4 St John's Road
Tunbridge Wells
Kent TN4 9NP

ENERGY STATEMENT

Proposed development at:

72 Westwood Road, Southampton, Hampshire, SO17 1DP

Proposed NW Elevation
1 : 100

Proposed SW Elevation
1 : 100

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1. Executive Summary

This Energy Statement has been prepared by Achieve Green in support of a full planning application for the conversion of a building to create an assisted living home at 72 Westwood Road, Southampton, Hampshire, SO17 1DP.

The design has been developed to address the energy performance policy requirements of Southampton City Council. A minimum target CO_2 reduction has therefore been set at 15% relative to the Building Regulations 2021, through the application of the energy hierarchy.

A base case has been developed, against which potential savings can be assessed. As this development is classified as a material change of use, the baseline has been established based on the minimum requirements of Approved Document L2 (2021).

This proposed development features improved insulation and air tightness standards, when compared against the compliance requirements of Approved Document L2 2021 of the Building Regulations. In addition, this proposed development will incorporate a mechanical and electrical specification that surpasses the requirements of Approved Document L2 2021. These combined energy efficiency measures lead to a reduction in CO_2 emissions equivalent to 17.6% of the base case.

Having minimised energy consumption in the first instance, the potential for remaining energy demands to be met via a decentralised energy source has been considered. It is evident this proposed development is neither within the coverage of an existing district heating network, nor is there an expectation that a district heating network will be developed at this site in the near future.

Due to its size, this development is not suitable for combined heat and power.

An assessment has been carried out to determine the potential for renewable energy systems to reduce CO_2 emissions further.

Carbon emissions within the building will be reduced through an enhanced fabric and energy efficient systems, including the installation of waste water heat recovery units for all first-floor showers. These combined measures will achieve the required reduction in carbon emissions, and no additional provision of renewable technology is proposed.

The total reduction in carbon emissions is 17.6%, compared to the regulated emissions from a building designed to just meet Building Regulations (2021) Part L2. This surpasses the on-site minimum target reduction of 15%, as required by Southampton City Council.

Internal water use has been calculated to be 98.69 litres/person/day. This meets the requirement to have internal water consumption below 100 litres/person/day.

2. Introduction

Energy use in buildings is a significant contributor to global CO_2 emissions and global warming. Designing energy efficient buildings and incorporating low and zero carbon energy generation is a vital part of ensuring this development incorporates sustainability as a core part of its design.

