DRAFT

SAID
BUSINESS SCHOOL

GLOBAL LEADERSHIP CENTRE | AIR SOURCE HEAT PUMP DESIGN AND ACCESS STATEMENT

3rd DRAFT ISSUE REV 00 - 15 SEPTEMBER 2022

JOHN McASLAN + PARTNERS

The Design and Access Statement is the result of a coordinated team input comprising the following:

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Quantity Surveyor	Arcadis
Planning Consultant	Savills
Acoustic Consultant	RBA
LVIA and View Cone Study	Hankinson Duckett
Contractor	GRAHAM

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Left: View of the existing Osney Power Station - in its riverside context.

01

INTRODUCTION

01

.1 INTRODUCTION.

The following Design and Access Statement has been prepared in support of a change to a previously approved design for the new Global Leadership Centre for Saïd Business School, University of Oxford. Refer to planning permission reference: **18/02982/FUL,** which was granted conditional approval on 16 January 2020, for the base design which is varied in this application and for additional context information.

The brief for the new Global Leadership Centre was for an architectural intervention to the existing Osney Power Station on the bank of the Thames in the West end of Oxford that produces executive education in an internationally communicative, functionally flexible, and place-sensitive environment. In short, a memorable world-class building that serves the development of world class leadership.

Re-use of the redundant but charismatic Osney Power Station offers an excellent opportunity for conservation-led regeneration. It secures the future of a locally important historic building and enhances the contribution which the School already brings to Oxford.

In keeping with the tenets of excellence and leadership, the decision was taken to change the service strategy for the new building from a more traditional HVAC system, using a gas boiler and chillers, to an Air Source Heat Pump system, with back up electric boiler. This is a much more environmentally responsible and sustainable solution to the building's energy needs.

The proposal for the ASHP were discussed with the planning team during a Pre-Application meeting held on 6 April 2022. The proposal was also presented to local residents on 11 April 2022, 16 May 2022 and sent to them in the June and August newsletters.

This document outlines the proposed change to the previously approved scheme and makes a case for the merits of the change to an Air Source Heat Pump.

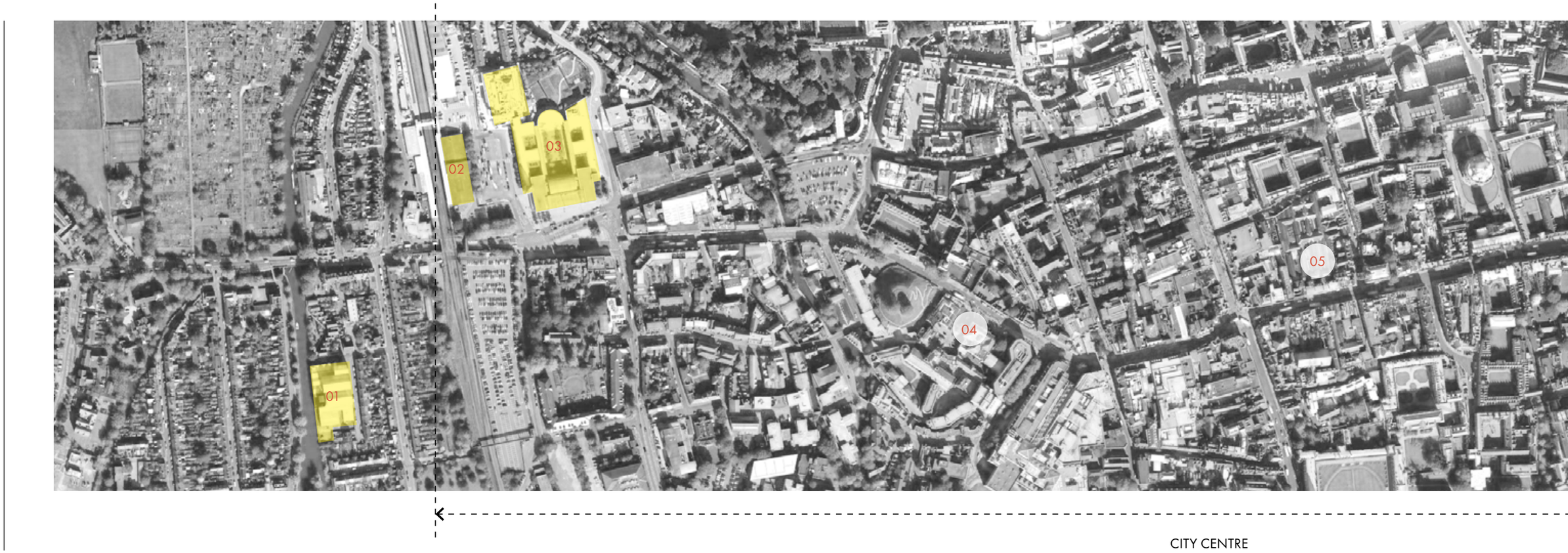
Left: Aerial view of the Osney Power Station, prior to the ongoing construction works - surrounded by its riverside and residential context.

02

THE SITE AND CONTEXT

02

.1 CONTEXT.



MAP REFERENCE

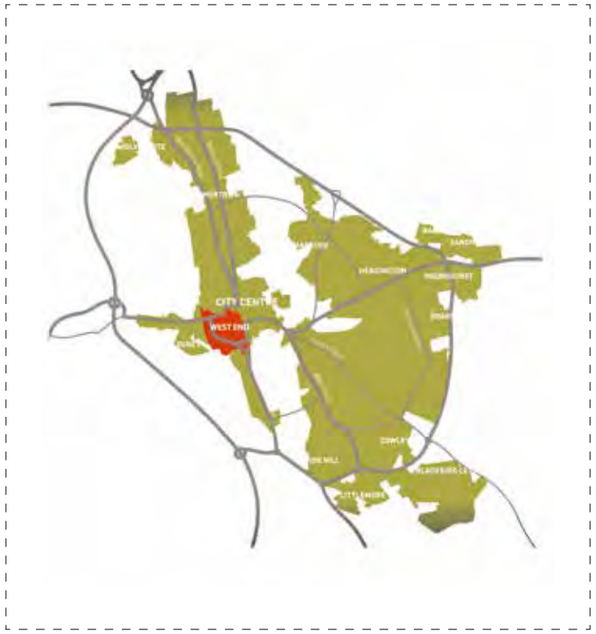
01 Osney Power Station
02 Oxford Station
03 Saïd Business School
04 Castle Prison
05 Carfax Tower
06 Botanic Gardens

The site location map below - and diagram to the right - illustrate Saïd Business School's and Osney Power Station's relationship with Oxford Station and the rest of Oxford as a whole.

