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Condition 10
Technical Note

Application Ref: 2013/7130/P

Contemporary Design Solutions LLP

65-69 Holmes Road

Final

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ABOUT HODKINSON CONSULTANCY

Our team of technical specialists offer advanced levels of expertise and experience to our clients. We have a wide experience of the construction and development industry and tailor teams to suit each individual project.

We are able to advise at all stages of projects from planning applications to handover.

Our emphasis is to provide innovative and cost effective solutions that respond to increasing demands for quality and construction efficiency.

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CONTENTS

1. INTRODUCTION

1.1 This document has been prepared by Hodkinson Consultancy, a specialist energy and environmental consultancy for planning and development to address the requirement of Condition 10 (Combined Cooling Heat and Power) of planning decision notice (Application Ref: 2013/7130/P).

1.2 The site is located at 65-69 Holmes Road in the London Borough of Camden.

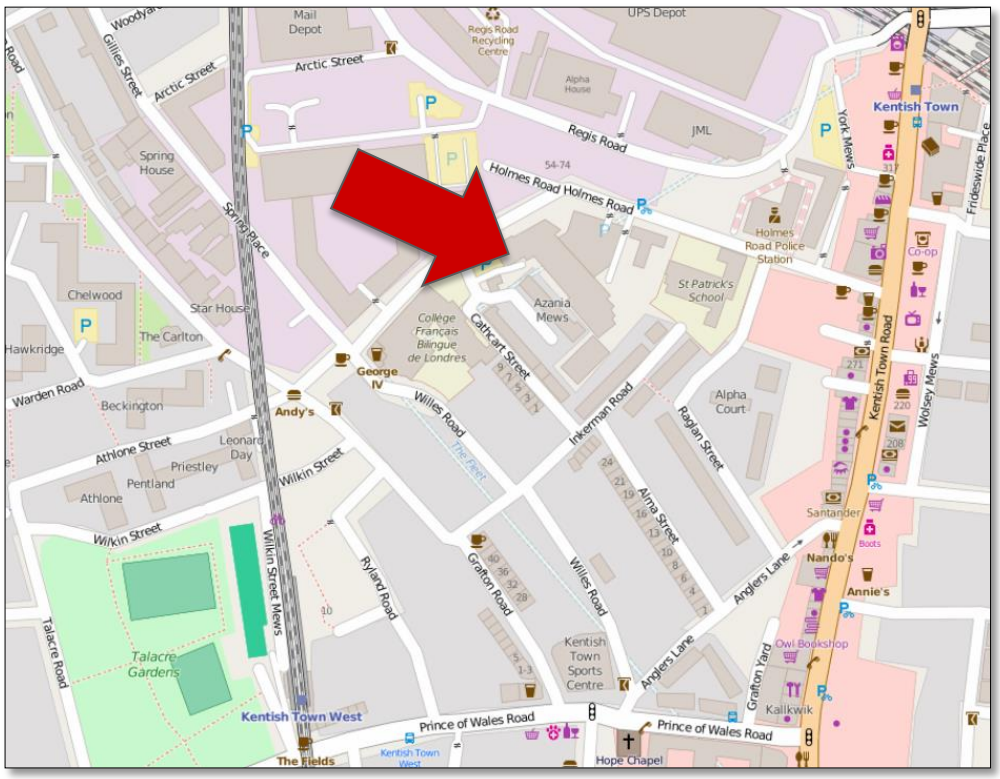

Figure 1: Site Location - © OpenStreetMap Contributors. Go to www.openstreetmap.org/copyright

1.3 The development consists of a new part seven, part three storey building above two basement levels to provide student accommodation comprising 273 units with ancillary facilities (sui generis), warehouse (Class B8) at basement and ground floor levels and coffee shop (Class A1) at ground floor level following demolition of existing B8 buildings.

1.4 This technical note provides an outline specification of the proposed Combined Heat and Power (CHP) technology to be implemented at the site. The specification of the CHP system may differ slightly from what is outlined in this technical note, as the detailed design develops, but the same outcome of low carbon energy will still be achieved.

2. CONDITION 10

2.1 **Condition 10: (Combined Cooling Heat and Power)**, of the Decision Notice states:

''Before the development commences, details of the proposed Combined Cooling Heat and Power technology shall be submitted to and approved by the Council. The approved facility shall thereafter be provided in its entirety prior to the first occupation of any of the new units and permanently retained thereafter.''

3. METHODOLOGY

3.1 Condition 10 asks for details of the proposed Combined Cooling Heat and Power (CCHP) technology, however as stated in the approved Energy Statement by Richard Hodkinson Consultancy (Matthew Bailey) dated October 2013 that was submitted with the planning application for this development, the feasibility of a CCHP system has been assessed, but has not been proposed as the development's cooling demand is too small to justify a system of this type.

3.2 The Energy Statement proposed to incorporate a CHP system to provide space heating and hot water for the development.

3.3 A CHP system is ideally suited to the development due to the high heat demand and will be utilised to provide low carbon heating and electricity.

3.4 The CHP capacity detailed in this technical note has been calculated using performance benchmarks from similar development's from the developer's (Contemporary Design Solutions LLP) portfolio with the intention of providing an initial specification to guide the design. As the detailed design develops the specification will be refined, the same outcome of low carbon energy still being achieved.

4. SPECIFICATION

4.1 The CHP capacity for the development has been calculated as 299kWth.

4.2 This is based on sizing the CHP engine to meet 75% of the development's hot water demand. The remaining 25% will be met by efficient gas boilers on site.

