

Design & Access Statement

5th December 2008

1253/08

ARCH
ARCHITECTS

THE LONG SUTTON SUSTAINABLE SETTLEMENT EXTENSION (LS SSE)

(Proposed Sustainable Settlement Extension development adjacent 47 Bridge Road, Long Sutton, Spalding, Lincs PE12 9EF)

The Long Sutton Sustainable Settlement Extension (LS SSE) is allied to the Government's vision in the White Paper '*Planning for a Sustainable Future*[1]'. This proposal seeks to encourage the implementation of some of the principles expressed in the White Paper by developing an exemplar Sustainable Settlement Extension (SSE) within Long Sutton, one of the District's Area Centres[2], in preparation of a low carbon future.

The proposed development site is close to the defined settlement boundary and is a previously developed site. In identifying the appropriateness of this site, consideration has been given to the experimental nature and the concomitant commercial risks involved in such development. The Long Sutton SSE is designed to act as a catalyst for change within the existing Lincolnshire Market Town of Long Sutton, so as to promote, inspire and inform a low carbon society in anticipation of a time of diminishing availability of finite resources such as oil, coal, natural gas, water, and food. The Long Sutton SSE' is to serve as working model for broader application in the UK and is designed to demonstrate ways in which its residents and visitors can achieve greater levels of autonomy in terms of energy generation, water, waste management, and food supplies without resort to fossil fuels.

The characteristics of the Long Sutton Sustainable Settlement Extension include:-

- the promotion of low carbon work-life ethic
- the offer of fossil fuel free lifestyle
- the promotion of renewable energy applications
- the delivery of innovative building solutions
- the implementation of living–streets layouts[3]
- application of traditional construction techniques (The Gateway)
- the potential for an increase in the biodiversity of the local landscape
- the operation of a zero-waste policy[4]
- the provision of access to green spaces[5]

Ease of replication is a design principle for all aspects of The Long Sutton SSE development. Innovation is a significant tenet of this development and aims to be technically progressive and experimental in the promotion of environmentally responsible development and aims to offer contributions to knowledge, building on existing bodies of peer-reviewed work.

Exemplfying these tenets, The Gateway entrance to the LS SSE showcases alternative construction techniques using three traditional construction techniques, strawbale, rammed-earth and cob. Their Carbon Mitigation both through construction and occupation will be exemplary.

A rigorous academic research programme in collaboration with a recognised academic institution is soon to be agreed as an integral part of the Design Brief for The Long Sutton SSE.

Intellectual Property Rights derived from this SSE Project are to be shared with SHDC and could be the subject of legally binding agreement with the District Council.

---

[1] H.M. Government. 2007. *Planning for a Sustainable Future:* White Paper. May

[2] South Holland. 2006. *Local Plan.* Written Statement Adopted. July

[3] Country Survyeors' Society. 2008. *Travel is Good:* CSS Transport Futures Report. January

[4] Murray, Robin. 2002. *Zero Waste.* www.greenpeace.org.uk/trust. February

[5] Natural England. 2004. *The Countryside in and around towns:* A Vision.

Contact: Dr Jeremy Harrall
SEArch
89 Gedney Road, Long Sutton, SPALDING, Lincs PE12 9JU
Tel. 01406 364646 molearch@searcharchitects.co.uk

Project Description

The Long Sutton SSE is a 10.45 acre (4.23ha) development proposal of forty nine dwellings, one office and nine commercial units designed and laid out with the intention of achieving for the residents and businesses a greater level of self reliance over their own resources, than is currently achieved in conventional developments of this scale.

The SSE is to be located at (Grid Reference TF 4452255) the eastern gateway of the Lincolnshire Market Town of Long Sutton and will form part of the largest aggregation of environmentally responsible development in the UK (LSWLP[6], CaNeBuZo[7], LESH[8], GTB[9], see description below)

The Long Sutton SSE is an exceptional form of development that:-

- has been conceived as a ***catalyst for positive environmental change*** within the existing settlement of Long Sutton, so as to promote a low carbon society in anticipation of a time of diminishing availability of finite resources such as oil, coal, natural gas, water, and food.
- is to serve as a ***working model***, designed to demonstrate ways in which homes and businesses can achieve greater levels of autonomy in terms of energy generation, water, waste management, and food supplies without resort to fossil fuels.
- will achieve ***relative autonomy***[10] over its own resources and enable residents and business to counter the threat of fuel poverty, liberating them from their reliance on the public utility infrastructure (with the exception of the telephone network), whilst giving them the opportunity to reduce the associated costs.
- will place Long Sutton at the forefront of settlements striving to ***mitigate carbon emissions***, putting them in an advantageous position in the fast developing low-carbon economy.
- promotes the implementation of the ***work/life ethic*** espoused at the LSWLP (The Long Sutton Work/Life Project Planning Approval Ref. H06/0018/01) as a key characteristic of sustainable settlements.
- is laid out around a ***'Living-Street'***[11], relegating the dominance of the car within the development while extending the areas of play and general circulation to pedestrian traffic.
- houses are designed to achieve a ***zero heated status, naturally heated and naturally ventilated***. Each building is of a high thermal mass construction, super-insulated, orientated around the path of the sun with the benefit of micro-climates designed into the garden and site layouts.
- Promoting and exploring the commercial applications of traditional construction techniques for low energy building using rammed-earth, strawbale, cob and mixed medium.

---

[6] LSWLP *The Long Sutton Work Life Project, 87/89 Gedney Road, Long Sutton, Spalding, Lincs PE12 9JU Planning Ref* H06/0018/01

[7] CaNeBuZo *Carbon Neutral Business Zone, 96 Gedney Road, Long Sutton , Spalding, Lincs PE12 9JU Planning Ref : H06/0092/06 and H06/0866/06*

[8] LESH *Long Sutton Earth-Sheltered Social Housing Scheme, Adj. 21 Bridge Road, Long Sutton, Spalding, Lincs PE12 9EF. Planning Approval Ref. H11/0585/08*

[9] GTB *Greening-the-Box, 25 Main Road, Long Sutton, Spalding, Lincs PE12 0AA*

[10] The precise meanings of the terms *autonomy* and *autonomous* in an architectural context are debatable. There is a spectrum of definitions, perhaps the most demanding of which is provided by those pioneers of sustainable architecture, Professor Brenda Vale and Dr Robert Vale: *"The autonomous house on its site is defined as a house operating independently of any inputs except those of its immediate environment. The house is not linked to the mains services of gas, water, electricity, or drainage, but instead uses the income-energy sources of sun, wind, and rain to service itself and process its own wastes."* B. Vale and R. Vale, *The Autonomous House: Design and Planning for Self-sufficiency* (London: Thames and Hudson, 1975), p7. Clearly, this degree of independence from mains services would not be allowable in publicly owned houses. However, the LS SSE is designed to give tenants the means to achieve the degree of autonomy from the mains services that suits their life-style. For further reading, please see Brenda and Robert Vale's, *The New Autonomous House: Design and Planning for Sustainability* (London: Thames and Hudson, paperback edition 2002), pp 8 - 10.

[11] 'Living Streets' *aka Naked Streets*

Contact: Dr Jeremy Harrall
SEArch
89 Gedney Road, Long Sutton, SPALDING, Lincs PE12 9JU
Tel. 01406 364646 molearch@searcharchitects.co.uk

Project Highlights

The LS SSE will be an exemplar development which anticipates our inevitable low carbon future, in achieving this the project espouses many attributes, of which the highlights are;

Autonomy Agenda -	*increasing self reliance over essential measures.*
Fossil Fuel Free -	*no gas, oil or coal applications used.*
Reduced Running Costs -	*buildings operation on up to 75% less energy*
Work/Life -	*facilitate walk to work opportunities*
Mixed Tenure -	*promoting social inclusion of affordable housing*
Food Production -	*twenty five allotments and generous garden areas*
Energy Conservation -	*SAP Ratings in excess of 100*
Open Spaces -	*21% os site area (1.5 acres)*
Increased Biodiversity -	*24,518 plants of 22 species and 0.43 acres of wetland areas*
New Aesthetic -	*49 individual houses*
CO_2 Mitigation -	*344 tonnes CO_2 every year*

SEArch's Ethos for the LS SSE

SEArch believes that environmentally responsible architecture in the context of social housing will always seek to reduce costs (of whatever kind) to the user to the commissioning authority, and to the environment; but it will also seek in like measure to enhance the lives of those users, the quality of the immediate environment and, given the times, the reputation of the commissioning authority for sustainable policies.

SEArch further believes that the residents are best supported in their domestic circumstances if their housing and immediate environment is so designed as to give them as great a degree of autonomy as is feasible in terms of their energy, water, and waste management, minimising above all the threat of fuel poverty, liberating them from reliance on the public utility infrastructure (with the exception of the telephone network), and thus giving them the opportunity to reduce or even eliminate the associated costs - all this at the same time as encouraging self-reliance in terms of the production of green and root vegetables and fruit for domestic consumption.

The Long Sutton Sustainable Settlement Extension will place South Holland District Council at the forefront of Districts striving to mitigate carbon emissions in its development. It will put the area in a leading position in the fast developing low-carbon economy.

Contact: Dr Jeremy Harrall
SEArch
89 Gedney Road, Long Sutton, SPALDING, Lincs PE12 9JU
Tel. 01406 364646 molearch@searcharchitects.co.uk

A RESPONSE to the South Holland Local Plan; Adopted 2006

Chapter 3 –CORE STRATEGIC AND GENERAL POLICIES

POLICY SG1: *General Sustainable Development*

The Principals of sustainable development espoused by the LS SSE:-

The LS SSE espouses the sustainability principles identified within SHDC's Local Plan and the Governments White Paper; *'Planning for a Sustainable Future'*. This is achieved in the following three areas:-

1) ***Enhanced quality of life-***
   - substantially reduced energy bills, water and waste costs.
   - network of footpaths providing, access to the countryside.
   - enlivened building environments with elevated internal natural daylight levels and sunlight levels.
   - allotments for food production and an abundance of fruit bearing trees in the landscape,
   - true mixed tenure building layout, incorporating rented and freehold housing in a random mixture.
   - A 'Living Street' layout extending the residents amenity areas onto the drive.

2) ***Energy and natural resources conservation***
   - integrated renewable energy applications to all buildings eg. photovoltaic's, solar water heating, rainwater harvesting.
   - low technology design applications, simplifying the use of the home.
   - naturally heated and naturally ventilated homes and businesses.
   - consuming in the region of 75% less energy than conventional homes and commercial units.

3) ***Good custodianship of the local character and environment.***
   - a new aesthetic has evolved at LS SSE, in which local vernacular styles and features have been reinterpreted and adapted for incorporation with the delivery of passive solar design techniques.
   - increased bio-diversity through an extensive range of landscaping and water
   - increased wildlife habitats eg. bats and swifts
   - rainfall discharge attenuation

POLICY SG2: *Distribution of Development*

This Long Sutton SSE is to be located at the eastern gateway to this Lincolnshire Market Town and will form part of the largest aggregation of eclectic environmentally sound buildings in the UK. It will also pioneer a mixed tenure housing solution espousing the work/life ethic. In this way it will tackle the growing concerns surrounding the social implications of high-density social housing development that foster perceptions of social exclusion.

It will be the first time in the UK that a design solution of this scale offering relative autonomy is implemented for the combined benefit of social housing tenants, open market housing and commercial development. Above all, this design solution will counter the threat of fuel poverty, which is jeopardising the welfare of so many households and the financial viability of business. At the same time, these households, their landlords and the businesses will be able to pride themselves as to the high level of environmental responsibility and the low environmental impact embodied in this development.

1) ***Sequential approach*** - The proposed development site is close to the defined settlement boundary and is a previously developed site formerly operating as a horticultural business. The site currently includes two commercial activities:
   - Advanced Green Fuels – *manufacturers of 100% bio-diesel*
   - Ashtons Bulbs – *pre-packaging cut flowers and bulbs*

   In identifying the appropriateness of this site for development consideration has been given to the experimental nature and the concomitant commercial risks involved in such a project. Eighty percent of the proposed development site is allocated for an 'Affordable Housing' and 'Employment Zone'. The

Contact: Dr Jeremy Harrall
SEArch
89 Gedney Road, Long Sutton, SPALDING, Lincs PE12 9JU
Tel. 01406 364646 molearch@searcharchitects.co.uk

remaining 20% of the site is allocated for open market housing. This unusual mix of uses would not be financially viable on land identified for Development within the 'Defined Settlement'.

2) ***Efficient use and reuse of land adjacent No. 47 Bridge Road, Long Sutton*** - The 10.45 acre (4.23 ha. 42,289.65 m^2) was formerly operated by two generations of a local family of horticulturalists who combined their horticultural activities with other commercial and agricultural operations on site that included:-

8 acres
- forced cut flowers in two acres of glasshouses
- pre packing flowers and bulbs
- logistical operation – distributing plants internationally

2 acres
- storage of bulbs and flowers in chillers
- agricultural field (formerly daffodil and tulip fields

One glasshouse (half an acre) remains, the pre-packaging, storage and limited distribution activities are still operational.

An additional business operation, Advanced Green Fuels – manufacturers of bio-diesel, (Planning Approval Ref. H11/1425/06), operate from a former implement shed and part of the glasshouse. Part of the operation includes running a collection service and bio-diesel distribution service from the site.

In total the existing commercial premises provide 2,400 m^2 gross floor area of which 1,400 m^2 is currently in use.

It is the intention of Advanced Green Fuels to relocate and expand into one of the new units on the proposed 'Employment Zone' (subject to Planning Permission).

Garden land – the former gardens to No. 47 is 0.4 acres (1,618.74m^2) fronts Bridge Road and is a 45 m wide infill site and forms part of a built up frontage of linear development leading east out of Long Sutton.

3) ***Transport***

The site is:-

a) served by frequent scheduled bus services to King's Lynn, Wisbech, and Spalding with buses stopping at two stops adjacent to and opposite it;

b) adjacent to a prime road network node, the only location in Long Sutton giving direct access to B1359, A17 and A1101;

c) centrally located on one of the longest (c. 5 miles) continuous public footpaths in Long Sutton.

4) ***30mph Speed Zone*** - The existing site entrance is accessed off the B1359 (former A17 main trunk road) at the eastern gateway of Long Sutton inside a 30 mph speed zone. It is this entrance that is intended to continue serving the proposed 'Employment Zone' of 1,262 m^2 floor area (1,262 m^2 less than existing)

Enhanced Service Centre:-

WorkLife

The LS SSE offers a balance between, jobs, affordable housing and open market housing. It will also provide additional support for local services thus reducing the need to travel further afield out of the area. This Sustainable Settlement Extension is designed to add vitality and viability to Long Sutton and its catchment area. In so doing it will create a type of development that espouses the work/life ethic which in turn reinforces the sustainability of Long Sutton. As a result of the LS SSE the Market Town of Long Sutton would be invigorated particularly by its first 'Employment Zone', enhancing the role it plays as a service centre for the community by encouraging new businesses into the area.

Sequential Test

A sequential approach in the selection of this site for development as a Sustainable Settlement Extension has been considered in the following ways:-

a) The site is a previously developed area of land on the perimeter of the settlement which is well served by public transport and accessible to local facilities;

b) No other locations within the settlement will be suitable for this type of development on the grounds of cost, opportunity, experimentation, innovation. Given the relatively low density of development

Contact: Dr Jeremy Harrall
SEArch
89 Gedney Road, Long Sutton, SPALDING, Lincs PE12 9JU
Tel. 01406 364646 molearch@searcharchitects.co.uk

and high percentage of amenity area allocated for each dwelling and the SSE as a whole, the scheme would be cost prohibitive within the Defined Settlement Boundary.

Employment

LS SSE residents will have access to jobs on the new Employment Zone of 9 commercial units (1262 m^2 gross floor areas) within a walk to work distance via a network of footpaths. Access is available into Long Sutton and its social facilities by a range of transport modes including public transport, walking and cycling.

The opportunity to walk to work within the South Lincolnshire Fens where there is a considerable level of reliance on car usage is highly desirable.

Social Inclusion

Reducing the perception of social exclusion is one of the principle features of the LS SSE's design approach to its housing scheme. This it achieves:-

- by providing mixed tenure housing in a random pattern of tenure types through out the scheme.
- no differentiation in design or size of accommodation differentiates either freehold from affordable houses.
- selection of materials specification is consistent with all the buildings.
- SAP Ratings for each building will be exceptional in every case.
- a minimum Code Level 5 (Code for Sustainable Homes) is anticipated to be achieved for every dwelling.

Contact: Dr Jeremy Harrall
SEArch
89 Gedney Road, Long Sutton, SPALDING, Lincs PE12 9JU
Tel. 01406 364646 molearch@searcharchitects.co.uk

POLICY SG3: *Settlement Hierarchy*

Settlement Hierarchy:-

The LS SSE has been specifically designed to enhance Long Sutton's role as an Area Centre by:-

- providing the towns first '***Employment Zone***' incorporating 9 commercial units totalling 1262 m^2 Gross Floor Area
- increasing ***employment opportunities*** within the town
- increasing the availability of '***Affordable Housing***' by providing 49 low energy dwellings of which 25 are open market housing:-

15 No. 2 Bedroom, 3 person – Semi detached terraces, 75 sq m each
Plots 2, 3, 7, 8, 9, 10, 11, 15, 16, 17, 18, 19, 38, 39, 40

14 No. 3 Bedroom, 5 person – Semi detached houses, 109 sq m each
Plots 5, 6, 13, 14, 21, 22, 28, 29, 34, 5, 44, 45, 46, 47

11 No. 3 Bedroom, 5 person – Detached houses, 109 sq m each
Plots 4, 12, 20, 25, 26, 30, 31, 32, 33, 41, 50

6 No. 4 Bedroom, 6 person – Detached houses, 138 sq m each
Plots 24, 27, 37, 42, 43, 49

3 No. 4 Bedroom, 7 person – Detached houses, 156 sq m each
Plots 23, 36, 48

Site allocated for the social housing scheme is 0.943ha [2.33 acres], open market housing 0.943ha [2.33 Acres] and employment zone 0.701ha [1.732 acres].

The Long Sutton SSE is not without its architectural precedents within the Town. Beginning in 1997 the exceptional portfolio of architectural commissions espousing environmentally responsible development saw its first of four award winning projects granted Planning Approval;-

1997: LSWLP, The Long Sutton Work Life Project
87 and 89 Gedney Road, Long Sutton, Spalding, Lincs, PE12 9JU

The home of the LS SSE's Architect and the offices of SEArch. Collectively the LSWLP has reduced its reliance on fossil fuels to virtually zero. Each building has achieved a zero heating status, (naturally heated) and naturally ventilated, with no requirement for mechanical intervention for either heating or ventilation. The first earth-sheltered building to have won the coveted RICS ***Sustainable Building of the Year Award.***

2006: CaNeBuZo, (Carbon Neutral Business Zone)
96 Gedney Road, Long Sutton, Spalding, Lincs, PE12 9JU

Probably Europe's largest earth-sheltered development of its type and soon to be the home of SEArch as well as other businesses. Drawing on data from LSWLP and other SEArch projects, the Business Zone will provide its six commercial tenants with minimal running costs and a concomitant reduction in Carbon Dioxide emission in the region of 87 tonnes CO_2/yr.

