Quality information

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A. Introduction

This document outlines the energy data available and identifies the energy demand associated with Alexandra Park and Palace.

As part of this assessment, the following values have been generated:

- Space Heating operational peaks and annual energy usage,
- Domestic Hot Water operational peaks and annual energy usage,
- Cooling operational peaks and annual energy usage; and
- Electricity operation peaks and annual energy usage.

The output of this document is information that has been used to create hourly profiles for the project, either from metered data or AECOMs assessment of the data available.

In addition, actions have been identified to create an improved understanding of the Project's energy demands as well as a Benefits Realisation Programme. The Project's Benefits Realisation Programme is a system of defining measurable Key Performance Indicator's at inception and providing a low resource system that automatically measures, records and reports data against these KPIs.

A.1 Site Description

A.1.1 Main Palace Area Schedule

Alexandra Palace Main building has a wide variety of different spaces, with different uses. The Main Palace site plan can be seen in Figure A-1 below.

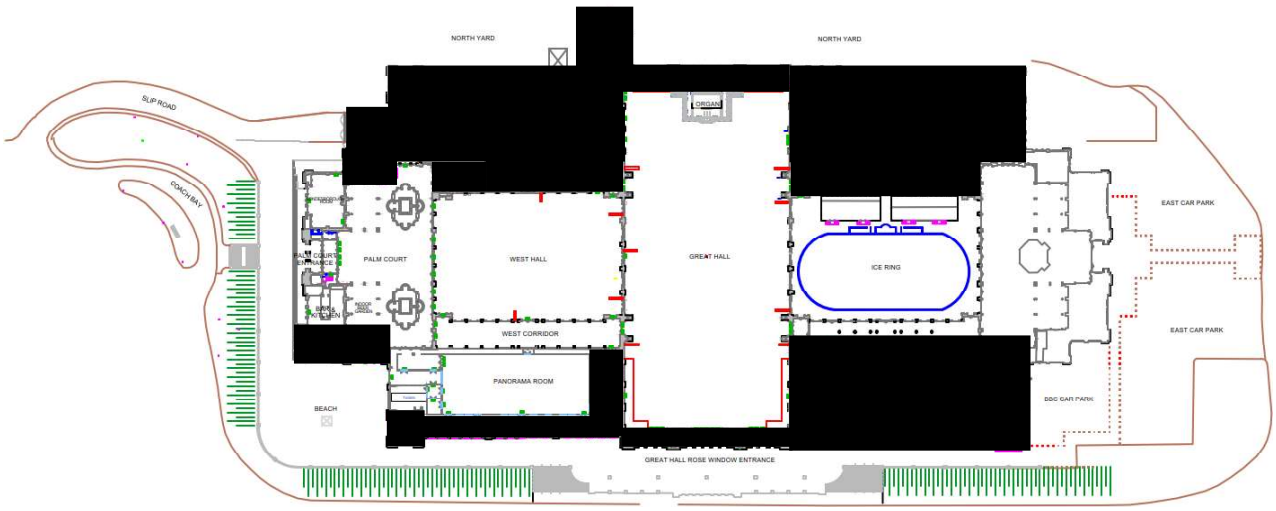


Figure A-1 - Alexandra Palace Main Building Site Plan

To enable the effective review of the energy usage, the Main Palace has been divided into zones based on the 'main' rooms in the Main Palace and their ancillary spaces. These zones and their areas in m^2 are listed in Figure A-2. These zones have been selected to align to Alexandra Palace's Forward Maintenance Plan (FMP) sectors, which are also listed in the below table for clarity.

Table A.1. Alexandra Palace Main Building Energy Zones

Zone	Alexandra Palace FMP Sector No.	Used Area (m^2)
Palm Court (Including B&K Servery, Londesborough Room)	1	2,976
West Hall	2	3,339
North West Hall & West Yard (Including Roman Bar, NW Tower)	3	4,187

Zone	Alexandra Palace FMP Sector No.	Used Area (m^2)
South West Tower**	4	0
SW Wing – Panorama Room	5	1,000
Great Hall	6	7,032
Ice Rink	7	4,706
Theatre (Including NE Tower)	8	5,017
TV Studios (Formerly BBC Studios) ***	9	402
TV Tower (Formerly BBC Tower) ***	10	1,204
East Court (Including NE & SE Pavilions, NE & SE OBs)	11	2,252
Main Kitchen & Plantrooms	12	4,684
South Basement	13	59
Pavilion Bunker (Including Ski Slope, Pitch and Putt & Playground) *	N/A	Not Used

*The Pavilion Bunker has been included as part of the main palace building as it is served from the same MPAN.

**No currently used spaces in the South West Tower. As a result, consumption is zero.

***It has been agreed that to avoid confusion with regards to meters in these zones, the TV Tower and TV Studios will be analysed as one zone. These are therefore combined in the remainder of this document.

It should be noted that these areas include only the currently used spaces of the Main Palace. Appendix 8.2 indicates these spaces on a map of the Main Palace Building.

A.1.2 Auxiliary Buildings Area Schedule

The auxiliary buildings present on the park site have been reviewed separately with regards to energy usage. There are eleven different separate buildings / areas that have been initially reviewed. The Park Site Plan can be seen in Figure A-2 below.

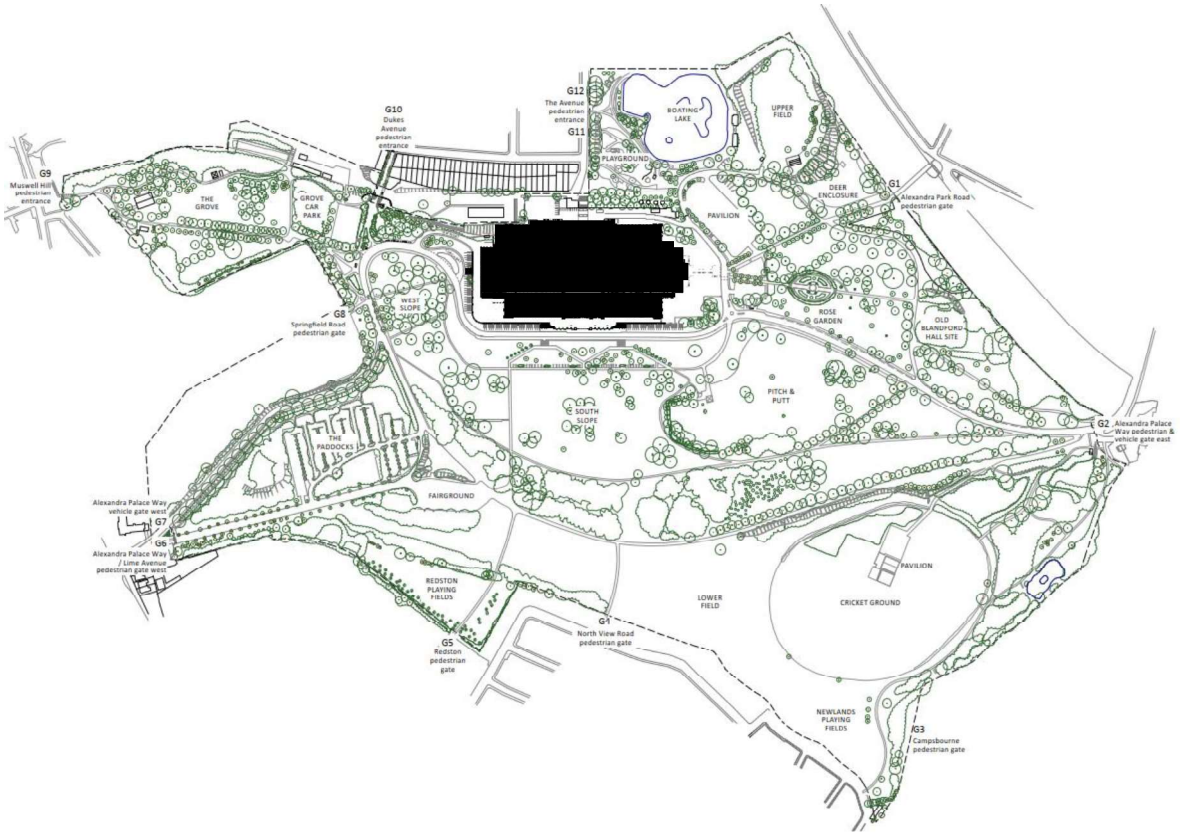


Figure A-2 - Alexandra Park and Palace Whole Site Plan

As described in more detail below, the metered data provided for these spaces was sufficient to generate a profile without the use of the building areas. These have therefore been omitted from the study. The separate buildings are listed in Table A.2.

Table A.2. Alexandra Palace Auxiliary Buildings

Building / Area
Little Dino Workshop
Grove Bunker Main
Lakeside Café / Go Ape
Unmetered Outside Lights
Garden Centre
Cricket Club
Gas Hut (de-energised) *
Meeson House
Paddock Pumphouse
Grove Café
Campsbourne Centre

*The Gas Hut has been excluded from further review

A.1.3 Future Use Area Schedule

The Alexandra Main Palace building contains a number of derelict and semi derelict areas which have been assessed separately and used to establish profiles for any potential future developments and loads that may be required by the site. Table A.3 shows the areas of the site that are derelict / semi derelict and which zone they sit in. For the purposes

of profiling, it has been assumed that if these areas were returned to full use, they would have a similar usage pattern to the 'in use' areas for the zone in which they sit, unless otherwise stated in bold.

Table A.3. Alexandra Palace Main Building Derelict Areas

Zone	Area (m^2)
North West Hall & West Yard (Including Roman Bar, NW Tower)	100
South West Tower	100
SW Wing **– New Multi-Storey Building to Replace Panorama Room**	2,644
TV Studios & TV Tower	3,219
East Court (Including NE & SE Pavilions, NE & SE OBs) **– Restaurant and Offices for Planned Area**	208
South Basement	3,875

In addition to the potential renovation and usage of the above derelict areas, the following other potential future changes have been included as part of the review:

- Campsbourne Centre New Community Hub Building
- West Yard Building: inclusion of a production gallery

B. Method of Assessment

AECOM have collected and compiled available electricity and gas meter data for the Alexandra Palace site, working with the client to identify what data is available and where there are gaps in the data. Following this data collection, the following tasks were undertaken:

- Utilising the data provided, the schematic information available and visits to site, energy hierarchy maps were generated for gas, electricity, and oil consumption. These maps show how energy is used across the site and identify where there is real information available or where assumptions have been made. These are discussed further in Section C, with the Maps indicated in Appendix 8.4.
- The information available was assessed and energy usage profiles were generated for electricity and heat requirements for each of the spaces outlined in Section A.
- Means of improving data quality and data collection have been identified and reported separately.

The main levels of data that drive quality that were reviewed are:

- Quantity – the time period which the data covers
- Granularity – the relevant position of the information to the energy hierarchy
- Accuracy – observed omissions, errors or discrepancies present

The occupancy patterns of the palace have been assumed from site visits and discussions with Alexandra Palace staff. These assumptions have been used to generate the daily profiles that are shown in Appendix 8.1. The assumptions are included in each of the profiles indicated in the appendix.

B.1 Energy Demand Assessment

For each of the zones outlined in Section A, an annual energy consumption in kWh has been estimated using (in ascending order of % attributed to assumption):

- Granular (Hourly or Half Hourly) Metered Data
- Monthly Metered Data
- Site recorded information (i.e., schematic information)
- Zone area, usage type and benchmarked values (in the absence of data, or the data being insufficient)

Annual energy consumptions have been established for both electricity and thermal requirements. Where possible, the sum of the annual demands of each zone were compared to the demand provided for the entire building to ensure consistency.

The metered data was also impacted by the covid pandemic. The thermal and electrical demand assessments have looked at and reported on the impact of the pandemic, and assessed the demands pre, post and during covid. In order to establish the annual energy demands for the palace, the following hierarchy was applied with regards to the covid pandemic:

- i) Covid figures ignored in final demand assessments where possible
- ii) Where data is granular enough to be relied upon, post covid figures only are used
- iii) For other data, an average of pre and post covid figures is used
- iv) In cases where only data for certain years is provided, this data has been used in absence of extended periods of information

B.2 Power Demand Assessment

Using the annual energy demands established, energy profiles were generated for each of the zones using profiling tools. From these profiles, peak loads in kW were extracted for each of the zones. Where possible, the sum of the peak loads for each zone was compared to the known peak load for the entire building to ensure consistency.

C. Energy Hierarchy and Primary Energy Use

The three types of energy supplied to Alexandra Park and Palace are Gas, Oil and Electricity. For all of the zones identified in Section A, the supply of these has been investigated and further understood. Energy Maps showing how these are supplied to each of the zones can be seen in Appendix 8.4 and are included as a separate document for ease of review. These maps present the findings of how energy is supplied and used by each of the zones.

The maps indicate where there are physical meters present on site, and where there are 'virtual' meters that can be calculated through either other physical meters or separata data provided (i.e., electricity bills). Branches indicated without meters have had energy consumption assumed, as described in Sections D-F of this report.

The energy usage across the site as a whole has been summarised in the below sections (C.1-C.3). Further sections break this energy usage down into zones, which can also be identified in the Energy Maps.

C.1 Gas

- Main Palace Supply: 9,100,000kWh/yr
- Auxiliary Buildings Supply: 158,000kWh/yr
- Means of Supply: Mains Gas Supply (Main Building & Auxiliary Buildings), Purchased Gas Canisters (Auxiliary Buildings only)
- Uses: Space Heating, Catering, Domestic Hot Water

C.2 Electricity

- Main Palace Supply: 3,900,000kWh/yr
- Auxiliary Buildings Supply: 447,000kWh/yr
- Means of Supply: Mains Electrical Supply
- Uses: Space Heating & Domestic Hot Water (Excluded from Zonal Review), Space Cooling (Excluded from Zonal Review), Lighting & Power

C.3 Other Fuels (Oil)

- Main Palace Supply: 107,000kWh/yr
- Auxiliary Buildings Supply: 22,000kWh/yr
- Means of Supply: Purchased and stored in Oil Tanks
- Uses: Space Heating, Vehicles, Electricity Generation

D. Thermal Demand Assessment

In the absence of sub-metered information for the generation of Domestic Hot Water, Space Heating shall be considered as an assessment of total Thermal Demand. Domestic Hot Water loads are considered to be a small fraction of site thermal energy usage at varying percentages of total energy use, dependent on zone use type. These have been factored into the profiles that are indicated in Appendix 8.1.

D.1 Data Summary

No direct sub-metering was present for space heating (or thermal demand). Assessment of the thermal demand is based on the gas information provided. Gas linked to thermal demand of the Main Palace building is estimated to be 9,100,000 kWh_G annually. This is from meter SN. 8618065 and has the catering gas load removed as detailed in Section F.2. Due to the monthly nature of the data, there is a level of uncertainty and to ensure that the heat demand is not underestimated the average of the pre and post covid demands was used.

The thermal demand is met by the 4no. Strebel Rex SRE-140 boilers located in the dedicated boiler plantroom, installed in 2015. The assessed gross seasonal efficiency is assumed to 92% based on the stated efficiency.
This assessment translates the average annual energy consumption of 9,100,000 kWh_G to 8,372,000 kWh_H, for the Main Palace building.

Monthly gas consumption data has been provided for the Main Palace Building as a whole from February 2018 to September 2022. Gas usage has also been provided for these dates as monthly data for the auxiliary building Meeson House, and the Main Palace kitchen.

