McCarthy & Stone

Energy Statement – New Wharf Road, Tonbridge

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Contents Page

Appendices

1.0 Introduction

1.1 Purpose of the Report

Instructions were received from Sim Singh of McCarthy & Stone to produce an Energy Statement for the proposed development at New Wharf Road, Tonbridge. This report has been produced to support the planning application to be submitted for the development.

This statement provides a response to the relevant planning policies contained within the Tonbridge & Malling Borough Council Local Development Framework Core Strategy (adopted September 2007).

1.2 Site and Building Description

The development will be located at New Wharf Road, Tonbridge, and consists of 36 Retirement Living apartments, and the associated communal areas to serve these apartments. These comprise: circulation areas, Guest Suite, Managers Office, Fitness Area and Lounge. A proposed site layout has been included in Appendix 1.

1.3 Methodology

SAP/SBEM calculations have been completed to determine expected performance of the proposed dwellings at New Wharf Road, Tonbridge. These consist of SAPs for a representative sample of apartments, and an SBEM from a similarly sized and serviced McCarthy & Stone scheme. The specifications and results for the buildings as proposed are compared to the target building baseline, which is the benchmark for Part L of Building Regulations compliance.

This report will detail the fabric and M&E specification and performance of the proposed development, then determine the renewable contribution and detail the proposed sanitary specification required to comply with the relevant planning conditions.

2.0 Planning Policy

2.1 Tonbridge & Malling Borough Council Local Development Framework – Core Strategy

Tonbridge & Malling Borough Council Local Development Framework Core Strategy (adopted September 2007) outlines the requirements regarding sustainability for this development. The relevant condition (Policy CP1) is detailed below. This statement will provide a response to the elements regarding the minimisation of energy and water consumption.

2.2 Policy CP1

"In selecting locations for development and determining planning applications the Borough Council will seek to minimise waste generation, reduce the need to travel and minimise water and energy consumption having regard to the need for 10% of energy requirements to be generated on-site from alternative energy sources and the potential for recycling water. Where possible, areas liable to flood will be avoided."

3.0 Energy Assessment

3.1 Maximising Energy Efficiency and Reducing Carbon Emissions

In efforts to reduce the overall carbon emissions associated with the development and to maximise the energy efficiency, the developer has a robust 'fabric first' approach to the build specification.

This has been achieved through building fabric improvements with an uplift on the minimum requirements of Approved Document Part L, and also specification of efficient mechanical and electrical services, including a number of 'add-on' measures to improve efficiency and performance.

The table below demonstrates how the specification of the development at New Wharf Road, Tonbridge compares to the limiting values and minimum efficiencies allowed within Part L 2013:

Table 1: Comparison with Building Regulations Part L 2013		
Building Element	**Limiting Part L 2013 Specification**	**Proposed Specification**
External Walls U-Value	0.30	0.20
Roof U-Value	0.20	0.11
Exposed Floor U-Value	0.25	0.18
Window U-Value	2.00	1.40
Party Wall U-Value	0.20	0.00
Door U-Value	2.00	1.40
Heating Efficiency	88%	100% (Direct Electric)
Pressure Test	10.00	4.50
Thermal Bridge Y-Value	0.15	0.06 (Average)
Low Energy Lighting	75%	100%

The development is proposed to adopt a 'fabric first' approach to the specification and as detailed above, the proposed U-Values are a significant uplift on the minimum requirements under Part L.

The build-up of external wall for the apartments is a fully filled 150mm cavity with Masonry block that generates a u-value of 0.20W/m^{2}K. Well insulated cavity walls, roof, floors and openings provide a comfortable environment within the development and reduce the buildings' reliance on the main heating system. The air permeability target in the apartments is 4.50 m^3/(h.m^2), providing a significant improvement over the Notional Building target.

Intelligent construction methods are also utilised in the specification of this development. The use of bespoke calculated thermal bridge details ensure that thermal performance is enhanced by minimising heat and energy losses through thermal bridges and air gaps. As such, the scheme achieves an average improvement of 17.15 % against the TFEE target under Part L1A.

From an energy efficiency perspective glazing to the scheme is generous and makes good use of the south facing orientation. High levels of natural light appear in many apartments, minimising the need for artificial light.