Osney Power Station stands within the western part of Oxford close to the railway station. This is a part of Oxford which does not currently make a full contribution to the economic, cultural and community life of the City. Keen to promote its renaissance, the City Council has adopted the West End Area Action Plan which seeks to encourage investment in mixed-use development.

Saïd Business School is one of the successes of the West End. It is a highly regarded educational institution currently housed within a distinguished contemporary building, currently expanding through the conversion of the Osney Power Station. The Power Station is close to the main School building - some 400 metres to the south west, just beyond the western boundary of the Action Area Plan, but within the part of the City where the Council is promoting regeneration and development.

The Power Station is in an excellent location for the Executive Education cohort being located so closely to both the main school and the train station with fast access to London and the South West as well as only a short walk from the city centre.



CONT'D OVERLEAF

02

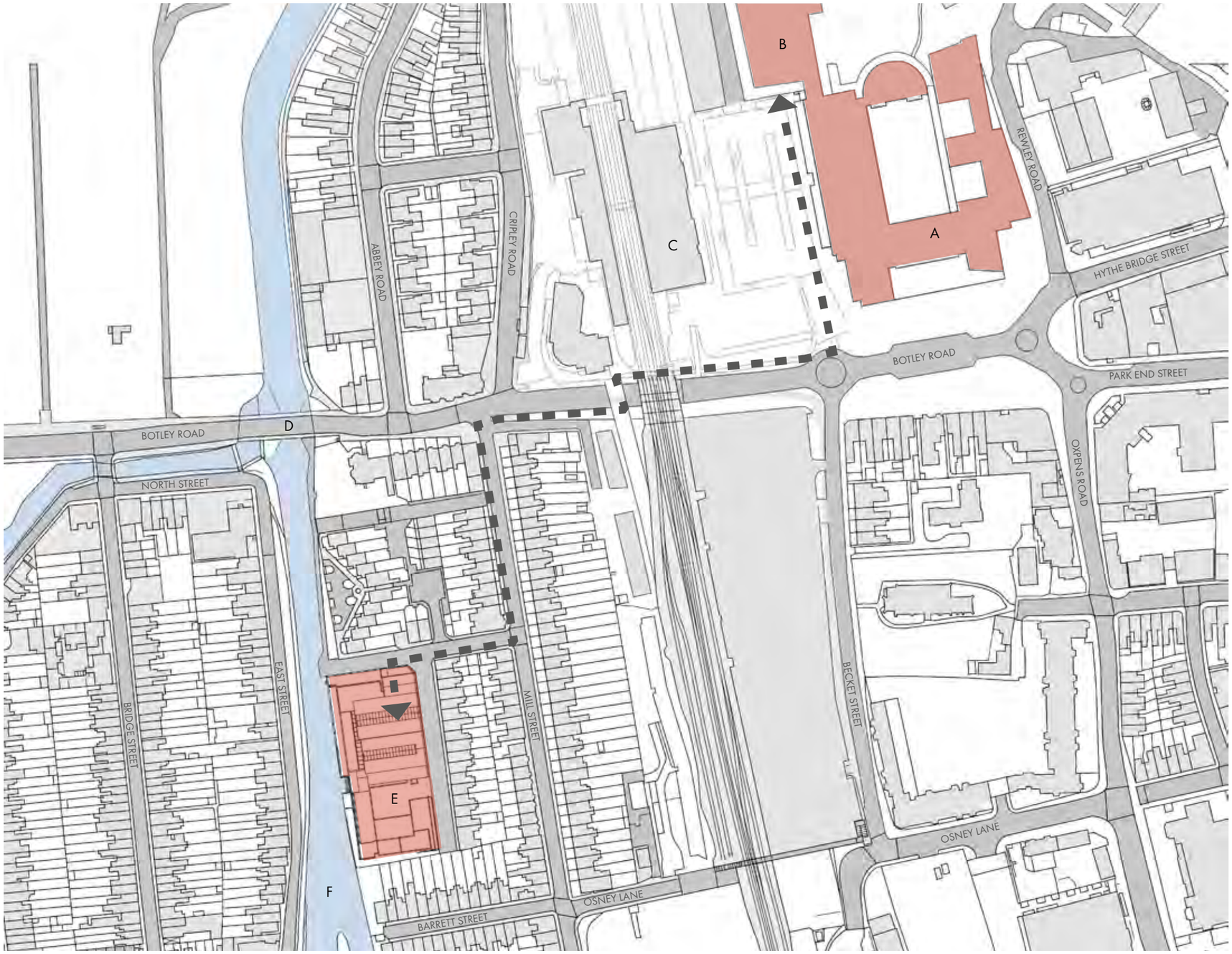
.2 SITE LOCATION.

The existing Osney Power Station site, including the access road at the northern end, is approximately 8,000 sqm. It is located adjacent to the River Thames (Isis) and is surrounded by 2-3 storey terraced houses on three sides and across the river to the west. These houses are small in scale and the power station towers above. Its scale and mass is significantly bigger than any of the surrounding buildings, so it is visible from a long distance.

The existing façades of the power station to the north and west are made of an ornate brick with a plainer brick façade to the east. The large turbine halls are set-back and clad in profiled metal sheet which gives the building its distinctive character. On the south west corner of the site there are two cottages, uncharacteristically for the locality, set back from the road.

