



Energy Analysis Report

for

Bayside Community Centre

Bayside Square N, Kilbarrack Lower, Sutton, Co. Dublin, D13 X8H4

Date: 14th February 2024



1.0 Executive Summary

Client:	Bayside Community Centre
Address:	Bayside Square N, Kilbarrack Lower, Sutton, Co. Dublin, D13 X8H4
Date of survey:	25th January 2024
Survey carried out by:	Siúin O'Riordan
Contact number:	01 8665151 / 086 0868879
Building description:	Single-storey detached building, constructed circa 1984. Floor area approx 400m2.

The principal purpose of this study was to determine the most appropriate energy upgrades which could be carried out to the building. The report outlines recommended measures which will contribute towards achieving energy and carbon targets as set out in the Climate Action Plan 2024.

- This analysis was carried out using IES Virtual Environment software to help calculate the existing energy performance of the building and for simulation of potential improvements.



Figure 1.2 IES software 3-D model of the building

1.1 CURRENT CONDITION

1.1.1 Building Fabric

- The external walls in the building consist of 450mm thick twin-leaf block cavity walls which have been pumped with cavity bead insulation. The u-value of the walls is circa 0.37 W/m²K (a u-value is a measure of the rate at which heat will pass through a material. The lower the u-value the slower the rate of heat transfer and hence the more desirable from an energy point of view).
- The roofs consist of an un-insulated flat roof section and a pitched roof section which is partially insulated with mineral wool. The u-value of the flat roofs are circa 2.3 and 1.1 W/m²K.
- The windows consist mainly of double glazed low-emissivity aluminium framed windows which were installed in 2017. There are a number of older single glazed timber window and door units. The u-value of the windows is circa 2.2 and 5.2 W/m²K.
- The external doors are mainly un-insulated solid timber or aluminium door units. The u-value of the doors is circa 3.3 W/m²K.

1.1.2 Heating, Ventilation & Air Conditioning (HVAC) Systems

- The space heating for the building is provided by 1 no. 24kW 'Ideal Logic Heat 24' (installed in 2015) and 1 no. 32kW 'Baxi Megaflow System 32 HE IE' (installed in 2007), condensing gas-fired boilers. These boilers have a seasonal efficiency of circa 90%. The boilers feed 3 no. radiator circuits - Main Hall, Creche, and Recreation/General Areas). There is no time or temperature control and there is no BMS system present. The controls consist of boost switches for each zone which turn on the heating in each zone for 1 hour, at which point the system will turn off and has to be manually turned back on each time.
- Domestic Hot Water (DHW) for the building is provided by 5 no. 10-litre electric under-sink instantaneous hot water heaters.
- There are ventilation grills in the Main Hall and controls for an 'Air Conditioning' unit. The area above the grills and ceiling tiles was not accessed during the survey, however it would appear that this system is not operational. There are localised extract fans in the bathrooms.

1.1.3 Lighting

- The lighting in the building consists of a combination of LED and low efficiency fluorescent lights.
- There appears to be minimal lighting controls (occupancy / daylight sensors) installed.

1.1.4 Renewables

- An 11 kWp Solar PV System was installed on the pitched roof, split between the east and west elevations of the pitched roof.

1.2 POTENTIAL IMPROVEMENTS

1.2.1 Building Fabric

- No further upgrade is recommended for the walls as they have already been pumped with cavity bead insulation.
- It is recommended to upgrade the main pitched roof to 300mm of mineral wool insulation to bring it up to current standards, resulting in a u-value of 0.16 W/m²K, by installing insulation above the ceiling tiles in the main hall and in the attic space above the creche area. The roof space should be ventilated to current standards also. It is recommended to consider externally insulating the flat roof to achieve a u-value of 0.2 W/m²K.
- It is recommended to replace the older windows and glazed doors with high-efficiency double glazed uPVC or aluminium units with a u-value of 1.4 W/m²K or better.
- It is recommended to replace the old solid doors with new efficient solid uPVC door units with a u-value of 1.4 W/m²K.

1.2.2 HVAC Systems

- It is recommended to consider replacing the gas boilers with an air to water heat pump system. 2 no. 16kW air to water heat pumps with a seasonal efficiency of at least 350% (SCOP of 3.5) would be suitable in this case. The new heat pump system should contain its own Building Management Systems, and be capable of remote access for monitoring and diagnostics. It is recommended to keep the newer (Ideal) gas-fired boiler in the attic to provide backup and assistance, if required, during extreme weather conditions.
- No upgrade is recommended for the hot water heating.

