Strategic Outline Case

Pimlico District Heat Undertaking (PDHU) – Decarbonisation Project

Version Control and Authorisation Sheet

Version Control

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Reviewers

This document requires the following reviews.

Name	Title	Approved / Not Approved	Date	Version
Debbie Jackson	Exec Director – Growth, Planning and Housing	Approved	13th January 2023	1
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Approvals

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0. EXECUTIVE SUMMARY

Decisions Required

1. To approve the Strategic Outline Case for the decarbonisation and refurbishment of the Pimlico District Heat Undertaking (PDHU) on the basis that there is a strategic need for change.
2. Approve the following decarbonisation options to proceed to Outline Business Case (OBC):
    a. Option 1A – refurbish the existing PDHU network and install a 7.5MW River Source Heat Pump at the Churchill Gardens energy centre, with gas boilers for peak demand
    b. Option 1B - refurbish the existing PDHU network and install a 7.5MW River Source Heat Pump at the Churchill Gardens energy centre, with an electric boiler for peak demand
    c. Option 3A – Zone Lillington and Longmoore estate and install a separate electric boiler. Refurbish the remaining PDHU network and install a 5MW River Source Heat Pump at the Churchill Gardens energy centre, with an electric boiler for peak demand
    d. Options 3B – Zone Lillington and Longmoore estate and install an electric boiler supported by a waste heat pump from TFL ventilation shaft. Refurbish the remaining PDHU network and install a 5MW River Source Heat Pump at the Churchill Gardens energy centre, with an electric boiler for peak demand
3. Approve a budget of £1.2m for development of the Outline Business Case, to include technical, commercial, legal and procurement support. Grant funding to be applied for up to £500k of this expenditure

1. Strategic Case

1.1 Strategic Context

This Strategic Outline Case outlines the rationale for significant investment in the Pimlico District Heat Undertaking (PDHU). PDHU is a critically important asset for Westminster City Council. The heat network delivers heating and hot water to 3,300 homes, 50 commercial units and schools and has a significant economic, environment and political impact.

There are a number of strategic reasons for investing in PDHU:

- **Network condition** – the existing PDHU network is over 50 years old. Due to its age, maintenance costs are increasing and WCC spend £1.97m per annum maintaining and repairing the network, with a further £1.7m on in flat repairs related to PDHU. The number of leaks from the network is increasing every year, a growing problem as the pipework deteriorates. The potential for network failure will increase without investment.

- **Carbon emissions and net zero** – PDHU is currently powered by three 8MW natural gas boilers which emit 16k Tonnes of CO2 per annum, this equates to 39% of the Council's total carbon emissions in 2021/22. Investment in the network will significantly reduce emissions, a critical part of achieving the Council's net zero 2030 target.

- **Fuel costs and fuel poverty** – The recent energy price crisis has highlighted the importance of energy efficiency and energy security. Operating an efficient heat network will minimise the impact of energy price fluctuations and help to alleviate fuel poverty for vulnerable tenants

- **Improved network management** – The existing network currently has limited control, with a high level of losses due to its condition. This project will improve control through the installation of modern metering systems, resulting in users only being billed for the energy they use. Replacement of pipework will also lead to lower distribution losses, which are currently estimated at 30%.

1.1.1 Local Strategy

Westminster City Council

The new 'Fairer Westminster' strategy highlights the Council's ambition to take action on climate change with the aim of becoming a net zero Council by 2030. PDHU accounts for over a third of the Councils direct emissions making it a key focus area for emission reduction.

Greater London Authority

The Mayor of London (GLA) ambition is for London to be a zero-carbon city by 2050. Generating energy locally is more efficient and helps to cut London's carbon emissions. To drive this aim the GLA launched the Decentralised Energy Enabling Programme (DEEP) which provides public sector intervention and support to larger-scale decentralised energy (DE) projects in London

South Westminster Area Network (SWAN)

The SWAN project is an ambitious proposal which includes creating a large district heat network, linking up the existing heat networks at Whitehall and Pimlico and creating a low carbon network across Westminster. When complete, this would run from Aldwych, through Whitehall into PDHU.

As a key stakeholder in the project, WCC has been in discussions with BEIS regarding development of the project.

The main attributes are:

- Public-Public partnership providing a key contribution to National targets to achieve net zero commitments
- An area wide energy network supplying solely low carbon energy to 500+ customer buildings
- Harness energy from local waste and ambient sources that are inaccessible at a smaller scale
- Capable of producing zero carbon heat, with an estimated saving of 75,000 tonnes of CO2 per year
- Allow building owners and operators to meet their carbon reduction goals at a low cost
- Not a replacement for the investment required in PDHU but significantly funding part of that requirement
- Unlocks wider carbon targets across wider areas of the City, through future network expansion

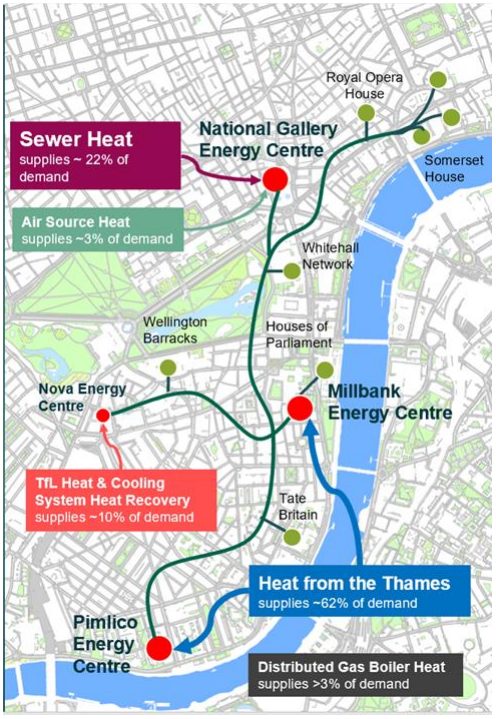


Figure 1 - Proposed Strategic SWAN Network Map

1.1.2 National Policy

Heat networks are a key feature in the UK Government's drive to net zero. The Government aims for heat networks to expand to serve 20% of UK households by 2050, up from around 2% in 2020, as part of its plans to bring heat and buildings to net-zero emissions. The Heat and Buildings Strategy aims to 'accelerate growth of the low-carbon heat network market' through a £338m Heat Network Transformation Programme which include initiatives such as the Green Heat Network Fund (GHNF) and the Heat Network Investment Project (HNIP).

Due to the increasing number of consumers connected to heat networks, OFGEM have recently been appointed by the UK Government 'to provide support and protection to consumers from volatile market changes through regulation'. The appointment of OFGEM is important for PDHU as it is expected that there will be a growing amount of regulation in the coming years.

In 2020, the Energy White Paper committed to implementing heat network zoning by 2025. This commitment was reiterated in October 2021 in both the Heat and Building Strategy and the Net Zero Strategy. Within a heat network zone, specific buildings will be required to connect to a heat network within a certain timeframe, unless exempt. A building may be exempt if low-carbon heating systems have already been installed or the costs of connection to the heat network are prohibitive.