The end of Russell Street is currently being used for vehicular access and parking. The highest point of the turbine halls is approximately 22m above ground level.

The site location plan on the right highlights pertinent issues that were addressed in the previously approved design, such as proximity to river; access restrictions; location of the site within a residential area and the scale of the existing Osney Power Station. The implications of introducing an Air Source Heat Pump to the scheme are discussed in further detail in the sections that follow.



LOCATION PLAN

KEY

Walk Distance/Time
0.3 mile_ 6 min

A SAÏD Business School
B Thatcher Wing
C Oxford Rail Station
D Osney Bridge
E Osney Power Station site
F River Thames

1:2000 @ A3

0 20 100m

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02

.3 THE CASE FOR AN AIR SOURCE HEAT PUMP.

The use of coal and gas as fuels to generate electricity is being phased out. The electrical output from other clean and renewable sources is increasing and as this occurs the electricity from the National Grid will be cleaner and the average carbon factor of the National Grid will fall. As the National Grid is becoming more decarbonised an all-electric heating and cooling source would provide the development with a clear strategy to achieve a zero-carbon building.

The National Grid predicts that as the output from clean and renewable sources of electricity increases, the electrical carbon factor of the National Grid will gradually reduce, from its current 0.519 kgCO2/kWh, to 0.002kg.CO2/kWh by 2050 i.e. to 1% of current National Grid carbon factor and 0.05% of current Building Regulation carbon factors.

Over the last two years the development of 4 pipe electric ASHPs providing simultaneous heating and cooling has advanced significantly and this technology is now considered a viable alternative to a traditional system based on air cooled chillers and gas fired boilers. Removal of gas fired boilers from the scheme and replacing it with an all-electric solution enables the opportunity to utilise a decarbonised national grid as the primary energy source.

The ASHP solution can produce hot and cold water in the two hydronic circuits of the system, achieving thermal comfort in every room of the building, independently and in any period of the year.

The development will benefit from having no gas fired appliances and equipment on site. Kitchen cooking facilities and building services are all electric which provides the site on a roadmap to a zero-carbon building.

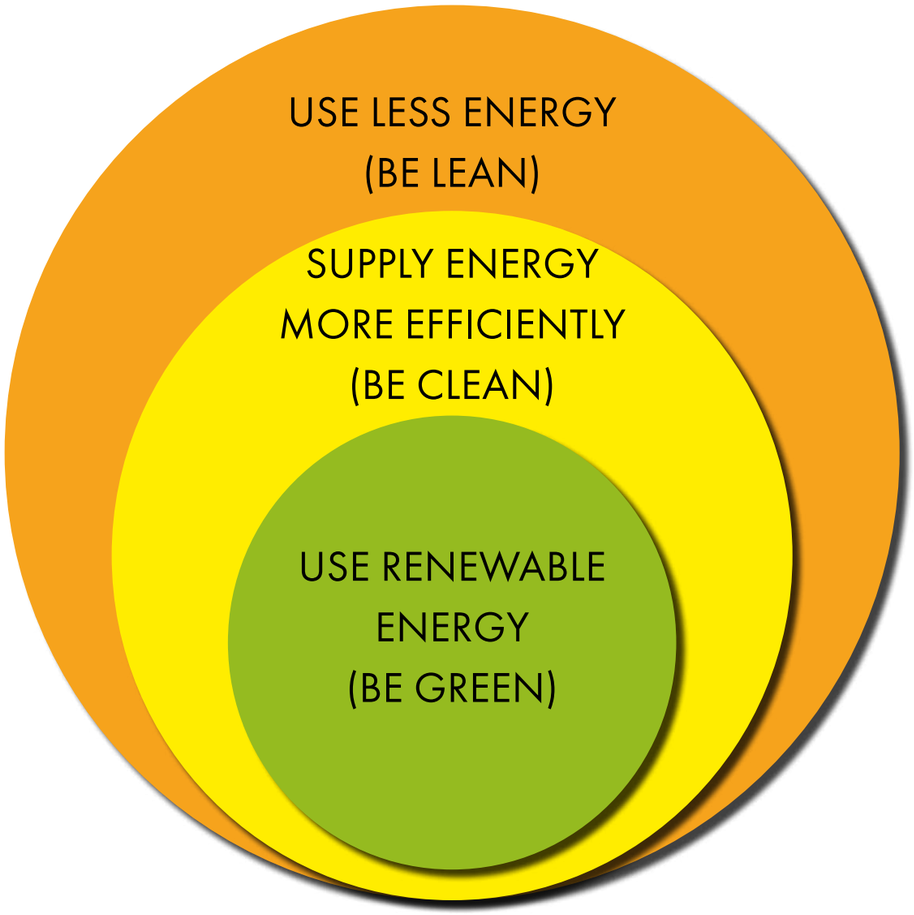
As boilers have been removed from the scheme there will be no local carbon dioxide emissions on site from the boiler flue.

Further renewable technology to be installed on site include 229 roof mounted high efficiency solar PV panels. All the electricity generated by the solar PV panels will be used within the site where possible with any excess being exported back to the National Grid.

Specification of Air Source Heat Pump technology has enabled the site to greatly improve its carbon emission reductions requirement set out within the Energy Strategy from 23% to 79%.

This is a real success story for the Business School and in line with their current goal to put sustainability front and centre.

Right: Energy strategy diagram.


USE LESS ENERGY
(BE LEAN)
SUPPLY ENERGY
MORE EFFICIENTLY
(BE CLEAN)
USE RENEWABLE
ENERGY
(BE GREEN)

02

.4 CONSTRAINTS AND OPPORTUNITIES.

CONSTRAINTS

The site presents a number of constraints that helped inform the decision to propose an Air Source Heat Pump as the most appropriate building service approach. These constraints concern conservation, environmental factors, and the unique nature of the existing power station. A number of different service strategies were considered and the ASHP was selected on the basis of being the most practical solution given the constraints.

The options which were considered are summarised in the diagrams on the facing page.