For the remainder of the auxiliary buildings, a number have only electric heating present on site. Gas data has been provided in a number of cases where available, but where this has been assumed to be used for catering as opposed to heating, this has been included and reviewed separately in Section F.2.

D.2 Data Gaps

There were a number of gaps in the information available with regards to the heat metered data on site. Gaps included missed readings in the monthly metering data, and no sub-meters available on site to allow a split of areas. Below is a full list of initial data gaps and how these gaps have been filled in the subsequent analyses.

Table D.1. Gaps and Resolutions in Gas Data

Data Gap	Assumption / Resolution
Missed Monthly Meter Readings	Meter readings were calculated as the average of the surrounding meter readings
Data provided shown in Cubic Feet	Confirmed that data is in Cubic metres
No Further Breakdown of Data past Monthly Readings	Hourly profiles have been generated based on annual data and the type of usage for each zone considered
For Main Building, only total heating and Boiler 3 Data provided	Assumed that total heating is for all 4 boilers and there are no other heat sources served by this gas intake
No Data for the Pavilion Bunker	Assumed that there is no gas heating to this zone
Garden Centre gas usage not provided between October - January	% Heating demand to known months assumed as the same proportion as Main Palace Building's heating. See Appendix 6
No Sub meters included in the heating system	Profiles for each zone have been generated based on area data and a comparison to site total gas demand

D.3 Main Palace Areas Thermal Analysis

The monthly data provided has been assessed in three separate periods:

- Pre Covid-Period (February 2018 – February 2020)
- Covid Period (March 2020 – March 2021)
- Post Covid Period (April 2021 – September 2022)

Figure D-1 below shows the average gas consumption in kWh for the three periods listed above, for each month of the year.

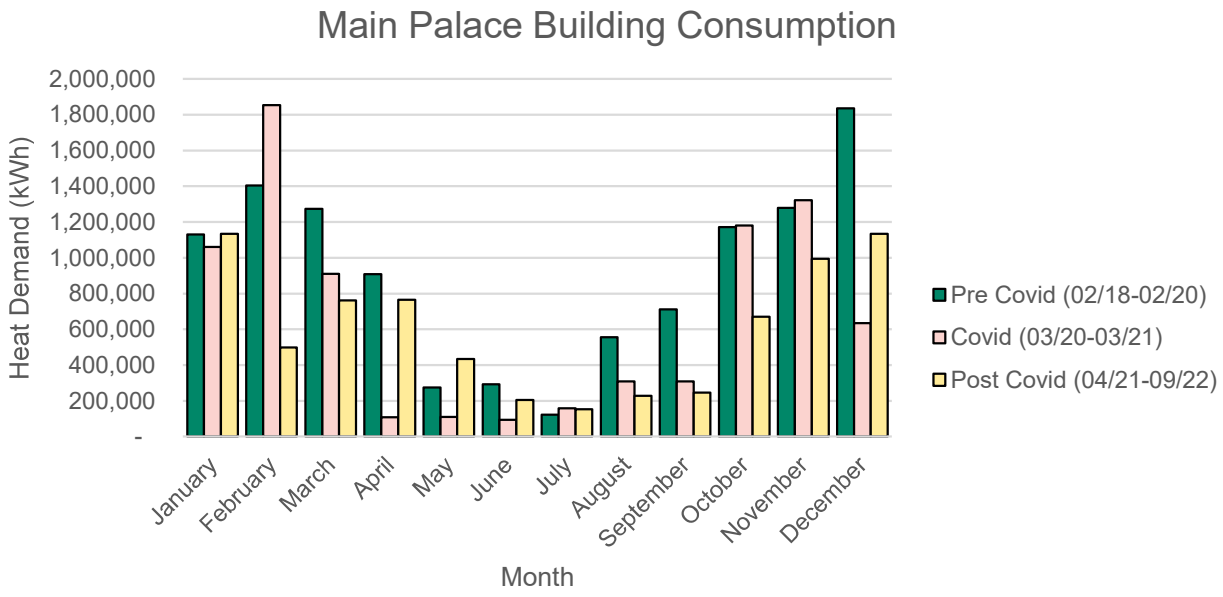


Figure D-1 - Average Gas Consumption by Month, Main Palace Building

To establish the heating profile for each of the allocated zones, two methods were considered. The first was to use the room areas, usage type and CIBSE guide TM46 to approximate the annual heat demand, and then use a benchmarking tool to establish monthly usage profiles. The second was to use the LTHW flow rates serving each zone to calculate the peak loads for each area and from this establish the annual heat demand, using the assumed profile shapes outlined in Appendix 8.1.

These LTHW flow rates were obtained from the site LTHW schematics. For spaces included in the 2018 renovation works, flow rates were obtained from drawings APEWR-BFES-00-XX-DR-M-0200-3 (LTHW Heating Schematic Sheets 1-4 of 4). For spaces excluded from these renovations, the physical copy of the Great Hall Boiler Room Heating Schematic was used – drawing number HOW/6/2442.

Table D.2 below summarises the results of these methods.

Table D.2. Heat Demand by Main Palace Building Zone

Zone	Assumed Use Type	Assessed Annual Heat Demand (kWh)	LTHW Flow Annual Heat Demand (kWh)
Palm Court (Including B&K Servery, Londesborough Room)*	Cultural Activities	1,082,860	850,000
West Hall	Entertainment Halls	1,402,380	1,150,000
North West Hall & West Yard (Including Roman Bar, NW Tower)	Entertainment Halls	1,758,540	650,000 (Information Incomplete)
South West Tower	Public Waiting or Circulation	0	0
SW Wing – Panorama Room	Cultural Activities	200,000	Insufficient Information Available
Great Hall	Entertainment Halls	2,953,440	2,400,000
Ice Rink**	Dry Sports and Leisure Facility	805,678	1,050,000
Theatre (Including NE Tower)	Entertainment Halls	2,107,140	550,000

Zone	Assumed Use Type	Assessed Annual Heat Demand (kWh)	LTHW Flow Annual Heat Demand (kWh)
TV Studios & TV Tower	Combination of Public Waiting or Circulation & General Office	192,720	Insufficient Information Available
East Court (Including NE & SE Pavilions, NE & SE OBs)	Entertainment Halls	945,840	190,000
Main Kitchen & Plantrooms	Public Waiting or Circulation	562,080	650,000
South Basement	Public Waiting or Circulation	7,100	Insufficient Information Available
Pavilion Bunker (Including Ski Slope, Pitch and Putt & Playground)	Multiple	No Heating to Area	No Heating to Area
Total	**-**	**12,020,000**	**7,490,000*** **

*Palm Court values adjusted to account for additional space heating to maintain elevated temperature in space. 20 Degree Minimum Assumed.

**Ice Rink values adjusted to account for reduced space heating to maintain cooler temperature in space. 12 Degree Minimum Assumed.

***Total includes where information was available only. 'True' total not obtainable.

Following establishing this data, the quality of the data was analysed to decide on which of the two methods for profiling the heat demand was appropriate, taking into account the gaps that are discussed in Section D.2.

The proposal is to use, where possible, the annual demand estimated from the LTHW flow rate. This is believed to provide a better estimate for the heat demand. This information is available for all zones bar North West Areas, TV areas and South Basement (where there is no heating). Using these annual heat demands gives an overall heat demand for the Main Palace zones of 9.00GWh, which is 7% higher than the total heat supplied by the boilers of 8.37GWh, accounting for a boiler efficiency of 92%. In order to produce accurate profiles for the separate zones, the heat demand data has been further multiplied by a factor of 93% to align to the whole site gas consumption data. No allowance has been made for additional demand anticipated for any electrical heaters on the site, and the Panorama room additional heating by oil is showing in Section D.3.1. The calculated final annual heat demand, from gas, per zone is shown in Table D.3.

Table D.3. Annual Heat Demand by Main Palace Building Zone

Zone	Annual Heat Demand (kWh)
Palm Court (Including B&K Servery, Londesborough Room)	790,833
West Hall	1,069,951
North West Hall & West Yard (Including Roman Bar, NW Tower)	1,636,131
South West Tower	-
SW Wing – Panorama Room	186,078
Great Hall	2,232,940
Ice Rink	976,911
Theatre (Including NE Tower)	511,715
TV Studios & TV Tower	179,305
East Court (Including NE & SE Pavilions, NE & SE OBs)	176,774
Main Kitchen & Plantrooms	604,755

Zone	Annual Heat Demand (kWh)
South Basement	6,606
Pavilion Bunker (Including Ski Slope, Pitch and Putt & Playground)	0
Total	**8,372,000**

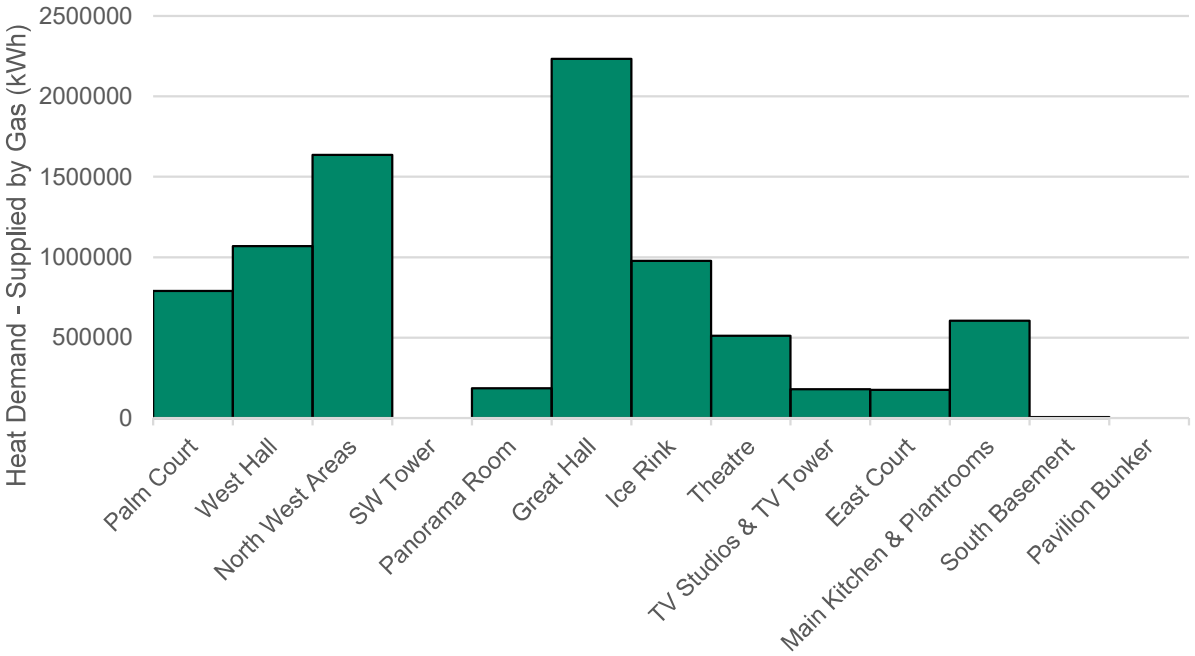


Figure D-2 - Main Site Heat Demand by Zone

These annual demands have been used to generate heating profiles for each of the Main Palace zones. The profile shapes can be seen in Appendix 8.1. The heating profile for the Panorama Room has been based on the demand indicated in Table D.3 and the additional heating demand currently provided through oil, as indicated below in Section D.3.1.

D.3.1 Panorama Room Oil Heating

The Panorama Room in the Main Palace Building has additional heating by oil that is delivered to site and then stored in the Panorama Room store tanks. The volume of oil purchased by Alexandra Palace has been shared and the volume that is reserved for Panorama Room heating has been identified. This volume of oil has been converted into a thermal heating demand by utilising the calorific value of the oil supplied (36MJ/l): 65,000kWh annual heating demand. The breakdown and calculations for the Panorama Room oil supplied for heating is shown in Appendix 8.9. The monthly heating breakdown of this demand is depicted in Figure D-3.

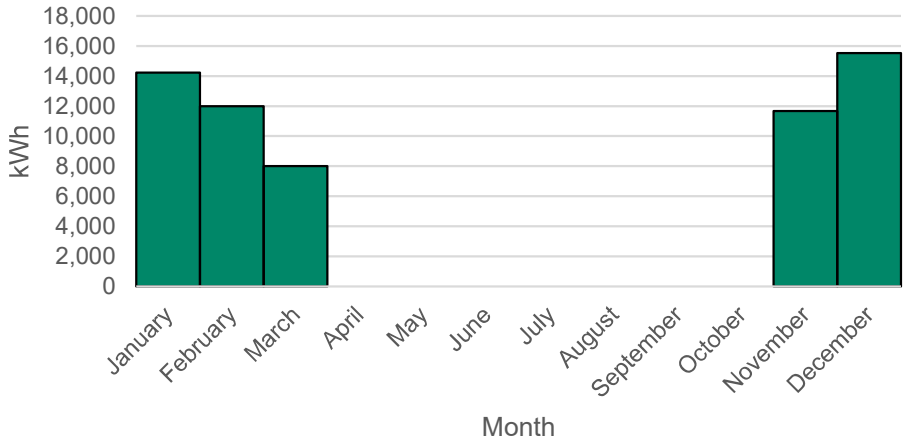


Figure D-3 - Monthly Heating Demand for the Panorama Room

The remainder of the oil volume that has been provided, is for 'general use' around the site, including the backup diesel generator and on-site works vehicles. This usage has been summarised in Section F.1.

D.4 Auxiliary Buildings Thermal Analysis

Of the eleven auxiliary buildings in the Park, four of them have been identified as using gas or oil and have provided data or statements that have allowed an annual consumption estimate to be obtained. Of the data obtained, some assumptions have been made with regards to gas usage. Table D.4 below indicates the areas that have gas / oil usage, and the assumptions made. For gas / oil that is not used for heating, this has been analysed separately in Section F.

Table D.4. Auxiliary Buildings Gas and Oil Usage

Building	Gas Usage	Oil Usage	Assumptions
Garden Centre	Yes	N/A	All Gas Used for Heating
Cricket Club	Yes – Canister Use Provided	Yes – Litres Use Provided	All Oil for Heating All Gas for Catering
Meeson House	Yes – Monthly Data Provided	N/A	All Gas used for Heating
Grove Café	Yes – Annual Usage Statement Provided	N/A	All Gas used for Catering

Based on the above assumptions, three of the auxiliary buildings have space heating or domestic hot water provided by gas or oil. The table below summarises the annual consumption, the method for obtaining the value shown and the year that this method has been applied to, based on the data obtained.

Table D.5. Auxiliary Buildings Annual Gas Demand

Building / Area	Annual Gas Demand (kWh)	Method of Obtaining Data	Year Data is from
Garden Centre	128,000	Monthly Gas Usage and Extrapolation	2022
Meeson House	27,000	Monthly Metered Data (Gas)	2021
Cricket Club	22,000	Annual Oil Usage Data	2019

The figure below shows the results graphically. This suggests that the heat demand of the auxiliary buildings is dominated by the Garden Centre. In total, the heat demand (non-electric) of the auxiliary buildings is approximately 2% compared to the consumption of the Main Palace Building.