McCarthy & Stone utilise underfloor electric heating in conjunction with thermal mass to regulate internal temperature, which achieve efficiencies up to 100%. This is a further improvement on the minimum efficiency required by individual gas combination boilers in the notional building. Electricity is increasingly becoming the low carbon energy source of choice, given the rapid decarbonisation of the grid in recent years.

Another key element to the specification of the proposed development is the utilisation of mechanical ventilation with heat recovery (MVHR). This system allows warm stale air produced by occupancy and internal activities to be extracted from the building; however, the heat within this air is retained and transferred into cool fresh air being brought into the building from outside. The use of MVHR significantly reduces the theoretical need for use of the main heating system as providing background heating through occupation (as well as improving comfort levels through the flow of fresh air).

In communal areas, lighting occupancy sensors will be utilised that switch off or dim the lighting when occupants are not present in areas such as circulation spaces, toilets or storage areas. This prevents lighting from being left on when it is not needed, therefore saving energy.

Metering and sub-metering equipment for the heating system will also be used that help identify areas where more energy than expected is being used, such as heaters being left on at times when they are not needed or where there are defective elements present. This helps improve the heating strategy and therefore save energy.

To summarise, all of the main building elements outlined in Table 1 have been designed to provide a thermally efficient building envelope that achieves an improvement on the minimum requirements set out within Part L.

3.2 Energy Consumption

To understand the overall proposed energy use of the development, sample SAP calculations for the proposed development have been undertaken and figures for the communal areas derived from a representative SBEM. A further breakdown of the calculations completed can be found in Appendix 2.

Table 2 demonstrates the development's energy use, based on the Design Stage SAP and SBEM calculations completed.

Table 2: Predicted Energy Consumption	
Apartments	**Units (kwh/yr)**
Space Heating	38,123.02
Hot Water	57,218.13
Lighting	4850.72
Auxiliary SAP – Pumps, fans and electric keep-hot	11,349.01
Sub-Total	**111,541.05**
Communal Areas	**Units (kwh/yr)**
Heating	30,915.44
Lighting	17,190.01
Hot Water	3559.50
Auxiliary	825.80
Sub-Total	**52,490.76**
Total Predicted Building Energy Consumption	**164,031.80**

As stated within the policy CP1, the development is required to secure at least 10% of their expected energy demand from on-site renewable or low carbon sources. A 10% total, based on the total Predicted Building Energy Consumption figure (as detailed in Table 2) of 164,031.80 kWh/yr, equates to 16,403.18 kWh/yr to be achieved from on-site renewable or low carbon sources.

3.3 Renewable Technologies

With regards to this policy, a brief overview of relevant renewable technologies will be undertaken.

3.3.1 Small-Scale Wind Turbines

Wind turbines convert the power in the wind into electrical energy using rotating wing-like blades to drive a generator. Similar to Photovoltaic panels (PV), they can either be grid connected or used to charge batteries or for on-site use.

Wind turbines can range from small domestic turbines producing hundreds of watts to large offshore turbines with capacities of 3MW and diameters of 100m. A detailed study for urban deployment should take into account wind speed and turbulence and potential noise pollution issues.

There are two main types of turbine available, horizontal or vertical axis. Horizontal axis turbines, (sometimes referred to a propeller type) range in scale from 0.5m to 100m diameter. Vertical-axis turbines rotate around a vertical axis, resulting in lower rotor tip speed and reduced noise and vibration issues.

In both cases, the output of the turbine will be dependent upon both the start-up speed of the blades and the specific gearing and generator design.
The most common cause of poor performance is poor siting of the turbine. The turbulent wind conditions often found in urban locations undermines the performance of horizontal scale turbines as they have to regularly rotate Yaw to face the oncoming wind.

This process reduces the proportion of energy that the turbine can capture. Vertical axis turbines are designed to avoid this issue by always having blades facing the wind.

These performance issues mean that as a general rule, horizontal turbines are better suited to less turbulent wind regimes, whilst vertical axis turbines offer potential for installation in urban environments. In either case, the turbine must be mounted at a reasonable height to ensure that it can 'see' the wind. For urban deployment, this means that roof mounted turbines still require a mast and the structural design of the building must be developed to incorporate the additional loads and stresses.

