St Aloysius Convent
Thermal Envelope
Design Base Summary
Energy Consumption Assessment

MECHANICAL AND ELECTRICAL SERVICES ASSESSMENT REPORT

Document Reference: 443/4.2/01

CONSOLUX

Consolux M&E Consulting Ltd
(London)
35 Piccadilly
London
W1J 0DW
Tel: 0207 7343030
Email: london@consolux.co.uk

Consolux M&E Consulting Ltd
(Liverpool)
The Cotton Exchange
16 Bixteth Street,
Liverpool, L3 9JR
Tel: 0151 7089469
Email: liverpool@consolux.co.uk

Submitted and Prepared by:
Reuben Hendriks

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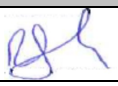
P1	6th October 2017	Report Submission	Megan Wood
P2	7th November 2017	Energy Strategy Updates	Reuben Hendriks

Approvals

This document requires the following approvals:
Signed approval forms are filed in the Management section of the project files

Name	Signature	Title	Date of Issue	Version
Richard Greenough		Director	7th November 2017	P2

Distribution

Name	Organisation	Role
Patrick Rogers	Alcyum Solutions Ltd	C/A
Bronwen Gombert	Connected Architecture	Architect

Note: Unless otherwise noted herein, the conclusions and recommendations contained in this report are based on the information supplied by the Client and visual inspection and testing (if any) described within. CONSOLUX can accept no liability in respect of differences between the actual structure and the information supplied except

(i) where these are readily apparent by visual inspection or
(ii) Where physical investigation has been undertaken by, or under the control of Consolux Ltd, and then only to the extent of such physical investigation.

Contents

1.0 Introduction

Consolux M&E Consulting Ltd have been engaged by Patrick Rogers of Alcyum Solutions Ltd to carry out a desktop based survey of the thermal envelope of the existing building. The building was modeled using Cymap 2018 and its Energy program. This thermal model produced heat losses, heat gains, and energy costs with the U-values used in section 2. By comparing the results from the historical and proposed buildings, an assessment was made of the potential savings.

The purpose of this assessment is compare the energy consumption of the current building aginst the building with proposed improved thermal elements. This should help to show how the proposed improvements reduce the running costs of the building and lead to savings over a period of time.

2.0 Heat Loss Assessment

The renovation to St Aloysius Convent is proposed to improve the thermal envelope of the existing building, through new thermal elements such as an internal wall lining to existing external walls and the replacement of windows and doors.

As a comparison between the current thermal envelope of St Aloysius Convent and the proposed with additional insulated wall lining, thermal models have been produced with the relevant U-Values:

2.1 External Wall U-Values

- The **historical** U-Value limit of 1.7 W/m²K for walls, as per the Building Regulations 1965 Part F Thermal Insulation.
- The **proposed** U-Value of 0.2 W/m²K when insulated wall lining has been included.

2.2 Glazing U-Values

- The historical U-Value limit of 5.0 W/m²K for windows, as previously there was not a limit and thus based on single glazing.
- The proposed U-Value of 1.6 W/m²K for windows has been used based on Approved Document L1B.

2.3 Proposed Improvements and Energy Strategies

2.3.1 Material Improvements

The building is to be internally insulated with an improved wall lining to improve its heat loss characteristics. The windows are to be replaced from single glazed units to double glazed. The doors are to be replaced to meet current L1B u values. Together, these material improvements will lead to a significant reduction in the amount of energy required to keep the building at required temperatures set in CIBSE Guide B Table 1.1.

2.3.2 Lighting improvements

Lower energy LED lighting is to be used together with PIR/Presence/Absence detectors. This would reduce energy consumption when rooms are not occupied. In the Chapel and Prayer rooms, DALI panel will be used to facilitate light settings management to allow for greater control of lighting.

2.3.3 Heating Strategy

3No. gas fuel condensing boilers will supply low pressure heating to radiators throughout the building. The heating pump will be able to analyse the heating system and optimise its settings to adjust its operation when there are changes in heating demand. This would lead to minimum energy consumption.

2.3.4 Domestic Water Strategy

Water supply to plant room will be circulated throughout the building with a water booster set. Hot water production would be through a condensing water heater with modulating burners to allow for the optimum amount of gas to be used to maximise energy efficiency and cost savings.

