



Fronks Road

Energy Statement

July 2023

CONTENTS

1. Executive Summary.....	3
2. Policy Framework	4
3. Energy Calculations	6
4. Renewable Technologies	8
5. Water Efficiency.....	9
6. Conclusion	10

Appendix 1 – CO₂ Calculation Spreadsheet

Appendix 2 – SAP Data – Part L 2021 – Pre-PV

Appendix 3 – SAP Data – Part L 2021 – With PV

Appendix 4 – PV Drawing and Datasheet

DOCUMENT CONTROL SHEET

Report Reference	MW294/FR/ES/202307-EC
Issue Purpose	For Planning
Client	Tim Snow Architects
Author	Edward Coate
Approved By	Ryan Thrower
Date of Issue	6th July 2023

DISCLAIMER

This report has been produced to support a Planning Application and is not to be used 'For Construction', for Building Control compliance or for submission against a Planning Condition.

This report is based on drawings and specifications provided along with information assumed by NRG Consulting for the purposes of compliance. Any budget costs or plant sizing contained within this document are estimated unless otherwise specified and are to be taken as guideline only.

NRG Consulting accepts no responsibility whatsoever to third parties to whom this report or any part thereof is made known. Any such party relies upon the report at their own risk.

This report is for the use of the specified Client only unless in the case that there is a signed Letter of Reliance to accompany the report.

1. EXECUTIVE SUMMARY

- 1.1 This Energy Statement has been prepared by NRG Consulting in support of an application for full planning permission for a new development at Fronks Road, Dovercourt to Tendering District Council by Tim Snow Architects.

The proposed development is described as the:

“Construction of 5no detached bungalows including garages, access drive and landscaping.”

- 1.2 SAP calculations have been undertaken under Part L 2021 of the Building Regulations and this document illustrates a renewable contribution of >20%. The following measures have been introduced over the scheme:

Energy Efficient Measures

- High levels of thermal insulation to achieve U-Values in-line with the Part L 2021 notional building specification.
- LED Lighting with high luminous efficacy (100lm/W)
- Air Permeability target of 3 m³/(hm²) @50Pa

Renewable Technologies

A PV array of 3.2 kWp per dwelling to be individually inverted to each bungalow. This equates to a site-wide total of 16kWp

	CO ₂ Emissions (Tonnes per Annum)	
	Regulated	
DER (No-PV)	5.8	
Final Regulated Energy (DER with PV)	4.3	
Renewable Energy Contribution	25.35 %	
Table: Carbon Emissions Table		

2. POLICY FRAMEWORK

- 2.1 The proposed development falls within the Government’s “minor” category of planning applications.

NATIONAL POLICY – NPPF (2021)

The delivery of sustainable development is at the foundation of the NPPF, which defines it as “meeting the needs of the present without compromising the ability of future generations to meet their own needs.

LOCAL POLICIES

- 2.2 The following Planning Policies from the local authority Local Plan¹ are relevant to this report:

Policy SP 1

Presumption in Favour of Sustainable Development

When considering development proposals the Local Planning Authorities will take a positive approach that reflects the presumption in favour of sustainable development contained in the National Planning Policy Framework. They will always work pro-actively with applicants 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.

Development that complies with the Plan will be approved without delay, unless material considerations indicate otherwise.

Policy SPL 3

SUSTAINABLE DESIGN

Part A: Design. All new development (including changes of use) should make a positive contribution to the quality of the local environment and protect or enhance local character. The following criteria must be met:

- a. new buildings, alterations and structures are well designed and maintain or enhance local character and distinctiveness;
- b. the development relates well to its site and surroundings particularly in relation to its siting, height, scale, massing, form, design and materials;
- c. the development respects or enhances local landscape character, views, skylines, landmarks, existing street patterns, open spaces and other locally important features;
- d. the design and layout of the development maintains or enhances important existing site features of landscape, ecological, heritage or amenity value; and
- e. boundary treatments and hard and soft landscaping are designed as an integral part of the development reflecting the function and character of the development and its surroundings. The Council will encourage the use of locally distinctive materials and/or locally occurring and characteristic hedge species.

Part B: Practical Requirements. New development (including changes of use) must meet practical requirements. The following criteria must be met:

- a. access to the site is practicable and the highway network will, following any required mitigation, be able to safely accommodate the additional traffic the proposal will generate and not lead to severe traffic impact;
- b. the design and layout of the development maintains and/or provides safe and convenient access for people with mobility impairments;
- c. the development incorporates or provides measures to minimise opportunities for crime and anti-social behaviour;
- d. the applicant/developer can demonstrate how the proposal will minimise the production of greenhouse gases and impact on climate change as per the Building Regulations prevailing at the time and policies and requirements in this plan;
- e. buildings and structures are designed and orientated to ensure adequate daylight, outlook and privacy for future and existing residents;
- f. provision is made for adequate private amenity space, waste storage and recycling facilities, vehicle and cycle parking; and

¹

https://www.tendringdc.gov.uk/sites/default/files/documents/planning/Planning_Policy/S

ection_1/Tendring%20District%20Local%20Plan%202013-2033%20and%20Beyond%20-%20Section%201_AC.pdf

g. the development reduces flood risk and integrates sustainable drainage within the development, creating amenity and enhancing biodiversity.

Part C: Impacts and Compatibility. *New development (including changes of use) should be compatible with surrounding uses and minimise any adverse environmental impacts. The following criteria must be met:*

a. the development will not have a materially damaging impact on the privacy, daylight or other amenities of occupiers of nearby properties;

b. the development, including any additional road traffic arising, will not have unacceptable levels of pollution on: air, land, water (including ground water), amenity, health or safety through noise, smell, dust, light, heat, vibration, fumes or other forms of pollution or nuisance;

c. the health, safety or amenity of any occupants or users of the proposed development will not be materially harmed by any pollution from an existing or committed use; and

d. all new development should have regard to the most up to date adopted Essex Mineral Local Plan; and

e. during the construction phase, developers must comply with a 'considerate constructors' scheme' which employs reasonable measures and techniques to minimise and mitigate impacts and disturbance to neighbours and the existing wider community and any damage to public and private property.

All new development (including changes of use), should incorporate climate change adaptation measures and technology from the outset including reduction of emissions, renewable and low carbon energy production, passive design, and through green infrastructure techniques, where appropriate.

When considering new development, applicants and developers should avoid adverse impacts upon the environment. Where this is not possible, mitigation measures should be put forward. As a last resort, compensate for adverse environmental impacts.

Any measures necessary to meet the above requirements are to be established by the applicant/developer.

This Policy contributes towards achieving Objectives 6, 7 and 8 of this Local Plan.

BUILDING REGULATIONS (PART L 2021 & FUTURE HOMES STANDARD)

2.3 On 24th July 2018 the Department for Business Energy & Industrial Strategy (BEIS) published their update to SAP 9.92 (Part L 2013), called SAP 10.

In October 2019, the Ministry of Housing, Communities and Local Government (MHCLG) then issued consultation on changes to Part L of the Building Regulations. Dubbed *The Future Homes Standard*, it is an aspiration to ensure all new homes will have low carbon heating and "world-leading levels of energy efficiency" by 2025 and is intended to be the primary driver in achieving the Governments desire to reduce carbon emissions in the creation of new-build housing stock.

On the June 15th 2022, Part L 2021 of the Building Regulations came into force. As per the requirements, all new homes must produce 31% less CO₂ emissions than that of Part L 2013 in-order to achieve Building Regulation compliance.

2.4 The major change in the regulations is the change in carbon factor of electricity to represent the decarbonisation of the National Grid and the push towards net-zero carbon developments.

Fuel	SAP 2012 CO ₂ (kgCO ₂ /kWh)	SAP 10 CO ₂ (kgCO ₂ /kWh)	Part L 2021 CO ₂ (kgCO ₂ /kWh)	Percentage Reduction
Main Gas	0.216	0.210	0.210	2.75%
Electricity	0.519	0.233	0.136	73.8%

Table: Change in Carbon Factors from Part L 2013 to Part L 2021

3. ENERGY CALCULATIONS

3.1 In order to estimate the predicted energy demand and regulated CO₂ emissions for the site, SAP Calculations have been carried out by a licensed and OCDEA accredited SAP Assessor using Elmhurst Design SAP 10 (Part L 2021).

3.2 The baseline CO₂ emissions covered by Part L 2021 of the Building Regulations will be expressed as the Target Emissions Rate (TER). This covers regulated carbon emissions from:

- Heating
- Cooling
- Hot Water
- Lighting
- Auxiliary (Pumps and Fans)

3.3 Passive Design

Passive design measures utilised by the architect in the concept and development of the scheme's design include:

Through good design and careful construction, air infiltration will be minimised and thus a low Air Permeability target has been set.