1.1.3 Project Objectives

Investment in PDHU has the following objectives:

- Reduction of carbon emissions – PDHU currently accounts for 39% of WCC's scope 1 and 2 emissions therefore is a priority for improvement
- Reduce maintenance costs – The existing PDHU network is reaching the end of its useful life and maintenance costs are increasing, upgrading the network will lower annual opex costs for WCC
- Improve customer experience – Due to its condition, there is an increasing number of leaks across the network which impact on residents. Upgrading the network will improve its condition and significantly reduce the number of leaks
- Improve energy control and management – the project will seek to install a modern energy system with improved control. This will reduce energy waste and minimise ongoing energy costs
- Modernise PDHU for the 21st century – the project will include the installation of regulatory compliant metering which will allow comprehensive monitoring of the system in real time

1.1.4 Project Scope

The scope of the project is wide reaching and ambitious. It is expected to cover the following headline areas:

- **Removal of fossil fuel boilers** – to be replaced by electric heat pumps, electric boilers or direct electric heating, depending on the preferred option. This is considered critical in reducing carbon emissions from the network and a key component of the WCC net zero strategy

- **Repurposing of existing Churchill Gardens energy centre and thermal storage overhaul** - only applies to options where the PDHU network is retained

- **Upgrade to the network pipework** – Replacement or decommissioning of the PDHU pipework which currently transfers hot water from the energy centre to the properties. In many areas the existing pipework has reached the end of its useful life and the incidence rate for leaks is increasing

- **Installation of river source heat pump** – Construction of a new river offtake structure on the River Thames to house a pump – options 1 & 3 only

- **Electrical upgrades** – Upgrades to the electrical infrastructure to accommodate the increased electricity demand from heat pumps, electric boilers or direct electric heating

- **Metering** – Installation of energy metering across the network to comply with the Metering and Billing regulations. This will allow improved energy management and PDHU users will only pay for energy they use

1.2 Spending Objectives

Spending Objective	Strategic Objective	Output	Measurement	Deadline / Timing
Reduce carbon emissions from PDHU	Fairer Environment, Fairer Housing	Reduced carbon emissions	PDHU CO2 Emissions per annum	2030
Reduce leak incidence from PDHU	Fairer Housing	Reduced rate of leak incidence within housing	No of leaks per annum	2026
Improvement energy management across PDHU	Fairer Environment, Fairer Housing	Reduced energy losses and residents only pay for the energy they use	No of meters installed % energy losses across the network	2030
Improved resident experience of PDHU	Fairer Housing	Improved survey results for resident satisfaction	% of residents with a good experience of PDHU	2030

1.3 Existing Arrangements

The PDHU is the UK's oldest heat network and was designed to connect and utilise the excess heat created from Battersea Power Station as part of the Abercrombie Plan for Churchill Gardens estate design by architects Powell and Moya in 1946. The building is Grade II Listed and situated within Churchill Gardens Estate conservation area.

Figure 2 - Aerial view of PDHU Pump House and accumulator tower

PDHU currently supplies 3,306 residential properties and more than 50 commercial properties ranging from schools, offices, a library and shops. The majority of demand is from 3 main housing estates:

Estates	No of Dwellings	Detail
Abbots Manor	411	
Churchill Gardens	1619	• Conservation area • Includes grade 2 listed buildings
Lillington and Longmoore	1156	• Constructed 1960 – 1970 • Conservation area • Includes grade 2 listed buildings

The PDHU is supplied with heat from an Energy Centre which is located at the Pump House at Churchill Gardens Estate. The Energy Centre has 3 gas fired hot water boilers each rated at 8 MWth, together with 2 No. gas fired combined heat & power (CHP) engines each of which has an output of 1.55 MWe and 1.5 MWth, these CHP engines are not currently operational. Heat from the Energy Centre is pumped via a series of circulating pumps located within the Energy Centre.

The site's electrical grid connections are via a UKPN ring main unit housed within a secure roofed enclosure within the PDHU demise. A high voltage radial connects the site services 500kW HV/LV transformer (import use) and 2 further 2000kW HV/LV transformers (export from each of the CHP units). These three transformers are located in adjacent open-air compounds at the southern end of the PDHU site.

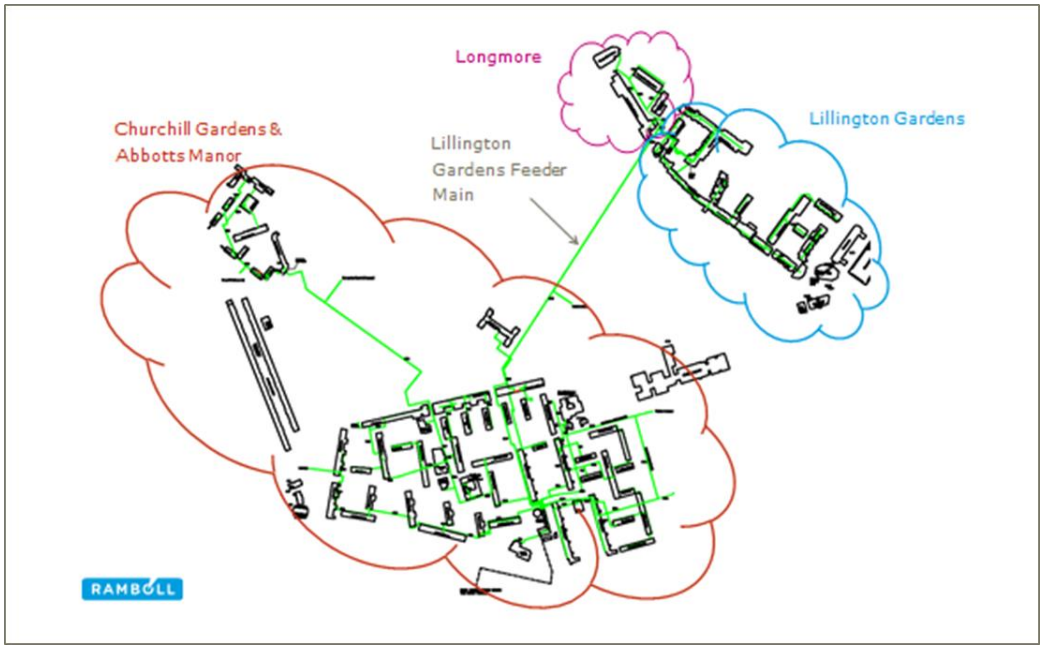


Figure 3 - PDHU Network Diagram

1.4 Benefits

Renewal of PDHU will provide a number of benefits to WCC and users of the network:

- **Carbon emission savings** – PDHU currently accounts for 39% of WCC's scope 1 and 2 emissions. Replacing the existing gas boilers with the options presented in this paper is expected to reduce carbon emission 55% - 80% by 2030, with the achieved % reduction dependent on the final solution and decarbonisation of the electricity grid
- **Reduce maintenance costs** – The existing PDHU network is reaching the end of its useful life and maintenance costs are increasing, upgrading the network will lower annual operational and maintenance costs for WCC.
- **Improve resident experience** – Due to its condition, there is an increasing number of leaks across the network impacting on residents. Upgrading the network will improve its condition and significantly reduce the number of leaks. It also significantly reduces the risk of major network failure in the future
- **Improve energy control and management** – the project will install a modern energy system with improved control. This will reduce energy waste and minimise ongoing energy costs
- **Modernise PDHU for the 21st century** – the project will include the installation of regulatory compliant metering which will allow comprehensive monitoring of the system in real time

1.5 Risks

The table below shows the top red rated risks for the project at this stage, a full risk register is provided in the appendices. Proposed mitigation measures are also provided, following a risk workshop with the project team.

Risk Items	RAG	Mitigation	Post Mitigation RAG
Delays due to requirement for consultation with tenants/leaseholders		1. Start consultation process as early as possible 2. Obtain legal advice on consultation process 3. Stakeholder engagement manager appointed - consultation started early 2023	
Planning permission for work at Churchill/Lillington is not granted e.g external risers, fabric improvements		1. Engineering study to identify pipework routing options has been completed with support from Architect 2. Early engagement with planners to gain feedback on proposed routing 3. Develop planning strategy - including making pre-apps during OBC process	
External factors i.e Potential benefits from joining SWAN cause delay on decision making for PDHU		1. Early engagement with SWAN partners 2. Prioritise discussions with BEIS to determine preferred route as early as possible	
Building safety act and building control - fire safety - secondary legislation approaching which could increase cost through required upgrades to the connected buildings		1. Appoint health and safety lead during OBC stage 2. Appoint specialist fire engineering consultants to review impact	
Community liason - delay to the decarbonisation project due to impact on residents e.g decanting		1. Appoint a stakeholder engagement lead	
Construction programme risk associated with electrical infrastructure upgrade.		1. Early application to UKPN has been made to identify estimate upgrade costs 2. Plan upgrades required during OBC stage	
Decant of residents and risk to programme		1. Development of robust decant strategy 2. Consultation and engagement strategy to be developed	
Cost of construction - uncertainty due to number of uncertainties across the different options and early stage of current design		1. A risk premium of 20% has been included in the cost estimates 2. Consultants have reviewed the areas of high risk to manage the level of cost risk where possible e.g electrical surveys 3. OBC to develop level of design further to	

