

# Housing Scrutiny Commission

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Energy Efficiency of New Build Housing  
Assistant Mayor for Housing: Cllr Elly Cutkelvin

Date: 7<sup>th</sup>. September 2020

Lead director: Chris Burgin

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**City Mayor**

## **Useful information**

- Ward(s) affected: Potentially all
- Report author: Simon Nicholls
- Author contact details: [simon.nicholls@leicester.gov.uk](mailto:simon.nicholls@leicester.gov.uk)
- Report version number: V.1

### **1. Summary**

The Council has embarked on a programme of building new council homes to help meet the identified need for the city. Since we started this process the City has declared a 'climate emergency' and the energy efficiency and climate credentials of our new homes has come under scrutiny.

The primary reason for the new build programme was to increase the supply of much needed 2-bedroom and wheelchair accessible homes in the city; the first phases are being built to established building control standards, with the enhancement of solar PV panels.

The specification for future phases has been increased to exceed building control standards and this report details the standards we are delivering at Saffron Velodrome, Phase 2, of the new council house building programme.

### **2. Recommendations**

To update members of the Housing Scrutiny Commission on the climate credentials of the new build council houses proposed at Saffron Velodrome and Lanesborough Road.

### **3. Supporting information including options considered:**

Phase 1.

The first phase of the new build council house programme consists of six small sites located on established council housing estates, sites range from just 2 dwellings up to 12, a total of 29 units.

The overriding reason for the building of these homes was to try and address the chronic shortage of 2 bedroomed and wheelchair accessible accommodation available to rent for social housing tenants.

In 2019 the city council declared a 'Climate Emergency' and rightly since then there has been a greater emphasis on ensuring that all capital schemes meet the council's aspirations and targets.

Phase 1 were designed and are being built to current building control standards, however we have since increased the specification to include solar PV panels and triple glazing. The contractors are on site now and the first of these new homes will be

ready for occupation in October 2020.

Next steps:

There has been a lot in the construction media about ambitious plans to deliver zero carbon homes by housing providers and homes to Passive House standards and there are some schemes that have gained national recognition for this. one in particular is the Goldsmith Street scheme in Norwich.

[https://amp.theguardian.com/artanddesign/2019/oct/08/stirling-prize-architecture-goldsmith-street-norwich-council-houses?\\_twitter\\_impression=true](https://amp.theguardian.com/artanddesign/2019/oct/08/stirling-prize-architecture-goldsmith-street-norwich-council-houses?_twitter_impression=true)

Whilst we want to be proactive in delivering low carbon homes and homes that are fit for a fossil fuel-free future the original aim of the programme hasn't gone away and we need to find cost effective and sustainable ways of delivering new homes that people can enjoy living in.

The building regulations are also being revised and we have reviewed our specification, based on our expectation of the new regulations and our desire to exceed them.

We are proposing not to follow others or commit to delivering all new build council houses to 'Passive House' standards, but concentrate on a 'Leicester Standard' that is clear, based on fabric first principles uses standard building materials and methods and be simple and inexpensive to run for the occupier. We hope this approach will deliver homes that are up to 70% better than current Building Control requirements and will have a carbon saving of 65 tonnes per year.

Subsequent phases will follow this approach; however, we will review this on a phase by phase basis and review and amend as necessary to ensure that we are constantly improving.

The next two phases are Saffron Velodrome and Lanesborough Road, where we have adopted the following approach to sustainability and energy efficiency. The examples given all relate to the Saffron Velodrome site.

### **General Measures:**

Layout and Orientation:

The layout of the scheme has been designed to ensure that as many plots as possible have a south east or south west orientation to maximise solar PV generation. However it has not been possible to do this on all plots. Main living rooms have also been designed to have a dual aspect to maximise the potential for solar gain and cross flow ventilation to limit any overheating.