2008: LESH, (Long Sutton Earth-Sheltered Social Housing Scheme)
Adjacent 21 Bridge Road, Long Sutton, Spalding Lincs PE12 9EF

A fossil fuel free construction. This is the UK's first autonomous social housing scheme and consists of six dwellings, (3 x 2 bed and 2 x 3 bed) all of which will generate their own electricity, harvest their own water, process their own sewage and manage their own waste stream, alleviating the tenants of their reliance on public utilities and the burden of fossil fuel dependency.

2009: GTB, (Greening-The-Box)
25 Main Road, Long Sutton, Spalding, Lincs PE12 0AA

In a partnership between SEArch South Holland District Council, there are endeavours to undertake the refurbishment of a three bed-roomed semi-detached council house to a near autonomous state for its existing tenants. Some of the techniques to be implemented are to be tried and tested, while others are unique to SEArch's building design ethos, evolved through Dr Jeremy Harrall's Doctoral research through his Practices portfolio of commissions.

Contact: Dr Jeremy Harrall
SEArch
89 Gedney Road, Long Sutton, SPALDING, Lincs PE12 9JU
Tel. 01406 364646 molearch@searcharchitects.co.uk

POLICY SG4: *Development in the Countryside*

The LS SSE is a Sustainable Settlement Extension seeking to deliver on the agenda of autonomy and cannot reasonably be accommodated within the defined settlement limits of Long Sutton. There is not the land available for this scale and type of development within in the Town and such land would be prohibitively too expensive to accommodate affordable housing at 50% allocation , a 4 acre 'Employment Zone' all of an experimental nature with its concomitant financial risks.

The land adjacent No. 47 Bridge Road has operated commercially at a large scale with a variety of business operations.

Long Sutton has been identified in the Local Plan as an Area Centre which will continue to provide housing, employment, and commercial development in support of its role as a service centre for its rural catchment.

It is proposed to site the LS SSE on the mixed use commercial development site close to the Defined Settlement Boundary. The site frontage forms part of a continuous ribbon of development leading (east) out of Long Sutton, and constitutes to a greater extent Brownfield land adjacent residential dwellings, a haulage yard and a former garage in the existing built-up frontage.

The design proposal for the LS SSE is unique in that it is for a mixed commercial and residential development of low-energy buildings designed to achieve a greater level of self reliance than conventional development while mitigating exceptional levels of Carbon Dioxide emissions.

The site in question is appropriate, available and suitable for the proposed development by reason of its physical attributes alone; but more than that, it is also uniquely suitable for this mixed use of commercial units, social housing (50%) and open market housing (50%) development – the first in the UK of this scale to be designed to achieve a degree of autonomy in respect of energy, waste, water, and food production.

Services and facilities

The residents and users of the LS SSE would be adequately catered for in terms of access to the essential provisions to sustain the lifestyle expectations of the 21st Century.

The site is within walking distance of the following services and facilities:-

a) **Schools:-**
- pre-school
- primary (Long Sutton County Primary School)
- secondary schools (The Peele Community College)

b) **The Market Place:-**
- weekly Friday market
- main shopping area, variety of shops i.e. electrical, clothing, hardware, hairdressers, beauty salon, takeaways. Further shopping is offered along Market Street i.e.
- banks i.e. Barclays, Natwest and Lloyds TSB

c) **Health Centre**

d) **Dental surgery**

e) **Veterinary Practice**

f) **Variety of grocery shops:-**
- NISA convenience store
- SPAR convenient store
- Co-operative supermarket

g) **Churches:-**
- Baptist Church
- St Marys Church

h) **Public Houses:-**
- The Olde Ship Public House
- The Crown and Woolpack

i) **Cafes:-**
- Cosey Cafe
- The Dining Rooms
- Co-operative coffee shop

j) **Visitor attractions and recreational facilities:-**

- The Peele Leisure Centre
- Cinder Ash Park
- The Long Sutton Wildlife and Butterfly Park
- Long Sutton Athletic Football Club

k) **Social/entertainment venues:-**

- Conservative Club
- The Parkside Club
- The Long Sutton Market House

l) **The Long Sutton Market House** (a multi use centre providing access to South Holland District Council, IT training with Boston College, Parish Council, Police Surgery, Tourist Information, venue hire of the Friends Room)

j) **Long Sutton Library**

k) **Post Office**

Transport

The site is:-

a) served by frequent scheduled bus services to King's Lynn, Wisbech, and Spalding with buses stopping at two stops adjacent to and opposite it;
b) adjacent to a prime road network node, the only location in Long Sutton giving direct access to B1359, A17 and A1101;
c) centrally located on one of the longest (c. 5 miles) continuous public footpaths in Long Sutton.

Employment

a) Premier Foods: *half a mile*
b) Schools: *one mile*
c) Town Centre: *one mile*
d) Public Transport links to major regional conurbations: *immediate.*

Advertisement

The Long Sutton Sustainable Settlement Extension project represents a unique opportunity for the District Council to lead on Sustainable Development solutions which could inform and perhaps lead the UK's low carbon agenda in the drive to mitigate the effects of global warming on settlements of all scales. The proposed location on Bridge Road will serve to advertise the ethos underlying the Scheme.

Contact: Dr Jeremy Harrall
SEArch
89 Gedney Road, Long Sutton, SPALDING, Lincs PE12 9JU
Tel. 01406 364646 molearch@searcharchitects.co.uk

POLICY SG7: *Energy Efficiency*
(incorporates policies SG8 – Water Efficiency)

Design Principles

What price autonomy? **The proposed Sustainable Settlement Extension(SSE) at Long Sutton will be the first of its type in the UK and will to strive for autonomy**[12].

Relative autonomy over their energy, water, and waste management will enable residents to minimise the threat of fuel poverty, liberating them from their reliance on the public utility infrastructure (with the exception of the telephone network), whilst giving them the opportunity to reduce the associated costs. LS SSE will place SHDC at the forefront of public bodies striving to mitigate carbon emissions in its housing and commercial building stock and put them in a leading position in the fast developing low-carbon economy.

For the first time in the UK a mixed use development of this type will deliver buildings all of which can:-

- achieve zero heating status.
- generate no CO_2 emissions in occupation.
- harvest their own rainwater to provide clean potable water.
- passively ventilated.
- have both their own gardens and their own allotments in which they will be able to grow their own food.

The LS SSE is an evolution of the expanding collection of eclectic environmentally sound buildings in the Lincolnshire Market Town of Long Sutton.

1997 – 2003 ***LSWLP (The Long Sutton Work Life Project)***
87 and 89 Gedney Road Long Sutton, Spalding, Lincs, PE12 9JU
(Planning Approval Ref: H06/0018/01)

South Holland District Council granted Planning Approval for an earth-sheltered home and architects offices in the open countryside, the house of its Architect Dr Jeremy Harrall and his architectural Practice SEArch, (Sustainable Ecological Architecture Limited).

In 1997 only 17 earth-sheltered houses had been built in the UK, while the proposed offices became the first of its kind in Europe. Through design, the Long Sutton Work Life Project buildings are zero-heated, net zero CO_2 emission and are now a fossil-fuel-free undertaking. In recognition of these credentials the project has achieved 12 TV appearances, 7 radio, 63 journals and 6 national and international awards.
These projects have undergone peer review at the highest level as part of its architect's PhD thesis[13]*. Amongst other endorsements, LSWLP has received awards from the CPRE*[14] *and the Green Organisation. Furthermore, it was the RICS Sustainable Building of the Year (2005). LSWLP's home and offices have been shown to have enjoyed annual energy consumption rates 75% less than the average UK four bedroom house.*

2004 – Present Day ***CaNeBuZo, (Carbon Neutral Business Zone),***
96 Gedney Road, Long Sutton, Spalding, Lincs, PE12 9JU
(Planning Approval Ref: H06/0092/06 and H06/0866/06)

---

[12] The precise meanings of the terms *autonomy* and *autonomous* in an architectural context are debatable. There is a spectrum of definitions, perhaps the most demanding of which is provided by those pioneers of sustainable architecture, Professor Brenda Vale and Dr Robert Vale: *"The autonomous house on its site is defined as a house operating independently of any inputs except those of its immediate environment. The house is not linked to the mains services of gas, water, electricity, or drainage, but instead uses the income-energy sources of sun, wind, and rain to service itself and process its own wastes."* B. Vale and R. Vale, *The Autonomous House: Design and Planning for Self-sufficiency* (London: Thames and Hudson, 1975), p7. Clearly, this degree of independence from mains services would not be allowable in publicly owned houses. However, the LS SSE is designed to give tenants the means to achieve the degree of autonomy from the mains services that suits their life-style. For further reading, please see Brenda and Robert Vale's, *The New Autonomous House: Design and Planning for Sustainability* (London: Thames and Hudson, paperback edition 2002), pp 8 - 10.

[13] Harrall, J. 2007. *Demonstrating the Viability and Growing Acceptability of Earth-Sheltered Buildings in the UK.*

[14] Norfolk Campaign to Protect Rural England. 27th October 2004

Following SEArch's success with other earth-sheltered developments South Holland District Council agreed the sale of the contaminated former garage site at Long Sutton to SEArch as the preferred developer.

Planning Approval was granted outside the Development Area Boundary for what has become known as CaNeBuZo, (Carbon Neutral Business Zone), Europe's largest earth-sheltered development of its type. Construction commenced in October 2006 and is due for completion in November 2009.

A self imposed Zero-Waste Policy is in force, a policy implemented at the Long Sutton Work Life Project, where no waste during the deconstruction process has left site and none during construction.

No fossil fuels have been used on the site since it has been under the control of SEArch. No fossil fuels will be used throughout the construction and none in occupation. 100% bio-diesel manufactured in Long Sutton is being used by all plant and machinery.

CaNeBuZo consists of eight units, which includes five offices, a café, classroom and model autonomous dwelling, (the first to achieve 100% true autonomy in the UK).

SEArch have agreed to share with South Holland District Council's the dissemination of all data from the projects research and development.

2007 – Present Day ***LESH (Long Sutton Earth-Sheltered Social Housing Scheme)***
Adjacent 21 Bridge Road, Long Sutton, Spalding Lincs PE12 9EF
(Planning Approval Ref: H11/0585/08)

A fossil fuel free construction. This is the UK's first autonomous social housing scheme and consists of six dwellings, (3 x 2 bed and 2 x 3 bed), which will generate their own electricity, harvest their own water, process their own sewage and manage their own waste stream, alleviating the tenants of their reliance on public utilities and the burden of fossil fuel dependency.

The site includes access to footpaths, a rich bio-diverse landscape, food production areas, (allotments), and additional alternative renewable energy generated on site by a vertical axis wind turbine (VAWT).

2007 – Present Day ***Greening-The-Box,***
25 Main Road, Long Sutton, Spalding, Lincs PE12 0AA

In partnership with SEArch, South Holland District Council are endeavouring to undertake the refurbishment of a three bed-roomed semi-detached council house to a near autonomous state for its tenants. Some of the techniques to be implemented are to be tried and tested, while others are unique to SEArch's building design ethos, evolved through Dr Jeremy Harrall's doctoral research through his Practices building portfolio.

From the data derived from the building in occupation, eg. Life Cycle Energy Analysis and Life Cycle Costing Analysis, the partnership will be able to advise developers and other Local Authorities of the most cost effective solutions for the 'greening' of other existing buildings

Drawing on experience gained from these projects, amendments have been made to their design and specification that have been applied at the LS SSE. Those amendments include:-

- a substantial increase in the levels of insulation
- the integration of renewable energy applications in each building
- larger rainwater harvesting vessels
- supplementary heating from wood burners, both to compliment the back-up underfloor space heating and to provide a virtual hearth for home comfort
- more on-site communal renewable electricity generated by a series of six 6Kw vertical axis wind turbines[15]
- greater levels of passive cross and stack ventilation

Probably unique to the Long Sutton SSE are the combination of other ecological benefits and life-style enhancements such as:-

- allotment allocations on site
- increased biodiversity with hedgerows, trees, and wetland area
- a large scale 'living street' in which traffic is effectively calmed and there will be no on-street parking.

[15] www.limgear.com

- enhanced living environments with natural ventilation, elevated internal daylight levels and maximum sunlight.
- proximity to a well-served bus route and footpath giving easy access to the Town and local services
- a network of footpaths within the site.

Design Techniques:-

The architectural design solution for all the buildings on the LS SSE has been achieved by adopting the principles of passive solar design.

- ***orientation*** - *Each building is orientated south to maximise receipts of solar gains[16] so as to achieve optimum benefits in terms of space heating, ventilation, solar electricity, solar water heating, and high levels of daylight.*

- ***fenestration*** - *By maximising the areas of glazing on the south elevation of each building, the opportunity for solar gains into the home[17] are optimised.*

  By reducing the glazing areas on the north, east and west elevations, the rate of heat loss from those sides of the buildings most prone to higher rates of heat loss is minimised.

- ***high thermal mass*** – *The internally exposed high-mass structural elements of the LS SSE buildings work to stabilise the internal ambient air temperature by acting as heat-sinks[18]. For instance, the tiled but uncarpeted areas of the floor will, like large storage radiators, re-emit stored heat at times at times when the external air temperature is lower than that inside the building.*

- ***super-insulation*** - *Designing out conventional external cavity walls makes it possible to increase the thickness of insulation to the walls, which reduces the rate of heat loss from the buildings while increasing their capacity for retaining stored heat[19].*

  A continuous envelope of 300mm thick extruded polystyrene creates elemental u-values significantly better than the minimum Building Regulation requirements[20].

- ***passive ventilation*** - *Designing out the requirement for mechanical air extraction reduces the energy demands of the buildings. Instead, passive stack vents are installed in the kitchens, toilets, and bathrooms.*

  The layout of these buildings is designed to enable occupants to encourage passive cross-ventilation by inducing the movement of air through the building from the south side to the north side.

- ***passive heating*** - *A combination of passive solar heat gains[21], human occupation, and secondary heat from household appliances can provide most, if not all, of the heat that these bungalows will require. Heat stored in the super-insulated fabric (floors and walls) of the buildings is evenly re-emitted into the rooms ensuring the maintenance of stable internal ambient air temperatures.*

- ***back-up heating*** – *A thermostatically controlled low-grade electric underfloor heating system is embedded in the concrete floor slab. Neither pipe-work, radiators, switch-gear, boilers, flues, fuel tanks nor the associated fossil fuel emissions are required in these houses[22].*

- ***solar water heating*** - *A flat-plate solar water heating collector (approx 5m^2) is built into each south-facing roof. These will reduce domestic hot water heating costs and the demand for electricity from the grid[23]*

- ***rainwater harvesting*** - *Rainwater collected from the bungalow roofs will be stored in a proprietary water tank and pumped into each home at a suitable pressure. After proprietary filtering the tenants will be able to use the purified rainwater, thus reducing metered consumption.*

---

[16] Sterling, R. 1982. *Earth Sheltered Residential Design,* University of Minnesota. pp153 - 154

[17] Sterling, R. 1982. *Earth Sheltered Residential Design,* Underground Space Centre. pp*75 - 80*

[18] Weber, M.J. Boyer, L.L. Grondzik, W.T. 1980. *Implications for Habitability Design and Energy Savings.* Oklahoma State University. VI p 24

[19] Wendt, R.L. 1982. *An Evaluation of Energy Conservation Potential.* p6.

[20] Building Regulations. Part L. *Conservation of Fuel and Power in New Dwellings.* 2006

[21] Labs, K. 1981. *Earth-Shelter Performance and Evaluation.* 2nd National Technical Conference. P43

[22] Harrall, J. 2007. *Demonstrating the Viability and Growing Acceptability of Earth-Sheltered Buildings in the UK.* P140, para 3.12

[23] Harrall, J. 2007. *Demonstrating the Viability and Growing Acceptability of Earth-Sheltered Buildings in the UK.* P133, para 3.02.2

Site Layout

- ***orientation***- *Collectively this collection of commercial units and homes are laid out to face south so as to maximise solar receipts*[24].

- ***site Layout*** - the *houses are laid out in strict alignment with the stereographic graph, ensuring each property receives the maximum exposure to the path of the sun. Appropriately the three lanes take their names from the winter and summer solstice and the equinox. Each lane will be identifiable by its radii, length, and associations with their diurnal references.*

- ***microclimate***[25] - *The siting of the building collection forms an enclave around the southerly gardens providing shelter from the northerly winds. Strategic positioning of landscaping, fencing, and garages assist with the provision of shelter necessary for the establishment of effective microclimates at the rear building elevations, helping reduce rates of heat loss from each building*[26]

- ***'living-street'***[27] – *'Living-streets' accommodate both pedestrians and vehicles with compatibility. Two hundred percent off-street parking ensures minimum visitor parking spaces are necessary on the shared drive, freeing it up for recreational and pedestrian use.*

- ***pinch-points'***, *surface treatment changes, and the absence of dedicated footpaths, encourages drivers to travel across the road surface with care.*

Energy conservation and CO_2 mitigation are two of the benefits in the implementation of passive solar design techniques.

Using the Energy Saving Trusts 2006 energy consumption data of the existing UK housing stock, we have made comparisons in performance of the LS SSE proposed houses. At the time of writing this Planning Statement, no data from the EST on commercial properties was available.

In the absence of any fossil fuel fired space heating for the LS SSE homes, all the energy consumed on the site will be derived from renewable energy sources either on site or off. Taking into account only that CO_2 displaced from the houses as a benefit of passive solar design techniques (not that derived from renewable energy) the estimated ***Carbon Dioxide mitigated is 144, 256Kg CO_2/yr (144 tonnes CO_2/yr equivalent to 76 hot air balloons).***

Materials specification

Concrete

Similar low-inevasive construction techniques to those developed at the LSWLP and evolved at CaNeBuZo and LESH will be used for the LS SSE buildings. To reduce up to a third of the carbon dioxide emissions in the building construction, all unnecessary subterranean construction will be avoided. Instead a floating concrete slab, built-up on hardcore will replace the requirement for foundations.

An environmentally responsible concrete developed by SEArch in collaboration with Lafarge for the CaNeBuZo development, now being used at LESH is to be exclusively used throughout the LS SSE. Both embodied energy and CO_2 emissions are significantly reduced in this product, which comprises 90% Ordinary Portland Cement (OPC) replacement with a waste slag; 50% aggregate replacement using crushed recycled concrete and 10% replacement sand using ground recycled glass.

There is ongoing research between SEArch and Lafarge to develop a 100% OPC replacement concrete that might be available for this development.

