

Barrat & David Wilson Homes

Sustainability Statement and Energy Strategy

Land at Cherryfield Drive, Kirkby

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Watt Energy & Consulting Engineers Ltd
40 King Street, Manchester, M2 6BA

t. 0161 43 43 103
w. www.wece.co.uk
e. office@wece.co.uk

watt 
Energy & Consulting Engineers

Issue Control

Director

Daniel Watt



Sustainability Consultant

Jude Darnborough

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1. Executive Summary

This Environmental Standards Statement has been prepared by Watt Energy on behalf of Barrot & Wilson Homes to support a planning application for the development at the land at Cherryfield Drive, Kirkby. The statement specifically addresses the following Knowsley Borough Council approved climate change action plans in addition to planning policies, as stipulated in the Knowsley Local Plan (2016):

- **Core Strategy SD1: Sustainable Development**
- **Core Strategy Policy CS17: Housing Sizes and Design Standards**
- **Core Strategy Policy CS22: Sustainable and Low Carbon Development**
- **Core Strategy Policy CS23: Renewable and Low Carbon Infrastructure**

The statement details how the development will incorporate sustainable design and resource efficiency in line with the Energy Hierarchy, so to meet the targets outlined within the relevant documents and as a result, reducing its overall environmental impact. The methodology and calculations are consistent the Building Regulations and all figures used within this report have been based on the most recent issue of drawings and modelled using SAP to accurately predict Energy Usage and CO₂ reductions.

In relation to the planning documents and policies outlined above, the development is required to achieve a **pass** over Part L 2021 of the Building Regulations.

In order to achieve compliance the development has been designed with a holistic low energy design concept involving a fabric first approach. The U-values, design air permeability and ventilation targets all aspire to Passive House design standards along with the consideration and application of low zero carbon renewable technologies.

This statement also examines how the design, specification and characteristics of the proposal will contribute to sustainability overall and the creation of a sustainable development. The measures assessed included:

- **Green and Blue Infrastructure**
- **Sustainable Drainage Systems (SUDs)**
- **Biodiversity / Ecology**
- **Internal Water Efficiency**
- **Waste Management**
- **Embodied carbon.**
- **Materials**
- **Pollution Control**
- **Sustainable Transport**

Based on the above considerations the proposed development complies with the targets promoted within the Knowsley Local Plan (2016), whilst also providing additional contributions to the wider scope of sustainability and sustainable development.



2 Planning Statement

The following statement relates to the proposed development at the land at Cherryfield Drive, Kirkby.

2.1 The Site and Proposed Development

The site is located northeast of Liverpool and sits centrally within Kirkby. A plan, with the site's extents denoted by the red outline seen in Figure 1 (shown later in this subsection).

The site is bounded to the north and east by Cherryfield Drive, south by Bewley Drive, Valley Road to the west and is adjacent to Winberry Drive Close, Kirkby Leisure Centre and Knowsley Community College. The site currently exists as uncopied Greenfield land.

The proposal is for a residential-led mixed use development consisting of 720 new build houses. These dwellings will be a mix of two, three and four bed (Use class C3). Also provided will be associated ancillary facilities including a refuse/recycling store.