1.2.3 Lighting

- It is recommended to consider replacing all remaining tungsten / halogen and fluorescent lights with high-performance LED lights.
- Consideration could be given to upgrading the lighting controls to incorporate daylight and occupancy sensors, particularly in toilets, store rooms, corridors, etc..

1.2.4 Renewables

- No further renewables upgrades are recommended at this time.

2.0

Potential Improvements

Element	Upgrade	Net Area (m2)	Thermal Savings (kWh)	Electrical Savings (kWh)	Total Energy Savings (kWh)	Carbon savings (kg CO ₂)	Cost Savings (€)	Budget Cost (€)	Simple Payback (Years)
Roofs:									
Flat Roof	Flat roof external	178	7,445	0	7,445	1,526	€1,117	€48,901	43.8
Pitched Roof - mineral wool insulation	Insulation above ceiling tiles/attic	217	4,065	0	4,065	833	€610	€9,761	16.0
Windows:									
Single Glazed Timber	Double glazed high-spec upvc	12	1,281	0	1,281	263	€192	€7,386	38.5
Doors:									
Solid Door	Door - standard spec	16	1,038	0	1,038	213	€156	€12,744	81.8
Heating:									
Boiler	Air-to-water heat pumps	N/A	16,746	-4,306	12,440	2,008	€2,490	€45,000	18.1
Electrical:									
Lighting	Low-energy lights & controls	N/A	0	2,558	2,558	847	€767	€5,094	6.6
Full retrofit		N/A	30,574	-1,748	28,826	5,689	€5,332	€128,885	24.2

Table 2.1 Summary of potential improvements, savings, costs & paybacks (all prices are ex VAT)

Percentage Energy and Carbon Savings	
Total existing kWh usage	39,710 kWh
Potential kWh savings	28,826 kWh
Potential % kWh savings	72.6%
Total existing CO2 usage	9,292 kgCO2
Potential CO2 savings	5,689 kgCO2
Potential % CO2 savings	61.2%