### **Energy Efficiency and Carbon reduction measures:**

The new houses will be constructed under current Part L of the Building regulations,

below is the proposed specification for the new houses, the following is based on the 38 homes at Saffron Velodrome; we are still finalising the Lanesborough Road site, however it will follow the same principles:

Item	Standard	Specification
Walls - Brick	0.16 W/m <sup>2</sup> .K	Masonry cavity wall with partial fill or full fill insulation.
Party wall	0.00 W/m <sup>2</sup> .K	Fully filled party wall
Roof (ceiling)	0.09 W/m <sup>2</sup> .K	Tradition trussed roof with 500mm mineral wool insulation
Ground Floor	0.12 W/m <sup>2</sup> .K	Suspended floor with either insulated blocks or insulation on beam and block floor
Windows & Glazed doors	0.80 W/m <sup>2</sup> .K	Triple glazed 'g' value = 0.57
Front door	1.00 W/m <sup>2</sup> .K	
Air test	3 m <sup>3</sup> /hr/m <sup>2</sup>	
Accredited Details	Accredited and Concrete Block Association	Separate lintels

The 'U' value is a measure of how efficient a material is as an insulator; the lower the number the better the materials insulating qualities.

These homes will have increased thermal efficiencies compared to that is required under the current building regulations; below is a comparison table that shows the improvement as a percentage:

Item	Standard	Building Regs	Improvement
Walls Cavity	0.16 W/m <sup>2</sup> .K	0.30 W/m <sup>2</sup> .K	47%
Roof (Ceiling)	0.09 W/m <sup>2</sup> .K	0.20 W/m <sup>2</sup> .K	55%
Ground Floor	0.12 W/m <sup>2</sup> .K	0.25 W/m <sup>2</sup> .K	52%
Windows	0.80 W/m <sup>2</sup> .K	2.00 W/m <sup>2</sup> .K	60%
Front Door	1.00 W/m <sup>2</sup> .K	2.00 W/m <sup>2</sup> .K	50%
Air Permeability	3 m <sup>3</sup> /hr/m <sup>2</sup>	10 m <sup>3</sup> /hr/m <sup>2</sup>	70%

The proposed building fabric improvements show an up to 70% improvement based on current building control standards.

Building Services, heating and hot water:

Item	Standard	Specification
Heating and ventilation	Air to Air Heat Pump	Nilan Compact P**
Heating Controls	Programmer and room thermostat	
Heating Features	Via air (Nilan Compact)	
Hot Water	Via the Nilan Compact	180 litre storage tank, 0.84 kWh/day losses
Ventilation	Via the Nilan unit	
Lighting	100% low energy lighting	

Air to Air Heat pump:

An air source heat pump takes heat from the air and boost it to a higher temperature, the pump needs electricity to run but should use less electricity than the heat that it generates.

The proposed Nilan Compact P is a multi-function air to air heat pump that provides highly efficient space heating, hot water and integrated heat recovery ventilation.



Solar PV panels:

PV panels convert solar radiation into direct current electricity. They are a very good source of renewable energy as they convert the most abundant source of energy on the earth, the sun, into the most useful source of energy, electricity.

PV panels are silent in operation, they have no moving parts, have low levels of maintenance and a long-life expectancy. They are connected into the grid via an inverter and more recently battery technology has improved so the electricity can now

be stored.

Solar PV is more efficient in lower temperatures; they should be located to avoid over shading and preferable face due south at an angle of 35 degrees. The output of PV panels is measured in KWP, kilowatts peak. The average cost of an installation will be between £2k - £3k.

We are proposing installing 6 x 250-watt panels to each of the roofs, with the exception of two plots that will need 8 panels to achieve the required EPC 'A' rating, see below:

	Plots	Panels per roof	Total PV panels	kWp PV	Energy kWh/yr
South Roofs	5	6	30	7.50	6,475
SW Roofs	29	6	174	43.50	35,815
West Roofs	2	6	12	3.00	2,435
<b>West Roofs</b>	<b>2</b>	<b>8</b>	<b>16</b>	<b>4.00</b>	<b>3,247</b>
<b>TOTAL</b>	<b>38</b>		<b>152</b>	<b>58.00</b>	<b>47,972</b>

Based on the above 47,972kWh/year on site renewable energy will be generated.