2.3.5 Domestic Water Appliances

Taps and fittings would be fitted with flow control equipment which reduces the consumption. Cisterns would be of a water saving, low-flush or dual-flush type which would reduce toilet flushing.

2.3.6 Ventilation strategy

All extractor fans for bathrooms to be low specific fan power with boost mode wired into the light switch. Overrun setting on fans will minimise energy use after occupant has left the room. A heat recovery unit will provide ventilation to the basement library and will be controlled with an ambient response humidity sensor to allow for optimum ventilation.

Heat Loss Summary

Floor Level	Total Heat Loss *Existing* (W)	Total Heat Loss *New* (W)	Average Heat Loss *Existing* (W/m^2)	Average Heat Loss *New* (W/m^2)
Basement	5213	3220	94.78	58.54
Ground	16134	4820	90.64	24.27
First	19954	5852	85.27	23.73
Second	21309	5698	91.85	24.56
Third	22784	5934	99.06	25.8
Total	85.4 kW	25.5kW	91.93	26.61

2.4 Total Heat Loss Components

The requirement for conservation of fuel and power, is stated in Building Regulations Part L1B. Reasonable provision is to be made by limiting heat gains and losses, through thermal elements and other parts of the building fabric, and providing fixed building services which are energy efficient, have effective controls, and are commissioned by testing and adjusting as necessary to ensure they use no more fuel and power than is reasonable in the circumstances. The heat loss figures shown, detail the existing envelope with retained elements fall short of the required minimum U-Values to achieve a sustainably viable heat loss, as opposed to the introduction of proposed elements, with added insulated wall lining decreasing the heat loss significantly. The proposed thermal elements fully meet the requirements set in Building Regulations Part L1B.

	Existing Elements	New Elements
Fabric Loss (kW)	64.1	14.5
Infiltration & Ventilation Loss (kW)	21.3	11

3.0 Thermal Model Calculation - Existing Building

CADline Limited	443 - St Aloysius Convent Historical.CYC	Page 1
443 - St Aloysius Convent	Engineer: Reuben Hendriks	06/10/2017

Heatloss Calculation:- 443 - ST ALOYSIUS CONVENT HISTORICAL.CYC (06/10/2017)443 - ST ALOYSIUS CONVENT HISTORICAL.CYC (06/10/2017)

Project Reference	443 - St Aloysius Convent		
Thermal Response Factor	3.17	Temperature Type	DRT
Building Weight	LightWeight	Plant Hours	8 hrs
Convective Heating	70 %	Preheat Hours	2 hrs
		Design Outside Temp	-5.0 C

Total Zone + Building Heatlosses In kW

Zone Number	Boosted Plant kW	Total Loss kW	Fabric Loss kW	Infiltration + Vent kW	Mean W/m² K	Mean W/m³	Glazing %	Floor Area m²
1	5.5	2.6	0.7	1.9	4.19	25.6	---	40
2	23.0	12.1	8.6	3.5	3.23	30.2	29	158
4	29.7	14.4	10.3	4.1	2.71	23.0	18	234
6	3.9	2.2	1.8	0.4	2.36	46.1	7	20
7	60.2	35.3	29.6	5.7	3.97	53.0	51	252
9	32.1	17.3	12.3	4.9	3.07	31.1	34	188
11	1.6	0.9	0.7	0.2	1.95	55.1	7	6
13	0.5	0.2	0.0	0.2	---	13.8	---	5
14	5.2	2.8	1.8	1.0	2.05	38.7	7	25
Building	161.8	87.8	65.7	22.1	3.28	35.1	34	958