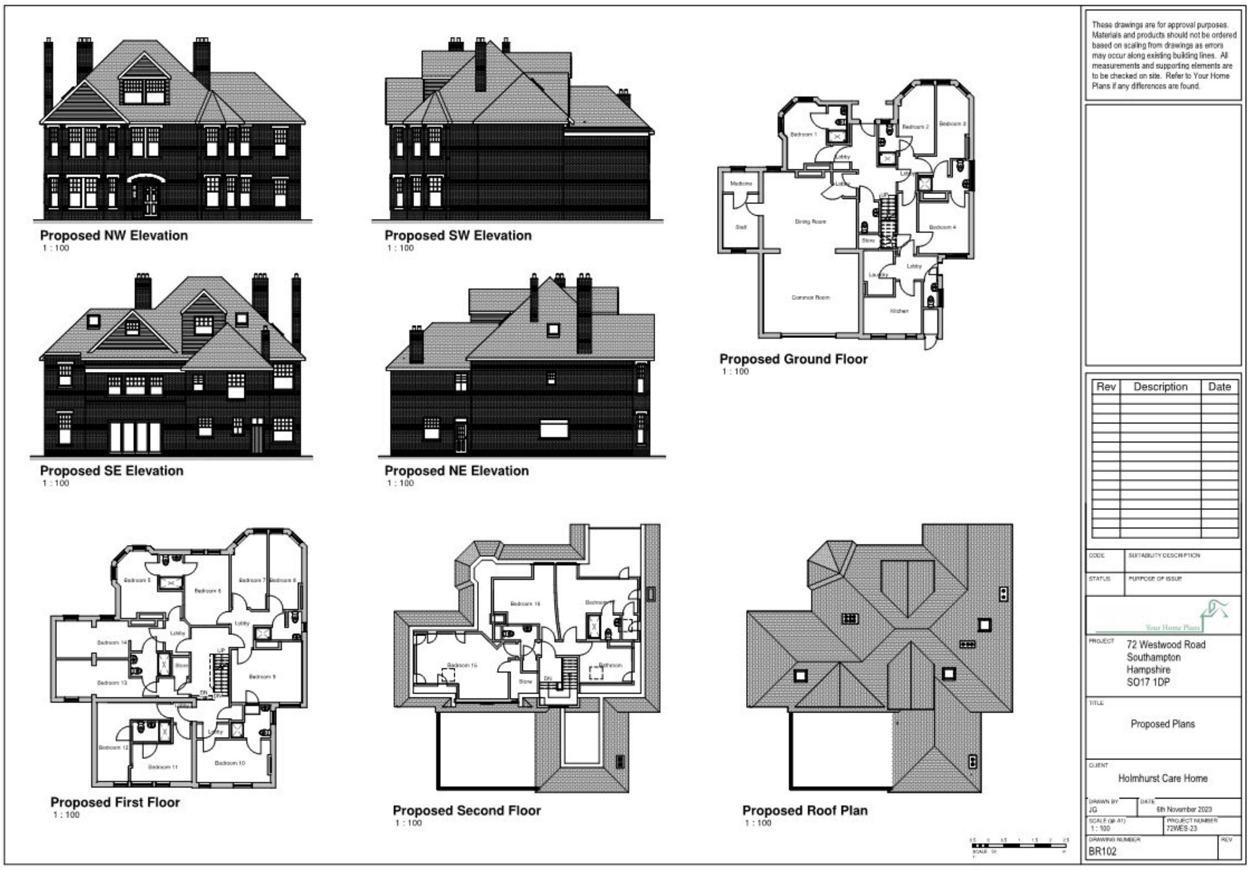
The purpose of the report is to assist evaluating parties to understand the energy consumption and performance of the proposed development and consider its performance against the "lean, clean, green" performance standard.

This application, seeks by its design to surpass the CO_2 emission target of Approved Document L2 2021 by a minimum of 15% of the regulated energy consumption.

2.1. Overview of the proposed development

The proposed development consists of a material change of use to create a 17-bed assisted living home.

Proposed floor plan:



3. Policies and Drivers

3.1. National and International Policy

The Climate Change Act (2008) sets a legally binding target for reducing UK carbon dioxide (CO_2) emissions to zero by 2050. It also provides for a Committee on Climate Change, which sets out carbon budgets binding on the Government for 5-year periods.

The National Planning Policy Framework (NPPF) 2021, reflects the requirements of the Climate Change Act 2008 in paragraphs 153 and 155 as follows:

"Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures. Policies should support appropriate measures to ensure the future resilience of communities and infrastructure to climate change impacts, such as providing space for physical protection measures, or making provision for the possible future relocation of vulnerable development and infrastructure."

"New development should be planned for in ways that:

a) avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure; and

b) can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards."

"To help increase the use and supply of renewable and low carbon energy and heat, plans should:

a) provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);

b) consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and

identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers."

3.2. Local Policy: Southampton City Council

Sustainability is key to Southampton City Council planning policy and should be considered with every planning application:

10. Energy Efficiency - Conversion (Pre-Commencement Condition)

Confirmation of the energy strategy, that will achieve a reduction in CO2 emissions of at least 15% or a minimum Energy Efficiency Rating of 70 post refurbishment (an EPC rating C), must be submitted and approved in writing by the Local Planning Authority prior to the commencement of the development hereby granted consent. Measures that meet the agreed specifications must be installed and rendered fully operational prior to the first occupation of the development hereby granted consent and retained thereafter.
Reason: To ensure the development has minimised its overall demand for resources and to demonstrate compliance with policy CS20 of the Local Development Framework Core Strategy Development Plan Document Adopted Version (January 2010).