Table 2.3 Summary of % energy and carbon savings

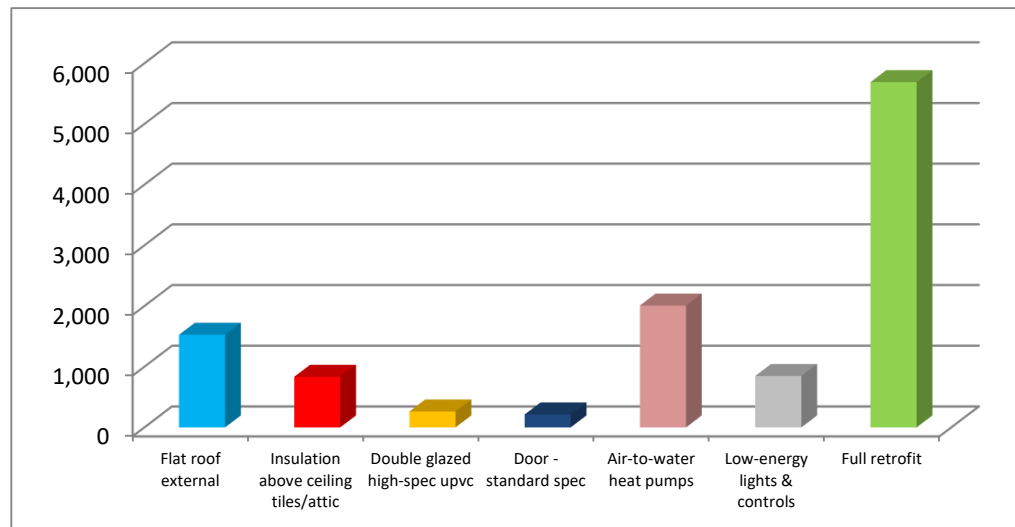


Figure 2.1 Annual carbon savings for each improvement

Energy & Carbon Analysis

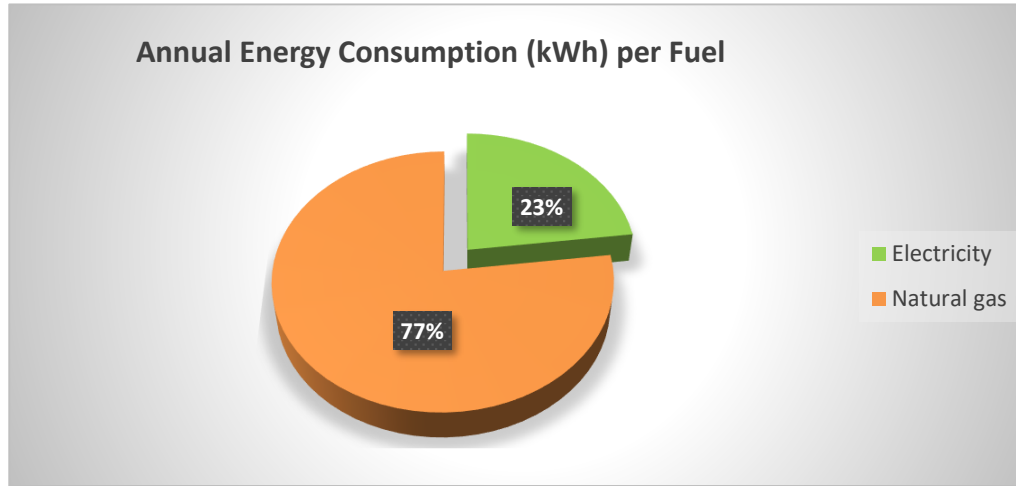


Figure 3.1 Energy usage breakdown

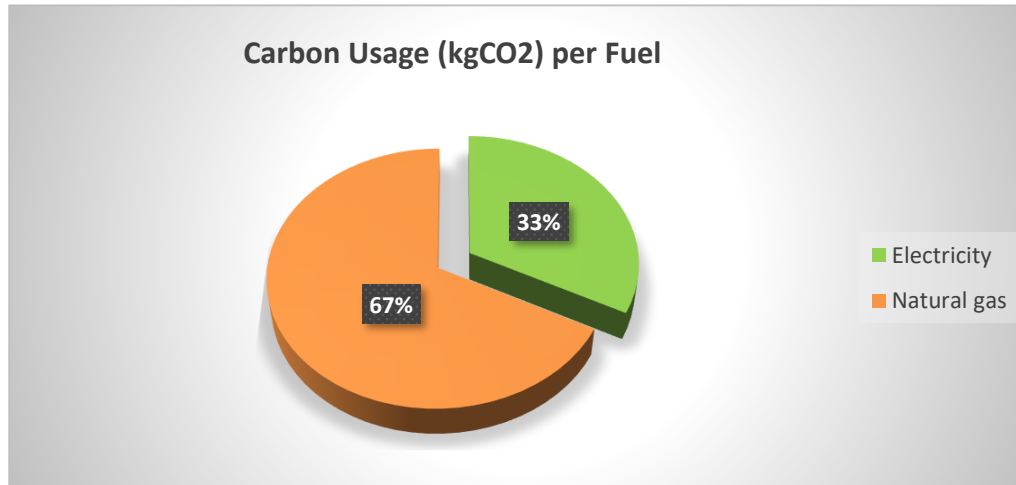


Figure 3.2 Carbon usage breakdown

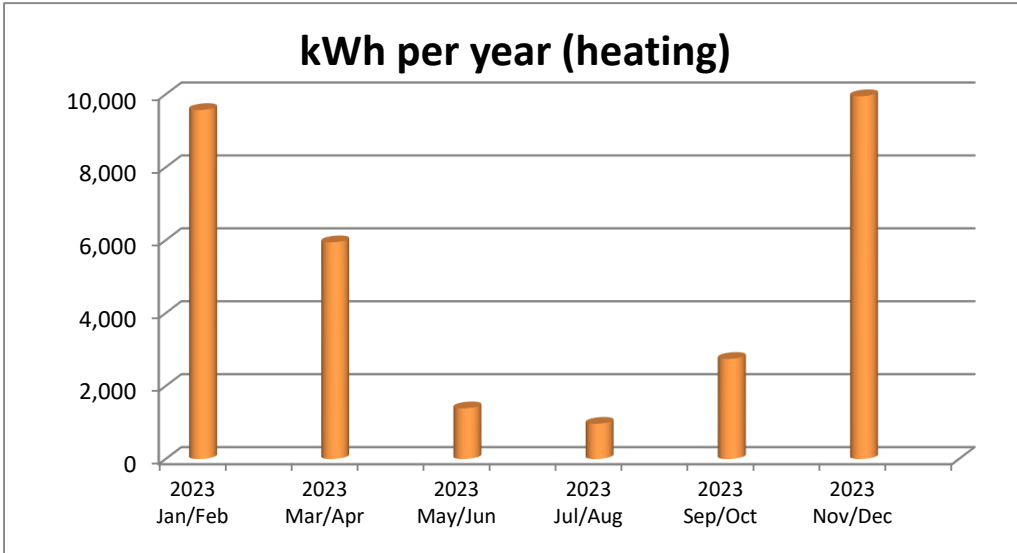


Figure 4.1

Natural gas usage summary

Notes:

Natural gas Bill Summary

Date	kWh used	Total cost of bill
Jan/Feb 2023	9,573	€2,892
Mar/Apr 2023	5,945	€1,411
May/June 2023	1,391	€254
Jul/Aug 2023	967	€297
Sep/Oct 2023	2,746	€459
Nov/Dec 2023	9,952	€1,593
Total	30,574	€6,905

Table 4.1

Natural gas usage summary

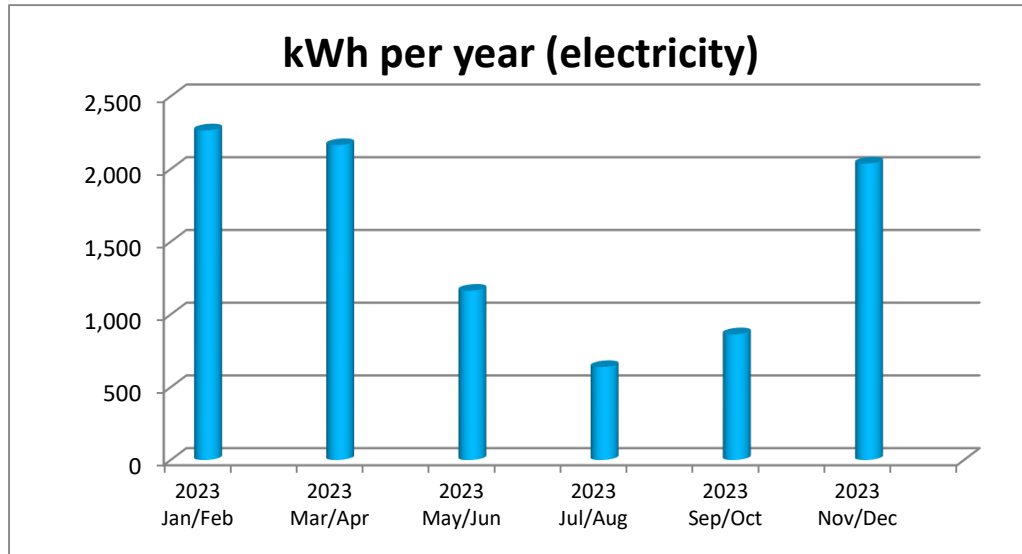


Figure 4.2 Electricity bills summary

Notes:

Electricity Bill Summary

Date	kWh used	Total cost of bill
Jan/Feb 2023	2,266	€1,842