Lafarge Aggregates
Granite House
Granite Way
Syston
Leics LE7 1PL

[24] Sterling, R. 1982. *Earth Sheltered Residential Design*, University of Minnesota. pp153 - 154

[25] Mulligan, H., Baker, H. 1989. *Landscape Modification and Energy Use*. The Martin Centre. July. pp9 - 10

[26] Mulligan, H., Baker, H. 1989. *Landscape Modification and Energy Use*. The Martin Centre. July. pp9 - 10

[27] Poundbury. 2002. The Duchy of Cornwall.

Contact: Peter Keal. External Account Representative - South Lincs Sector
Tel. 0780 395 3904
peter.keal@lafarge.com

Blocks

Reducing the volume of land extracted aggregates used within the construction industry and its products has a concomitant benefit in the reduction of carbon emissions associated with the extraction and subsequent processing.
Next to ready mixed concrete, one of the most used materials in the construction industry is concrete blocks. The LS SSE will use 100% aggregate replacement blocks using recycled aggregates as the major constituent as it has at CaNeBuZo and LESH.
Masterblock and Fyfestone blocks

Aggregate Industries Limited
Marions Way
Coventry Road
Croft
Leicestershire LE9 3GP

Contact: Stuart Jupp
Tel: 01455 285670 or 07771 835984
stuart.jupp@aggregate.com

Insulation

All the LS SSE buildings are to be super insulated (300 mm thick) with DOW Building solutions Styrofoam LS-An extruded polystyrene rigid insulation board. This material uses CO_2 extracted from the air as its blowing-agent instead of the 'green-house' gases that are the norm in this process.

Dow Chemical Company Limited
Diamond House
Lotus Park
Kingsbury Crescent
Staines
Middlesex TW18 3AG

Contact: Jayne Law, Sales Manager - UK and Ireland, Dow Building Solutions
Tel. 0203 139 4124
jaynelaw@dow.com

Carbon Dioxide Mitigation

Any mention of the "greenhouse effect" tends to ignite controversy, while rising atmospheric concentrations of greenhouse gases, especially carbon dioxide are broadly accepted as one of the most pressing of issues today. The LS SSE was conceived directly in response to these issues and offers viable and replicable solutions to mitigate atmospheric pollution associated with new development both through their construction and in occupation.

It is widely accepted that buildings are responsible for over a third of global energy-related carbon dioxide (CO_2) emissions. In the UK this proportion is higher, with a significant share of these emissions being avoidable through cost effective solutions. Improved energy efficiency in our existing buildings and better design for new buildings would reduce significantly greenhouse gas emissions.

How large is this emission reduction potential at the LS SSE and how much will it cost to unlock it?
The LS SSE provides answers to these questions, providing low tech, low cost solutions that eleviate the threat of fuel poverty, reduce reliance on fossil fuels at no extra cost compared to conventional development.. This project also demonstrates that it is possible to cut running costs effectively with concomitant reductions of approximately 54% of building-related CO_2 emissions, far in excess of those reductions achieved through contemporary development. Initial estimates indicate that LS SSE will reduce carbon emissions by ***34tonnesCO_2/yr*** compared to those emissions of the average UK housing stock[28].

[28] Energy Saving Trust. 2006. *Whole Energy Consumption – Summary.xls* (source Guidelines for Company (sic) Reporting on Greenhouse Gas Emissions, Defra)

If this carbon reduction potential is realised, LS SSE would serve as a national exemplar development in which the mitigation of building-related CO_2 emissions could be delivered affordably.

Standard Assessment Procedure (SAP

Under a long standing partnering arrangement between SEArch and South Holland District Council progressive development of environmentally sound design has been verified using the Standard Assessment Procedure. The emerging portfolio of projects that are the LS SSE's design precedent, are in the words of the South Holland District Council's Building Control Department, 'exemplary'.[29] [APPENDIX ITEM 1]

> ***An Overview***
> *The SAP[30] is a compulsory assessment that must be carried out on all new building, to show compliance with Part L of the Building Regulations.*
>
> *SAP is used to give a building a rating from 0 to 120 based on the annual energy costs of the building. It also gives a 'Carbon Index', a measure from 0 – 100 (National Energy Rating) for which a certificate can be issued, an indication of the energy needed for space heating and hot water.*
>
> *It is widely accepted that the existing UK housing stock would produce an average SAP rating of between 40 – 50.*
>
> *A prerequisite to achieving the 'zero carbon' house as defined by the Code for Sustainable Homes (CfSH) is a minimum SAP rating of 100.*

Using this now generic specification of SEArch's current portfolio of buildings, the same standard to be used at LS SSE, South Holland District Council undertook a preview SAP on Plot 5 (3bedrooms) Winter Solstice.[APPENDIX ITEM 2] It achieved a SAP Rating of 107A with an estimated energy cost of £43, with a negative value for its emissions of -1.58 tonnes/year.

South Holland District Council Building Control have confirmed this is by far the highest rating SAP they have come across. All the LS SSE properties are designed using the same specification.

Building Regulation Compliance Page 1 of 3

Users Ref: b11 plot 5 winter solisice **Issued on:** 4.December.2008
Prop Type Ref: Winter solistice east

Property: Plot 5, Bridge Road, Long Sutton, Spalding, Lincolnshire TER: 22.25
DER: -17.07

SAP Rating:	**107 A**	**SAP Energy Cost:** £43	**CO2 Emissions:**	-1.58 t/year	
EI Rating:	**116 A**	**Energy used:** -18 kWh/m2/year	**Enel:** 0	**ZC:**	0.00

Surveyor: 1086-0016, Michael Charlton, Tel: 01775 764616, Fax: 01775 762937
Address: Priory Road, Spalding, Lincolnshire, PE11 2XE
Client: 3, Sutainabl Ecological Architecture, 89 Gedney Road, Long Sutton, Spalding, Lincolnshire, PE12 9JU
Software Version: EES SAP 2005.0.15,build.0019, April 2008 (Design System), BRE SAP Worksheet 9.81
Regs Type: SAP 2005, Regs Region: England and Wales (Part L1A 2006), Construction Type: New Build

Extract from SAP preview for Plot 5, Winter Solstice, LS

Code for Sustainable Homes Assessment (CfSH)

While there is some controversy over elements of the CfSH assessment criteria, SEArch is demonstrating through its portfolio of projects that the perquisites stipulated in the Code can be achieved through the CfSH procedure in combination with parallel appraisals. This has in some instances led to ratings that exceed the Government's targets for reducing carbon emissions.

[29] Adams, P. 2008. *South Holland District Council's Chief Building Control Officer.*
[30] Building Regulations. Part L. *Conservation of Fuel and Power in New Dwellings.* 2006

CARBON DIOXIDE MITIGATION DUE TO PASSIVE SOLAR DESIGN APPLICATIONS AT LS SSE										
			Space and Water Heating		Lights and Appliances		Cooking		CO_2	
Property Type	Bedrooms	No. of units	kWh/yr	$KgCO_2/yr$	kWh/yr	$KgCO_2/yr$	kWh/yr	$KgCO_2/yr$	Total annual CO_2 displaced/house	Total annual CO_2 displaced/house type
Mid Terrace house	2		11,693	2,222	2,109	907	1,008	192		
(Proposed LS SSE)	**2**	**2**	**3,400**	**1,462**	**1,500**	**645**	**1,008**	**192**	**1,025**	**2,050**
End Terrace house	2		15,138	2,876	2,117	910	1,008	192		
(Proposed LS SSE)	**2**	**13**	**3,600**	**1,548**	**1,500**	**645**	**1,008**	**192**	**1,593**	**20,709**
Semi detached house	**3**		**21,236**	**4,035**	**2,992**	**1,287**	**1,314**	**250**		
(Proposed LS SSE)	**3**	**14**	**4,000**	**1,720**	**2,100**	**903**	**1,314**	**250**	**2,699**	**37,786**
Detached House	3		28,209	5,360	3,572	1,536	1,386	263		
(Proposed LS SSE)	**3**	**11**	**4,000**	**1,720**	**3,000**	**1,290**	**1,386**	**263**	**3,880**	**42,680**
Detached House	4		32,549	6,184	4,121	1,772	1,599	304		
(Proposed LS SSE)	**4**	**9**	**4,400**	**1,892**	**3,500**	**1,505**	**1,599**	**304**	**4,559**	**41,031**
							TOTAL Kg OF CO_2 DISPLACED BY HOUSES/yr =			144,256

Existing *UK average housing stock energy consumption* figures taken from Energy Savings Trusts (EST) 2006 data

Contact: Dr Jeremy Harrall
SEArch
89 Gedney Road, Long Sutton, SPALDING, Lincs PE12 9JU
Tel. 01406 364646 molearch@searcharchitects.co.uk

POLICY SG9: *Development and Flood Risk*

A Flood Risk Assessment has been undertaken by Geoff Beel (Chartered Water and Environmental Manager[SEE APPENDIX ITEM 3] to satisfy the Local Authority Planning Departments requirements and those of Planning Policy Statement 25 (PPS25) – Development & Flood Risk and for approval by the Environment Agency. In undertaking the assessment the following facts where established. the site is;

1. located within Flood Zone 3, of the Environment Agency's Flood Zone Maps.
2. located in the South Holland IDB district.
3. in Fluvial Flood Zone 1 of the Council's Strategic Flood Risk Assessment Map as defended by the Internal Drainage Board system.
4. within a defended floodplain, as defined in Appendix 1 of the Environment Agency's 'Policy for the Protection of Floodplains'

A material consideration in the appraisal of this Planning Application is that a previous Flood Risk Assessment was prepared in April 2008 for an adjoining development (LESH) under planning application ref. No. H11/0585/08 which received approval from the Environment Agency on 13th May 2008 under file ref. No AN/2008/105092.

Flood Risk Assessment Conclusions and Recommendations

As a result of the assessment, the following conclusions have been reached:-

- the proposed development is not in a Functional Floodplain as defined by PPS25. It is located in the Passive Floodplain protected by defences to a 1 in 100 year return period, (1.0%).
- although the site is in Flood Zone 3, the actual risk of site flooding from any Environment Agency river system is very low (less than 0.5%). The site has been identified in fluvial Flood Zone 1 of the South Holland District Council's Strategic Flood Risk Assessment Maps.
- although the site is located within an Internal Drainage District with a minimum standard of drainage of 1 in 50 years, this accords with Defra guidelines for rural development. Freeboard to design water levels of 900 mm to lowest land level is available for events greater than 1 in 50 years providing further storage within the drainage channels.
- on site rainwater from the development with be discharged via a comprehensive sustainable surface water drainage system to attenuate run-off to meet the requirements of the IDB.
- Land Drainage Byelaw Consent will be required from the South Holland Internal Drainage Board for the proposed site entrance drain culverts and also the 6 metre easement to the drains on the development site western boundary.

POLICY SG11: *Sustainable Urban Drainage Systems (SUDS)*

The Long Sutton Sustainable Settlement Extension attenuates surface water run-off to the extent that no precipitation falling on the development site will be directly discharged into neither the IDB Drains nor the Public Stormwater Drains.

Rainfall Run-Off Discharge

All precipitation falling onto the building roofs will be directed to Rainwater Harvesting Tanks. From those tanks, the overflows will feed a Wetland Basin (0.14 ha [0.34 acres]) to the north of the site. In each house the harvested water will feed each properties utility wc's, sinks and washing machines while also providing water for car washing and garden irrigation, reducing their reliance on the mains supply.

Reducing the proportion of impermeable areas onsite is another way in which the LS SSE intends to attenuate the adverse affects of surface water runoff, while mitigating the risk of flooding from the development. Currently the existing 10acre development site has 9,450m^2 of impermeable surface area which represents a quarter of the existing site area.. None of the surface water run-off is discharged to the public storm sewer. At present the existing overflow drains from the glasshouse (2000m^2) and service yards (3,200m^2) discharge directly into the eastern perimeter dyke which in turn discharges into the IDB Hundred Drain north of the site. All other impermeable area run-off discharges into soakaways and cisterns.

There will be no rainfall run-off into the IDB's Drains as a result of the SSE development. Instead, the total proposed impermeable surface area of the SSE will reduce by 75% to 3,746m^2.

As a result of the SSE, rainwater discharge into the IDB will cease, impermeable areas will reduce by three quarters, while all other precipitation run-off will be collected and managed onsite.

1:100yearRainfall Intensity Event

At the LS SSE exceptional provision has been made to attenuate the adverse effects of a 1:100yr Rainfall Intensity Event. Using the Environment Agencies range of rainfall intensity rates over varying timescales there is to be provision at LS SSE of up to a twentyfold catchment capacity.

It is generally accepted that the 60 minute storm intensity rates (38.41mm/hr) are taken as the normal benchmark for calculation purposes. Therefore, assuming the rainwater harvesting vessels are full, all the rainfall run-off from the SSE roofs in a 1:100 yr event would discharge directly to the proposed catchment basin in the form of the Wetland Area. The catchment capacity from the roofs discharge would be 134 m^3 (3.746 m^2 x 0.0384 mm/hr). Below the invert level of the rainwater harvesting outfall (+2.24 m ODN) at the Wetland is a catchment capacity of 262 m^3 twice that calculated as being needed for a 1:100 yr Rainfall Intensity Event.

The provision of an additional catchment area has been designed into the scheme with a capacity of 2,597 m^3 providing a total catchment area (including the Wetland Area) of 2,859 m^3, a twenty fold capacity.

POLICY SG14: *Design and Layout of New Development*

For the purposes of assessing the design and layout of the proposed Long Sutton Sustainable Settlement Extension, the following areas are to be considered:-

1) ***Local Distinctiveness***

Unlike other parts of Lincolnshire (e.g., Stamford, the Wolds, Lincoln City itself) the south Lincolnshire fens lack an easily identifiable local vernacular architecture. In Long Sutton, as in many of the other towns in the area, a large proportion of the built-up areas are dominated by the high-volume house builders' brick boxes of a bland aesthetic.

The LS SSE offers a new aesthetic evolving from SEArch's portfolio of environmentally responsible architecture, eg, LSWLP, CaNeBuZo, GTB and LESH all built or under construction along the B1539; the former trunk road. When completed, the town's collection of eclectic buildings will represent the largest aggregation of buildings of this type in the UK. Collectively these buildings mitigate 141,841Kg CO_2 each year (141 tonnes/yr) the equivalent of 76 hot air balloons.

2) ***The Choice of Materials***

Walls - Some of the perimeter walls of the buildings are to be rendered with lime and painted (colour to be agreed), other walls are to be timber clad, while the remaining are to be a mixture of both.

Fenestration - By maximising the areas of glazing on the south elevation of each building, the opportunity for solar gains into the home[31] are optimised.

By reducing the glazing areas on the north, east and west elevations, the rate of heat loss from those sides of the buildings most prone to higher rates of heat loss is minimised.

Roof - on the south elevations only amorphous silicone and monocrystalline photovoltaic's are to form the roof covering and will provide a significant proportion of the resident's electricity. To the north elevations interlocking tiles (materials to be specified) are to be used.

3) ***The Historic Pattern of Development along Bridge Road***

Existing

Long Sutton's settlement pattern is typical of Fenland market towns. It still retains its historically linear infrastructure layout. Spreading out from the Market Place along the former A17 trunk road in an east-west direction, the pattern of the settlement is one of ribbon development. Bridge Road travels east through the settlement in a straight line through the hamlet of Little Sutton and onwards to Sutton Bridge.

A continuous line of residential development marks the beginning of this road, changing in its make-up heading east with a sporadic mix of residential, commercial and horticultural buildings.

As befits a rural settlement, both north and south frontages of Bridge Road are lined with mature hedgerow and trees (more marked on the north side) with the buildings in some cases set back from the highway by as much as ten meters, particularly on the north side.

Residential curtilages along Bridge Road are substantial in area, typical of rural fenland dwellings

[31] Sterling, R. 1982. *Earth Sheltered Residential Design*, Underground Space Center. pp75 - 80.

where, historically, food production and the rearing of livestock at home was commonplace as a way of supplementing the residents' diet and livelihood. Typical gardens would have included vegetable garden areas, outbuildings, fruit trees, water cisterns, and cesspools. The drive for self-sufficiency was always an imperative.

LS SSE continues the chronological development of architectural styles within the settlement of Long Sutton and adds to the pattern of historical residential development along the northern edge of Bridge Road. The project occupies a previously developed site in the continuous line of ribbon development along the line of what is effectively the settlement of Long Sutton.

LS SSE achieves this accord by:-

a) ***Hedgerow*** – planting a native hedge to the site perimeter with a selection of fruit-bearing trees and hedges.

b) ***Linear frontage*** – the front two LS SSE homes (The Gateway) line up with the pattern of buildings on either side of the site.

c) ***Self-sufficiency*** – the proposed development at LS SSE will give its residents and users the opportunity to achieve a greater degree of independence and self reliance from public services and commercial food suppliers than has hitherto been achieved at this scale in the UK.

LS SSE represents a design solution which gives its residents and uses the opportunity to achieve a more autonomous existence in terms of energy supply, drinking water, waste disposal and processing, and food production. This is in line with the historical pattern of development, albeit in the context of mixed uses.

The LS SSE recognises that households and businesses can also have a need to take control of their consumption, especially of their fossil-fuel energy consumption, at a time when food prices are rising and fossil-fuel energy is becoming prohibitively expensive. Building on the historical precedents, LS SSE applies advanced building design solutions in terms of layout, orientation, and technology to achieve the requirement for self-sufficiency in a contemporary socio-economic context.

The Relationship of the Development to the Character, Form, and Scale of Existing Buildings along Bridge Road

Existing

Existing buildings on Bridge Road vary significantly in their architectural character, form and scale. Of these buildings, the residential dwellings are diverse, ranging from detached, semi-detached, and terraced to bungalows, houses and dormer houses.

Diverse stylistic elements include an array of wall treatments such as painted and natural pebble-dash, painted and natural rough-cast, painted render, full brick elevations, and half brick elevations. Roof finish varieties are equally diverse ranging from slate, clay pantiles, concrete interlocking tiles and plain tiles. Fenestration along Bridge Road is eclectic, with a variety of window styles in wood and plastic. Vertical sliding sash windows in box form and modern spring balanced varieties exist. Casement windows vary from side hung to top hung with some combinations of both. All the windows vary in colour or finish.

Tenure along Bridge Road is mixed, and this contributes to its distinctive character. Council houses are now both rented and owned. Other properties are freehold, some owner occupied and some privately rented.

A considerable proportion of the buildings along the Bridge Road frontage on the north side are obscured from view from the road by the presence of the continuous line of mature hedgerow and trees.

The design solution proposed for LS SSE follows the historical pattern of building development frontage and perimeter along Bridge Road which has led to the current diversity of styles in the street scene. The development proposed at LS SSE continues the tradition of diversity by introducing a new aesthetic which has clearly been obtained historically.

The building type at LS SSE will introduce a new layer of diversity, and the layout of the development allows for the continuation of the line of roadside planting already established by providing:-

a) ***hedgerow***- a hedgerow of native species is to be planted to the development frontage with a selective variety of trees with relative low mature canopy heights so as not to obscure the penetration of sunlight into the buildings at LS SSE.

b) the treatment of fenestration at LS SSE will contribute to the variety of styles along Bridge Road (not that they will be seen) with a variety of casement windows.

