FITZARCHITECTS

SUSTAINABILITY STATEMENT

PROPOSED RESIDENTIAL DEVELOPMENT AT CHURCH LANE, WHITBURN

A Royal Institute of British Architects Chartered Practice

1.0 **Introduction**

This statement is in support of the full planning application for a residential development of 5 dwellings at Church Lane, Whitburn.

A full description of the site, its location and sustainable location credentials are contained in the Design and Access statement.

1.1. **Scheme Description**

Current proposals for the site involve the development of 5 no. five bedroom dwellings.

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2.0 **Site specific design**

South Facing Thermal Analysis

Arup Consulting Engineers provided a study that shows that the south facing thermal mass approach results in 25% savings in winter heating and cooler temperatures in summer by around 2deg.C. Arup have undertaken a study of the thermal performance of two terrace housing models using IES computer simulation. The purpose of the study was to evaluate the relative benefit in terms of energy consumption through heating demand and summertime internal temperature. The two types of houses that were modelled are:

- A timber framed (light weight) terrace house with exposed faced to East and West.

- A brick/concrete block (heavy weight) terrace house with exposed facades to the North and South (with a glazed additional sunspace to the South). The analysis on these two models has given an indication as to the benefit of a north-south orientation and inclusion of high levels of thermal mass in a house. The north-south heavy weight house has the following benefits compared to the east-west light weight house:

- Requires an 40% lower peak boiler capacity, therefore a smaller boiler
- Retains heat input for longer after the boiler has been switched off, thus maintaining more constant internal temperatures.
- Benefits from higher internal solar gains. Requires ~25% less heat input over the winter.
- Does not get as hot in the summer. With ventilation thorough open windows the lightweight house maintains similar internal conditions to outside, while the heavyweight house is around 2°C cooler than outside.

The average internal temperature is similar for the two models. The main difference between the models can be seen in the peak internal temperatures. The heavyweight model peaks at 1°C below the external temperature while the lightweight model gets slightly hotter than the outside temperature. The thermal mass of the heavyweight house is retaining the cool air from earlier in the day so does not increase in temperature to the same extent as the lightweight model or external temperatures.

Healthy and Energy Efficient Building Design

Step 1 - site specific design

- the context, site history, topography and geology
- thorough site analysis
- south facing orientation
- organisational structure and function, spatial relationships
- internal and external environmental requirements
- passive heating and cooling
- natural cross ventilation via open-plan layouts
- incorporation of useable sun-space buffers

- stack ventilation through open stairwells
- spaces at first floor take advantage of rising heat
- future proof design (plans for future expansion and integration of technologies)

Step 2 - fabric

- life expectancy of building and components
- carbon negative or low carbon building elements and components
- air-tight construction to passivhaus standards
- low u-values in the walls, roof, floors and windows
- thermal mass to absorb and release heat
- triple glazing with insulated shutters if required
- windows with top and bottom openings for natural air flow
- low volatile organic compound (voc) finishes
  a natural, breathable envelope
- stack services to minimise travel distances
- ample storage for plant

Step 3 – renewable and technology

- solar thermal panels for hot water generation
- photo-voltaic panels and off-site wind to generate power
- low voltage artificial lighting and power
- a - rated appliances
- heat recovery systems
- rainwater butts

3.0 Fitz procedure

Fitz Architects has opted to develop mainly an enhanced ‘Fabric First' energy strategy which will achieve significant reductions in CO2 emissions when measured against the standards of the Building Regs 2006. The strategy has been selected in preference to an entirely LZC centred solution. This preference can be justified on a number of grounds;

The CO2 reductions are calculated are permanent and will persist for the lifetime of the development.

The reductions are not dependent on the efficiency or lifespan of bolt-on technologies.

The eventual emissions footprint of the development will be entirely determined by the lifestyles and habits of the owners/occupiers.

By designing a sustainable solution into the fabric of each property it is felt that the anticipated energy reductions will be dependent on few other factors and thus the calculated reductions are realisable and permanent. This outcome is not always achievable with a LZC strategy. The ‘resource appetite' of the development will be reduced for the long term.

Furthermore, it can be stated that the preferred strategy is in line with the current direction of national policy: long term energy reduction is preferable to short term energy generation. This approach has been woven into the new definition of Zero Carbon.

A fabric first strategy also retains the likelihood that home owners will add renewables themselves such as PV, thereby further increasing carbon savings.

2.0 Insulation

Insulating a home is the most effective way of improving the energy efficiency. Insulation of the building envelope helps keep heat in during the winter, but prevents ingress of heat during the summer to improve comfort and save energy. Insulating a home can save 45 – 55% of heating and cooling energy.

The Benefits of Insulating:-

Comfort is improved year round.
It reduces the cost of heating by over 40%
There is less need for heating and cooling which saves non renewable sources and reduces CO_2.

In order to reduce heat loss from dwellings, Fitz Architects are currently achieving an improvement in the SAP calculations from the current building regulation standards, by implementing the following specification on all new developments.

Element	**U-Value**
Ground Floor In-situ Suspended Concrete floor slab	0.14 W/m2K
External wall with fully filled cavity construction	0.23 W/m2K
Roof with 400mm mineral wool Insulation	0.1 W/m2K
Doors	1.4 W/m2K

3.0 Enhanced Construction Details

Enhanced construction details go hand in hand with air tightness requirements. Building to enhanced construction details will limit thermal bridging and also provide a better detail at critical elements of the building structure. This in turn will limit the air leakage paths out of the building.

