

DESIGN, ACCESS and SUSTAINABILITY STATEMENT

Project : New Dwelling
Client : Mr & Mrs Gill
Site : Plot adjacent to 13 Cootes Lane, Fen Drayton,
Cambridgeshire. CB24 4SL
Date : April 2023

Introduction

This statement has been prepared for Mr & Mrs Gill, in support of a planning application for a new build two storey private domestic dwelling at their property.

To summarise, my client's intentions are to :

- Create Carbon Neutral dwellings in accordance with SCDC LSA policy
- Build environmentally friendly and highly sustainable four bedroom dwelling.
- Create modern and unique self build homes, incorporating passive solar design, high thermal efficiency, low impact methods of construction and materials.
- Enhance and expand the ecological value of the site and local surrounding area, maximise site views, protect local built vernacular and bio diversity.

In accordance with Town and County Planning Act 1995, this statement will explain the design intent, sustainable context of the proposed dwelling, consider the planning context and history of the development. This statement is to be read in conjunction with the proposed drawings submitted with the planning application.

Site Analysis

Use

Currently a privately owned site, located on the western fringes of the village, Fen Drayton, Cambridgeshire. The site was part of a unique range of large individual plots within what was once of a number of horticultural plots in the confines of a local Land Settlement Association Estate (LSA), created in 1934 and disposed of in 1980s by the Ministry of Agriculture. The site is not listed. The site runs in a north– south direction, with the original existing semi detached house located in the south west corner of the site, namely No 13, the house is under the ownership of my clients along with the related glasshouses and sheds. The site is approached from the northern roadside boundary, off Cootes Lane.

Site and Landscape

Current site has series of partially used, redundant and derelict glasshouse, agricultural sheds/structures and general open paddock grassland areas. The site is predominantly flat, with a small decrease in site levels towards the north east boundary.

Site boundaries. The north boundary runs the full length of the site bordering a footpath, it is predominantly a low post and wire fence and contains hedge planting along its edge, It is open, affording wide views across the neighbours plot and fields beyond. The entire east boundary is partially non maintained low post and wire fence with No 12 Cootes lane. It is open, affording wide

views in part across the neighbours plot. The southern boundary is a roadside boundary to Cootes lane, it is formed with a fence set within a mature native hedgerow, and it also contains the existing vehicular site access to No13. The West boundary steps around the adjacent neighbouring plots and properties, namely 14 Cootes lane, Wilderspin Garage, it also borders Springhill rd. it is formed with a closed and open fence. The sites interior has limited visibility from Cootes Lane, obscured by the existing hedgerow and glasshouses, adjacent the road.

Total site area is 31,584m² / 7.8 acres. For the purpose of this application, it is proposed to separate the new dwelling plot area. Namely `Plot adjacent` – the new dwelling plot area is of 1573m² / 0.38 acre, containing the proposed new dwelling, new private site access, allotment beds, garage, parking spaces. It will partially contain a redundant glasshouse. The remaining part of site with 30,011m² / 7.42 acres containing the existing semi detached dwelling, agricultural buildings and glasshouses will remain under current family ownership.

The existing shared access track does not form part of the application and shall remain. A new vehicular private site access shall be formed, It will contain hard surface, vehicular gates, afford a wide clear and safe vehicular sight lines

The existing semi-detached house at No13 does not form part of the application and shall remain unaltered and access maintained as before, it shall not be effected by or overlooked by the new dwelling.

Existing use

Area of Plot concerned is not currently used for any horticultural or agricultural purposes and has not been so for over 5 years.

The sites existing eligible agricultural buildings were originally surveyed as part of the listing procedure in accordance with SCDC Planning policy `Fen Drayton LSA Estate – SP11' Appendix 2 `Schedule` and `Cootes Lane` plan`. I can confirm this application wishes the following building to form the whole for the the eligible agricultural building allowance, so as to allow my client to use the footprint for new dwelling development in accordance with the LSA policy.