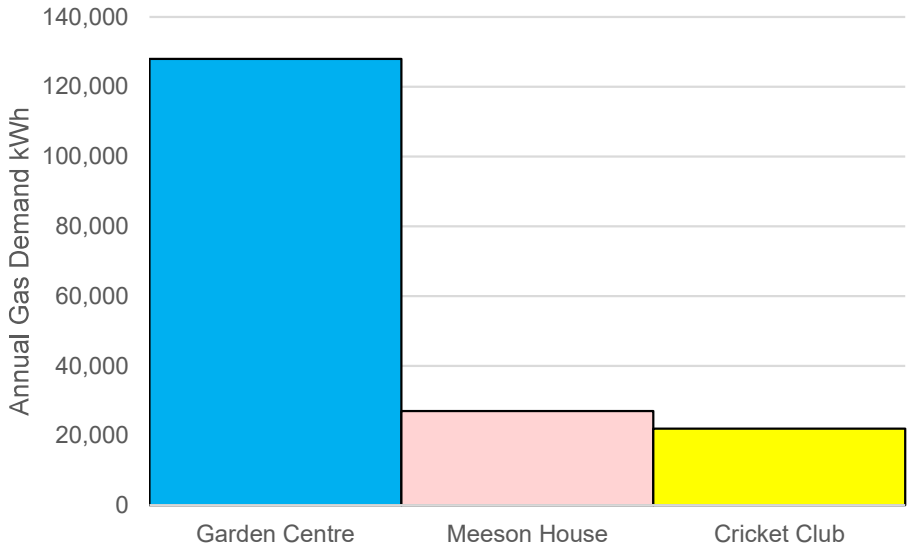


Figure D-4 - Auxiliary Buildings Annual Heat Demand

The monthly data provided for the Meeson House gas consumption has enabled a review of the monthly heating profile for the three separate periods identified. Figure D-5 below shows the average consumption in kWh for the three periods, for each month of the year.

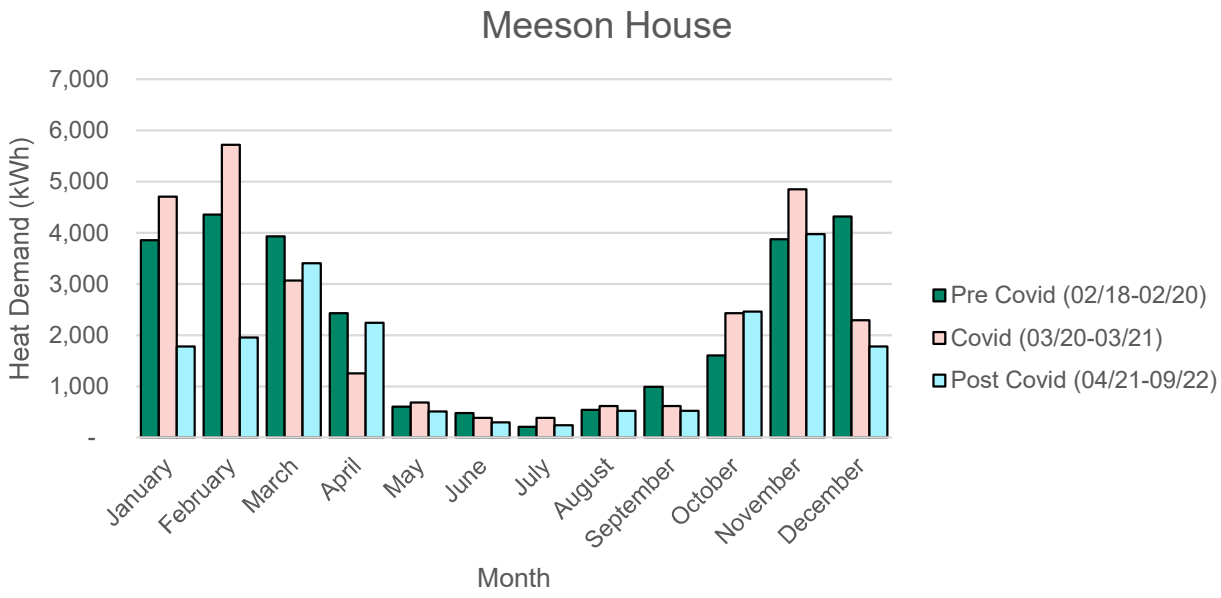


Figure D-5 - Average Gas Demand by Month, Meeson House

This data suggests that there is a reduction in heating demand post-covid. The 2021 annual data has been used for Meeson House to represent the demand.

These annual demands have been used to generate heating profiles for each of the auxiliary zones. The profile shapes can be seen in Appendix 8.1.

D.5 Ice Rink / AC Unit Cooling

The Ice Rink Heating / Cooling system is an interconnected system using compressors, heat exchangers and heat rejection plant to carry out the Ice Rink Underfloor Heating, Ice Rink Cooling and Snow Melt Heating system. These heating / cooling loads are sustained by the plant in the system, and there is only electrical input to this plantroom. As

a result, the heating / cooling loads have been excluded from further review as they do not impact on loading requirements of any potential space heating / domestic hot water plant.

It has been noted that the chiller equipment supplying the Air Handling Unit cooling coils to provide cooling into the Ice Rink space is no longer running. As a result, the cooling requirement for the Ice Rink space has not been further included in the review on the basis that it is not currently applicable.

There are a number of split AC units providing spot cooling to various zones in the building. These units have not been accounted for as part of the building thermal load. It is anticipated that there would be no benefit from replacing these systems with a building wide cooling system.

D.6 Potential Future Use

Using the areas and use types defined in Section A.1.3 for derelict and semi-derelict areas, annual heat demand has been approximated. This has then been multiplied by the same factor identified in Section D.3 to align the potential future use with the whole site energy usage. The results of this are indicated in Table D.6. This table also includes estimated demand increases for future changes that are identified in Section A.1.3.

Table D.6. Potential Future Heat Demand Assessment by Zone

Zone	Assumed Use Type	Assessed Annual Heat Demand (kWh)	Revised Annual Heat Demand (kWh)
North West Hall & West Yard (Including Roman Bar, NW Tower)	Entertainment Halls	42,000	39,076
South West Tower	Public Waiting or Circulation	12,000	11,165
SW Wing – New Multi-Storey Building	Cultural Activities	528,800	491,991
TV Studios & TV Tower	General Office	386,280	359,392
East Court (Including NE & SE Pavilions, NE & SE OBs)	Restaurant	76,960	71,603
South Basement	Public Waiting or Circulation	465,000	432,632
Campsbourne Centre New Community Hub Building	Cultural Activities	80,000	74,431
West Yard (Inclusion of Production Gallery) *	Entertainment Halls	-	-
Total	-	**1,590,000**	**1,480,000**

*The West Yard inclusion of a production gallery is anticipated to not require any additional heating demand.

This table shows that there is an estimated additional 1,480MWh of heat annually that could potentially be required by these zones, provided they were all were renovated.

E. Electrical Demand Assessment

E.1 Data Summary

The electrical consumption data for the Main Palace Building has been provided on a half hourly basis from 1st April 2018 to 19th April 2023. This has allowed a comprehensive study to be carried out on the electrical consumption for the Main Palace Building as a whole.

Monthly data has been provided for the electricity consumption of the auxiliary buildings on the site from February 2018 to April 2022, and for the sub-meters that are included in the Main Palace Building. To understand how the separate supplies work across the whole site, a markup was generated and reviewed with the client. This allowed MPANs to be identified and associated with different areas of the site. The results of this are displayed in Appendix 8.3. Due to the granularity of the data provided, it was determined that the post-covid demands could be used to estimate annual demand.

For some of the auxiliary buildings, instead of metered data, annual consumption data was provided, or monthly bills were provided that have been converted into electrical consumption. More detail on the results of this is shown in Section E.4.

E.2 Data Gaps

There were a number of gaps in the information available with regards to the metered data on site. Gaps included missed readings in the monthly metering data, and, for the main palace building, areas of the site that were not metered at all. Below is a full list of initial data gaps and how these gaps have been filled in the below analyses.

Table E.1. Gaps and Resolutions in Electrical Data

Data Gap	Assumption / Resolution
No Meters on a number of outside lights	Assumed usage patterns and consumption. See Appendix 8.5
No Metered Data for Garden Centre, Campsbourne Centre, Grove Café, Paddock Pumphouse and Cricket Club	Consumption calculated from bills provided, usage statements and assumed usage patterns. See Appendix 8.6, Appendix 8.7 and Appendix 8.8
Kitchen Area not provided	Assessment of kitchen electrical consumption using meter readings only
West Hall – E67-70, unclear how these link to the main electrical system	Meters have not been used in subsequent analysis
West Hall – E67-70, large number of 0 meter readings	Consumption calculated using area provided and assumed usage type. See Section E.3.
Palm Court – E73, large number of 0 meter readings	Consumption calculated using area provided and assumed usage type. See Section E.3.
Panorama Room – Two supplies without a meter	Consumption calculated using area provided and assumed usage type. See Section E.3.
Great Hall – Three supplies without a meter	Consumption calculated using area provided and assumed usage type. See Section E.3.
Great Hall – E12, Meter includes other unmetered zones	No logical way of breaking down this usage due to the layout of meters.
Ice Rink – E6, Meter includes other unmetered zones	No logical way of breaking down this usage due to the layout of meters.
East Court – No sub metered data available	Consumption calculated using area provided and assumed usage type. See Section E.3.
Theatre – E52-58, large number of 0 meter readings	Consumption calculated using area provided and assumed usage type. See Section E.3.

Data Gap	Assumption / Resolution
TV Studios & TV Tower – E32, E36, E74-76, E29, E40, E72, E61-64, large number of 0 meter readings	Consumption calculated using area provided and assumed usage type. See Section E.3.
E10 No Data	Chiller Removed – No Consumption from E10
Various other unmetered spaces	Unmetered spaces cannot be included in the metered data analysis. The annual consumptions have been benchmarked where required and are shown in Section E.3.
Missed Monthly Meter Readings	Meter readings were calculated as the average of the surrounding meter readings

E.3 Main Palace Areas Electrical Analysis

The half hourly data provided has been assessed in three separate periods:

- Pre Covid-Period (April 2018 – February 2020)
- Covid Period (March 2020 – March 2021)
- Post Covid Period (April 2021 – April 2023)

It has been determined that there are not unexpected variations in the electricity consumption of the main site on average with either time of day or month of year, with the exception of night-time use for which a larger drop would be anticipated than is shown. Figure E-1 and Figure E-2 below show the average consumption in kWh for the three periods listed above, for each time of day and month of the year.

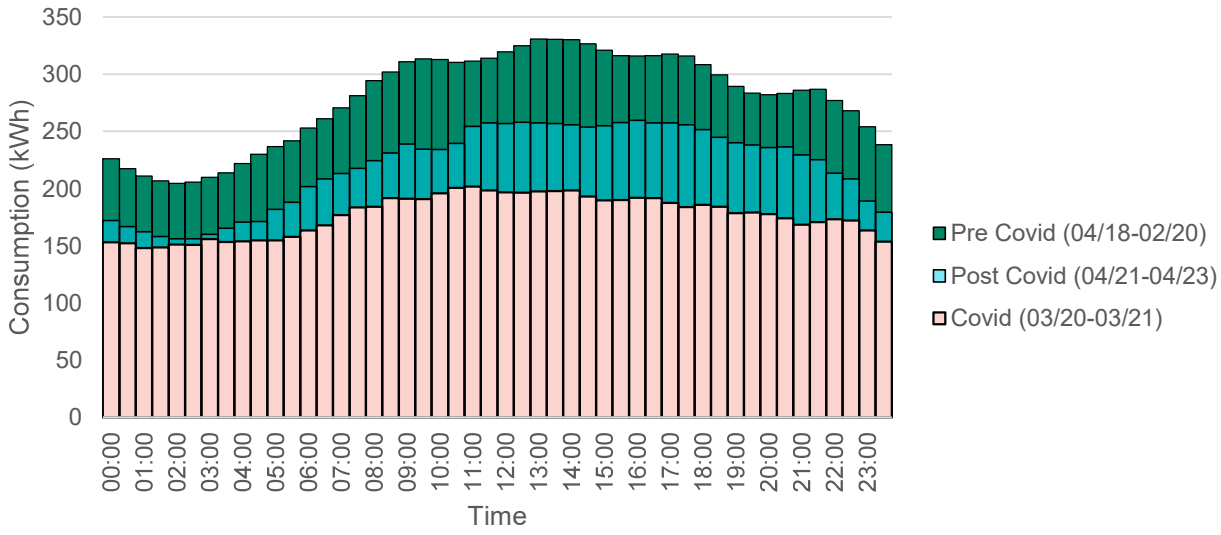


Figure E-1 - Average Electricity Usage by Time (kWh)

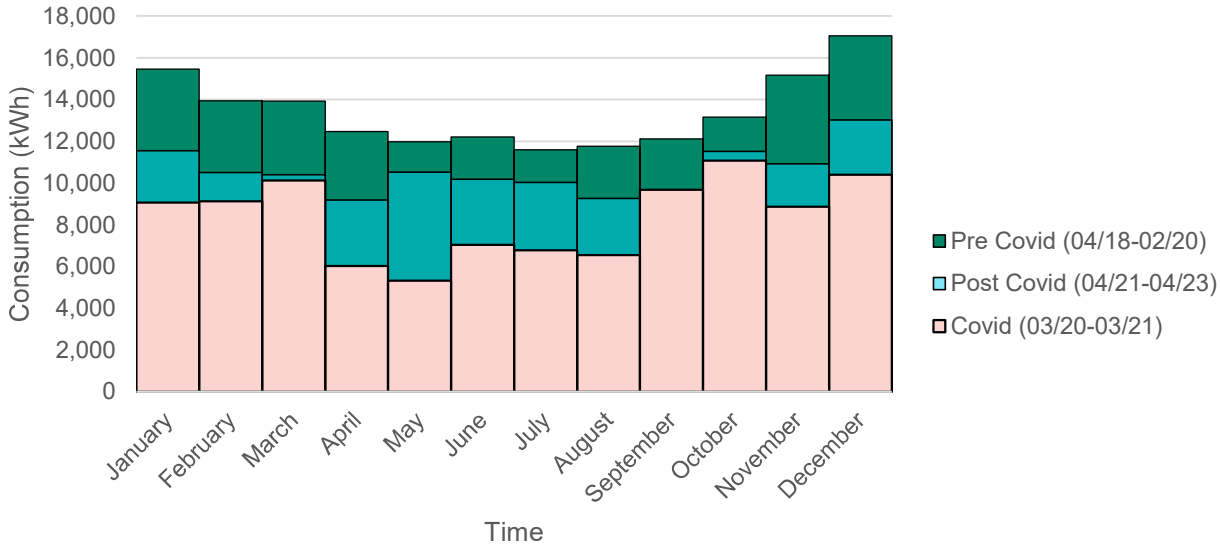


Figure E-2 - Average Electricity Usage per Day by Month

With a number of areas in the Main Palace Building being used as event spaces, it is important to understand both the base load and the peak load for the site. Figure E-3 below depicts the Load Duration curve for the data provided. It can be seen that for the post-covid period, the base electrical load for the site is approximately 200kW, whilst the peak load is 1031kW.