OPPORTUNITIES

Opportunities presented by the proposal to change the service approach to an ASHP are as follows:

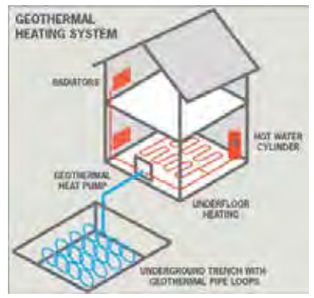
- It promotes the new development as a low energy exemplar.
- A world class executive training centre should have a contemporary service approach.
- The unique learning environment should provide an example for ethical decisions in relation to the environment.
- It expresses an understanding and acknowledgement of the responsibilities of large institutions to combat climate change.
- It provides an exemplar for occupant well being.
- It will contribute to the Oxford City Target of Carbon Neutral City by 2040.
- It removes any local emissions from site.
- It will future proof the scheme from any future legislation changes with local impact of retrofitting.

Wind Turbine
Turbulent and non continuous wind due to surrounding buildings.
Visual impact
Noise and vibrations

Conclusion: Not applicable

Solar Water Heating
Project has a greater electrical demand in comparison to DHW so PV would provide a greater benefit to the development

Conclusion: Not applicable



Ground Source Heat Pump
Not sufficient balance between summer cooling load and winter heating load to maintain a stable ground temperature in the midterm.
Due to the size of the development, reduced efficiency due to potential for rejected thermal energy to be fed back into the ground.

Conclusion: Not applicable

Photovoltaics
Photovoltaics can be installed on the available roof areas of the development. Straightforward technology / does not require any integration.

Conclusion: Applicable

Bio Diesel
Biodiesel can potentially offer CO2 savings.
Considerable issues including frequent deliveries, requirement for biodiesel storage tank and air quality to be assessed / filtration considered.

Conclusion: Not applicable

Air Source Heat Pump
This technology is considered to be suitable for application to the Plant/Server and Server spaces

Conclusion: Applicable

Biomass
Biomass can potentially offer CO2 savings.
Considerable issues including frequent deliveries, requirement for biodiesel storage tank and air quality to be assessed / filtration considered.

Conclusion: Not applicable

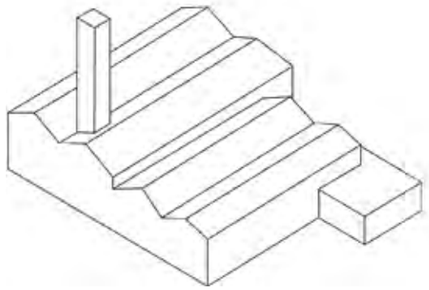
Water Source Heat Pump
Water source heat pump was investigated for the adjacent river.
Environment Agency confirmed maximum temperature difference of only 1.5°C between intake and discharge was acceptable
Salmon migratory route. Water may create a thermal barrier to migrating fish.

Conclusion: Not applicable

Left: Aerial model view showing new lantern structure (highlighted in blue) in the context of the previously approved design.