Optimising orientation and site layout to reduce energy demand.

Provision of cross-ventilation.

Maximising thermal mass where possible to reduce internal temperature variation.

Thermal Bridging has been reviewed and appropriate industry schemes have been proposed (this being Masonry Construction).

ELEMENT	PART L1a LIMITING FABRIC PARAMETERS	PROPOSED U-VALUES (W/ m ² K)
<i>Walls</i>		
External Wall	<i>0.26 W/m²K</i>	0.18 W/m ² K
<i>Floors</i>		
Ground Floor	<i>0.18 W/m²K</i>	0.1 W/m ² K
<i>Roof</i>		
Roof	<i>0.16 W/m²K</i>	0.14 W/m ² K
<i>Openings</i>		
Front Doors	<i>1.6 W/m²K</i>	1.0 W/m ² K
Windows	<i>1.6 W/m²K</i>	1.4 W/m ² K
<i>Air Permeability</i>		
3 m ³ /(hm ²) @50Pa		
<i>Table: Proposed Fabric Specification</i>		

3.4 Active Design

The development will incorporate efficient building services to limit carbon emissions, including:

LED Lighting

Time and Temperature Zone Controls

ELEMENT	PROPOSED DETAILS
Ventilation	System 1 Ventilation - Natural
Heating	Combi Gas Boiler – 89.5%
Heating Controls	Time and Temperature Zone Control
Heat Emitters	Radiators
Hot Water	From Boiler
Lighting	LED (100 lm/W)
Cooling	No
<i>Table: Proposed Mechanical and Electrical Specification</i>	

4. RENEWABLE TECHNOLOGIES

PV Details and Illustration

5.5 PV has been chosen as the renewable technology most suited to the scheme. Benefits of PV are:

1. Substantial energy savings (and running costs): A 16kWp PV panel system can generate a significant amount of electricity, estimated at around 11,000 kWh annually (based on average UK solar irradiance in SAP – MCS figures are higher). This can offset a portion of the running costs for the dwellings based on the current Ofgem Cap in July 2023 of 30p per kWh of Electricity.
2. Clean and renewable energy: By installing a PV system, the dwelling actively contributes to the UK's renewable energy targets and reduces its carbon footprint, helping to combat climate change and aligning with the UK's commitment to reach net-zero emissions by 2050.
3. Financial incentives and revenue generation: By installing a PV system, the dwellings can take advantage of government incentives such as the Smart Export Guarantee (SEG). Under the SEG, a monetary payment can be earned per kWh by exporting surplus solar energy generated back to the grid.



PV System Details – Part L 2021	
CO ₂ Offset via 1kWp	~0.165 tonnes CO ₂ /year
PV Proposed	16.0 kWp
Electricity Produced	10,810 kWh
Module Output	400 Watts (Datasheet in Appendices)
Number of Panels	32
Panel Orientation	East / West
Tilt of Collectors	30°

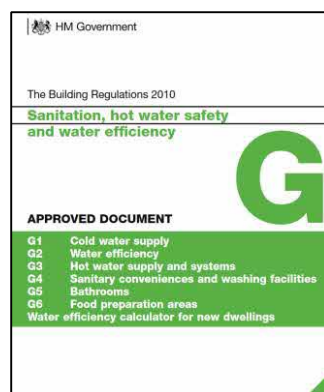
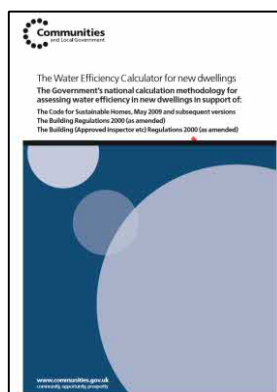
5. WATER EFFICIENCY

- 5.1 All developments must incorporate water conservation measures to limit the consumption to 110 litres per person per day in line with the Local Plan (PPL 5).
- 5.2 This target is the same as the optional target included within Part G of the Building Regulations which encourages the efficient use of potable water. The specification proposed has been produced using the calculation methodology used to assess compliance against the water performance targets in Building Regulations 17.K and is based on the Government’s “The Water Efficiency Calculator for new dwellings – September 2009” (withdrawn in June 2016).
- 5.3 The current guidance and calculation methodology can now be found within Approved Document G - Sanitation, hot water safety and water efficiency (2015 edition with 2016 amendments):
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/504207/BR_PDF_AD_G_2015_with_2016_amendments.pdf
- 5.4 The proposed specification for the scheme can be found on the right-hand side of the page showing compliance. For the Dishwashers and Washing Machines, default consumption figures have been used.

PROPOSED SANITARYWARE SPECIFICATION

ELEMENT	SPECIFICATION	UNIT OF MEASUREMENT
WC	6/3 dual flush	<i>Litres per Flush</i>
Basin Taps	5	<i>Litres per Minute</i>
Kitchen Sink Taps	9	<i>Litres per Minute</i>
Shower	8	<i>Litres per Minute</i>
Bath	155	<i>Capacity to Overflow</i>
Washing Machine	8.17	<i>Litres per Kilo (Dry)</i>
Dishwasher	1.25	<i>Litres per Place Setting</i>
Total Consumption (Litres / Person / Day)		104.7

Table : Proposed Water Consumption (litres/person/day)



6. CONCLUSION

- 6.1 SAP calculations have been undertaken and this document illustrates a reduction in CO₂ emissions over the baseline of Part L 2021 via:

Energy Efficient Measures

- High levels of thermal insulation to achieve U-Values in-line with the Part L 2021 notional building specification.
- LED Lighting with high luminous efficacy (100 lm/W)
- Air Permeability target of 3 m³/(hm²) @50Pa

Renewable Technologies

- A PV Array of 3.2 kWp per plot (20.8 kWp total) will be installed.

- 6.2 The report demonstrates a renewable contribution of >20% and in combination with passive and active energy efficiency measures, highlights a scheme that has been sustainably designed to maximise on-site carbon reduction for the benefit of future residents and the local community.

	CO ₂ Emissions (Tonnes per Annum)	
	Regulated	
DER (No-PV)	5.8	
Final Regulated Energy (DER with PV)	4.3	
Renewable Energy Contribution	25.35 %	
Table: Carbon Emissions Table		

Appendix 1



Fronks Road

RESIDENTIAL UNITS

Plots	AREA	DER <i>Part L 2021 (No-PV)</i>	Total DER (Pre- PV)	DER Part L 2021 Proposed (PV)	Total DER Proposed
	m ²	kg CO ₂ /m ² /yr	kg CO ₂ /yr	kg CO ₂ /m ² /yr	kg CO ₂ /yr
House Type A (m2 for all Type A)	187	16.69	3,124	11.98	2,243
House Type E (m2 for all Type E)	179	14.91	2,675	11.63	2,086
Total Area Assessed	367		5,799		4,329
		Average	1m2 TER 15.82		1m2 DER 11.81
Total Site Area (m²):	367	TOTAL TER CO₂:	5,799	TOTAL DER CO₂:	4,329

Carbon Emissions (DER) - Proposed Development Pre-Renewable Energy	<u>5,799</u>	kg CO2/yr
Carbon Emissions (DER) - Proposed Development with Renewable Energy	<u>4,329</u>	kg CO2/yr
CO ₂ Savings from Renewable Energy	<u>25.35%</u>	%

Appendix 2



Summary for Input Data



Property Reference	Plot A	Issued on Date	28/06/2023
Assessment Reference	Plot A	Prop Type Ref	
Property			

SAP Rating	84 B	DER	16.69	TER	11.60
Environmental	87 B	% DER < TER			-43.88
CO ₂ Emissions (t/year)	0.96	DFEE	40.15	TFEE	44.84
Compliance Check	See BREL	% DFEE < TFEE			10.47
% DPER < TPER	-49.63	DPER	92.75	TPER	61.99

Assessor Details	Mr. Edward Coate	Assessor ID	Z417-0001
Client	NRG, TBC		

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	Southeast
Property Tenure	ND
Transaction Type	6
Terrain Type	Suburban
1.0 Property Type	Bungalow, Detached
2.0 Number of Storeys	1
3.0 Date Built	2023
4.0 Sheltered Sides	1
5.0 Sunlight/Shade	Average or unknown
6.0 Thermal Mass Parameter	Enter TMP value
Thermal Mass	250.00 kJ/m ² K

7.0 Electricity Tariff	Standard
Smart electricity meter fitted	Yes
Smart gas meter fitted	Yes

7.0 Measurements		Heat Loss Perimeter	Internal Floor Area	Average Storey Height
	Ground floor:	34.80 m	62.40 m ²	2.40 m

8.0 Living Area	18.00 m ²
-----------------	----------------------

Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Res	Shelter Code	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Other	0.18		83.52	66.77	0.00	None	16.75	Calculate Wall Area

Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Plane Roof	Other	0.14	0.00	62.40	0.00	None	0.00	Calculate Wall Area	0.00

Description	Type	Storey Index	Construction	U-Value (W/m ² K)	Shelter Code	Shelter Factor	Kappa (kJ/m ² K)	Area (m ²)
Heatloss Floor 1	Ground Floor - Solid	Lowest occupied	Other	0.10	None	0.00	0.00	62.40

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m ² K)
Opening Type 1	Manufacturer	Solid Door							1.00
Opening Type 2	Manufacturer	Window	Double Low-E Hard 0.2			0.72		0.70	1.30

Name	Opening Type	Location	Orientation	Area (m ²)	Pitch
Opening	Opening Type 1	External Wall 1	North West	2.10	
Opening	Opening Type 2	External Wall 1	North West	3.48	
Opening	Opening Type 2	External Wall 1	South East	1.21	
Opening	Opening Type 2	External Wall 1	South East	5.46	
Opening	Opening Type 2	External Wall 1	South West	3.90	
Opening	Opening Type 2	External Wall 1	North East	0.60	

Summary for Input Data



14.0 Conservatory

15.0 Draught Proofing %

16.0 Draught Lobby

17.0 Thermal Bridging

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E2 Other lintels (including other steel lintels)	Gov Approved Scheme	11.30	0.02	0.02	No
E3 Sill	Gov Approved Scheme	10.30	0.01	0.01	No
E4 Jamb	Gov Approved Scheme	31.60	0.01	0.01	Yes
E5 Ground floor (normal)	Gov Approved Scheme	34.80	0.09	0.09	No
E10 Eaves (insulation at ceiling level)	Gov Approved Scheme	21.20	0.13	0.13	No
E12 Gable (insulation at ceiling level)	Gov Approved Scheme	14.20	0.00	0.00	No

Y-value W/m²K

18.0 Pressure Testing

Designed AP₅₀ m³/(h.m²) @ 50 Pa

Test Method

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System

22.0 Lighting

No Fixed Lighting

Name	Efficacy	Power	Capacity	Count
Lighting 1	100.00	5	500	11

24.0 Main Heating 1

Percentage of Heat %

Database Ref. No.

Fuel Type

In Winter

In Summer

Model Name

Manufacturer

System Type

Controls SAP Code

Delayed Start Stat

Flue Type

Fan Assisted Flue

Is MHS Pumped

Heating Pump Age

Heat Emitter

Flow Temperature

Flow Temperature Value

Boiler Interlock

Combi boiler type

Combi keep hot type

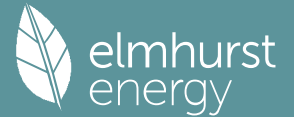
25.0 Main Heating 2

26.0 Heat Networks

28.0 Water Heating

Water Heating

Summary for Input Data



SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Cold Water Source	From mains
Bath Count	1

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
-------------	-------------	-------------------	------------------	-----------	--------------

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
In Airing Cupboard	No

34.0 Small-scale Hydro

None	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

Typical Cost	Typical savings per year	Ratings after improvement	
		SAP rating	Environmental Impact
£3,500 - £5,500	£197	B 84	B 89
		A 93	B 90
		0	0

Appendix 3



Summary for Input Data



Property Reference	Plot A	Issued on Date	28/06/2023
Assessment Reference	Plot A	Prop Type Ref	
Property			

SAP Rating	95 A	DER	11.98	TER	11.60
Environmental	91 B	% DER < TER			-3.28
CO ₂ Emissions (t/year)	0.64	DFEE	40.15	TFEE	44.84
Compliance Check	See BREL	% DFEE < TFEE			10.47
% DPER < TPER	-2.18	DPER	63.34	TPER	61.99

Assessor Details	Mr. Edward Coate	Assessor ID	Z417-0001
Client	NRG, TBC		

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	Southeast
Property Tenure	ND
Transaction Type	6
Terrain Type	Suburban
1.0 Property Type	Bungalow, Detached
2.0 Number of Storeys	1
3.0 Date Built	2023
4.0 Sheltered Sides	1
5.0 Sunlight/Shade	Average or unknown
6.0 Thermal Mass Parameter	Enter TMP value
Thermal Mass	250.00 kJ/m ² K

7.0 Electricity Tariff	Standard
Smart electricity meter fitted	Yes
Smart gas meter fitted	Yes

7.0 Measurements		Heat Loss Perimeter	Internal Floor Area	Average Storey Height
	Ground floor:	34.80 m	62.40 m ²	2.40 m

8.0 Living Area	18.00 m ²
-----------------	----------------------

Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Res	Shelter Code	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Other	0.18		83.52	66.77	0.00	None	16.75	Calculate Wall Area

Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Plane Roof	Other	0.14	0.00	62.40	0.00	None	0.00	Calculate Wall Area	0.00

Description	Type	Storey Index	Construction	U-Value (W/m ² K)	Shelter Code	Shelter Factor	Kappa (kJ/m ² K)	Area (m ²)
Heatloss Floor 1	Ground Floor - Solid	Lowest occupied	Other	0.10	None	0.00	0.00	62.40

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m ² K)
Opening Type 1	Manufacturer	Solid Door							1.00
Opening Type 2	Manufacturer	Window	Double Low-E Hard 0.2			0.72		0.70	1.30

Name	Opening Type	Location	Orientation	Area (m ²)	Pitch
Opening	Opening Type 1	External Wall 1	North West	2.10	
Opening	Opening Type 2	External Wall 1	North West	3.48	
Opening	Opening Type 2	External Wall 1	South East	1.21	
Opening	Opening Type 2	External Wall 1	South East	5.46	
Opening	Opening Type 2	External Wall 1	South West	3.90	
Opening	Opening Type 2	External Wall 1	North East	0.60	

Summary for Input Data



14.0 Conservatory

15.0 Draught Proofing %

16.0 Draught Lobby

17.0 Thermal Bridging

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E2 Other lintels (including other steel lintels)	Gov Approved Scheme	11.30	0.02	0.02	No
E3 Sill	Gov Approved Scheme	10.30	0.01	0.01	No
E4 Jamb	Gov Approved Scheme	31.60	0.01	0.01	Yes
E5 Ground floor (normal)	Gov Approved Scheme	34.80	0.09	0.09	No
E10 Eaves (insulation at ceiling level)	Gov Approved Scheme	21.20	0.13	0.13	No
E12 Gable (insulation at ceiling level)	Gov Approved Scheme	14.20	0.00	0.00	No

Y-value W/m²K

18.0 Pressure Testing

Designed AP₅₀ m³/(h.m²) @ 50 Pa

Test Method

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System

22.0 Lighting

No Fixed Lighting

Name	Efficacy	Power	Capacity	Count
Lighting 1	100.00	5	500	11

24.0 Main Heating 1

Percentage of Heat %

Database Ref. No.

Fuel Type

In Winter

In Summer

Model Name

Manufacturer

System Type

Controls SAP Code

Delayed Start Stat

Flue Type

Fan Assisted Flue

Is MHS Pumped

Heating Pump Age

Heat Emitter

Flow Temperature

Flow Temperature Value

Boiler Interlock

Combi boiler type

Combi keep hot type

25.0 Main Heating 2

26.0 Heat Networks

28.0 Water Heating

Water Heating

Summary for Input Data



SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Cold Water Source	From mains
Bath Count	1

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
-------------	-------------	-------------------	------------------	-----------	--------------

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
In Airing Cupboard	No

32.0 Photovoltaic Unit

Export Capable Meter?	Yes
Connected To Dwelling	Yes
Diverter	No
Battery Capacity [kWh]	0.00

PV Cells kWp	Orientation	Elevation	Overshading	FGHRS	MCS Certificate	Overshading Factor	MCS Certificate Reference	Panel Manufacturer
3.20	East	30°	None Or Little		No	1.00		

34.0 Small-scale Hydro

None					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
------	--	--	--	--	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

Typical Cost	Typical savings per year	Ratings after improvement	
		SAP rating	Environmental Impact
		A 96	A 93
		0	0
		0	0

Appendix 4



PUZ-WM85VAA(-BS)

Ecodan R32

Monobloc Air Source Heat Pump

R32

Key Features:

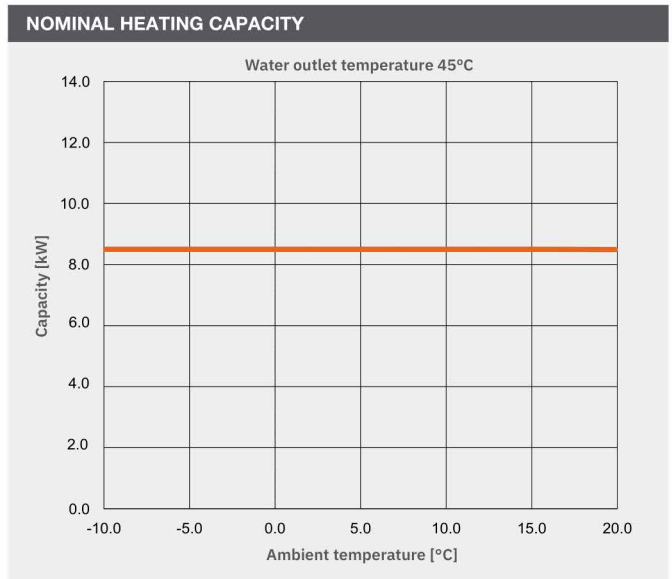
- A+++ high efficiency system
- Ultra quiet noise levels
- Maintains full heating capacity at low temperatures
- Zero carbon solution
- MELCloud enabled

Key Benefits:

- Ultra low running cost
- Flexible product placement
- Confident and quick product selection
- Help to tackle the climate crisis
- Remote control, monitoring, maintenance and technical support



OUTDOOR UNIT		PUZ-WM85VAA(-BS)
HEAT PUMP SPACE HEATER - 55°C	ErP Rating	A++
	η_s	139%
	SCOP (MCS)	3.48
HEAT PUMP SPACE HEATER - 35°C	ErP Rating	A+++
	η_s	193%
	SCOP (MCS)	4.84
HEAT PUMP COMBINATION HEATER - Large Profile ^{*1}	ErP Rating	A+
	η_{wh}	145%
HEATING ^{*2} (A-7/W35)	Capacity (kW)	8.5
	Power Input (kW)	3.27
	COP	2.60
OPERATING AMBIENT TEMPERATURE (°C DB)		-20 ~ +35
SOUND DATA ^{*3}	Pressure Level at 1m (dBA)	45
	Power Level (dBA) ^{*4}	58
WATER DATA	Pipework Size (mm)	28
	Flow Rate (l/min)	24
	Water Pressure Drop (kPa)	15.0
DIMENSIONS (mm)	Width	1050
	Depth	480
	Height	1020
WEIGHT (kg)		98
ELECTRICAL DATA	Electrical Supply	220-240v, 50Hz
	Phase	Single
	Nominal Running Current [MAX] (A) ^{*5}	9.1 [22]
	Fuse Rating - MCB Sizes (A) ^{*6}	25
REFRIGERANT CHARGE (kg) / CO ₂ EQUIVALENT (t)	R32 (GWP 675)	2.2 / 1.49

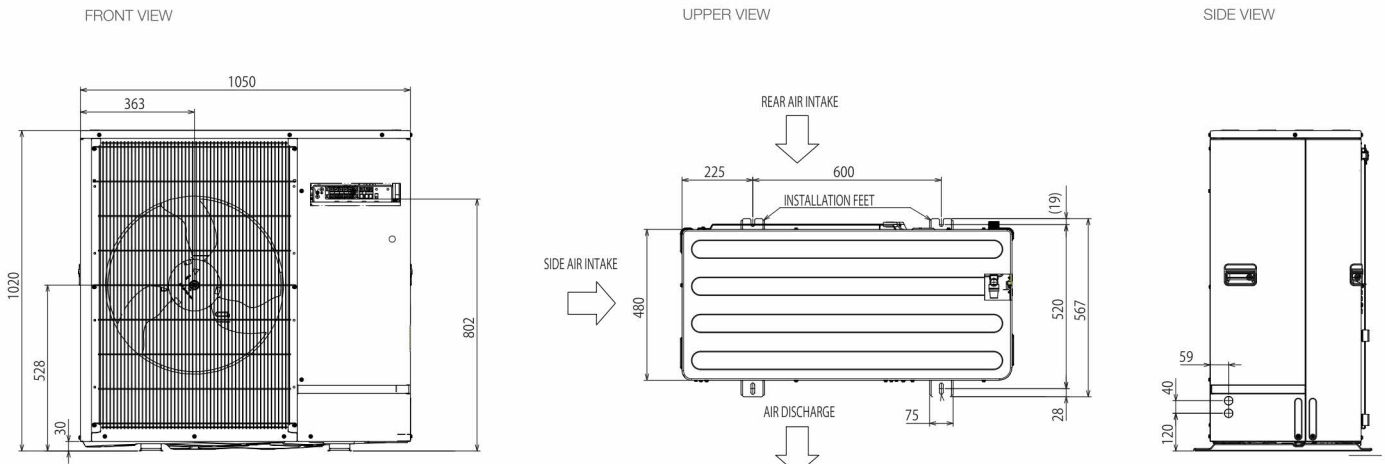


Notes:

- *1 Combination with E*PT20X Cylinder
- *2 Under normal heating conditions at outdoor temp: -7°CDB / -8°CWB, outlet water temp 35°C, inlet water temp 30°C.
- *3 Under normal heating conditions at outdoor temp: 7°CDB / 6°CWB, outlet water temp 55°C, inlet water temp 47°C as tested to BS EN14511.
- *4 Sound power level tested to BS EN12102.
- *5 Under nominal heating conditions at outdoor temp: 7°C, outlet water temp: 35°C.
- *6 MCB Sizes BS EN60898-2 & BS EN60947-2.

η_s is the seasonal space heating energy efficiency (SSHEE) η_{wh} is the water heating energy efficiency

PUZ-WM85VAA(-BS) DIMENSIONS



All dimensions (mm)



- [@meuk_les](#) / [@green_gateway](#)
- [in](#) Mitsubishi Electric Living Environmental Systems UK
- [f](#) Mitsubishi Electric Cooling and Heating UK
- [ig](#) mitsubishielectricuk_les
- [yt](#) Mitsubishi Electric Living Environmental Systems UK
- [BLOG](#) thehub.mitsubishielectric.co.uk

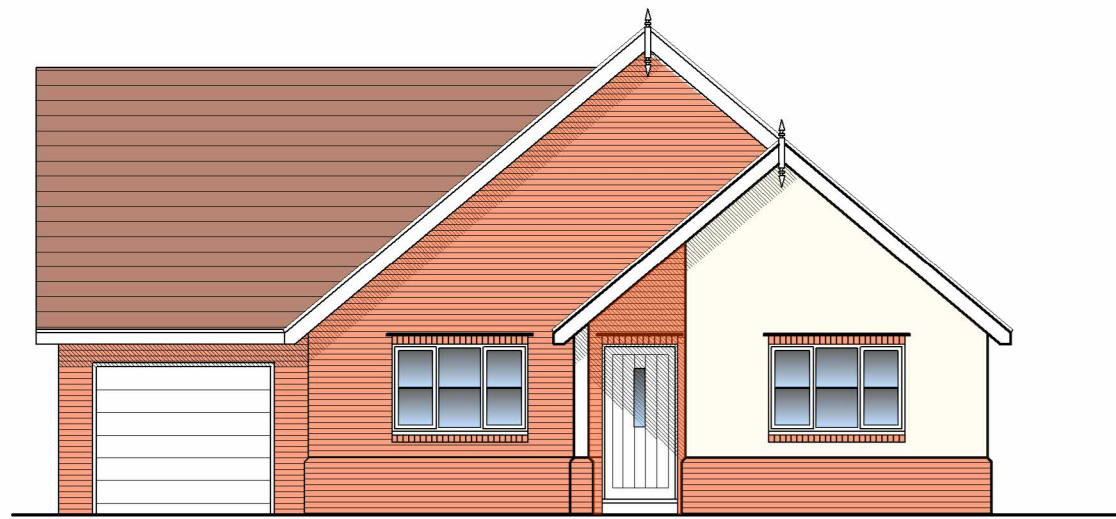
UNITED KINGDOM Mitsubishi Electric Europe Living Environment Systems Division, Travellers Lane, Hatfield, Hertfordshire, AL10 8XB, England. Telephone: 01707 282880 Fax: 01707 278881
IRELAND Mitsubishi Electric Europe, Westgate Business Park, Ballymount, Dublin 24, Ireland. Telephone: (01) 419 8800 Fax: (01) 419 8890 International code: (003531)

Country of origin: United Kingdom - Japan - Thailand - Malaysia. ©Mitsubishi Electric Europe 2020. Mitsubishi and Mitsubishi Electric are trademarks of Mitsubishi Electric Europe B.V. The company reserves the right to make any variation in technical specification to the equipment described, or to withdraw or replace products without prior notification or public announcement. Mitsubishi Electric is constantly developing and improving its products. All descriptions, illustrations, drawings and specifications in this publication present only general particulars and shall not form part of any contract. All goods are supplied subject to the Company's General Conditions of Sale, a copy of which is available on request. Third-party product and brand names may be trademarks or registered trademarks of their respective owners.