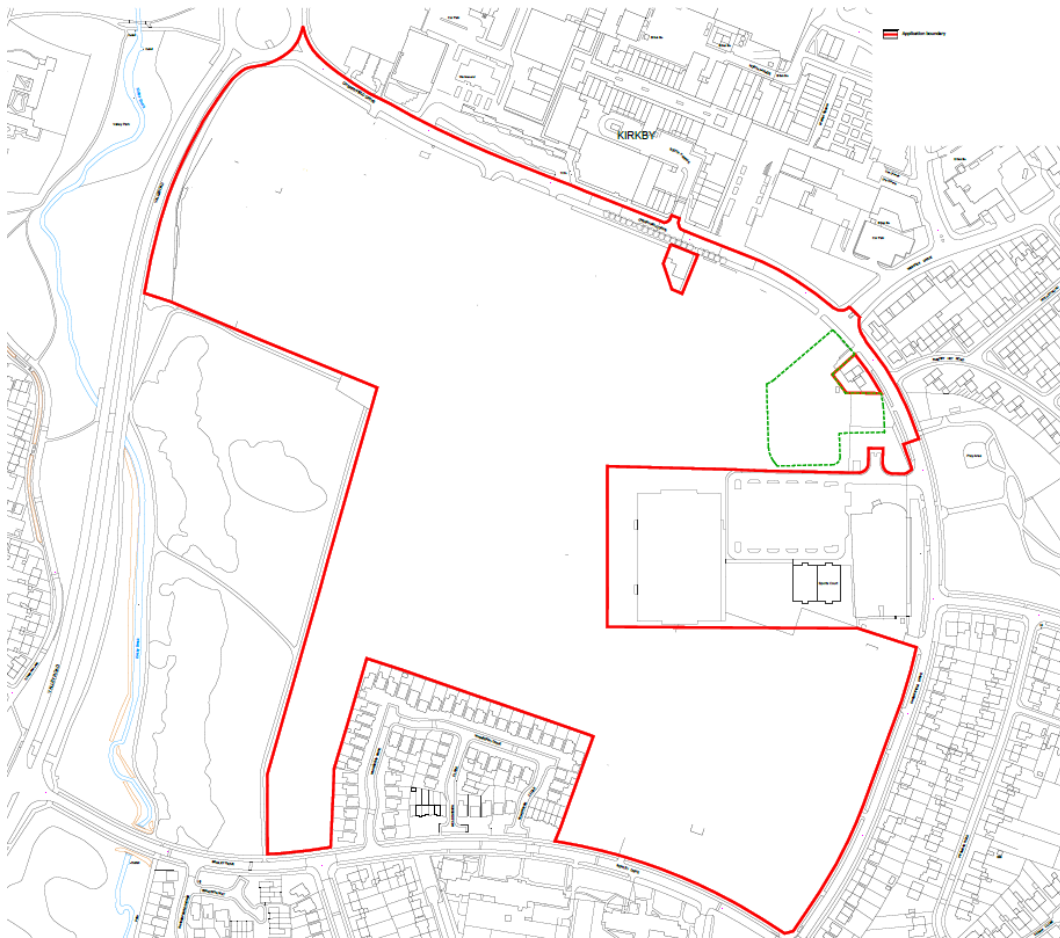


Figure 1: Site Plan

2.2 Accommodation Schedule

Cherryfields Lane - Kirkby				
House Mix				
NW-23 Rev G				
02/11/2022				
DWH				
Private:				
Names	Beds/Person	No.	sqft	sqft combined
P204- Willford (mid)	2B/4P	7	620	4340
P204- Willford (end)	2B/4P	14	620	8680
P382- Archford (mid)	3B/5P	6	832	4992
P382- Archford (end)	3B/5P	44	832	36608
P341- Hadley (end)	3B/5P	6	1001	6006
P341- Hadley (det)	3B/5P	21	1001	21021
H351- ECKINGTON	3B/6P	13	965	12545
T310- Kennett (mid)	3B/6P	12	1089	13068
T310- Kennett (end)	3B/6P	41	1089	44649
H403- Ingleby	4B/6P	12	1081	12972
T322 - Greenwood (mid)	3B/6P	12	1179	14148
T322 - Greenwood (end)	3B/6P	49	1179	57771
T427 - Parkin	4B/8P	8	1259	10072
H421- Shenton	4B/7P	14	1260	17640
H486- Hollinwood	4B/7P	7	1220	8540
H442- Kirkdale	4B/8P	21	1354	41974
H456- Avondale	4B/8P	13	1491	19383
		310		334409
Affordable: (LGH)				
Names		No.	sqft	sqft combined
SH50 (mid)	2B/4P	5	750	3750
SH50 (end)	2B/4P	10	750	7500
SH52 (mid)	3B/5P	5	926	4630
SH52 (end)	3B/5P	8	926	7408
SH54	4B/6P	1	1103	1103
SH55	3B/5P	3	958	2874
		32		27265
Totals		342		361674
Nett Dev. Area (in acres)				10.93
Coverage (sqft/acre)				17288

NW-23 Rev G				
Barrett				
Private:				
Names	Beds/Person	No.	sqft	sqft combined
Kenley (mid)		10	624	6240
Kenley (end)		24	624	14976
Ellerton (mid)		11	830	9130
Ellerton (end)		25	830	20750
Maidstone (mid)		6	830	4980
Maidstone (end)		9	830	7470
Moresby (end)		13	854	11102
Moresby (det)		20	854	17080
Denby		6	880	5280
Lutterworth		4	1001	4004
Kingsley		21	1085	22785
Kingsville (mid)		20	1072	21440
Kingsville (end)		58	1072	62176
Widmermore		9	1073	9657
Norbury (mid)		10	1107	11070
Norbury (end)		10	1107	17712
Ripon		10	1121	11210
Alderney		12	1225	14700
Brentford		12	1162	13944
Sambourne (mid)		7	1157	8099
Sambourne (end)		6	1157	6942
Sambourne (spec 10)		15	1157	17355
Bedale (end)		21	993	22453
Midhurst 2 (end)		4	736	2944
Midhurst 2 (det)		1	736	736
		300		334435
Affordable: (LGH)				
Names		No.	sqft	sqft combined
TARP (avg. sqft.)		4	456	1824
T50 (mid)		4	749	2996
T50 (end)		6	749	4494
T52 (mid)		8	927	7416
T52 (end)		8	927	7416
T54 (mid)		0	1103	0
T54 (end)		2	1103	2206
T55		0	957	0
Ambersham		3	586	1758
Maldon		3	873	2619
		38		30435
Totals		338		364370
Nett Dev. Area (in acres)				19.77
Coverage (sqft/acre)				18430
Combined Totals		730		726044
Nett Dev. Area (in acres)				40.69
Combined Coverage (sqft. per acre)				17843



