Planning Stage
Energy and Sustainability Report

at

Ruislip Lido
Reservoir Road
Ruislip
HA4 7TY

for

London Borough of Hillingdon

4560/DH/JP/SA
Issue 1
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Table of Contents

Appendices

1.0 Introduction

RHB Partnership have been commissioned by the London Borough of Hillingdon to complete a Planning Stage Energy and Sustainability report for the works at the Ruislip Lido, Reservoir Road, Ruislip, HA4 7TY.

The works include the redevelopment of the existing Willow Lawn and Woody Bay sites inclusive of 2 No. existing toilet blocks. The new toilet blocks shall have improved services to cater for the elevated tourist demand in summer months.

This report specifically focuses upon the developments energy, CO_2 emissions, water consumption, materials, in use waste and recycling. The report determines the Architectural and Mechanical, Electrical and Public Health (MEP) services strategy to best satisfy the energy and sustainability requirements of the Building Regulations.

Relevant Hillingdon Council planning policies have been listed in Section 2.0 of this document and the proposed energy and sustainability solution for the development has been produced in accordance with these policies.

Although the Woody Bay development exceeds 50m^2, the development shall be unheated and will therefore not require an 'As-Designed' or 'As-Built' SBEM calculation. However, both developments shall still be designed and constructed with a high degree of sustainability credentials.

Water conservation is detailed in Section 4.0 where low usage appliances are detailed.

The sustainable construction materials specification is explained in Section 5.0 with Waste and Recycling detailed in Section 6.0.

Section 7.0 confirms the development will be constructed using the latest sustainable construction techniques.

2.0 Policy Framework

The national and local policy context that are relevant to the construction of these developments have been identified in Sections 2.1 and 2.2 and used to develop the energy strategy.

Hillingdon currently has the fourth highest carbon emissions of the thirty-three London Boroughs, therefore, the implementation of the local policy framework and London Plan (2021) aims to improve upon this figure, where possible.

2.1 Building Regulations

The proposed re-developments at both Willow Lawn and Woody Bay must meet the minimum requirement of the Building Regulations. Approved Document Part L, Volume 2 2021 (incorporating 2023 amendments) sets the minimum compliance standards for both the envelope of the building and all new MEP systems.

Both developments do not require an 'As-Designed' or 'As-Built' SBEM calculation due to their unheated nature and/or total area <50m^2. The appointed building control officer shall ratify this statement.

2.2 Hillingdon Council Local Planning Policy

The current Hillingdon Council Local Plan Strategic Polices Part 1 was adopted in November 2012; Local Plan Part 2 was adopted as of 16th January 2020. Each document outlines a number of Strategic Objectives as well as Policies to achieve their 'Vision'.

Key Strategic Objectives within the current Strategic Policies are:

SO11: Adress the impacts of climate change and minimise emissions of carbon and local air quality pollutants from new development and transport.

Key policy requirements within the Strategic Policies are:

EM1: Climate Change Adaption and Mitigation

Policy EM1: Climate Change Adaptation and Mitigation

The Council will ensure that climate change mitigation is addressed at every stage of the development process by:

1. Prioritising higher density development in urban and town centres that are well served by sustainable forms of transport.
2. Promoting a modal shift away from private car use and requiring new development to include innovative initiatives to reduce car dependency.
3. Ensuring development meets the highest possible design standards whilst still retaining competitiveness within the market.
4. Working with developers of major schemes to identify the opportunities to help provide efficiency initiatives that can benefit the existing building stock.
5. Promoting the use of decentralised energy within large scale development whilst improving local air quality levels.
6. Targeting areas with high carbon emissions for additional reductions through low carbon strategies. These strategies will also have an objective to minimise other pollutants that impact on local air quality. Targeting areas of poor air quality for additional emissions reductions.
7. Encouraging sustainable techniques to land remediation to reduce the need to transport waste to landfill. In particular developers should consider bioremediation(39) as part of their proposals.
8. Encouraging the installation of renewable energy for all new development in meeting the carbon reduction targets savings set out in the London Plan. Identify opportunities for new sources of electricity generation including anaerobic digestion, hydroelectricty and a greater use of waste as a resource.
9. Promoting new development to contribute to the upgrading of existing housing stock where appropriate.

The Borough will ensure that climate change adaptation is addressed at every stage of the development process by:

10. Locating and designing development to minimise the probability and impacts of flooding.
11. Requiring major development proposals to consider the whole water cycle impact which includes flood risk management, foul and surface water drainage and water consumption.
12. Giving preference to development of previously developed land to avoid the loss of further green areas.
13. Promoting the use of living walls and roofs, alongside sustainable forms of drainage to manage surface water run-off and increase the amount of carbon sinks(40).
14. Promoting the inclusion of passive design(41) measures to reduce the impacts of urban heat effects.