		manage risk 4. Use 2 stage design and build contract to design out risk	
Energy prices change significantly impacting on techno economic model e.g electricity prices increase more than gas prices		1. Undertake sensitivity analysis during techno- economic modelling	
Difficulty and cost of replacement underground pipework - 100% replacement is likely required due to condition		1. Condition surveys of pipework where possible 2. Prioritise replacement where most urgent	
Cost of electrical infrastructure upgrade - uncertainty due to early stage of design		1. Initial applications with UKPN to understand grid capacity and constraints 2. Survey existing electrical infrastructure to identify areas of concern and requirement for upgrades	
Replacement of existing distribution pipework in buildings and in flats is not possible due to accessibility		1. Undertake significant survey work to identify existing routing and options for upgrade 2. Design risk/cost passed to contractor	
Service continuity to residents during construction e.g temporary heating		1. Identify temporary heating options as part of OBC	
Impact of lowering building heating system temperatures on thermal comfort levels impacts ability to run scheme efficiently or with sufficiently decarbonised heat levels. This risk particularly important for sheltered blocks or for elderly/vulnerable residents.		1. Increase thermal insulation programme 2. Model impact of higher flow temperatures as part of OBC Techno Economic analysis 3. Legal discussion - obligation on leaseholders to improve insulation	
Heat Pump Scheme does not achieve the modelled COP / SEER leading to high electricity consumption		1. Undertaken sensitivity analysis of different COP levels and impact on techno economic performance 2. Pass performance risk to contractor/operator as part of tender process	

Asbestos - presence of asbestos within buildings delays installation programme		1. Review asbestos register 2. Instruct R&D surveys to identify areas of risk 3. Build asbestos removal costs into programme and cost estimates	
Decant - residents will need to be decanted to deliver upgrade work potentially leading to construction delays		1. Develop decant strategy as part of design stage	
Offtake structure - uncertainty on what is underground		1. Carry out ground radar surveys	
Issues with delivery of building insulation programme, leading to lower u values and higher flow temperatures		1. Accelerate insulation programme where possible 2. Model impact of lower U values on performance of network	

1.6 Site Constraints

The PDHU upgrade project faces a number of significant constraints. Overcoming these will require extensive planning and consultation along with innovative engineering solutions. The main constraints for the project are outlined below:

Network pipework replacement (applies to all options where heat network is retained)

To transfer heat from the energy centre to the end user, heat networks require extensive pipework and associated services. These are commonly placed into three categories:

- primary heat network systems – these are the large diameter distribution pipes which run from the energy centre to the building
- secondary heat network systems – the pipework within the communal spaces of a building.
- tertiary systems – the pipework within a dwelling connecting to radiators

Replacing and upgrading the pipework across the network is a significant constraint due to the disruption it will cause both to residents and local road users, the secondary and tertiary pipework in particular is often located in areas with restricted access e.g within concrete screed or behind in flat bathrooms. The key considerations are summarised below:

Pipework type	Constraint
Primary pipework (underground from energy centre to blocks)	Requirement for road closures Parking suspensions Disruption to heat provision Disruption to local residents
Secondary pipework (pipework within communal areas)	Requirement to decant residents Asbestos within buildings Lack of detail on pipework routes Grade 2 listed buildings

Tertiary pipework (pipework within dwellings)	Requirement to decant residents Impact on internal fixtures and fittings e.g kitchens, radiators Asbestos within buildings

An analysis of the options for routing the secondary and tertiary pipework has been developed as part of the feasibility study. This identifies potential pipework solutions for each building archetype. The proposed next steps for to develop the proposed solution are:

- Identify the lowest risk approach to upgrading and installing external risers (Planning Consultant/Architect).
- Develop outline design proposals for external risers accordingly, sequentially or simultaneously. This workstream should combine Building Services and Planning Consultant/Architect disciplines.
- Carry out an options appraisal to determine the most appropriate hydraulic arrangement for replacement of distribution pipework, risers and laterals. This should consider the identified opportunities and constraints on an archetype-by-archetype basis as well as the impact to the distribution network as a whole. Included in this should be consideration of the impact on heat pump efficiency and possible future connection to SWAN.

Electrical Grid Capacity

Movement away from natural gas for heating will significantly increase electrical consumption, this applies to all options. There are expected to be significant upgrades required to electricity supply infrastructure to increase the electrical capacity. The project team have made initial enquiries with the network operator UKPN to assess the likely work required, the output of which is summarised below:

Option	Location	Import Cap	Budget costs (£)	Residual Risk	Remarks
1a	Churchill Gardens	3.6 MVA	1,010,000	Low	Replaces existing CHP supply
5	Abbot's Manor	3.206 MVA	1,030,000	High	Requires additional space in car park
3 a/b	Morgan House (Lillington & Longmoore)	9.6 MVA	5,400,000	Medium	Requires additional space in car parks
5	Lillington & Longmoore Gardens	8.249 MVA	5,400,000	Medium	Requires additional space in car parks
3 a/b	Churchill Gardens	12.167 MVA	8,600,000	High	Requires additional space for substation
1b	Churchill Gardens	13.2 MVA	8,600,000	High	Requires additional space for substation
5	Churchill Gardens	16.616 MVA	8,600,000	Medium	Utilising existing space for substation

In summary, the greater the electrical demand for each option the higher the capital costs and complexity. The highest capital costs are associated with option 5 (direct electric heating) as upgrades will be required at all estates. Option 1a has the lowest capital costs as only a small upgrade to the existing supply is required, with peak demand picked up by gas boilers.

These constraints will be reviewed in further detail in the OBC.

Heat Pump Installation

The option to install a River Source Heat Pump will require extensive consultation with the Port of London Authority and Environment Agency. A specialist maritime engineering consultant with experience in delivery of heat pumps has undertaken some initial investigations and feasibility (report included in the appendix), with the following key next steps at the Outline Business Case Stage:

- Modelling of thermal plume from the River Source Heat Pump offtake structure
- Review of historical tidal data
- Initial discussions with planning authorities, Port of London Authority and Environment Agency
- Additional dispersion modelling to show temperature impact on Rivers

1.7 Project Dependencies

Dependency	Detail
Port of London Authority permission	Any option taken forwards requiring installation of a heat pump in the River Thames will require approval from PLA. A programme of consultation with appropriate evidence will need to be developed during the Outline Business Case.
Planning permission	All solutions are expected to require planning permission due to the impact on the building fabric of the estate. The solution is likely to require new external risers and architectural advice has been taken to assess the risk along with potential solutions.
Building fabric improvement	To operate effective and efficiently, the current programme of building insulation should be accelerated. This will minimise energy demand within the dwellings leading to lower energy costs. It is particularly important if the heat pump option is selected due to the lower water temperatures.
Resident consultation	The project may require residents to decant dwellings to replace pipework or install new radiators. This will require a full decant strategy to be developed and extensive consultation with the residents in advance.
Electrical grid capacity	Switching to an electric solution will increase demand on the local power grid, this may require significant upgrades to allow installation of the new technology. Initial enquiries have been made with the National Grid to assess what upgrades will be required and are summarised above.
Funding and affordability	A significant level of investment is required in all options. Potential sources of funding have been reviewed and will need to be confirmed during the Outline Business Case (OBC) and Final Business Case (FBC). This will include consideration of the impact on the Housing Revenue Account and charges to lessees.

1.8 Strategic Case Conclusion

PDHU is an important asset for the Council but requires significant investment to improve its condition, maximise efficiency and reduce carbon emissions. Without investment across the network, it is anticipated that the condition will continue to deteriorate, resulting in a requirement for increasing capital investment and a negative impact on residents due to leaks, major network outages and high levels of reactive maintenance.

