



10-20 Marine Place, Worthing, Brighton, BN11 3DN

Sustainability and Energy Statement Rev B

For

Craig Developments Ltd.
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Low Carbon Consultants have the expertise and necessary qualifications to offer advice in a professional capacity on matters relating to Part L of the Building Regulations and sustainability within the construction sector.

This document contains the following information:

- Sustainability Statement, SAP Calculations

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1. Executive Summary

1.1 Overview

The Energy Statement provides a clear assessment of the proposed development's overall energy requirements.

In formulating designed energy and carbon emissions SAP 10.2 has been used to calculate the estimated CO₂ reductions.

The Sustainability Strategy provides information on proposed energy efficiency measures and other carbon reductions. It also provides a summary of proposed major fabric building materials, waste management and water management. It considers how the development maintains a balance of environmental, economic and social issues. Steps taken to promote an effective energy hierarchy are detailed.

1.2 Key Findings

The Energy Statement concludes that a minimum 20% reduction in CO₂ emissions can be achieved using connecting to a district heating system with an ASHP with a minimum efficiency of 280%. Renewable and low carbon energy production equipment to meet at least 10% of predicted total energy requirements can be met by using a total of 18.9 kWp of PV. This total has been based on panels with an output of 350W each. The individual flat quantities are as follows.

Plot Number	PV kWp	Orientation	Angle
Flat 01	0.7	South	30°
Flat 02	0.7	South	30°
Flat 03	0.7	South	30°
Flat 04	0.7	South	30°
Flat 05	0.7	South	30°
Flat 06	0.7	South	30°
Flat 07	0.7	South	30°
Flat 08	0.7	South	30°
Flat 09	0.7	South	30°
Flat 10	0.7	South	30°
Flat 11	0.7	South	30°
Flat 12	0.7	South	30°
Flat 13	0.7	South	30°
Flat 14	0.7	South	30°
Flat 15	0.7	South	30°
Flat 16	0.7	South	30°
Flat 17	0.7	South	30°
Flat 18	0.7	South	30°
Flat 19	0.7	South	30°
Flat 20	0.7	South	30°
Flat 21	0.7	South	30°
Flat 22	0.7	South	30°
Flat 23	0.7	South	30°
Flat 24	0.7	South	30°
Flat 25	0.7	South	30°
Flat 26	0.7	South	30°
Flat 27	0.7	South	30°

2. Introduction

This Statement has been prepared by Melin Consultants considering Worthing Local Plan 2023.

It is intended to provide a clear and straightforward assessment of the proposed development's energy requirements and subsequent CO₂ emissions.

This Statement assesses expected energy demand at the site, showing how energy and carbon dioxide emissions will be reduced through designing for minimum energy use and installing on-site renewable energy.

2.1 Background

This Sustainability Strategy & Energy Statement has been prepared by Melin Consultants considering national planning policy requirements and the requirements of Worthing Local Plan 2023.

It assesses expected energy demand for the site, showing how energy and carbon dioxide emissions can be reduced through designing for minimum energy use and installing on-site renewable and low carbon energy sources.

It is supported by a summary of the proposed thermal performance of the major fabric building materials, waste management and water

management and how the development engages with issues around sustainable design in a wider context.

In summary, Worthing Local Plan 2023 requires new developments to both mitigate and adapt to climate change. They should also include measures to reduce carbon dioxide emissions and incorporate sustainable design to maximise energy efficiency. Specifically, evidence is required to demonstrate how new development minimises its energy requirements and how it will reduce CO₂ emissions by a minimum 20% over a Building Regulations Part L compliant building and at least 10% of predicted total energy requirements can be met using renewable technologies.

2.2 Policy Context

Carbon dioxide (CO₂), along with other greenhouse gases, is linked directly to a warming wetter climate. The use of fossil fuels to provide energy for lighting, heating and hot water in buildings contributes to carbon emissions. Thereby, reducing demand for energy will reduce total carbon emissions required to operate and condition a building. It is estimated that buildings account for near half of the total UK carbon emissions with the domestic housing sector accounting for around 27% of the total UK carbon emissions.

To mitigate against the reliance on fossil fuels and further contributing to greenhouse gases the UK has two measurable future targets which help share and develop sustainable construction standards.

The EU Renewable Energy Directive (2009) requires the UK to meet a renewable energy target of 15% energy generation by 2020.