*Shed 80 – Agricultural store building - 73.09m². Function Redundant.
The Other Eligible building site footprint s No78 & 79 do not form part of this application*

Total Eligible building site footprint = 73.09m²

The existing eligible building footprint is within the ownership and control of my client. Refer to existing drawing 0268.001

DESIGN PROPOSALS

The design brief is to design 1No bespoke ground breaking dwelling that is sympathetic to its surroundings, cost effective to build and live in, yet maximise from the site's beneficial environmental characteristics.

The new dwelling is orientated to maximise environmental characteristics of the site, ensure privacy, increase visual connection with the front and rear gardens, maximise views and solar gains. Positioned parallel to Cootes Lane, as per the original adjacent semi detached dwelling on Cootes lane, it will provide occupants with privacy from its direct neighbours. It shall be set back a min 10m from the 13 Cootes lane, as per policy guidelines, it will provide occupants with privacy from Cootes Lane whilst being set within newly landscape grounds.

The proposed dwelling is designed to the highest standards, reflecting exemplar development in sustainable terms. Functionally, the designs will create a modern open plan flexible ground floor

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living areas and modular first floor bedrooms, best suited for the benefit and enjoyment of a modern single family unit. The external materials will reduce dwelling bulk, provide material connection to neighbouring brick dwellings to the east and west and compliment the newly landscaped grounds in which it shall be located.

Ground Breaking Design

The new dwellings environmental design characteristics, aim to:

- Reduce greenhouse gas emissions, to reduce the threat of global climate change.
- Aim to create a carbon neutral dwelling that will be better adapted to climate change with regards to the effects of solar gains in summer, promote water efficiency through retention and generate its own solar power.
- Include construction measures to use less polluting materials, building systems and encourage household recycling, so as to reduce impact on the environment.
- Improve client's `well-being` through the creation of site specific and simple dwelling naturally lit, adaptable and healthy place to live, directly connected and associated with the natural environmental that it is set within.
- Protect and benefit the local ecology, with increased site ecology enhancements and reduction in the environmental `footprint` of the house.

Contemporary House Design

The new dwelling is a simple rectangular plan, with gable ends and dual pitched roof. The houses form is economic to construct, has large areas of glazing, with highly insulated walls and roof. Mechanical services will be specifically sized and designed to complement the volume and functions. The design principles, technical design and approach are modern in use and form.

The strict design characteristics of an environmental home dictates the most appropriate design form to be adapted and specifically suited to the development site. With a desire not to waste resources or have an over reliance on modern technology, the rigorous manner of the proposed environmental and sustainable design approach will satisfy the following : Maximise solar gain and thermal mass, increase natural daylight, provide a warm enclosure to prevailing winds, use natural passive cross ventilation, reduces heat load and recycle waste water. A compromise in the environmental design criteria, through inappropriate placement on site or use of a restricted architectural style, would affect the home's overall environmental efficiency and nullify attempts to create a ground breaking sustainable new dwelling.

The dwelling's south facing and north elevations therefore are the most architecturally characteristic and environmental important elevation. They provide the majority of strong daylight, passive solar gain, the best views, visual comfort and connection to the newly landscaped gardens. The southerly aspect has the large window, a projecting built in overhang and generous roof eaves to provide solar shade into the main living room space and bedrooms. The garage roof building will contain the solar pv panel array as required.

Siting

SCDC SPD `Fen Drayton Local Framework`, May 2011, Section 5.13 – 5.16 `Development Design Principles`, Mill Rd. states “ *any new buildings are to be located away from the road frontages` and `architectural design should respect the height , massing, scale and rhythm` of the existing buildings` additionally` `Properties in these areas should protect and retain rural character of the area, prevent visual intrusion to the wider landscape, existing hedges should be strengthened with additional planting`*”

The proposed dwelling is set back from the notional building line of No13 & 12 Cootes lanes, a min of 10m from the rear elevation, as per policy guidelines. It is located approximately 29m back from Cootes Lane roadside edge. The proposed landscape areas to the front of the plot and increased

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boundary planting, will reduce the visual intrusion to wider landscape and enclose the dwelling, turning an unassuming open plot area into an interesting ecologically diverse landscaped area when viewed from the road.

Building Height and Scale

SCDC SPD `Fen Drayton Local Framework` Policy requests new dwellings should respect the height, massing, rhythm and scale of the existing buildings. Proposed massing and scale of the new dwelling is respectful to the local vernacular of the area.