In addition, the existing network is currently supplied by natural gas boilers, which produce over a third of WCC's annual carbon emissions. Without investment, it will not be possible to reduce carbon emissions and reach the 2030 net zero target.

Investment in the network provides a number of strategic benefits:

- **Carbon emission savings –** Replacing the existing gas boilers with an electric alternative is expected to deliver significant carbon emission savings by 2030
- **Reduce maintenance costs –** The existing PDHU network is reaching the end of its useful life and maintenance costs are increasing, upgrading the network will lower annual opex costs for WCC.
- **Improve resident experience –** Due to its condition, there is an increasing amount of leaks across the network which impact on residents. Upgrading the network will improve its condition and significantly reduce the number of leaks. It also significantly reduces the risk of major network failure in the future
- **Improve energy control and management –** the project will install a modern energy system with improved control. This will reduce energy waste and minimise ongoing energy costs
- **Modernise PDHU for the 21st century –** the project will include the installation of regulatory compliant metering which will allow comprehensive monitoring of the system in real time
- **Future proof the network for SWAN –** The SWAN project is a significant infrastructure project planned by Central Government. If this option is pursued in future, the existing secondary and tertiary network will need to be upgraded to maximise the benefits from connecting to a low carbon heat network

A range of potential decarbonisation options have been considered, each of which faces a number of constraints and dependencies. The aim of this analysis was to compare how the options deliver against WCC's strategic objectives and identify which ones to take forwards to Outline Business Case. The results of this analysis are presented below.

2. Economic Case

2.1 Critical Success Factors

Strategic Fit	Does the project meet with the defined strategic and spending objectives, and does it fit with wider Council Strategies?
Net zero targets	Does the project achieve a significant carbon emission reduction in line with the Councils net zero target?
Deliverable	Is the project likely to be deliverable either through existing resources or supplier arrangements or through new mechanisms created by the project?
Affordable	Is the project affordable in terms of either the funding streams currently available to the Council or proposed funding streams accessed through the project?
Market Capability / Capacity	Does the project match with the capability of known and available suppliers and are they likely to be interested in delivering the project?
Value for money	Does the project maximise return on the required spend in terms of economy, efficiency and effectiveness?

2.2 Options Appraisal

2.2.1 Scoping Options

The table below compares the different scope options for delivering the project. These options are focused on delivering a decarbonised solution. The technical options are covered in the options appraisal summarised below:

Option	Business as Usual	Option 1	Option 2	Option 4
Description	Retain gas boiler	Decarbonise heat supply only	Decarbonise heat supply and upgrade the network	Decommission heat network
Spending Objective				
Reduce carbon emissions from PDHU				
Improved resident experience of PDHU				

Reduce leak incidence from PDHU				
Improve energy management across PDHU				
Critical Success Factors				
Strategic Fit				
Net zero targets				
Deliverability				
Affordability				
Supply Side Capacity / Capability				
Value for money				
Conclusions	**Discounted**	**Discounted**	**Include in OBC**	**Discounted**

2.2.2 Delivery Options

The potential delivery options for the project are covered in section 4 of this business case. The early stage of the project means that these options have not been compared in detail, although a full review will be carried out during the Outline Business Case.

2.2.3 Long List of Options

There have been a number of options considered during the scoping exercise. A full options presentation is provided in the appendices which was presented to Councillors for discussion and steer. A full list of options considered is as follows:

Options	Shortlisted	Rationale
Option 1a – River Source Heat Pump with gas boiler back up	Yes	Provides high carbon savings and lower impact on fuel bills for PDHU users
Option 1b – River Source Heat Pump with electric boiler back up	Yes	Provides high carbon savings and lower impact on fuel bills for PDHU users. Electric boiler for back up offers the potential for fully decarbonised solution
Option 2 – Electric Boiler	No	Discounted due to high impact on energy bills due to lower efficiency
Option 3a – Zone Lillington and Longmoore with electric boiler. Retain the remaining PDHU and install a RSHP with electric boiler.	Yes	As per options 1A/1B but with reduced requirement for disruption to local roads from underground pipework replacement. Offers the potential to fast track pipework upgrades to Lillington and Longmoore.

Option 3b – Zone Lillington and Longmoore with electric boiler and heat pump using waste heat. Retain the remaining PDHU and install a RSHP with electric boiler.	Yes	As per options 1A/1B but with reduced requirement for disruption to local roads from underground pipework replacement. Offers the potential to fast track pipework upgrades to Lillington and Longmoore and also explore a heat pump to increase efficiency.
Option 4 – Zone Lillington and Longmoore with direct electric heating. Retain the remaining PDHU and install a RSHP with electric boiler	No	Discounted due to high impact on fuels for Lillington and Longmoore residents.
Option 5 – Decommission PDHU and install direct electric heating	Yes	Included in shortlist as an alternative option to a heat pump solution
Option 6 – River Source Heat Pump with distributed Air Source Heat Pump	No	Discounted due to planning risk from installing roof mounted Air Source Heat Pumps across the network
Option 7 – Centralised ASHP	No	Discounted to space requirements at Pump House and potential noise impact on nearby residents
Option 8 – Decommission PDHU and install direct electric heating with ASHP for hot water	No	Discounted due to impact on fuel bills and planning impact for roof mounted ASHP.

2.3 Shortlisted Options

Option 1a
Installation of 7.5MW Centralized River Source Heat Pumps with Gas Boilers providing top up at the existing PDHU pump house
Option 1b
Installation of 7.5MW Centralized River Source Heat Pumps with Electric Boilers providing top up at the existing PDHU pump house
Option 3a
Install RSHP at existing energy centre with electric boilers for peak demand. Zone Lillington and Longmoore, to be supplied by electric boiler
Option 3b
Install RSHP at existing energy centre with electric boilers for peak demand. Zone Lillington and Longmoore, to be supplied by electric boiler and heat pump using TFL waste heat
Option 5
Decommission PDHU and install direct electric heating by storage heaters with hot water supplied by immersion coils

2.4 Feasibility Study of Shortlisted Options

See below

Option	Estimated Capital Cost	Energy costs (40 year)	Opex/Repex cost (40 year)	2030 Carbon emission reduction (%)	Construction Risk	Operational Risk	Reputation Risk	Net Zero Target	Disruption to residents	Timescale	
Business As Usual	£133m	£140m	£95m	0%							Discounted due to lack of emissions savings
1A – Retain PDHU and power by a river source heat pump (gas boiler back up)	£175m	£126m	£112m	74%							Take forwards to OBC
1B Retain PDHU and power by a river source heat pump (electric boiler back up)	£186m	£144m	£110m	76%							Take forwards to OBC
3A - Zone L&L and install electric boiler at Morgan House. Power PDHU by river source heat pump	£210m	£190m	£106m	68%							Take forwards to OBC
3B – Zone L&L and install electric boiler with heat pump using waste heat. Power PDHU by river source heat pump	£212m	£164m	£106m	72%							Take forwards to OBC
5 - Close down PDHU and install individual electric heating and immersion heated communal hot water	£182m	£351m	£34m	54%							Discounted to high energy costs and low carbon savings

The capital costs and scope for Options 1A, 1B, 3A and 3B presented above include for the upgrade of network distribution pipework, which is considered vital in delivering a decarbonised solution. This includes installation of new heating infrastructure within buildings and dwellings to replace the existing.

Option 5 would include decommissioning the existing pipework and installing new electrical infrastructure.