The Climate Change Act (2008) is a legally binding commitment by the UK to reduce greenhouse gas emissions by 34% by 2020 and 80% by 2050 from a 1990 baseline.

3. Policy Requirements

The report has been carried out considering the Worthing Local Plan 2023 policies DM16 & DM17.

Worthing Local Plan 2023 policies DM16 – Sustainable Design states:

- a) All development (excluding householder applications) will be required to achieve the relevant minimum standards below unless superseded by national planning policy, Building Regulations or it can be demonstrated that it is not practicable, feasible or viable (in which case the minimum standard should be met as far as is possible). Applications for major development must be supported by a Sustainability Statement demonstrating that the minimum standards are met and where possible exceeded. All development is encouraged to exceed these minimum standards where possible.

Towards Zero Carbon Development

- b) All new build housing will achieve a minimum 20% CO₂ reduction compared to the Building Regulations Part L 2013 standard through energy efficiency measures, unless superseded by national policy or Building Regulations. Developers will be expected to provide evidence of the level of carbon reduction achieved in the dwellings through submission of SAP calculation reports at the design and built stages.
- c) New non-domestic buildings will achieve a 27% reduction in CO₂ on average per building compared to the Building Regulations Part L 2013 standard unless superseded by national policy or Building Regulations. Applications for major development should demonstrate how the design and layout of the development has sought to maximise reductions in carbon emissions in line with the energy hierarchy.
- d) All new build housing should seek to achieve an A rating (with a minimum expectation of B rating) Energy Performance Certificate. New housing should achieve a minimum of a 'C' rating Energy Performance Certificate.
- e) All non-domestic properties (including those created through conversions) should achieve a 'B' rating Energy Performance Certificate.
- f) Non-residential development of at least 1,000 sqm floorspace should achieve BREEAM New Construction 'Very Good' as a minimum rating based on the latest BREEAM scheme.

Preventing Overheating

- g) All new development should incorporate design measures where appropriate to minimise excessive solar gain and maximise opportunities for passive cooling through natural ventilation and other passive means to avoid contributing to the urban heat island effect and reduce vulnerability to overheating. Multifunctional green infrastructure should be integrated into public spaces to provide urban cooling and access to shady outdoor space.
- h) Major development proposals should reduce potential overheating and reliance on energy intensive air conditioning systems and demonstrate this in accordance with the cooling hierarchy.

Minimising Waste

- i) All development will be required to follow the waste hierarchy to minimise the amount of waste disposed to landfill and incorporate facilities that enable and encourage high rates of recycling and re-use of waste and materials.

The report is intended to provide a clear and straightforward assessment of the proposed development's energy usage and carbon emissions and will outline any proposed measures that have been included, in order to increase the sustainability of the proposed development.

Worthing Local Plan 2023 policies DM17 – Energy states:

- a) All new housing and major non-residential development should incorporate renewable and low carbon energy production equipment to meet at least 10% of predicted total energy requirements (after CO₂ reductions from energy efficiency measures).
- b) All proposals for major development must demonstrate that the heating and cooling systems have been selected in accordance with the heating and cooling hierarchy and that the lowest carbon solution that is feasible is used. Applicants will be required to submit a feasibility assessment to provide a rationale for the chosen heating/cooling system.
- c) Applicants for major development within areas identified as heat network opportunity clusters should demonstrate how they have considered connecting to district heating networks where:
 - a. they exist at the time of permission being granted;
 - b. the heat network route lies adjacent to the site; and
 - c. otherwise, it is feasible and viable to do so. Alternatively, where a heat network route is planned but has not been delivered, sites adjacent to the planned heat network routes should consider being heat network ready to enable a future connection.
- d) The development of renewable, low carbon, or decentralised energy schemes will be supported and community initiatives encouraged where proposals:

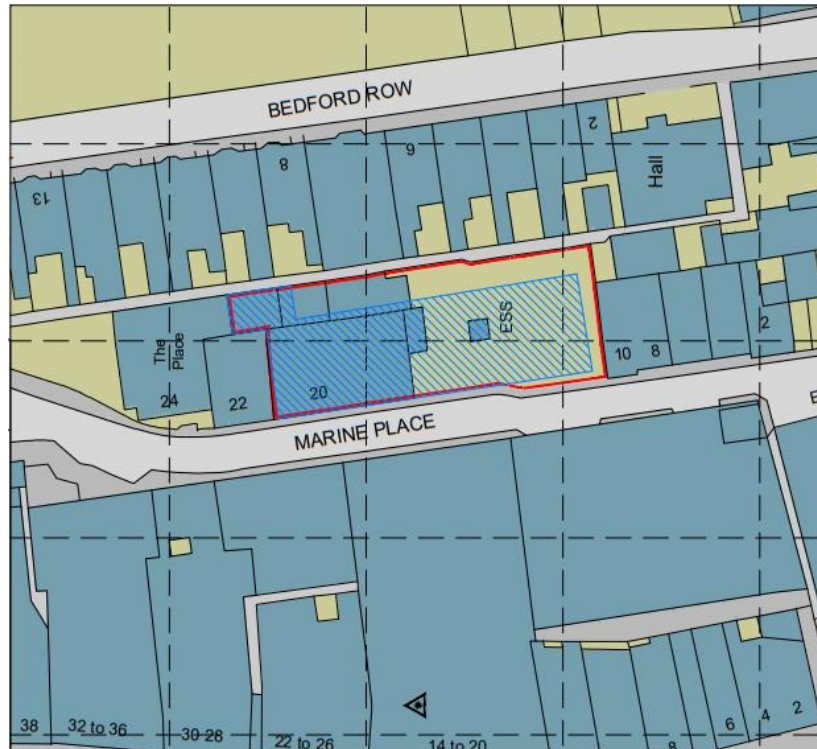
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- a. are located appropriately and do not cause an unacceptable impact on surrounding uses or the local environment, landscape character or visual appearance of the area (including the South Downs National Park), taking into account the cumulative impact of other energy generation schemes; and
 - b. mitigate any potential noise, odour, traffic or other impacts of the development so as not to cause an unacceptable impact on the environment or local amenity.

4. Site Analysis

4.1 Location

The proposed development is located on the site of the current building at 20 Marine Place in Worthing. **Error! Reference source not found.** below highlights the area of the development.

Figure 1: Location of plot



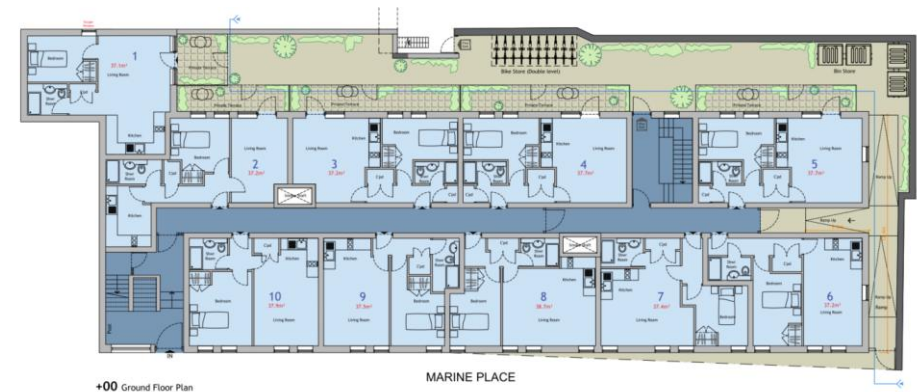
4.2 Local Transport Services

Situated on Marine Place the site is close to several good transport links. Worthing railway station is approximately 1.1 miles from the site by road, this provides services to Portsmouth, Southampton, Brighton and London Victoria amongst others.

Several bus stops are located on Marine Parade, less than 100m from the proposed site, which provide further local transport links.

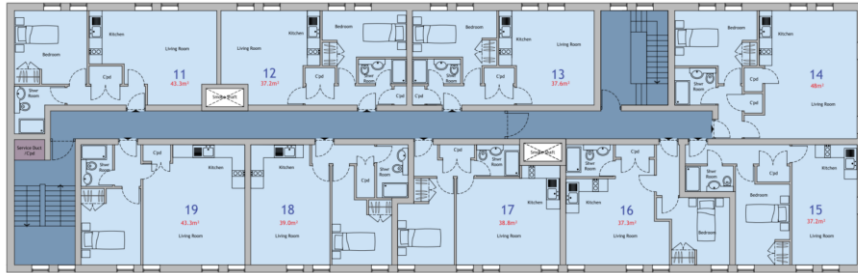
4.3 The Proposals

It is proposed to demolish the existing building at 20 Marine Place and construct 27 flats across 3 floors.