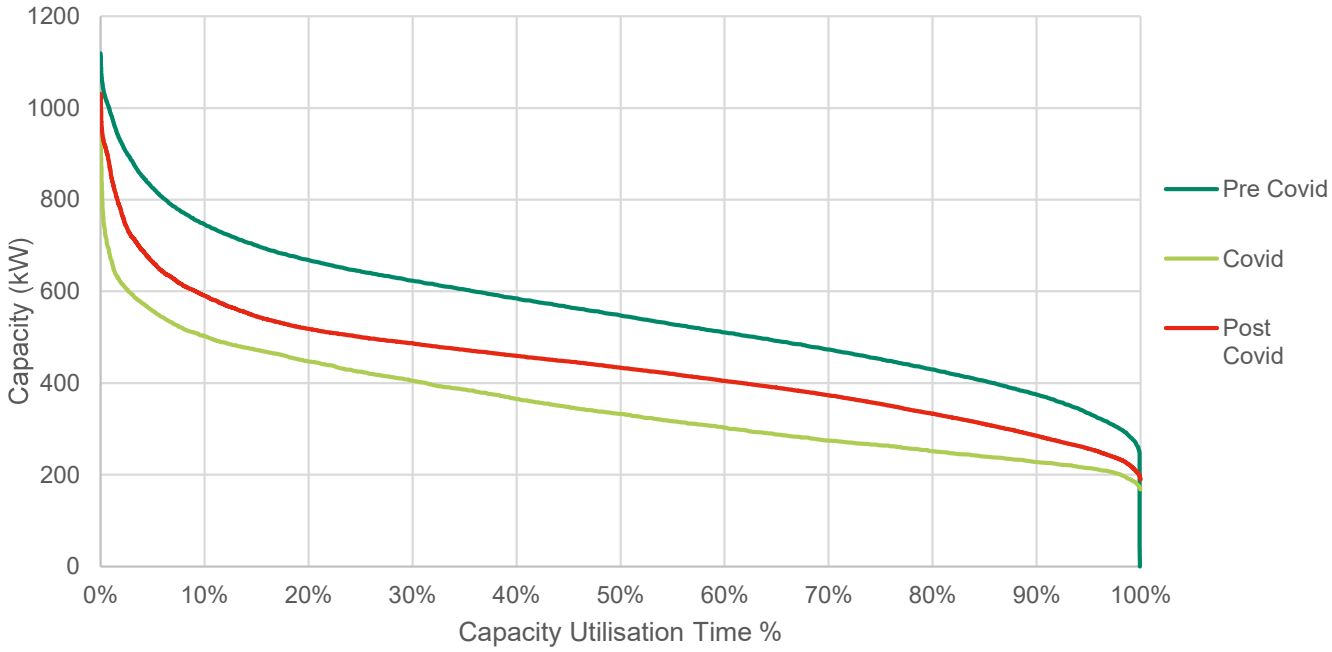


Figure E-3 - Alexandra Palace Main Site Load Duration Curve

To better understand the peak loads of the site, an analysis has been undertaken into the common times that these peak loads occur and what dates these peak loads occurred on. For the post-covid period, the PDC Darts World Championships were held at Alexandra Palace between the dates of:

- 2022 World Championships, 15th December 2021 – 3rd January 2022
- 2023 World Championships, 15th December 2022 – 3rd January 2023

These peak demands across these championships were reviewed with the following findings:

- The top 139 periods of demand (69.5 hours) were all recorded during one of these championships.
- All demands recorded equal to and above 90% of the peak demand were recorded at one of these championships, the demand never exceeded 90% of peak outside of these times.

- The peak demand for periods outside of these championships was 89% of current peak stated.

AECOM undertook a detailed review of potential regular spikes in electricity consumption within the 5-year period over which the data was provided. It was discovered that there were only 93 occurrences in which electricity consumption increased by 33% in half an hour, for loads that were at least 33% of the building peak load. These occurrences were approximately normally distributed, suggesting that there was no regular spike in electrical consumption that would require further review.

In order to understand the electricity usage on site, the overall consumption above was used as a baseline to compare and verify the consumption profiles for each of the main palace zones summarised below. There are 13 areas in the Main Palace Building that have been identified, and the sub-meters associated with each zone have been tabulated below. There were also a number of spaces that were not sub metered, as identified in the gaps above.

Table E.2. Alexandra Palace Main Building Sub-Meters Overview

Zone	Sub-Meters
Main Kitchen	E4
West Hall	E24, E27, E67-70
Palm Court	E11, E73
Panorama Room	E26
Great Hall	E12*, E15, E23-25, E65-66
Ice Rink	E6-9
East Court	N/A
Theatre	E52-58
Pavilion Bunker (Including Ski Slope, Pitch and Putt & Playground)	E17-22, E51
TV Tower & TV Studios	E36, E74-76, E29-32, E40, E61-64, E72
West Yard	N/A
Northwest Hall	N/A
Other Ancillary Spaces (Plantrooms, Corridors, All 4 Towers)	E3, E5, E10 (no longer in use)

*E12 also part supplied the TV Tower with no split provided

To establish the electricity consumption profiles for each of the spaces below, two methods were considered. The first was to use the room areas, usage type and CIBSE guide TM46 to approximate the annual consumption, and then use a benchmarking tool to establish monthly usage profiles. The second was to use the monthly meter readings provided and, where possible, establish the annual consumption. Due to the gaps listed, in some cases it was not possible to use the metered data. Table E.3 below summarises the results of these methods.

Table E.3. Electricity Consumption Assessment by Main Palace Building Zone

Zone	Assumed Use Type	Assessed Annual Electricity Consumption (kWh)	Metered Data Annual Electricity Consumption (kWh)
Palm Court (Including B&K Servery, Londesborough Room)	Cultural Activities	208,320	35,573
West Hall	Entertainment Halls	500,850	35,806
North West Hall & West Yard (Including Roman Bar, NW Tower)	Entertainment Halls	628,050	Insufficient Metered Data

Zone	Assumed Use Type	Assessed Annual Electricity Consumption (kWh)	Metered Data Annual Electricity Consumption (kWh)
South West Tower	Public Waiting or Circulation	0	0
SW Wing – Panorama Room	Cultural Activities	70,000	4,864
Great Hall	Entertainment Halls	1,054,800	116,612
Ice Rink	Dry Sports and Leisure Facility	447,070	86,316
Theatre (Including NE Tower)	Entertainment Halls	752,550	313,411
TV Studios & TV Tower	Combination of Public Waiting or Circulation & General Office	126,440	307,593
East Court (Including NE & SE Pavilions, NE & SE OBs)	Entertainment Halls	337,800	Insufficient Metered Data
Main Kitchen & Plantrooms	Public Waiting or Circulation	140,520	5,014
South Basement	Public Waiting or Circulation	1,770	Insufficient Metered Data
Pavilion Bunker (Including Ski Slope, Pitch and Putt & Playground)	Multiple	Not Used	58,503
Total	**-**	**4,270,000**	**964,000***

*Total includes where information was available only. 'True' total not obtainable.

Following establishing this data, the quality of the data was analysed to decide on which of the two methods for profiling the electricity usage was appropriate, taking into account the gaps that are discussed in Section E.2. Due to the number of spaces associated with the above zones that do not currently have meters, the metered data was generally not useable to establish a profile for each of these areas.

The proposal is to use the higher of the two values presented in the table above for each zone. This means utilising the TM46 benchmark for all cases bar the TV Studios & TV Tower, Main Kitchen and Pavilion Bunker. Using these annual consumptions gives an overall electricity consumption for the main palace of 4.51GWh, which is 16% higher than the post-covid half hourly annual consumption provided of 3.90GWh. Given the nature of CIBSE guide TM46 being produced pre-covid, it is not unusual that the total value is higher than anticipated. In order to produce accurate profiles for the separate zones, the consumption data has been further multiplied by a factor of 86.5% to align to the whole site electrical consumption data. The final annual electricity consumption per zone is shown in Table E.4.

Table E.4. Annual Electricity Consumption by Main Palace Building Zone

Zone	Annual Electricity Consumption (kWh)
Palm Court (Including B&K Servery, Londesborough Room)	180,231
West Hall	433,316
North West Hall & West Yard (Including Roman Bar, NW Tower)	543,365
South West Tower	-
SW Wing – Panorama Room	60,561

Zone	Annual Electricity Consumption (kWh)
Great Hall	912,573
Ice Rink	386,788
Theatre (Including NE Tower)	651,078
TV Studios & TV Tower	266,118
East Court (Including NE & SE Pavilions, NE & SE OBs)	292,252
Main Kitchen & Plantrooms	121,573
South Basement	1,531
Pavilion Bunker (Including Ski Slope, Pitch and Putt & Playground)	50,615
Total	**3,900,000**

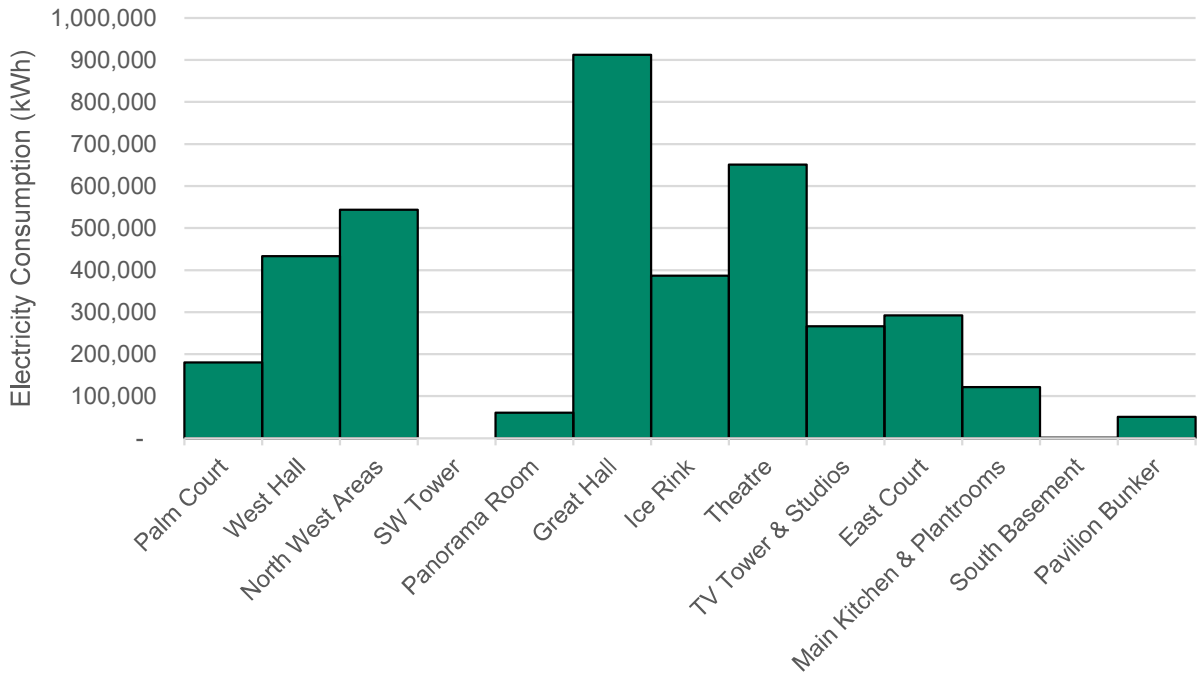


Figure E-4 - Main Site Annual Electricity Consumption by Zone

These annual demands have been used to generate electricity profiles for each of the Main Palace zones. The profile shapes can be seen in Appendix 8.1.

E.4 Auxiliary Buildings Electrical Analysis

There are eleven auxiliary buildings on the park that have been reviewed. Firstly, the MPANs associated with each site were identified and numbered (with an "a" and "b" assigned for the Garden Centre's 2 MPANs). It was then identified which sub-meters were associated with each MPAN, in order for these to be reviewed and the total electrical consumption for each building understood. Table E.5 shows this MPAN and sub-meter association.

Table E.5 - MPANs and Sub-Meters Overview

Colour / MPAN No.	Building(s) Served	Main Supply Meters
1	Main Palace Building	TX1-3. Includes Pavilion Bunker (E17-22 & E51)
2	Little Dino Workshop	E38

3	Grove Bunker Main (345 Preschool, Street lights, Event Supply)	E37 (E41-44)
4	Lakeside Café, Boat Lake & Go Ape	E46, E47, E48, E49, E50
N/A	Unmetered Outside Lights	No Metered Data
5a & b	Garden Centre	No Metered Data
6	Cricket Club	No Metered Data
7	Gas Hut	E33
8	Meeson House	E34 & E35
9	Paddock Pumphouse	E28
10	Grove Café	E71
11	Campsbourne Centre	E77

Using the above table and the metered data provided, allowing for the gaps being filled as described in Section E.2, annual consumption data for each of the separate buildings has been summarised. Due to the nature of the data provided, there is not a standardised year that the data has been obtained from. The table below summarises the annual consumption, the method for obtaining the value shown and the year that this method has been applied to.

Table E.6. Auxiliary Buildings Annual Electricity Consumption

Building / Area	Annual Electricity Consumption (kWh)	Method of Obtaining Data	Year Data is from
Little Dino Workshop	37,000	Metered Data	2021
Grove Bunker Main	22,000	Metered Data	2021
Lakeside Café / Go Ape	96,000	Metered Data	2021
Unmetered Outside Lights	150,000	Calculation – Appendix 5	N/A
Garden Centre	89,000	Bills – Appendix 6	2022
Cricket Club	15,000	3rd Party Readings	2019
Gas Hut (de-energised)		Excluded from Study	
Meeson House	22,000	Metered Data	2021
Paddock Pumphouse	1,400	Calculation – Appendix 8	2021-2022
Grove Café	8,000	Email Statement	N/A
Campsbourne Centre	7,000	Bills – Appendix 7	2022
Total	**447,000**		

The Figure below shows the results of the above graphically. This suggests that the electricity consumption of the auxiliary buildings is dominated by the unmetered lights, Lakeside Café / Go Ape and the Garden Centre. In total the electricity consumption of the auxiliary buildings is approximately 12% compared to the consumption of the main site.

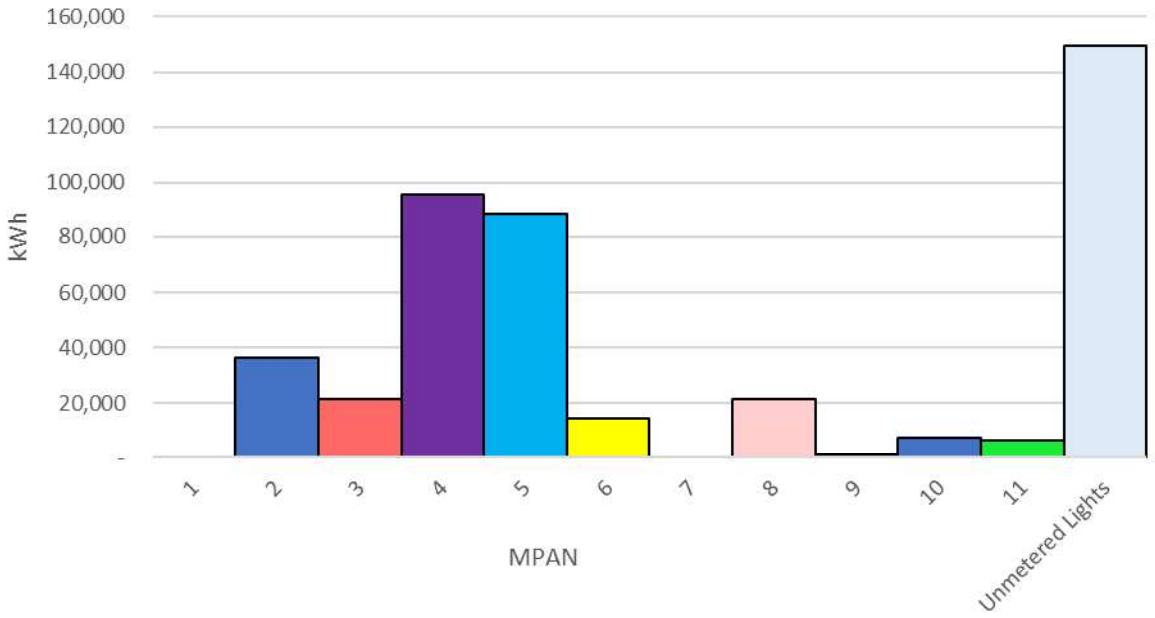


Figure E-5 - Auxiliary Buildings Annual Electricity Consumption

These annual demands have been used to generate electricity profiles for each of the auxiliary zones. The profile shapes can be seen in Appendix 8.1.