It may be possible for the scheme to secure a 10% contribution from Wind Turbines, however, due to the likely issues associated with permissions required for such installation and the potential for nuisance noise in a residential area, the use of wind turbines has not been considered appropriate for the scheme**.**

3.3.2 Solar Thermal Heating

Solar thermal panels collect solar radiation to heat water that can then be used for either space heating or domestic hot water. There are two types of competing solar thermal technologies; flat-plate and evacuated tube.

Evacuated tube collectors are more efficient and therefore require less active collector array than the equivalent output of a flat plate system. However, in general, capital costs for the two technologies are comparable.

The system consists of solar collectors that are often roof mounted. Liquid is passed through the solar collectors and then to a heat exchanger in a domestic hot water cylinder, which will also have a top-up heat source (gas, biomass, or electricity) to ensure reliability of supply.

Solar thermal collectors can still produce energy from diffuse sunlight and are therefore less susceptible to performance reductions from orientation and angle compared to PV.

A typical 3-4m^2 collector area system (area dependent on technology) is capable of providing 50% the annual domestic hot water demand for a typical 2-3 bed house. The proportion of hot water provided varies over the course of a year, with the system achieving 100% coverage during the summer months and 5% during the winter.

It is questionable whether the Solar Thermal could meet the 10% requirement, and even if so, it would not be the most efficient or cost-effective method to do so. As such, the use of solar thermal has not been considered for this scheme.

3.3.3 Heat Pumps

A ground source heat pump (GSHP) can harness the energy from the ground for use within buildings. This makes it possible to use the heat in the ground during the winter months to meet our heating needs. In the summer months it is also possible to cool buildings using ground temperatures that are lower than ambient air.

A typical ground system consists of a ground to water heat exchanger often called the 'ground loop' or 'ground coil', a heat pump and a distribution system. Water (or other solution) is passed round the system 'absorbing' heat from the ground and upgrading this heat via the heat pump into the building.

The heat exchanger can consist of either a vertical borehole system, where long pipes are driven deep into the ground or a horizontal trench system, which operates at shallower depths. The performance of a HP is measured using a COP (coefficient of performance). This defines the amount of useful energy output from the heat pump compared to the energy input. Typical systems can achieve a COP in the region of 350-400%.

The COP is maximised where the flow temperature of the heating circuit is between 35-40°C and therefore GSHP are ideally suited for connection to under-floor heating. The potential scale of GSHP is only limited by the availability of land for the ground loop and reasonable levels of energy abstraction. Typical costs for ground source heat pumps range from £800/kW for trench systems to £1,500/kW for vertical borehole systems.

Based on discussions with the client, the constraints of the proposed site and scheme layout do not lend well to the use of ground source heat pumps and as a result of this, this technology has not been considered to be feasible.

Air source heat pumps (ASHP) work in a similar way to ground source and are able to extract heat from the outdoor air, even when the outside temperatures are very low, for use in space heating and hot water systems. ASHP are also available in air – air formats, in which the heat is emitted into the building through ductwork, in which instance can also provide the option for air conditioning or cooling in summer, however they cannot serve hot water systems.

These systems only require space for an external condenser unit, which makes them much simpler to install when compared to GSHP. These systems also offer a significant reduction in carbon emissions from that of a conventional heating system (especially electric heating systems).

Given site constraints (both in terms of space required and potential noise and visual nuisance) as well as financial viability reasons, currently heat pumps are not considered appropriate for this development.

3.3.4 Photovoltaics

Photovoltaic panels convert solar radiation into direct current electricity. In principle, they are an ideal source of renewable energy as they harness the most abundant source of energy on the Earth, the sun, and they produce electricity, which is the most useful form of energy.

PV's are silent in operation, have no moving parts and have a long life with low maintenance levels. PV systems can be connected to the grid or battery arrays in remote locations. Grid connected systems consist of PV arrays connected to the grid through a charge controller and an inverter. PV cells are more efficient at lower temperatures so good ventilation should be allowed around the PV modules where possible.