The proposed new dwelling, will be reflective of the traditional vernacular form and surrounding dwelling heights, they are unique individual interventions, they are not dominant in scale and form to the local vernacular. The pitched linear roof form is parallel to the road elevation, it shall be sympathetic to the existing street rhythm of Cootes Lane. With regards to the new building's ridge height, in isolation it is marginally higher than, but comparable to existing semi at No13. New vertical, eaves and ridge heights are comparatively similar to that of the existing dwellings.

The existing dwelling at No10 Cootes Lane, has a surveyed ridge height of 6.65m above Ex GL (external ground level)

The proposed new dwelling ridge height of 8.90m above Ex GL datum, set within SCDC LSA policy guidelines. The comparable difference in ridge ht of +2.13m higher than No13. Distance apart = 65m. The distance apart of all dwellings significantly minimises / eradicates the modest difference in ridge heights.

In summary I would argue that due to nature and scale of the new house design, variation in massing and the considered location, the new building is suitable for this particular site and comparable to the existing semi-detached dwellings in relation to scale, mass and form.

PLANNING

In accordance with the guidelines set out within the SCDC SPD `Fen Drayton Local Framework` Policy and SCDC planning `Core strategy DPD 2007`, `Development Controls Policies DPD 2007` and the new revised policy dated Sept 2015 `Site specific policy DPD 2015` Fen Drayton Former Land Settlement Association Estate : Implications of the withdrawal of the Code for Sustainable Homes` I can confirm the proposed development complies with the objectives as outlined and required within the local guidance, South Cambridgeshire and national planning policies. The SCDC and national planning objectives addressed by the proposed development are:

The development protects the existing village character of Fen Drayton, as the proposed building scale, location and function enhances and maintains the existing village fabric and character.

The new dwelling address the range of sustainability issues for the development and living within, go well above and beyond the national average, design intent creates a dwelling of exceptional standard of performance and design. Refer to Sustainability Statement with design characteristic achieved.

The high level of design expectation, ground breaking approach and manner to which site specific environmental concerns have been addressed will provide the local area a beneficial and inventive dwelling.

The existing land use is maximised through promotion of green sustainable development criteria, through the maintenance of existing features and enhancement of the existing site through dwelling placement, user lifestyle and locality.

The SCDC local development framework has identified individual site specific maximum footprint areas for the redevelopment on the sites, by formal identification and replacement of eligible redundant agricultural buildings.

New dwellings Total external ground floor eligible footprint area= 73.09m², additionally an extra 7.2m² of non habitable plantroom footprint is included, for use of dwellings specific mechanical plantroom equipment.

The local framework planning requirement for the “*promotion of ground breaking forms of sustainable living*” and “*Experimental forms of development*” is hard to define and determine. The proposed design is not what I would consider “*experimental*”, although may be considered exceptional, by nature of its simplistic design form, the specification of high thermal insulated walls, the high performance glazing, very good air tightness and small scale heating system. The new dwelling demonstrate a ground breaking architectural approach, form and style directly associated with a type of dwelling that is equivalent to carbon neutral modern dwelling, in a manner without excessive cost or restriction to my clients.

The SCDC local development framework requests consideration and confirmation of a number of issues, I confirm the following have been considered and included in the new scheme:

- Identification of the new dwelling domestic curtilage area on the site
- Wildlife Consideration and Impact of local landscape features
- Consideration of the dwellings need to maximise environmental design criteria
- Creation of dedicated allotment areas, min 250m² included for both.
- Inclusion of new Garden Outbuildings, such as garages and bin stores, that are separate to the permitted development footprint area
- Landscape design enhancement measures
- Adequate space separation to existing dwellings and each other
- Provide private access track
- Safe secure parking and ability to turn all vehicles on site
- Disabled access and pathways
- Waste collection / storage areas
- SuDS waste water management scheme

Outbuildings

A New outbuilding forms part of the application, it includes a garage with a garden tool storage attached to the west side of the dwelling and facing the roadway. In accordance with policy its footprint is additional to the eligible footprint allowed and use is ancillary to the dwelling.