2.3 Relevant Policies and Guidance

2.3.1 Local Planning Policy

2.1.1.1 Knowsley Local Plan Core Strategy (January 2016)

Policy SD1: Sustainable Development

Policy SD1

Sustainable Development

- 1) When considering development proposals, a positive approach will be taken, which reflects the presumption in favour of sustainable development contained in the National Planning Policy Framework. Work will be undertaken pro-actively with applicants jointly to find solutions which mean that proposals can be approved wherever possible, and to secure development that improves the economic, social and environmental conditions in the area.
- 2) Planning applications that accord with the policies in this Local Plan (and any relevant policies in Neighbourhood Plans) will be approved without delay, unless material considerations indicate otherwise.
- 3) Where there are no policies relevant to the application or relevant policies are out of date at the time of making the decision then permission will be granted unless material considerations indicate otherwise – taking into account whether:
 - a) Any adverse impacts of granting permission would significantly and demonstrably outweigh the benefits, when assessed against the policies in the National Planning Policy Framework taken as a whole; or
 - b) Specific policies in that Framework indicate that development should be restricted.

Policy CS17: Housing Sizes and Design Standards

Policy CS17

Housing Sizes and Design Standards

Achieving a Mix of Housing Sizes

- 1) An appropriate mix of dwelling sizes will be sought across the borough, having regard to evidence of local housing needs and the monitoring of housing completions (see Table 8.1: Mix of dwelling sizes for new housing in Knowsley).
- 2) For individual residential developments of 15 dwellings or more, developers must demonstrate how their scheme contributes to the re-balancing of Knowsley's housing market in terms of the size of dwellings provided.
- 3) For smaller residential developments, a mix of housing sizes should be provided which complement the overall mix available in the area.

Residential Design Standards

- 4) All new residential development in Knowsley will be encouraged to comply with the following design standards (or equivalent replacement standard):
 - a) Building for Life standards;
 - b) Lifetime Homes design criteria; and
 - c) Specific design and sustainability guidance in [Policy CS19: Design Quality and Accessibility in New Development](#), [Policy CS22: Sustainable and Low Carbon Development](#) and relevant Supplementary Planning Documents¹¹².

Policy CS22: Sustainable and Low Carbon Development

Policy CS22

Sustainable and Low Carbon Development

Sustainable Construction Principles

- 1) New development will be required to meet high standards of sustainable design and construction and minimise carbon emissions. This should be achieved by:
 - a) Designing new buildings for flexible uses throughout their lifetime;
 - b) Avoiding the creation of adverse local climate conditions by using natural systems to avoid internal overheating and excessive heat generation;
 - c) Ensuring developments are comfortable and safe for users;
 - d) Making the most effective and sustainable use of water, aggregates and other resources;
 - e) Limiting energy use by incorporating high standards of insulation, heat retention, natural ventilation and passive solar techniques;
 - f) Landscaping (including measures such as green walls or roofs) to create shelter and reduce any heat island effect;
 - g) Using sustainable materials from local suppliers where possible;
 - h) Supplying energy efficiently and incorporating decentralised energy systems, using renewable and low carbon energy where feasible;
 - i) Managing flood risk, including through the use of Sustainable Drainage Systems (SuDS) and flood resilient design for infrastructure and property; and
 - j) Promoting sustainable waste practices in new and existing developments.



Low Carbon Development, Community Energy Fund and Allowable Solutions

- 2) Government targets for carbon reduction in new development are expected to be implemented through updates to the Building Regulations. Where it is not technically feasible or economically viable to meet the requirements on site, contributions to the Council's Community Energy Fund may be accepted as one of a range of options under the Government's proposed 'Allowable Solutions' mechanism. The Fund will be used to support carbon reduction initiatives in Knowsley and potentially the wider Liverpool City Region.

Sustainable Construction Targets

- 3) Local targets for sustainability in relation to specific development areas or sites may be outlined in the Local Plan: Site Allocations and Development Policies.

Priority Zones and Decentralised Energy Networks

- 4) Knowsley Industrial Park and Knowsley Business Park are identified as a 'Priority Zone'. Within this area the Council and its partners will facilitate renewable and low carbon infrastructure by (subject to feasibility) requiring new development to:
 - a) Make provision for connection to an existing or planned decentralised energy network; and
 - b) Be designed to enable future connectivity in terms of proposed site layout, infrastructure and heating provision, including consideration of connections at a later date or phase.
- 5) Subject to opportunity and need, additional 'Priority Zones' may be identified in the Local Plan: Site Allocations and Development Policies.

Policy CS23: Renewable and Low Carbon Infrastructure

Policy CS23

Renewable and Low Carbon Infrastructure

- 1) The Council will support proposals that will produce and distribute decentralised, low carbon and renewable energy, provided that they do not cause significant harm (in terms of their number, scale, siting or cumulative impacts) to:
 - a) Natural resources, biodiversity, geodiversity, water and air quality and, landscape character;
 - b) Aviation and transport safety;
 - c) Historical and cultural assets;
 - d) Public amenity and living conditions; or
 - e) Openness and amenity of the Green Belt, except in very special circumstances.
- 2) Proposals must be accompanied by information that shows how the local environment will be protected, and how the site will be restored when energy production ends. Proposals resulting in an unacceptable impact must be mitigated by appropriate measures agreed by the Council.