Capital cost estimates include the following where applicable:

- Installation of river source heat pump at Churchill Gardens Pump House
- Construction of new river offtake structure with pumping station
- Upgrade to electrical infrastructure to accommodate heat pump installation or direct electric heating
- Replacement of boiler #1 and #2 and flues
- Overhaul of thermal storage
- Phased replacement of primary distribution network (25% replacement allowance) with remaining 75% replacement over the next 25 years
- Replacement of block and dwelling level heating systems with new CP1 2020 compliant systems in Churchill Gardens, Lillington Gardens and Abbots Manor
- Installation of Metering and Billing Regulations compliant energy metering (heat meters for space heating and flow meters for domestic hot water)
- Installation of indirect block level substations in Churchill Gardens, Lillington Gardens and Abbots Manor (not required at Longmoore Gardens)
- Replacement of block and dwelling level domestic hot water systems with new CP1 2020 compliant systems in Churchill Gardens, Lillington Gardens and Abbots Manor
- Replacement with new of CP1 2020 compliant block and dwelling level combined domestic hot water systems and space heating systems in Longmoore Gardens, including upgrading HIUs
- 20% risk premium, client direct items 10% (including decant costs), fees 15%, inflation to 2026 15%, prelims 15%

Modelling assumptions

- BAU assumes that the network is upgraded under normal business due to life expiry of network
- Proposals set out in this document are broadly in line with RIBA stage 0/1 and associated CAPEX do not reflect developed designs based on detailed site investigations for each of the strategic options. Prior knowledge of the site is incorporated where available, and specifically for centralized options, where RIBA stage 2 design services are ongoing
- All strategic options investigated require compliance under the Metering and Billing Regulations
- All strategic options investigated are assumed to undergo fabric upgrades to improve thermal efficiency to dwellings in Churchill Gardens and Lillington Gardens (assumed not to be implemented at Longmoore Gardens and Abbots Manor). These costs are not accounted for in the modelling since these have been allocated under separate budgets within WCC. However, the reduction in customer demand is accounted for during energy modelling

- Building fabric improvements are assumed to be carried out from 2023 until 2030 for 70% of tenanted and 10% leaseholder units, as applicable. Similarly, primary and secondary network improvements are assumed to be carried out in the same period. These improvements will reduce space heating demand and heat losses for all strategies. These projected loads are used in techno-economic modelling
- Operation & maintenance costs are modelled for main heating equipment in the following way:
    - 5% of capital cost for heat pumps
    - 2% of capital cost for gas boilers, Electric/Electrode boilers, electric immersion heaters and electric storage heaters
- Other operations & maintenance costs are modelled annually based on 2018/19 fixed costs for PDHU
- Replacement costs are modelled for the main heating equipment assuming 100% of the capital cost and design lifetimes in line with CIBSE Guide M
- Primary heat network replacement allowance has been made as 25% of the capital value in year 1 and the remaining 75% during the project lifecycle
- Commercial electricity and gas tariffs are modelled based on April 2022 data. Residential electricity tariffs are modelled based on the current energy price cap applicable since October 2022. Energy price escalation has been accounted for using BEIS energy pricing forecasts
- Modelling of carbon emissions assumes long-run marginal consumption-based for commercial and public sector from BEIS Green Book Supplementary Guidance for centralized options and long run marginal consumption-based residential for electric only options (option 5)

2.5 Economic Case Conclusion

The techno economic options appraisal has identified that a significant investment will be required to deliver the Councils strategic objectives. A heat pump led solution is the only option which will deliver a significant carbon reduction but would need to be delivered alongside a widespread renewal of the existing heat distribution pipework and upgrade to the connected buildings thermal performance.

The appraisal identifies two main strategic options to take forwards into the Outline Business Case, with variations of each:

- Option 1A and 1B – Retain the existing PDHU network and install a 7.5MW River Source Heat Pump
- Option 3A and 3B – Remove Lillington and Longmoore from PDHU and install a separate electric boiler and heat pump. Retain the remaining PDHU and install a 5MW River Source Heat Pump

Investment in these options is forecast to range between £175m and £212m which would be spread over a number of years. These costs are strategic estimates only and subject to further analysis and technical development.

The efficiency of a heat pump means that, along with carbon emissions, operational energy costs are significantly lower. Achieving the necessary efficiency will be dependent on a separate programme of fabric insulation upgrades, which is being delivered separately.

It should be noted that there is a risk that the River Source Heat Pump solution could be deemed technically unviable during the OBC. All other low carbon solutions have been discounted at this stage due to high modelled running costs or concerns over technical viability. Therefore, there is not currently a viable back up decarbonisation option being taken forwards to the OBC. Further technical analysis will be carried out at an early stage to reduce this risk and increase certainty on the preferred solution.

3. Financial Case

3.1 Capital Cost

3.1.1 The total estimated capital cost for the options that the business case proposes to develop is in the range of £175-212m. It is anticipated that this capital outlay would be spread over a period of 6-8 years, depending on the final option and scope of the project.

This is summarised as follows:

Ref	Option	Estimated Capital Cost	Delta to "Do Nothing"
1A	Retain PDHU and power by a river source heat pump (gas boiler back up)	£175m	+ £42m
1B	Retain PDHU and power by a river source heat pump (electric boiler back up)	£186m	+ £53m
3A	Zone L&L and install electric boiler at Morgan House. Power PDHU by river source heat pump	£210m	+ £77m
3B	Zone L&L and install electric boiler with heat pump using waste heat. Power PDHU by river source heat pump	£212m	+ £79m

3.1.2 Clearly these figures are based on high level cost estimates at this stage and will be subject to detailed development as part of the progress towards an Outline Business Case (OBC) in December 2023.

3.1.3 For the purposes of the business case, the investment consideration is centred on the additional funding required to achieve other strategic objectives (such as decarbonisation). Given the imperative to keep the PDHU operational, the options appraisal demonstrates that it would cost a minimum of £133m to achieve this (i.e. the "Do Nothing" option), which excludes the potential future carbon offsetting costs for carbon if a gas boiler is retained. This is assumed to be a voluntary cost and there is uncertainty on the future £/Tonne rate therefore it has not been included at this stage. The right-hand column on the table therefore identifies the supplementary investment required under each option to deliver additional benefits.

3.2 Capital Funding

3.2.1 There are a number of identified funding sources that are available to support the project, but the bulk of the funding is still expected to fall on borrowing.

3.2.2 The carbon saving measures that form a prominent part of the project are expected to attract several grant funding opportunities. At this stage, the most likely source of grant funding is the Green Heat Networks Fund (GHNF). GHNF funding is currently limited to a cap of 4.5p per kWh in terms of the carbon saving (with a 50:50 match funding expectation). It is also understood that GHNF grant would not be able to fund works to address pre-existing performance issues (e.g., faulty pipework). There may be flexibility on these terms (which will be explored) but the current projection is that GHNF grant would be available to fund 50% of the river-source heat pumps (**worth £10m, equivalent to c.5% of the total investment**).

3.2.3 The PDHU serves approximately 3,300 homes, of which an estimated 45% are leaseholders. Network upgrades constitute roughly 55% of total capital expenditure, which includes in-dwelling pipework. This expenditure is likely to qualify as being rechargeable under the terms of those leases. Qualifying expenditure is **equivalent to c.25% of the total capital investment**. Consideration will be made about what costs are reasonable to recharge to leaseholders as part of the development of the outline business case (as well as the terms that might be applied to any potential recharges).

3.2.3 The Westminster Infrastructure Delivery Plan provides a definition of the types of infrastructure works that would qualify for CIL funding. One of these categories is "Utilities and Waste" which includes energy infrastructure projects. It is reasonable to assume that some of the network upgrades that are external to residential buildings may qualify for a level of CIL funding. A prudent estimate of **£15m (equivalent to c.7.5% of total capital investment)** has been made at this early stage. As with all prospective funding sources, this will be explored further as part of the development of the outline business case.

3.2.4 Based on the estimates for external funding opportunities, the residual expenditure that would need to be funded from borrowing is **equivalent to c.62.5% of the total investment**. There are two key considerations in relation to applying borrowing to support the scheme:

- **Servicing** – legal advice is required to ascertain how debt might be shared between the General Fund and the HRA (with the current assumption being that only in-dwelling works on tenant properties would qualify to be funded through the HRA as a landlord duty). The other potential opportunity to be explored is for a sinking fund type charge to be added to the PDHU service charge in order to service some of the debt.