Simply assessing heat losses through the main areas of walls, roofs and floors by calculating U-Values is no longer sufficient, consideration has to be given to the connectivity of these elements.

Fitz Architects has now adopted the use of Enhanced Construction Details for future developments in order to limit thermal bridging and gain an improvement in the SAP calculation.

4.0 Air Tightness

Air Tightness and leakage testing is a requirement of the Building Regulations and aims to improve energy efficiency and reduce CO_2 emissions. Air tightness is an increasingly important aspect of building and requires a good standard of workmanship in order to pass an air leakage test.

Air leakage tests are performed on all units to ensure that the designed air tightness levels are achieved. The test consists of installing a fan contained in a temporary screen, to an outside door rebate and pressurising or depressurising the building to record how much air is leaking from the structure.

Air leakage is measured in m^3 of air, per square metre of envelope, per hour at 50 Pascals differential pressure, and aims to measure the un-controlled ventilation, which is the free flow of air into and out of the structure. If the air pressure test result is above $10m^3$ at 50 Pa then this will result in a fail. The air leakage procedure will identify any unwanted drafts and uncontrolled airflow through the house, which can then be rectified in order to re-test the dwelling.

To assist in reducing the future heat loss of a dwelling and therefore conserving energy in return, Fitz Architects are currently achieving air permeability test results which are of a greater standard than the building regulation standard minimum of $10m^3$ at 50 Pa. The company's designed air tightness aim is a minimum of $5m^3$.

5.0 Energy Efficient Lights

Fitz Architects' standard specification includes the installation of 100% energy efficient lights.

Energy saving light bulbs use between a fifth and a quarter of the electricity of ordinary bulbs to generate the same amount of light. So where you'd normally use a 60W bulb, you'll only need an 11-14W energy saving trust recommended equivalent.

6.0 Time & Temperature Zone Control

Central heating zone controls allow dwellings heating systems to be split into smaller sections that can be independently controlled with regard to time and/or temperature.

In suitable applications, it is common to achieve savings of around 30% of the heating energy used in the area concerned. The payback period is typically under five years.

The technology

A heating zone control system normally comprises two main components namely:

- A motorised isolation valve used to interrupt the flow of hot water to the heating zone.
- A controller to regulate the operation of the motorised valve.

Controllers can be used to regulate the heating system with regard to time, temperature or both.

Time control

Time control can be achieved using a traditional time switch (where the required operating times are predictable and regular) or based on occupation (for example PIR detectors or run back timers), where heating time requirements are unpredictable. The use of presence detecting control does however require that the heating system has a high output and is responsive in order that satisfactory room temperatures can be achieved soon after occupancy occurs.

Temperature control

Temperature control is normally provided using one or more room thermostats.

Combined control

Combined time and temperature control can be provided using a programmable room thermostat. This allows different temperature settings to be programmed for different times of the day; these can be valuable when trying to maintain an area at a reduced "setback" level during unoccupied periods.

Application

Heating zone controls can potentially be applied to all hot water based central heating systems. They have particular value in areas that either have variable heat gains (for example south facing elevations that are subject to high levels of solar radiation), or those that have reduced occupancy times (for example single shift areas of a building that may otherwise be continuously occupied).

Central heating zoning within a dwelling is a much more comfortable way of living and saves energy and reduces gas emissions. It is a far more sophisticated approach to central heating, where different parts of the home can be at different temperatures. Lower temperatures can be maintained in unoccupied or less used areas of the house and the system can take full advantage of solar gains, which can have quite a significant effect of the temperature within a room.

Systems can also be fitted with a Weather Compensator which monitors the outside air temperature and factors this into the occupants programmed on / off times and desired temperatures.

7.0 Water Conservation

Over the next 20 years water consumption is set to increase substantially, however there is likely to be less water available due to climate change and government policies limiting water abstraction. The overall picture is one of ever increasing demand for an even scarcer resource, and less water will need to go further.

The government is driving a sustainable development programme that mandates water efficiency in the built environment through the use of regulations, the most recent being through Part G of the current Building Regulations.

The current building regulations require maximum water consumption for new dwellings of 125 litres / person / day. In order to achieve this standard Fitz Architects are now restricting flow rates from the taps and showers installed within the dwelling. The use of 2 part flush systems for toilets and lower overflows installed to baths also ensure the maximum required water usage, per person per day is not exceeded.

Water efficiency calculations are completed and kept on site for inspection by the building inspector.

9 Conclusion

It is proposed the development will be highly insulated, energy efficient and well designed for the future. They are specifically designed to optimise the south facing orientation.

Fitz Architects believe energy and water conservation are taken into consideration from the design stage, through to the construction phase and the finished dwelling.

The above information demonstrates the dwellings we build comply with, and improve upon the current Building Regulations in terms of energy and water conservation. The adoption of enhanced construction details, better than average U values, and low air tightness test results, enable increased energy efficiency of the dwellings to be attained.

Energy efficient lights and advanced efficient heating systems with time and temperature zone control will also be installed, as well as increasing the energy efficiency of the dwellings; these elements also provide financial benefits for the homeowner in terms of gas and electricity bills.