Carbon emission summary,

House Type	No.	Floor area	TER	DER	Baseline	Actual	Saving	Saving
		m2	kgCO2/m2/yr	kgCO2/m2/yr	kgCO2/yr	kgCO2/yr	kgCO2/yr	%
Type A1	4	64.4	28.25	5.35	7,277	1,378	5,899	81.06%
Type A2	2	64.4	25.34	6.58	3,264	848	2,416	74.03%
Type B	2	70.84	31.45	6.69	4,456	948	3,508	78.73%
Type C1	4	81.84	25.95	6.05	8,495	1,981	6,514	76.69%
Type C2	6	81.84	25.75	5.95	12,644	2,922	9,723	76.89%
Type D	2	98.76	28.44	8.7	5,617	1,718	3,899	69.41%
Type E	10	92.88	24.95	6.56	23,174	6,093	17,081	73.71%
Type F	3	117.06	27.27	8.62	9,577	3,027	6,550	68.39%
Type G1	2	146.58	21.09	7.97	6,183	2,336	3,846	62.21%
Type G2	2	146.58	21.96	8.47	6,438	2,483	3,955	61.43%
Type H	1	103.33	28.18	9.72	2,912	1,004	1,907	65.51%
	<b>38</b>				<b>90,036</b>	<b>24,738</b>	<b>65,298</b>	<b>72.52%</b>

All dwellings will have an EPC rating of A and the predicted annual electricity bill of £440 per year, or £36 per month, which compares well to £443 per year for a similar sized Passive House.

This is compared to the average dual fuel energy bill in the UK of £1,138 per year or £93.83 a month. (Ofgem 2020)

Sustainability  
Electricity usage

These houses will be carbon free because they will be solely powered by electricity. The council's energy supplier, Robin Hood Energy supplies only electricity from renewable sources.

Water usage:

The water usage per person per day has been calculated at 110 litres, set against a current average consumption of 142 litres per person per day.

It has been calculated as per the table below:

Installation Type	Unit of Measure	Capacity/Flow Rate	Use Factor	Fixed Use (Litres/person/day)	Litres/person/day
WC (Single Flush)	Flush Volume (litres)		4.42	0	0.00
WC (Dual Flush)	Full Flush Volume (litres)	4	1.46	0	5.84
	Part Flush Volume (litres)	2.6	2.96	0	7.70
Taps (excluding kitchen utility)	Flow rate (litres/min)	6	1.58	1.58	11.06
Bath (where shower present)	Capacity to overflow (litres)	180	0.11	0	19.80
Shower (where bath present)	Flow rate (litres/min)	8	4.37	0	34.96
Bath only	Capacity to overflow (litres)		0.5	0	0.00
Shower only	Flow rate (litres/min)		5.6	0	0.00
Kitchen/Utility taps	Flow rate (litres/min)	6	0.44	10.36	13.00
Washing Machine	Litres/kg dry load	8.17	2.1	0	17.16
Dishwasher	Litres/Place Setting	1.25	3.6	0	4.50
Waster Disposal	Litres/use (1 = present, 0 - absent)	0	3.08	0	0.00
Water Softener	Litres/person/day	0	1	0	0.00
	5	Total Calculated			114.01
	6	Contribution Greywater			0.00
	7	Contribution Rainwater			0.00
	8	Normalisation factor			0.91
	9	Total water consumption			103.75
	10	External water use			5.00
	11	<b>Total Water Consumption</b>			<b>108.75</b>

Sustainable materials used in construction.

Where possible green guide A rated material will be used, the only exception being the load bearing partition walls.