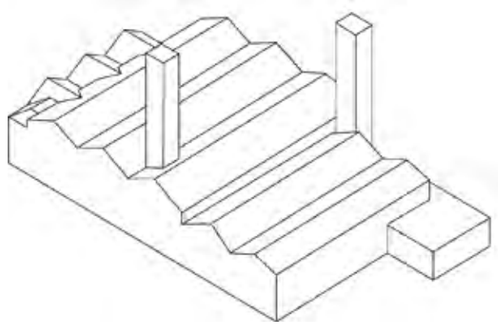
03

DESIGN DEVELOPMENT



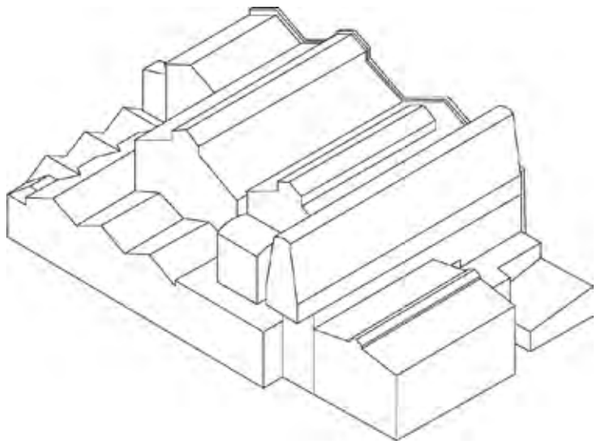
1892

Original Power Station



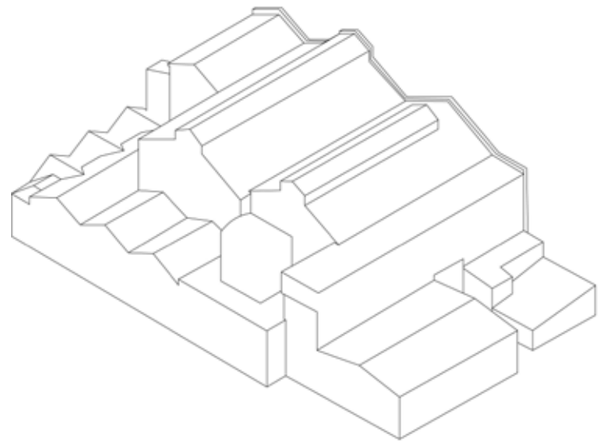
1904

Extended Power Station



1945

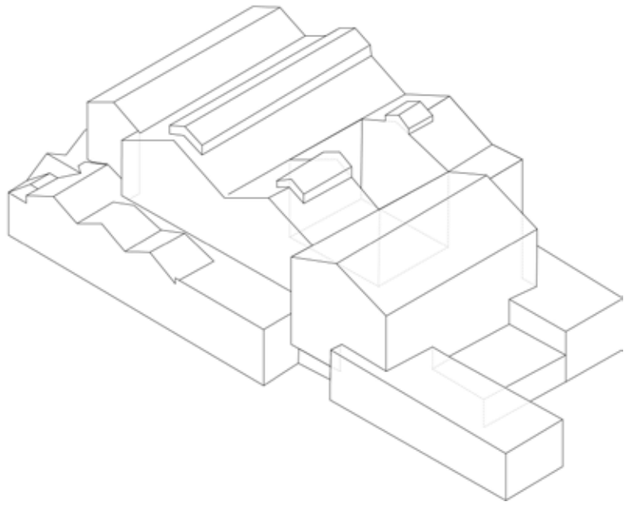
Extended Power Station



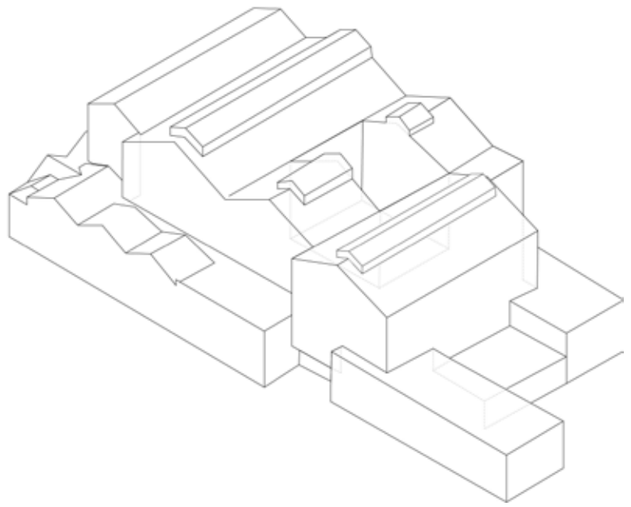
2018

Redundant Power Station

03



(2020 approved)



2024

Global Leadership Centre for Said Business School

Global Leadership Centre with air source heat pump

.1 DESIGN EVOLUTION.

The existing building has a history of change over time. It has also always been a product of necessity to meet its functional requirements: bigger machinery lead to a bigger spaces and volumes. Demolition of parts made way for new sheds. The resulting form would never have been designed as it now stands, but its charm lies in its very visible history of change.

The massing for the approved building takes its clues from the existing building forms and adds a new hall to complement the two existing sheds and the residential scale of the brick façade on the riverside is extended to the south to form a definitive two storey masonry base from which the larger metal clad volumes rise above.

A new lantern structure is proposed for the southern shed to house the Air Source Heat Pump. This allows space for the acoustic attenuator as well. The addition of a lantern to the third shed will match the lanterns on the two existing sheds which are being refurbished as part of the currently approved scheme.

The proposal for the change to an Air Source Heat Pump service strategy is a continuation and reinforcement of the concepts which underpinned the currently approved design and the new lantern is a positive design change for the building.

03

.2 DESCRIPTION OF THE ASHP SYSTEM.

DESCRIPTION OF HEATING AND COOLING SYSTEM

The High efficiency Air Source Heat Pump (ASHP) unit is to be located at fifth floor plantroom level providing simultaneous heating and cooling. The ASHP is sized to provide the development's entire cooling demand and share of the site's heating requirements. The ASHP would be the lead heating source and run to meet the building's base heating demand throughout the year and charge the heating buffer vessels located in the ground floor plantroom.

ASHP (4 pipe)		
Cooling	696kW	
Heating	529kW	
Heating Efficiency (COP)	2.56	
Dimensions	8525Long x 2285Wide x 2465High	
Weight	11,110kg	

The ASHP unit will be provided with attenuators on the air intake and discharge to achieve the external noise levels.

It is also proposed to install two floor standing electric boilers with a rated output of 150kW each at Ground Floor plantroom level.

The heating strategy for the scheme would comprise as follows:

- ASHP only is used to charge the buffer vessel and serve heating load.
- Once buffer vessel is depleted boiler will provide for heating load only and will not be used to charge the buffer vessel.
- Electric boilers will not turn on until all energy in the buffer vessel is depleted.

The heating strategy has been modelled using thermal modelling software and it is estimated that the electric boilers would provide 5% of the annual heat output while the ASHP provides 95% of the site heating requirements.

MAINTENANCE

- The ASHP life expectancy is approximately 20 – 25 years and the roof design will allow for a section to be removed for major plant replacement at end of its design life.
- Routine maintenance of ASHP unit is similar to Air Cooled chillers and is anticipated that periodic maintenance of the ASHP unit would occur a minimum of every six months.

Consideration has been given to minimise the impact of ASHP down time through the following measures:

- Suitable area is located on Russell Street for temporary air-cooled chiller.
- Stabbings to be provided in primary chilled water pipework to enable quick connection of temporary chilled water pipework.
- Removable louvre at ground floor plantroom to run temporary chilled water pipework through into plantroom.
- Provision of power supply in bin store to connect temporary air-cooled chiller in case of failure.
- Recommended spares part list kept on site to mitigate ASHP down time.

03

.3 LOCATION OF THE ASHP.