For McCarthy & Stone following research and evaluation over several years, PV has been adopted as their preferred renewable technology. McCarthy & Stone put their customers at the heart of product choice, it is the attributes of PV’s high performance by delivering real energy generation benefits to running costs, added to the low maintenance costs, which is vital to reduce whole life costs of a scheme for all residents. It is this that makes it their preferred renewable approach for CO2 reduction and Energy reduction targets.

As such, McCarthy & Stone have confirmed that a suitably qualified PV installer will be contracted to provide an array with a minimum output of 16,403.18 kWh/yr.

4.0 Water Consumption

As part of Policy CP1, McCarthy & Stone will ensure that apartment water use does not exceed 110 litres/per person/per day, as per the Building Regulations Part G Optional target. This target improves upon the standard Part G target of 125 litres/per person/per day, demonstrating a commitment to minimising water consumption. The development at New Wharf Road, Tonbridge will incorporate efficient, water saving sanitaryware to meet this goal. Where this is not possible, flow restrictors will be installed to limit water use of sanitaryware items.

A representative specification is listed below, whilst the final flow rates of individual sanitaryware items may change as detailed design progresses, compliance with the 110 Litre target will be maintained. A full breakdown of proposed flow rates is available in Appendix 3.

W/C – 6 Litres (Full Flush Volume), 3 Litres (Part Flush Volume)
Shower – 9 Litres/Minute
WHB Tap – 5 Litres/Minute
Kitchen Tap – 6 Litres/Minute
Washing Machine – 8 Litres/kg.

5.0 Conclusion

This statement has reviewed the proposed development at New Wharf Road, Tonbridge, which consists of 36 Retirement Living apartments, and the associated communal areas to serve these apartments and provided an assessment of the proposed scheme against the relevant policies contained within Tonbridge & Malling Borough Council Local Development Framework Core Strategy (adopted September 2007), that is Policy CP1.

The statement has highlighted that the scheme currently proposes to utilise a good thermal envelope to minimise heat loss, as well as efficient heating and lighting systems as well as low carbon technologies, which will drive energy efficiency in the building.

The calculations completed on the building fabric show a predicted energy use of 164,031.80 kWh/yr, confirming a figure of 16,403.18 kWh/yr kWh/yr to be contributed by on-site renewable energy generation to meet the Energy Use minimisation element of Policy CP1.