5. ***The Scale, Form, and Height of LS SSE***

Scale

Unlike high-volume, high-density conventional housing development, LS SSE seeks to achieve an acceptable level of density in which the agenda for autonomy can be delivered while optimising the use of land for the benefit of the residents and businesses. Rainwater-harvesting, renewable energy applications, a 'living-street' environment, and generous communal amenity areas are key parts in the exploration of the LS SSE concept.

Form

The historical pattern of development along Bridge Road is reflected at LS SSE, where the roadside frontage is to be planted with indigenous hedge and selected fructiferous tree species.

The building type proposed for LS SSE not without its architectural and planning precedents in Long Sutton, nor is it without precedent along the former A17. The Long Sutton Work-Life Project (the LSWLP - two buildings: office and house) and the Carbon Neutral Business Zone (CaNeBuZo) (seven commercial buildings and one dwelling) and the Long Sutton Earth-Sheltered Social Housing Scheme are developments along the former trunk road on the western perimeter of Long Sutton and were, because of the highly environmentally responsible type of development they represent, granted planning approval in the open countryside.

Height

The two storey buildings at LS SSE are not more than 6.6 metres in height and only this height at the ridge of the roofs. They are 4.5 metres at the eaves of the roofs, which is comparable to the height of the bungalows (6.6m) as approved and built adjacent to the LSWLP in January 2008.

The buildings of LS SSE will become an integral part of the surrounding landscape by virtue of their abundant planting scheme and generous allocation of ameniety area and allotments to the outer environs of the site.

6. ***Architectural Detailing***

The new emerging architectural aesthetic represented by LS SSE has emerged in response to the widely acknowledged imperatives dictated by climate change. The dictates of the low-carbon economy make it incumbent on designers and developers to deliver low-tech, low energy consumption, high energy conservation buildings. The architectural detailing for the LS SSE building arises directly from these considerations.

The diverse collection of buildings on Bridge Road presents an equally diverse range of architectural detailing which has emerged as each new building has been built. The architectural detail for LS SSE, albeit perhaps more purposeful, follows the historical pattern of development.

7. ***Effect of LS SSE on the Amenity of Neighbouring Residents*** *(in terms of noise, smell, general disturbance, overlooking, and loss of light.)*

Noise and General Disturbance

Historically, development on the northern side of Bridge Road has been predominantly for residential housing interspersed with small and large business operations, which is commensurate with the use intended for LS SSE. Planting is a widely accepted medium for some attenuation of noise and this will afford residents of the houses at LS SSE with a greater than usual level of peace and tranquillity. Endogenous noise will also be attenuated for neighbours by reason of extensive planting and wide perimeter gaps; and street-scene parking will attenuate exogenous noise from the development for both tenants and neighbours.

Overlooking and Loss of Light

Each of the buildings at LS SSE faces directly south towards Bridge Road. All principle rooms have their principle windows in the southerly elevation so as to maximise solar receipts. No windows exist to the west or east on these buildings restricting / eliminating the possibility for overlooking.

All the LS SSE buildings are less than the average height normally built for homes and will cause no loss of light to any neighbouring properties. The distance between each view of houses has been carefully prescribed, so as not to restrict solar gains to the houses behind.

8 ***The Layout of Vehicular Access*** *(parking, and manoeuvring facilities and the provision of facilities for cyclists and pedestrians)* [APPENDIX ITEM 4]

Contact: Dr Jeremy Harrall
SEArch
89 Gedney Road, Long Sutton, SPALDING, Lincs PE12 9JU
Tel. 01406 364646 molearch@searcharchitects.co.uk

Living-streets, answer the call in the Report of the County Surveyors' Society, *Travel is Good*, published in March 2008, which recommends '*...a revolution in road design and the widespread adoption of the concept of shared-space better known in Britain as naked-streets.*'

- The use of gradually diminishing roadway widths, which provide a subliminal message to drivers that their speed and their priority should be similarly reduced as they progress through the development.
- The use of the series of circular road forms that both resolved the various turning movements at junctions and cause gentle interruption to movement through the site and to the line of sight along the main spine road.
- The inclusion of a tear-like taper on the entry to the central islands of the circular junctions to both guide inbound vehicle movements around the islands and 'steer' outbound drivers towards the Bridge Road junction.
- The omission of footways (along the sides of the roadways) to promote the 'Living Street' ethos.
- The inclusion of linking footpaths/cycle paths throughout the residential areas and between the residential, employment and amenity/recreational areas to reduce the need for car travel. I recall you are also considering the possibility of providing sheltered and secured parking at each of the residential and the employment units, which would further reinforce the message of Sustainable Development.
- The use of porous surfacing to the roadways to minimise the discharge of surface water run-off into the local watercourses.

The drives at LS SSE exemplifies the concept of 'living-streets' (aka naked-streets), in which pedestrians and vehicles are accommodated compatibly. 200% off-street parking ensures that minimum visitor parking spaces are necessary on the drives, freeing it up for recreational and pedestrian use.

9. ***The Needs of Disabled Persons***

By their very nature, 'low-invasive' building types such as those proposed for LS SSE employ single-level internal and external floors at the same level throughout, making for exceptional ease of access and use for the disabled whether in wheelchairs or otherwise.

10. ***The use of Sustainable Materials and Methods of Construction***

The design solution for LS SSE adopts the same rationalised construction process exemplified and peer-reviewed at the Long Sutton Work-Life Project and now being implemented at the Gedney Road Carbon Neutral Business Zone and LESH (Long Sutton Social Housing Scheme), where both the specification itself and the construction processes are streamlined to reduce negative environmental impact in the following areas:-

a) subterranean works
b) material varieties
c) material quantities
d) individual trades
e) construction waste
f) carbon emissions from machinery

A comparative study undertaken by the designing architect to evaluate current traditional construction methodology and those methods employed at the LSWLP showed that the former to be both more expensive to implement and more detrimental to the environment.

11. ***Measures taken to reduce the Potential for Crime and Disorder***

LS SSE espouses the principles of 'Security by Design' to ensure the creation of a safe living environment. These are:-

a) Surveillance – each of the homes at the proposed development at LS SSE is orientated and located to enable its residents to view the communal spaces. Encouraging the use of the communal drive as an amenity space encourages self-policing within the development.

b) Image – the high quality contemporary design proposed will help mitigate the stigma sometimes associated with social housing, particularly in a random layout of mixed tenure.

c) Territoriality – 'Living-Streets' design promotes a feeling of neighbourhood and encourages residents to exercise surveillance over the area of defensible space.

d) Environment – Hedgerow and selective tree species promise to elevate the perception of the immediate environment at LS SSE as a safe place to live. A pinch-point created by the Living Street along the Avenue of the development creates a defined site entrance and sign posting.

12. ***Cycles***

A network of footpaths and cycle ways weaving in and around the settlement extension cover a distance of 1543.361 metres (1.533km, 0.919 miles). To encourage and support this network a bicycle rack accommodating up to six bikes is to be provided to each home and more to the business units. A total of 360 cycle parking spaces are to be provided at the LS SSE.

The Gateway [32] - *An exemplar showcase of alternative construction techniques using traditional materials.*
Plots 1, 2, 3, 49 & 50

The LS SSE residential entrance will provide four distinctive dwellings and an iconic office (Hodnydod) using three traditional (so-called alternative) low-energy construction techniques, providing four distinct building solutions - all of them, by comparison to conventional construction model , achieving a greater level of self-reliance in terms of the resources required for day-to-day living, but without loss of comfort.

These five buildings will set the scene for a new aesthetic, promoting a local identity with a reinterpretation of local vernacular styles and details using local materials, a large proportion of which will be derived from the site.

Five units:-

Plot 1	***Rammed Earth*** - 1 x 4-bed house (four person) 71m^2
Plots 2, 3	***Strawbale*** - 2 x 2-bed semi-detached (four person) 71m^2
Plot 49	***Cob Block*** - 1 x 3-bed house (five persons) 78m^2
Plot 50	***Mixed Medium*** - 1x office (Hodneydodd)

The LS SSE Gateway buildings will present the opportunity to explore and develop the concept of the low energy consumption buildings, built using traditional materials and construction techniques by deploying the traditional construction techniques of cob, rammed earth, and straw-bale. These buildings will broker financially viable housing solutions by virtue of pragmatic but robust specification. They will provide further insights into the properties and attributes of non-standard but tried and tested materials, thus establishing them in the mainstream of the social housing and open market housing context and promoting them as greener and healthier (more sustainable) alternatives to conventionally used materials.

With appropriate monitoring and record keeping, this collection of homes, which will be unique and could provide datasets for comparative studies in terms of the design, construction, and costing processes, not to mention invaluable occupant feedback.

The Gateway development will express, explore, and evaluate leading-edge thinking in sustainable construction using traditional building techniques. It will play a part in re-introducing the use of traditional sustainable materials to mainstream construction and development and will push the agenda for autonomous social housing.

At LS SSE, the deployment of traditional building techniques using materials derived from the site (subsoil) offers another opportunity to challenge and inform the prevailing wisdom underlying the current design assessment tools used to promote more environmentally responsible construction techniques.

[32] *hamel* - a small knot of houses outside the main concentration of a settlement

POLICY SG17: *Protection of Residential Amenity*

Effect of LS SSE on the Amenity of Neighbouring Residents *(in terms of noise, smell, general disturbance, overlooking, and loss of light.)*

Overlooking and Loss of Light

Each of the buildings at LS SSE faces directly south towards Bridge Road. All principle rooms have their windows in the southerly elevation so as to maximise solar receipts. No windows exist to the west or east on these buildings eliminating the possibility for overlooking.

All the LS SSE buildings are less than the average height normally built for houses and will cause no loss of light to any neighbouring properties. The distance between each of the houses has been carefully prescribed, so as not to restrict solar gains to adjacent houses.

Noise and General Disturbance

Historically, development on the northern side of Bridge Road has been predominantly for residential housing interspersed with small and large business operations, which is commensurate with the use, intended for LS SSE. Planting is a widely accepted medium for some attenuation of noise and this will afford residents of the houses at LS SSE with a greater than usual level of peace and tranquillity. Endogenous noise will also be attenuated for neighbours by reason of extensive planting and wide perimeter gaps; and street-scene parking will attenuate exogenous noise from the development for both tenants and neighbours.

The Layout of Vehicular Access *(parking, and manoeuvring facilities and the provision of facilities for cyclists and pedestrians)*

The drives at LS SSE exemplifies the concept of 'living-streets' (aka naked-streets), in which pedestrians and vehicles are accommodated compatibly. 200% off-street parking ensures that minimum visitor parking spaces are necessary on the drives, freeing it up for recreational and pedestrian use.

Living-streets design answers the call in the Report of the County Surveyors' Society, *Travel is Good*, published in March 2008, which recommends '*...a revolution in road design and the widespread adoption of the concept of shared-space better known in Britain as naked-streets.*'

POLICY SG18: *Landscaping of New Development*

The LS SSE is as much an architectural and socially derived scheme as it is a landscaping scheme.

Where possible, selected hedgerow and trees [APPENDIX ITEM 5] have been used to define lanes and footpaths of the development. Copse and holts to the northern site boundaries have been included to provide shelter from the severe northerly winds and to screen the development from the open countryside.

Contact: Dr Jeremy Harrall
SEArch
89 Gedney Road, Long Sutton, SPALDING, Lincs PE12 9JU
Tel. 01406 364646 molearch@searcharchitects.co.uk

Chapter 4 - HOUSING

POLICY HS9: *Rural Exceptions (including HS1, HS4 and HS8)*

SEArch's proposal for the Long Sutton Sustainable Settlement Extension (LS SSE) is designed to be built on land which it is hoped will be deemed and exception. The site on Bridge Road, Long Sutton, is outside the *identified Development Area Boundary* but effectively forms part of the settlement and could reasonably be described as part of an established ribbon development.

In compliance with the four conditions set out in SHDC's Local Plan in respect of exceptions sites, the following factors have been considered:-

1) ***Local Need*** – SHDC's Affordable Housing Delivery Plan February 2007 places a strong emphasis on increasing the provision of affordable housing in line with the Council's Local Plan, Community Plan, and Corporate Plan. The Council's Housing Needs Survey Update 2004 identifies an affordable housing shortfall in Long Sutton during 2004 – 2009 of in the region of 300 homes.

2) ***Size*** – LS SSE proposes a contribution of 25 exemplar low-energy homes to this identified need.

3) ***Tenancy*** – A Registered Social Landlord (RSL) would select tenants for LS SSE from SHDC's housing register.

4) ***Social Housing in Perpetuity*** – A RSL is by definition a non-profit making charitable association registered with the Charities Commission and governed by the Housing Corporations strict codes of conduct.

5) ***Development Scale and Character:-***

Precedents – LS SSE is not without its architectural precedents in Long Sutton: the Long Sutton Work-Life Project (LSWLP) (planning Ref. H06/0961/98 and H06/0018/01), the Carbon-Neutral Business Zone (CaNeBuZo (H06/1163/04 and H06/0866/06) and the Long Sutton Earth-Sheltered Social Housing Scheme (LESH) (H11/0585/08). There are sixteen low energy buildings either side of the former A17 trunk road and on the perimeter of the town. Each of those developments achieves exceptional environmental standards by virtue of inherent design characteristics which have created a form of development the scale and character of which are unique.

Scale – LS SSE comprises 49 two storey houses and 9 single storey commercial units and an office in a relatively compact site layout which includes a 'living-street', a Wetland Area, renewable energy appliances, amenity areas, footpaths and allotments. Orientation, shelter-belts, microclimate gardens and building forms are an integral part of a design solution that seeks to provide its residents with the opportunity to reduce their dependency on fossil-fuels, whilst relieving them of the threat of fuel poverty.

Character – for the first time in the history of speculative high volume house building in the UK, the proposal for the LS SSE will deliver on the agenda for autonomy, a defining characteristic of this proposal. In order to achieve these aspirations, the building types require a southerly aspect and benefit from being single-room deep. To accommodate LS SSE the site must therefore have specific characteristics. Ideally it should be a wide site facing south with an element of protection from the prevailing south-westerly winds. LS SSE is built on previously developed land which is part of a continuous line of ribbon development on the north side of Bridge Road.

6) ***Sustainability*** *(local services and facilities)*

The LS SSE site is located on the eastern entrance of the settlement of Long Sutton along the former A17 Trunk Road which is now circumnavigated by a bypass. Adjacent to and opposite to LS SSE are two bus stops with regular scheduled services between Kings Lynn, Wisbech and Spalding. Other local services and facilities available to the LS SSE are:-

- Public footpaths on both sides of Bridge Road lead east (for 4 miles) uninterrupted (unusual in the Fen) to Cross Keys Bridge at Sutton Bridge and west (3 miles) through the town to Gedney.
- Long Sutton Market Place is half a mile away and contains all the essential local services expected of a rural settlement with the exception of an independent butcher although the Co-op do supply an adequate selection of meat.
- Ninety metres west is The Ship Public House, one of six licensed premises in the town, none of them more than one mile from this site.

- Employment in Long Sutton is predominantly in the food production sector or in businesses supporting it. Premier Foods' factory, the largest employer in the catchment area of the town, is located half a mile east on the same former trunk road.
- Pre-school, primary and secondary schools are each within one mile of the LS SSE site.
- MacDonald's, Travel Lodge, and the 24-hour petrol station are 200 metres away.

LS SSE's location is securely established as sustainable in terms of local services and facilities, in line with the abiding principles of Sustainable Development.

POLICY HS11: *Open Space in New Residential Developments*

One and a half acres of Open Space provision are to be wrapped around and within LS SSE, representing 21% of the gross site area significantly more than the minimum requirements of 14% cited in the Local Plan. Included in the 'open-space' are a range of provisions;

- network of footpaths
- grassed play area

The LS SSE Management Company will ensure that long term future maintenance of the open spaces provided by the development are secured in perpetuity.

Contact: Dr Jeremy Harrall
SEArch
89 Gedney Road, Long Sutton, SPALDING, Lincs PE12 9JU
Tel. 01406 364646 molearch@searcharchitects.co.uk

Chapter 5 - ECONOMY

POLICY EC2: *New Employment Development In Built Up Areas But Outside the Major Employment Areas*

A demonstrable need for business units across South Holland has been identified in a needs analysis report commissioned through Focus Consultants in August 2007[APPENDIX ITEM 6] by South Holland District Council. A shortfall within South Holland's small towns of units less than 3,000 sq ft was one of the report's conclusions. In particular there was shown to be a need for starter units (600 to 1,000 sq ft). The LS SSE's Employment Zone provides 9 commercial units of which four provide 970 sq ft and five 1,660 sq ft gross floor areas.

South Holland's Economic Development Team are more specifically aware of demand for units in Long Sutton of a size between 1,000 and 2,500 sq ft which LS SSE's Employment Zone is designed to facilitate.

New Employment Development In Built Up Areas But Outside the Major Employment Areas

An 'Employment Zone' (Long Sutton's first) of a modest scale (1.732 acres, 0.701 ha) providing 7,009.15 sq m^2 of net usable floor area is proposed as an integral part of the LS SSE. Business (B1) uses including office and light industrial uses will be linked with the new residential area by a network of footpaths and screened from residents by strategically located native trees and hedgerow.

Existing footpaths on the Bridge Road will provide employment opportunities for local people that are accessible by foot or bicycle.

As a result, employment opportunities will be made available within walking distance of both the LS SSE residents and those of the existing town. A combination of reducing travel-to-work movements and integrating landscaping with the business environment it is intended to provide a more economically and socially balanced community.

A range of business types (within the B1 category) are anticipated to move to the 9 business units that make up this unique 'Employment Zone' Each building is designed to achieve:-

- a zero heating status
- generate no CO_2 emissions in occupation
- harvest their own rainwater
- passive ventilation

These building are an evolution of the building type under construction at Long Sutton's CaNeBuZo. At LS SSE a new aesthetic is explored, one more familiar to Business Parks. These buildings include:-

- integrated photovoltaic's to the roofs
- integrated solar water heating
- super-insulated fabric
- high thermal mass superstructure
- orientation about the sun
- south facing fenestration
- rendered and timber clad facades

Reinforcing the uniqueness of this 'Employment Zone', two Vertical Axis Wind Turbines (VAWT) are sited prominently along the Avenue, celebrating the sites use of renewable energy applications.

An increase in local bio-diversity is encouraged in the presence of extensive landscaping within and around the site and includes:-

- native and fruit bearing hedgerows to sites perimeter
- broad leaf specimen trees to the boundaries
- hedgerow and selected trees to the Avenue and plots
- wetland area with margin plants
- copse to the northern boundary providing a shelter belt

In occupation it is anticipated that businesses operating from these premises will produce no carbon emissions or close to nothing, dependant on their activity and use of resources.