E.5 Potential Future Use

Using the areas defined in Section A.1.3 for derelict and semi-derelict spaces, annual electricity consumption has been approximated. This has then been multiplied by the same factor identified in Section E.3, to align the potential future use with the whole site energy usage. The results of this are indicated in Table E.7. This table also includes estimated demand increases for future changes that are identified in Section A.1.3.

Table E.7. Potential Future Electricity Consumption Assessment by Zone

Zone	Assumed Use Type	Assessed Annual Electricity Consumption (kWh)	Revised Annual Electricity Consumption (kWh)
North West Hall & West Yard (Including Roman Bar, NW Tower)	Entertainment Halls	15,000	12,977
South West Tower	Public Waiting or Circulation	3,000	2,595
SW Wing – New Multi-Storey Building	Cultural Activities	185,080	160,124
TV Studios & TV Tower	General Office	305,805	264,571
East Court (Including NE & SE Pavilions, NE & SE OBs)	Restaurant	18,720	16,196
South Basement	Public Waiting or Circulation	116,250	100,575
Campsbourne Centre New Community Hub Building	Cultural Activities	66,000	57,101
North East Office Building Extension	General Office	54,750	47,368
West Yard (Inclusion of Production Gallery) *	Entertainment Halls	18,720	16,196
Total	-	**765,000**	**662,000**

*The West Yard inclusion of a production gallery is not a new / renovated area. This is the estimated annual consumption for updating part of the area to a production gallery.

This table shows that there is an estimated additional 662MWh of electricity annually that could potentially be consumed by these zones, provided they were all renovated.

F. Other Energy Uses

There are four 'other' energy demands that are not from electrical demand or space heating / domestic hot water demand These are:

- Gas cannisters used at the Grove Café for catering purposes.
- Gas cannisters used at the Cricket Club for catering purposes.
- Mains Gas supply to the Main Palace Building kitchen for catering purposes.
- Oil supply for general store tanks for site vehicles (MEWPs, Forklifts etc) and other general use.

F.1 Oil Supply

The Oil purchased by Alexandra Palace that is apportioned for general use is indicated for 2021-2022 in Appendix 8.11. From this data, an estimated 2,500-4,000 litres of oil are used on site annually for general use. The split between generator and vehicle use has not been established, and for the purposes of providing a worst-case intervention to replace the generator, the entire oil consumption has been apportioned for generator use.

To eliminate all oil use from the site, the vehicles used are suggested to be switched to electrical vehicles in the future. Insufficient information and anticipated negligible impact on overall consumption means that this intervention has not been considered further.

F.2 Gas Supply

Table F.1 below indicates the areas that use gas for catering purposes, the volume of gas used annually and how this data was provided / obtained.

Table F.1 – Site Gas Consumption for Catering

Building / Area	Annual Gas Consumption (m^3)	Method of Obtaining Data	Year Data is from
Cricket Club	0.15	Annual cannister usage	2019
Grove Café	0.23	Annual cannister usage	N/A
Main Palace Kitchen	415.00	Monthly metered data	Post Covid Period average

The monthly data provided for the Main Palace kitchen gas consumption has enabled a review of the monthly usage profile for the three separate periods identified in Section D.3. Figure F-1 below shows the average consumption in m^3 for the three periods, for each month of the year.

Figure F-1 - Average Gas Consumption by Month, Main Palace Kitchen

Appendix 8.1. Demand Load Assessments

The below tables show the usage profiles that have been generated for each of the spaces within the Main Palace building and for the auxiliary buildings. These have subsequently been used with the demands set out in this document to generate hourly consumption profiles for each of the spaces. These profiles have been used to assess the cost / carbon impact of any potential future interventions and estimate the correct size of any plant suggested.

The profiles indicated below have also been applied to potential future renovations and derelict spaces as discussed in Section A.1.3 to enable a review of potential future site demands and how this could impact installed plant capacity.

The Domestic Hot Water annual loads have been assumed as a percentage of the Space Heating load. The table below lists the assumed percentages for each profile.

Table F.2. Domestic Hot Water Loads

Profile	DHW % of SH Load
Cultural Activities: General Public Spaces	15
Entertainment Halls: Leisure Halls and Spaces	25
General Spaces: Circulation	25
Sport Centre (no pool): Activity Spaces	25
Restaurant: Main Kitchen	35
Office Spaces	25
Garden Centre	20

The Domestic Hot Water profiles have been included in the tables below, with the graphical representations excluded for clarity.

Profile – Cultural Activities: General Public Spaces	Main Occupancy Assumptions: baseline electrical demand at weekends																							
Profile Rooms: - **Panorama Room, Palm Court, Meeson House, Campsbourne Centre**	**Modelled Plant Load (%)**																							
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
Space Heating -Weekday	22	22	22	22	22	93	100	70	66	66	74	74	74	74	66	66	66	61	55	25	25	25	22	22
Space Heating -Weekend	22	22	22	22	22	24	64	77	46	46	52	52	52	52	46	46	46	44	42	35	24	22	22	22
Domestic Hot Water -Weekday	19	19	18	18	18	20	30	53	79	96	98	97	94	92	90	87	71	60	42	21	19	19	19	19
Domestic Hot Water – Weekend	21	22	21	21	21	21	22	24	29	30	29	28	26	23	21	21	21	21	21	21	21	21	21	21
Electricity – Weekday	20	20	20	20	20	20	20	50	80	90	100	100	100	100	100	100	100	100	90	70	50	20	20	20
Electricity – Weekend	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20

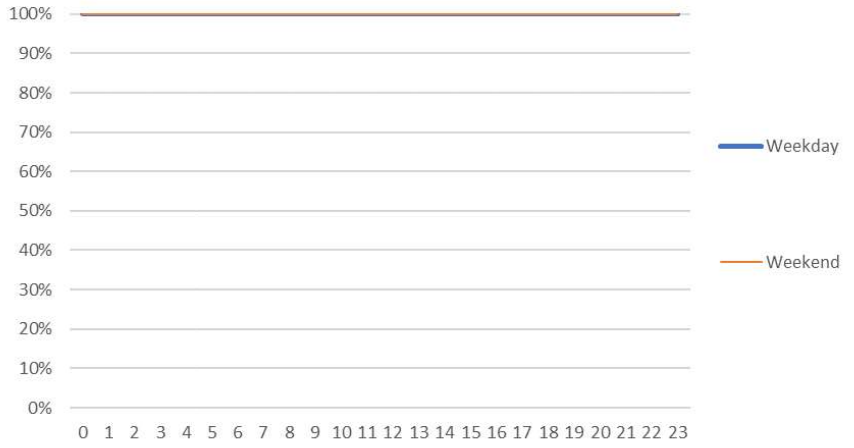
Space Heating Profile

Electricity Profile

Profile – Entertainment Halls: Leisure Halls and Spaces	Main Occupancy Assumptions: constant electrical load																							
Profile Rooms: - **West Hall, North West Hall, Great Hall, Theatre, East Court, Dino Workshop, Grove Bunker Main, Lakeside Café/Go Ape**	**Modelled Plant Load (%)**																							
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
Space Heating -Weekday	33	23	23	23	48	76	90	95	100	90	90	88	88	88	88	88	88	83	66	60	55	50	44	39
Space Heating -Weekend	30	22	22	22	28	55	70	72	77	72	72	72	72	72	72	72	72	66	63	61	61	55	50	33
Domestic Hot Water -Weekday	4	4	4	4	4	21	100	97	49	33	30	29	33	36	28	29	34	42	58	59	40	17	4	4
Domestic Hot Water – Weekend	4	4	4	4	4	4	21	100	84	49	56	56	57	55	55	56	53	49	41	35	11	5	4	4
Electricity – Weekday	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Electricity – Weekend	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Space Heating Profile

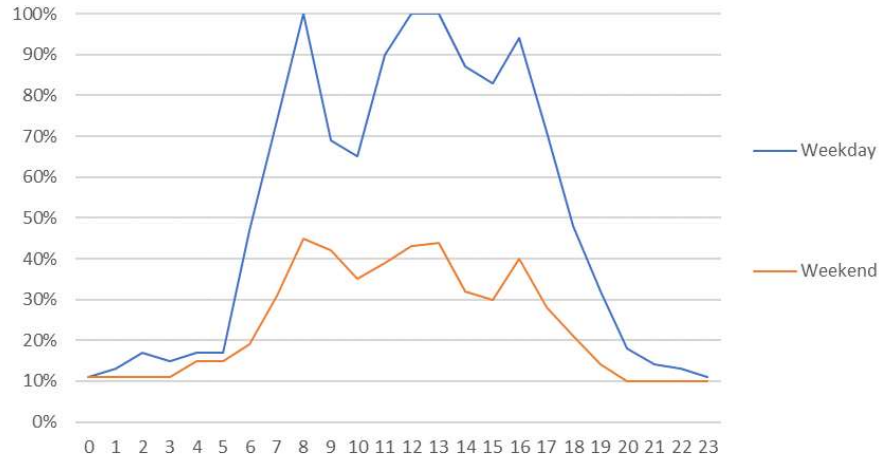
Electricity Profile



Profile – General Spaces: Circulation	Main Occupancy Assumptions: No weekend occupancy, weekend space heating and electrical demand from setback and left on equipment																							
Profile Rooms:	**Modelled Plant Load (%)**																							
- **South West Tower, South Basement, Paddock Pumphouse**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
Space Heating -Weekday	17	17	17	24	26	35	100	94	94	82	86	85	83	77	68	69	65	50	44	42	35	28	25	25
Space Heating -Weekend	17	17	17	19	22	26	77	72	66	66	66	61	61	50	44	44	44	50	39	28	17	17	17	17
Domestic Hot Water -Weekday	10	10	10	10	10	10	40	94	100	100	98	74	74	100	100	97	94	50	10	10	10	10	10	10
Domestic Hot Water – Weekend	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Electricity – Weekday	11	13	17	15	17	17	47	74	100	69	65	90	100	100	87	83	94	71	48	32	18	14	13	11
Electricity – Weekend	11	11	11	11	15	15	19	31	45	42	35	39	43	44	32	30	40	28	21	14	10	10	10	10

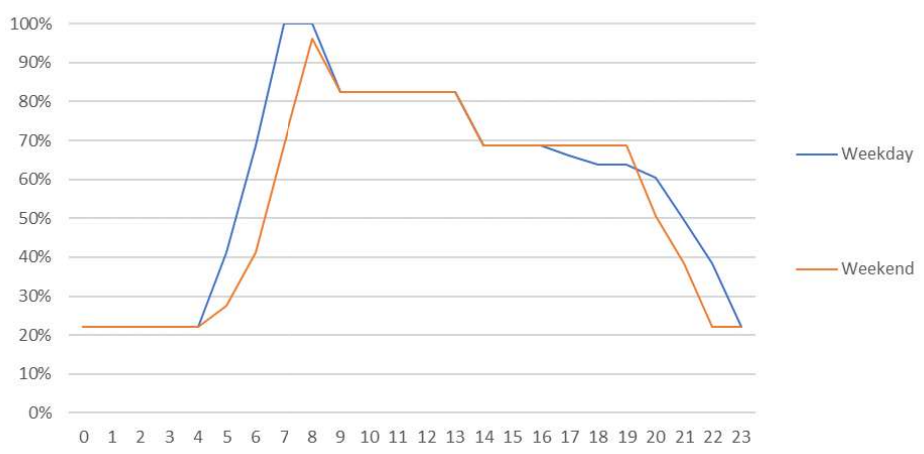
Space Heating Profile

Electricity Profile

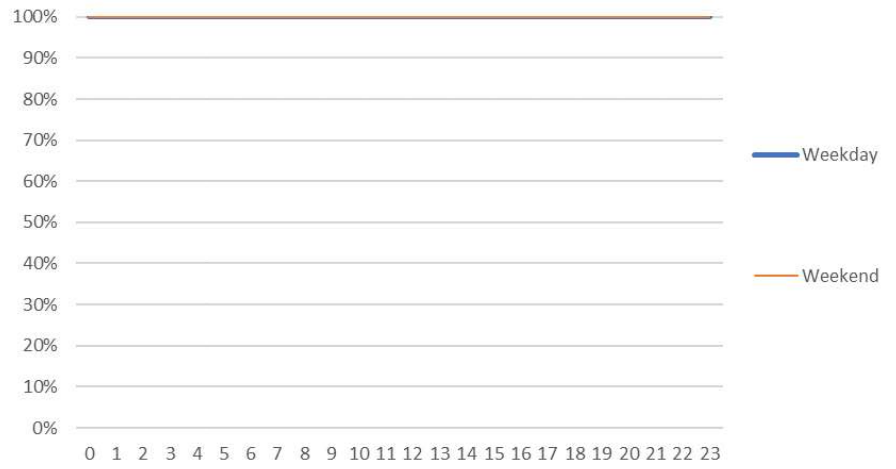


Profile – Sport Centre (no pool): Activity Spaces	Main Occupancy Assumptions: constant electrical load																							
Profile Rooms: - **Ice Rink, Pavilion Bunker, Cricket Club**	**Modelled Plant Load (%)**																							
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
Space Heating -Weekday	22	22	22	22	22	41	69	100	100	83	83	83	83	83	69	69	69	66	64	64	61	50	39	22
Space Heating -Weekend	22	22	22	22	22	28	41	69	96	83	83	83	83	83	69	69	69	69	69	69	51	39	22	22
Domestic Hot Water -Weekday	2	2	2	2	2	2	2	60	34	20	17	17	17	39	17	17	17	23	100	100	57	15	2	2
Domestic Hot Water – Weekend	2	2	2	2	2	2	2	5	17	45	88	100	100	100	100	100	76	51	30	23	12	7	2	2
Electricity – Weekday	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Electricity – Weekend	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Space Heating Profile