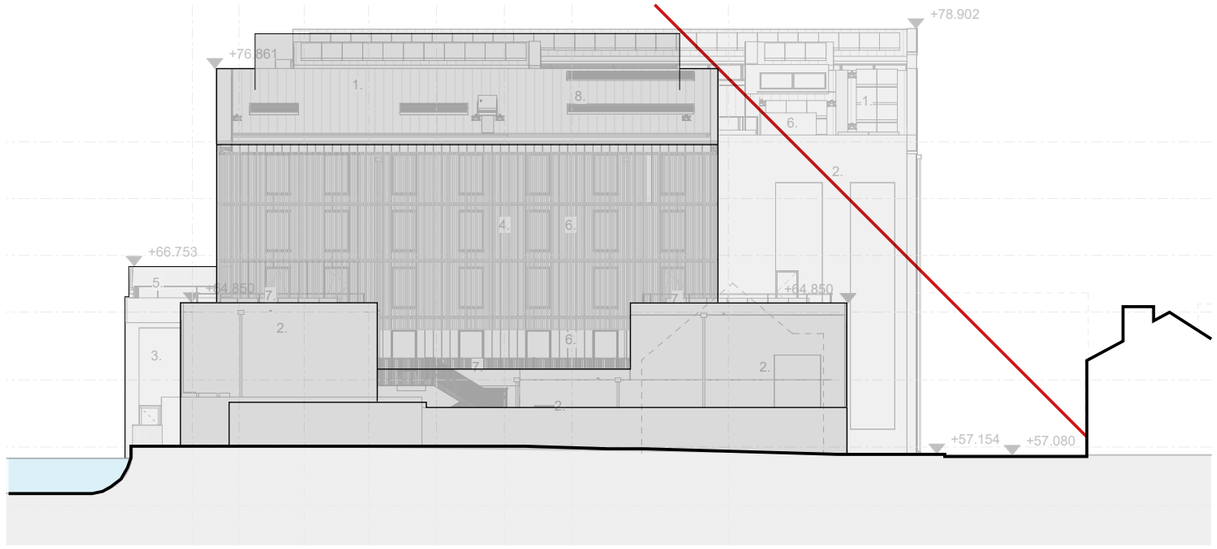
The cross section on the opposite page illustrates the location of the 5th floor plant room in relation to the rest of the currently approved design scheme. The space was already designed as a plant room and access to the plant room will be maintained as the current design. The new ASHP has greater space requirements than the previous plant and will feature integrated sound attenuation which will require an amendment to the building envelope.

The two existing sheds both feature a pitched lantern structure, therefore the most logical extension of the third shed is to provide another lantern structure to accommodate the ASHP.

To ventilate the ASHP enclosure, the new lantern will feature linear ventilation louvres similar to the currently approved roof design.

The diagram to the right shows the 45 degree line, which set the agreed position of the building previously, is extended to set the position of the new lantern.

It has been assessed that this revision does not alter the previous Daylight/Sunlight assessment for the development.



Revised south elevation diagram showing compliance with the 45 degree policy (indicative study based on number 14 Arthur Street)

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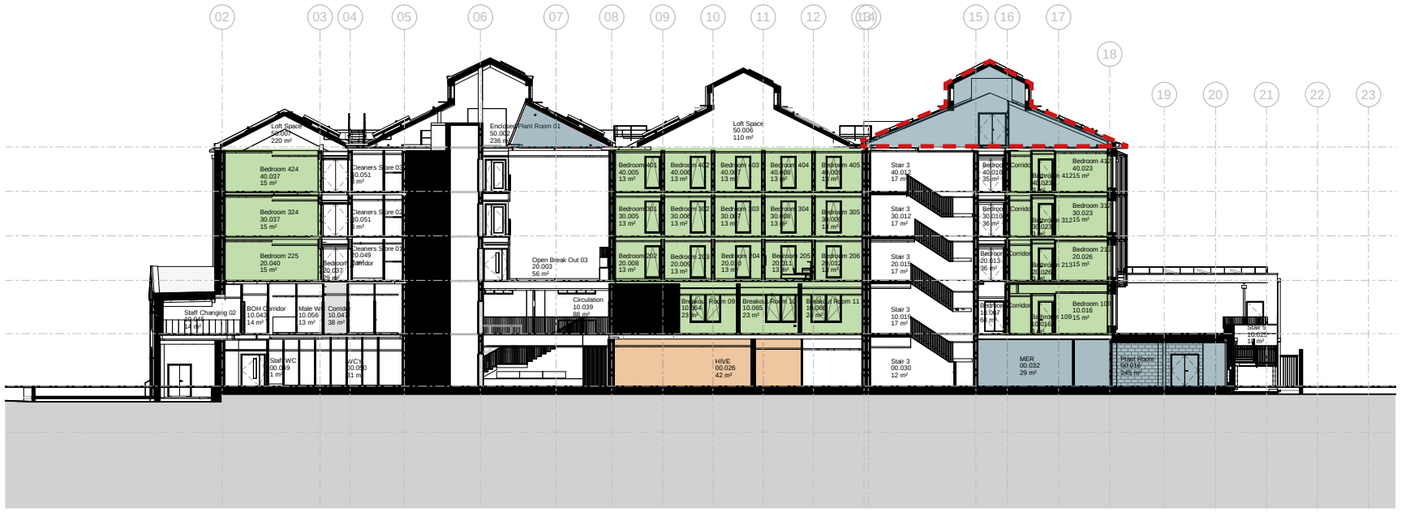


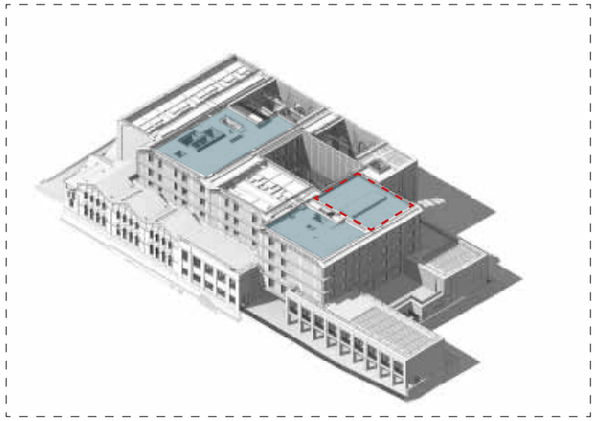
REFERENCE

- Bedroom
- Teaching
- Plant
- Leisure Facilities
- Dining/Bar

Long section through building showing the new lantern for the air source heat pump.

