Waterstone Design

Energy Strategy

Land at Thorn Barn, Matfield

waterstonedesign.co.uk

Issue and Revision Record

Revision	Date	Comments	Author	Checked
REV1	23/02/2024		Joshua Collett	Charlotte Russell

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1. Executive Summary

This Energy Strategy has been prepared by Waterstone Design on behalf of Canham Homes in support of addressing relevant planning conditions (23/01314/FULL) for the proposed development at Land Adjacent to Thorn Barn, Maidstone Road, Matfield, Tonbridge, Kent, TN12 7JH in order to satisfy the sustainability requirements of Tunbridge Wells Council.

National, Regional and Local Planning Policies have been identified and the proposals developed within this strategy will meet and exceed the requirements. In accordance with the Tunbridge Wells Local Plan (2020 – 2038), the development has been assessed in line with the recognised energy hierarchy to determine the most appropriate strategy to deliver a reduction in carbon dioxide emissions through on-site measures from Part L of the Building Regulations, applicable at the time of the application.

This energy hierarchy approach can be outlined using the following proposals:

- be lean: use less energy and manage demand during operation through fabric and servicing improvements and the incorporation of flexibility measures
- be clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly by connecting to district heating networks
- be green: maximise opportunities for renewable energy by producing, storing and using renewable energy on-site

The proposed energy strategy can achieve a reduction in carbon emissions (CO2) of 56.69% over the Part L 2021 baseline with a 53.58% reduction coming from incorporating low-carbon heating source in the form of an ASHP which is in line with the requirements set out by Tunbridge Wells Councils Policies.

2. Introduction

Waterstone Design Ltd has been commissioned by Canham Homes to produce an Energy Strategy for the proposed development at Land Adjacent to Thorn Barn, Maidstone Road, Matfield, Tonbridge, Kent, TN12 7JH. The outline application of the site will provide residential development together with new access and associated landscaping.

Any information to date has been taken from the outline approval 23/01314/FULL as approved on (31/08/23).

In order to achieve the energy and sustainability objectives, a thorough analysis of local and national policy has been carried out to ensure the development is practical as well as feasible. These options will be addressed in relevant sections and also address the latest design information available to date.

3. Planning Policy Context

This section looks into the current and future relevant policies that would need to be considered for the proposed development. This includes National, Regional and Local policies and Building Regulations which are summarised below:

3.1 National Planning Policy Framework 2021

The National Planning Policy Framework was updated in February 2021 and outlines the Government's planning policies for England and how these are expected to be applied. It sets out the Government's requirements for the planning system only to the extent that it is relevant, proportionate, and necessary to do so. It provides a framework within which local people and their accountable councils can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities. The NPPF was designed to consolidate all policy statements and guidance into a single and simpler framework, making the planning stage more user friendly.

Achieving sustainable development means that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives):

- **an economic objective** – to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure.

- **a social objective** – to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering a well-designed and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being; and

- **an environmental objective** – to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy

In determining planning applications, local planning authorities should expect all new developments to comply with adopted Local Plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable; and take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption.

3.2 Tunbridge Wells Local Plan (2020-2038)

As part of the proposed development at Land Adjacent to Thorn Barn, Maidstone Road, Matfield, Tonbridge, Kent, TN12 7JH, the following conditions of the Decision Notice (23/01314/FULL) will be addressed:

> **"Condition 15:** Prior to the commencement of any above ground works, written and illustrative details for renewable energy technologies within the development such that a 10% saving in site wide carbon emissions can be achieved, along with details for water conservation within the development shall be submitted to, and approved in writing by the Local Planning Authority. The development shall be carried out in strict accordance with the approved details which shall be retained thereafter."

Additionally, this strategy will demonstrate compliance with applicable policies taken from Section 6: Development Management Policies from the Tunbridge Wells Local Plan (2020-2038)

- All dwellings to achieve the higher water efficiency standard of 110 litres per person per day;
- Risk of overheating in all dwellings is assessed and appropriate measure to prevent overheating are agreed with the Council.