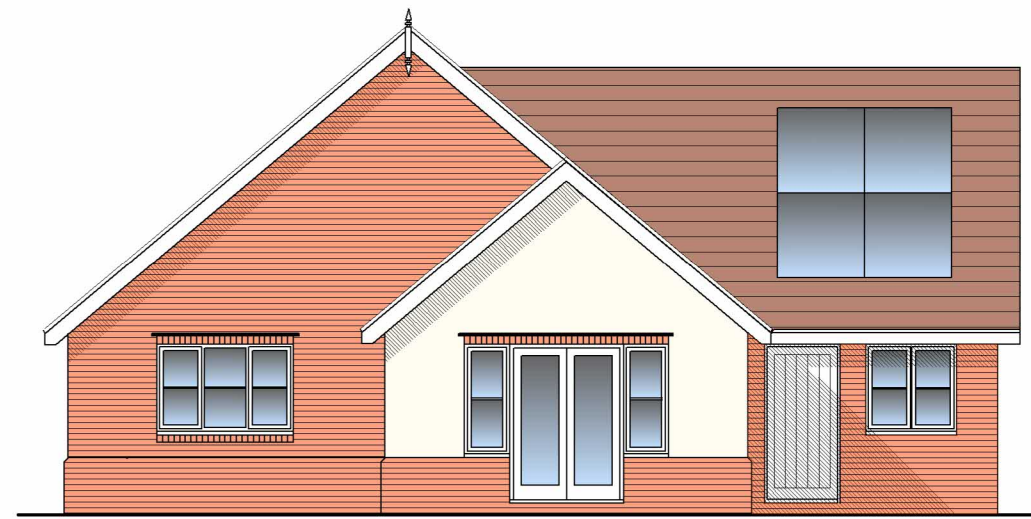
Note: Refer to 'Installation Manual' and 'Instruction Book' for further 'Technical Information'. The fuse rating is for guidance only and please refer to the relevant databook for detailed specification. It is the responsibility of a qualified electrician/ electrical engineer to select the correct cable size and fuse rating based on current regulation and site specific conditions. Mitsubishi Electric's air conditioning equipment and heat pump systems contain a fluorinated greenhouse gas, R410A (GWP:2088), R32 (GWP:675), R407C (GWP:1774), R134a (GWP:1430), R513A (GWP:631), R454B (GWP:466), R1234ze (GWP:7) or R1234yf (GWP:4). *These GWP values are based on Regulation (EU) No 517/2014 from IPCC 4th edition. In case of Regulation (EU) No.626/2011 from IPCC 3rd edition, these are as follows. R410A (GWP:1975), R32 (GWP:550), R407C (GWP:1650) or R134a (GWP:1300).

Effective as of August 2020

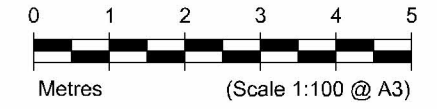




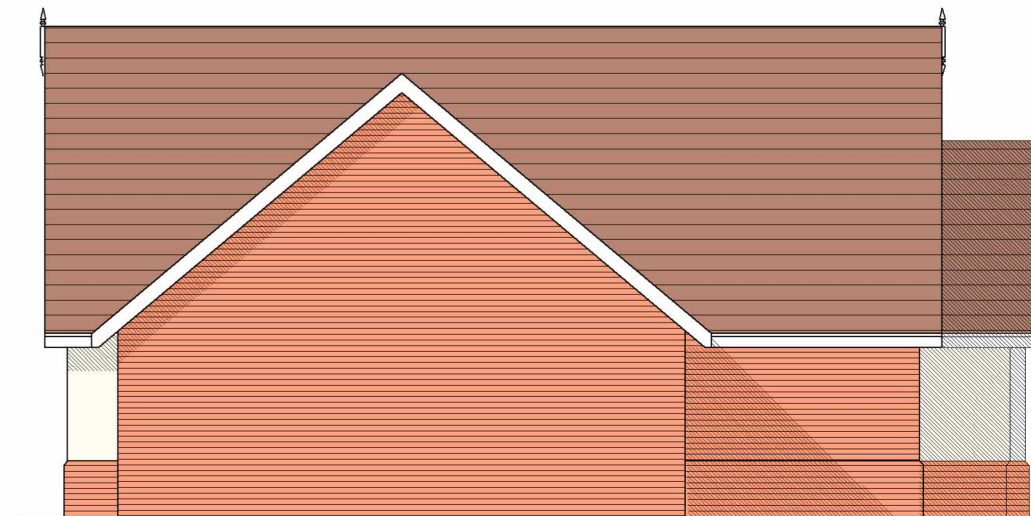
FRONT ELEVATION



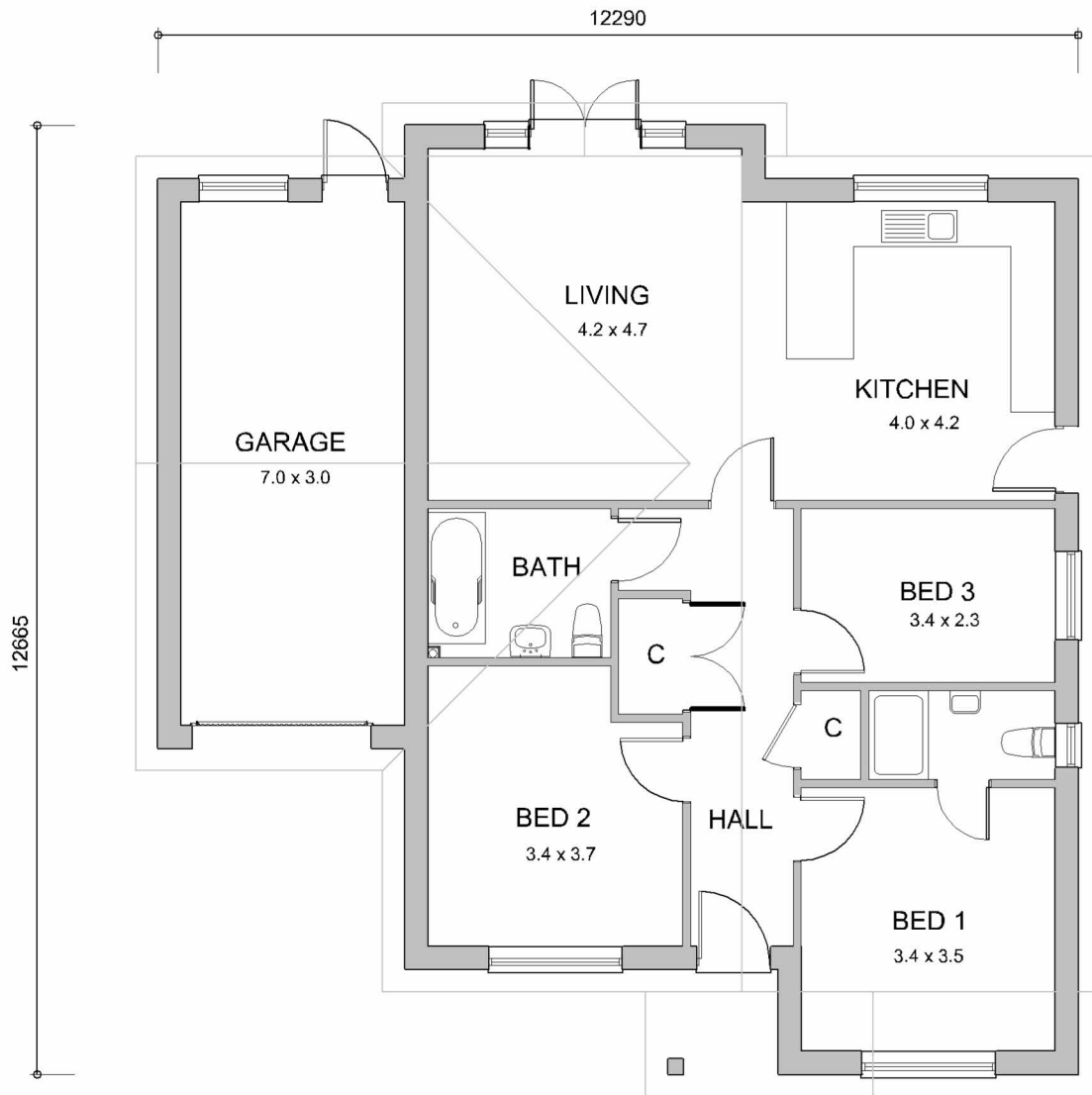
REAR



SIDE



SIDE



FLOOR PLAN

Total Floor area 91 sq.m (excludes garage of 21 sq.m)