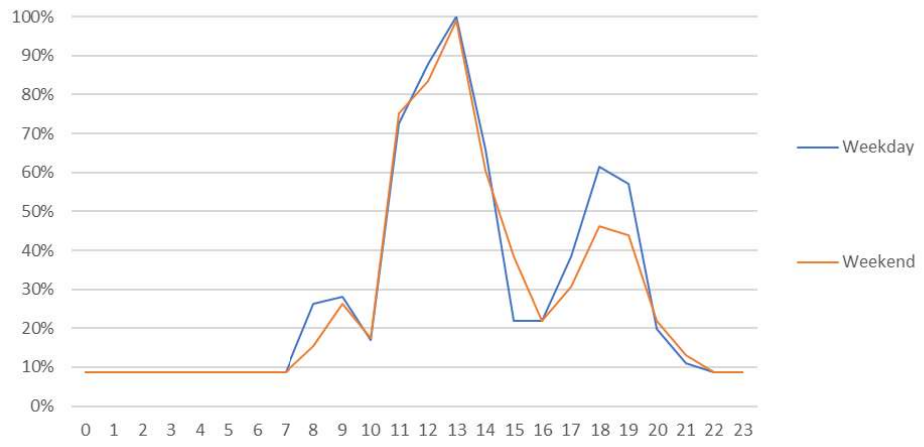


Electricity Profile

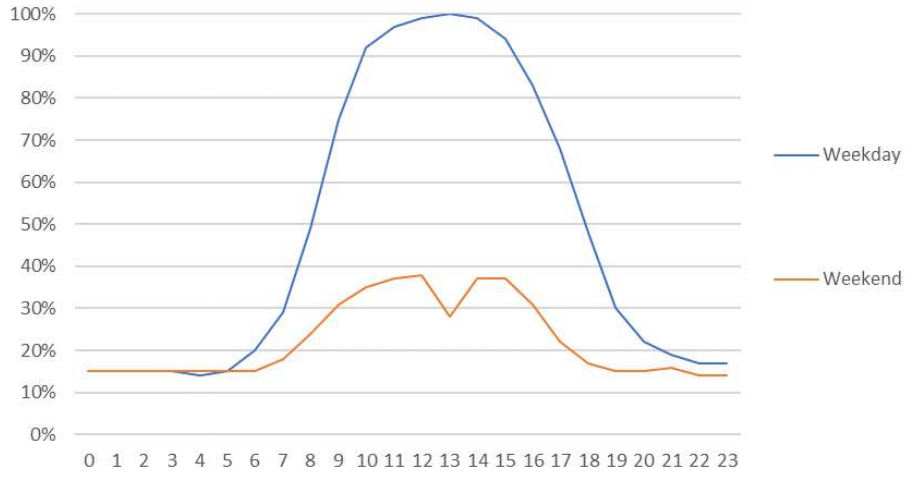


Profile – Restaurant: Main Kitchen	Main Occupancy Assumptions: similar occupancy at weekends but reduced appliance usage																							
Profile Rooms: - **Main Kitchen, Grove Café**	**Modelled Plant Load (%)**																							
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
Space Heating -Weekday	9	9	9	9	9	9	9	9	26	28	17	73	88	100	66	22	22	39	62	57	20	11	9	9
Space Heating -Weekend	9	9	9	9	9	9	9	9	15	26	18	75	84	99	61	39	22	31	46	44	22	13	9	9
Domestic Hot Water -Weekday	3	3	3	3	3	3	3	3	32	34	18	79	51	43	17	17	36	96	89	75	54	34	19	14
Domestic Hot Water – Weekend	3	3	3	3	3	3	3	3	19	41	20	81	55	44	18	17	26	100	89	78	57	39	24	18
Electricity – Weekday	15	15	15	15	14	15	20	29	49	75	92	97	99	100	99	94	83	68	48	30	22	19	17	17
Electricity – Weekend	15	15	15	15	15	15	15	18	24	31	35	37	38	28	37	37	31	22	17	15	15	16	14	14

Space Heating Profile

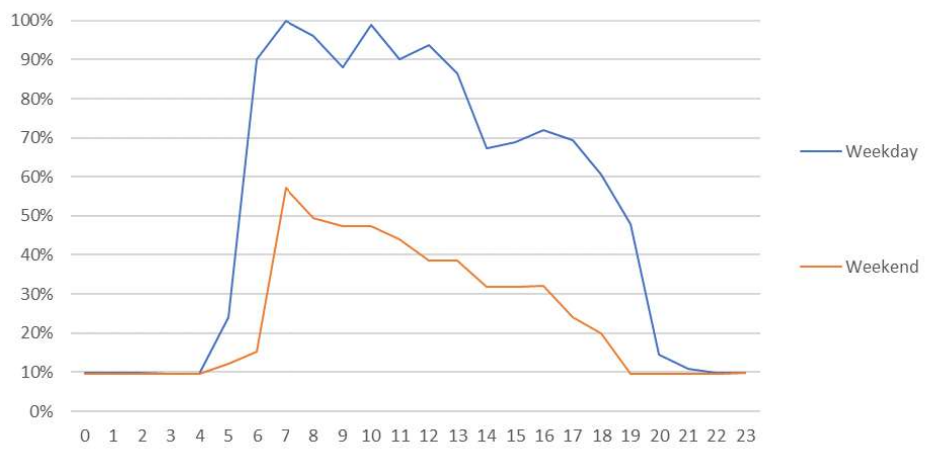


Electricity Profile

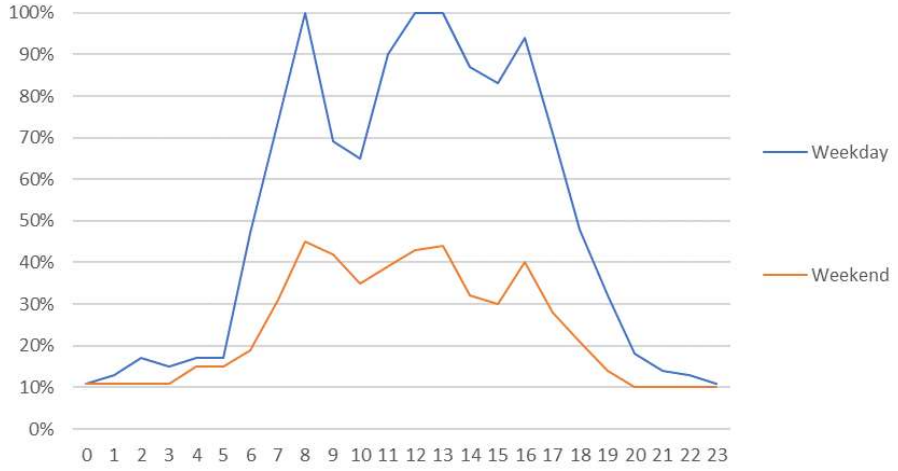


Profile – Office Spaces	Main Occupancy Assumptions: No weekend occupancy, weekend space heating and electrical demand from setback and left on equipment																							
Profile Rooms: - **TV Tower & TV Studios**	**Modelled Plant Load (%)**																							
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
Space Heating -Weekday	10	10	10	10	10	24	90	100	96	88	99	90	94	86	67	69	72	69	61	48	14	11	10	10
Space Heating -Weekend	10	10	10	10	10	12	15	57	50	47	47	44	39	39	32	32	32	24	20	10	10	10	10	10
Domestic Hot Water -Weekday	0	0	0	0	0	0	30	94	100	100	98	64	64	100	100	97	94	40	0	0	0	0	0	0
Domestic Hot Water – Weekend	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Electricity – Weekday	11	13	17	15	17	17	47	74	100	69	65	90	100	100	87	83	94	71	48	32	18	14	13	11
Electricity – Weekend	11	11	11	11	15	15	19	31	45	42	35	39	43	44	32	30	40	28	21	14	10	10	10	10

Space Heating Profile

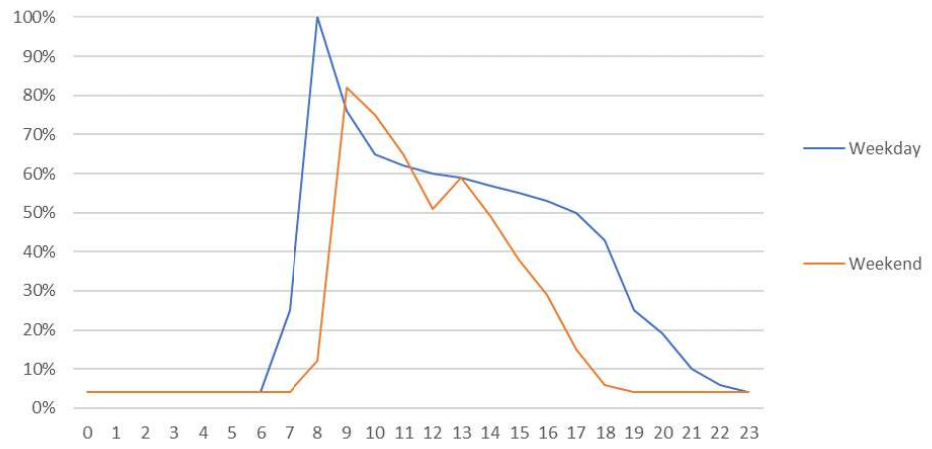


Electricity Profile

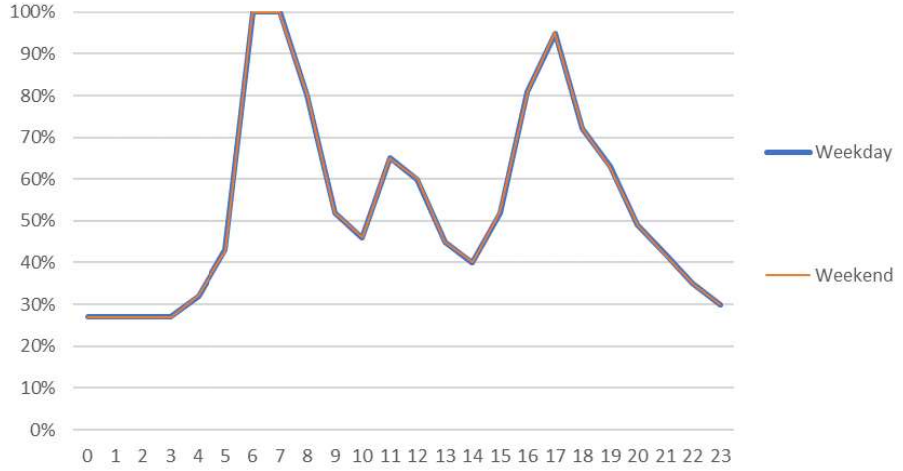


Profile – Garden Centre	Main Occupancy Assumptions: N/A																							
Profile Rooms: - **Garden Centre**	**Modelled Plant Load (%)**																							
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
Space Heating -Weekday	4	4	4	4	4	4	4	25	100	76	65	62	60	59	57	55	53	50	43	25	19	10	6	4
Space Heating -Weekend	4	4	4	4	4	4	4	4	12	82	75	65	51	59	49	38	29	15	6	4	4	4	4	4
Domestic Hot Water -Weekday	3	3	3	3	3	6	9	35	87	100	100	100	100	100	100	100	100	87	85	35	22	10	5	4
Domestic Hot Water – Weekend	3	3	3	3	3	3	3	12	40	65	75	80	80	80	80	74	35	10	2	2	2	2	2	2
Electricity – Weekday	27	27	27	27	32	43	100	100	80	52	46	65	60	45	40	52	81	95	72	63	49	42	35	30
Electricity – Weekend	27	27	27	27	32	43	100	100	80	52	46	65	60	45	40	52	81	95	72	63	49	42	35	30