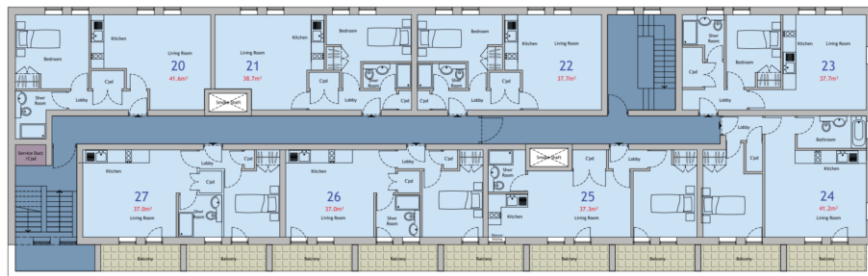
Sustainability and Energy Statement

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First Floor Plan

+01 First Floor Plan



+02 Second Floor Plan

5. Energy Efficient Design Measures

To supplement the **Worthing Local Plan 2023** core requirements for sustainable construction the design team have considered the three issues that contribute to the proposed developments overall sustainability. These are environmental, economic and social.

5.1 Solar/Daylighting

The proposed development will make good use of glazing to all elevations to help reduce internal lighting loads.

Where possible the following daylight factors will be met:

- Kitchen areas are anticipated to achieve a minimum average daylight factor of at least 2%.
- Living rooms, dining rooms and work areas are anticipated to achieve a minimum average daylight factor of at least 1.5%.
- Home office areas are anticipated to achieve a minimum average daylight factor of at least 1.5%.

5.2 Ventilation

A whole house mechanical extraction system will be fitted throughout the dwelling. This will have efficiencies in line with current Part F of the building regulations.

5.3 Overheating

The SAP calculations have carried out basic solar gains calculations to determine which areas may be at risk from overheating. None of the areas on which calculation have been carried out show any risk of overheating. To reduce the risk of solar gains and reduce the need for mechanical ventilation or cooling, the London Plan Cooling Hierarchy has been used. The steps and measures included within the design are outlined below:

- *Minimise internal heat generation through energy efficient design* – The building has been designed in such a way to reduce the internal generation within rooms. Based on the usage of the rooms within the building it is unlikely that there will be significant amounts of internal heat generated.
- *Reduce the amount of heat entering a building in summer through orientation, shading, albedo, fenestration, insulation and green roofs and walls* – The orientation of the building is such that there are windows that face South, where it is deemed necessary, these windows will incorporate solar glazing to reduce the solar gains.
- *Manage the heat within the building through exposed internal thermal mass and high ceilings* – The building design will include materials with a high thermal mass to help manage the heat within the building.
- *Passive ventilation* – The building will make use of a natural ventilation strategy to ensure all areas are ventilated to an adequate level and reduce heat levels within the building.

- *Mechanical ventilation* – The building has been designed to use mechanical ventilation within the residential areas.
- *Active cooling systems* - The building has been designed not to use cooling within the residential areas.

5.4 Lighting

It has been assumed within the calculations that all internal lighting will be low energy fittings. To be classified as a low energy light fitting under the Domestic Building Services Guide the fitting must have an efficacy of 75 lumens per circuit watt or higher.

5.5 Insulation and fabric performance

High performance insulation will be specified throughout and will have a GWP of <5 and zero ODP. The effects of cold bridging and air infiltration will be addressed prior to construction. Low U values have been specified in order to reduce the carbon emissions for the development.

5.6 Materials

Where possible, it is proposed that construction materials will be purchased from sources that minimize carbon emissions and/or come from sustainable sources. The environmental policy and sustainability policy for each manufacturer shall be carefully considered before orders are placed.

Where possible, timber should be sourced that has Forest Stewardship Council (FSC) or Programme for the Endorsement of Forest Certification PEFC) certification. This is to ensure that the timber is legally and sustainably sourced.

Green roofs have been discounted on this scheme as the roof was required to install the PV

5.7 Heating, cooling & DHW strategy

It has been assumed for the purposes of this report that the proposed heating and domestic hot water strategy will be through connection to a district heating system with 200l hot water cylinders within the dwellings.

To meet enhanced Building Regulations requirements, water usage must not exceed 110 Litres/person/day. To achieve this the following fittings will be required:

- WCs – dual flush 4 (full flush), 2.6 (part flush)
- Kitchen taps – 6 litres per minute
- Basin taps – 6 litres per minute
- Baths – 180 litre capacity
- Showers – 8 litres per minute

5.8 District Heating

There are currently no opportunities for connection to a district heating scheme. However, the development is within a heat priority area so future opportunities may become available. This report has been produced based on connection to the possible future heat network.