3.3 Summary of Policies

1. Compliance with Approved Document L1A: Conservation of fuel and power, Volume 1: Dwellings (2021 edition)

2. Demonstrate accordance with the outlined Energy Hierarchy

3. Minimise carbon emissions through energy efficiency in-line with a 'fabric first' approach and encourage the use of renewable energy to minimising energy use

4. 10% energy demand through low/zero carbon technology

5. All dwellings new homes to achieve a water usage of 110 litres per person per day

4. Energy Strategy Principles

In line with the principles and policies outlined within Section 3, the proposed energy strategy will focus on the three key driving principles:

1. **be lean**: use less energy and manage demand during operation through fabric and servicing improvements and the incorporation of flexibility measures

2. **be clean**: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly by connecting to district heating networks

3. **be green**: maximise opportunities for renewable energy by producing, storing and using renewable energy on-site

For the purposes of this assessment and to satisfy the above principles, energy demands and CO2 emissions for the all-residential dwellings on site have been assessed for Building Regulation compliance against the current Building Regulations Part L1A (2021 edition) using the latest Standard Assessment Procedure. The Baseline emissions have been derived from Target Emissions Rate (TER) as calculated under SAP methodology in accordance with Part L 2021.

Regulated CO2 emission estimations (those associated with space and water heating, pumps, fans and lighting) are based on initial SAP calculation data taken from the proposed plan drawings. This energy strategy is only required to address regulated emissions, as such the regulated CO2 emissions which include those which arise from heating and lighting within the development as controlled by Building Regulations have been based on initial modelling data and do not include the emissions resulting from the use of appliances by the occupiers of the development.

5. Baseline CO2 Emissions

To coincide with local planning policy, the baseline emissions for the proposed development have been calculated for regulated CO2 emissions as per Part L1A 2021 (TER), this will allow an analysis of the CO2 performance of the proposed energy strategy.

The CO2 emissions are based on preliminary SAP calculations and demonstrate the potential energy and CO2 emission savings from the initial proposed measures for the development.

Carbon Dioxide Emissions after each stage of the Energy Hierarchy for domestic buildings

	Carbon Dioxide Emissions for domestic buildings (Tonnes CO_2 per annum)	
	Regulated	**Unregulated**
Baseline: Part L 2021 of the Building Regulations Compliant Development	6.42	

6. Demand Reduction – 'Be Lean'

The initial priority of this energy strategy is to reduce the CO2 emissions as far as practically possibly through efficient design measures as per the 'be lean' approach of the energy hierarchy,

Energy efficiency measures such as excellent building fabric, efficient mechanical and electrical systems will be incorporated into the design to achieve this but also assist in surpassing the mandatory Target Fabric Energy Efficient (TFEE) as per Building Regulations.

Furthermore, by reducing energy demand this can be beneficial for future homeowners as energy costs in relation to space heating and water will see a reduction.

6.1 Passive Design

As mentioned above, numerous measures implemented throughout the development follows relevant policy regarding sustainable design in order to reduce energy demand and avoid potential overheating issues for homeowners.

The dwellings will incorporate various passive solar design measures such as openable windows which will deliver natural ventilation as well as fresh air to habitable rooms and utilise a glazing specification which will allow optimal daylight whilst reducing passive solar gains,

Additionally, a decentralised Mechanical Extract Ventilation (d-MEV) system will be provided to ensure that stale air is extracted to atmosphere from all the wet rooms via ducting in compliance with Part F Building Regulations.

6.2 Building Fabric

In order to achieve compliance with Part L 2021 Target Fabric Energy Efficiency (TFEE) targets, the following building fabric standards will be adopted. It is recognised that by utilising a superior fabric standard it can be an excellent cost-effective measure to reduce CO2 emissions before any form of renewables are incorporated.

As previously touched upon, a high standard of insulation throughout a dwelling can see a reduction in day to day running costs and also reduce the reliance on renewable.