1:400 @ A3

0 5 20m



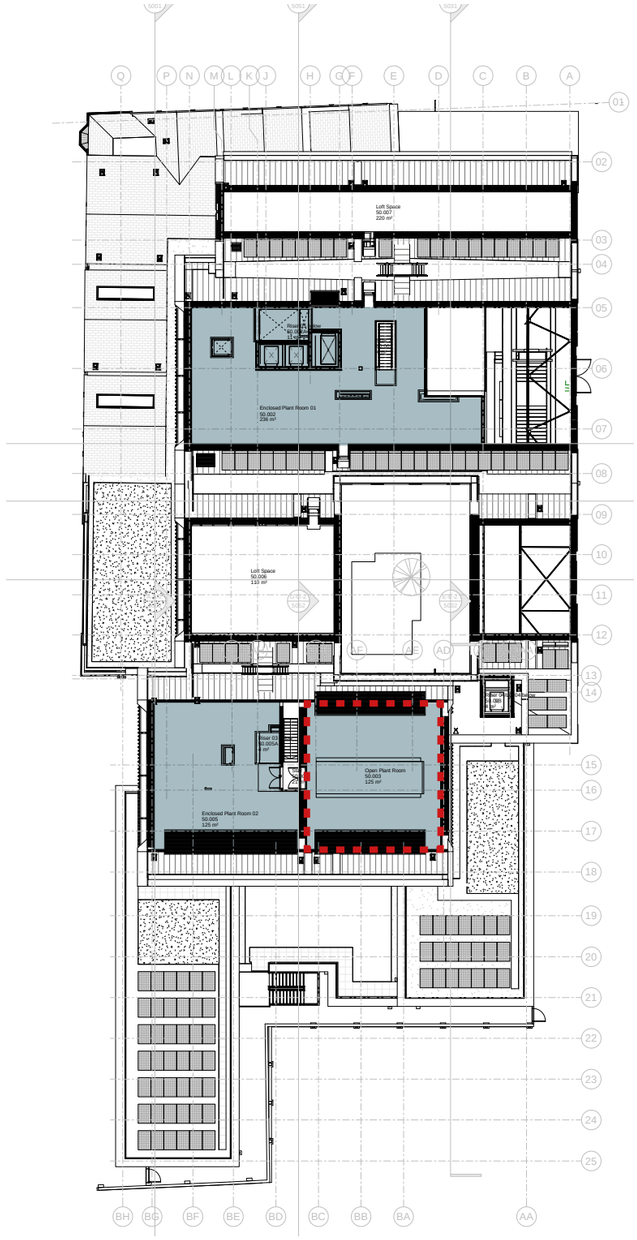
The fifth floor is primarily dedicated to plant space, previously designed to house air handling units and chillers. The new Air Source Heat Pump (ASHP) will be located in the open plant room of the new Southern Shed and will replace the chillers.

Fifth floor plant spaces are accessed via internal stairwells. From the fifth floor plant rooms there are access hatches which facilitate access to the roof valleys for maintenance and inspection.

The ASHP will be contained within the pitch of the roof with a new roof lantern to house the additional height of plant required. The fifth floor slab is insulated and waterproofed in the ASHP enclosure.

The ASHP machinery is fitted with an acoustic attenuator to reduce sound emitted, as described in section 3.7 of this report.

05.
FIFTH FLOOR PLAN



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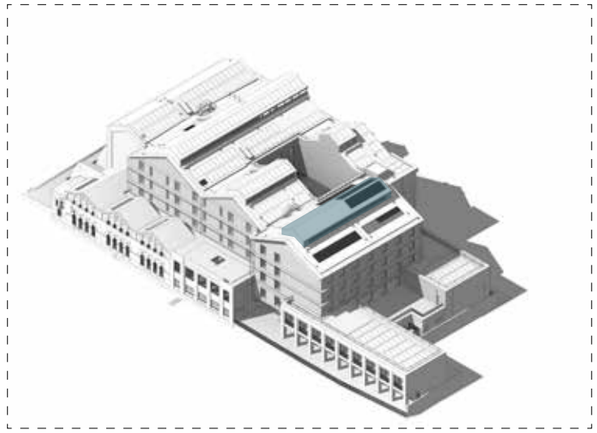


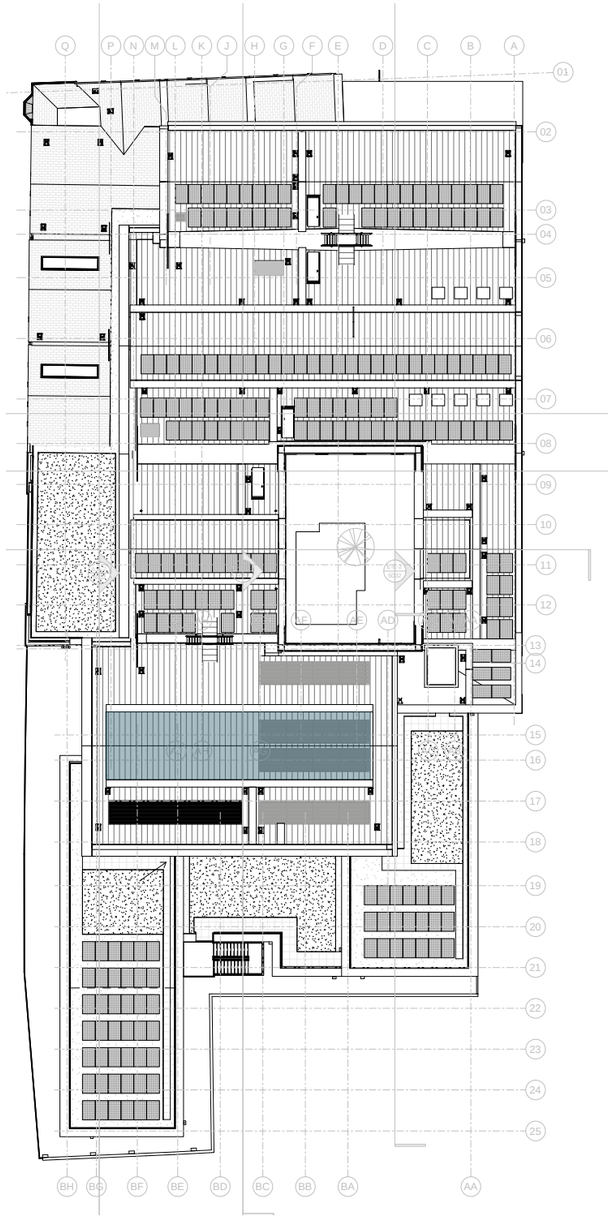
The roof plan indicates the location of the new lantern structure housing the ASHP in relation to the currently approved scheme.