EM8: Land, Water, Air and Noise – *Water Resources*

Water Resources

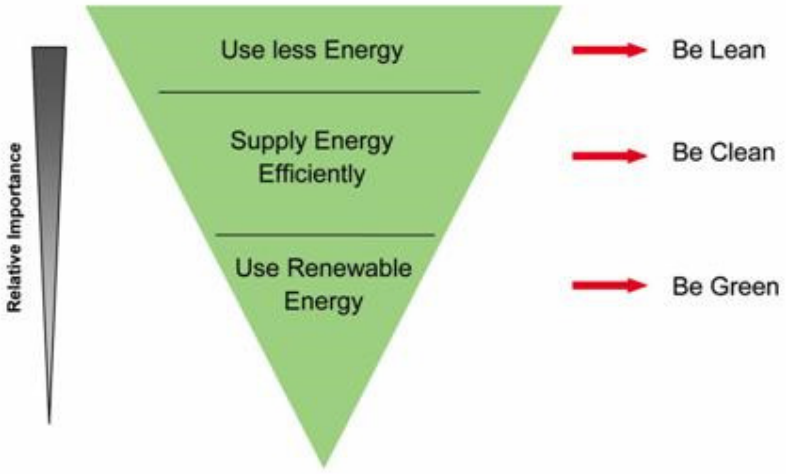
The Council will require that all new development demonstrates the incorporation of water efficiency measures within new development to reduce the rising demand on potable water. All new development must incorporate water recycling and collection facilities unless it can be demonstrated it is not appropriate. For residential developments, the Council will require applicants to demonstrate that water consumption will not surpass 105 litres per person per day.

3.0 Energy and CO_2 Emissions

To secure a future route to net zero carbon, it is proposed both Willow Lawn and Woody Bay developments will not utilise fossil fuels and will be all electric to adhere to both policies SO11 and EM1.

Both developments shall be designed and constructed to comply with the requirements of Approved Document Part L, Volume 2 2021 (incorporating 2023 amendments).

The Energy Hierarchy for the site shall follow the Be Lean, Be Clean, Be Green philosophy as described in the following sections of this report.



3.1 Be Lean – Passive and Active Design Measures

A number of techniques shall be employed to passively reduce energy consumption at each development.

Due to the function of both developments, the core Female and Male WC's shall not be air-tight, complete with a louvred steel gate on entry that shall be left open during operating hours, therefore, these spaces will be unheated.

However, the thermal envelope of both Willow Bay and Woody Lawn will still be designed as per the limiting u-values set out in Table 4.1 of Approved Document Part L Volume 2 (2021) below:

Table 4.1 Limiting U-Values for new or replacement elements in new and existing buildings and air permeability in new buildings.	
Element Type	**Maximum U-Value W/(m².K)**
Roof (flat roof)	0.18
Roof (pitched roof)	0.16
Wall	0.26
Floor	0.18
Windows	1.6
Rooflights	2.2
Pedestrian Doors (including glazed doors)	1.6
Air Permeability	8.0m³/h(h.m²) @ 50Pa

Where possible, the thermal performance shall be improved beyond the figures stated in Table 4.1.

Although an air permeability test is not mandatory for either development, the Contractor shall target a maximum figure of 8.0m³/h(h.m²) in all BOH areas where there is a complete air-tight, thermal line.

Following the adoption of passive measures, further enhancements are possible with the implementation of the active design features listed below:-

i) Low energy and LED luminaires with occupancy control systems.