Room Heatlosses

No. Zone	Room Name	Total Loss W	Fabric Loss W	Infiltration + Vent W	Mean W/m² K	Control Temp C	W/m³	Glazing %	Floor Area m²
1 (10)	B-PlantRm (heat gain to spa...	---	---	---	---	---	---	---	4
2 (10)	B-Intake (heat gain to space)	---	---	---	---	---	---	---	3
3 (14)	B-AWC	476	318	158	1.61	21.0	50.5	28	4
4 (2)	B-Laundry	797	587	211	1.52	17.0	34.4	23	10
5 (6)	B-Library	2158	1771	388	1.39	21.0	46.1	7	20
6 (12)	B-Store (heat gain to space)	---	---	---	---	---	---	---	4
7 (10)	LiftShaft (heat gain to space)	---	---	---	---	---	---	---	2
8 (4)	B-Corridor	1782	1415	367	1.21	21.0	37.3	5	21
9 (4)	G-MainEntrance	2240	1746	494	1.63	21.0	31.0	---	25
10 (11)	G-Reception	945	712	233	1.95	21.0	55.1	7	6
11 (9)	G-MeetingRm1	1804	1466	338	2.93	21.0	53.5	31	12
12 (9)	G-MeetingRm2	788	494	295	2.49	21.0	28.3	20	10
13 (9)	G-MeetingRm3	1076	851	225	4.07	21.0	75.5	59	5
14 (9)	G-MeetingRm4	1767	1405	362	5.15	21.0	44.7	86	14
15 (9)	G-MeetingRm5	775	546	229	3.66	21.0	47.5	49	6
16 (9)	G-MeetingRm6	775	546	229	3.66	21.0	47.5	49	6
17 (7)	G-Chapel	4970	4296	674	3.58	21.0	50.2	47	35
18 (7)	G-Sacristy	686	420	266	2.71	21.0	31.2	26	8
19 (14)	G-WC1	351	204	146	1.68	21.0	54.8	---	2
20 (14)	G-WC2	141	0	141	---	21.0	22.1	---	2
21 (14)	G-AWC	577	364	213	1.68	21.0	42.5	---	5
22 (13)	G-TeaPoint	216	0	216	---	21.0	13.8	---	5
23 (4)	G-Corridor	1455	861	593	4.22	21.0	13.8	63	37
24 (9)	1-MeetingRm7	750	504	246	2.48	21.0	40.3	20	6
25 (9)	1-MeetingRm8	1516	973	543	2.51	21.0	17.9	20	28