It is also a requirement to meet the Part L1A 2021 minimum building fabric standards which are outlined alongside the proposed residential fabric specification in table below.

Element	Part L1A 2021 Limiting fabric U-values	Proposed L1A Specification
Ground Floor	0.18	0.13 W/(m²·K)
External Wall	0.26	0.17 W/(m²·K)
Roofs	0.16	0.10 W/(m²·K)
Windows	1.6	1.2 W/(m²·K) (g-value 0.63)
Doors	1.6	1.2 W/(m²·K)
Air Permeability	8m³/h·m² at 50 Pa	4.0 m³/h·m² at 50 Pa
Thermal Bridging	0.15	Calculated – Knauf Details
Thermal Mass Parameter	N/A	Calculated or Medium

6.3 Building Services

The energy demand from dwellings as well as sitewide CO2 emissions can be reduced further through the use of high performance, efficient mechanical and electrical (M&E) design. In reference to this development, initial designs have proposed the following measures:

- 100% low-energy lighting
- Decentralised Mechanical Extract Ventilation (d-MEV)
- Energy efficient Air Source Heat Pump (ASHP)
- Effective controls for space heating and zoning
- Insulation of pipes servicing the heating demand.
- Energy efficient appliances

M&E System	Proposed Specification
Ventilation	Greenwood Unity - dMEV
Space Heating	Mitsubishi Electric Ecodan 5.0 kW
Heating Controls	Time & Temperature zone control (by arrangement)
Heating Emitter	Radiators
Water Heating	From main heating system
Cylinder Specification	210.0 litre cylinder / 1.5 kwh loss per day
Lighting	>80 lumens per circuit watt

7. Supply Energy Efficiently – 'Be Clean'

For the purpose of this report, the feasibility of connecting to existing heat networks and Combined Heat and Power (CHP) systems are assessed, and where a new CHP system is appropriate, there should be encouragement to extend the system beyond the site boundary to adjacent sites

Major development proposals should select energy systems in accordance with the following hierarchy:

1. Connection to existing heating or cooling networks
2. Site wide CHP network
3. Communal heating and cooling

Due to the nature of the proposed development, a community heating system has been investigated however deemed unviable. This type of system operates most efficiently when there is a high, constant demand for hot water and electricity – examples include large commercial premises such as hotels.

Additionally, the running of CHP engines is recognised as louder than a conventional gas boiler approach which would not be beneficial for residents and would also have to operate all year round which encourages a high reliance on gas and electricity. There are also high installation costs associated with this system along with maintenance which would significantly increase initial build costs but also ongoing costs for the residents moving forward.

8. Use Renewable Energy – 'Be Green'

It is essential that all developments are planned to contribute to tackling climate change, and at the outset, 'design in' the principles of renewable energy systems.

Air Source Heat Pumps are considered to be a suitable renewable energy technology for the scheme as these will be integral to the specification of the Future Homes Standard (2025) – this will also ensure the site becomes 'gas free'. The ASHP extracts the ambient heat energy from outside air and use this for heating and the production of domestic hot water. Additionally, they are deemed most efficient when used in conjunction with well insulated properties – the dwellings will be built to standards which surpass Part L 2021.

The installation of PV has been found unnecessary for this scheme due to the ASHP achieving the 10% energy demand of the development to be delivered from renewable or low carbon sources. It should be noted that whilst an assessment of other forms of renewable technology options has been undertaken (included within Appendix A), the above was deemed most suitable for the development so no other renewable energy technology is considered suitable for this.

9. Conclusion

The proposed energy strategy for the development is to reduce the overall energy demand as far as practically possible through implementation of energy efficiency measures and the incorporation of low carbon or renewable energy technology.

These measures have been adopted in order to comply with the National and Local Planning Policies as set out in the Tunbridge Wels Local Plan (2020-2038). All new dwellings on the development will also demonstrate compliance with Part L1A 2021 of the Building Regulations whilst the estimated site wide CO2 emissions have been calculated using SAP10 methodology in determining the CO2 emissions.