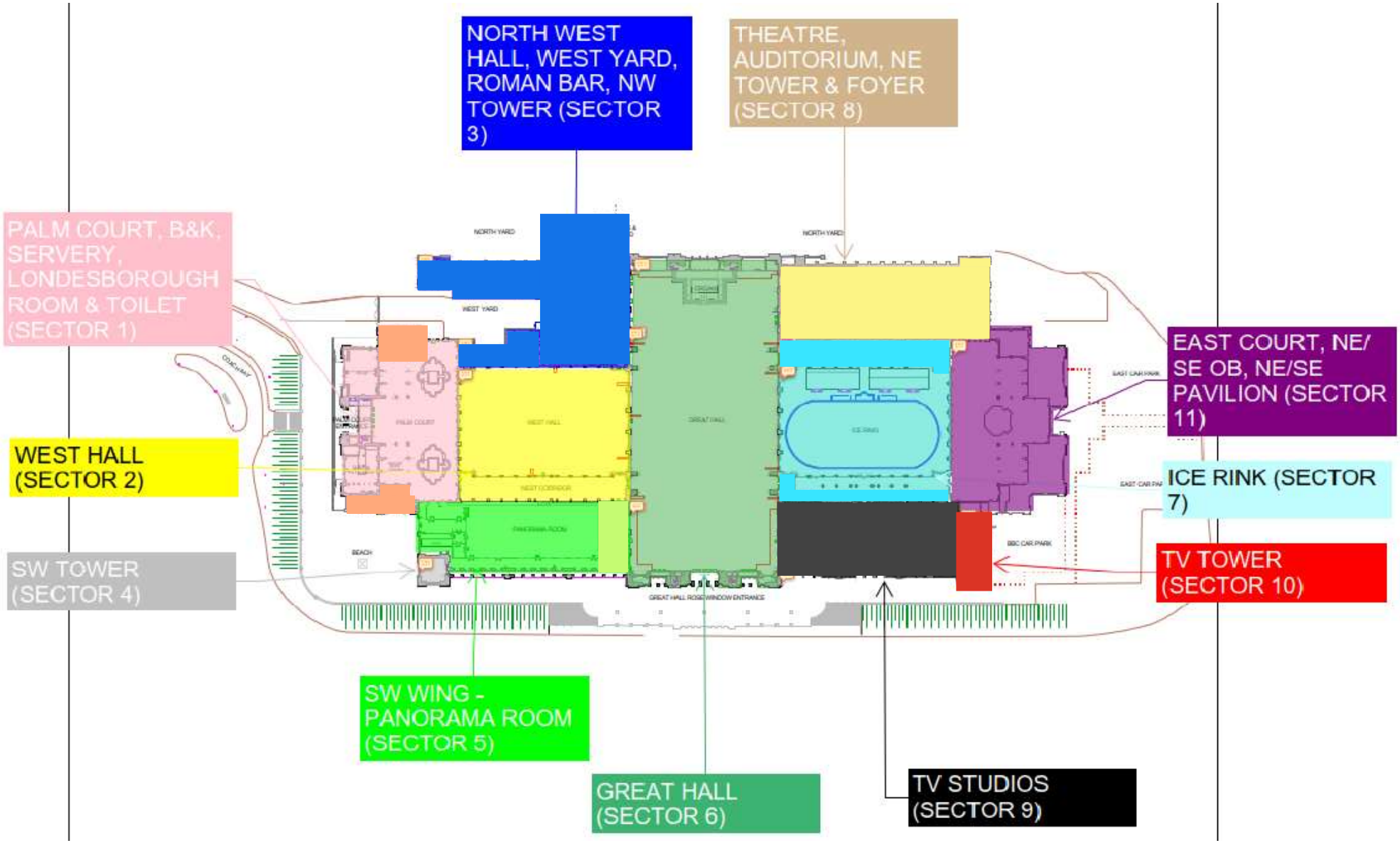
Space Heating Profile



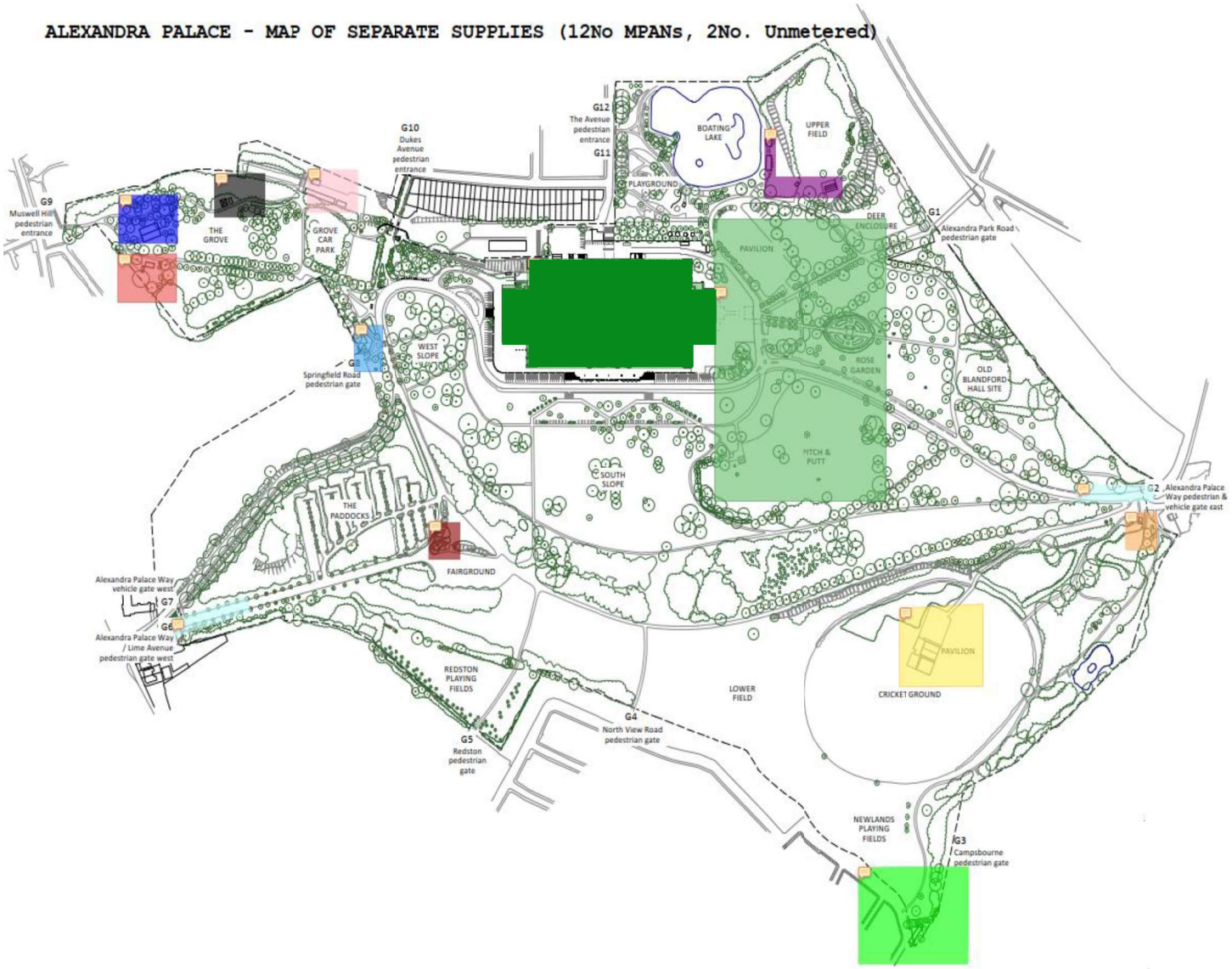
Electricity Profile



Appendix 8.2. Map of Alexandra Palace Building Zones



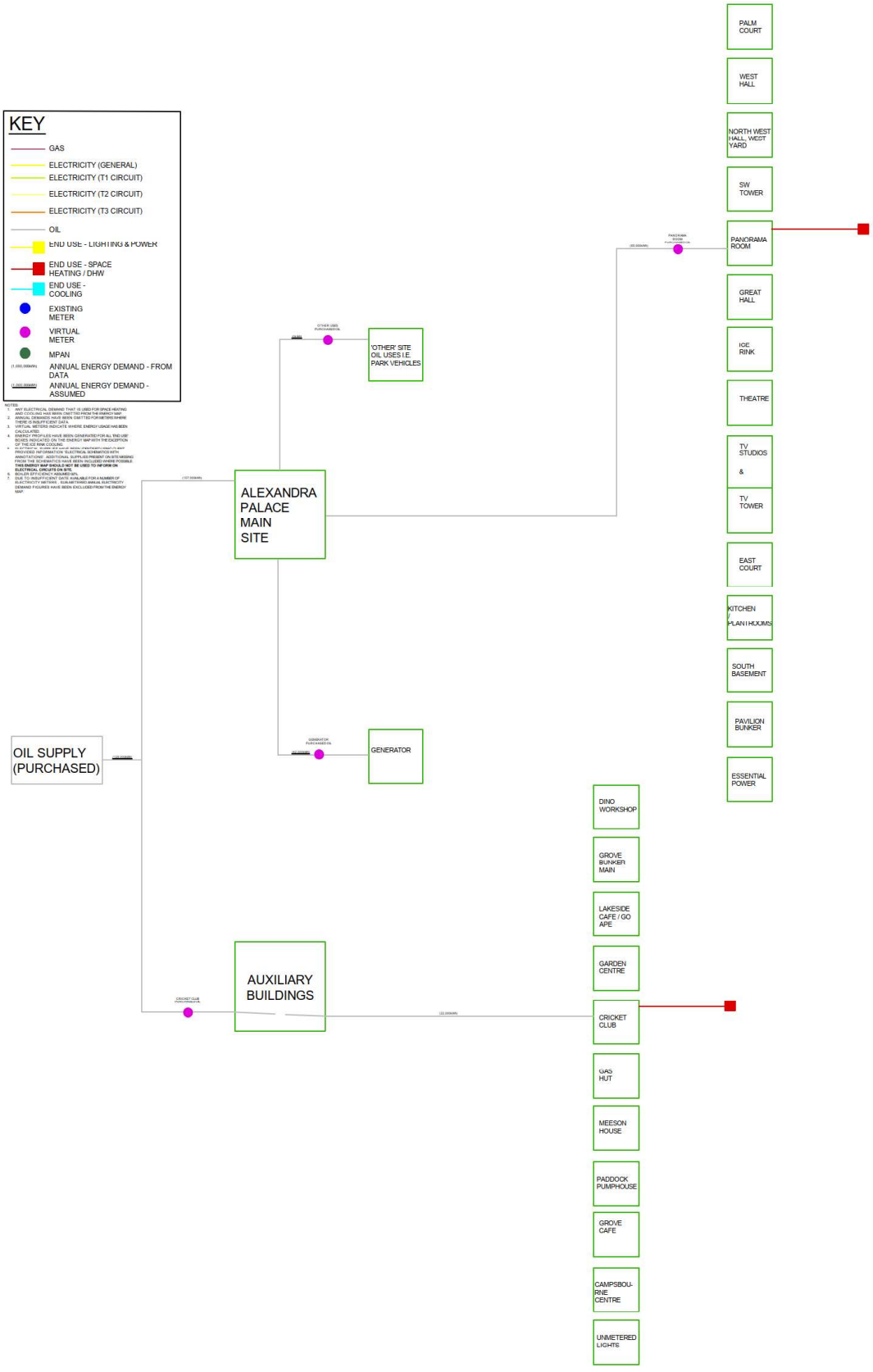
Appendix 8.3. Map of Alexandra Palace Auxiliary Electrical Supplies

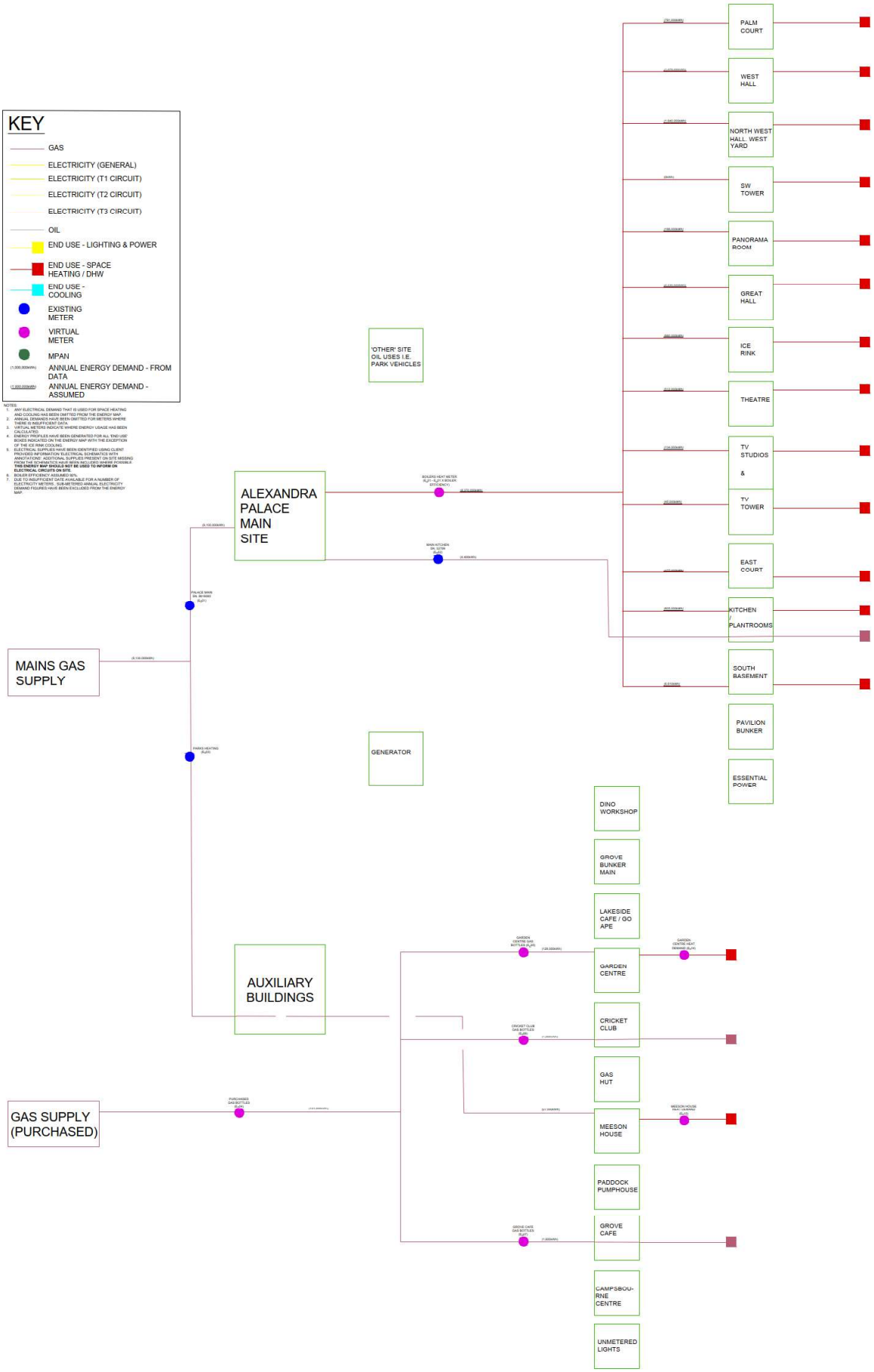


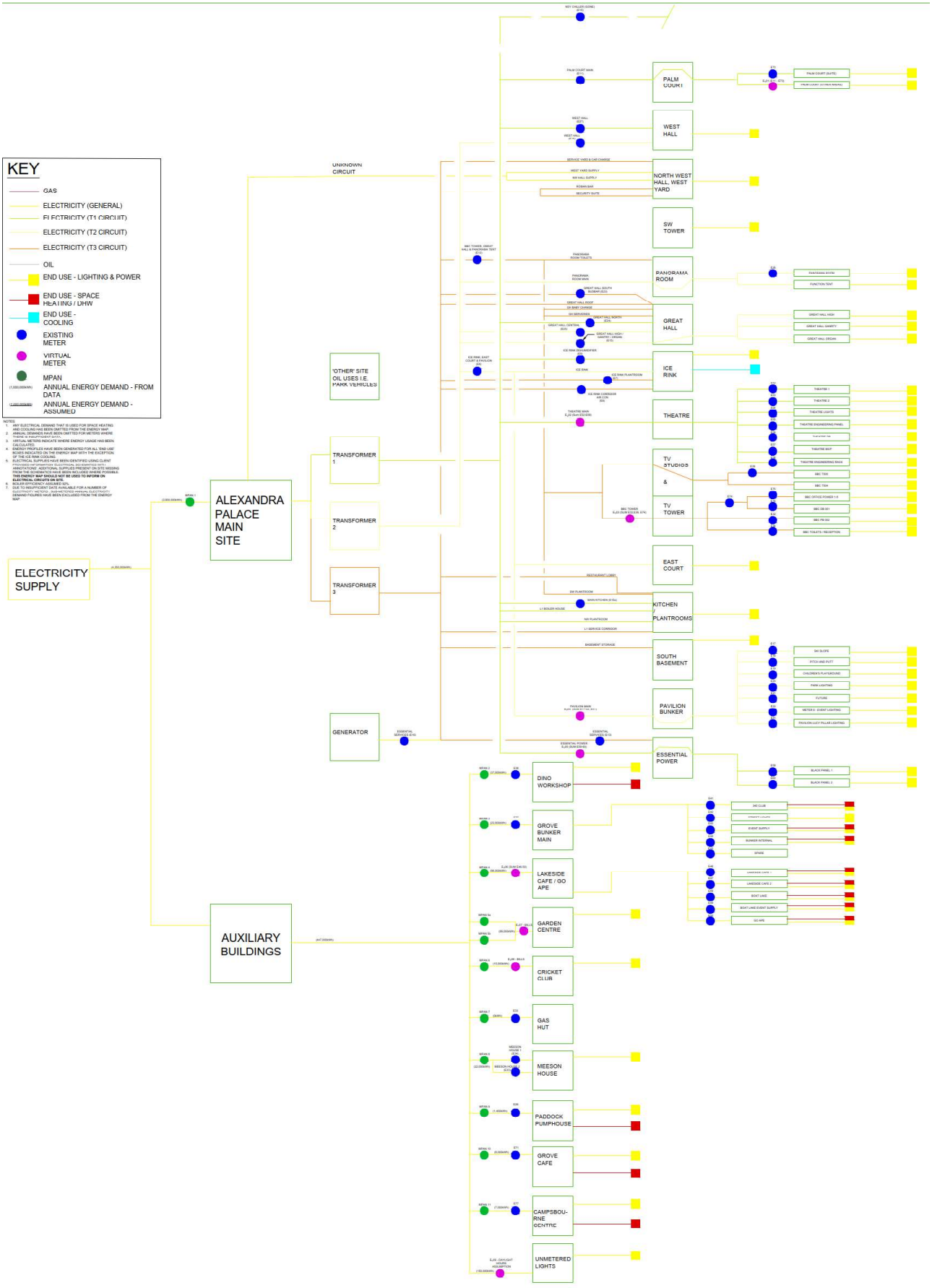
Colour / MPAN No.	Building(s) Served
1	Main Palace Building
2	Little Dino Workshop
3	Grove Bunker Main (345 Preschool, Street lights, Event Supply)
4	Lakeside Café, Boat Lake & Go Ape
N/A	Unmetered Outside Lights
5a & b	Garden Centre
6	Cricket Club
7	Gas Hut
8	Meeson House
9	Paddock Pumphouse
10	Grove Café
11	Campsbourne Centre

Appendix 8.4. Alexandra Park & Palace Energy Maps

The 3 Energy Maps below indicate the Oil, Gas and Electricity Usage on site, as used by the separate zones identified in the document above. Separate PDF documents of these maps are available for clarity.