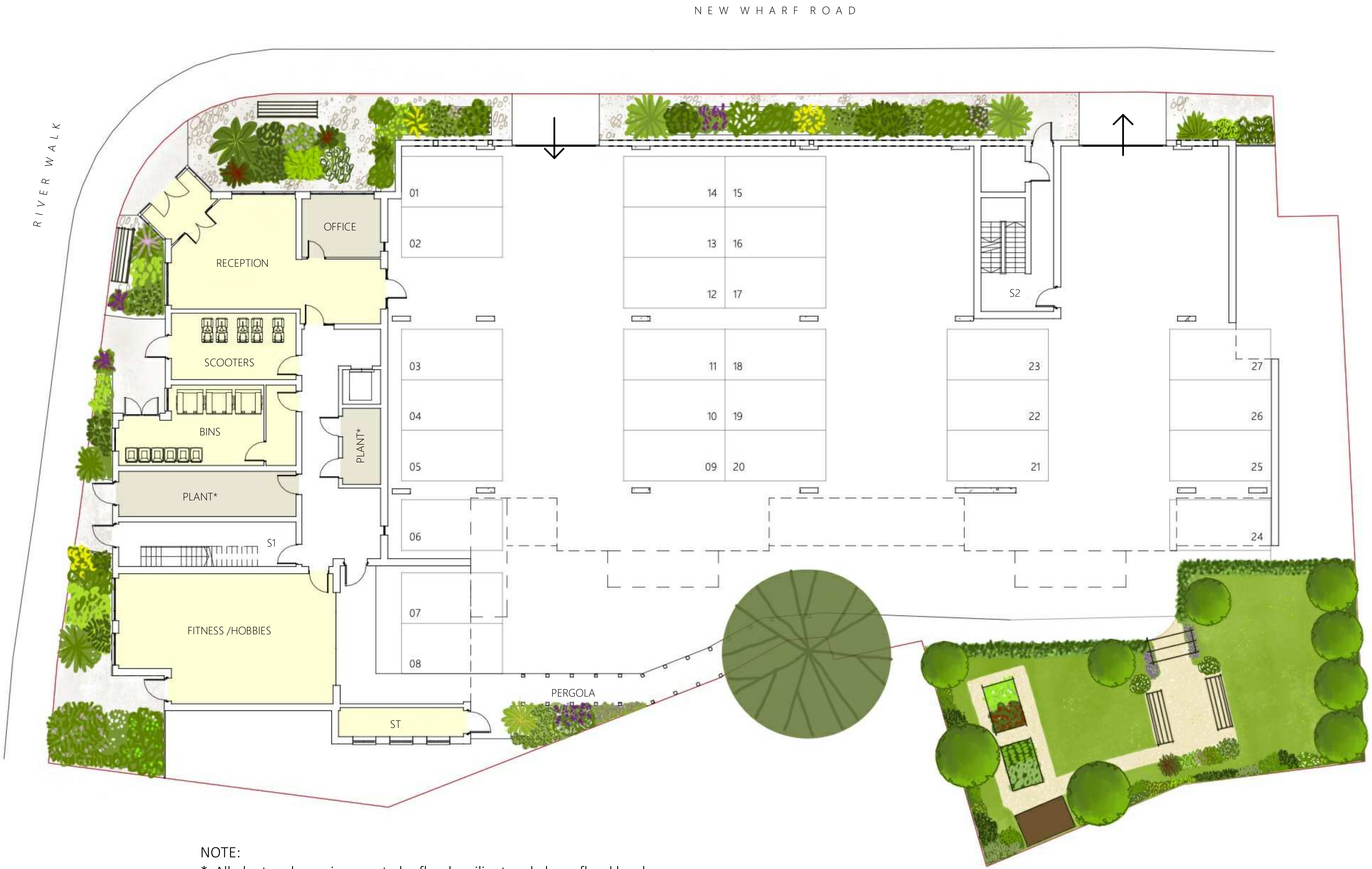
A proposed sanitaryware specification has also been provided in order to comply with the Water Use minimisation element of Policy CP1, with the Part G Optional target of 110 litres/use/per person/per day to be achieved. The specification proposed achieves a total 106.8 litres, meeting the target.

Whilst PV and the listed water sanitaryware flow rates are the preferred at present time, the strategy and required contribution may be subject to change as design develops further. Nonetheless, it will be ensured that where any changes are made, the policy requirements listed will be maintained.

Appendix 1

Proposed Site Plan

REVISIONS:
A 02/11/20: FIRST ISSUE
B 08/11/20: PARKING LAYOUT REVISED TO ADD GARDEN AREA
C 19/11/20: ACCESS MOVED TO NORTH, PARKING REVISED, STRUCTURE UPDATED
D 02/12/20: ENTRANCE REVISED, LANDSCAPING ADDED FOLLOWING PRE-APP
E 04/03/21: BLDG MOVED WEST, PARKING LAYOUT & ENTRANCE REVISED, PERGOLA ADDED



NOTE:
* All plant and sercvices are to be flood resilient and above flood level

0 10 20 30 40 50mm
FULL SIZE @ A3

ROSEMARY WHITE DESIGN
rosemary@rawhite-design.co.uk 07988 404168

Tonbridge RL
New Wharf Road

Plan L0

0 2 4 6 8 10 14m
1:200

STAGE 02 Preliminary 1:200 @ A3

SE-2739-02-AC- 03 E

RWD REF: 9147-MR21-201116-B

Appendix 2

Predicted Energy Calculations

FOCUS CONSULTANTS 2010 LLP

Predicted Energy Calculations

CLIENT: McCarthy & Stone
PROJECT: Tonbridge
DATE: 14.05.2021
REVISION: A

Predicted Energy Calculations

PLOT TYPE	NO. OF PLOT TYPE	TOTAL ENERGY USE PER PLOT TYPE (KWH / YEAR)
1F 1 BED MID TERRACE	6	17482.72
1F 1 BED END TERRACE	2	6902.49
1F 2 BED MID TERRACE	3	11237.48
1F 2 BED END TERRACE	3	12854.52
2F 1 BED MID TERRACE	6	14374.53
2F 1 BED END TERRACE	2	6060.96
2F 2 BED MID TERRACE	3	9836.34
2F 2 BED END TERRACE	3	9151.47
3F 1 BED	4	10090.91
3F 2 BED MID TERRACE	3	9670.73
3F 2 BED END TERRACE	1	3878.89
COMMUNAL AREAS	1	52490.76
TOTAL		164031.80
10 % TOTAL (kWh / yr)		16403.18