The design of the development surpasses any CO2 emission targets required for improvements over Part L1A 2021 of the Building Regulation Target Emission Rate (TER) in line with Section 6: Development Management Policies and Outline Planning Permission 23/01314/FULL.

Furthermore, all dwellings on the development have been designed to consider best practice in water efficiency. This is achieved through the inclusion of water efficient fittings and appliances demonstrating that internal water use is at or below 110 litres per person per day (Appendix B).

This report has demonstrated how the development proposals contribute to minimising CO2 emissions in accordance with the required energy hierarchy principles:

- be lean: use less energy – fabric improvements, high efficiency M&E systems and 100% low energy lighting

- be green: use renewable technology – Low-Carbon heating source (ASHP) to provide space heating and water

Energy Hierarchy	Energy Strategy Proposals
be lean: use less energy and manage demand during operation through fabric and servicing improvements and the incorporation of flexibility measures	**Building Fabric** • Deliver a high-performance building fabric • High levels of air tightness • Reduction of thermal bridging through the use of calculated details

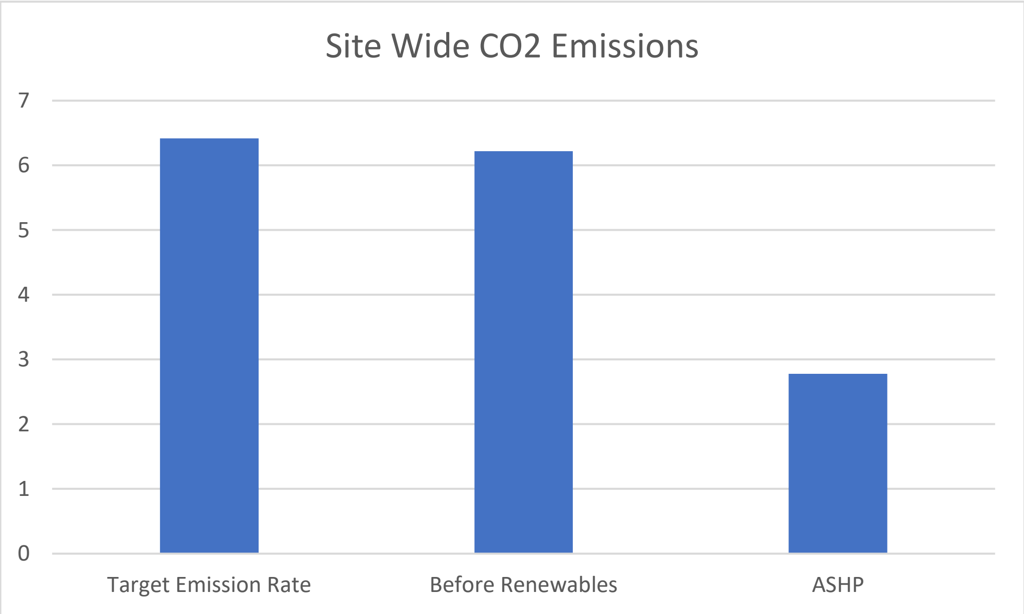
	Passive Design • Optimised orientation/layout to enable controlled solar gain improved daylighting • Balanced glazing specification reduces the risk of overheating • Openable windows and cross-ventilation to increase natural ventilation and mitigate overheating **Energy Efficiency** • Energy efficient lighting and controls • Energy efficient heating controls • Appropriate energy metering and monitoring • Provision of energy efficient appliances • Decentralised Mechanical Extract Ventilation (d-MEV) system
be clean: exploit local energy resources (such as secondary heat) and supply energy efficiently and cleanly by connecting to district heating networks	**Energy Efficient Energy Supply** • CHP has been disregarded due to the demand, nature of development and installation costs • No existing or planned heating network within the vicinity of the site
be green: maximise opportunities for renewable energy by producing, storing and using renewable energy on-site	**Renewable Energy** • Utilising ASHP to reduce the amount of carbon dioxide emissions produced

9.1 Overall CO^2 Emissions

The overall reduction in regulated CO2 emissions for the proposed development at Land Adjacent to Thorn Barn, Maidstone Road, Matfield, Tonbridge, Kent, TN12 7JH, is achieving approximately a 56.53% improvement over Part L1A 2021 baseline emissions (TER).