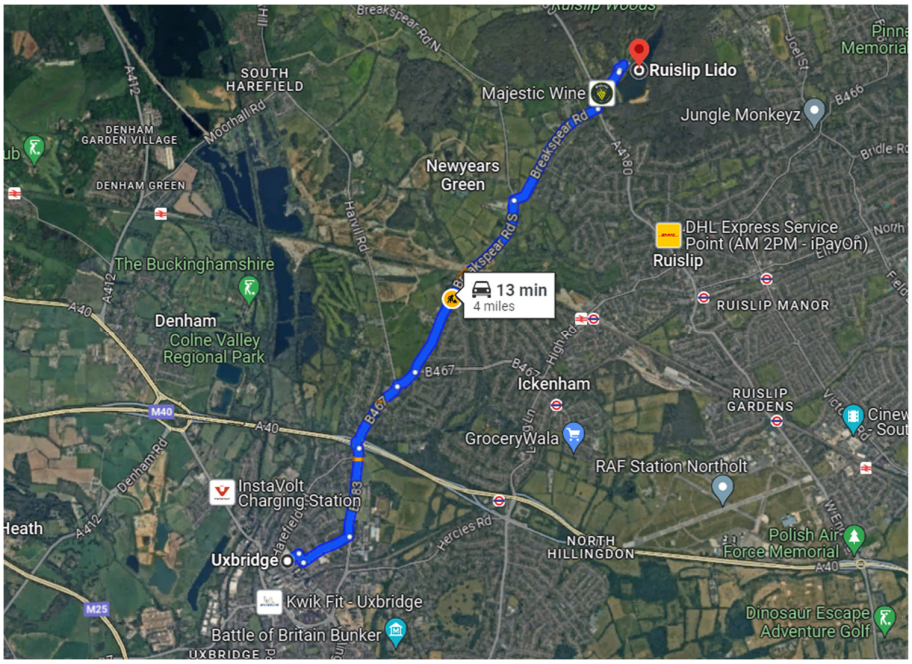
ii) Air source heat pump hot water generation with high SCOP figures.

iii) Fan units to be complete with EC fan motors and low SFP figures.

iv) Electrical infrastructure power factor correction (If possible)

3.2 Be Clean – Supply of Clean Energy

There are no feasible district heating systems in the area providing low carbon heat and electricity to connect in to for the size of the proposed development. The closest network is located at St Andrew's Park, London and is over 4 miles away, as indicated below:



To secure a future route to Net Zero Carbon, it is proposed the developments will not utilise fossil fuels and will be all electric.

A number of options were evaluated for Hot Water Generation, as completed within the finding below.

Renewable Energy Technology	Description	Appropriate
Traditional Air source heat pumps (ASHP)	Operational CO_2 emissions for high efficiency models can compare favourably to gas fired boiler plant. Life cycle embodied carbon values are similar to gas fired boiler plant. Noise from plant can be suitably attenuated so there are no problematic technical or planning issues connected with heat pumps. Newer refrigerant based ASHP's utilising R290 refrigerant can generate temperatures up to 70degC, therefore, not requiring additional input from a less efficient electric immersion heater to meet the DHW store temperature of 60degC. These heat pumps still operate with a high Seasonal Coefficient of Power (SCOP) when operating at this higher temperature.	Yes
Air Source Heat Pump (ASHP) Cylinders	Similar to traditional ASHP's, Operational CO_2 emissions for high efficiency models can compare favourably to gas fired boiler plant. Large ducts are required from the inlet / outlet of the unit. With limited service ceiling voids throughout each development, coordination of ductwork would be problematic. Large louvres / roof cowls will have to be incorporated into the façade / roof design. Due to the lower heat input from the integral ASHP's, DHW re-heat times can be prolonged, which is not suitable for a high water usage demand development.	No
Water source heat pumps (GSHP)	WSHPs offer all the benefits of ASHPs with a slight improvement on efficiencies however a large, pipework array is required to act as a heat exchanger. Due to the nature of the site there is limited areas in which the water array could be located, without visually impacting the aesthetic of the Lido. To suitably locate the array, a large connecting trench would have to be dug on site that could potentially disturb wildlife in the area. A feasibility study would need to be conducted by a specialist, in coordination with the local environmental agencies to ensure no risks to water quality and wildlife in the area.	No

3.3 Be Green – Application of Renewable Energy

Further to the introduction of the Air Source Heat Pump system(s), an appraisal of suitable renewable energy solutions has been undertaken to determine the most appropriate accompanying technology.

A summary of the findings is listed below:-

Renewable/LZC Technology	Description	Appropriate
Solar hot water heating	Solar hot water panels could be installed at roof level and there are no land use, noise or planning restrictions. However, as the development is to be all electric without fossil fuels solar hot water panels have been discounted in favour of electric solar PV panels.	No
Solar photovoltaic (PV) panels	There are no planning restrictions or land use/noise problems associated with PV panels and meaningful reductions in the CO_2 emissions can be viable given suitable locations. PV was considered for Wiilow Lawn, and the most viable location is the grass area in the middle of the car park. PV was considered for Woody Bay, but as most buildings are shaded by trees no viable locations could be found.	Yes
Battery Energy Storage Systems	Battery Energy Storage Systems can be used in two ways, firstly to store electricity generated by a PV Array and secondly to store cheap rate electricity overnight for use during the day to offset against higher rate electricity during peak daytime use. Battery energy storage was considered for Willow Lawn. The most viable solution viable solution being to store the PV generated electricity and use this to feed the existing Electric Vehicle Charging Stations in the car park. Battery energy storage was considered for Woody Bay. The most viable solution being to store off peak overnight electricity to offset against higher rate electricity during peak daytime use.	Yes
Biomass/biofuel boiler	Biomass/biofuel boiler plant can achieve carbon reductions however there are numerous drawbacks to this technology especially where buildings are located in urban locations. First generation biofuels should not be used within building heating systems and the use of biofuel in the built environment should be restricted to recycled biofuels only, such as locally sourced reclaimed cooking oils. In addition to this transport emissions for fuel deliveries offset operational carbon reductions. Air quality is a significant issue particularly in the London CAZ with Local Authorities placing limits on particulate matter (PM) and nitrogen dioxide (NO_2) emissions. Emissions control devices (catalysis, filtration, cyclones, etc.) are available for municipal scale installations but these are not practical or economical to install on the scale envisaged for this development. Biomass/biofuel has been discounted for the reasons above.	No