- **Source** – the nature of the scheme and its strategic intention to reduce carbon emissions means it is likely to qualify for favourable borrowing rates from lenders such as the UK Infrastructure Bank (UKIB) or the Mayor's Energy Efficiency Fund (MEEF). Early engagement with both lenders has been met with enthusiasm and this would allow the Council to access debt at a rate lower than PWLB.

3.3 Financial Implications

3.3.1 Whilst financial benefit is not the primary driver for the decision to upgrade the PDHU, a complete renewal of all pipework across the network is expected to drive some revenue savings. The HRA is currently spending an estimated £1.7m per annum on in-flat repairs relating to the PDHU. Clearly a renewed network can be expected to reduce failure rates and drive a substantial saving in this area if the number of leaks is reduced. The modelling to be undertaken as part of the next phase of work will seek to assess this potential, although it is broadly expected to be very similar across each of the four options being progressed. A saving on the repairs budget would also generate some potential headroom in the HRA needed to fund borrowing for the project, if required (see above).

3.3.2 The potential benefit of lower carbon offset costs should also be considered, if this is a strategy the Council adopts to achieve net zero in 2030. There is still uncertainty on the future cost impact from off-setting, but it will be higher if gas boilers are retained.

3.3.3 Given the proportion of borrowing needed to support the PDHU upgrade, the other key financial implication is the revenue cost generated by the additional debt. The assessment above indicates that borrowing is expected to be in the range of £109-133m. Based on the Council's current forward borrowing arrangements, this would result in an interest cost of £2.8 to £3.5m. Clearly there are important caveats in terms of whether the debt burden falls on the General Fund or the HRA, which is still subject to advice. Any borrowing done via the General Fund would also attract an MRP charge (adding further cost to the revenue budget), while the HRA Business Plan currently has little or no borrowing headroom (and only savings on the repairs budget would create space to fund interest costs). Nonetheless, this is an important consideration in terms of the affordability of the scheme.

3.4 Financial Case Conclusion

3.4.1 The HRA has been spending at least £2m a year on PDHU upgrades and this figure is expected to rise sharply as the network gets closer and closer to the end of its operating life. The "Do Nothing" option included in the strategic options appraisal is still expected to cost the Council more than £130m over the next 10 years.

3.4.2 This is an important consideration in the context of the financial case for the project, as it means that the delta to the other options being put forward is relatively small given some of the additional benefits that are generated. The extra investment allows for both de-carbonisation and the ability to deliver a holistic upgrade of the network (as opposed to an ad hoc patching up as elements start to fail).

3.4.3 Consideration should also be given to the potential cost of offsetting carbon emissions in the future. There is still a high level of uncertainty around the cost of taking this approach (£/Tonne) but it is likely that the financial impact per annum will be significantly higher if gas boilers are retained. It is proposed that this is explored in further detail during the financial modelling for the OBC.

3.4.4 Whilst this represents a significant level of capital outlay, the additional benefits generated by this investment and the extra repair savings that are anticipated (which will be modelled in detail) are considered to justify the investment. Furthermore, the risk of the PDHU failing and what this would mean in terms of having to decant up to 3,300 households is such a substantial financial risk to the Council that the proposed investment can be considered essential.

4. Commercial Case

4.1 Procurement Strategy

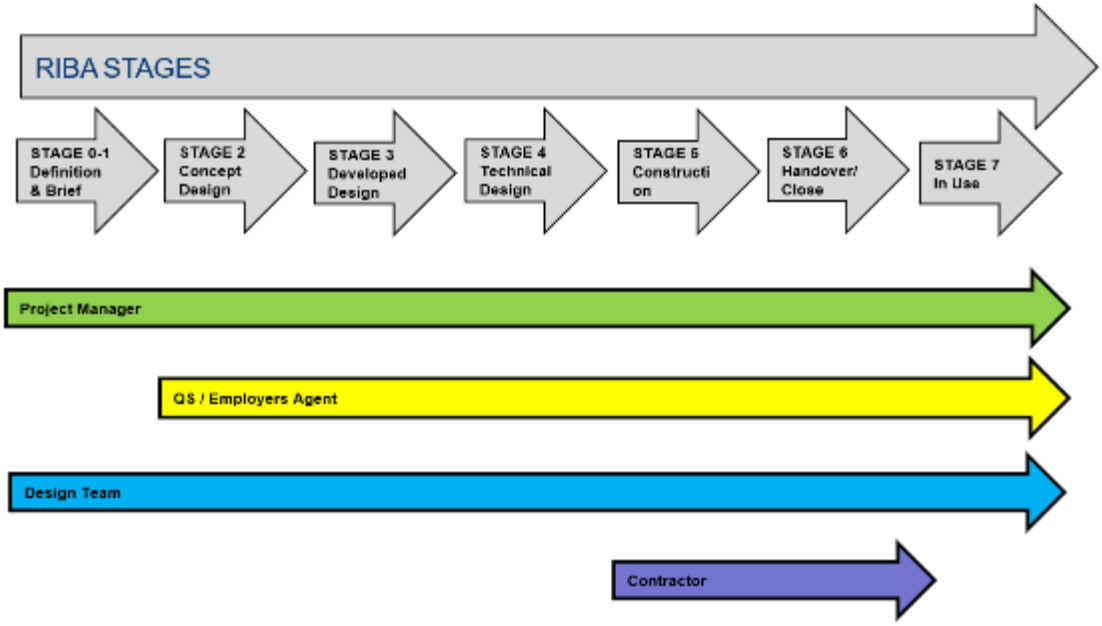
4.1.1 Contracting Structure:

There are early decisions to be made around the contracting strategy and delivery model for this project. This is vital to set the project and procurement off positively.

The main strategies to consider are:

- Traditional contracting
- Single stage design & build contracting
- Two stage design & build contracting
- Construction Management (not recommended)

A traditional route may resemble the graphic below (each line and colour representing a contract with a supplier and the council directly):



Traditional procurement routes mean that all suppliers have a direct link to the council. This does require more coordination, but the Council will have greater control. This is the classic contracting structure.

Advantages:

- Normally attractive to the main contractor market
- Fixed price agreed prior to entering contract
- Single point of responsibility for construction
- Transfer of programme risk
- Client retains high degree of control over design until completion
- Simple warranty provision for client, funders, tenants etc
- Easy to manage cashflow & payments

Disadvantages:

- Relatively slow start, as design needs to be complete prior to tendering
- Client retains risk for completion of design
- Client retains responsibility for any defects in the design
- Client changes post-contract will result in claims under the contract

The more modern structure is via a design & build route:

- A Single stage D&B would involve a designer designing to a point and then a Contractor being appointed to take over designing and building from that point through to completion.
- The difference from single-stage D&B to two stage D&B is that the main contractor is initially engaged on a consultancy basis, via a Pre-construction Services Agreement (PCSA), to sit alongside the Project Team during the completion of pre-contract design and preparation of the Employer's Requirements. This allows the contractor to provide advice, particularly in regard to buildability, which can be incorporated into the design during RIBA Stage 3/4.

The Government's construction playbook recommends a two stage D&B procurement route. This increases collaboration between the supply chain and allows the contractor to remedy any constructability concerns before the design is finalised (removing re-work). It also allows for sensible risk transfer as the Contractor can mitigate risk during the first stage – so the client is not paying for it. The Contractor will develop the detailed detail under a PCSA (Pre-Construction Services Agreement), then build under a build contract. An overview of the sequence is below:

- Client appoints a Designer
- Designer produces a RIBA 3 design
- Client appoints a Contractor at RIBA 3 for a PCSA to:
    - Produce a RIBA 4 (detailed) design
    - Develop a programme to build and a cost to build
    - There may also be site set up, surveys, and some early works included (to help better the overall programme and also mitigate risk pricing)
- The Client will then appoint the Contractor to build (if they are satisfied with the design, programme, and price offered).