2.4 Sustainable Design Strategy

2.4.1 Energy and Carbon Emissions

Building Services Strategy

To achieve the most accurate calculations and estimates of the carbon emissions of the development, and to quantify the savings due to the energy efficiency measures, the proposed dwellings have been modelled using *SAP 2012* the governments Standard Assessment Procedure for residential dwellings.

The proposed strategy for minimising energy use and carbon emissions is based on the energy hierarchy described in CIBSE Guide F 2012 (Energy efficiency in buildings). The energy hierarchy has been adopted for the development to ensure that the correct approach to design is taken to promote an energy-efficient low carbon solution (see figure 2). This has ensured that the benefits of effective methods of energy use reduction have been maximised first. The approach adopted is as follows:



Fig 2: Energy Hierarchy

Minimise energy demand – Implement passive design measures and optimise the building envelope in terms of orientation, air tightness, and insulation. The current proposal is targeting a low carbon classification, which it aims to achieve through a holistic low energy design concept, involving a fabric first design approach whereby Passive House design standards are aspired to for all fabric U-values and air permeability targets.

Meet demands efficiently – Specification of energy efficient decentralised plant, heating, ventilation, lighting, and system controls to facilitate efficient operation. Highly efficient gas boilers will be utilised to satisfy the space heating demand which will be minimal due to the high levels of insulation and fabric first approach.

Particular attention is being paid to the wellbeing of occupants. The ventilation strategy has been developed to minimise noise ingress from the proposed location as far as possible while minimising the risk of overheating.

Additional Renewable Energy Measures

Opportunities for incorporating low and zero carbon technologies (LZCT) have been considered for this development. The viability of several separate technologies was examined in a LZCT study (see section 3).

Efficient and Sustainable Design Measures

In line with the above Sustainable Design Strategy, the following Energy Efficient design measures are specified.

- Aspiring to Passive House design standards
- High levels of insulation throughout with minimal thermal bridges
- Passive solar gains and internal heat sources
- Excellent level of airtightness
- Good indoor air quality by openable windows
- 100% operational energy supplied by a renewable energy provider

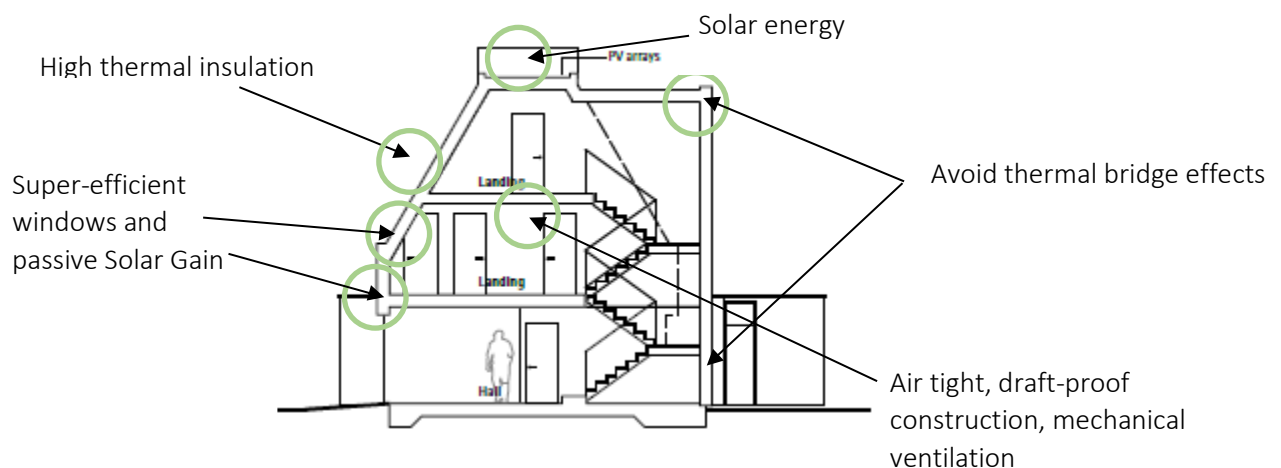


Fig 3. Efficient Design Measure examples

2.4.2 Fabric First

The first step in the energy hierarchy requires that buildings be designed to use improved energy efficiency measures – Be Lean. Adopting a fabric first approach; involving maximising the performance of the building's external envelope, rather than relying on 'add-ons' to improve a building's energy efficiency and sustainability credentials, will reduce demand for heating, cooling and lighting.

Adopting a fabric-first approach reduces the energy demand by focusing on the following: maximising air tightness, eliminating thermal bridging, optimising insulation, solar gain and energy efficient ventilation therefore reducing operational costs while also minimizing associated carbon dioxide emissions.