11. Water efficiency (Pre-Commencement Condition)

With the exception of site clearance, demolition and preparation works, no development works shall be carried out until written documentary evidence demonstrating that the development will achieve a maximum of 100 Litres/Person/Day internal water use the form of a water efficiency calculator shall be submitted to the Local Planning Authority for its approval, unless an otherwise agreed timeframe is agreed in writing by the LPA. The appliances/ fittings to be installed as specified.
Reason: To ensure the development minimises its overall demand for resources and to demonstrate compliance with policy CS20 of the Local Development

3.2.1. Project policy

Planning policy leads to a minimum on-site target reduction in CO_2 emissions equal to 15% compared to 2021 Building Regulations.

4. Energy hierarchy

In line with best practice the proposed energy strategy for this development will follow the principals of the energy hierarchy.

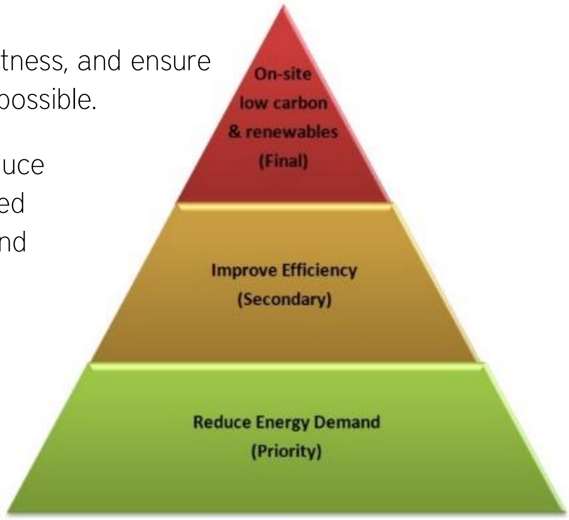
The energy hierarchy has three priorities, seeking to reduce energy use before meeting remaining demand by the cleanest means possible:

1) Be lean – use less energy: Optimise the building fabric, glazing, and structure to minimise energy consumption in the first

instance by using low U-values and good air tightness, and ensure that active systems run as energy efficiently as possible.

2) Be clean – supply energy efficiently: Further reduce carbon emissions through the use of decentralised energy where feasible, such as combined heat and power (CHP).

3) Be green – use renewable energy: When the above design elements have been reasonably exhausted, supply energy through renewable sources where practical.



5. Establishing the baseline

For buildings that are subject to a material change of use, the baseline is established by applying the minimum standards of Approved Document L2.

The baseline calculations are based on buildings that are the same size and shape as the proposed building and have the same exposed facades.

6. Energy efficient design measures *("be lean")*

Enhancing the thermal performance of the building envelope helps to future-proof the structure and also yields the greatest CO_2 savings. Adding renewable technology will then yield maximum carbon reductions with lower long-term costs for the developer.

The proposed non-domestic development will achieve compliance with Approved Document L2 2021 without reliance on the contribution of renewable technology.

The following energy-efficient design measures are proposed:

	Proposed development	L2 2021 requirements
New external wall U–value (W/m^{2}K)	0.20	0.26
Upgraded external wall U–value (W/m^{2}K)	0.29	0.30
Upgraded pitched roof (insulation at rafters) U–value (W/m^{2}K)	0.15	0.18
Upgraded pitched roof (insulation at joists) U–value (W/m^{2}K)	0.15	0.16
New flat roof U–value (W/m^{2}K)	0.18	0.18
Windows and roof windows U–value (W/m^{2}K)	1.40	1.60
External door U–value (W/m^{2}K)	1.40	1.60

	Proposed development	L2 2021 requirements
Air permeability	8 $m^3/h.m^2$	25 $m^3/h.m^2$

Having reduced energy demand through improvements to the fabric, this development shall seek to reduce energy consumption further through the specification of mechanical and electrical systems with efficiencies that surpass the requirements of Approved Document L2 2021:

	Proposed development	L2 2021 requirements
Lighting efficacy	110 lm/W	95 lm/W
Heating efficiency	Gas boiler- 95%	Gas boiler- 93%
Domestic Hot Water	Gas boiler- 95%	Gas boiler- 91%
Waste water heat recovery – 1st floor showers only	Heat recovery efficiency 35%	-

6.1. Waste water heat recovery

Waste Water Heat Recovery (WWHR) works by recovering the heat that would normally be lost down the drain in waste hot water from the shower. The WWHR device is attached to the drain of the shower and uses the outgoing waste warm water to pre-heat the fresh cold mains water coming into the home. This means that the water heater requires less energy to bring the shower water up to the required temperature.