Mar/Apr 2023	2,165	€1,511
May/June 2023	1,164	€558
Jul/Aug 2023	639	€392
Sep/Oct 2023	864	€566
Nov/Dec 2023	2,038	€1,064
Total	9,136	€5,934

Table 4.2 Electricity bills summary

5.0

Heating Analysis

Existing Elements

Element	Gross Area (m2)	Net Area (m2)	U-value (W/m2K)	Temp Difference (deg C)	Heat Loss (Watts)
External Walls:					
450mm Pumped Cavity wall	263.9	217.0	0.37	25	2,007
Roofs:					
Flat Roof	183.7	177.8	2.30	25	10,225
Pitched Roof - mineral wool insulation	216.9	216.9	1.10	25	5,965
Heat loss Floors:					
Original solid floor	400.6	400.6	0.80	15	4,807
Windows:					
Double Glazed Aluminium 16mm	18.7	18.7	2.20	25	1,029
Single Glazed Timber	12.3	12.3	5.20	25	1,600
Roof Windows	5.9	5.9	3.30	25	485
Doors:					
Solid Door	15.9	15.9	3.30	25	1,314
Other:		Average Height	ACPH		
Infiltration	Total Floor Area 400.6	3.3	1.00	25	10,906
Total Heat Loss					38,339