The strategy of the currently approved scheme featuring photovoltaic panels on the southern facing sections of the pitched roofs and linear louvres remains. The design for the new ASHP has linear louvre panels set within the roof to provide adequate ventilation to the plant and to provide visual screening.

The additional lantern structure is designed to integrate seamlessly into the currently approved design, both in terms of materiality and proportion.

The new lantern has a detachable portion of the roof which can be craned off to allow replacement of the ASHP machinery every twenty five years (approx.). This is described in greater detail in the access statement.

06.
ROOF PLAN



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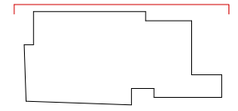
01.
PROPOSED EAST ELEVATION

East elevation (artistic impression)



01

02.
PROPOSED WEST ELEVATION

West elevation (artistic impression)

02

03

.4 FAÇADE TREATMENT.

MATERIALITY

The new lantern atop the Southern shed will be clad in standing seam aluminium to match the material of the rest of the roof. The lantern will be fitted with continuous louvre blades in aluminium, to match the colour of the roof sheeting and the rest of the louvres on the roof above the ASHP.

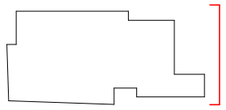
The new lantern is designed to integrate into the current design in terms of the facade treatment.

The rest of the design remains unchanged.

03.
PROPOSED SOUTH ELEVATION

South elevation (artistic impression)

03



03

.5 APPEARANCE.

The proposed air source heat pump has resulted in the need for an additional lantern on the southern ‘shed’. This has provided a more balanced roofscape.

The design intent of the currently approved proposal is a direct response to the volumetric forms of the Power Station as well as its innate industrial aesthetic and character.

The additional lantern will further reinforce the industrial character of the building, as an architectural form intrinsically similar to the character of the existing Power Station.

Overall, the additional lantern will further emphasise the appearance of an industrial composition, with the new additions providing a complimentary feeling of dignified utility.

Visualisation of the previously approved scheme from the river bank looking south east.

Left: Visualisation of the proposed scheme from the river bank looking south east. The new lantern is visible on the far shed

Right: Visualisation of the proposed scheme (including the new lantern) from the south end of Arthur Street looking north west.
Inset: Visualisation of the previously approved scheme

Right: Visualisation of the proposed scheme (including the new lantern) from the river bank looking north east.
Inset: Visualisation of the previously approved scheme

03

.6 VIEWS / LVIA.

Hankinson Duckett Associates (HDA) have carried out a Landscape and Visual Appraisal and View Cone Study to inform the local planning authority (Oxford City Council) of any potential landscape and visual impacts arising from the scheme. The report describes the landscape and visual baseline for the site and its surrounds, and a landscape and visual appraisal of the existing site is undertaken. This is followed by an assessment of the landscape and visual impacts that are likely to occur during the construction and operation of the scheme.

The 'Oxford Historic Urban Character Assessment' divides the central area of the city into 44 separate character areas lying within 13 broad character zones. The study places the site in broad character Zone A; Osney Island, and more specifically in Historic Urban Character Area 1: Mill Street and Botley Road (HUCA1). HUCA1 is dominated by Victorian and 20th century development around the railway and the site of medieval Osney Abbey to the south of the site. The former Power Station is a long-standing feature of this part of West Oxford and its mass, despite dominating the surrounding domestic scale architecture, has become an accepted building in the local street scene.

The site's visual envelope is constrained by terraced rows of housing together with riverside trees. Views of the site are generally restricted to parallel streets and open space near to the Site. In views from Oxford Castle Mound, St George's Tower and Carfax Tower, the power station forms a small part of the wider panorama in which pylons clutter the skyscrape. To the west, the extent to which the site can be seen from view cones is limited to the South Hinksey junction and Raleigh Park/Raleigh Road on Harcourt Hill. In both these views the former power station forms a relatively small part of the panorama, in which pylons, power lines and later 20th Century development detract from the view.

The regeneration of the former Power Station will see the existing grey metal facades replaced with a glass and perforated zinc veil, which will break-up and enliven the existing frontages. More recent extensions will be replaced with new additions including a fourth gable end. These additions will increase the overall massing, but are designed to be subservient to the existing building. In views from promontories within the City Centre and View Cones to the west, the scheme would form a small part of the wider panorama and changes will be difficult to perceive, having no impact upon Oxford's historic skyline. From local visual receptors, the greatest change will be in views from the Thames path, south of the site, where the new lantern will be visible on top of the southern shed. In this view, the proposed cladding and lower storey brick additions will break-up the overall massing, and together with the river terrace, positively address the river frontage.

As illustrated by the drawings included in this document, the addition of a third 'lantern' to the new southern shed is designed to mirror the appearance of the lanterns on the two existing sheds. The additional lantern should enhance the post-industrial architectural language of the building and improve the balance of the massing.

.7 NOISE ASSESSMENT

A detailed acoustic assessment has been carried out of the proposed Air Source Heat Pumps in order to determine the potential noise impact on nearby noise sensitive premises. Taking into consideration the maximum attenuation that can practicably be incorporated within the space constraints, noise levels are predicted to be 3 dB below the existing background noise levels during the day, and not exceed the existing background noise levels during the night. When assessed in line with the assessment detailed in BS4142, this is considered to be a 'low impact'. BS4142 also requires the context of the installation to be assessed, and on this basis the following items are relevant:

- The units are attenuated as far as is possible within the space constraints
- The units are more efficient than previous proposals from an environmental perspective
- The levels are predicted with the units operating at full capacity, and in practice noise levels would be lower for much of the time when units operate at reduced capacity

As such, it is considered that the proposed units (with the proposed attenuation) are acceptable acoustically.