6.1.1. Benefits of WWHR

- No specialist installation required – can be installed by a qualified plumber.
- Takes up little to no floorspace.
- Reduction in fuel bill costs. Each WWHR unit saves approximately 450-500kWh per person per year.
- Vertical WWHR units require no maintenance.
- Passive technology that is always working (no need to turn it on or off).
- Vertical WWHR units are designed to last the lifetime of the building.

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7. Energy efficient systems *("be clean")*

7.1. Combined heat and power

Combined heat and power (CHP) systems use relatively cheap and clean fuels (such as natural gas) to generate heat and electricity on site. A typical CHP system uses combustion of natural gas to drive a turbine that produces electricity. The heat generated is captured and used to produce hot water.

As losses are minimised the carbon footprint of the energy generated is very low. However this is dependent on there being sufficient year-round local heat demand to fully utilise the heat generated by the CHP plant. An example would be developments of at least 500 dwellings, universities or hospitals.

The feasibility of a gas-fired CHP for the site has been considered, however, in this case the base load is insufficient to make CHP feasible. CHP is therefore not considered to be feasible or desirable for this project, due to the scale of the development.

7.2. District heating networks

In a district heating network heat is supplied from one or more central energy centres to multiple buildings within the network. Supply to multiple buildings guarantees high year-round local heat demand which in turn allows the use of low carbon technologies within the energy centre, such as combined heat and power systems. Large plant and aggregated demand allows systems within the energy centre to run more efficiently.

Hot water is distributed within the network via highly insulated pipes. To connect to the network individual boilers are replaced with separately metered heat exchangers.

Due to the fact this proposed development is neither within the coverage of an existing district heating network, nor is it within an area designated as having potential for a future network, district heating can be discounted as a viable option.

8. Low and zero carbon energy sources *("be green")*

8.1. Photovoltaics

Solar photovoltaics (PV) capture the sun's energy using photovoltaic cells. The cells convert sunlight into electricity, which can be utilised on site or transferred into the National Grid. PV cells are made from layers of semi-conducting material, usually silicon. When light shines on the cell it creates an electric field across the layers. The stronger the sunshine, the more electricity is produced. Groups of cells are mounted together in panels or modules that can be mounted on a roof.

The power of a PV cell is measured in kilowatts peak (kWp). This is the rate at which the cell generates energy at peak performance in full direct sunlight.

Photovoltaics offer high CO_2 savings, are simple to install and suitable for most buildings. The only limiting factor for PV is the availability of suitable roof space.

8.2. Heat Pumps

Heat pumps collect low temperature heat from renewable sources (such as the air or ground) and concentrate the heat to a usable temperature via a reverse refrigeration cycle. Useable heat is transferred to the building via a heat exchanger and can be used for low temperature heating and Domestic Hot Water, though an immersion top-up may be required for DHW.

Heat pumps have some impact on the environment as they generally use grid supplied electricity to run the pumps. It is common for heat pumps to have a coefficient of performance of three, meaning that for every 1kWh of electricity used, over 3kWh of heat can be generated. The renewable component of the output is therefore taken as the difference between the output energy and the input energy, in this scenario the heat pump will be deemed to have delivered 2kWh of renewable energy.

Ground source heat pumps require external horizontal ground loops, or as is more likely in built-up environments, vertical loops fed into bore holes. The application of ground source heat pumps is therefore constrained by site ground conditions and available space.

Air source heat pumps have a slightly lower seasonal efficiency than ground source heat pumps, but require less space. Noise and space considerations should be assessed when determining an appropriate site for external condensing units.

8.3. Solar thermal

Solar thermal systems, use free heat from the sun to warm Domestic Hot Water. A conventional boiler or immersion heater can be used to make the water hotter, or to provide hot water when solar energy is unavailable.