See table below

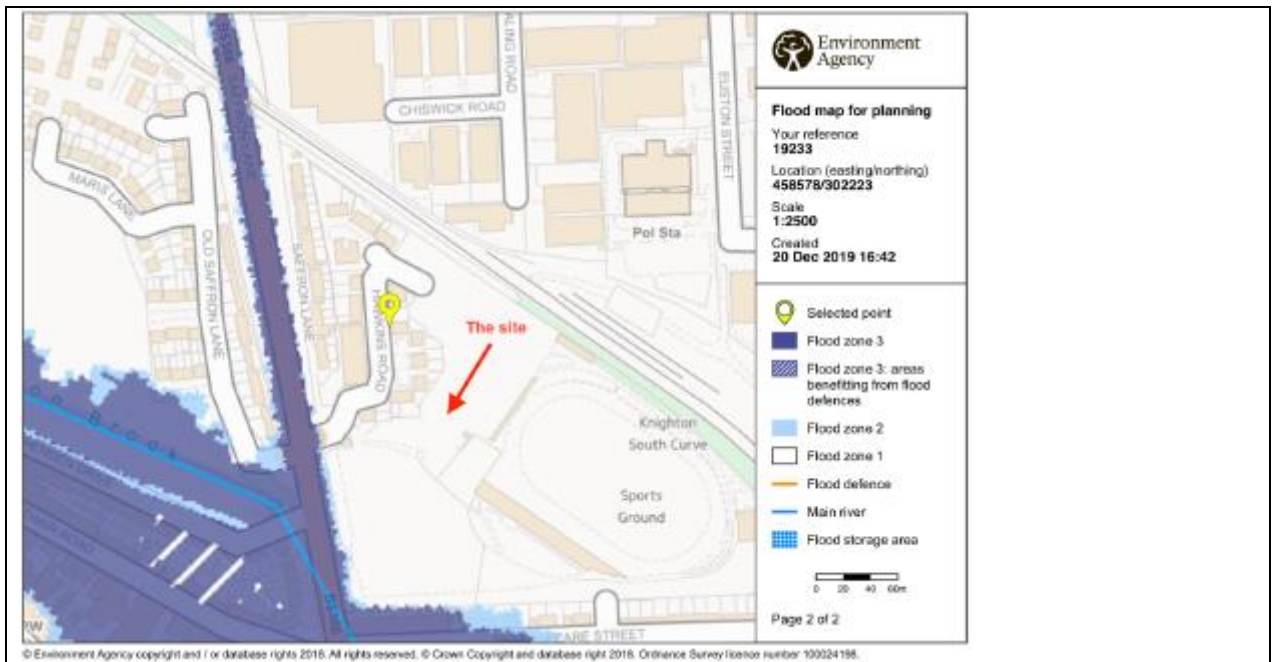
Element	Green Guide Ref	Rating	Description
External brick cavity wall	806170047	A+	Brickwork outer leaf, insulation, medium dense solid blockwork inner leaf, cement mortar, plasterboard on battens, paint
External rendered block cavity wall	806180042	A+	Cement rendered medium dense solid blockwork cavity wall, insulation, cement mortar, plasterboard on battens, paint
Roof	812410007	A+	Timber trussed rafters and joists with insulation, roofing underlay, counterbattens, battens and concrete interlocking tiles or clay tiles
Intermediate Floors (Houses)	807280026	A+	T&G floorboards on timber 'I' joists
Non-loadbearing internal walls	809760002	A	Galvanised steel stud, plasterboard, paint
Loadbearing walls	809180008	B	Medium dense blockwork, plasterboard, paint
Windows	813100009	A	PVC-U window with steel reinforcement, double glazed
Carpet – Floor Finish	821570080	A	Carpet - polypropylene cut, 1000 g/m <sup>2</sup> , textile backing. Felt Underlay 1400 g/m <sup>2</sup> . FCSS 21, 22/23.
Vinyl – Floor finish	821570015	A	Homogeneous and heterogeneous profiled surfaced rubber floor coverings (EN 12199). FCSS 23/32.

Flood risk and surface water run off:

The proposed scheme will use rainwater recycling and if ground conditions permit we will use soakaways to limit surface water run and existing storm water drains.

The site is not in a flood plain, it is low risk, flood zone 1 but borders a flood zone 3





What next:

We are continuing to look at the specification and review the materials that we use to build our new homes with the aim of reducing the running cost further and using materials from sustainable/local sources.

We are also looking at the way we build our homes to try and see if we can make them more sustainable by considering off site construction and or modular construction. We are currently working through these ideas on a number of smaller sites and will bring a further report to the Executive once we are further ahead in the process.