The garage roof space shall provide pv panel mounting space. It is located upon the western edge of the plot. The garage / workshop has a plan area of approx. 52m², it shall provide covered parking for two cars, workroom area. Refer to drawings 0268.131, 130.

Landscape

The new house is to be surrounded by a levelled site area for ease of access. A terrace area is to be formed to the north, opening onto new lawn areas. Front face and driveway opens up onto the herb garden, vegetable plots and new planting. Views from within the house across the site are to be framed / formed to enhance site potential. New planting to the garden boundaries, along with open post and rail timber fences, will provide necessary privacy and security barriers.

Site Access

A new private roadway connection shall be formed off Cootes lane, and form part of this planning application and shall be constructed in accordance with Cambs County Highways criteria for single dwellings access. The new site access will have adequate visibility splays onto road and footpath.

Sufficient visitor parking and adequate turning area will be provided on site to allow safe access and egress from the site.

Parking

There will be a creation of 4 No permanent parking bays on a new permeable gravel area, including a wider accessible disabled parking bay. There will be a provision for visitor / delivery access and turning on site.

Dwelling Access

Level dwelling access is to be created for all visitors in accordance with typical `Life Time Homes` criteria. An intrinsic part of the design is the accessible ground floor guest WC, clear access circulation and future ground floor bedroom space.

Drainage

A new foul sewage drainage connection is proposed to existing foul drain network. All the dwelling's rainwater will be collected in a new underground chamber rainwater harvesting tank and will be re-used on site. New outbuildings will also be connected to new rainwater harvesting system.

Refuse

A new covered bin store, recycling area is to be formed for ease of access.

Flood Risk

The property is not in a flood risk area, as identified by the environment agency. New landscape measures have created a low lying area away from the house, to prevent and alleviate flood risk in the event of a freak rain storm.

SUSTAINABILITY STATEMENT

The scheme's environmental design is based on the current building regulations and withdrawn national CfSH standards, it will aim to :

- Reduce greenhouse gas emissions, to help reduce the threat of global climate change.
- Become carbon neutral dwelling at the construction stages and during occupation.
- Create a dwelling that will be adapted to climate change with regards to the effects of extreme temperatures, of solar gains in summer, promote water efficiency through retention and generation of its own solar power.
- Include on site construction measures that use less polluting materials and building systems, encourage household recycling, so as to reduce impact of waste on the environment.
- Benefit the occupiers in the short and long term with a reduction in running costs, through greater energy and water efficiency.
- Improve client's `well being` through the creation of site specific and simple dwelling. A dwelling that is naturally lit, adaptable and healthy place to live, directly connected and associated with the natural environmental that it is set within.
- Protect and benefit the local ecology, with a site wide ecology enhancements and reduction in the environmental 'footprint' of the house.

The following elements below demonstrate how my clients new dwelling balances the release of carbon dioxide by reducing and saving emissions through the high level of the design, materials specification and life style choice.

A full SAP calculation has been carried out on a set of detailed design drawings by accredited assessor, to assist with determination of dwellings energy performance, refer to enclosed SAP Calcs.

Renewables and Low Carbon Technologies Study

As part of the design process, inclusion and consideration was given to all the possible renewables and low/zero carbon technologies that may be contribute towards the clients aim to create a carbon neutral dwellings and meet current SCDC LSA planning policy for the site. The following list outlines consideration and feasibility of the individual options appropriate to the site, client and the proposed dwelling.

Solar Thermal Panel System

Water heated through a series of roof mounted solar collectors Considered system ;
Evacuated tube panels. Combined with 250 litre Water storage cylinder with solar coils, pump, controls and buffer vessel. Limited South facing roof area available.

SAP Calculation : Not Undertaken

Comments : Additional heating source will be required. 90% efficient Solar thermal panels, roof area 4m², to suit estimated domestic dwelling water needs. Solar PV panels as required in conjunction with solar thermal to achieve carbon neutral status.

Design conclusions :

Area of south facing roof area is limited, decrease in roof area will compromise amount of PV panels, limiting PV load output. Plant room would allow 250litre cylinder. Maintenance costs increased to replace Glycol fluid periodically if panels overheat. Solar PV panels are able to heat hot water through emersion element as a more viable / cost effective alternative.