Solar thermal systems are most appropriate for buildings with high year-round Domestic Hot Water demand.

Many solar thermal systems will use electricity to run pumps within the system. This means the resultant CO_2 and cost savings in a building with a gas boiler will be relatively low.

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8.4. Wind turbines

Wind turbines use blades to catch the wind. When the wind blows, the blades are forced round, driving a turbine which generates electricity. The stronger the wind, the more electricity produced.

There are two types of domestic-sized wind turbine: Pole mounted and building mounted. Pole mounted turbines are free standing and are erected in a suitably exposed position, and are often about 5kW to 6kW in size. Building mounted turbines are smaller and can be installed on the roof of a home where there is a suitable wind resource. Often these are around 1kW to 2kW in size.

Large scale turbines, in exposed locations offer one of the best financial returns of all renewable energy systems as the payback of the system increases dramatically with the size of the turbine. However small-scale systems offer much lower levels of performance and recent studies have questioned the viability and output from such systems, particularly in urban environments.

8.5. Biomass

Biomass heating systems, burn wood pellets, chips or logs to provide warmth in a single room or to power central heating and hot water boilers. The carbon dioxide emitted when wood is burned is the same amount that was absorbed over the months and years that the plant was growing. The process is sustainable as long as new plants continue to grow in place of those used for fuel. There are some carbon emissions caused by the cultivation, manufacture and transportation of the fuel, but as long as the fuel is sourced locally, these are much lower than the emissions from fossil fuels.

When specifying biomass heating systems is important to consider the potential technical issues surrounding delivery and storage of fuel.

Although the CO_2 savings from biomass are substantial, the high levels of NOx emissions can make biomass systems unsuitable for urban environments.

8.6. Proposed low and zero carbon energy sources

Carbon emissions within the building will be reduced through an enhanced fabric and energy efficient systems, including the installation of waste water heat recovery units for all first-floor showers. These combined measures will achieve the required reduction in carbon emissions, and no additional provision of renewable technology is proposed.

9. Results: Calculated CO_2 savings

9.1. Regulated CO_2 savings

Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for non-domestic buildings

	Carbon dioxide emissions for non-domestic buildings (Tonnes CO_2 per annum)	
	Regulated	Unregulated
Baseline: Part L 2021 of the Building Regulations Compliant Development	22.8	12.3
After energy demand reduction (be lean)	18.8	12.3
After heat network connection (be clean)	18.8	12.3
After renewable energy (be green)	18.8	12.3

Table 2: Regulated carbon dioxide savings from each stage of the Energy Hierarchy for non-domestic buildings

	Regulated non-domestic carbon dioxide savings	
	(Tonnes CO_2 per annum)	(%)
Be lean: Savings from energy demand reduction	4.0	17.6
Be clean: Savings from heat network	0.0	0.0
Be green: Savings from renewable energy	0.0	0.0
Cumulative on-site savings	4.0	17.6

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10. Appendix A: Water consumption calculation

Water Efficiency Calculator for New Dwellings (V1f - Aug 2010)

yorkshire LABC

Project Details

Adress/Reference	72 Westwood Road, Southampton, Hampshire, S(	Case Reference	
Number of Bedrooms	17	Occupancy for Calculation Purposes	18

Appliance/Useage Details

Taps (Excluding Kitchen Taps)

Tap Fitting Type	Flow Rate Litres/Min	Quantity (No.)	Total per Fitting type
Shower room / WC mixe	6.00	12	72.00
Laundry tap	10.00	1	10.00
			0.00
			0.00
			0.00
			0.00
Total No. of Fittings (No.)		13	
Total Flow (l/s)			82.00
Maximum Flow (l/s)			10.00
Average Flow (l/s)			6.31
Weighted Average Flow (l/s)			7.00
Flow for Calculation (l/s)			**7.00**