Improved Elements

U-value (W/m2K)
0.37
0.20
0.16
0.80
2.20
1.40
3.30
1.40
ACPH
0.90

Table 5.1 Summary of heat loss through the building fabric

Heat loss through walls	€361
Heat loss through roof	€2,916
Heat loss through floor	€866
Heat loss through windows & doors	€798
Heat loss through infiltration	€1,964
Total	€6,905

Table 5.2 Summary of costs of heat loss through each element / DHW

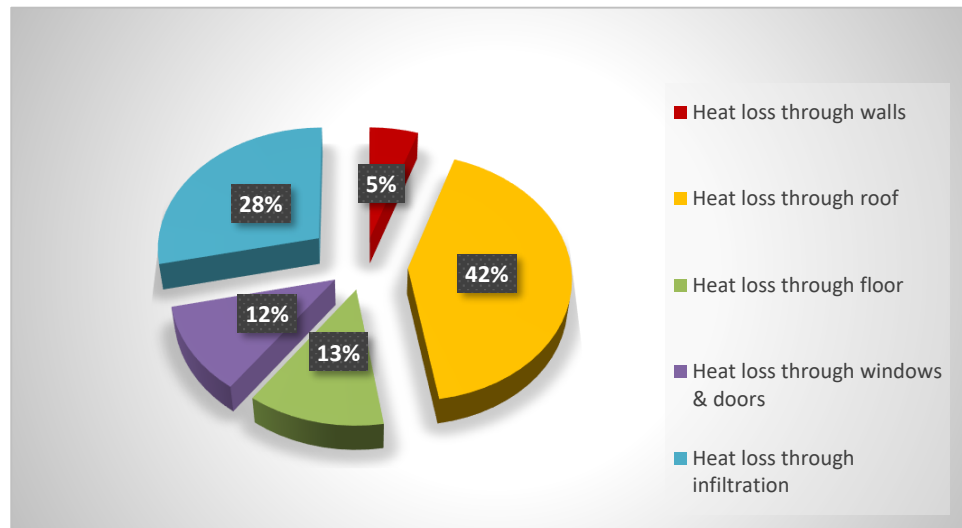


Figure 5.1 Summary of heat losses / DHW breakdown

Electricity Analysis

Total Annual Electricity Consumption 9,136 kWh

Total Annual Electricity Cost €5,934

Element	Usage (kWh)	Cost
Lighting	5,322	€3,457
Hot water heaters	1,188	€771
Kitchen appliances	1,279	€831
Auxiliary (pumps, fans, etc)	365	€237
Miscellaneous	982	€638
Total	9,136	€5,934