It should be noted that before any renewable or low-carbon sources have been introduced to the development, the improvement over the baseline was 3.11%. This demonstrates that a 53.58% demand has been delivered from a renewable source in the form of an ASHP which has been portrayed in a graph on the following page.

	Total regulated emissions (Tonnes CO_2 / year)	CO_2 savings (Tonnes CO_2 / year)	Percentage savings (%)
Part L 2021 baseline	6.42		
Before Renewables	6.22	0.2	3.11%
ASHP	2.78	3.64	56.69%



Appendix A – Assessment of Renewable Options

Wind Turbines

Wind turbines harness the power of the wind and use it to generate electricity. When the wind blows, the blades are forced round, driving a turbine that generates electricity. The stronger the wind, the more electricity produced. There are two types of domestic-sized wind turbine:

- Pole mounted – these are free standing and are erected in a suitably exposed position, with generation capacity around 6Kw (Horizontal Axis).

- Building mounted – these are smaller than mast mounted systems and can be installed on the roof of a home where there is a suitable wind resource. Often these are around 2kW in size.

There are previous studies on roof mounted turbines which have demonstrated that they do not perform effectively in most urban environments. A high-level assessment of the effectiveness of location and sitting of turbines is crucial to secure performance and sites should be monitored assess the sites potential - high speed winds are required generally at least 5m/s.

The NOABL Wind Speed Database has identified that the average wind speed for 10m above ground level for DA9 9DX is approximately 4.8m/s. This indicates that even with a large, pole mounted wind turbine the electricity generation might not be significant, let alone with a smaller building mounted turbine.

For a typical wind turbine installation, these should be erected large open areas landscape to promote air flow and minimal resistance.

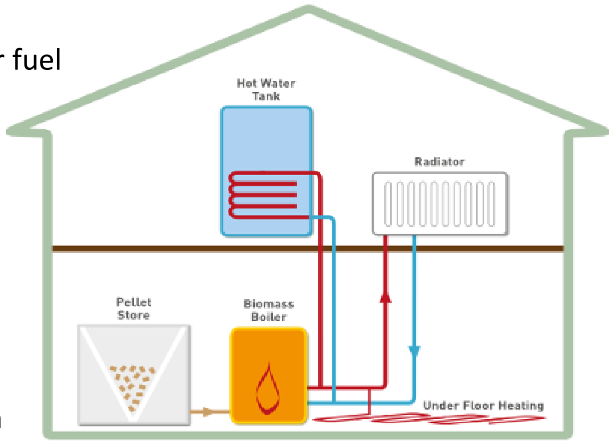
The above analysis has demonstrated as to why a wind turbine is not a feasible option

Biomass

Biomass boilers provide an alternative to the traditional approach of gas or oil-fired boilers to provide the space heating and hot water demands. This approach is considered to be environmentally friendly due to the use natural fuels for combustion rather than fossil fuels, these include wood, plants and other organic matter, such as manure or household waste. As the fuels are recognised as a 'natural resource', these can be replenished, thus a renewable energy source. A Biomass boiler installation can be connected to a central heating and hot water system however the set-up tends to be significantly larger than conventional gas boilers which may result in a plant room scenario

In a typical Biomass system, this would be estimated in delivering 40% of the peak heating demand, which means there should more than likely be a secondary 'back up' system to be installed which also has an impact on and limits the potential carbon savings for the development.

The installation would also need to account for fuel storage which requires space, as well as the boiler and buffer vessel. There should be careful consideration given to airborne pollutants and noise which is a biproduct of boiler operation.