The thermal comfort of the occupant is both important to recognise in colder and warmer temperatures. The National Planning Policy Framework emphasises the need to take account of climate change over the longer term and plan new developments to avoid increased vulnerability to the range of impacts arising from climate change. The UK Climate Impacts Programme 2009 projections suggest that by the 2080's the UK is likely to experience summer temperatures that are up to 4.2°C higher than they are today. Accordingly, designers are to ensure buildings are designed and constructed to be comfortable in higher temperatures, without resorting to energy intensive air conditioning. Therefore, to maintain healthy living internal environments for the occupants in an air-tight home, energy efficient Mechanical Ventilation with Heat Recovery (MVHR) systems will be installed to provide a source of fresh filtered air. In colder temperatures, a room with a poor fabric efficiency can lead the homeowner to turn up the heating to counteract the effect of draughts and in turn increase energy consumption of the property. Therefore, adopting the fabric first approach is beneficial for both the occupant in terms of cost and living comfort.

Insulation measures will be utilised to ensure the calculated u-values exceed the Building Regulations minima, with specific guidance taken from the design team to achieve passivhaus like u-values.

New glazing for windows and doors will be triple glazed and have area weighted average U-Values of 1.2W/m²K or better

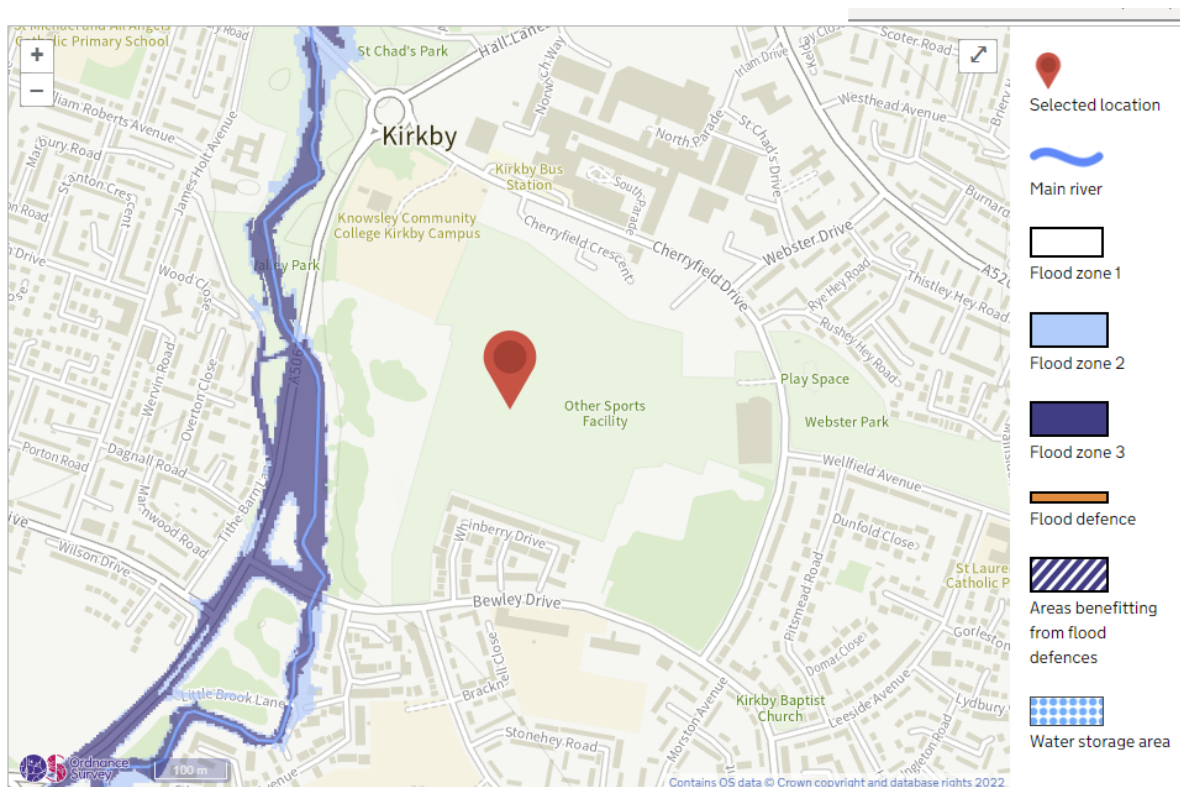
Heat loss via non-repeating thermal bridging will be minimised by the use of Accredited Construction Details.

2.5 Adaptation to Climate Change

In addition to measures implemented to reduce energy use and carbon emissions, there are many other issues that will influence creating a Sustainable Development, including flood prevention, material use, waste minimisation and transport.

Sustainable development measures should be taken into consideration from the start of the development and promoted throughout the building construction on site in order to maximise their benefits. Additionally, features which enable more efficient usage should also be specified to encourage the building users to maintain efficient use once construction has been completed.

2.5.1 Flood Risk Zone



The above map and snippet have been taken from a Government licenced flood risk map for Kirkby. It can be seen that the site is just located within flood risk zone 1 and therefore has minimal to no risk of flooding.