Table 6.1 Summary of electricity costs

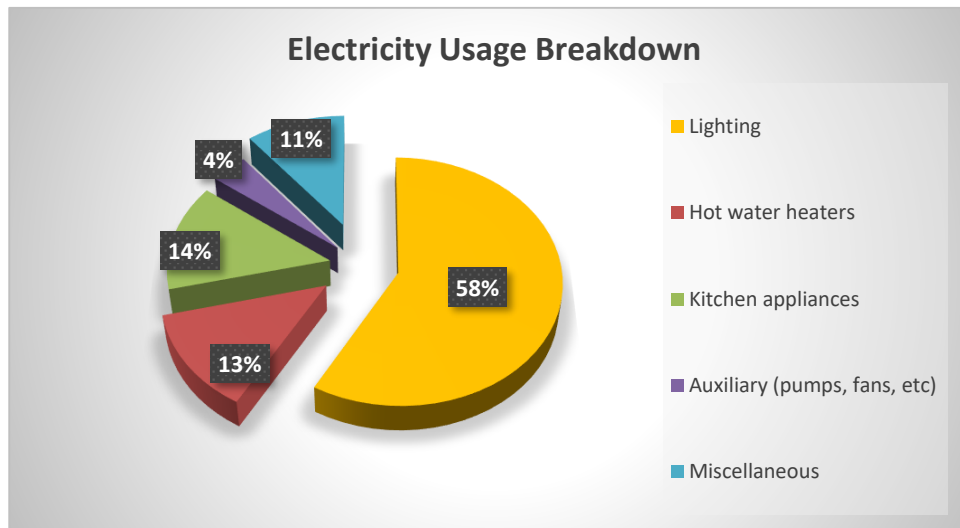


Figure 6.1 Summary of electricity costs

- CIBSE (Chartered Institution of Building Services Engineers) provides best practice advice for energy efficiency and is the standard setter and authority on building services engineering. The building compares favourably to the thermal and electrical benchmark figures, as outlined in CIBSE Guide F for community centres.

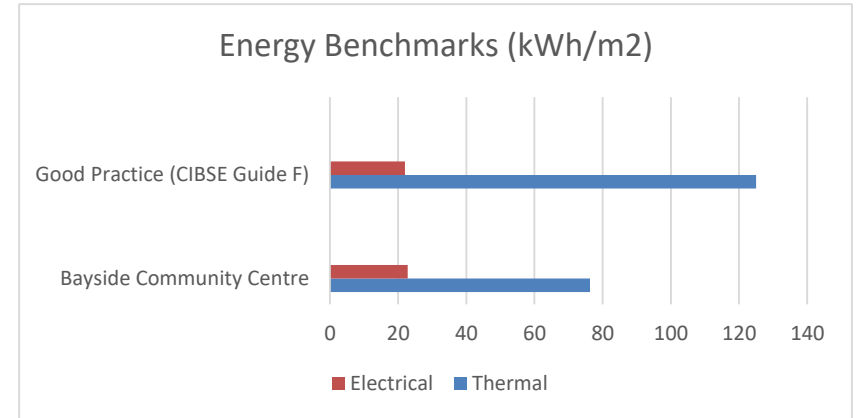


Figure 7.1 Energy Performance versus CIBSE Benchmarks

EXISTING LIGHTING SCHEDULE

Area	Space	Lighting Category	Fitting Type	Quantity	Input Wattage	Hours of operation	kWh / year	Comments
Internal Lighting	Reception/Entrance	<u>Fluorescent Batten or Flatback</u>	Batten T8 2x36W SS	1	88	1500	132	
Internal Lighting	Reception/Office	<u>Fluorescent Batten or Flatback</u>	Batten T8 2x36W SS	1	88	1500	132	
Internal Lighting	Circulation	<u>Fluorescent Batten or Flatback</u>	Batten T8 2x36W SS	4	88	1500	528	
Internal Lighting	Main Office	<u>Fluorescent Batten or Flatback</u>	Batten T8 2x36W SS	2	88	1500	264	
Internal Lighting	Small sitting room	<u>Fluorescent Batten or Flatback</u>	Batten T8 2x36W SS	1	88	1500	132	
Internal Lighting	Recreation room	<u>Fluorescent Batten or Flatback</u>	Batten T8 2x36W SS	4	88	1500	528	
Internal Lighting	Bathroom (F)	<u>LED</u>	10W LED Light	2	10	1500	30	Not for upgrade
Internal Lighting	Bathroom (M)	<u>LED</u>	10W LED Light	2	10	1500	30	Not for upgrade
Internal Lighting	Store	<u>LED</u>	10W LED Light	1	10	1500	15	Not for upgrade
Internal Lighting	Tea section	<u>Fluorescent Batten or Flatback</u>	Batten T8 2x36W SS	1	88	1500	132	
Internal Lighting	Kitchen	<u>LED</u>	20W LED Light	2	20	1500	60	Not for upgrade
Internal Lighting	Classroom	<u>Fluorescent Batten or Flatback</u>	Batten T8 2x36W SS	1	88	1500	132	
Internal Lighting	WC	<u>CFL 2D Surface</u>	Surface CC 28W 2D SS	1	35	1500	53	
Internal Lighting	Circulation	<u>LED</u>	20W LED Light	1	20	1500	30	Not for upgrade
Internal Lighting	Creche	<u>Fluorescent Batten or Flatback</u>	Batten T8 2x36W SS	4	88	1500	528	
Internal Lighting	WC	<u>CFL 2D Surface</u>	Surface CC 28W 2D SS	1	35	1500	53	
Internal Lighting	Circulation	<u>LED</u>	7W LED Light	1	7	1500	11	Not for upgrade
Internal Lighting	Boiler Room	<u>Incandescent</u>	Candle 40W	1	40	1500	60	
Internal Lighting	Store 1	<u>LED</u>	7W LED Light	2	7	1500	21	Not for upgrade
Internal Lighting	Store 2	<u>LED</u>	7W LED Light	1	7	1500	11	Not for upgrade
Internal Lighting	Store 3	<u>LED</u>	7W LED Light	1	7	1500	11	Not for upgrade
Internal Lighting	Main Hall	<u>LED</u>	14W LED Light	24	14	1500	504	Not for upgrade
Internal Lighting	Attic Space	<u>Fluorescent Batten or Flatback</u>	Batten T8 1x36W SS	1	44	730	32	
External Lighting	Building	<u>LED</u>	30W LED Light	2	30	730	44	Not for upgrade
External Lighting	Building	<u>LED</u>	100W LED Light	1	100	730	73	Not for upgrade
External Lighting	Building	<u>CFL 2D Surface</u>	Surface CC 28W 2D SS	3	35	2920	307	
External Lighting	Building	<u>Floodlight</u>	FL 150W HPS	3	168	2920	1,472	
Totals				69			5,322	