A factor which is overlooked in terms of Biomass is the delivery of the fuel – if there is not sufficient storage space as per the diagram then this would result in a larger number of deliveries which increases associated carbon emissions from this process.

The use of biomass for this project is not a viable solution due the space required for the equipment and as well as the lack of secure fuel storage.

A Biomass system is not feasible for installation on this project.

Solar Thermal

Solar water heating systems, use energy from the sun to warm water for storage in a hot water cylinder or thermal store. Because the amount of available solar energy varies throughout the year, a solar water heating system won't provide 100% of the hot water required throughout the year. A conventional boiler or immersion heater is normally used to make up the difference.

Solar water heating systems use panels or tubes, called solar collectors, to gather solar energy. The solar collectors convert the infra-red portion of visible light into heat. They are filled with a mix of water and glycol. This fluid is pumped round a circuit, which passes through the hot water cylinder.

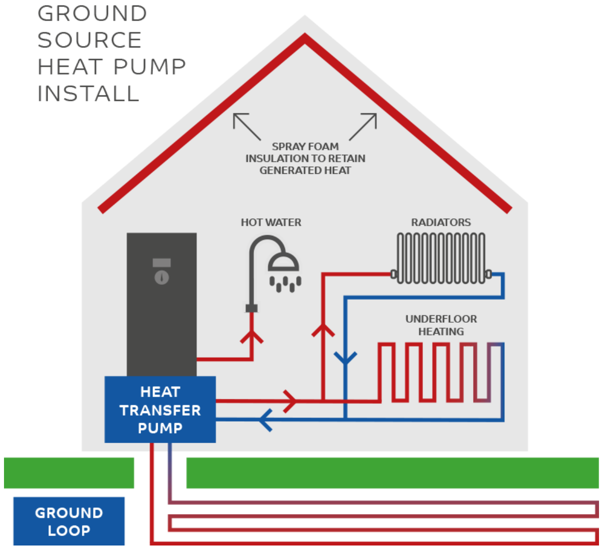
The space for solar thermal panels would be limited to the available roof space and it is likely that it will not be sufficient to meet the hot water demands. Additionally, the roof space has been utilised for PV to generate electricity and the carbon savings associated with solar thermal panels would be significantly less than PV.

On this basis, solar thermal is deemed not appropriate for this development

Ground Source Heat Pump (GSHP)

A GSHP transfers heat from the earth to provide space heating and hot water through a heat exchange system which works like a refrigerator in reverse. An accurately sized system is able to produce 100% of the heating and hot water requirement of a well-insulated building.

GSHPs consist of a ground loop, heat pump and distribution system. The ground loop can be in horizontal trenches, vertical boreholes or in the structural piles of a building. Vertical boreholes and structural piles are used where there is limited external space. GSHP can also be used in reverse for cooling. When the GSHP is used for heating and cooling in a building in the same day, the efficiency of the system is enhanced.



A typical GSHP may have an efficiency (SCOP) of 4.0, which means for every unit of electricity used in the heat pump 4 units of heat will be delivered to the building. In comparison to other heating sources, a direct electric or gas system cannot exceed a SCOP of 1.

Although the efficiency of the system is an incentive to use a GSHP system, there is significant capital expenditure and electrical costs associated with installation which in turn will impact the payback period. Additionally, a large area would be required for the ground heat exchanger arrays, which would need extensive ground works and due to the existing infrastructure of the site this would not be feasible.

For this project, it seems that there will be no cooling throughout the year, with a predominantly heating led system – a GSHP is most efficient when serving a balanced heating and cooling demand. In addition to this, the potential high expense of this installation does not make this approach a financially viable LZC option for a project of this size.