Result : Solar thermal panels not included or considered.

Wind turbine

Free standing pole mounted, small scale domestic wind turbine to produce on site electricity.

Connected to national grid or off grid battery storage.

Considered system ; Not Considered , planning issues

SAP Calculation : Not undertaken.

Result : Wind Turbine not included or considered.

Wood Pellet boiler

Biomass heating system per dwelling, burning wood pellets. Boiler connected to central heating and water storage vessel. Suitable for low temp heating UFH systems.

Considered system ; Unit to large / expensive for scale of dwelling

SAP Calculation : Undertaken

Result : not included or considered.

Ground Source heat pump

Ground to water system, through series pipes loops across the ground or within bore hole/s.

Considered system ; Site area for ground loop system is inadequate. Borehole option available.

Both options expensive to install.

SAP Calculation : Not undertaken.

Result : Ground Source heat pump not included.

CHP (combined heat and power unit)

Gas or LPG powered unit generating heat and electricity simultaneously. Connected to the national grid. Feed in tariffs available.

Considered system ; No gas on site. LPG site storage not desirable Not considered.

SAP Calculation : Not undertaken.

Design conclusions : Not considered suitable for the site

Result : CHP Not included.

Air source heat pump

Air to water system. Heat from the air absorbed in to fluid that is transferred via an electrical heat pump compressor to a higher temperature, for use with hot water and heating systems.

Considered system ;

8.5Kw small scale unit, externally located. Suitable for UFH systems. To provide hot water and heating as required. Work in association with Solar PV, Solar thermal or Wind turbine. Connected 250 litre hot water storage cylinder. Requires single phase electrical supply. 300% Efficient. Degree sound proofing required. Planning permission assumed. RHI scheme payback possible. Electrical power consumption to power heat pump unit (increased C02 emissions factor)

SAP Calculation : Undertaken

Comments : Single 8.5Kw unit per dwelling, to suit estimated domestic dwelling, in conjunction with pv panels, achieves DER rating -0.05, creates -0.39 C02 emissions, therefore dwelling would be **carbon neutral** for energy use,

Design conclusions :

Air Source unit is viable / cost effective. Expected Low / medium cost of supply / installation and short investment pay back period. Achieves required **Carbon Neutral** status.

Result : Air Source heat pump is to be proposed along with PV panels, although it has a higher electrical consumption and C02 emissions rating than a mains gas boiler, wood pellet and pv option.

Photovoltaic panels Solar PV

Photovoltaic cells, set within rigid roof mounted panel, generate electricity from light. Panels located in southerly inclined aspect work at peak efficiency.

Considered system ;

Monocrystalline Silicon high efficiency roof panels, set flush or laid over roof covering. National grid Feed in tariff available, site restricted to 3.76kw feed In by local network provider standard single phase domestic supply. 3 phase site power supply maximum 11.27kw feed Is subject to provider approval. Off grid available but requires battery storage. Additional heating source is required. Can be connected to hot water emersion heating circuit within 250 litre hot water storage cylinder. Located upon south facing house and garage roof areas, no overshadowing. Planning permission assumed.

SAP Calculation : Undertaken

17% efficient panels with a 3 phase site power supply per dwelling. Design level pv load to achieve **carbon neutral** emissions =kw peak load.

Design conclusions :

Suitable facing roof area. Plant room sized to allow 250litre cylinder. Minimal maintenance costs. Feed In tariff available. Solar PV panels able to efficiently heat hot water through emersion element, negates use of Solar thermal panels. Use viable / cost effective. Expected medium cost of supply / installation with medium / short investment pay back period.

Result : PV panel array is to be proposed along with Air Source heat pump. Proposed Low Carbon renewable option.

Hydro generation

Not considered appropriate for the site

Feasibility study summary

Low/Zero Carbon Technologies feasibility study demonstrates the most feasible option/s most suited to the dwelling, the site and clients wishes. To achieve carbon neutral emissions a combined 'Air source heat pump with Solar PV panel array' option is proposed.

Design intention is that the proposed dwelling **will not** increase overall carbon emissions, therefore the dwellings are calculated as **ZERO CARBON** emissions.