Room Heatlosses

No. Zone	Room Name	Total Loss W	Fabric Loss W	Infiltration + Vent W	Mean W/m² K	Control Temp C	W/m³	Glazing %	Floor Area m²
26 (9)	1-MeetingRm9	1143	715	428	3.01	21.0	22.1	33	17
27 (7)	1-Kitchen	3376	2886	490	4.28	21.0	53.9	64	21
28 (12)	1-ChairStore (heat gain to sp...	---	---	---	---	---	---	---	3
29 (9)	1-MeetingRm10	607	384	224	2.90	21.0	42.2	30	5
30 (9)	1-MeetingRm11	2739	2227	512	2.99	21.0	39.3	33	23
31 (9)	1-MeetingRm12	1204	757	447	2.92	21.0	21.4	31	19
32 (9)	1-MeetingRm13	1378	882	496	2.64	21.0	19.0	24	24
33 (9)	1-MeetingRm14	940	582	358	2.34	21.0	23.8	16	13
34 (7)	1-ResourceCent	2501	2008	493	2.75	21.0	37.6	26	22
35 (14)	1-WC	1250	904	346	2.04	21.0	34.4	9	12
36 (12)	1-ClStore (heat gain to space)	---	---	---	---	---	---	---	1
37 (4)	1-Corridor	2550	1849	701	2.86	21.0	19.2	29	44
38 (7)	2-Office1	1048	755	292	2.62	21.0	35.7	23	11
39 (2)	2-Bed1	977	640	337	2.89	21.0	25.1	30	15
40 (1)	2-Ensuite1	182	18	164	---	23.0	21.8	---	3
41 (2)	2-Bed2	977	640	337	2.89	21.0	25.1	30	15
42 (1)	2-Ensuite2	182	18	165	---	23.0	21.7	---	3
43 (7)	2-Lounge	4087	3616	471	5.64	21.0	68.8	98	22
44 (7)	2-DiningRm	1256	1009	247	5.63	21.0	62.4	98	8
45 (7)	2-Kitchen	2611	2228	383	4.14	21.0	65.4	61	15
46 (2)	2-Bed3	990	653	337	2.95	21.0	25.4	32	15
47 (1)	2-Ensuite3	183	18	164	---	23.0	21.9	---	3
48 (2)	2-Bed4	991	653	337	2.95	21.0	25.5	32	15
49 (1)	2-Ensuite4	182	17	164	---	23.0	21.8	---	3
50 (2)	2-Bed5	1103	752	350	2.66	21.0	26.5	24	16
51 (1)	2-Ensuite5	226	52	173	---	23.0	23.7	---	4
52 (2)	2-Bed6	1783	1430	352	2.74	21.0	45.0	26	15
53 (1)	2-Ensuite6	375	206	168	1.68	23.0	44.9	---	3
54 (7)	2-Office2	1019	773	246	2.05	21.0	50.5	9	8
55 (12)	2-ClStore1 (heat gain to space)	---	---	---	---	---	---	---	3
56 (12)	2-ClStore2 (heat gain to space)	---	---	---	---	---	---	---	2
57 (1)	2-AShower	192	11	182	---	23.0	18.1	---	4
58 (4)	2-CorridorA	2409	1772	637	2.95	21.0	20.6	31	44
59 (4)	2-CorridorB	536	138	398	1.52	21.0	19.5	---	10
60 (7)	3-Lounge	1130	860	270	1.58	21.0	42.5	24	11
61 (2)	3-Bed7	1123	811	312	1.41	21.0	31.8	31	15
62 (1)	3-Ensuite7	211	62	149	---	23.0	27.9	---	3
63 (2)	3-Bed8	1123	811	312	1.41	21.0	31.8	31	15
64 (1)	3-Ensuite8	213	63	150	---	23.0	28.0	---	3
65 (7)	3-Lounge2	4036	3600	436	3.19	21.0	75.0	100	22
66 (7)	3-Kitchen	3849	3348	500	2.70	21.0	68.6	72	23
67 (2)	3-Bed9	1123	811	312	1.41	21.0	31.8	31	15
68 (1)	3-Ensuite9	212	63	149	---	23.0	28.0	---	3
69 (2)	3-Bed10	1119	807	312	1.41	21.0	31.7	30	15
70 (1)	3-Ensuite10	213	65	149	---	23.0	28.2	---	3
71 (7)	3-Office4	1054	795	259	1.66	21.0	42.2	39	10
72 (7)	3-Office5	880	613	267	1.29	21.0	33.7	19	11
73 (7)	3-PrayerRm	2802	2364	438	1.62	21.0	46.9	18	25
74 (12)	3-UtilityRm (heat gain to spa...	---	---	---	---	---	---	---	4
75 (12)	3-ClStore (heat gain to space)	---	---	---	---	---	---	---	2
76 (1)	3-Bathroom	233	68	165	---	23.0	24.3	---	4
77 (4)	3-CorridorA	2808	2239	569	1.34	21.0	28.1	31	42
78 (4)	3-CorridorB	655	285	370	0.81	21.0	26.3	---	10

4.0 Thermal Model Calculation – Energy Assessment – Existing Building

CADline Limited	443 - St Aloysius Convent Historical.CYC	Page 1
443 - St Aloysius Convent	Engineer: Reuben Hendriks	10/10/2017

Energy Consumption Using File:- 443 - St Aloysius Convent Historical.CYC (10/10/2017)

This Report includes:

Summary Report

General Information

Project Reference	443 - St Aloysius Convent
Areas Calculated	All Rooms
Weather File	!Weather Global 2010.DBE -

Item	Month On	Month Off	Fuel Type	Fuel Price	System Efficiency
Cooling	June	August	Elect Direct	0.16 £/kWh	383 %
Heating	October	April	Natural Gas	0.04 £/kWh	80 %
Lights	January	December	Elect Direct	0.16 £/kWh	
Equip	January	December	Elect Direct	0.16 £/kWh	

Item	Hour On	Hour Off	People % Used	Lighting % Used	Equipment % Used
Cooling	9	17	100	100	100
Heating	9	17	---	---	---