2.5.1.1 Sustainable Drainage Systems (SUDs)

The development should ensure that the levels of surface water run-off do not increase, especially due to the change of the site from a permeable greenfield surface to a mainly impermeable surface. Therefore, a Flood Risk Assessment and Drainage Strategy has been produced by Lees Roxburgh and will be submitted in support of the planning application.

By incorporating SuDs, flood risk can be managed and mitigated. Section 1.1 of the SuDs Manual (Ciria C753) states the following:

“Sustainable drainage systems (SuDS) can deliver multiple benefits.

Surface water is a valuable resource, and this should be reflected in the way it is managed and used in the built environment. It can add to and enhance biodiversity, beauty, tranquillity and the natural aesthetic of buildings, places and landscapes and it can help make them more resilient to the changing climate.”

The general concept of SUDs is to manage the flood and pollution risks in developed areas. This is done by efficiently managing surface water run-off by either slowing down the surface water run-off, or by reducing the quantity of surface water run-off. There are different methods to achieve this such as:

- Harvesting – capturing rainwater and facilitate its use within the development
- Infiltrating – rainwater infiltrates into the ground
- Storing – capturing rainwater and control the flow through the means of storing and releasing it slowly i.e. attenuation
- Conveying & treating – capturing rainwater and removing any contaminants, then convey the flow towards a downstream system

The SuDS Manual describes the four pillars of SuDS design as Water Quality, Water Quantity, Amenity and Biodiversity as illustrated in Figure 3 below:

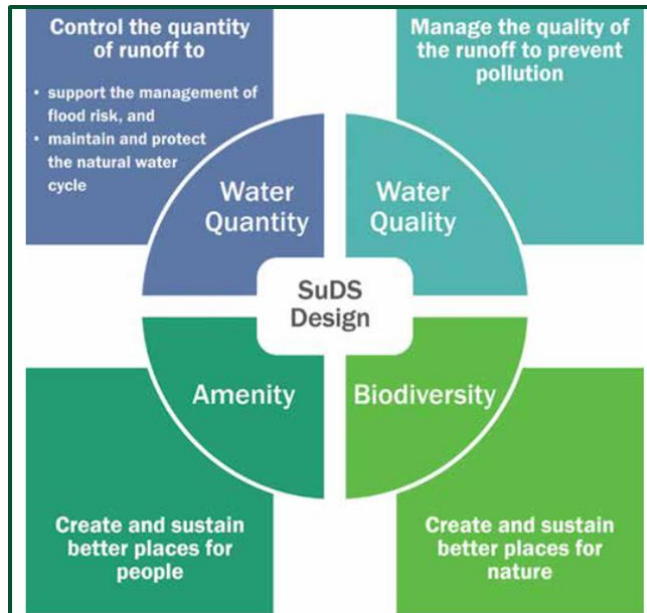


Fig 6. Representation of figure 2.1 of the SUDs Manual

SuDS are increasingly gaining popularity as a holistic solution to a wide range of pressing issues including flood risk, water pollution, groundwater depletion, biodiversity loss and urban decline.

Drainage Hierarchy

To alleviate pressure on existing sewer networks and to address issues of climate change the following hierarchy has been developed and implemented from a planning perspective.

The Planning Practice Guidance, states that:

“generally, the aim should be to discharge surface run-off as high up the following hierarchy of drainage options as reasonable practicably:

1. Into the ground (infiltration)
2. To a surface water body
3. To a surface water sewer
4. To a combined sewer”

The “Building Regulations Approved Document H” refer to this discharge hierarchy.

Description	Benefit
Flood risk management	SuDS aim to have an attenuating affect by slowing down and storing surface water run-off
Drainage resilience	Future proofing designed to be resilient against climate change
Natural flow regime protection	Mimic natural drainage arrangements to emulate natural flow
Water quality	Filter out pollutants and discharge cleaner water
Water reuse	Can be strategically placed to clean and capture water for reuse
Biodiversity and ecology	SuDS use vegetation and natural landscape to support biodiversity and ecology
Amenity	Improve visual integrity and desirability of the site by implementing green and blue features
Carbon reduction	SuDS can reduce carbon use throughout the life cycle including construction, maintenance, and demolition
Microclimate	Aim in reducing heat island effects
Education	Educate and engage the general public about surface water management

Table 1. Outline of types of green/blue infrastructure and associated benefit

2.5.1.2 Biodiversity

Similarly, to the previous section on SUDs, there could be adverse impacts on the surrounding ecology as well as potential for the enhancement. Therefore, a suite of ecology surveys and an ecological assessment have been undertaken by ERAP as part of the Environmental Impact Assessment to be submitted in support of the application.