Advantages:

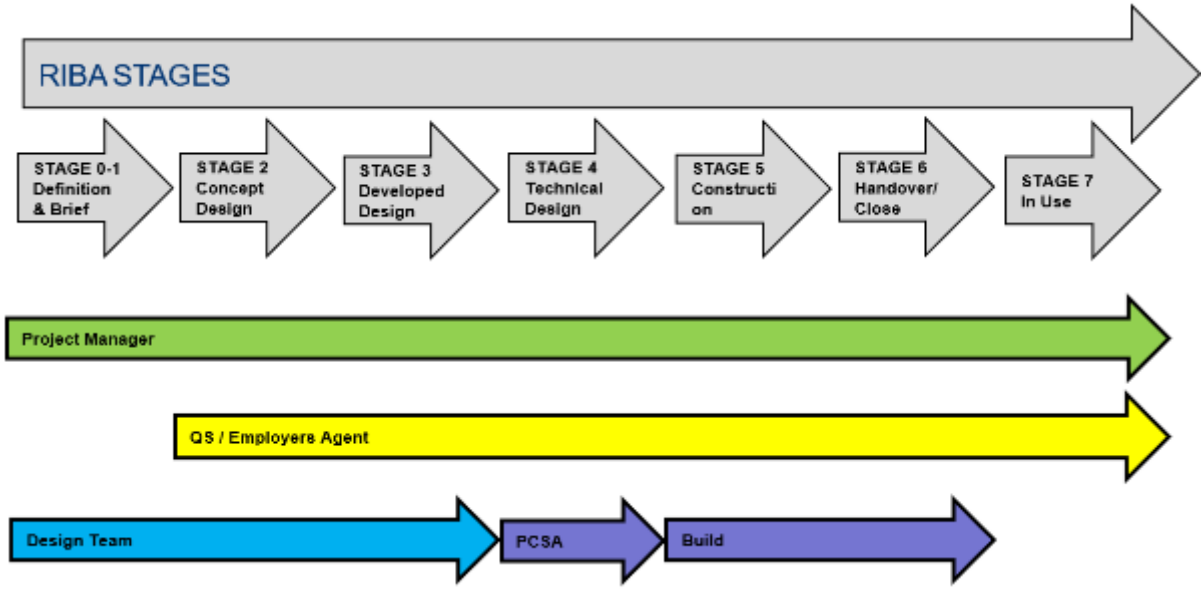
- Attractive to the main contractor market
- Fixed price agreed prior to entering contract (for build)
- Single point of responsibility for design and construction
- Maximum transfer of programme risk
- Maximum transfer of design coordination risk
- Simple warranty provision for client, funders, tenants etc
- Easy to manage cashflow and payments

Disadvantages:

- Post contract design change can be complex costly if Client changes their mind
- Need to produce comprehensive coordinated Employer's Requirements

- Early engagement of the contractor requires commitment from client, under a PCSA (but less thereafter)
- RIBA 4 design programme requires higher degree of coordination between design and procurement activities

Two stage D&B will resemble a different structure traditional, as below (client not retaining the designer post RIBA 3 as the design is the responsibility of the Contractor as a D&B:



Irrespective of the above (traditional vs D&B), the main contracts to consider at this stage are:

- Project Manager
- Quantity Surveyor / Employer's Agent
- Designer (Architect)
- Contractor

4.1.2 Designer Procurement:

It is expected that the design services will cost in the region of circa £200,000 and therefore the procurement will be above the OJEU/FAT limit. Procuring design services will need to comply with both the Council's Procurement Code and the Public Contract Regulations.

There are several procurement routes available to the Council when procuring a multi-disciplinary designer to develop the scheme through the early RIBA stages. However, if time is of the essence, procuring via an established complaint framework is likely to be the preferred route. There are numerous frameworks in the market for this; for example, the NHS SBS and CCS (both of which the Council has used many times).

It is best practice to procure design services for the full project lifecycle (possibly RIBA 0-7) if using a traditional route (separate design and build contracts). However, this would be RIBA 0-3 if the Council intends to then procure a Design & Build Contractor thereafter (who would develop the design from RIBA 3 and build through to RIBA 7. Either way, the designer should be procured for the full intended term with break clauses after each RIBA stage where the Council can terminate through no fault (for example, if the scheme was to majorly shrink or not move forward).

4.1.3 Project Management & Quantity Surveyor / Employer's Agent

Procuring a Project Manager, QS and Employer's agent may be very similar to the above (Designer procurement). Ultimately, they are people rate contracts for professional services.

These are key consultants in delivering the project, likely with a similar recommended procurement route. It is recommended to have separate consultants, but it is also possible to have one consultant deliver all disciplines.

4.1.4 Contractor Procurement:

The Contractor procurement will be very different to the professional services as above. This is where most of the project cost will sit – in the build. This is also much more complex to procure as it is not based solely upon people rates and time.

Recommendation: Two Stage design and build

Procurement route vehicle: To be discussed, compliant framework or OJEU/FAT process. The council has undertaken very similar analysis of procurement routes for large construction projects and have many lessons learned to share and discuss in regard to this.

4.2 Delivery Strategy

It is undetermined what will be the delivery model for this project will be. A strategic decision on whether a single of two stage build contract will be pursued will be made post SOC, following professional analysis of the options.

4.3 Legal Strategy

The council has powers under Section 1 of the Localism Act 2011 gives the Council the 'general power of competence'. It gives local authorities the legal capacity to do anything that an individual can do that is not specifically prohibited by law

The main powers in relation to local authority functions regarding heat and electricity are set out in Section 11 of the Local Government (Miscellaneous Provisions) Act 1976. These permit the council:

- to produce heat or electricity or both.
- establish and operate generating stations or installations for such
- production; buy or otherwise acquire heat.
- use, sell or otherwise dispose of heat produced or acquired or electricity
- produced by the council.
- and enter into and carry out agreements for the supply of such heat to
- premises within or outside of the council's area.

In developing the plan, the council is under a duty to consult with various stakeholders on the options to inform the report recommendations. This should include residents where the district heating work will impact. Officers should ensure that such consultation is updated on a regular basis for the purpose of monitoring the effectiveness of the plan and to assist future decision making in this area.

Legal due diligence will need to be undertaken as to the land and any take into consideration all parties who will be affected by the programme bearing in mind the terms of such leases and agreements which are in place. Which will also assist with regards s.20 consultations. Officers from

legal services will provide legal advice, when required, on the models for service provision considered, some of which may have procurement implications

There must be a continued regard to take into account the public sector equality duty (PSED) general duty under the Equality Act 2010 and when making decisions, to have regard to the need to (a) eliminate discrimination, harassment, victimisation or other prohibited conduct, (b) to advance equality of opportunity and (c) foster good relations between persons who share a relevant protected characteristic and those who do not share it. The relevant characteristics are age, disability, gender reassignment, pregnancy and maternity, race, relation, religion or belief, sex and sexual orientation. The PSED general duty also applies to marriage and civil partnership but only in relation to (a). The PSED general duty is a continuing duty and potential equality considerations should be considered at the different stages of the programme.