Summary Results

Month	Heating		Cooling		Lights		Equipment	
	£	GJ	£	GJ	£	GJ	£	GJ
January	1261.1	113	---	---	63.9	1	279.9	6
February	917.6	83	---	---	35.2	1	252.8	6
March	704.2	63	---	---	27.8	1	279.9	6
April	372.8	34	---	---	16.2	0	270.8	6
May	---	---	---	---	10.3	0	279.9	6
June	---	---	172.5	4	10.0	0	270.8	6
July	---	---	252.0	6	10.3	0	279.9	6
August	---	---	236.8	5	16.7	0	279.9	6
September	---	---	---	---	26.9	1	270.8	6
October	351.7	32	---	---	38.9	1	279.9	6
November	807.9	73	---	---	61.8	1	270.8	6
December	1055.0	95	---	---	63.9	1	279.9	6
Total	5470.2	492	661.2	15	381.9	9	3295.3	74

5.0 Thermal Model Calculation – New Thermal Improvements

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443 - St Aloysius Convent	Engineer: Reuben Hendriks	09/10/2017

Heatloss Calculation:- 443 - ST ALOYSIUS CONVENT.CYC (09/10/2017)443 - ST ALOYSIUS CONVENT.CYC (09/10/2017)

Project Reference	443 - St Aloysius Convent		
Thermal Response Factor	5.83	Temperature Type	DRT
Building Weight	LightWeight	Plant Hours	8 hrs
Convective Heating	70 %	Preheat Hours	2 hrs
		Design Outside Temp	-5.0 C

Total Zone + Building Heatlosses In kW

Zone Number	Boosted Plant kW	Total Loss kW	Fabric Loss kW	Infiltration + Vent kW	Mean W/m² K	Mean W/m³	Glazing %	Floor Area m²
1	1.7	0.7	0.2	0.5	0.72	6.7	---	40
2	7.4	3.2	1.5	1.7	0.56	8.0	29	158
4	12.7	5.6	2.8	2.8	0.73	8.9	18	234
6	2.5	1.5	1.3	0.2	1.72	32.3	7	20
7	20.1	9.1	6.2	3.0	0.80	13.7	51	252
9	10.7	4.6	2.1	2.4	0.52	8.2	34	188
11	0.4	0.2	0.1	0.1	0.23	10.9	7	6
13	0.2	0.1	0.0	0.1	---	4.4	---	5
14	1.4	0.6	0.3	0.3	0.36	8.9	7	25
Building	57.3	25.5	14.5	11.0	0.70	10.2	34	958

Room Heatlosses

No. Zone	Room Name	Total Loss W	Fabric Loss W	Infiltration + Vent W	Mean W/m² K	Control Temp C	W/m³	Glazing %	Floor Area m²
1 (10)	B-PlantRm (heat gain to spa...	---	---	---	---	---	---	---	4
2 (10)	B-Intake (heat gain to space)	---	---	---	---	---	---	---	3
3 (14)	B-AWC	189	147	42	0.74	21.0	20.1	28	4
4 (2)	B-Laundry	382	294	88	0.76	17.0	16.5	23	10
5 (6)	B-Library	1512	1297	215	1.02	21.0	32.3	7	20
6 (12)	B-Store (heat gain to space)	---	---	---	---	---	---	---	4
7 (10)	LiftShaft (heat gain to space)	---	---	---	---	---	---	---	2
8 (4)	B-Corridor	1137	923	214	0.86	21.0	23.8	5	21
9 (4)	G-MainEntrance	746	428	318	0.39	21.0	10.3	---	25
10 (11)	G-Reception	187	111	75	0.23	21.0	10.9	7	6
11 (9)	G-MeetingRm1	357	208	149	0.40	21.0	10.6	31	12
12 (9)	G-MeetingRm2	195	73	122	0.33	21.0	7.0	20	10
13 (9)	G-MeetingRm3	255	192	63	0.90	21.0	17.9	59	5
14 (9)	G-MeetingRm4	515	340	175	1.23	21.0	13.0	86	14
15 (9)	G-MeetingRm5	152	80	72	0.53	21.0	9.3	49	6
16 (9)	G-MeetingRm6	152	80	72	0.53	21.0	9.3	49	6
17 (7)	G-Chapel	1302	862	439	0.70	21.0	13.2	47	35
18 (7)	G-Sacristy	153	57	96	0.36	21.0	7.0	26	8
19 (14)	G-WC1	50	22	28	0.18	21.0	7.8	---	2
20 (14)	G-WC2	28	0	28	---	21.0	4.4	---	2
21 (14)	G-AWC	99	40	59	0.18	21.0	7.3	---	5
22 (13)	G-TeaPoint	68	0	68	---	21.0	4.4	---	5
23 (4)	G-Corridor	681	221	459	0.63	21.0	6.5	63	37
24 (9)	1-MeetingRm7	148	66	82	0.32	21.0	7.9	20	6
25 (9)	1-MeetingRm8	495	125	369	0.33	21.0	5.8	20	28