2.5.2 Internal Water Efficiency

Part G of the Building Regulations requires all new dwellings to have an internal water consumption of no greater than 110 litres / person / day, unless specified to be less. Therefore, fittings proposed should have low flow rates, capacities, effective flush volumes etc. Example targets for these to achieve the required internal consumption are as follows:



Appliance	Unit of measure	Amount (litres)
WC (Dual flush)	Full flush volume	4
WC (Dual flush)	Part flush volume	2.6
Taps (excluding kitchen)	Flow rate l/min	5
Kitchen taps	Flow rate l/min	6
Bath	Capacity to Overflow	170
Shower	Flow rate l/min	8
Washing Machine	Litres / kg dry load	8.17
Dishwasher	Litres / place setting	1.25

Table 2. Internal Water Efficiency Flow Rates

The above rates will achieve a total internal water consumption of 106.31 with a bath present and 98.25 with only a shower present.

The specifying of 'A' rated appliances should be prioritised where possible.

2.5.3 Waste Management

2.5.3.1 Construction Waste

The proposal will endeavour to maximise the use of recycled materials on site, whereby further promoting the minimising of waste production.

2.5.4 Materials

The construction of new buildings and building elements has a large environmental impact in terms of both, energy, and embodied carbon of new materials. Therefore, the development will prioritise the use of environmentally friendly materials, where possible, and encourage the use of recycled building materials.

Where new materials are to be used, careful consideration of their environmental impact should be taken. This can be achieved by ensuring that only materials that score well under The Green Guide to Specification. This useful online tool can be used as a reference that provides guidance on the relative environmental impacts for a wide range of different building specifications. The BRE's Environmental Profile Methodology determines the Life Cycle Assessment (LCA) of materials, which is what the Guide's specifications are based on.



In order to take full advantage of low impact materials, elements key to the scheme should be specified to achieve ratings of between A+ and C under The Green Guide's ratings. Insulation materials that are specified will also have a global warming potential (GWP) of 5 or less, with an ODP of 0. Additionally, 100% of all timber used as part of the scheme will be responsibly sourced from suppliers that are either Forest Stewardship Council (FSC) accredited, Programme for the Endorsement of Forestry Certification accredited, or a similar recognised accreditation body.

Finally, in addition to the above policy points, the development is also recommended to register with the Considerate Constructors Scheme, or a similar approved scheme.

2.5.5 Pollution Control

To reduce emissions of gases with high GWP and nitrogen oxide (NOx) into the atmosphere, new buildings will be specified with insulating materials that have a GWP of less than 5. This will follow throughout the development to reduce the impact that the construction phase has upon climate change.

Additionally, the following measures will be implemented:

- Pollution Prevention Guidance will be adhered to in respects of air (dust) and water (ground and surface) pollution during the demolition and construction phase.
- External light fittings will be controlled through a time switch, or daylight sensor, to prevent operation during daylight hours to limit the impact of artificial lighting for the development's residents and surrounding environment.

Sound insulation will be specified to achieve Building Regulation Part E compliance standard (this will be verified by pre-completion testing) in addition to meeting the requirements of the council. This will reduce the impact of sound pollution for the occupants within adjoining dwellings.

2.5.6 Sustainable Transport

Transport Links

- **Train:** The closest train station to the site is Kirkby, which is located approximately 1.15km northwest of the site, providing frequent local mainland services to Liverpool central trains to, where access to national destinations can be made.
- **Bus:** The closest bus stop to the site is outside Kirkby Shopping Centre, which is adjacent to the site, providing services every 10 minutes to Liverpool City Centre .

Local Amenities

- Kirkby Shopping Centre is located adjacent to the site which has a wide range of shops and local amenities from retail to restaurants.
- The site is bounded by Kirkby Leisure Centre and Webster Park.

3 Feasibility Assessment of Renewable Energy and Low Carbon Technologies

Solar Hot Water (Thermal)

Solar water heating systems are one of the more familiar renewable technologies used at the moment. They use the energy from the sun to heat water, most commonly for hot water needs. Solar heating systems use a heat collector that is usually mounted on a roof in which the sun heats a fluid. This fluid is used to heat water that is stored in either a separate hot water cylinder or in a twin-coil hot water cylinder (the second coil is used to provide additional heating from a boiler or other heat source).

Photovoltaic Panels (PV)

Photovoltaic modules convert sunlight directly to DC electricity. The solar cells consist of a thin piece of semiconductor material, in most cases of silicon. Through a process called doping, very small amounts of impurities are added to the semiconductor, which creates two different layers called n-type and p-type layers.

Certain wavelengths of light are able to ionize the silicon atoms, which separates some of the positive charges (holes) from the negative charges (electrons). The holes move into the positive or p-layer and the electrons into the negative or n-layer. These opposite charges are attracted to each other, but most of them can only re-combine by the electrons passing through an external circuit, due to an internal potential energy barrier. This flow of electrons produces a DC current.

A PV array can be mounted on the suitable roof space and is being considered by the design team to offset residual carbon emissions.

Ground Source Heat pumps

A heat pump is a device that takes up heat at a certain temperature and releases it at a higher temperature. The essential components of a heat pump are heat exchangers (through which energy is extracted and emitted) and a means of pumping heat between the exchangers. The effectiveness of the heat pump is measured by the ratio of the heating capacity to the effective power input, usually known as the coefficient of performance (COP). Ground-source heat pumps (GSHP) extract heat from the ground. They are classified as either water-to-air or water-to-water units depending on whether the heat distribution system in the building uses air or water. Ground source heat pumps either use long shallow trenches or deep vertical boreholes to take low grade heat from the ground and then compress it to create higher temperatures.