Conclusion

Carbon Neutral emissions is achieved by off setting energy uses, with use of additional low carbon technologies.

Off setting with additional PV panels In this instance has only been possible to achieve with the addition of 3 phase power supply to each dwelling, to allow for the increased pv load output over and above the network limited single phase capacity of 3.74kw. Please note the Increased national grid feed in / supply is subject to a formal application, quote and approval confirmation from local DNO provider 'UK Power Networks', provision of 3 phase power supply is not guaranteed. The client has applied for 3 phase power supply and awaits a survey and a formal quote.

Individual elements

Fabric Thermal Efficiency

Extremely good levels of thermal efficiency are proposed for all the external elements, thermal cold bridges have been minimised, 'Passivhaus' standard levels of very low air tightness is proposed. In combination a 'Fabric first' approach will make a sealed fabric external warm skin around the building, almost negating the need for internal heating. All levels are set well below the minimum building regulation standards. Refer to enclosed SAP.

Design elements include : A sand cement screeded ufh floor slab, thick walls and a pitched roof built with light weight off site manufactured timber panels with minimal / reduced material cold bridging. Triple glazed timber windows with Low E glass with air tight perimeter seals. Minimal north facing windows. Minimal through wall / roof penetrations.

Solar Gain / Protection / Daylight

Primary living spaces will have large windows facing south so as to provide winter solar gain and maximise views. The building and south facing windows are designed with generous overhangs and protection so as to prevent summer overheating. All habitable rooms have above average level daylight and views of the sky, to enhance occupiers well being and general health.

Low energy use appliances and low energy lighting

Fit and specify low energy electrical devices to minimise energy consumption. Use of 100% low energy lighting throughout.

MVHR

Installation of mechanical ventilation and heat recovery system, so as to recover, minimise and circulate dwelling waste heat, omit stall air / moisture and promote use of filtered fresh air for occupiers health & well being.

Low and Zero Carbon Technologies

Scheme includes air source heat pump and roof mounted Photovoltaic Solar array as stipulated.

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Low water consumption

Internal Fittings will be specified to reduce water consumption within the house. A water consumption calculator shall be used to ascertain precise levels, design level **80lpp**.

Rainwater Harvesting

Propose each dwelling to re use site rainwater from the new below ground 3300 litre tank using a pump for direct feed to Washing Machine, ground floor WC and garden watering.

Storm water run off

Peak rate storm water run off is no greater risk than before works. Development site rainwater volume run off across the site is no greater than before. Proposed to use permeable materials for the external paths, terraces and driveway areas. Site has extremely good levels of water permeability as result of over 1.5m thick strata of granular & sand alluvium bed over a historical river bed deposits before oxford clay deposits lower down, all below lightweight top soil covering.

Flood risk

Site is not within an identified the flood risk zone. New works shall not have any detrimental effect on the flood risk of clients site or adjacent sites. Refer to separate flood risk assessment.

Nox Emissions

To reduce Nitrogen oxide emissions into the atmosphere, it would be proposed to use low NOx rated appliances, with a less than 40 dry NOx rating, the most efficient appliance rating.

Global Warming Potential rating

Propose the specify low GWP insulation material products so as to reduce emissions of harmful gases at manufacture and related site off gassing.

Accessible Lifetime Homes

Proposed house designed in accordance with Lifetime Homes checklist criteria, so as to promote fully accessible and adoptable home for visitors, current and future users. Includes features such as : wide doorways, level access, accessible internal spaces, easy access bathrooms, wide stairs.

Ecology

Build on land with low ecological value and to enhance sites ecological value. Planting recommendations are proposed as part of the site development landscape plan to protect, enhance and improve sites overall ecology level.

Composting

Provide permanent composting facilities on site.

Waste

Encourage occupiers to recycle materials, provide adequate space and facilities.

Materials

Specification of materials and methods of construction that have low environmental impact over their life cycle. BRE Green guide rated methods, to be either A or +A rated. Such as wall and timber cladding, roof construction, engineered joists, stud walls and windows.

Specification of responsibly sourced materials for dwellings basic frame, covering and internal finishes.

Statement to be read in conjunction with :

As submitted proposed design drawings

End 0268/DS/