(29 for upgrade)

Existing Lighting Schedule

PROPOSED LIGHTING SCHEDULE

Area	Space	Lighting Category	Lamp Type	Quantity	Input Wattage	Hours of operation	kWh / year	Comments
Internal Lighting	Reception/Entrance	LED	2x18W T8 LED	1	36	1500	54	
Internal Lighting	Reception/Office	LED	2x18W T8 LED	1	36	1500	54	
Internal Lighting	Circulation	LED	2x18W T8 LED	4	36	1500	216	
Internal Lighting	Main Office	LED	2x18W T8 LED	2	36	1500	108	
Internal Lighting	Small sitting room	LED	2x18W T8 LED	1	36	1500	54	
Internal Lighting	Recreation room	LED	2x18W T8 LED	4	36	1500	216	
Internal Lighting	Bathroom (F)	LED	10W LED Light	2	10	1500	30	Not for upgrade
Internal Lighting	Bathroom (M)	LED	10W LED Light	2	10	1500	30	Not for upgrade
Internal Lighting	Store	LED	10W LED Light	1	10	1500	15	Not for upgrade
Internal Lighting	Tea section	LED	2x18W T8 LED	1	36	1500	54	
Internal Lighting	Kitchen	LED	20W LED Light	2	20	1500	60	Not for upgrade
Internal Lighting	Classroom	LED	2x18W T8 LED	1	36	1500	54	
Internal Lighting	WC	LED	15W Bulkhead LED	1	15	1500	23	
Internal Lighting	Circulation	LED	20W LED Light	1	20	1500	30	Not for upgrade
Internal Lighting	Creche	LED	2x18W T8 LED	4	36	1500	216	
Internal Lighting	WC	LED	15W Bulkhead LED	1	15	1500	23	
Internal Lighting	Circulation	LED	7W LED Light	1	7	1500	11	Not for upgrade
Internal Lighting	Boiler Room	LED	Candle 6W LED	1	6	1500	9	
Internal Lighting	Store 1	LED	7W LED Light	2	7	1500	21	Not for upgrade
Internal Lighting	Store 2	LED	7W LED Light	1	7	1500	11	Not for upgrade
Internal Lighting	Store 3	LED	7W LED Light	1	7	1500	11	Not for upgrade
Internal Lighting	Main Hall	LED	14W LED Light	24	14	1500	504	Not for upgrade
Internal Lighting	Attic Space	LED	1x18W T8 LED	1	18	730	13	
External Lighting	Building	LED	30W LED Light	2	30	730	44	Not for upgrade
External Lighting	Building	LED	100W LED Light	1	100	730	73	Not for upgrade
External Lighting	Building	LED	15W Bulkhead LED	3	15	2920	131	
External Lighting	Building	LED	80W LED Floodlight	3	80	2920	701	
Totals				69			2,764	

(29 for upgrade)

Proposed Lighting Schedule

Note: Wattage of proposed fittings may vary between lighting suppliers. The above lights are suggested replacements.