Appendix 3

Part G Water Calculations

breglobal

Job no:	
Date:	14.05.2021
Assessor name:	Ben Matthews
Registration no:	
Development name:	Tonbridge

PRINTING: before printing please make sure that in "Page Setup" you have selected the page to be as "Landscape" and that the Scale has been set up to 70% (maximum)

WATER EFFICIENCY CALCULATOR FOR NEW DWELLINGS - (BASIC CALCULATOR)

	House Type:	Type 1		Type 2		Type 3		Type 4		Type 5		Type 6		Type 7		Type 8		Type 9		Type 10	
	Description:	1 Bed RL Classic		2 Bed RL Classic		1 Bed RL Platinum		2 Bed RL Platinum		RL Compact											
Installation Type	Unit of measure	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day	Capacity/ flow rate	Litres/ person/ day
Is a dual or single flush WC specified?		Dual		Dual		Dual		Dual		Dual		Select option:								Click to Select	
WC	Full flush volume	6	8.76	6	8.76	6	8.76	6	8.76	6	8.76		0.00		0.00		0.00		0.00		0.00
	Part flush volume	3	8.88	3	8.88	3	8.88	3	8.88	3	8.88		0.00		0.00		0.00		0.00		0.00
Taps (excluding kitchen and external taps)	Flow rate (litres / minute)	5	9.48	5	9.48	5	9.48	5	9.48	5	9.48		0.00		0.00		0.00		0.00		0.00
Are both a Bath & Shower Present?		Shower only		Shower only		Shower only		Shower only		Shower only		Select option:		Select option:		Select option:		Select option:		Select option:	
Bath	Capacity to overflow		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Shower	Flow rate (litres / minute)	9	50.40	9	50.40	9	50.40	9	50.40	9	50.40		0.00		0.00		0.00		0.00		0.00
Kitchen sink taps	Flow rate (litres / minute)	6	13.00	6	13.00	6	13.00	6	13.00	6	13.00		0.00		0.00		0.00		0.00		0.00
Has a washing machine been specified?		Yes		Yes		Yes		Yes		Yes		Select option:		Select option:		Select option:		Select option:		Select option:	
Washing Machine	Litres / kg	8	16.80	8	16.80	8	16.80	8	16.80	8	16.80		0.00		0.00		0.00		0.00		0.00
Has a dishwasher been specified?		No		No		No		No		No		Select option:		Select option:		Select option:		Select option:		Select option:	
Dishwasher	Litres / place setting		4.50		4.50		4.50		4.50		4.50		0.00		0.00		0.00		0.00		0.00
Has a waste disposal unit been specified?		No	0.00	Select option:	0.00	Select option:	0.00	Select option:	0.00	Select option:	0.00	Select option:	0.00	Select option:	0.00	Select option:	0.00	Select option:	0.00	Select option:	0.00
Water Softener	Litres / person / day		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00
Calculated Use			111.8		111.8		111.8		111.8		111.8		0.0		0.0		0.0		0.0		0.0
Normalisation factor			0.91		0.91		0.91		0.91		0.91		0.91		0.91		0.91		0.91		0.91
Code for Sustainable Homes	Total Consumption		**101.8**		**101.8**		**101.8**		**101.8**		**101.8**		**0.0**		**0.0**		**0.0**		**0.0**		**0.0**
	Mandatory level		Level 3/4		Level 3/4		Level 3/4		Level 3/4		Level 3/4		-		-		-		-		-
Building Regulations 17.K	External use		5.0		5.0		5.0		5.0		5.0		5.0		5.0		5.0		5.0		5.0
	Total Consumption		**106.8**		**106.8**		**106.8**		**106.8**		**106.8**		**0.0**		**0.0**		**0.0**		**0.0**		**0.0**
	17.K Compliance?		Yes		Yes		Yes		Yes		Yes		-		-		-		-		-