One such business anticipating occupying the site that will achieve zero emissions is Advanced Green Fuels (AGF), the Long Sutton manufacturer of 100% bio-diesel. AGF is a business already located on the site and has been manufacturing there for 3 years. They operate off-the-grid, generating their own electricity from bio-diesel

powered generators and harvest their own water. AGF's product is manufactured from waste, producing no waste. This is a business that produces no carbon emissions through its manufacturing process.

Contact: Dr Jeremy Harrall
SEArch
89 Gedney Road, Long Sutton, SPALDING, Lincs PE12 9JU
Tel. 01406 364646 molearch@searcharchitects.co.uk

Chapter 6 – CONSERVATION AND ENHANCEMENT OF THE ENVIRONMENT

POLICY EN2: *Wildlife Corridors and Other Areas*

The Long Sutton SSE's landscaping scheme[APPENDIX ITEM 5] includes for the planting of *24,518 plants* of *22 species* over the 10acre site. A mixture of native and Mediterranean plants are selectively specified and strategically located for a desired effect and more specifically to encourage new populations of wildlife onto the site.

Specific habitat creation on the development site include;

Bats[APPENDIX ITEM 7]

With the assistance of the Lincolnshire Bat Group (LBG), bat habitats and feeding corridors have been designed into the LS SSE with the intention of encouraging bats into allocated areas of the scheme in a safe environment. It is considered by the LBG that the VAWT's along 'The Avenue' may possibly be of a threat (not proven) to bats if tree canopy heights immediately adjacent the turbines exceed 3m and are too numerous in number and of a native species.

Therefore, to mitigate the threat of the turbines in anticipation of encouraging a local bat population 'The Avenue' planting scheme has been designed as follows;

- non-native trees (Olive) planted along the Avenue.
- grafted heads onto a grafted root stock restricting its mature height to 3m.
- 8m centres between each of the trees

To encourage populations of bats on the LS SSE development, bat roosts (60mm long x 12mm wide) have designed into the perimeter houses on the west (plots 44,43,42,32,31,24,23) and to the east (plots 22,15,14,7,6). Summer and winter roosts are catered for with habitats built into the front, side and rear of each of the identified properties. Native tree species (hawthorne, blackthorn, hazel and cherry) are to be planted in a dense line running north to south adjacent the bat roosts. These lines of native trees are anticipated to become the feeding grounds for the new population of bats. (Pipistrelles).

Birds

Bird boxes of various forms are designed into the gable ends of all dwellings and business units.

?.5cm hole designed to attract: **Blue Tit, Coal Tit, Marsh Tit, Treecreeper, and very small birds.**

2.8cm hole designed to attract: **Tree Sparrows, Great Tits, and Crested Tit.**

3.2cm hole designed to attract: **Tree Sparrow, Great Tit, Crested Tit, Nuthatch, Pied Flycatcher, Redstarts.**

Open front designed to attract: **Wagtails, Robins, Flycatchers, and Blackbirds, etc.**

*Size:*29.5cm Height x 13cm Width x 13.5cm depth : Varying hole sizes

Specifications: Exterior quality resin bonded ply, corner drainage holes in floor, manufactured with surface sunk nails to resist rusting, coated with a non-toxic water repellant finish.

The box fully conforms with all RSPB specifications.

A Wetland Area (1,250 m^3) It is intended that the inclusion of a Wetland Area will expand the biodiversity on the site to include other more varied habitats for wildlife, including ducks, fish, frogs, newts. Keeping this area sufficiently supplied with water, besides precipitation will be the overflows from 49 rainwater harvesting vessels. Margin planting including maces, sedge and flag irises will add to the rick bio-diverse flora and fauna proposed.

POLICY EN3: *Renewable Energy*

These high energy conservation performing houses and business unites should reduce their annual energy demand by up to 80%. Therefore, the energy contribution made by the renewable energy appliances (PV's, solar water heating, VAWT) is a significant proportion of each buildings overall energy demand.

Photovoltaics

A range of different types of photovoltaic (PV's) applications using Thin Film (amorphous silicone) and Monocrystaline technologies are to be installed on the dwellings and business units, providing recoverable performance data for research purposes in terms of comparative outputs for the same location. It is believed that this large scale mixed application of PV's will be the largest development of its type in the country, potentially generating up to 116,263kW hrs (0.12MWhrs/yr) of electricity each year. The cash value of the displaced electricity from the Grid as at 2008 tariffs (12p per unit) is **£13,951.** each year.

CARBON DIOXIDE MITIGATED FROM PHOTOVOLTAICS IS 49,993kG CO_2 each year (50 Tonnes/yr)

Solar Water Heating

Flat plate solar water heating collectors (approximately 5 m^2) are to be installed to the south elevation of each house and business unit. These panels will reduce domestic hot water heating costs and a concomitant demand for electricity from the National Grid. It is estimated that the total displaced electricity from solar water heating at the LS SSE will be in the region of 141,600kWhrs each year (0.14 MWhrs/yr). The value of this electricity as at 2008 tarrifs (12p per unit) is **£16,992**. each year.

CARBON DIOXIDE MITIGATED FROM SOLAR WATER HEATING 60,888kg CO_2 EACH YEAR (61 Tonnes/yr)

Vertical Axis Wind Turbines (VAWT)

Six communal 6kW vertical axis 6 kW wind turbines (VAWT) located along the two Avenues within the site could generate upto 72,000kWhrs/yr. The electricity generated from the VAWT's is planned for use by the Management Company(MC) for communal lighting and other power requirements. Surplus electricity (most of that generated) will be used by the MC to fund the site maintenance.
The value of the VAWT generated electricity as at 2008 tarrifs is **£8,640.**

CARBON DIOXIDE MITIGATED FROM VAWT 30,960kG CO_2 each year (30 Tonnes/yr)

Total Renewable Energy Contribution

The renewable energy contribution at the LS SSE has the potential to significantly reduce its residents and users reliance on Grid generated electricity by 329,863kWhrs each year (0.33MWhrs/yr). The value of the electricity as at 2008 tariffs is £39,583. each year

TOTAL CARBON DIOXIDE MITIGATED FROM RENEWABLE ENERGY 141,841kG CO_2 each year (142 Tonnes/yr)

Contact: Dr Jeremy Harrall
SEArch
89 Gedney Road, Long Sutton, SPALDING, Lincs PE12 9JU
Tel. 01406 364646 molearch@searcharchitects.co.uk

Long Sutton Sustainable Settlement Extension (LS SSE) - Houses
Resources Quantified

Plots	Floor Area (m^2)	Rainwater Harvesting (litres/yr)	PV Generated Electricity (kWhrs/yr)	Solar Water Heating Displaced (kWhrs/yr)	Total Renewable Energy Contribution	CO2 Displacement ($kgCO_2/yr$)
1	68.4	15000	405.5	2400	2805.5	2085.5
2	61.8	7500	804.1	2400	3204.1	1377.7
3	61.8	7500	804.1	2400	3204.1	1377.7
4	86	10600	1702.8	2400	4102.8	1764.2
5	86	10200	1152.4	2400	3552.4	1527.5
6	86	10200	1152.4	2400	3552.4	1527.5
7	61.8	7500	1272.8	2400	3672.8	1579.3
8	61.8	7500	1272.8	2400	3672.8	1579.3
9	61.8	7500	1272.8	2400	3672.8	1579.3
10	61.8	7500	1272.8	2400	3672.8	1579.3
11	61.8	7500	1272.8	2400	3672.8	1579.3
12	86	10600	1702.8	2400	4102.8	1764.2
13	86	10200	1152.4	2400	3552.4	1527.5
14	86	10200	1152.4	2400	3552.4	1527.5
15	61.8	7500	804.1	2400	3204.1	1377.7
16	61.8	7500	804.1	2400	3204.1	1377.7
17	61.8	7500	804.1	2400	3204.1	1377.7
18	61.8	7500	804.1	2400	3204.1	1377.7
19	61.8	7500	804.1	2400	3204.1	1377.7
20	86	10600	1702.8	2400	4102.8	1764.2
21	86	10200	1152.4	2400	3552.4	1527.5
22	86	10200	1152.4	2400	3552.4	1527.5
23	119.2	15000	2760.6	2400	5160.6	2219
24	108.8	13400	1466.3	2400	3866.3	1662.5
25	86	10600	1702.8	2400	4102.8	1764.2
26	86	10600	1702.8	2400	4102.8	1764.2
27	108.8	13400	2549.9	2400	4949.9	2128.4
28	86	10200	1152.4	2400	3552.4	1527.5
29	86	10200	1152.4	2400	3552.4	1527.5
30	86	10600	1702.8	2400	4102.8	1764.2
31	86	10600	1702.8	2400	4102.8	1764.2
32	86	10600	1702.8	2400	4102.8	1764.2
33	86	10600	1702.8	2400	4102.8	1764.2
34	86	10200	1152.4	2400	3552.4	1527.5
35	86	10200	1152.4	2400	3552.4	1527.5
36	119.2	15000	1440.5	2400	3840.5	1651.4
37	108.8	13400	1466.3	2400	3866.3	1662.5
38	61.8	7500	804.1	2400	3204.1	1377.7
39	61.8	7500	804.1	2400	3204.1	1377.7
40	61.8	7500	804.1	2400	3204.1	1377.7
41	86	10600	1702.8	2400	4102.8	1764.2
42	108.8	13400	1466.3	2400	3866.3	1662.5
43	108.8	13400	2549.9	2400	4949.9	2128.4
44	86	10200	1152.4	2400	3552.4	1527.5
45	86	10200	1152.4	2400	3552.4	1527.5
46	86	10200	1152.4	2400	3552.4	1527.5
47	86	10200	1152.4	2400	3552.4	1527.5
48	119.2	15000	2760.6	2400	5160.6	2219
49	108.8	13400	2449.9	2400	4849.9	2085.4
50	86	10600	1702.8	2400	4102.8	1764.2
Totals	**4155.8**	**512300**	**68585.2**	**120000**	**188585.2**	**81969.3**

Contact: Dr Jeremy Harrall
SEArch
89 Gedney Road, Long Sutton, SPALDING, Lincs PE12 9JU
Tel. 01406 364646 molearch@searcharchitects.co.uk

Long Sutton Sustainable Extension (LS SSE) - Employment Zone

Resources Quantified

Plots	Floor Area (m^2)	Rainwater Harvesting (litres/yr)	PV Generated Electricity (kWhrs/yr)	Solar Water Heating Displaced (kWhrs/yr)	Total Renewable Energy Contribution	CO2 Displacement ($kgCO_2/yr$)
51	179.1	35000	6708.8	2400	9108.8	3916.7
52	179.1	35000	6708.8	2400	9108.8	3916.7
53	97.8	19000	3533.5	2400	5933.5	2551.4
54	97.8	19000	3533.5	2400	5933.5	2551.4
55	97.8	19000	3533.5	2400	5933.5	2551.4
56	97.8	19000	3533.5	2400	5933.5	2551.4
57	179.1	35000	6708.8	2400	9108.8	3916.7
58	179.1	35000	6708.8	2400	9108.8	3916.7
59	179.1	35000	6708.8	2400	9108.8	3916.7
Totals	**1286.7**	**251000**	**47678**	**21600**	**69278**	**29789.1**

Vertical Axis Wind Turbines:-	

Six No. 6kW Vertical Axis Wind Turbines, estimated electricity generation each year is 72,000 kWhrs, displacing 30,960 kg CO_2 each year (31 Tonnes/yr)

Total Combined Renewable Energy generated at LS SSE is 329,863 kWhrs/yr (0.33MWhrs/yr)

Total Carbon Dioxide Mitgated is 141,841 kg CO_2 each year (141 tonnes/yr)

Contact: Dr Jeremy Harrall
SEArch
89 Gedney Road, Long Sutton, SPALDING, Lincs PE12 9JU
Tel. 01406 364646 molearch@searcharchitects.co.uk

Research

The LS SSE offers the opportunity for comparisons between the performance of a variety of building techniques as applied to low-energy housing designed to alleviate fuel poverty and mitigate Carbon Dioxide emissions. Empirical evidence of this nature is not currently available to the UK market. Therefore by monitoring building performance and resident feedback, SEArch and the SSE's incumbent developer would be able to provide valuable data for the construction industry and general public at large.

Contact: Dr Jeremy Harrall
SEArch
89 Gedney Road, Long Sutton, SPALDING, Lincs PE12 9JU
Tel. 01406 364646 molearch@searcharchitects.co.uk

Appendix:-

Appendix Item 1 – Letter from South Holland District Council Building Control Manager
Phil Adams, 4th December 2008

Appendix Item 2 – SAP Calculations
Michael Charlton, Principal Building Control Surveyor, South Holland District Council, 4th December 2008, Ref. B11, Plot 5, Winter Solstice

Appendix Item 3 - Flood Risk Assessment
Geoff Beel Consultancy, 1st December 2008, Ref. GCB/Search

Appendix Item 4 – Letter from Lincolnshire County Council's Principal Highways Officer
John Sharpe, 28th November 2008, Ref. D/JPS/PLAN11/vw

Appendix Item 5 – Landscape Schedule
Bettaland Products Limited, November 2008

Appendix Item 5 – Letter from South Holland District Council Economic Development Manager
Bruce Wakeling, Economic Development Manager, 4th December 2008

Appendix Item 7 – Email from Lincolnshire Bat Group
Annette Faulkner, 4th December 2008

Contact: Dr Jeremy Harrall
SEArch
89 Gedney Road, Long Sutton, SPALDING, Lincs PE12 9JU
Tel. 01406 364646 molearch@searcharchitects.co.uk

Appendix Item 1 –

Letter from South Holland District Council Building Control Manager
Phil Adams, 4th December 2008

Contact: Dr Jeremy Harrall
SEArch
89 Gedney Road, Long Sutton, SPALDING, Lincs PE12 9JU
Tel. 01406 364646 molearch@searcharchitects.co.uk

SOUTH HOLLAND DISTRICT COUNCIL

Dr J Harrall
89 Gedney Road,
Long Sutton,
Spalding,
Lincolnshire,
PE12 9JU

P. Adams
4th December 2008.

Dear Jerry.
Re: THE LONG SUTTON SUSTAINABLE SETTLEMENT EXTENSION (SSE).

In response to your request for support and technical observation, for the above scheme and in particular to the building control and energy assessment process.

However I wish to start by pointing out that the building control team at South Holland has work in conjunction with you and your team at Search, in how these types of developments can be developed to maximise the potential for buildings of high environmental value. This has been invaluable to all the BC team in developing our greater awareness of our energy requirements and future technical knowledge that can be passed on to future projects.
It should be noted that the development and research that has been exercised has been built over a considerable time span and is well in excess of the level of the current building regulations requirements.

In response to the proposal for the above project, this is the first that has been proposed on this large scale any where in the country, there are a number of smaller schemes but this is well in excess of those.
These building are of an exceptional nature in style and should be seen for what they can achieve.

The high level of performance of the building in terms of light, natural ventilation and the need for no reliance on fossil fuel requirements by the use of zero heating status shows that the governments Code for sustainable homes level 6 is well achievable. Where currently there are only a hand full to date that reach this level,
This shows how an exciting venture this is taking account of the number of units proposed.
We have been able to demonstrate by the energy assessments that have been carried out by the BC unit that has shown that very high standards of construction can achieve substantial results in terms of energy performance and this can be shown through proven energy assessment results.
This is why this particular scheme will set this project apart from conventional housing development that is constructed not only in this district but country wide, this will give an example that sustainable homes and commercial premises can be achieved without compromise on usability and provide the end user and the environment with a project that is sound in terms of its environmental impact.

LABC

I wish to support this proposal for its leading edge development and its achievement at reducing the reliance on fossil fuels.

Yours faithfully

Phil Adams
Building Control manager
South Holland District Council

Appendix Item 2 –

SAP Calculations

Michael Charlton, Principal Building Control Surveyor, South Holland District Council, 4th December 2008, Ref. B11, Plot 5, Winter Solstice

Contact: Dr Jeremy Harrall
SEArch
89 Gedney Road, Long Sutton, SPALDING, Lincs PE12 9JU
Tel. 01406 364646 molearch@searcharchitects.co.uk

Building Regulation Compliance

Users Ref: b11 plot 5 winter solisice

Issued on: 4.December.2008

Prop Type Ref: Winter solistice east

Property: Plot 5, Bridge Road, Long Sutton, Spalding, Lincolnshire

TER: 22.25
DER: -17.07

SAP Rating: 107 A **SAP Energy Cost:** £43 **CO2 Emissions:** -1.58 t/year

EI Rating: 116 A **Energy used:** -18 kWh/m2/year **Enel:** 0 **ZC:** 0.00

Surveyor: 1056-0016, Michael Charlton, Tel: 01775 764616, Fax: 01775 762937
Address: *Priory Road, Spalding, LIncolnshire, PE11 2XE*
Client: 3, Sutainabl Ecological Architecture, 89 Gedney Road, Long Sutton, Spalding, Lincolnshire, PE12 9JU

Software Version: EES SAP 2005.015.build.0019, April 2008 (Design System), BRE SAP Worksheet 9.81

Regs Type: SAP 2005, Regs Region: England and Wales (Part L1A 2006), Construction Type: New Build

CHECKLIST FOR DWELLING AS DESIGNED

Site reference		Plot reference		
Builder		Contact		Tel:
Builder Control body		Contact		Tel:
SAP assessment by	Michael Charlton	Contact	Priory Road	Tel: 01775 764616
Evidence of competency:	Elmhurst Energy Systems Accredited Assessor. ID 1056-0016			

No.	Check	Evidence	Produced by	Design OK
1	**Criterion 1: Predicted carbon dioxide emission from proposed dwelling does not exceed the target.**			
1.1	**TER** (kg $CO_2/m^2.a$)	*Main fuel - Renewable energy* *Fuel factor = 1.00* *TER = 22.25*	Authorised SAP Assessor	N/A
1.2	**DER** for dwelling as designed (kg $CO_2/m^2.a$)	*DER = -17.07*	Authorised SAP Assessor	N/A
1.3	Are emissions from dwelling as designed less than or equal to the target?	*DER -17.07 < TER 22.25*	Authorised SAP Assessor	OK
2	**Criterion 2: The performance of the building fabric and the heating, hot water and fixed lighting systems should be no worse than the design limits.**			
2.1	**Fabric U-values** Are all U-values better than the design limits in Table 2?	Element / Average / Highest *Wall 0.10 (0.35) 0.10 (0.70) OK* *Roof 0.09 (0.25) 0.09 (0.35) OK* *Floor 0.08 (0.25) 0.08 (0.70) OK* *Openings 1.86 (2.20) 2.40 (3.30) OK*	Authorised SAP Assessor	OK
	Common areas in buildings with multiple dwellings (where relevant)			
2.2	If the common areas are un-heated, are all U-values better than the limits in Table 2? (If heated, use L-2A)	Schedule of U-values	Builder's submission	N/A
	Heating and hot water systems			
2.3	Does the efficiency of the heating systems meet the minimum value set out in the Domestic Heating Compliance Guide?	Main heating system: *Wood closed room heat, HETAS approved* *Efficiency - Table 4b: 65.0%* *Minimum permitted: 65.0% - OK* *Secondary heating: None*	Authorised SAP Assessor	OK
2.4	Does the insulation of the hot water cylinder meet the standards set out in the Domestic Heating Compliance Guide?	Cylinder: *No cylinder* Solar Cylinder: *Dedicated solar store volume: 300 litres (separate store) (required: 53 l) - OK*	Authorised SAP Assessor	OK