KEY
GAS
ELECTRICITY (GENERAL)
ELECTRICITY (T1 CIRCUIT)
ELECTRICITY (T2 CIRCUIT)
ELECTRICITY (T3 CIRCUIT)
OIL
END USE - LIGHTING & POWER
END USE - SPACE HEATING / DHW
END USE - COOLING
EXISTING METER
VIRTUAL METER
MPAN
ANNUAL ENERGY DEMAND - FROM DATA
ANNUAL ENERGY DEMAND - ASSUMED
NOTES:
1. ANY ELECTRICAL DEMAND THAT IS USED FOR SPACE HEATING AND COOLING HAS BEEN OMITTED FROM THE ENERGY MAP.
2. ANNUAL DEMANDS HAVE BEEN OMITTED FOR METERS WHERE THERE IS INSUFFICIENT DATA.
3. ANNUAL DEMANDS INDICATE WHERE ENERGY USAGE HAS BEEN CALCULATED.
4. ENERGY PROFILES HAVE BEEN GENERATED FOR ALL 'END USE' BOXES INDICATED ON THE ENERGY MAP WITH THE EXCEPTION OF THE ICE RINK COOLING.
5. ALL METERS HAVE BEEN IDENTIFIED USING CLIENT PROVIDED INFORMATION, ELECTRICAL SCHEMATICS WITH ANNOTATIONS. ADDITIONAL SUPPLIES PRESENT ON SITE MISSING FROM THE SCHEMATICS HAVE BEEN INCLUDED WHERE POSSIBLE.
THIS ENERGY MAP SHOULD NOT BE USED TO INFORM ON ENERGY PERFORMANCE.
6. BOILER EFFICIENCY ASSUMED 82%.
7. DUE TO INSUFFICIENT DATA AVAILABLE FOR A NUMBER OF ELECTRICITY METERS , SUB-METERED ANNUAL ELECTRICITY DEMAND FIGURES HAVE BEEN EXCLUDED FROM THE ENERGY MAP.
'OTHER' SITE OIL USES I.E. PARK VEHICLES
ALEXANDRA PALACE MAIN SITE
MAINS GAS SUPPLY
GAS SUPPLY (PURCHASED)
AUXILIARY BUILDINGS
GENERATOR
PALM COURT
WEST HALL
NORTH WEST HALL, WEST YARD
SW TOWER
PANORAMA ROOM
GREAT HALL
ICE RINK
THEATRE
TV STUDIOS &
TV TOWER
EAST COURT
KITCHEN / PLANTROOMS
SOUTH BASEMENT
PAVILION BUNKER
ESSENTIAL POWER
DINO WORKSHOP
GROVE BUNKER MAIN
LAKESIDE CAFE / GO APE
GARDEN CENTRE
CRICKET CLUB
GAS HUT
MEESON HOUSE
PADDOCK PUMPHOUSE
GROVE CAFE
CAMPSBOURNE CENTRE
UNMETERED LIGHTS


KEY
GAS
ELECTRICITY (GENERAL)
ELECTRICITY (T1 CIRCUIT)
ELECTRICITY (T2 CIRCUIT)
ELECTRICITY (T3 CIRCUIT)
OIL
END USE - LIGHTING & POWER
END USE - SPACE HEATING / DHW
END USE - COOLING
EXISTING METER
VIRTUAL METER
MPAN
ANNUAL ENERGY DEMAND - FROM DATA
ANNUAL ENERGY DEMAND - ASSUMED
ELECTRICITY SUPPLY
ALEXANDRA PALACE MAIN SITE
AUXILIARY BUILDINGS
TRANSFORMER 1
TRANSFORMER 2
TRANSFORMER 3
GENERATOR
UNKNOWN CIRCUIT
'OTHER' SITE OIL USES I.E. PARK VEHICLES
PALM COURT
WEST HALL
NORTH WEST HALL, WEST YARD
SW TOWER
PANORAMA ROOM
GREAT HALL
ICE RINK
THEATRE
TV STUDIOS & TV TOWER
EAST COURT
KITCHEN / PLANTROOMS
SOUTH BASEMENT
PAVILION BUNKER
ESSENTIAL POWER
DINO WORKSHOP
GROVE BUNKER MAIN
LAKESIDE CAFE / GO APE
GARDEN CENTRE
CRICKET CLUB
GAS HUT
MEESON HOUSE
PADDOCK PUMPHOUSE
GROVE CAFE
CAMPSBOURNE CENTRE
UNMETERED LIGHTS

Appendix 8.5. Unmetered Street Lights Electrical Consumption Analysis

Month	Nightime Hours per Day	Days	Total Hours Lights On	kWh Usage
Jan	16	31	496	17,360
Feb	15	28	420	14,700
Mar	13	31	403	14,105
Apr	11	30	330	11,550
May	9	31	279	9,765
Jun	8	30	240	8,400
Jul	7.5	31	232.5	8,138
Aug	8	31	248	8,680
Sep	10	30	300	10,500
Oct	13	31	403	14,105
Nov	14	30	420	14,700
Dec	16	31	496	17,360
				Total = 149,363

Number of Unmetered Lights	81
kW per Light	35

Appendix 8.6. Garden Centre Electrical Consumption Analysis (Based on Bills Provided)

Garden Centre Data (MPAN 5a)			
Period	Electricity Price	kWh	Comments
Jan-22	£371.23	2092.6	Calculated kWh
Feb-22	£383.51	2161.8	Calculated kWh
Mar-22	£338.38	1907.4	Calculated kWh
Apr-22	£300.79	1695.5	Calculated kWh
May-22	£260.43	1468.0	Calculated kWh
Jun-22	£247.18	1393.3	Calculated kWh
Jul-22	£233.69	1317.3	Calculated kWh
Aug-22	£248.93	1403.2	Calculated kWh
Sep-22	£272.84	1538.0	Calculated kWh
Oct-22	£294.86	1662.1	Calculated kWh
Nov-22	£339.43	1913.4	Calculated kWh
Dec-22	£417.43	2353.0	Calculated kWh
Jan-23	£376.49	2122.3	Calculated kWh
Feb-23	£393.83	2220.0	Calculated kWh
Mar-23	£353.29	1991.5	Calculated kWh

Garden Centre Data (MPAN 5b)			
Period	Electricity Price	kWh	Comments
Dec-21	£1,071.81	6636.6	kWh on bill
Jan-22	£1,086.62	6728.3	kWh on bill
Feb-22	£945.58	5855.0	kWh on bill
Mar-22	£1,079.83	6686.3	kWh on bill
Apr-22	£1,072.21	6639.1	kWh on bill
May-22	£1,032.49	1520.1	kWh on bill
Jun-22	£888.16	5499.4	kWh on bill
Jul-22	£782.79	4847.0	kWh on bill
Aug-22	£828.06	5127.3	kWh on bill
Sep-22	£756.48	4684.1	kWh on bill
Oct-22	£842.72	5218.1	kWh on bill
Nov-22	£941.24	8328.1	kWh on bill
Dec-22	£1,052.82	6519.0	kWh on bill
Jan-23	£940.56	5823.9	kWh on bill
Feb-23	£849.28	5258.7	kWh on bill

Apr-23	£300.77	1695.4	Calculated kWh

Appendix 8.7. Campsbourne Centre Electrical Consumption Analysis (Based on Bills Provided)

Campsbourne Centre Data			
Period	**Electricity Price**	**kWh**	**Comments**
Nov-22	£111.23	627.0	Estimated Read – Bills Provided

Campsbourne Centre Estimated (Based on GC)			
Period	**Electricity Price**	**kWh**	**Comments**
Jan-22	Not Provided	685.7	Estimated usage based on Nov-22 Data provided and Garden Centre Monthly Usage
Feb-22	Not Provided	708.4	Estimated usage based on Nov-22 Data provided and Garden Centre Monthly Usage
Mar-22	Not Provided	625.1	Estimated usage based on Nov-22 Data provided and Garden Centre Monthly Usage
Apr-22	Not Provided	555.6	Estimated usage based on Nov-22 Data provided and Garden Centre Monthly Usage
May-22	Not Provided	481.1	Estimated usage based on Nov-22 Data provided and Garden Centre Monthly Usage
Jun-22	Not Provided	456.6	Estimated usage based on Nov-22 Data provided and Garden Centre Monthly Usage
Jul-22	Not Provided	431.7	Estimated usage based on Nov-22 Data provided and Garden Centre Monthly Usage
Aug-22	Not Provided	459.8	Estimated usage based on Nov-22 Data provided and Garden Centre Monthly Usage
Sep-22	Not Provided	504.0	Estimated usage based on Nov-22 Data provided and Garden Centre Monthly Usage
Oct-22	Not Provided	544.7	Estimated usage based on Nov-22 Data provided and Garden Centre Monthly Usage
Nov-22	£111.23	627.0	
Dec-22	Not Provided	771.1	Estimated usage based on Nov-22 Data provided and Garden Centre Monthly Usage
Jan-23	Not Provided	695.5	Estimated usage based on Nov-22 Data provided and Garden Centre Monthly Usage
Feb-23	Not Provided	727.5	Estimated usage based on Nov-22 Data provided and Garden Centre Monthly Usage
Mar-23	Not Provided	652.6	Estimated usage based on Nov-22 Data provided and Garden Centre Monthly Usage
Apr-23	Not Provided	555.6	Estimated usage based on Nov-22 Data provided and Garden Centre Monthly Usage

Appendix 8.8. Paddock Pumphouse Electrical Consumption Analysis

The paddock pumphouse is no longer utilised for film shoots or unit bases. Electricity is used sporadically at events through the year, with the two main events identified as the Fireworks event (02-07th November) for which there is metered data and the two-week outdoor music event in July for which some data is available. Consumption has been calculated as per below allowing for additional events or higher usage:

Fireworks Event Consumption, kWh	228
Music Event Consumption, kWh	424
Allowance for additional events / usage	x2
Total Paddock Pumphouse Annual Consumption	1,304

Appendix 8.9. Panorama Room Heating and General Oil Usage Monthly Breakdown

2021-2022 Profile					
Year	Month	Litres Fuel	Litres General	Litres Panorama Room	Heating Panorama Room (kWh)
2021	January	1480	200	1280	12801
2021	February	1500	300	1200	12001
2021	March	1000	200	800	8001
2021	April	0	0	0	0
2021	May	0	0	0	0
2021	June	0	0	0	0
2021	July	0	0	0	0
2021	August	0	0	0	0
2021	September	0	0	0	0
2021	October	0	0	0	0
2021	November	1973	300	1673	16731
2021	December	3222	1622	1600	16001
2022	January	1600	300	1300	13001
2022	February	0	0	0	0
2022	March	0	0	0	0
2022	April	0	0	0	0
2022	May	1000	1000	0	0
2022	June	0	0	0	0
2022	July	757	757	0	0
2022	August	0	0	0	0
2022	September	1000	1000	0	0
2022	October	0	0	0	0
2022	November	662	0	662	6621
2022	December	5523	900	4623	46234

Appendix 8.10. Gas Usage for Auxiliary Buildings

Sports Pavilion Gas Usage			
Year	**kg propane**	**Litres Propane**	**Consumption kWh (If used for Heating)**
2017	95	187	1,324
2018	95	187	1,324
2019	76	150	1,059

Grove Cafe Gas Usage			
Year	**kg propane**	**Litres Propane**	**Consumption kWh (If used for Heating)**
Per Year	114	224	1,589

Propane Calorific Value (kWh/litre)
7.08
Propane Volume (l/kg)
1.969

Gas Consumption Annual Summary (From Meter Readings)					
Year	**2018 (From Feb)**	**2019**	**2020**	**2021**	**2022 (Up to September)**
Parks Heating (Meeson House) (kWh)	21,142	30,205	24,571	26,211	10,682

Garden Centre Gas Usage - Provided Bottled Data			
Date	**kg gas**	**litres gas**	**kWh**
10/02/2022	158	311	2,203
24/04/2022	152	299	2,119
30/03/2022	99	195	1,380
28/04/2022	10	20	139
30/04/2022	15	30	209
05/05/2022	5	10	70
06/05/2022	45	89	627
10/05/2022	78	154	1,087
13/05/2022	114	224	1,589
18/05/2022	166	327	2,314
25/05/2022	158	311	2,203
31/05/2022	61	120	850
18/06/2022	15	30	209
24/06/2022	87	171	1,213
08/07/2022	77	152	1,073
05/07/2022	80	158	1,115
12/07/2022	55	108	767
19/07/2022	84	165	1,171
26/07/2022	123	242	1,715
04/08/2022	89	175	1,241
05/08/2022	15	30	209
19/08/2022	79	156	1,101
05/09/2022	103	203	1,436
30/09/2022	89	175	1,241

Garden Centre Monthly Gas Demand (kWh)	
Month	**kWh (Known Values in Black, assumed values in Red)**
January	15,298
February (only one date provided)	18,041
March (only one data provided)	14,095
April (full month not provided)	9,489
May	7,890
June	1,422
July	5,841
August	2,551
September	2,677
October	14,401
November	16,747
December	18,686

Appendix 8.11. Oil Usage for Auxiliary Buildings (Cricket Ground)

Year	Litres Fuel - Cricket Ground	Heating (kWh) - Cricket Ground
2017	2800	28,002
2018	2800	28,002
2019	2200	22,002

Appendix 8.12. Assumptions Log

Assumptions are included throughout this document, highlighting where certain decisions have influenced the figures obtained. The table below lists the main assumptions included in the document for ease of reference. Assumptions listed do not include gaps in data that have been calculated by other means such as gas bills etc.

Assumptions Log		
Description	**Value**	**Comment**
Missing Monthly Meter Readings were calculated as the average of the surrounding readings	Multiple	-
Data for Gas is assumed to be in Cubic Metres	-	-
Main incoming Gas meter includes heating provided by 4No. on site boilers and no other heating methods.	-	-
No Heating to the Pavilion Bunker Zone	0	-
Garden Centre Heating demand for missing months assumed proportional to main palace heating	-	-
Unmetered Outside Lights are on at night, controlled by LDRs	-	-
Profiles as per Appendix A	-	-
Building Use types assumed as listed	-	-

Assumptions Log		
Description	**Value**	**Comment**
Palm Court Elevated Base Temperature	20°C	-
Ice Rink Reduced Base Temperature	12°C	-
'General' Oil for vehicle purposes is assumed negligible	~0 litres	-
'General' Oil usage is predominantly apportioned to generator use	~4,000 litres	-
Domestic Hot Water usage estimated as a % of Space Heating load as identified in Appendix A	Various	-
Future use renovated zones are the same use type as the zone in which they currently sit unless otherwise stated	-	-
Boiler efficiency	92%	-
All Garden Centre Gas used for Heating	-	-
All Meeson House Gas used for Heating	-	-
All Cricket Club Oil used for Heating	-	-

Assumptions Log		
Description	**Value**	**Comment**
All Grove Café and Cricket Club Gas used for Catering	-	-