5.9 Renewable technologies

As part of the decision-making process required to determine the feasibility of suitable low carbon and renewable technologies, several options have been considered for the proposed scheme. A summary of the suitability of each technology is listed in the table below.

Table 1 – Summary of renewable technology

Solar PV
Solar PV lends itself to the proposed development with minimal obstruction and a significant available installation area. The electricity demand of the proposed building is going to be significant, especially during period of occupation and a 10% reduction in energy usage could be achieved by using this technology.
Solar thermal
The proposed development would have low to medium hot water demand which, if sized correctly, lends itself to solar thermal. It is unlikely that a 10% reduction in energy usage could be achieved

through the use of this technology alone and may need to be used with another technology.

Air source heat pumps

Air source technology is a potential technology that could be used on the proposed development. It would require wall or roof mounted plant which may present visual issues.

Biomass

Biomass is a potential technology for the site however fuel storage would be an issue for the development. Biomass boilers do not modulate as well as a conventional fuel boiler and would therefore require a constant heat demand to be sized correctly. Due to the location of the building delivery and storage of the fuel would be an issue.

Ground source heat pumps

The energy demand of the proposed development would be suitable for ground source technology, however, due to the location of the development it has been assumed that the geology of the proposed site would not be suitable for bore-holes to work effectively, in addition to this the topography and size of the site does not lend itself to loops.

Wind

The estimated wind speed for the location and the surrounding obstructions do not lend itself to this technology.

CHP

A medium heat and electricity demand make CHP a viable option for this development. Further investigation will be required if this system is chosen, so that the system can be sized properly.

In addition to the above, other technologies have been considered for this project to reduce the carbon emissions of the dwellings. Waste Water Heat Recovery systems have also been considered. These systems use a heat exchanger to recover energy and reuse heat from drain water, this then feeds into the hot water system to pre-heat the water.

6. Baseline Energy Demand and CO₂ Emissions

6.1 Energy Benchmarks

Energy performance benchmarks for the proposed development are taken from 'Energy efficiency in buildings' CIBSE Guide F (2012) and where appropriate data from relevant design team members. SAP calculations have also been used to calculate the reductions in Carbon Emissions that have been achieved.

To demonstrate how the development has reduced energy demand by a prescribed amount, technical calculations SAP 10.2 provide estimated primary energy usage for a building (baseline building). This is followed by a set of calculations with improved energy efficiency, this is followed by a final set of calculations have been carried out which include the renewables. These calculations demonstrate how the required reduction of 20% over Building Regulations Compliance can be achieved and a further 10% reduction in energy usage can be achieved through the addition of renewable technologies..

6.2 Baseline Calculations

Baseline calculations have been obtained from a Building Regulations Part L: 2021 Notional target dwelling. Figures below have been taken from Appendix R Table R1:

- Heating system: mains gas combi boiler feeding radiators
- The floor U-value is set at 0.13 W/m²K.

- The external wall U-value is set at 0.18 W/m²K.
- The roof U-value is set at 0.11 W/m²K.
- The window and door U-value is set at 1.20 W/m²K.
- Natural ventilation
- An air permeability figure of 5.0 m³/h/m²@50Pa has been used.
- WWHR system for all showers
- 40% of floor area /(6.5 x number of stories) kWp of solar PV facing south-east/west with an export capable meter

6.3 Improved Calculations

To achieve a 20% reduction through energy efficient measures alone the following have been proposed:

- Heating system: District heating system with ASHP minimum efficiency of 280%. Charging linked to use with Programmer, room thermostat & TRVs. Distribution loss factor 2
- The floor U-value is set at 0.14 W/m²K.
- The external wall U-value is set at 0.18 W/m²K.
- The roof U-value is set at 0.13 W/m²K.
- The window and door U-value is set at 1.30 W/m²K.
- MVHR – Vent Axia Sentinel Kinetic FH used in the calculations
- An air permeability figure of 3.0 m³/h/m²@50Pa has been used.
- 200l hot water cylinder with a heat loss of 161 kWh/day
- Shower flow rate 8l/minute

6.4 Final Proposed Calculations

Several renewable technologies have been considered for the proposed development (Solar Thermal, Solar PV, Wind, ASHP, GSHP, CHP and Biomass), the suitability of these technologies has been covered in Section 4.13 of this report. PV was considered the most appropriate technology in this case, with a total of 18.9kWp used to meet 10% of predicted total energy requirements.