© Elmhurst Energy Systems Limited Registered Office Unit 16, St Johns Business Park, Lutterworth, Leicestershire LE17 4HB

Users Ref: b11 plot 5 winter solisice

Issued on: 4.December.2008

Prop Type Ref: Winter solistice east

Property: Plot 5, Bridge Road, Long Sutton, Spalding, Lincolnshire

TER: 22.25
DER: -17.07

SAP Rating: 107 A **SAP Energy Cost:** £43 **CO2 Emissions:** -1.58 t/year
EI Rating: 116 A **Energy used:** -18 kWh/m2/year **Enel:** 0 **ZC:** 0.00

Surveyor: 1056-0016, Michael Charlton, Tel: 01775 764616, Fax: 01775 762937
Address: Priory Road, Spalding, LIncolnshire, PE11 2XE
Client: 3, Sutainabl Ecological Architecture, 89 Gedney Road, Long Sutton, Spalding, Lincolnshire, PE12 9JU

Software Version: EES SAP 2005.015.build.0019, April 2008 (Design System), BRE SAP Worksheet 9.81
Regs Type: SAP 2005, Regs Region: England and Wales (Part L1A 2006), Construction Type: New Build

CHECKLIST FOR DWELLING AS DESIGNED

No.	Check	Evidence	Produced by	Design OK
2.5	Do controls meet the minimum controls provision set out in the Domestic Heating Compliance Guide?	Space heating control: *Appliance thermostats - OK* Hot water control:	Authorised SAP Assessor	OK
2.6	Does the heating and hot water system meet the other minimum provisions in the Domestic Heating Compliance Guide?	Schedule of compliance provisions	Builder's submission	
	Fixed internal and external lighting			
2.7	Does fixed internal lighting comply with paragraphs 42 and 44?	Schedule of installed fixed internal lighting *Light fittings: 11. L.E.L. fittings: 4 = 36.00% > 25% - OK* *L.E.L. fittings required per 25m2 or part of TFA: 4 = 4 - OK*	Builder's submission (see schedule below)	OK
2.8	Does the external lighting comply with paragraph 45?	Schedule of installed external lighting *External lights: Yes, controlled: Yes*	Builder's submission (see schedule below)	OK
3	**Criterion 3: The dwelling has appropriate passive control measures to limit solar gains.**			
3.1	Does the dwelling have a strong tendency to high summertime temperatures?	*Region: East Pennines (15.5)* *Thermal mass parameter = 19.0* *Ventilation rate in hot weather = 8.0* *Overheating risk (Orientation 'N') = Not significant - OK*	Authorised SAP Assessor	OK
4	**Criterion 4: The performance of the dwelling, as built, is consistent with the DER.**			
4.1	Have the key features of the design been included (or bettered) in practice?	*Wall U-value 0.10 < 0.28* *Roof U-value 0.09 < 0.15* *Floor U-value 0.08 < 0.20* *Main Heating Fuel: W Wood logs* *Solar panel* *Photovoltaic Array*	Authorised SAP Assessor	N/A
	Fabric construction			
4.2	Have accredited details been adopted?	Schedule of details used and their reference codes.	Builder's submission	
4.3	Have non-accredited details been used?	Evidence that details conform to standards set out in IP/06.	Builder's submission	
4.4	Has satisfactory documentary evidence of site inspection checks been produced?	Completed pro-formas showing checklists have been completed.	Builder's submission	N/A
4.5	Design air permeability ($m^3/(h.m^2)$ at 50Pa)	*Design air permeability = 15.0*	Authorised SAP Assessor	OK

© Elmhurst Energy Systems Limited Registered Office Unit 16, St Johns Business Park, Lutterworth, Leicestershire LE17 4HB

Users Ref: b11 plot 5 winter solisice **Issued on:** 4.December.2008

Prop Type Ref: Winter solistice east

Property: Plot 5, Bridge Road, Long Sutton, Spalding, Lincolnshire **TER:** 22.25 **DER:** -17.07

SAP Rating: 107 A **SAP Energy Cost:** £43 **CO2 Emissions:** -1.58 t/year

EI Rating: 116 A **Energy used:** -18 kWh/m2/year **Enel:** 0 **ZC:** 0.00

Surveyor: 1056-0016, Michael Charlton, Tel: 01775 764616, Fax: 01775 762937

Address: Priory Road, Spalding, LIncolnshire, PE11 2XE

Client: 3, Sutainabl Ecological Architecture, 89 Gedney Road, Long Sutton, Spalding, Lincolnshire, PE12 9JU

Software Version: *EES SAP 2005.015.build.0019, April 2008 (Design System), BRE SAP Worksheet 9.81*

Regs Type: SAP 2005, Regs Region: England and Wales (Part L1A 2006), Construction Type: New Build

CHECKLIST FOR DWELLING AS DESIGNED

No.	Check	Evidence	Produced by	Design OK
4.6	Has evidence been provided that demonstrates that the ***design air permeability*** has been achieved satisfactorily (see paragraph 56)	Sample pressure test results in comparison to design value.	Builder's submission (see schedule below)	N/A
	Commissioning heating and hot water systems			
4.7	Evidence that the heating and hot water systems have been commissioned satisfactorily	Commissioning completion certificate	Builder's submission (see schedule below)	N/A
5	**Criterion 5: The necessary provisions for energy efficient operation of the dwelling are put in place.**			
5.1	Has all the relevant information been provided?	O&M instructions *SAP = 107*	Builder's submission	N/A

Schedule of supporting competencies

No.	Organisation providing evidence	Telephone	Evidence of competency
2.7			
2.8			
4.6			
4.7			

© Elmhurst Energy Systems Limited Registered Office Unit 16, St Johns Business Park, Lutterworth, Leicestershire LE17 4HB

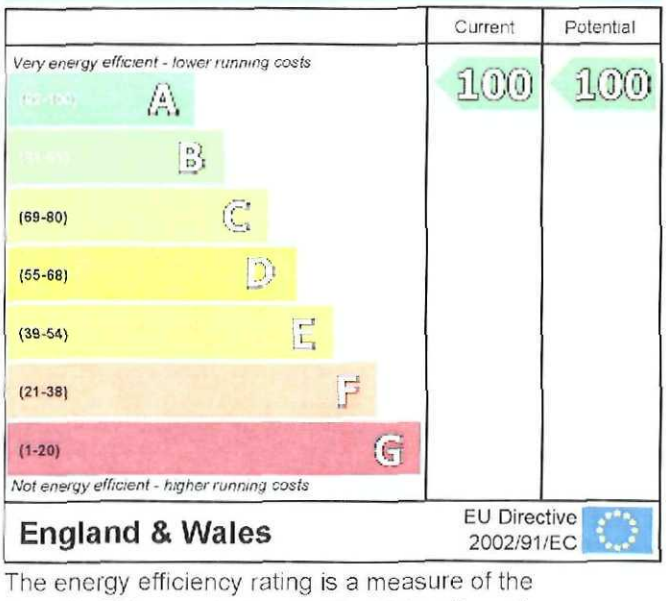
Predicted Energy Assessment

Plot 5, Bridge Road,
Long Sutton,
Spalding,
Lincolnshire

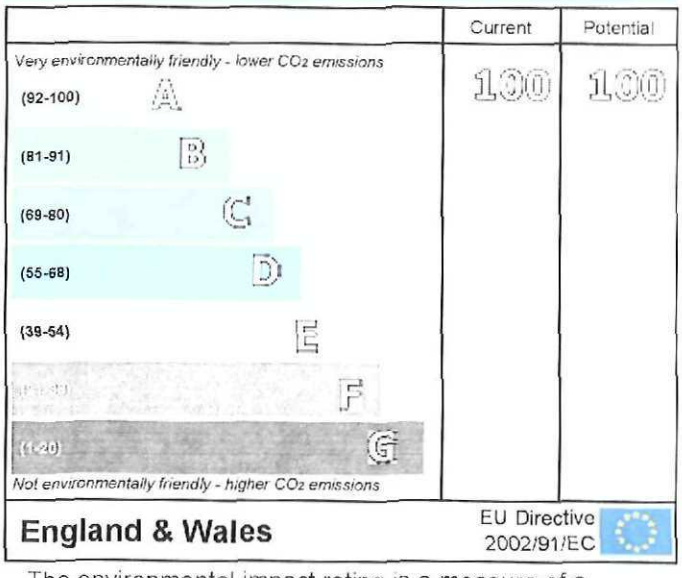
Dwelling type:	Semi-detached house
Date of assessment:	04 December 2008
Produced by:	South holland D. C
Total floor area:	84 mm ^{2}

This document is a Predicted Energy Assessment required to be included in a Home Information Pack for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, the Pack should be updated to include information about the energy performance of the completed property.

Energy performance has been assessed using the SAP 2005 methodology and is rated in terms of the energy use per square metre of floor area, energy efficiency based on fuel costs and environmental impact based on carbon dioxide (CO_2) emissions.



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.

UVALUE CALCULATION

Users Ref: b11 plot 5 winter solisice

Issued on: 4.December.2008

Prop Type Ref: Winter solistice east

Property: Plot 5, Bridge Road, Long Sutton, Spalding, Lincolnshire

TER: 22.25

DER: -17.07

SAP Rating: 107 A **SAP Energy Cost:** £43 **CO2 Emissions:** -1.58 t/year

EI Rating: 116 A **Energy used:** -18 kWh/m2/year **Ene1:** 0 **ZC:** 0.00

Surveyor: 1056-0016, Michael Charlton, Tel: 01775 764616, Fax: 01775 762937

Address: Priory Road, Spalding, Lincolnshire, PE11 2XE

Client: 3, Sutainabl Ecological Architecture, 89 Gedney Road, Long Sutton, Spalding, Lincolnshire, PE12 9JU

Software Version: EES SAP 2005.015.build.0019, April 2008 (Design System), BRE SAP Worksheet 9.81

Regs Type: SAP 2005, Regs Region: England and Wales (Part L1A 2006), Construction Type: New Build

Calculation method: BS EN ISO 6946, BS EN ISO 13370, BS 5250

Building Elements:

Building Element Floor 1

Floor Type: Slab on ground

Area = 42.18 m², Perimeter = 18.80 m, Wall thickness = 500 mm, Soil: Unknown

Horizontal edge insulation: none

Vertical edge insulation: none

Layer	Description	Thickness	λ	R	Fraction
External surface				0.040	
Layer1	**Concrete, medium density**				
	Main construction	250 mm	1.350	0.185	100.00 %
Layer2	**Floormate 200-X**				
	Main construction	100 mm	0.029	3.448	100.00 %
	Corrections - Air Gap: Level 0, Fasteners: None or plastic				
Layer3	**Floormate 200-X**				
	Main construction	100 mm	0.029	3.448	100.00 %
	Corrections - Air Gap: Level 0, Fasteners: None or plastic				
Layer4	**Floormate 200-X**				
	Main construction	100 mm	0.029	3.448	100.00 %
	Corrections - Air Gap: Level 0, Fasteners: None or plastic				
Internal surface				0.170	

Total resistance: Upper limit = 10.530 m²K/W Lower limit = 10.530 m²K/W Average = 10.530 m²K/W

U-value (unrounded) = 0.0000 W/m²K

Slab on Ground floor corrections:

Horizontal delta Psi = -0.0001 Vertical delta Psi = -0.0002 B' = 4.4872 Delta U = -0.00013

Total thickness: 550 mm **U-value: 0.08 W/m²K**

© Elmhurst Energy Systems Limited Registered Office Unit 16, St Johns Business Park, Lutterworth, Leicestershire LE17 4HB

UVALUE CALCULATION

Users Ref: b11 plot 5 winter solisice

Issued on: 4.December.2008

Prop Type Ref: Winter solistice east

Property: *Plot 5, Bridge Road, Long Sutton, Spalding, Lincolnshire*

TER: 22.25
DER: -17.07

SAP Rating: 107 A **SAP Energy Cost:** £43 **CO2 Emissions:** -1.58 t/year

EI Rating: 116 A **Energy used:** -18 kWh/m2/year **Ene1:** 0 **ZC:** 0.00

Surveyor: 1056-0016, Michael Charlton, Tel: 01775 764616, Fax: 01775 762937
Address: Priory Road, Spalding, LIncolnshire, PE11 2XE
Client: 3, Sutainabl Ecological Architecture, 89 Gedney Road, Long Sutton, Spalding, Lincolnshire, PE12 9JU

Software Version: EES SAP 2005.015.build.0019, April 2008 (Design System), BRE SAP Worksheet 9.81
Regs Type: SAP 2005, Regs Region: England and Wales (Part L1A 2006), Construction Type: New Build
Calculation method: BS EN ISO 6946, BS EN ISO 13370, BS 5250

Building Elements:

Building Element Wall Main

Layer	Description	Thickness	λ	R	Fraction
External surface				0.040	
Layer1	**Enviroblocks**				
	Main construction	200 mm	1.631	0.123	100.00 %
Layer2	**Syrofoam**				
	Main construction	300 mm	0.031	9.677	100.00 %
	Corrections - Air Gap: Level 0, Fasteners: None or plastic				
Layer3	**Standard cavity**				
	Main construction	50 mm	0.278	0.180	91.67 %
	Corrections - Cavity Unventilated, Emissivity: Normal				
	Bridging - Timber	50 mm	0.130	0.000	8.33 %
Layer4	**Lime Render**				
	Main construction	30 mm	1.130	0.027	100.00 %
Internal surface				0.130	

Total resistance: Upper limit = 10.193 m²K/W Lower limit = 10.185 m²K/W Average = 10.189 m²K/W
U-value (unrounded) = 0.0981 W/m²K

Unheated space: None

Total thickness: 580 mm **U-value: 0.10 W/m²K**

© Elmhurst Energy Systems Limited Registered Office Unit 16, St Johns Business Park, Lutterworth, Leicestershire LE17 4HB

Appendix Item 3 - Flood Risk Assessment

Geoff Beel Consultancy, 1st December 2008, Ref. GCB/Search

Contact: Dr Jeremy Harrall
SEArch
89 Gedney Road, Long Sutton, SPALDING, Lincs PE12 9JU
Tel. 01406 364646 molearch@searcharchitects.co.uk

FLOOD RISK ASSESSMENT FOR PROPOSED RESIDENTIAL AND COMMERICIAL DEVELOPMENT AT BRIDGE ROAD, LONG SUTTON, LINCS

FINAL REPORT

GEOFF BEEL CONSULTANCY

DECEMBER 2008

GCB/SEARCH

DISCLAIMER

This document has been prepared solely as a Flood Risk Assessment in support of a planning application for proposed Residential and Commercial Development at Bridge Road, Long Sutton, Lincolnshire. "Geoff Beel Consultancy" accepts no responsibility or liability whatsoever for any use made of this document other than by the client, "Mr H Myers", for the purposes it was originally commissioned and prepared. All comments and opinions made are based upon information available to "Geoff Beel Consultancy" during the necessary investigate process, and the conclusions and recommendations could therefore, differ in the event of material subsequently being found erroneous, incomplete or misleading. "Geoff Beel Consultancy" therefore, accepts no liability should this prove to be the case.

CONTENTS

1.0 INTRODUCTION

2.0 LOCATION

3.0 THE SITE AND SEQUENTIAL TEST

4.0 EXISTING FLOOD ALLEVIATION MEASURES

5.0 POTENTIAL SOURCE OF FLOODING

6.0 EXTENT OF KNOWN FLOODING

7.0 PROBABILITIES AND TRENDS OF FLOODING

8.0 IMPACTS OF FLOODING

9.0 RESIDUAL RISKS – EXTREME EVENTS

10.0 CONCLUSIONS AND RECOMMENDATIONS

Fig 1 - Location Plan – 1:2500
Search Architects Ltd

Fig 2 - Site Survey – 1:500
Search Architects Ltd

Fig 3 - Site Layout – 1:500 Search Architects Ltd

Fig 4 - Strategic Flood Risk Assessment Map
for South Holland District Council

Fig 5 - Location of site in South Holland Internal Drainage
Board district

1.0 INTRODUCTION

1.1 A full planning application is to be submitted by Search Architects Ltd on behalf of Mr H Myers for proposed residential and commercial development at Bridge Road, Long Sutton, Lincs.

1.2 A Flood Risk Assessment is required to accompany the planning application and meet the requirements of Planning Policy Statement 25 (PPS25) - Development & Flood Risk and for approval by the Environment Agency.

The site, as situated, is located within Flood Zone 3, of the Environment Agency's Flood Zone Maps. The latest Agency Flood Maps have been created as a tool to raise awareness of flood risk with the public and our partner organisations, such as Local Authorities, Emergency Services and Drainage Authorities. The Maps do not take into account any flood defences.

The site is also shown in fluvial Flood Zone 1 of the South Holland District Council's Strategic Flood Risk Assessment Maps.

The site is also located in the South Holland IDB drainage district.

1.3 Geoff Beel Consultancy was appointed on 3rd November 2008 to undertake a Flood Risk Assessment.

A previous Flood Risk Assessment was prepared in April 2008 for an adjoining development under planning application ref. no. H11/0585/08 which received approval from the Environment Agency on 13th May 2008 under file ref. no. AN/2008/105092.

2.0 LOCATION

2.1 The development site is located north of Bridge Road and the Bridge Road Industrial Estate which is on the south side of the road. The National Grid Reference of the central point of the development is TF 44252255.

2.2 The position and extent of the site is shown on Fig 1 Location Plan at the end of the document.

2.3 The site, located within the South Holland Internal Drainage Board district is shown within Flood Zone 3 as detailed on the Environment Agency Flood Zone Maps and in fluvial Flood Zone 1 of the Council's Strategic Flood Risk Assessment Map as defended by the Internal Drainage Board system.

3.0 THE SITE AND SEQUENTIAL TEST

3.1 The site is currently redundant agricultural land, glasshouses and packing sheds.

3.2 The area of development is approximately 4.18 hectares.

3.3 The proposed site layout consists of 49 residential units with an office and 9 commercial units all accessed from Bridge Road, Long Sutton. A proposed impermeable area of some 0.38 hectare within the total site area of approximately 4.18 hectare whilst the existing impermeable area totals 0.95 hectare.