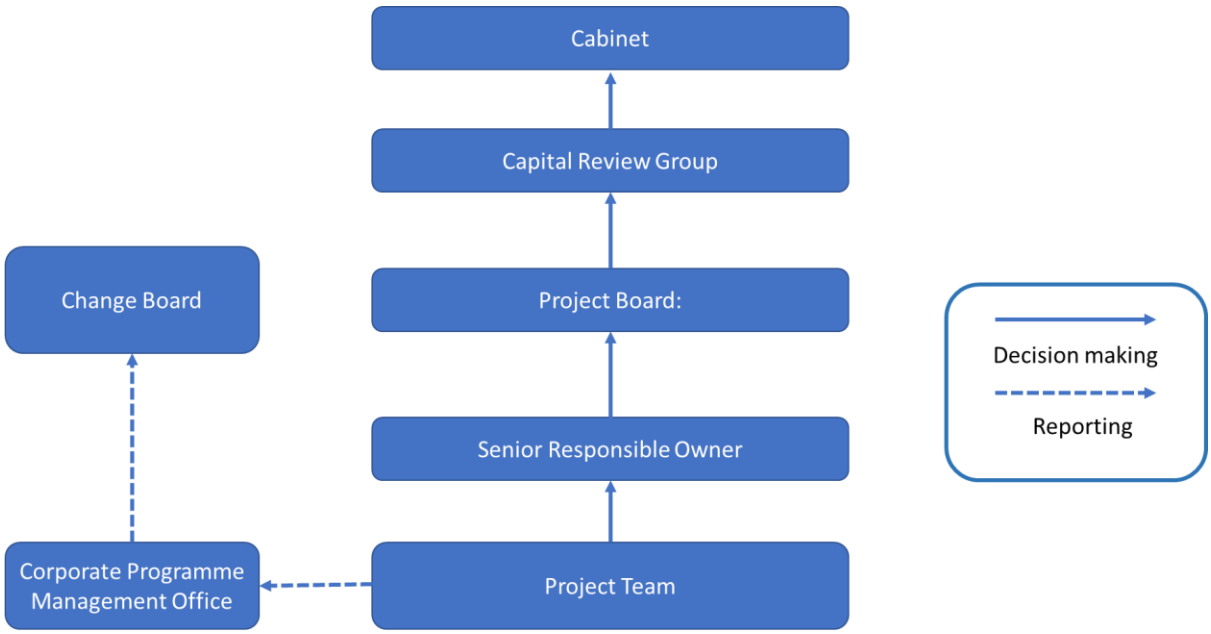
Good governance will be a key requirement throughout the process and officers will need to ensure that good decision making process is undertaken throughout any programme and time built in to ensure that all stakeholders have been involved in any decision making process.

Procurement of works or services will be undertaken in full compliance with Public Contracts Regulations 2015 and the Council's Contract Procedure Rules. Expenditure decisions will be subject to outline and full business case and further reports.

5. Management Case

5.1 Project Approach

It is proposed that the project will be managed following the following structure for decision making and oversight:



Project Board		
Name	**Directorate**	**Board Role**
Neil Wightman	GPH	Director of Housing
Jim Paterson	GPH	Divisional Head of Major Works and Sustainability
Chris Spicer	GPH	Programme Manager -PDHU Decarbonisation
Anthony Jones	GPH	Head of Housing Sustainability
Jason Killeen	GPH	PDHU Operations Manager
John Hayden	GPH	Divisional Head of Repairs and Planned Maintenance
Chris Shoubridge	GPH	Divisional Head of Housing Neighbourhood
Paul Halpin	GPH	Head of Leasehold Income and Engagement

Matthew Alexander	Corporate PMO	Project Delivery Business Partner
Iain Emmerson	Development	Senior Development Delivery Manager
Brendon Harper	Development	Climate Emergency Project Manager
Paul Foster	GPH	Mechanical Project Manager
PDHU Pump House	GPH	Technical Input
Luke Chiverton	Corporate Finance	Financial Consultant
Jake Bacchus	Corporate Finance	Director of Finance
Ryan Giles	Procurement	Head of Commercial
TBC	Procurement	Commercial Manager
Matt Curran	GPH	Health and Safety Lead
Sarah McCarthy	GPH	Engagement Lead (Stakeholder/Resident)
TBC		Project Manager/Officer
Amy Jones	Environment	Director of Environment

- Project Team: The project team will be led by the programme manager. The team will be responsible for the daily management and progress of the project up to the point of approval of the full business case and start of works by the selected contractor.

- The project team will report directly into the senior responsible owner (SRO) on a monthly basis, with urgent risks or actions escalated to the SRO when needed.

- Senior Responsible Owner (SRO): The SRO for the PDHU project is Debbie Jackson as executive director for Growth, Planning and Housing. The SRO is accountable for the successful delivery of the project and its benefits. The SRO will be supported by the project board.

- Project Board: The project board will support the SRO by ensuring that cross-council actions and dependencies are identified to enable the successful delivery of the project. The board will also represent the internal stakeholders to ensure that these views are captured in the design and planning of the project.

5.2 Project Resources

5.2.1 Internal Project Team

A project of this scale will require an experienced team. It is proposed that the majority of this resource is procured through a range of professional services, with oversight provided by a programme manager and a project officer/manager. Procurement of these activities will commence immediately after approval of the SOC.

5.2.2 Resources to be procured

It is proposed that a range of project resource is appointed as outlined in the table below. The costs provided are budget only and subject to a proposal:

Role	Budget Cost	Comment
Mechanical/Electrical engineering	£150,000	Eligible for grant funding
Principal Designer	£20,000	
Maritime Engineering	£30,000	Eligible for grant funding
Civil/Structural Engineering	£50,000	
Architectural	£60,000	
Commercialisation (incl Procurement, QS and financial modelling)	£160,000	Eligible for grant funding
Planning consultant	£40,000	
Legal services	£60,000	Eligible for grant funding
Project Management	£150,000	Eligible for grant funding
Business Case Writer	£55,000	
Comms/Engagement	£30,000	
Funding application support (GHNF and HNES)	£130,000	
Searches and surveys	£55,875	
Health and safety	£10,000	
Contingency @ 20%	£200,175	
TOTAL	**£1,201,050**	

A contingency of 20% has been added to cover any additional costs and services identified during the development of the OBC.

Resource Funding

It is proposed that funding for the Outline Business Case is provided by a combination of WCC funding and grant funding from the BEIS Heat Network Delivery Unit (HNDU). HNDU provides grant funding and guidance to local authorities in England and Wales for heat network project development.

Since its inception, HNDU has run 11 funding rounds – awarding £30 million in total and provides support through the early stages of heat network development.

HNDU grant funding can provide up to 67% of the estimated eligible external costs of heat network development studies (where 'eligible external costs' means the money paid by the Applicant to third parties to deliver the heat network development stages). **WCC will need to demonstrate in their application that it has secured at least the balance of funding required in match funding**.

HNDU grant funding can also provide up to 100% of the cost of estimated externally procured project management support. Discussions will commence with HNDU to identify the level of funding it could provide to the project in the next stage of the project.

It is estimated that HNDU could provide up to £500k of grant funding for development of the OBC. An application will be made in the early stages of the OBC to confirm the exact amount.

5.3 Key Stakeholders

The wide-reaching nature of this project means that stakeholder engagement and consultation will be vital for delivering a successful project. The table below outlines the key stakeholders for the project, this list is not exhaustive and it is proposed that an engagement lead is appointed to manage the process, once the project moves into the OBC stage.

Residential	Residents Associations: • Churchill Gardens • Lillington and Longmoore • Abbots Manor 20th Century Society Historic England
Political	• Cllr Matt Noble • Cllr Liza Begum • Cllr David Boothroyd • Cllr Ryan Jude
Commercial	Pimlico Academy WCC Planning Highways Utility Providers UKPN Port of London Authority Environment Agency Leaseholders

5.5 Communication Strategy

Due to the future impact on residents, road users and those connected to PDHU, the project will need to include an effective communication strategy. It is proposed that this is developed as a priority during the OBC.

5.6 Consultation Strategy

Consultation will be a vital part of delivering a successful project, there a number of stakeholders which will need to be engaged with throughout the project. It is proposed that consultation is a priority activity once the Outline Business Case commences, with a specialist lead appointed in the early stages.

5.7 Management Case Conclusion

An upgrade to PDHU is complex project which will impact a wide range of stakeholders. Successful delivery will require a strong and experienced project team and thorough programme of consultation. Oversight of the project will be provided by project board, with regular reporting back to the relevant boards on progress.

Funding of the OBC will be required, with a budget cost of £1.2m - it is expected that a grant from HNDU could cover up to £500k of these costs, subject to a successful application.

6. Programme

6.1 High level / Key milestones programme

Please note, the dates below are estimates and subject to change. It is proposed that regular reporting is provided throughout using the reporting structure in section 5.

Activity	Date
Strategic Outline Case Approval	**January 2022**
Outline Business Case complete	**December 2023**
Final Business Case complete	**December 2024**

7. Appendices

A	Risk register
B	Options Appraisal
C	Heat pump feasibility technical note - Draft
D	Strategic Options Appraisal – Technical Note
E	