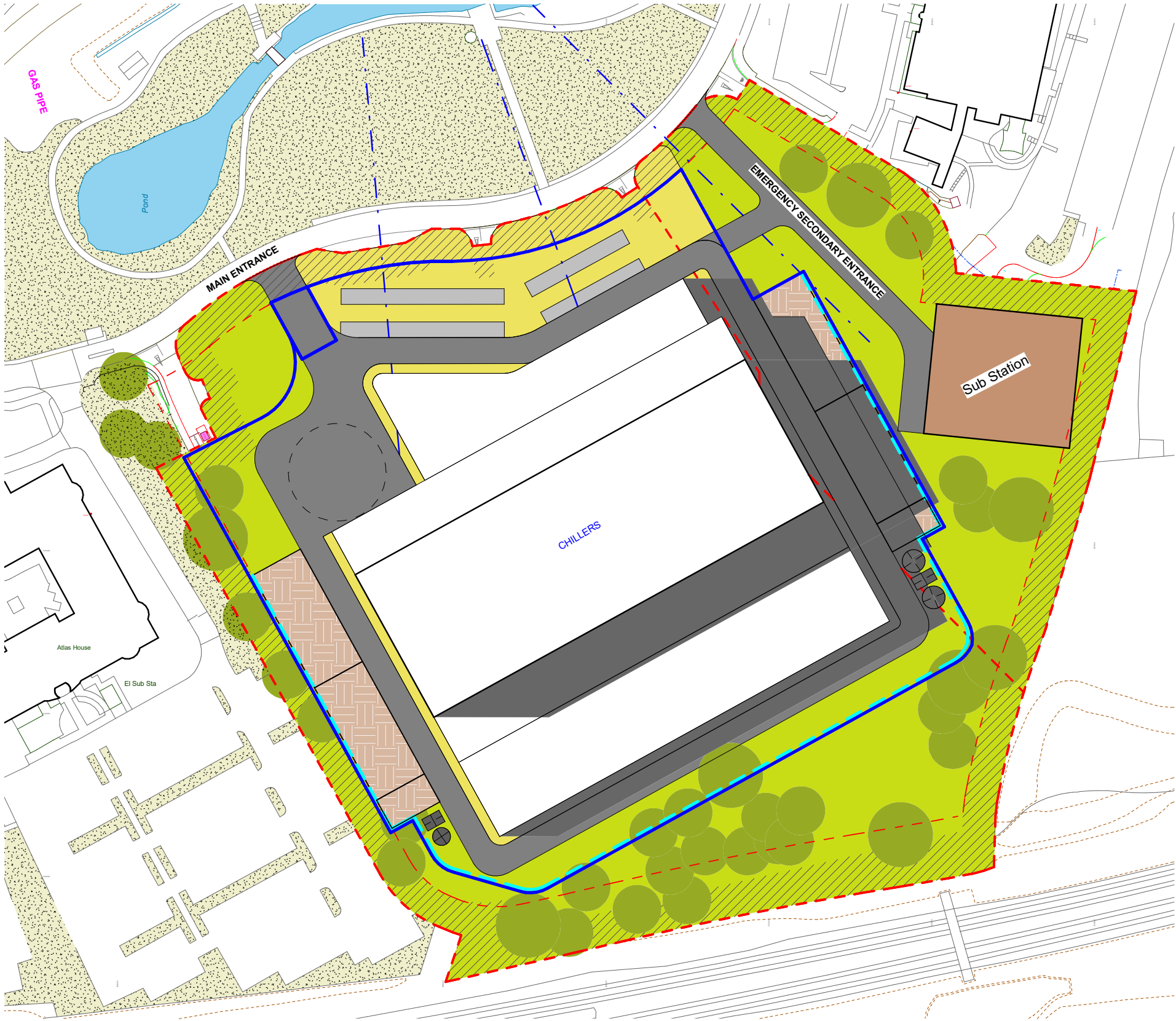


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3.7 Layouts & Plans

3.7.1 Pre-App 1 Site Plan for 3-Storey Data Centre

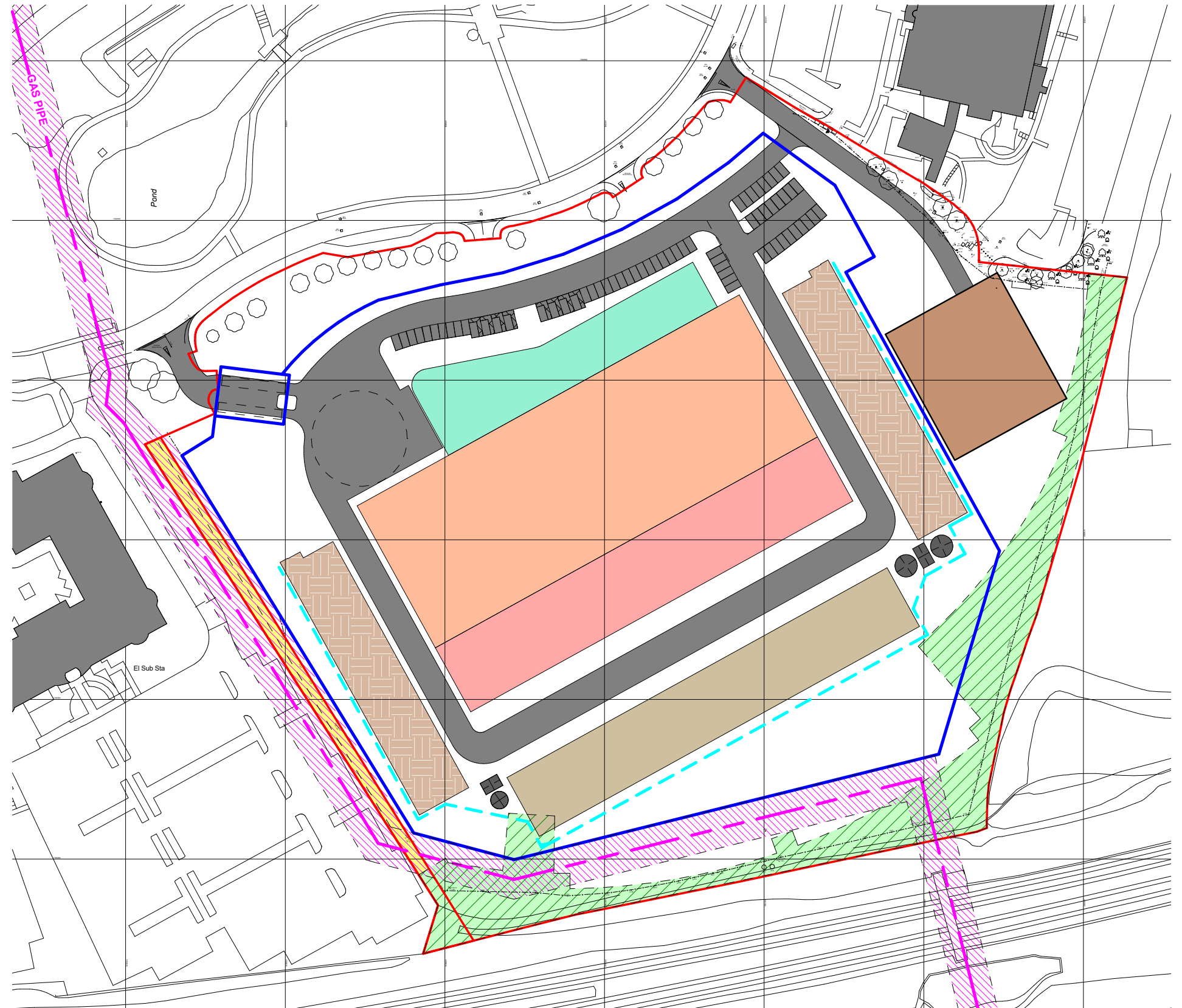
The site plan presented at Pre-Application 1 illustrated the proposed layout for the three-storey data centre option, including the administration building, data halls, associated plant and the infrastructure within the site.



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3.7.2 Pre-App 2 Site Plan

Following Pre-Application 1 and further site investigations, the site layout was developed to respond to a greater understanding of the site's constraints. This included consideration of the existing entrance locations, the high-pressure gas pipeline and the ecological constraints along the southern boundary of the site.



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3.7.3 Pre-App 2 Feedback

The Pre-Application 2 feedback requested further clarification regarding frontage tree retention, the relationship between security fencing and Root Protection Areas, and retention of existing pedestrian routes.

Following the Pre-Application Stage 2 meeting, the proposed layout was assessed against the existing trees. This identified a number of conflicts with Root Protection Areas (RPAs). A series of layout options were then explored by repositioning the building to reduce these conflicts.

Tree Survey Overlay Analysis



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3.7.4 Building Movement

A building movement exercise was undertaken using the indicative 132kV substation located to the east of the site, representing the maximum likely extent of the proposed infrastructure.

A number of alternative building positions were explored with the objective of avoiding Root Protection Areas (RPAs) around the site perimeter. This exercise confirmed that avoiding all RPAs was not possible and resulted in conflicts elsewhere on the site.

Through this iterative process, the building was repositioned approximately 1.4m to the north and 4.9m to the west. This revised position avoids all RPAs associated with TPO-protected trees whilst maintaining the established crescent building line

KEY

- Proposed building position
- Tree root protection area
- Tree crown spread
- Recommended maximum RPA encroachment zone for sheet-piled retaining wall (2m)
- Proposed retaining wall position
- Proposed fence position
- Site boundary
- High value woodland area