4.3 This load will be met with a single Ener-G 165 CHP gas engine. This will be supported by thermal stores where feasible to maximise the use of the CHP engine by balancing supply with demand.

4.4 The CHP engine will be located in the plant room at lower basement level.

5. CONCLUSION

5.1 This technical note provides details of the proposed CHP technology as required to address Condition 10 of the Decision Notice (Application Ref: 2013/7130/P)

5.2 The specification of the CHP technology may differ slightly from what is outlined in this technical note, as the detailed design develops, but the same outcome of low carbon energy will be still achieved.

5.3 The CHP technology will be provided in its entirety prior to the first occupation of any new units and will be permanently retained thereafter.

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APPENDICES

Appendix A

CHP Technical Data Sheet

Technical Datasheet

E165 Natural Gas CHP Unit

Energy Balance and Part Load Data @ 0.95PF		Units	100%	75%	50%
Electrical Output	(+/-3%)	kW	165	124	83
Electrical Efficiency (Net)	(+/-5%)	%	33.2%	30.7%	26.6%
Heat Output	(+/-10%)	kW	285	241	196
Thermal Efficiency (Net)	(+/-8%)	%	57.4%	59.7%	63.4%
Fuel Input (Net)	(+/-5%)	kW	497	403	310
Total Efficiency (Net)	(+/-8%)	%	90.7%	90.4%	90.0%
Heat Output from Jacket Water	(+/-8%)	kW	197	173	150
Heat Output from Exhaust Gas @ Outlet Temp.	(+/-8%)	kW	88	67	46
Aftercooler Heat Output	(+/-8%)	kW	N/A	N/A	N/A
Radiated Heat Output	(+/-8%)	kW	17	13	9
Combustion Air Flow	(+/-5%)	Nm^3/h	470	381	293
Fuel Mass Flow (ρ = 0.75kg/Nm³)	(+/-5%)	kg/h	37.3	30.2	23.2
Fuel Volume Flow (LHV = 10kWh/Nm³)	(+/-5%)	Nm3/h	49.7	40.3	31.0
Exhaust Mass Flow (Wet)	(+/-5%)	kg/h	651	528	406
Exhaust Volume Flow @ Outlet Temp.	(+/-5%)	m^3/h	725	588	452

Engine Details

Manufacturer		ENER-G
Model		EGE-12V
Fuel Type		Natural Gas
Min. Methane Number		70
Cylinders		12
Aspiration		Natural
Speed	rpm	1500
Aftercooler		No

Hot Water Details

Max. Water In/Out Temp.	°C	80/90°C
Max. Water Flow Rate*	l/s	7.20
Max. Glycol Content	%	0
Connection Size	mm	80
Flange Type		PN16
Pressure Loss**	kPa	15.7
Max. Test Pressure	Bar	10

* Assuming Cp = 3.91 kJ/kg·K and ρ = 1014.64 kg/m³

** Pressure loss figures stated are at max. water flow rate. Internal unit only.

Exhaust Details

Connection Size	mm	200
Flange Type		PN10
Outlet Temp.	°C	120
Max. Allowable Backpressure	Pa	3710

Ventilation Details

Connection Size	mm	500
Ventilation Rate	m^3/s	1.98
Max. Air Inlet Temp.	°C	30
Max. Air Outlet Temp.	°C	45

Generator Details

Manufacturer		Stamford
Model		HCI444E-311
Type		Synchronous
Rating	kVA	350
Voltage	V	400
Phase	Ph	3
Frequency	Hz	50
Protection Class		IP23
Rated Power Factor	PF	0.8
Xd Dir. Axis Synchronous		2.71
X'd Dir. Axis Transient		0.18
X"d Dir. Axis Sub-Transient		0.13
T" Sub-Transient Time Const.		0.019
T'do O.C Field Time Const.		1.7
CHP Protection Device	A/Ph	280
Indicative Client Protection Device	A/Ph	315 (Adjustable)
Current Per Phase @ 0.8PF	A	298
Current Per Phase @ 0.95PF	A	251
Efficiency @ 0.8PF	%	94.6%
Efficiency @ 0.95PF	%	95.5%
Indicative Main Cable Size [a] †	mm^2	TBC
Indicative Earth Cable Size [b] †	mm^2	TBC

[a] 4-Core XLPE/SWA/PVC to BS5467, Max 50 meters.

[b] 1-Core 6491B to BS7211, Max 50 meters.

† Sizes and lengths based on IET 17TH Edition BS7671, Installation method 31.

Fuel Details

Connection Size	mm	50
Flange Type		PN16
Min/Max. Supply Pressure	mbar	20/55

Emissions @ 5% O2

NOx	mg/Nm^3	4288
CO	mg/Nm^3	2014
NOx (With Catalyst)	mg/Nm^3	250
CO (With Catalyst)	mg/Nm^3	350

Weight Details

Enclosure (Dry) STD/PREM.	kg	5500/7000
Container (Dry) STD/PREM.	kg	TBC/TBC

Noise Data

Enclosure SPL @ 1m SN/LN	dB(A)	70/65
Container SPL @ 1m SN/LN	dB(A)	75/65

NB: Energy balance data assumes perfect combustion. Values for part load are estimates only. All information detailed is for guidance only and is subject to change without notice due to our commitment to continuous improvement - all values should be confirmed with ENER-G Combined Power Ltd on a project specific basis.