Ground Source Heat Pump (GSHP) is deemed not feasible for this project

Appendix B – Part G Water Calculator

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Building Service & Environmental Consultants

PART G - WATER EFFICIENCY CALCULATOR

Project Ref:	D2645
Project Name:	MATFIELD
Date:	19/12/2022
Assessor:	JOSHUA COLLETT
Notes:	Please see detailed calculations for specifications and details of flow restrictors

				110 lpd inc. external use	
Installation type	**Unit of measure**	**(2) Use factor**	**(3) Fixed use (litres/ person/ day)**	**(1) Capacity/ flow rate**	**Litres/person/ day = [(1) (2)] + (3)**
WCs (multiple fittings)	Average effective flushing volume (litres)	4.42	0.00	**4.66**	20.60
Taps (excluding kitchen/utility room taps)	Flow rate (litres/minute)	1.58	1.58	**4.00**	7.90
Bath (where shower also present)	Capacity to overflow (litres)	0.11	0.00	**150.00**	16.50
Shower (where bath also present)	Flow rate (litres/minute)	4.37	0.00	**8.00**	34.96
Bath only	Capacity to overflow (litres)	0.50	0.00	**0.00**	0.00
Shower only	Flow rate (litres/minute)	5.60	0.00	**0.00**	0.00
Kitchen/utility room sink taps	Flow rate (litres/minute)	0.44	10.36	**7.50**	13.66
Washing machine	**Washing machine installed?** Litres/kg dry load	2.10	0.00	No **8.17**	17.16
Dishwasher	**Dishwasher installed?** Litres/place setting	3.60	0.00	No **1.25**	4.50
Waste disposal unit	**Waste disposal installed?** Litres/use	3.08	0.00	No **0.00**	0.00
Water softener	**Water softener installed?** Litres/person/day	1.00	0.00	No **0.00**	0.00
(5)	Total calculated use = (Sum column 4)				115.27
(6)	Contribution from greywater (litres/person/day) from Table 4.6				
(7)	Contribution from rainwater (litres/person/day) from Table 5.5				
(8)	Normalisation factor				0.91
(9)	Total water consumption = [(5) – (6) – (7)] x (8) **(CSH)**				**104.9**
(10)	External water use				5
(11)	Total water consumption = (9) + (10) (litres/person/day) **(Part G)**				**109.9**

This calculation sheet has been developed in accordance with the methodology stated within Building Regulations Approved Document G 2015 (2016 Ammendments) Appendix A. Please refer to this document for specific guidance of how flow rates are to be derived.

Plot Ref	110 lpd inc. external use

Table A2.1: Consumption calculator for multiple taps (excluding kitchen sink taps)				
	(a)	(b)	(c)	
Tap fitting type	Flow rate (litres/min)	Quantity (No.)	Total per fitting type = [(a) (b)]	Notes
1	4	1	4	TBC
2			0	
3			0	
4			0	
(d)	Total (Sum of all quantities)	1		
(e)	Total (Sum of all totals per fitting type)		4	
	Average flow rate (litres/min) = [(e)/(d)]		4	
(f)	Maximum flow rate (litres/min)		4	
	Proportionate flow rate (litres/min) = [(f) × 0.7]		2.8	
	Higher value of average flow rate or proportionate		4	

Table A2.2: Consumption calculator for multiple baths				
	(a)	(b)	(c)	
Bath fitting type	Capacity to overflow (litres)	Quantity (No.)	Total per fitting type = [(a) (b)]	Notes
1	150	1	150	TBC
2			0	
3			0	
4			0	
(d)	Total (Sum of all quantities)	1		
(e)	Total (Sum of all totals per fitting type)		150	
	Average capcity to overflow (litres) = [(e)/(d)]		150	
(f)	Maximum capacity to overflow (litres/min)		150	
	Proportionate capacity to overflow (litres/min) = [(f) × 0.7]		105	
	Higher value of average capacity to overflow or proportionate		**150**	