3.4 The Sequential Test and Exception Test will require to be applied by the Local Planning Authority but the development may be permitted as the site is protected against both the 1 in 200 year return period tidal event and the 1 in 100 year return period fluvial event and located in fluvial Flood Zone 1 of the Council's Strategic Flood Risk assessment Map

4.0 EXISTING FLOOD ALLEVIATION MEASURES

4.1 The site is within a defended floodplain, as defined in Appendix 1 of the Environment Agency's 'Policy for the Protection of Floodplains' and is considered to be passive until such time as a flood greater than that for which the defences were designed occurs. The likelihood of flooding due to overtopping or failure of a flood defence embankment is considered to be small.

The South Holland Internal Drainage Board is protected by a combination of the River Welland tidal defences downstream of Spalding, the River Welland fluvial embankments as well as the River Nene tidal defences downstream of Foul Anchor.

4.2 The site and the surrounding land drains by gravity to Board drains on the immediate south and east boundaries to the Lutton Leam Outfall and hence to the tidal River Nene downstream of the West Lighthouse.

4.3 The existing standard of drainage for the South Holland Internal Drainage Board is 1 in 50 years return period, compatible with the Department of the Environment, Food and Rural Affairs target level of service for rural drainage and flood defence works. Freeboard of 900mm is provided to the lowest land levels. The maximum design flood level of the nearby IDB main drain is 2.26m aOD.

4.4 A length of culverted riparian drain flowing south to north bisects the site and discharges existing surface water run-off.

4.5 Current maintenance standards within the South Holland Internal Drainage Board and of the Environment Agency defences are generally very good.

During the operation and maintenance of its pumping stations, associated structures and channel systems, particularly those that could affect property, the Board seeks to maintain a general standard capable of providing flood protection to its district. A routine maintenance programme is in place to ensure that the Boards assets are commensurate with the standard of protection that is sought. However, bank slips, blocked culverts etc may occur from time to time and these matters are usually dealt with promptly.

5.0 POTENTIAL SOURCES OF FLOODING

5.1 Three potential sources of flooding have been identified as a result of this assessment:

a) local blockages to IDB main drain system.
b) storm return period of 1 in 50 years being exceeded
c) overtopping and breaching of defences of the fluvial River Welland, tidal River Welland and tidal River Nene

5.2 The probability of flooding from source a) is low due to the maintenance standards already achieved and managed by the IDB.

The probability of flooding from b) is also low due to the South Holland IDB main drain design standard incorporating a minimum 900mm freeboard to the lowest land level which provides adequate storage in events greater than 1 in 50 years. Maximum design flood level of nearby IDB main drain is 2.26m as compared with existing land level of varying between 3.40m and 3.96m aOD.

Previous historic rainfall events of 1968 and 1978, estimated to be greater than 1 in 100 year events, caused no flooding to any residential properties at the time and the Boards policy is to provide a standard of drainage which satisfies PPS25 requirements of a 1 in 100 year return period for fluvial protection inclusive of the effects of climate change and developments to the arterial system enables a flexible approach to be adopted and meet the criteria for "sustainable urban drainage".

5.3 The flood embankments to the fluvial River Welland provide a 1 in 100 year return period level of protection in combination with the Crowland and Cowbit Washes. The flood embankments to the tidal River Welland and tidal River Nene provide a 1 in 200 year return period level of protection.

5.4 A sustainable drainage system is to be implemented within the developed site to accommodate the 1 in 100 year rainfall event inclusive of climate change. The South Holland IDB has been involved with pre-planning application discussions to ensure that no increase in surface water run-off is discharged to the IDB main drain system.

The sustainable system will consist of

- rainwater harvesting
- soakaways to BRE365 design requirements
- the existing culverted length of drain will be restored to an open drain for both environmental and drainage benefit
- an attenuation pond will be created at the northern limits of the development site
- a new collector drain excavated to discharge surface water run-off to the attenuation pond on the eastern boundary
- a wetland area with landscaped buffer zone
- allotments and open space either side of the attenuation pond
- permeable access roads

6.0 EXTENT OF KNOWN FLOODING

6.1 During the preparation of this assessment, no evidence was discovered of the site being flooded or of any adjoining properties.

7.0 PROBABILITIES AND TRENDS OF FLOODING

7.1 The probability of this development flooding from localised drainage systems is very low.

7.2 The probability of the site flooding with water from any South Holland IDB main drain is less than 1% because of the standards of the existing flood defence systems, storage within existing drainage channels and the location of the site.

7.3 The probability of the site flooding with fluvial waters from any main river system is less than 1% because of the standards of the existing flood defences and the location of the site.

7.4 If under very extreme events, levels of floodwater from the South Holland IDB main drains or arterial systems rose to such an extent that the site was affected, the situation would not be sudden. It is very probable that sufficient time would be available to take precautionary actions to limit the extent and potential impact of flooding.

7.5 The water levels in the drainage channels will tend to rise as a result of the impacts of climate change. However the existing systems and defences together with the proposed floor levels above existing ground level will be appropriate for the design life of the development (i.e. 100 years).

8.0 IMPACTS OF FLOODING

8.1 No significant impacts of flooding are anticipated.

8.2 Floor levels of the development will be at 4.09m aOD and above existing ground levels which together with the proposed sustainable drainage system will offer additional protection against impacts arising from any extreme short duration, localised events.

8.3 The general location of the site within the catchment is such that if flooding occurred from any of the South Holland IDB main drain systems, then probably 2 to 3 days warning time would be available.

8.4 No displacement of water from the site will affect any adjoining properties. It is intended to provide a sustainable drainage system such that surface water drainage will be attenuated before discharging to the adjoining IDB main drain system at no greater rate than the existing impermeable area run-off.

8.5 Safe and dry access/egress is available to the site from Bridge Road with carriageway level at 4.50m aOD.

9.0 RESIDUAL RISK – EXTREME EVENTS

9.1 The residual risk from extreme events is very low on this site, because of its location, within the South Holland IDB area and its location 4.50 kms from the River Nene tidal defences.

9.2 Although within either fluvial Flood Zone 1 or Flood Zone 3 according to PPS25 classification, the site actually has a very low risk of flooding due to the current standards of drainage and flood defence and land levels. The site is not located within a Functional Flood Plain of any "main river" or "main drain" as defined in PPS25. The Environment Agency Flood Zone Maps have been produced irrespective of existing flood defences and standards of protection.

9.3 South Holland District Council in conjunction with the Environment Agency and the local IDB's within the Council area have carried out a Strategic Flood Risk Assessment of the whole District by appointed Consulting Engineers.

The Strategic Flood Risk Assessment has produced more definitive Flood Risk Maps than those published by the Environment Agency and at the same time has analysed flood return periods of all tidal and fluvial defences for years 2002 and 2052 to account for the effects of climate change.

Breach scenarios of embankments failing and/or being overtopped have also been carried out to establish Flood Risk Zones.

9.4 As a result of the Strategic Flood Risk Assessment: the South Holland Main Drain and associated IDB main drains have been determined as providing protection against a 1 in 100 year return period event both in years 2002 and 2052.

9.5 The development site has been identified outside of any Flood Risk Zone from the South Holland Main Drain and associated IDB main drain or the River Welland or the River Nene.

10.0 CONCLUSIONS AND RECOMMENDATIONS

10.1 As a result of the assessment, the following conclusions have been reached:-

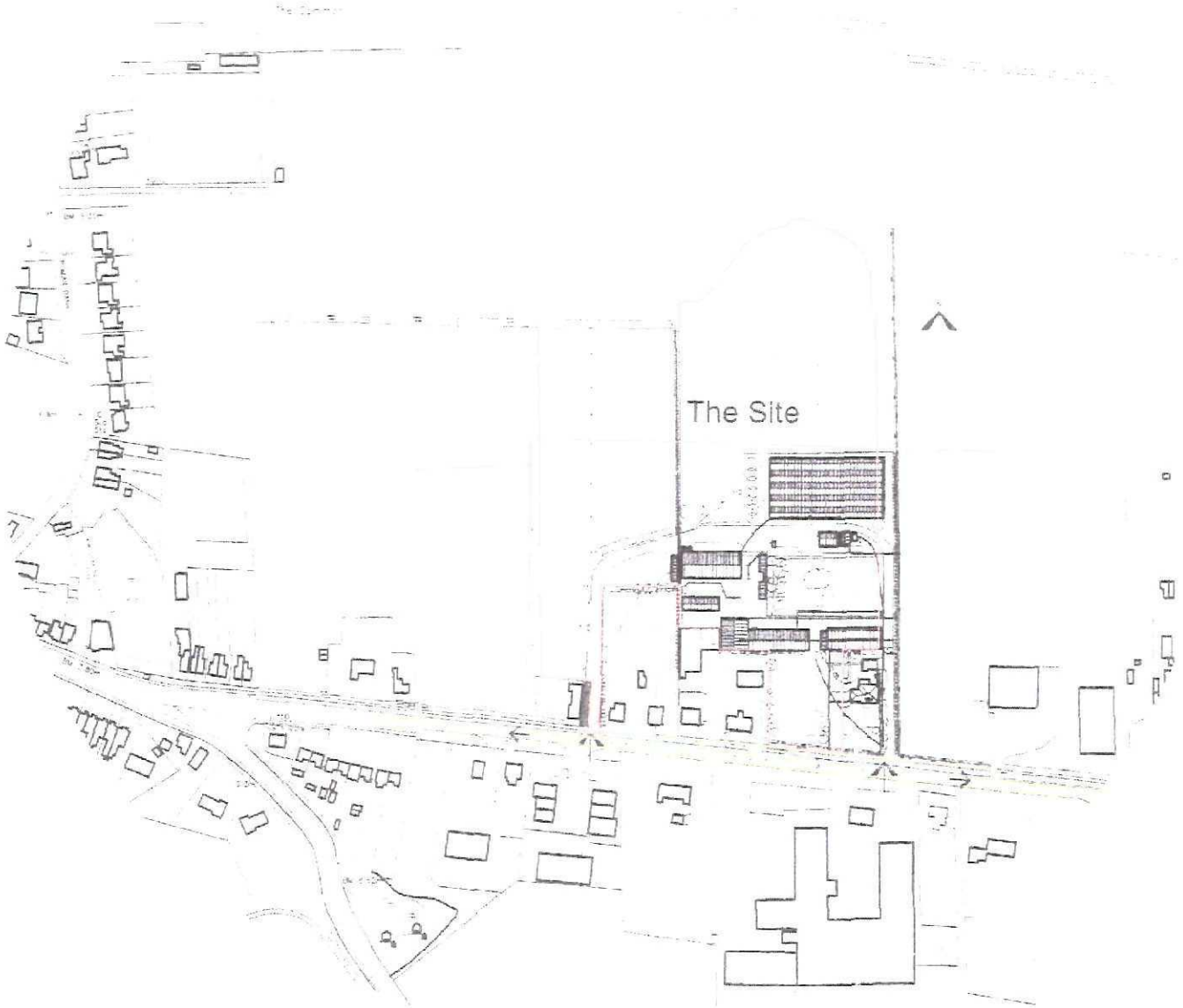
- The proposed development is not in a Functional Floodplain as defined by PPS25. It is located in the Passive Floodplain protected by defences to a 1 in 100 year return period. (1.0%)

- Although the site is in Flood Zone 3, the actual risk of site flooding from any Environment Agency river system is very low (less than 0.5%). The site has been identified in fluvial Flood Zone 1 of the South Holland District Council's Strategic Flood Risk Assessment Maps.

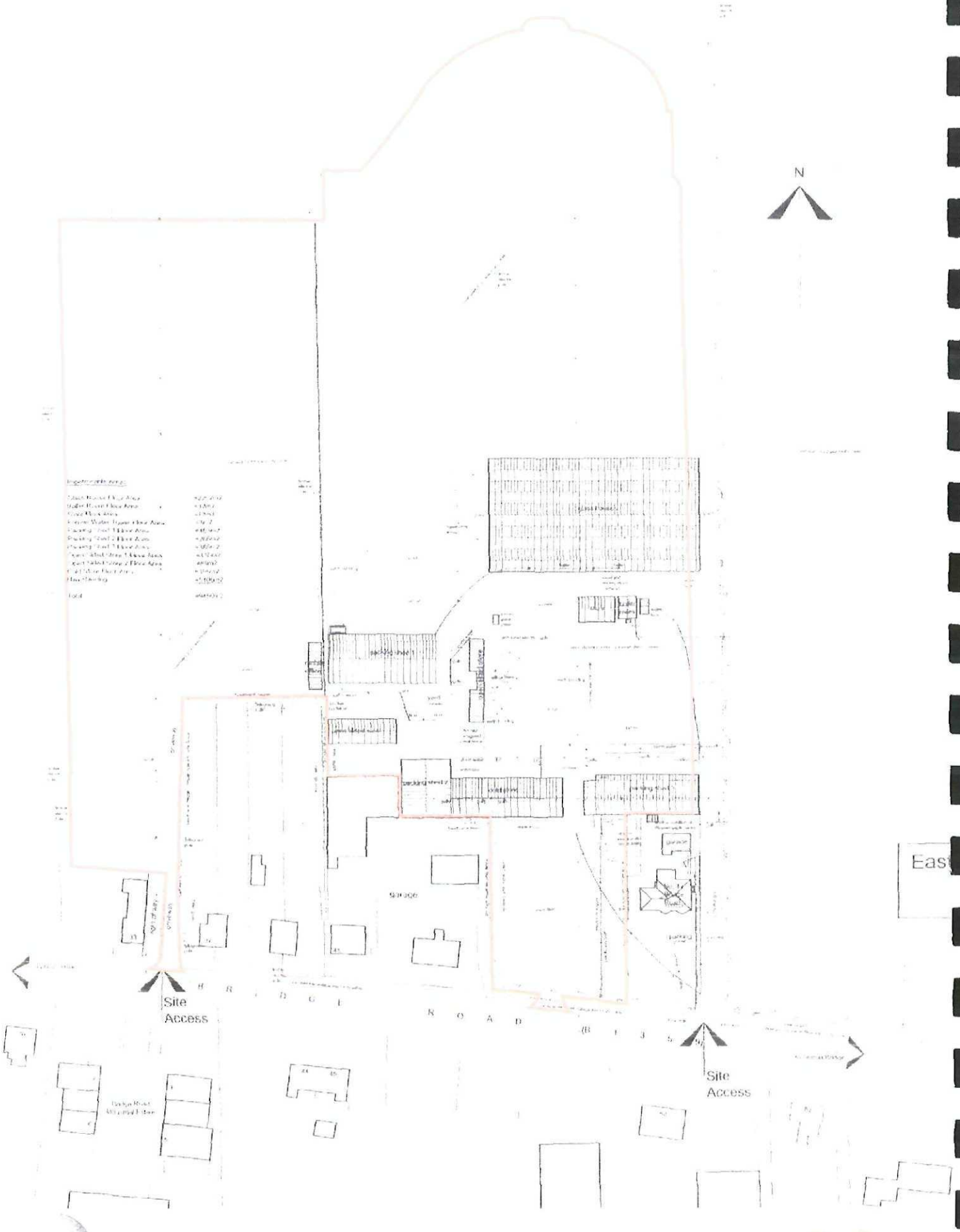
- Although the site is located within an Internal Drainage District with a minimum standard of drainage of 1 in 50 years. this accords with Defra guidelines for rural development. Freeboard to design water level of 900mm to lowest land level is available for events greater than 1 in 50 years providing further storage within the drainage channels.

- On site rainwater from the development will be discharged via a comprehensive sustainable surface water drainage system to attenuate run-off to meet the requirements of the IDB.

- Land Drainage Byelaw Consent will be required from the South Holland Internal Drainage Board for the proposed site entrance drain culverts and also the 6 metre easement to the drains on the development site western boundary.



LOCATION PLAN 1:2500 @ A3

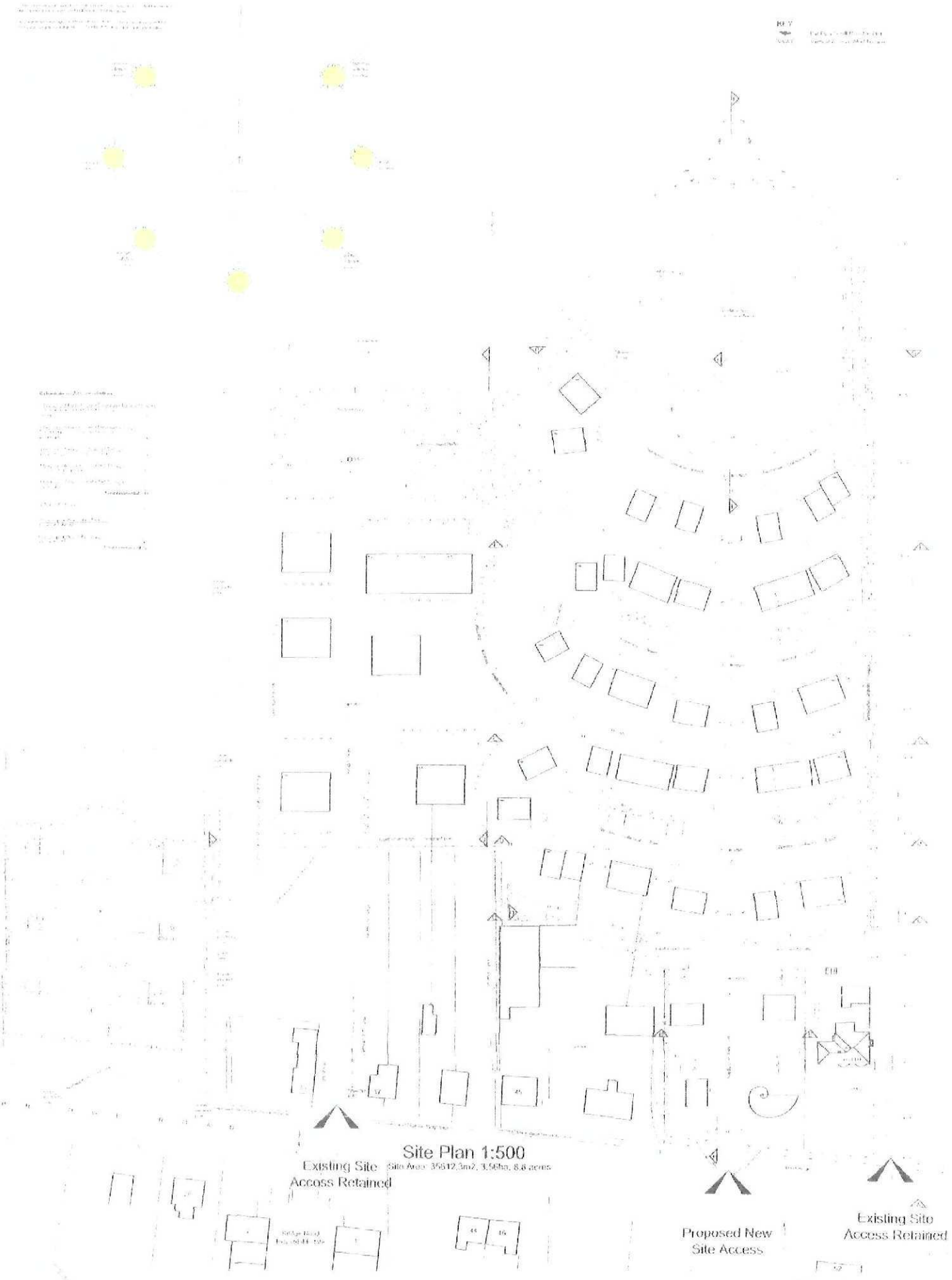


ARCH

Sustainable Settlement Extension to Long Sutton

Land Adjacent No.47 Bridge Road, Long Sutton

Site Survey
1:500 @ A1



ARCH

Sustainable Settlement Extension to Long Sutton

Land Adjacent No.47 Bo Jac Road, Long Sutton

Site Layout
1:500 @ A1





SOUTH HOLLAND INTERNAL DRAINAGE BOARD

Oddfellows, Bridge Road, Long Sutton
Plan showing Board-maintained drains

Appendix Item 4 –

Letter from Lincolnshire County Council's Principal Highways Officer
John Sharpe, 28th November 2008, Ref. D/JPS/PLAN11/vw

Contact: Dr Jeremy Harrall
SEArch
89 Gedney Road, Long Sutton, SPALDING, Lincs PE12 9JU
Tel. 01406 364646 molearch@searcharchitects.co.uk

Lincolnshire
COUNTY COUNCIL

1 DEC 2008

Our Ref: D/JPS/PLAN11/vw
Your Ref:
Date: 28 November 2008

Highways and Traffic
Boston and South Holland Division
Municipal Buildings, West Street
Boston, Lincolnshire PE21 8QR
Tel: 01522 782070 Fax: 01205 314572
Email: Dev_HT_BSH@lincolnshire.gov.uk

Jerry Harrall
Sustainable Ecological Architecture Ltd
89 Gedney Road
Long Sutton
Lincolnshire
PE12 9JU

Dear Jerry

PROPOSED SUSTAINABLE SETTLEMENT EXTENSION AT BRIDGE ROAD, LONG SUTTON.