PROPOSED DEVELOPMENT

Land to rear of
135 / 137 Fronks Road
Dovercourt
Essex

PLOT D
(3 BED DET)

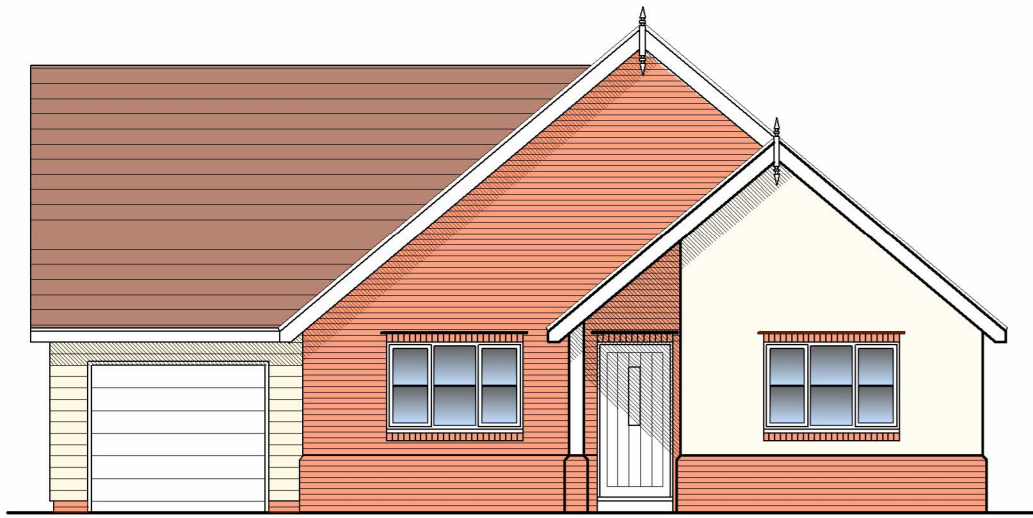
Tim Snow Architects

9A High Street, Brightlingsea
Colchester, Essex CO7 0AE

Scale 1:100 @ A3
Date MAY 2023

Drawing No. 988/04 A

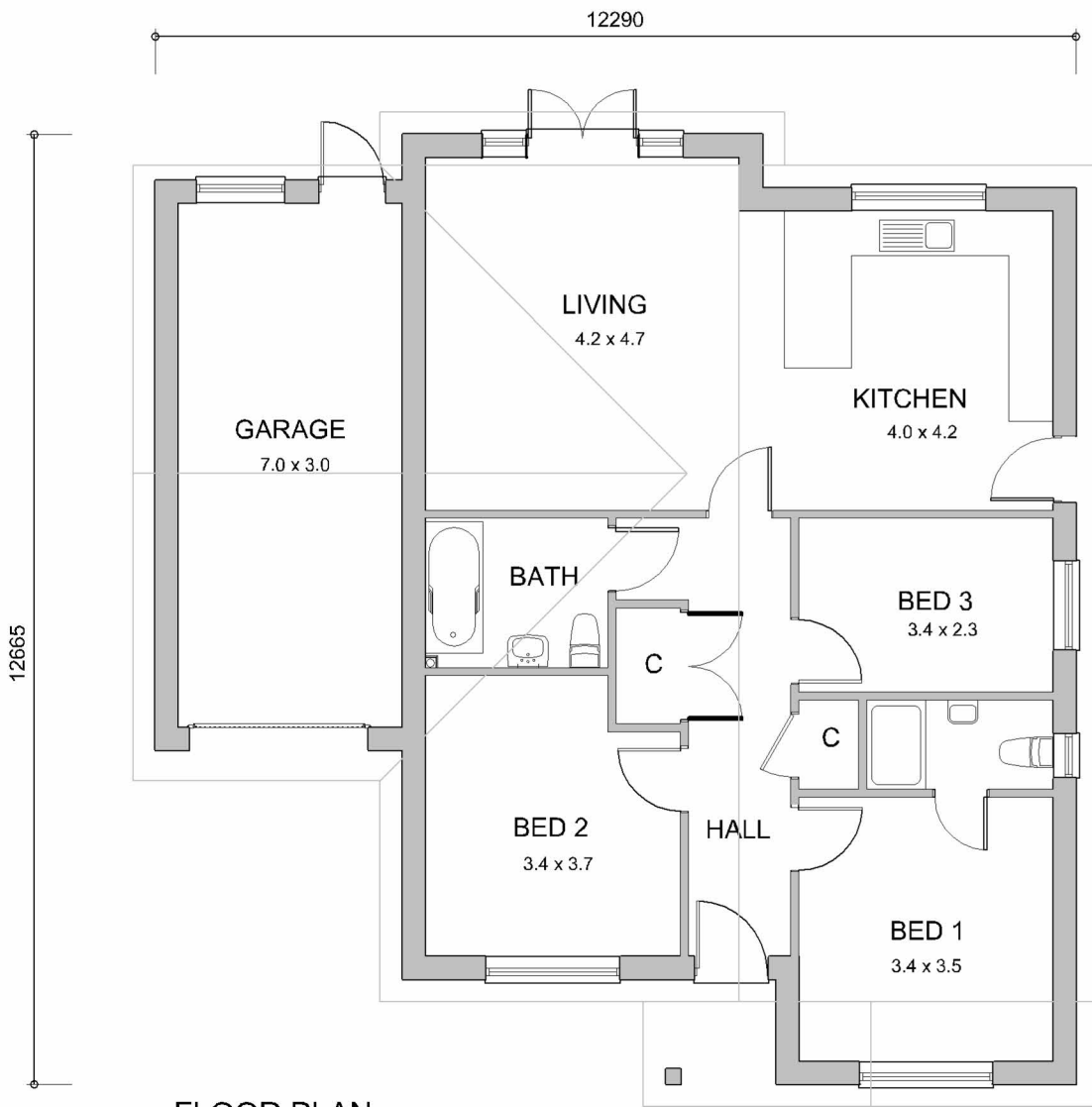
This drawing and design thereon is copyright and shall not be reproduced without written consent



FRONT ELEVATION



REAR

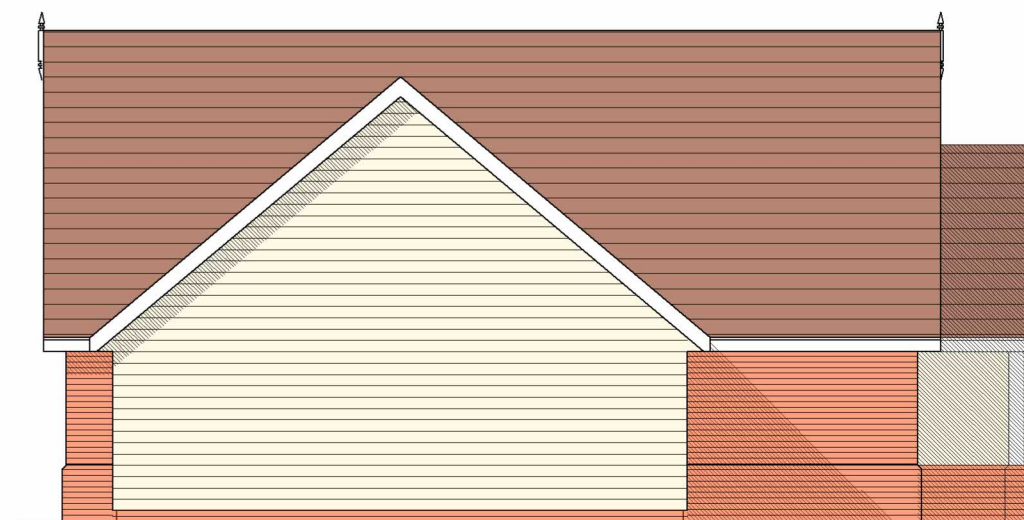


FLOOR PLAN

Total Floor area 91 sq.m (excludes garage of 21 sq.m)



SIDE



SIDE

PROPOSED DEVELOPMENT

Land to rear of
135 / 137 Fronks Road
Dovercourt
Essex

PLOT E
(3 BED DET)