No. Zone	Room Name	Total Loss W	Fabric Loss W	Infiltration + Vent W	Mean W/m² K	Control Temp C	W/m³	Glazing %	Floor Area m²
26 (9)	1-MeetingRm9	324	98	226	0.42	21.0	6.3	33	17
27 (7)	1-Kitchen	943	664	279	0.96	21.0	15.1	64	21
28 (12)	1-ChairStore (heat gain to sp...	---	---	---	---	---	---	---	3
29 (9)	1-MeetingRm10	118	55	63	0.40	21.0	8.2	30	5
30 (9)	1-MeetingRm11	812	504	308	0.66	21.0	11.7	33	23
31 (9)	1-MeetingRm12	350	103	246	0.40	21.0	6.2	31	19
32 (9)	1-MeetingRm13	433	117	316	0.35	21.0	6.0	24	24
33 (9)	1-MeetingRm14	247	75	172	0.30	21.0	6.3	16	13
34 (7)	1-ResourceCent	570	278	292	0.37	21.0	8.6	26	22
35 (14)	1-WC	273	114	159	0.24	21.0	7.5	9	12
36 (12)	1-ClStore (heat gain to space)	---	---	---	---	---	---	---	1
37 (4)	1-Corridor	938	355	582	0.54	21.0	7.0	29	44
38 (7)	2-Office1	230	101	129	0.35	21.0	7.8	23	11
39 (2)	2-Bed1	257	86	170	0.40	21.0	6.6	30	15
40 (1)	2-Ensuite1	51	12	39	---	23.0	6.1	---	3
41 (2)	2-Bed2	257	86	170	0.40	21.0	6.6	30	15
42 (1)	2-Ensuite2	51	11	40	---	23.0	6.1	---	3
43 (7)	2-Lounge	1191	924	267	1.38	21.0	20.1	98	22
44 (7)	2-DiningRm	346	256	89	1.37	21.0	17.2	98	8
45 (7)	2-Kitchen	688	509	178	0.92	21.0	17.2	61	15
46 (2)	2-Bed3	259	89	170	0.41	21.0	6.7	32	15
47 (1)	2-Ensuite3	51	12	39	---	23.0	6.1	---	3
48 (2)	2-Bed4	259	89	170	0.41	21.0	6.7	32	15
49 (1)	2-Ensuite4	51	11	39	---	23.0	6.1	---	3
50 (2)	2-Bed5	282	100	182	0.36	21.0	6.8	24	16
51 (1)	2-Ensuite5	76	32	45	---	23.0	8.0	---	4
52 (2)	2-Bed6	370	196	174	0.37	21.0	9.3	26	15
53 (1)	2-Ensuite6	73	34	39	0.18	23.0	8.8	---	3
54 (7)	2-Office2	183	95	89	0.25	21.0	9.1	9	8
55 (12)	2-ClStore1 (heat gain to space)	---	---	---	---	---	---	---	3
56 (12)	2-ClStore2 (heat gain to space)	---	---	---	---	---	---	---	2
57 (1)	2-AShower	61	11	50	---	23.0	5.7	---	4
58 (4)	2-CorridorA	856	345	512	0.56	21.0	7.3	31	44
59 (4)	2-CorridorB	200	80	120	0.88	21.0	7.3	---	10
60 (7)	3-Lounge	247	130	117	0.24	21.0	9.3	24	11
61 (2)	3-Bed7	284	129	155	0.23	21.0	8.0	31	15
62 (1)	3-Ensuite7	50	15	36	---	23.0	6.7	---	3
63 (2)	3-Bed8	284	129	155	0.23	21.0	8.0	31	15
64 (1)	3-Ensuite8	51	15	36	---	23.0	6.7	---	3
65 (7)	3-Lounge2	1144	902	242	0.77	21.0	21.3	100	22
66 (7)	3-Kitchen	1041	789	251	0.62	21.0	18.5	72	23
67 (2)	3-Bed9	284	129	155	0.23	21.0	8.0	31	15
68 (1)	3-Ensuite9	51	15	36	---	23.0	6.7	---	3
69 (2)	3-Bed10	283	128	155	0.22	21.0	8.0	30	15
70 (1)	3-Ensuite10	52	16	36	---	23.0	6.8	---	3
71 (7)	3-Office4	238	128	110	0.26	21.0	9.5	39	10
72 (7)	3-Office5	223	108	115	0.20	21.0	8.5	19	11
73 (7)	3-PrayerRm	610	347	263	0.23	21.0	10.2	18	25
74 (12)	3-UtilityRm (heat gain to spa...	---	---	---	---	---	---	---	4
75 (12)	3-ClStore (heat gain to space)	---	---	---	---	---	---	---	2
76 (1)	3-Bathroom	61	15	45	---	23.0	6.3	---	4
77 (4)	3-CorridorA	813	374	439	0.22	21.0	8.1	31	42
78 (4)	3-CorridorB	222	113	109	0.32	21.0	8.9	---	10