Renewable/LZC Technology	Description	Appropriate
Waste-to-Energy	The two most promising processes, anaerobic digestion and pyrolysis/gasification, require municipal scale installation to be economically feasible. Such installation is therefore not proportionate to the scale of the development.	No
Wind power	The wind resource in an urban environment is generally limited by low velocities and turbulent flows which are not easily harnessed by wind turbines. Other issues are vibration, shadow flicker, high maintenance and risk of noise. For these reasons wind power has been precluded.	No
Fuel cells	Fuel cells are an emerging technology which is not yet mature enough to be commercially viable.	No

As detailed in the above table, both Photovoltaic Arrays and Battery Storage shall be installed at the site.

Willow Lawn

It is proposed to provide a Photovoltaic (PV) array with battery energy storage, principally to feed the Electric Vehicle charging stations within the car park highlighted in Appendix A.

This will include a display on public view, to show the electricity generated by the PV and amount of CO_2 saved against a carbon generation source.

Woody Bay

The proposed development at the Woody Bay site has a heavily shaded roof from overhanging trees. Also, the availability of space on the ground that is not shaded and is facing a southerly direction is limited. As such, adding Photovoltaics would not be a viable option.

It is proposed to provide battery energy storage to the Woody Bay site. The battery storage could feed into the MCCB panel in the Woodlands Centre, which would provide energy to the entire Woody Bay site. The MCCB panel would need to be upgraded to allow this connection.

The introduction of battery storage to the site would assist in reducing peak loads during the busiest periods. Charging the battery energy storage system on a cheaper overnight rate and using this during the day would reduce the peak demand and enhance the eco credentials of the site.

The battery system will be located to the rear of the new toilet block as indicated in Appendix A.

It would be recommended that the battery energy storage systems make use of Lithium Ferro Phosphate batteries, as their fire risk is much lower than Lithium Ion for only a small reduction in energy density.

4.0 MEP Services Outline

Details of the MEP services serving Willow Lawn and Woody Bay are as follows:

Willow Lawn

i. Reuse the existing electric supply, with additional sub-metering to comply with Approved Document L.

ii. New Photovoltaic Array with battery energy storage to feed the Electric Vehicle Charging Stations in the car park.

iii. New sub-metering on the existing water supply.

iv. New below ground drainage sockets to suit the WC arrangements.

v. Toilet ventilation extract system to CIBSE recommendations with an internally mounted in-line extract fan, attenuators, ductwork, louvres, diffusers.

vi. Mains fed hot and cold water supplies via insulated copper pipework.

vii. Domestic hot water shall be provided via the ASHP's.

viii. Above ground foul and waste water installation complete with uPVC pipework.

ix. Rainwater Harvesting Tanks

x. Ensure all general and emergency lighting is via LED luminaires

xi. Lighting controls system with daylight dimming and automatic on/off presence detection.

Woody Bay

i. Reuse the existing electric supply, with additional sub-metering to comply with Approved Document L.

ii. New battery energy storage to feed into the general electrical services.

iii. New sub-metering on the existing water supply.

iv. New below ground drainage sockets to suit the WC arrangements.

v. Toilet ventilation extract system to CIBSE recommendations with an internally mounted in-line extract fan, attenuators, ductwork, louvres, diffusers.

vi. Mains fed hot and cold water supplies via insulated copper pipework.

vii. Domestic hot water shall be provided via the ASHP's.

viii. Above ground foul and waste water installation complete with uPVC pipework.

ix. Rainwater / Greywater Harvesting Tanks

x. Ensure all general and emergency lighting is via LED luminaires

xi. Lighting controls system with daylight dimming and automatic on/off presence detection.