7. Energy Statement for the Chosen Technology

Based on the information provided in the above report it has been decided that the most suitable and cost-effective renewable technology would be PV, below is a summary of the savings that have been achieved.

Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for the development

	Total Regulated carbon dioxide emissions across for the development (CO ₂ per annum)	Total Energy Demand across the development (kWh per annum)
Baseline: Part L 2021 of the Building Regulations Compliant Development	16,551.83	
After energy efficiency measures & District heating	8,034.36	141,634.04
After renewable energy	5,921.53	125,311.63

Table 2: Regulated Carbon Dioxide Emissions savings after each stage of the Energy Hierarchy for the development

	Total Regulated carbon dioxide emissions savings		Total Energy Demand across the development	
	(CO ₂ per annum)	(%)	(kWh per annum)	%
Savings from the energy demand reduction	8,517.47	51.46		
Savings from renewable energy	2,112.83	26.3	16,322.41	11.52

8. Energy Savings Conclusion

The report demonstrates that with electric panel heaters, MVHR and heat pump hot water cylinders the proposal can demonstrate a potential to reduce CO₂ by greater than 20% over a Part L 2021 compliant baseline calculation. 10% of the total energy demand after energy efficiency measures can be met with the inclusion of 14 kWp of PV across the development. In addition to this all dwellings can achieve an EPC rating of 79C or greater.

Plot Reference	Baseline CO ₂ emissions	CO ₂ emissions after energy efficient measures	Reduction (%)	Total Energy requirement after energy efficient measures	Total Energy requirement after PV	Energy requirement met by PV (%)	PV (kWp)	SAP Rating
Flat 01	663.26	321.71	51.50	5689.49	5084.96	10.63	0.7	79C
Flat 02	657.32	316.7	51.82	5595.31	4990.78	10.80	0.7	79C
Flat 03	617.03	296.64	51.92	5244.42	4639.88	11.53	0.7	80C
Flat 04	644.2	309.03	52.03	5456.27	4851.73	11.08	0.7	80C
Flat 05	681.1	327.74	51.88	5790.39	5185.86	10.44	0.7	79C
Flat 06	629.81	303.2	51.86	5347.72	4743.19	11.30	0.7	80C
Flat 07	591.86	285.06	51.84	5027.74	4423.2	12.02	0.7	81B
Flat 08	603.71	291.84	51.66	5135.9	4531.37	11.77	0.7	81B
Flat 09	574.92	277.75	51.69	4887.6	4283.06	12.37	0.7	81B
Flat 10	619.73	297.23	52.04	5231.76	4627.23	11.56	0.7	80C
Flat 11	671.61	320.3	52.31	5598.36	4993.83	10.80	0.7	80C
Flat 12	554.69	265.69	52.10	4692.46	4087.92	12.88	0.7	82B
Flat 13	538.21	258.61	51.95	4567.63	3963.1	13.24	0.7	82B
Flat 14	609.71	298.34	51.07	5200.85	4596.31	11.62	0.7	82B
Flat 15	534.43	261.45	51.08	4625.14	4020.6	13.07	0.7	82B
Flat 16	564.71	273.27	51.61	4821.67	4217.13	12.54	0.7	82B

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Flat 17	573.47	277.64	51.59	4888.75	4284.22	12.37	0.7	82B
Flat 18	566.62	274.5	51.55	4833.75	4229.22	12.51	0.7	82B
Flat 19	621.25	299.05	51.86	5232.51	4627.97	11.55	0.7	81B
Flat 20	668.13	331.1	50.44	5813.87	5209.34	10.40	0.7	79C
Flat 21	619.56	304.8	50.80	5370.53	4766	11.26	0.7	80C
Flat 22	625.87	306.14	51.09	5405.72	4801.19	11.18	0.7	80C
Flat 23	619.26	304.6	50.81	5385.62	4781.09	11.22	0.7	80C
Flat 24	612.64	304.57	50.29	5364.67	4760.14	11.27	0.7	81B
Flat 25	637.02	312.51	50.94	5535.99	4931.46	10.92	0.7	79C
Flat 26	619.95	305.38	50.74	5411.89	4807.35	11.17	0.7	80C
Flat 27	631.76	309.51	51.01	5478.03	4873.5	11.04	0.7	80C

Appendix A: Software Outputs