6.0 Thermal Model Calculation – Energy Assessment – New Thermal Improvements

CADline Limited	443 - St Aloysius Convent.CYC	Page 1
443 - St Aloysius Convent	Engineer: Reuben Hendriks	10/10/2017

Energy Consumption Using File:- 443 - St Aloysius Convent.CYC (10/10/2017)

This Report includes:

Summary Report

General Information

Project Reference	443 - St Aloysius Convent
Areas Calculated	All Rooms
Weather File	!Weather Global 2010.DBE -

Item	Month On	Month Off	Fuel Type	Fuel Price	System Efficiency
Cooling	June	August	Elect Direct	0.16 £/kWh	383 %
Heating	October	April	Natural Gas	0.04 £/kWh	80 %
Lights	January	December	Elect Direct	0.16 £/kWh	
Equip	January	December	Elect Direct	0.16 £/kWh	

Item	Hour On	Hour Off	People % Used	Lighting % Used	Equipment % Used
Cooling	9	17	100	100	100
Heating	9	17	---	---	---

Summary Results

Month	Heating		Cooling		Lights		Equipment	
	£	GJ	£	GJ	£	GJ	£	GJ
January	283.2	28	---	---	65.1	1	285.1	6
February	189.0	18	---	---	35.8	1	257.5	6
March	113.6	11	---	---	28.4	1	285.1	6
April	48.0	5	---	---	16.5	0	275.9	6
May	---	---	---	---	10.5	0	285.1	6
June	---	---	407.4	9	10.2	0	275.9	6
July	---	---	428.5	9	10.5	0	285.1	6
August	---	---	407.2	9	17.0	0	285.1	6
September	---	---	---	---	27.4	1	275.9	6
October	61.9	6	---	---	39.7	1	285.1	6
November	190.4	19	---	---	63.0	1	275.9	6
December	263.7	26	---	---	65.1	1	285.1	6
Total	1149.8	112	1243.1	27	389.0	9	3357.1	74

7.0 Summary and Analysis of Results

	Existing Elements	New Elements
Heating Cost (£)	5470.20	1149.80
Cooling Cost (£)	661.20	1243.10
Total Cost (£)	6131.40	2392.90

The summary table above compares the annual costs of energy consumption of St Aloysius Convent as modelled by Cymap 2018. There is a significant reduction in heating costs due to the improved thermal characteristics of the building. The lower U-values have led to lower heat losses and thus less requirement to keep the building heated at a comfort levels. The improved building fabric also leads to an increased cost to cooling. This is due to the improved insulation of the external walls. As there are no cooling systems to be installed presently, this cost should not be taken into consideration.

The impact of improving the U-values to prevent heat loss, result in an overall increase in savings on annual energy consumption. Guidance on thermal elements from Building Regulations L1B section 5.12 state that reasonable provision would be to upgrade the existing thermal elements. A reasonable test of economic feasibility would be to achieve a simple payback of 15 years or less. Where the standard is not technically, functionally or economically feasible, then the external thermal elements should be upgraded to the best standard that is technically and functionally feasible and delivers a simple payback period of 15 years or less.