5.0 Water Consumption

To adhere to EM 8, low usage appliances shall be specified throughout to exceed the requirements of Approved Document Part G. This will be achieved by a fittings approach, where the water consumption of the fittings shall not exceed the values shown in Table 5.1 below. If the values are exceeded, the water efficiency calculator must be completed to demonstrate compliance.

Low flow restrictors shall be fitted to all basins and sinks along with dual flush provision to WC's.

Water fitting	**Maximum consumption**
WC	4/2.6 litres dual flush
Basin Taps	5 l/min
Sink taps	6 l/min

One rainwater harvesting tank and one grey water harvesting tank shall be incorporated at the Woody Bay site. The grey water tank will recover / capture surface water run-off from the splash park area as indicated in Appendix A. The tanks shall be installed below ground adjacent to the toilet block and splash park respectively and shall provide grey-water toilet flushing.

One rainwater harvesting tank shall be incorporated at the Willow Lawn site. The tank shall be installed below ground adjacent to the toilet block and shall provide grey-water toilet flushing.

6.0 Materials

Wherever possible, Green Guide A+ materials will be used. Insulation materials with an Ozone Depletion Potential of 0 and a Global Warming Potential of less than 5.

Brickwork and blockwork will be specified for external wall build-ups due to their thermal mass properties.

Glazing to facing East, West and South to have a Low Emissivity coating in order to reduce solar gain.
Wherever possible, recycled and recyclable material will be used.

The building will also aim to be constructed so that materials can more easily be separated and re-used/recycled when the building comes to the end of its life cycle.

In order to further reduce the carbon footprint of the building, locally sourced and produced materials will be specified (where possible). This also enables us to support local businesses and to give the building a more local character.

7.0 Waste and Recycling

Wherever possible, recycled and recyclable material will be used. The building will also aim to be constructed so as to have a favourable and long-life cycle. This is achieved by specifying materials and systems with economical; capital costs; occupation costs; operating costs and the cost or benefit of the eventual disposal of the asset at the end of its life.

In addition, we are ensuring (where possible) the building materials used; have a low embodied energy; are robust; maximum sequestered carbon; and can be re-used/recycled when the building comes to the end of its useful life cycle.

8.0 Construction Phase Sustainability

The Main Contractor will complete the project under the Considerate Contractor's Scheme and will be encouraged to go beyond best practice site management principles.

The Contractor will monitor and minimise site CO_2 emissions, water consumption, air borne dust pollution and groundwater pollution. In addition, the Contractor is to have an Environment Materials Policy and Environmental Management System in place prior to starting construction on site.

9.0 Conclusion

This report demonstrates how the following key sustainability objectives of the scheme are to be achieved:

- Installation of Air Source Heat Pumps (ASHP) for the hot water systems at both Willow Lawn and Woody Bay building to provide a renewable and efficient energy solution.
- Reductions in the developments energy and CO_2 emissions through the integration of roof mounted renewable energy generated by photovoltaic panels
- Water consumption will be kept to a minimum by utilising low usage fittings.
- Rainwater and Greywater harvesting tanks shall be installed to recover and reuse for greywater flushing of WC's.

This document has been produced to demonstrate how the proposed development shall comply with the Part L of the Building Regulations and the Hillingdon Council Local Plan Strategic Polices.

Appendix A

Site Plan MEP Proposals

Ruislip Lido 1:5000 @ A1

Underground Bat Roost

Public House

Rainwater harvesting tank to be installed adjacent to toilet block. (Location TBC) Tank to be pumped to Willow Lawn to assist WC flushing.

Willow Lawn

Suggested PV array and battery storage on central grass area of car park to feed EV charging stations.

Suggested battery energy storage system to feed into Woody Bay distribution, located to rear of new toilet block.

Ruislip Lido Lake

Woody Bay

Suggested location for new ASHP arrangement, complete with acoustic enclosure / louvred screen.

Rainwater harvesting tank to be installed below ground adjacent to toilet block. (Location TBC) Tank to be pumped to Woody Bay to assist WC flushing.

Play ground equipment, to be temporarily protected

Foot wash and drinking fountain

Existing Bin Store

Grey water tank to be installed to recover / capture surface water run off from the splash park. (Location TBC) Tank to be pumped to rainwater harvesting tank.

Beach

Proposed Woody Bay Toilet Block

Woodlands

Woodlands Center

Railway Station and engine sheds

Woody Bay
1:500 @ A1

Willow Lawn
1:500 @ A1

Sewage Pumping Station

Proposed Willow Lawn Toilet Bl

Railway Station Cafe

Car park

Ruislip Lido Lake

Ruislip Liso 1:10000 @ A1

Site Boundary Key

Site Boundaries

Property Boundary

0 50m 100m