Table A2.3: Consumption calculator for multiple taps (Kitchen/utility room sink)				
	(a)	(b)	(c)	
Tap fitting type	Flow rate (litres/min)	Quantity (No.)	Total per fitting type = [(a) (b)]	Notes
1	7.5	1	7.5	TBC
2			0	
3			0	
4			0	
(d)	Total (Sum of all quantities)	1		
(e)	Total (Sum of all totals per fitting type)		7.5	
	Average flow rate (litres/min) = [(e)/(d)]		7.5	
(f)	Maximum flow rate (litres/min)		7.5	
	Proportionate flow rate (litres/min) = [(f) × 0.7]		5.25	
	Higher value of average flow rate or proportionate		**7.5**	

Table A2.4: Consumption calculator for multiple dishwashers				
	(a)	(b)	(c)	
Type of dishwasher	Litres per place setting	Quantity (No.)	Total per fitting type = [(a) (b)]	Notes
1			0	
2			0	
3			0	
4			0	
(d)	Total (Sum of all quantities)	0		
(e)	Total (Sum of all totals per fitting type)		0	
	Average litres per place setting = [(e)/(d)]		#DIV/0!	
(f)	Maximum litres per place setting		0	
	Proportionate litres per place setting = [(f) × 0.7]		0	
	Higher value of average litres per place setting or proportionate		**0**	

Plot Ref	110 lpd inc. external use

Table A2.5: Consumption calculator for multiple washing machines				
	(a)	(b)	(c)	
Type of washing machine	Litres per kg dry load	Quantity (No.)	Total per fitting type = [(a) (b)]	Notes
1			0	
2			0	
3			0	
4			0	
(d)	Total (Sum of all quantities)	0		
(e)	Total (Sum of all totals per fitting type)		0	
	Average litres per kg dry load = [(e)/(d)]		#DIV/0!	
(f)	Maximum litres per kg dry load		0	
	Proportionate litres per kg dry load = [(f) × 0.7]		0	
	Higher value of average litres per kg dry load or proportionate		0	

Table A2.6: Consumption calculator for multiple showers				
	(a)	(b)	(c)	
Shower fitting type	Flow rate (litres/min)	Quantity (No.)	Total per fitting type = [(a) (b)]	Notes
1	8	1	8	TBC
2			0	
3			0	
4			0	
(d)	Total (Sum of all quantities)	1		
(e)	Total (Sum of all totals per fitting type)		8	
	Average flow rate (litres/min) = [(e)/(d)]		8	
(f)	Maximum flow rate (litres/min)		8	
	Proportionate flow rate (litres/min) = [(f) × 0.7]		5.6	
	Higher value of average flow rate or proportionate		8	

Table A2.7: Consumption calculator for multiple WCs						
	(a)			(b)	(c)	
WC fitting type (single flush)	effective flushing volume (litres)*			Quantity (No.)	Total per fitting type = [(a) (b)]	Notes
1 (single flush)					0	
2 (single flush)					0	
3 (single flush)					0	
4 (single flush)					0	
WC fitting type (Dual flush)	Flush type	Flush volume	Effective flush volume (litres)*	Quantity (No.)	Total per fitting type = [(a) (b)]	Notes
1 (dual flush)	Full	6	4.66	1	4.66	TBC
	Part	4				
2 (dual flush)	Full		0		0	
	Part					
3 (dual flush)	Full		0		0	
	Part					
4 (dual flush)	Full		0		0	
	Part					
(d)	Total (Sum of all quantities)			1		
(e)	Total (Sum of all totals per fitting type)				**4.66**	
	Average effective flushing volume(litres) = [(e)/(d)]				**4.66**	

* The effective flushing volume for dual flush WCs is: (full flushing volume (litres) × 0.33) + (part flushing volume (litres) × 0.67)

Table A3: Water softener consumption calculation		
(a)	Total capacity used per regeneration (%)	0
(b)	Water consumed per regeneration (litres)	0
(c)	Average number of regeneration cycles per day (No.)	0
(d)	Number of occupants served by the system (No.)	0
(e)	Water consumed beyond 4% (litres/day) = [1 - (4/(a))] × [(b) × (c)]	#DIV/0!
(f)	Water consumed beyond 4% (litres/person/day) = [(e)/(d)]	**0**

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