Many thanks for e-mailing to me, your layout drawing of this scheme which I can see draws together the final few threads that remained to be resolved at the time of my visit to your office on 2 September 2008.

As I explained at our meeting, because you have elected to have the whole of the carriageway and footway network remaining private, i.e. for it not to be adopted as Public Highway, our interest in the development, from the position of the Highway Authority for the County, begins and end with the design, construction and operation of the two vehicular accesses onto Bridge Road. I can confirm that the essential access geometry in plan is satisfactory and subject to the materials and workmanship meeting the County Standards, the Authority would not raise objection when asked by the Local Planning Authority to comment upon this layout as a formal Planning Application.

Whilst the plan form of the development is not typical of a layout that would normally be submitted for adoption, it does never-the-less indicate many key principles we and the Local Planning Authority would encourage designers to consider in the interests not only of providing safe residential and working environments but also promoting a sense of place and belonging for residents and workers.

Provisions that I note and welcome include;

- The use of gradually diminishing roadway widths, which provide a subliminal message to drivers that their speed and their priority should be similarly reduced as they progress through the development.

- The use of the series of circular road forms that both resolve the various turning movements at junctions and cause gentle interruption to movement through the site and to the line of sight along the main spine road.

Continued/.....

- The inclusion of a tear-like taper on the entry to the central islands of the circular junctions to both guide inbound vehicle movements around the islands and 'steer' outbound drivers towards the Bridge Road junction.

- The provision of small turning areas at the ends of the spur roads that will accommodate private cars and the use of short spur roads that will require only the minimum of reversing manoeuvres for any larger vehicles that may need to enter the development.

- The omission of footways (along the sides of the roadways) to promote the 'Living Street' ethos.

- The inclusion of linking footpaths/cyclepaths throughout the residential areas and between the residential, employment and amenity/recreational areas to reduce the need for car travel. I recall you are also considering the possibility of providing sheltered and secured parking at each of the residential and the employment units, which would further reinforce the message of Sustainable Development.

- The use of porous surfacing to the roadways to minimise the discharge of surface water run-off into the local watercourses.

Whilst some of these proposals may be considered a little too 'avant-garde' for adoptable highways under the system we currently operate, the opportunity to observe, without risk of un-necessary expenditure to the public purse, the way in which residents, workers and visitors live and operate in this closed environment is something which we would welcome.

I wish you luck with this bold and progressive endeavour and look forward to you sharing with us the positive and indeed any negative experiences.

Yours sincerely

for Director for Development

Appendix Item 5 – Landscape Schedule

Bettaland Products Limited, November 2008

Contact: Dr Jeremy Harrall
SEArch
89 Gedney Road, Long Sutton, SPALDING, Lincs PE12 9JU
Tel. 01406 364646 molearch@searcharchitects.co.uk

Bettaland Products Ltd

Decoy Farm, Crowland
Peterborough
Tel 01733 211666
Fax 01733 211393

Planting plan for Land Adjacent to No. 47 Bridge Road, Long Sutton.

Nov-08

Supply and plant costs for planting within the bare root season of November 1st and the end of March, subject to weather conditions.

Phase 1 Planting within bare root season

	East road avenue (double sided)				Total plants	
	12-14 trees - 4 m centres	450m		4m centre	90 trees	
	Oak		bare root		18	
	Alder		bare root		18	
	Ash		bare root		18	
	Prunus padus		bare root		18	
	Sorbus auc Sheerwater		bare root		18	
	Tree stake and tie				90	
	Bags of Bettaland Compost				135	
	Ornamental Cherry (var unkown)	20-25cm girth	rb		12	
	Planted opposite the existing larger trees.					
	Hedging 450m - 5plants per m	**% Total**			**2250**	
	Crataegus	30	bare root	40-60	675	
	Corylus	15	bare root	40-60	337.5	
	Acer campestre	10	bare root	40-60	225	
	Ilex aquifolium	5	P9	30-40	112.5	
	Viburnum opulus	5	bare root	40-60	112.5	
	Quercus	10	bare root	40-60	225	
	Rosa canina	5	bare root	40-60	112.5	
	Prunus spinosa	20	bare root	40-60	450	
	Canes and spirals	**100**			**2250**	
	Bags of Bettaland Compost				225	
	Curve perimeter North side allotments					
	Hedging 153m - 5 plants per linear metre				**765**	
	Crataegus	30	bare root	40-60	230	
	Corylus	15	bare root	40-60	115	
	Acer campestre	10	bare root	40-60	77	
	Ilex aquifolium	5	P9	30-40	38	
	Viburnum opulus	5	bare root	40-60	38	
	Quercus	10	bare root	40-60	77	
	Rosa canina	5	bare root	40-60	38	
	Prunus spinosa	20	bare root	40-60	153	
	Canes and spirals				765	
	Bags of Bettaland Compost				77	
	12-14 trees - 4 m centres	**153**		**4m centre**	**31**	
	Oak		bare root		7	
	Alder		bare root		6	
	Ash		bare root		6	
	Prunus padus		bare root		6	
	Sorbus auc Sheerwater		bare root		6	

	Tree stake and tie				31	
	Bags of Bettaland Compost				15.5	
	Permiter of area above allotments					
	Hedging 288m - 5 plants per linear metre				*1440 total*	
	Crataegus	30	bare root	40-60	432	
	Corylus	15	bare root	40-60	216	
	Acer campestre	10	bare root	40-60	144	
	Ilex aquifolium	5	P9	30-40	72	
	Viburnum opulus	5	bare root	40-60	72	
	Quercus	10	bare root	40-60	144	
	Rosa canina	5	bare root	40-60	72	
	Prunus spinosa	20	bare root	40-60	288	
	Canes and spirals				1440	
	Bags of Bettaland Compost				144	
	12-14 trees - 4 m centres	**288**		**4m centre**	**72**	
	Oak		bare root		15	
	Alder		bare root		15	
	Ash		bare root		14	
	Prunus padus		bare root		14	
	Sorbus auc Sheerwater		bare root		14	
	Tree stake and tie				72	
	Bags of Bettaland Compost				36	
	North and West perimiter of Commercial units					
	Hedging 269m - 5 plants per linear metre				1345	
	Crataegus	30	bare root	40-60	404	
	Corylus	15	bare root	40-60	202	
	Acer campestre	10	bare root	40-60	135	
	Ilex aquifolium	5	P9	30-40	67	
	Viburnum opulus	5	bare root	40-60	67	
	Quercus	10	bare root	40-60	135	
	Rosa canina	5	bare root	40-60	67	
	Prunus spinosa	20	bare root	40-60	269	
	Bags of Bettaland Compost				135	
	Canes and spirals				1480	
	12-14 trees - 4 m centres	**269**		**4m centre**	**67**	
	Oak		bare root		14	
	Alder		bare root		14	
	Ash		bare root		13	
	Prunus padus		bare root		13	
	Sorbus auc Sheerwater		bare root		13	
	Tree stake and tie				67	
	Bags of Bettaland Compost				33.5	
	North, South & West of yard					
	Hedging 244m - 5 plants per linear metre				1220	
	Crataegus	30	bare root	40-60	366	
	Corylus	15	bare root	40-60	183	
	Acer campestre	10	bare root	40-60	122	
	Ilex aquifolium	5	P9	30-40	61	
	Viburnum opulus	5	bare root	40-60	61	
	Quercus	10	bare root	40-60	122	
	Rosa canina	5	bare root	40-60	61	
	Prunus spinosa	20	bare root	40-60	244	
	Canes and spirals				1220	
	Bags of Bettaland Compost	0.5 bag per m			122	
	12-14 trees - 4 m centres	**244**		**4m centre**	**49**	
	Oak		bare root		10	
	Alder		bare root		10	
	Ash		bare root		10	
	Prunus padus		bare root		10	
	Sorbus auc Sheerwater		bare root		9	
	Tree stake and tie				49	
	Bags of Bettaland Compost				25	
	Additional costs, plant hire etc					

Maintenance for 6 Months	2 men for one day every two weeks.				
	6 months starts from commencement of planting				

Phase 2 Planting within bare root season

2m clear stemmed Olive central avenue				Total plants
Olive	12-14 std		cg	32
Bags of Bettaland compost				16
Entrance				
105metre 4' Variegated Privet	3 per metre	rootball		315
182m small box	4 per metre	bare root		728
2 pyramid, sqre sided	140-160			2
1 Box ball 140cm diameter				1
1 Taxus ball 100cm diameter				1
1 Box ball 70cm diameter				1
Winter Solstice East	**Plants per m**		**Linear metres**	
Buxus sempervirens	4	bare root	220	880
Ligustrum oval Aureum	4	bare root	211	844
8 Rear gardens - Phormium	2per garden			16
Bags of Bettaland Compost				115
Winter Solstice West				
Buxus sempervirens	4	bare root	152	608
Ligustrum oval Aureum	4	bare root	88	352
12 Rear gardens - Phormium	2 per garden			24
Bags of Bettaland Compost				64
Coppice vars as hedge, equal qties	**Area m2**	**3 Plants per sq metre**		
A1	120	bare root		360
A2	308	bare root		924
A3	210	bare root		630
Canes and spirals				1914
Additional costs, plant hire etc				
Maintenance for 6 Months	2 men for one day every two weeks.			
	6 months starts from commencement of planting			

Phase 3 Planting within bare root season

				Total plants
Equinox West				
Buxus sempervirens	4	bare root	162	648
Ligustrum ovalifolium	4	bare root	327	1308
10 Rear gardens - Phormium	2 per garden			20
Bags of Bettaland Compost				130
Equinox East				
Buxus sempervirens	4	bare root	139	556
Ligustrum ovalifolium	4	bare root	116	464
8 Rear gardens - Phormium	2 per garden			16
Bags of Bettaland Compost				68
Summer Soltice East				
Buxus sempervirens	4	bare root	90	360
Ligustrum oval Aureum	4	bare root	92	368
3 Rear gardens - Phormium	2 per garden			6
Bags of Bettaland Compost				49
Summer Solstice West				
Buxus sempervirens	4	bare root	102	408
Ligustrum oval Aureum	4	bare root	221	884

	4 Rear gardens - Phormium	2 per garden			8	
	Bags of Bettaland Compost				86	
	Coppice vars as hedge, equal qties	Area m2	3 plants per sq metre			
	A4	375	bare root		1125	
	A5	300	bare root		900	
	A6	875	bare root		2625	
	A7	325	bare root		975	
	Canes and spirals				5625	
	Base of turbines	6		3.5m2 each		
	Hedera goldchild	3 per metre2	2L	6 units	60	
	Additional costs, plant hire etc					
	Maintenance for 6 Months	2 men for one day every two weeks.				
		6 months starts from commencement of planting				

Appendix Item 5 –

Letter from South Holland District Council Economic Development Manager

Bruce Wakeling, Economic Development Manager, 4th December 2008

Contact: Dr Jeremy Harrall
SEArch
89 Gedney Road, Long Sutton, SPALDING, Lincs PE12 9JU
Tel. 01406 364646 molearch@searcharchitects.co.uk

date: 04 December 2008

your reference:

our reference:

ask for: Bruce Wakeling

email: bwakeling@sholland.gov.uk

Council Offices
Priory Road
Spalding
Lincolnshire PE11 2XE

tel: 01775 761161
fax: 01775 711253
www.sholland.gov.uk

Dr. Jerry Harrall
SEArch,
89 Gedney Road,
Long Sutton, Spalding,
Lincolnshire PE12 9JU

Dear Jerry,

Industrial Units at Long Sutton and South Holland.

In August 2007 the Economic Development Team at the District Council received a needs analysis report that it had commissioned through Focus Consultants.

The report, which considered both office space and industrial unit demand, identified a strong requirement for industrial units across South Holland. Most of the demand for units of 3,000 sq. ft. and above was currently being met although there were gaps in the supply in the smaller towns. Below 3,000 sq. ft. there appeared to be a shortage mainly because the private sector tended not to build this sized unit, the District Council has a range of 600sq.ft to 1,000 sq. ft units across the district for rent but all of these were taken and there was a waiting list. 44% of businesses surveyed as part of the study thought that there was a requirement for more starter industrial units.

With regard to Long Sutton specifically, the district council does not have any units in the town, Sutton Bridge is the nearest location at which we have units, these are all currently taken. The only privately owned units that I am aware of in Long Sutton are the ones on Bridge Road that were built, I believe, by English Estates, these again are fully occupied. There is therefore no current availability of industrial units in Long Sutton and the allocated employment land in the town, around the Premier Foods site is not currently available for development because of Highways restrictions and the need to construct a new access on to the A17, this would not be economically viable for the construction of a few small industrial units.

We do have evidence of demand for units in Long Sutton from agents in the town. They have identified to us several instances of requests for units of between 1,000 and 2,500 sq. ft. that it has not been possible to meet, at least one of these businesses subsequently moved to Wisbech.

From an economic development viewpoint therefore I believe that there is a requirement for industrial units in Long Sutton and that the lack of suitable units is currently a problem for the district.

For your information the sizes identified as being required in the study were between 1,000 and 3,000 sq. ft. and businesses identified four criteria that were important to them in the selection of units. These were; cost, flexible leasing terms, parking and the availability of on-site storage. Several businesses also identified that they would prefer freehold rather than leasehold properties.

I hope that this is useful for you but please do not hesitate to contact me if I can be of further assistance.

Yours sincerely

Bruce Wakeling
Economic Development Manager

Appendix Item 7 – Email from Lincolnshire Bat Group

Annette Faulkner, 4th December 2008

Contact: Dr Jeremy Harrall
SEArch
89 Gedney Road, Long Sutton, SPALDING, Lincs PE12 9JU
Tel. 01406 364646 molearch@searcharchitects.co.uk

Julie Butcher

From: Annette Faulkner [a.faulkner@care4free.net]
Sent: 04 December 2008 15:28
To: Molearch
Subject: Long Sutton application

Dear Jerry,

Thank you for inviting us to look at your plans and comment on ways to make your new proposal as bat-friendly as possible. We wish more developers would take these beleaguered animals into consideration when planning new developments!

Wind turbines
As we discussed at length when we met you, there are potentially inherent problems with mixing domestic, pole-mounted wind turbines and bat-friendly habitat, as there is clear evidence that turbines in the wrong place can kill bats, since they occupy the same aerial space as the foraging animals and collisions have been recorded, including one bat that was decapitated.

At the same time no research has been done on turbines of this size, what research effort there is being concentrated on the big ones. This is of particular concern with helical turbines, as claims that they are 'bat-friendly' are totally unsubstantiated. In addition there are no national guidelines for distance turbines should be from foraging habitat (although the Eurobats Agreement on the siting of large turbines, to which the UK government is signed up, states 200 metres), but discussion with a local Natural England officer produced a suggestion of a minimum of 25-30 metres.

As far as we know there are only three species of bats to be found in the Long Sutton area out of a possible eleven in the county: soprano and common pipistrelles, and a small (and declining) population of brown long-eared bats. Brown long-eareds forage close to vegetation and are thought to be at less risk from small free-standing turbines, but pipistrelles forage along tree lines, often at some height, and are thought to be at much greater risk. Common pipistrelles in particular are found all over the Fens.

At our meeting we concluded that surrounding the avenue of turbines with low growing, non native, scattered vegetation should make it less attractive to foraging bats, as there *should* be fewer insects. Elsewhere, we agreed that creating a 'bowl' effect, where the taller vegetation is pushed right back, could also draw bats away from the turbine. No shrubs/trees that are going to grow above 1.5 - 2m should be within at least 20m of a turbine. We also concluded that creating linear features away from the turbines on the east boundary and along the dyke, using native forest trees (oak and willows having the greatest number of insects associated with them) should in time create safe foraging habitat.

New roosting opportunities
This is commendable, as many roosts are being lost all the time, in spite of the legal protection. It was thought that by siting suitable niches in the timber boarding of the houses on the periphery of the development, which would provide potential roosts for pipistrelles, should steer them towards the linear 'good' habitat and away from the turbines.

It was also agreed that an element of monitoring should be written in to any contract, for research purposes.

Subsequent to our discussions I have contacted the Bat Conservation Trust for further information and recently had a lengthy discussion with Dr Kate Barlow, who is currently looking into the whole issue of small turbines: working on sites in Scotland they are advocating a minimum distance between turbines and foraging areas of 50m, rather than 25-30m. There are also two independent research projects in the pipeline - if funding can be obtained - which would help to clarify the situation.

We discussed the designing of the roost opportunities in such a way that bats ought to be drawn away from the turbines, but she felt it would be better not to attract them into the site in the first place - pipistrelles from elsewhere will come in to investigate anyway. But she liked the idea of making the habitat surrounding the turbines as un-bat-friendly as possible, and agreed with the research element.

It is a pity to have to give the thumbs down to the roosts proposal, but I feel we have to bow to her greater experience on this issue. With a bigger site there would be more scope for roost creation as well. I'm sure all would agree that 'green' initiatives should never have the potential to put protected species at risk. It rather defeats the object.

With kind regards,

Annette Faulkner
Lincolnshire Bat Group