Showers

Shower fitting Type	Flow Rate Litres/Min	Quantity (No.)	Total per Fitting type
Shower	8.00	9	72.00
			0.00
			0.00
			0.00
			0.00
			0.00
Total No. of Fittings (No.)		9	
Total Flow (l/s)			72.00
Maximum Flow (l/s)			8.00
Average Flow (l/s)			8.00
Weighted Average Flow (l/s)			5.60
Flow for Calculation (l/s)			**8.00**

Baths

Bath Type	Capacity to Overflow	Quantity (No.)	Total per Fitting type
			0.00
			0.00
			0.00
			0.00
Total No. of Fittings (No.)		0	
Total Capacity (l)			0.00
Maximum Capacity (l)			0.00
Average Capacity (l)			0.00
Weighted Average Capacity (l)			0.00
Capacity for Calculation (l)			**0.00**

WCs

WC Type	Full Flush Volume	Part Flush Volume	Quantity (No)
WC	5.00	3.00	12
Total number of fittings			**12**
Average effective flushing volume			**3.67**

Dishwashers

Dishwasher Type	L per Place Setting	Quantity (No.)	Total per Fitting type
Dishwasher	0.90	1	0.90
			0.00
Total No. of Fittings (No.)		1	
Total Consumption (l)			0.90
Maximum Consumption (l)			0.90
Average Consumption (l/s)			0.90
Weighted Average Consumption (l)			0.63
Consumption for Calculation (l/s)			**0.90**

Washing Machines

Washing Machine Type	L per Kg Dry Load	Quantity (No.)	Total per Fitting type
Washing machine	8.00	1	8.00
			0.00
Total No. of Fittings (No.)		1	
Total Consumption (l)			8.00
Maximum Consumption (l)			8.00
Average Consumption (l/s)			8.00
Weighted Average Consumption (l)			5.60
Consumption for Calculation (l/s)			**8.00**

Kitchen Taps

Tap Fitting Type	Flow Rate Litres/Min	Quantity (No.)	Total per Fitting type
Kitchen tap	10.00	1	10.00
			0.00
			0.00
Total No. of Fittings (No.)		1	
Total Flow (l/s)			10.00
Maximum Flow (l/s)			10.00
Average Flow (l/s)			10.00
Weighted Average Flow (l/s)			7.00
Flow for Calculation (l/s)			**10.00**

Other Fittings

Waste Disposal Y/N	N
Water softner	
Consumption beyond 4% l/p/d	

Use of grey water and harvested rainwater

Total Grey water from WHB taps (l)	0
Total Availble Grey Water Supply (l)	806.40
Possible Demand (l)	594.12
Grey/Rain Installed Capacity (l)	0.00
Figure for Calculation lit/person/day	0.00

Water Use Assessment

Installation Type	Unit	Capacity/ Flow Rate	Use Factor	Fixed use (l/p/day)	Total Use (l/p/day)
WC Single Flush	Volume (l)	0.00	4.42	0.00	0.00
WC Dual Flush	Full Flush (l)	0.00	1.46	0.00	0.00
	Pt Flush (l)	0.00	2.96	0.00	0.00
WC's (Multiple)	Volume (l)	3.67	4.42	0.00	16.21
Taps Exc. Kitchen	Flow Rate	7.00	1.58	1.58	12.64
Bath (shower present)	(l/s)	0.00	0.11	0.00	0.00
Shower (bath present)	(l/s)	0.00	4.37	0.00	0.00
Bath Only	(l)	0.00	0.50	0.00	0.00
Shower Only	(l/s)	8.00	5.60	0.00	44.80
Kitchen Taps	(l/s)	10.00	0.44	10.36	14.76
Washing Machines	(l/kgdry)	8.00	2.10	0.00	16.80
Dishwashers	(l/place)	0.90	3.60	0.00	3.24
Waste Disposal	(l/s)	0.00	3.08	0.00	0.00
Water Softner	(l/s)	0.00	1.00	0.00	0.00
Total Calculated Water Use (l/p/day)					**108.45**
Grey/RainWater Reused (l)					0.00
Normalisation Factor	(Factor)				0.91
Total Consumption CSH (l/p/day)					**98.69**
External Water Use Allowance (l)					5.00
Total Consumption Part G (l/p/day)					**103.69**
Assesment Result					**PASS**

11. BRUKL Report