Tim Snow Architects

9A High Street, Brightlingsea
Colchester, Essex CO7 0AE

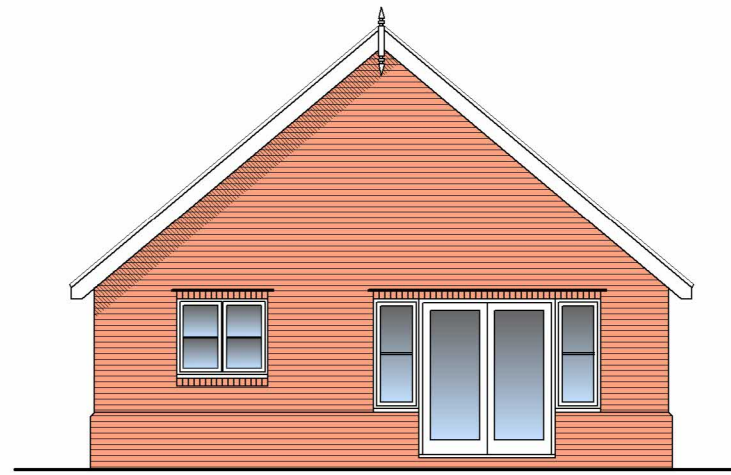
Scale 1:100 @ A3
Date MAY 2023

Drawing No. 988/05 A

This drawing and design thereon is copyright and shall not be reproduced without written consent



FRONT ELEVATION



REAR

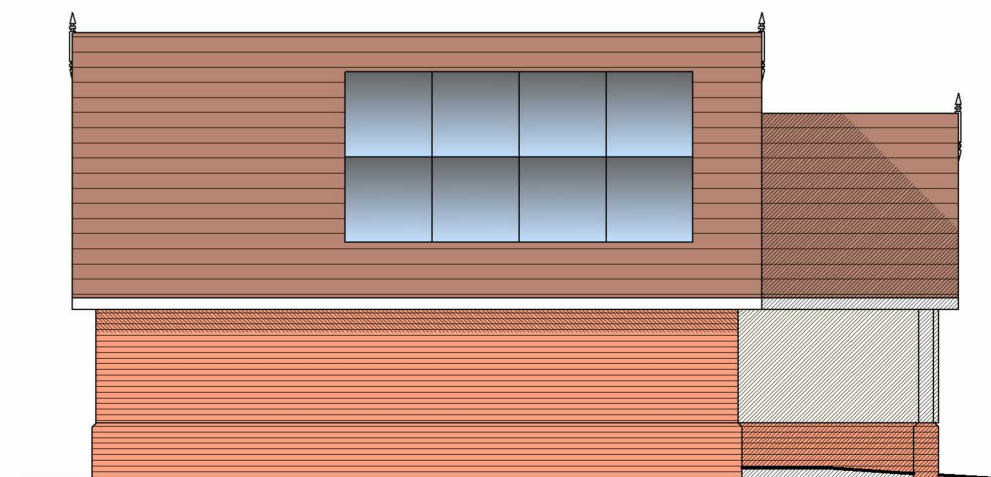


FLOOR PLAN

Total Floor area 63.5 sq.m



SIDE



SIDE

PROPOSED DEVELOPMENT

Land to rear of
135 / 137 Fronks Road
Dovercourt
Essex

PLOT A & C
(2 BED DET)

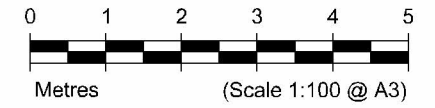
Tim Snow Architects

9A High Street, Brightlingsea
Colchester, Essex CO7 0AE

Scale 1:100 @ A3
Date MAY 2023

Drawing No. 988/02 A

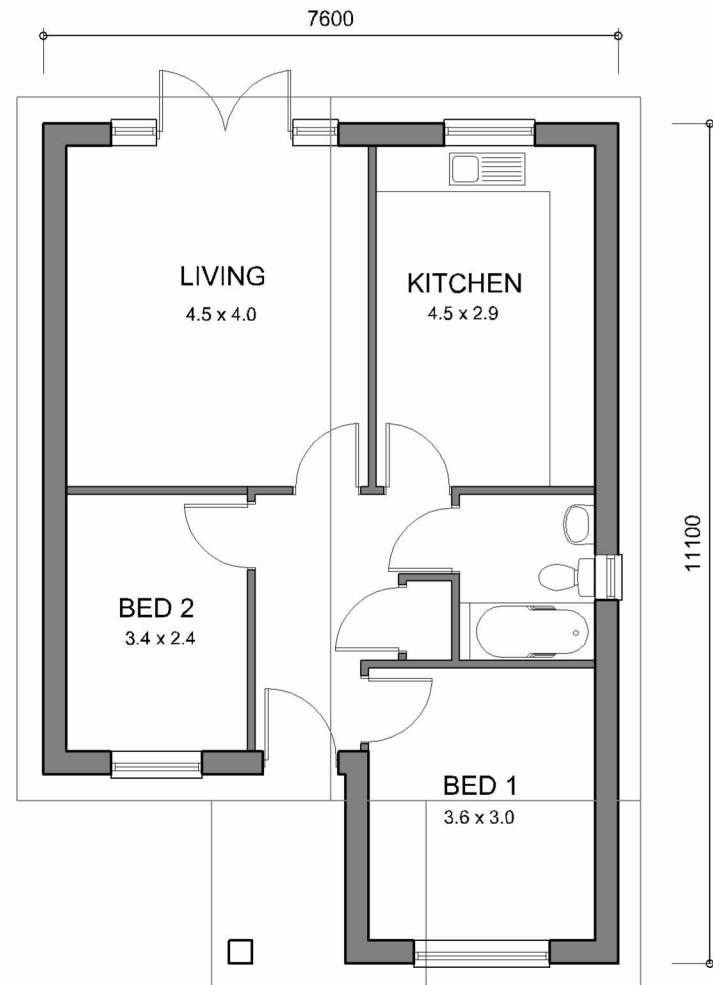
This drawing and design thereon is copyright and shall not be reproduced without written consent



FRONT ELEVATION



REAR

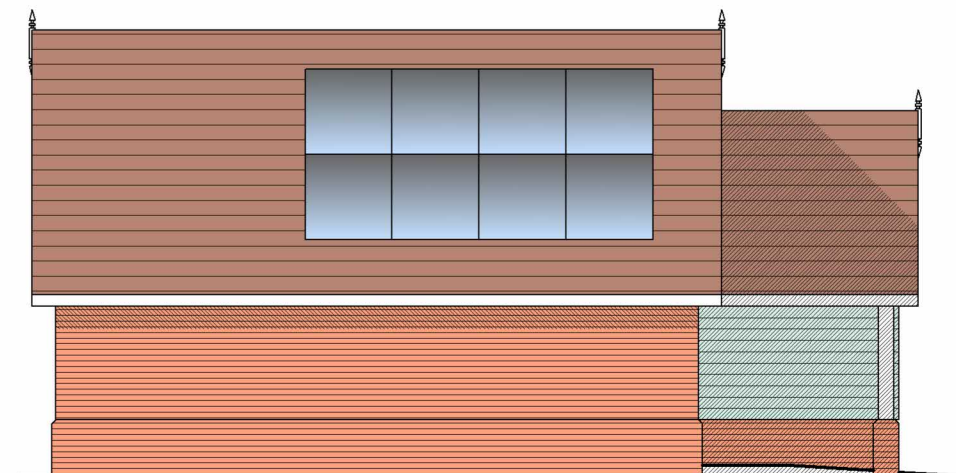


FLOOR PLAN

Total Floor area 63.5 sq.m



SIDE



SIDE

PROPOSED DEVELOPMENT

Land to rear of
135 / 137 Fronks Road
Dovercourt
Essex

PLOT B
(2 BED DET)

Tim Snow Architects

9A High Street, Brightlingsea
Colchester, Essex CO7 0AE

Scale 1:100 @ A3
Date MAY 2023

Drawing No. 988/03 A

This drawing and design thereon is copyright and shall not be reproduced without written consent

Vertex S

BACKSHEET MONOCRYSTALLINE MODULE

PRODUCT: TSM-DE09
 PRODUCT RANGE: 390-405W

405W+
 MAXIMUM POWER OUTPUT

0~+5W
 POSITIVE POWER TOLERANCE

21.1%
 MAXIMUM EFFICIENCY



Small in size, big on power

- Small form factor. Generate a huge amount of energy even in limited space. Up to 405W, 21.1% module efficiency with high density interconnect technology
- Multi-busbar technology for better light trapping effect, lower series resistance and improved current collection
- Reduce installation cost with higher power bin and efficiency
- Boost performance in warm weather with lower temperature coefficient (-0.34%) and operating temperature