Ground source heat pumps would not be suitable due to the lack of land space around the properties and the associated costs.

Air Source Heat pumps

Air source heat pumps absorb heat from the outside air. This is usually used to heat radiators, underfloor heating systems, or warm air convectors and hot water in your home. An air source heat pump extracts heat from the outside air in the same way that a fridge extracts heat from its inside.

The system performs down to air temperatures of -20°C which means that they are more than suitable for installations within the UK. Hot water and Heating can be provided 365 days a year. The hot water is produced without the aid of electrical immersions and at 55°C is more than hot enough for baths and showers.

There are two main types of air source heat pump system:

- An air-to-water system distributes heat via your wet central heating system. Heat pumps work much more efficiently at a lower temperature than a standard boiler system would. So they are more suitable for under-floor heating systems or larger radiators, which give out heat at lower temperatures over longer periods of time.
- An air-to-air system produces warm air which is circulated by fans to heat your home. They are unlikely to provide you with hot water as well.

Air Source heat pumps are a good option to provide heating and cooling however, highly efficient gas boilers will be utilised to provide the space heating and hot water. Due to the fabric first approach the space heating requirements will be minimal dependent on user occupancy.

Biomass Heating

Biomass is any plant-derived organic material that renews itself over a short period.

Biomass energy systems are based on either the direct or indirect combustion of fuels derived from those plant sources. The most common form of biomass is the direct combustion of wood in treated or untreated forms. The use of biomass is becoming increasingly common in some European countries.

The environmental benefits relate to the significantly lower amounts of energy used in biomass production and processing compared to the energy released when they are burnt. This can range from a four-fold return for biodiesel to an approximate 20-fold energy return for woody biomass. Biomass-fuels can be used to produce energy on a continuous basis (unlike renewables such as wind or solar energy) and it can be an economic alternative to fossil fuels as it is a potential source of both heat and electricity.

However, Biomass systems have design management and maintenance requirements associated with sourcing, transportation and storage and are therefore more commonly used in commercial developments rather than domestic installations. It can be less convenient to operate than mains-supplied fuels such as natural gas and are more management intensive and require expertise in facilities management. Sources of biomass can also fluctuate, so boilers should be specified to operate on a variety of fuels without risk of overheating or tripping out.

A communal biomass system would not be feasible for this development due to the expense associated with the necessary output to heat all dwellings on the site.

Wind

Wind turbines convert the kinetic energy in wind into mechanical energy that is then converted to electricity. Turbines are available in a range of sizes and designs and can either be free-standing, mounted on a building or integrated into a building structure.

The wind speed in the area is under the advised minimum and the built-up area means that a wind turbine wouldn't be feasible.

4 Conclusion

This statement has assessed the proposed development at the land at Cherryfield Drive, Kirkby against the Knowsley Local Plan 2016. Compliance has been demonstrated through the following of the energy hierarchy, the modelling of the scheme in the FSAP 2012 and addressing all aspects of a sustainable development.

As part of this process, the development was designed with a fabric first approach; with U-values, design air permeability and ventilation targets all aspiring to exceed Building Regulations Part L 2021 standards. This approach demonstrates a holistic low energy design concept, involving very low limiting values and thus led to high-energy performance targets and being defined as a low carbon development.

Furthermore, an LZC feasibility assessment was carried out, with all suitable technologies investigated for their suitability to the site and development. The design team are currently considering a PV system at this stage.

The development will also be adapting to climate change by incorporating sustainable drainage measures into the design, protecting existing ecology and enhancing biodiversity where possible.

In addition to the following of the energy hierarchy through the efficient design and renewable technology measures mentioned and meeting all relevant Knowsley Local Plan targets the proposal will include many sustainability measures throughout construction and once completed, which will contribute heavily to the development's sustainability performance and accord with the requirements of the NPPF. The key measures to be included and therefore can be taken from this report include:

- A SUDs strategy will be produced to outline all measures to be incorporated that will ensure any additional surface water is collected, treated, and removed.
- The development will incorporate green infrastructure that will instil a sense of wellbeing whilst also assisting with offsetting carbon dioxide and balancing local temperatures through evapotranspiration.
- Internal water efficiency will be prioritised by ensuring that efficient water fixtures are proposed so that each dwelling achieves less than 110L per person per day and 'A' rated appliances will be specified where possible.
- Prioritising reusing existing materials and locally sourced materials for construction to reduce waste and transportation to landfill in addition and promote a low embodied carbon development.
- When new materials are specified that are not locally attainable then only those that score well on the BRE: The Green Guide to Specification are to be used; to further encourage the use of sustainable materials and reductions in embodied carbon.

As a result of all the above, the proposed sustainable design and energy strategy allows the development to comply with the Knowsley Local Plan planning policy requirement and is in line with all targets put forward in their planning documents.