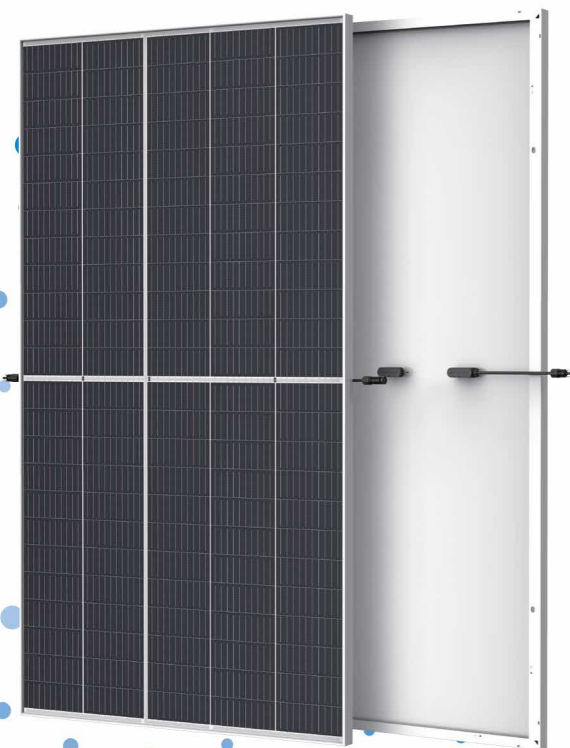
Universal solution for residential and C&I rooftops

- Designed for compatibility with existing mainstream optimizers, inverters and mounting systems
- Perfect size and low weight. Easy for handling. Economy for transporting
- Diverse installation solutions. Flexible for system deployment

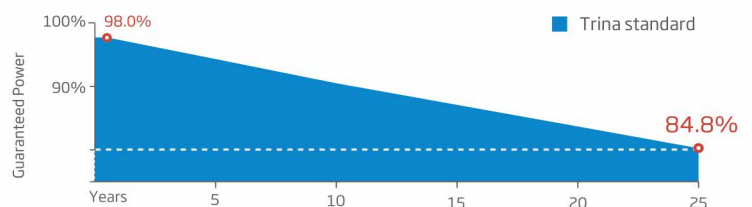


High Reliability

- 25 year performance warranty with lowest degradation;
- Ensured PID resistance through cell process and module material control
- Mechanical performance up to 6000 Pa positive load and 4000 Pa negative load



Trina Solar's Backsheet Performance Warranty



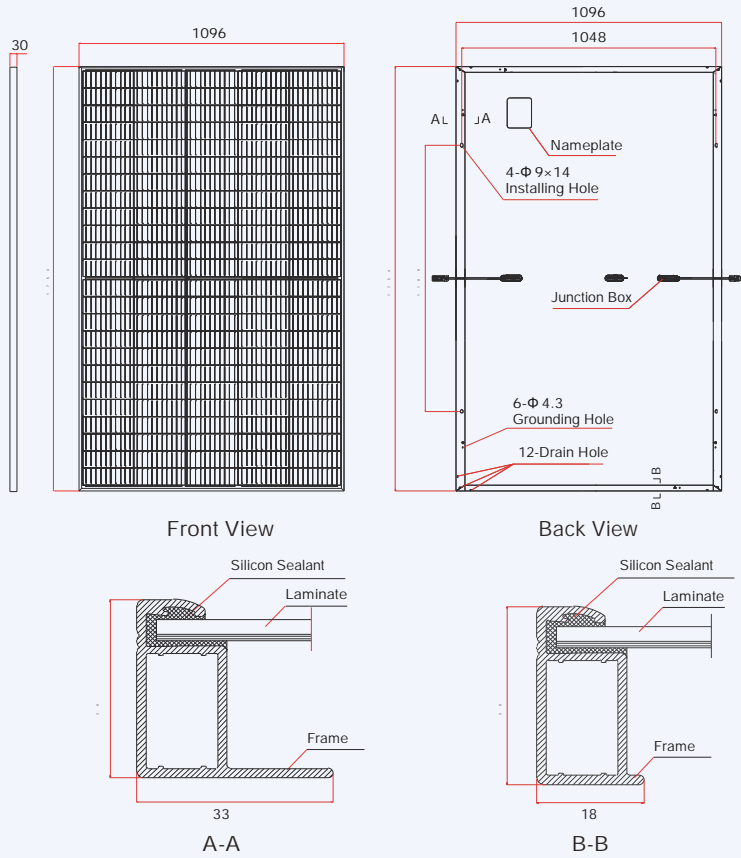
Comprehensive Products and System Certificates



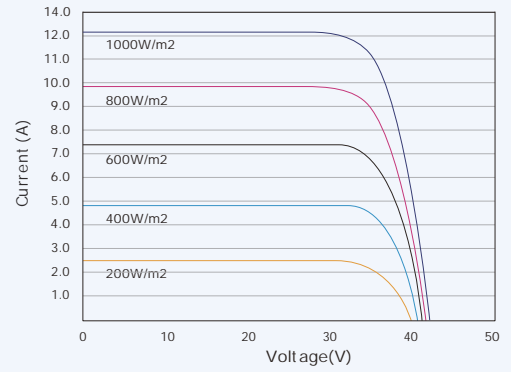
IEC61215/IEC61730/IEC61701/IEC62716
 ISO 9001: Quality Management System
 ISO 14001: Environmental Management System
 ISO14064: Greenhouse Gases Emissions Verification
 ISO45001: Occupational Health and Safety Management System



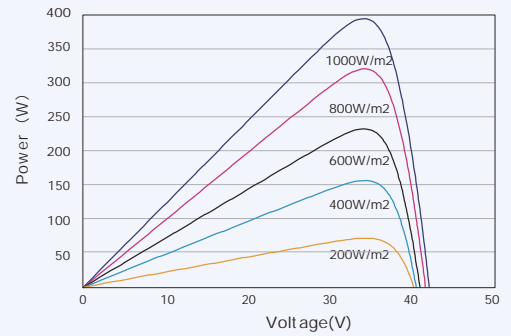
DIMENSIONS OF PV MODULE(mm)



I-V CURVES OF PV MODULE(395 W)



P-V CURVES OF PV MODULE(395W)



ELECTRICAL DATA (STC)

Parameter	390	395	400	405
Peak Power Watts- P_{MAX} (Wp)*	390	395	400	405
Power Tolerance- P_{MAX} (W)	0 ~ +5			
Maximum Power Voltage- V_{MPP} (V)	33.8	34.0	34.2	34.4
Maximum Power Current- I_{MPP} (A)	11.54	11.62	11.70	11.77
Open Circuit Voltage- V_{oc} (V)	40.8	41.0	41.2	41.4
Short Circuit Current- I_{sc} (A)	12.14	12.21	12.28	12.34
Module Efficiency η_m (%)	20.3	20.5	20.8	21.1

STC: Irradiance 1000W/m², Cell Temperature 25°C, Air Mass AM1.5. *Measuring tolerance: ±3%.

ELECTRICAL DATA (NOCT)

Parameter	295	298	302	306
Maximum Power- P_{MAX} (Wp)	295	298	302	306
Maximum Power Voltage- V_{MPP} (V)	31.8	32.0	32.2	32.5
Maximum Power Current- I_{MPP} (A)	9.26	9.32	9.38	9.41
Open Circuit Voltage- V_{oc} (V)	38.4	38.6	38.8	38.9
Short Circuit Current- I_{sc} (A)	9.78	9.84	9.90	9.95

NOCT: Irradiance at 800W/m², Ambient Temperature 20°C, Wind Speed 1m/s.

MECHANICAL DATA

Solar Cells	Monocrystalline
No. of cells	120 cells
Module Dimensions	1754×1096×30 mm (69.06×43.15×1.18 inches)
Weight	21.0 kg (46.3 lb)
Glass	3.2 mm (0.13 inches), High Transmission, AR Coated Heat Strengthened Glass
Encapsulant material	EVA/POE
Backsheet	White
Frame	30mm (1.18 inches) Anodized Aluminium Alloy
J-Box	IP 68 rated
Cables	Photovoltaic Technology Cable 4.0mm ² (0.006 inches ²), Portrait: 280/280 mm(11.02/11.02 inches) Landscape: 1100/1100 mm(43.31/43.31 inches)
Connector	MC4 EVO2 / TS4*

*Please refer to regional datasheet for specified connector.

TEMPERATURE RATINGS

NOCT (Nominal Operating Cell Temperature)	43°C (±2°C)
Temperature Coefficient of P_{MAX}	-0.34%/°C
Temperature Coefficient of V_{oc}	-0.25%/°C
Temperature Coefficient of I_{sc}	0.04%/°C

MAXIMUM RATINGS

Operational Temperature	-40 ~ +85°C
Maximum System Voltage	1500V DC (IEC)
Max Series Fuse Rating	20A

WARRANTY

12 year Product Workmanship Warranty
 25 year Power Warranty
 2% first year degradation
 0.55% Annual Power Attenuation

(Please refer to product warranty for details)

PACKAGING CONFIGURATION

Modules per box: 36 pieces
 Modules per 40' container: 936 pieces