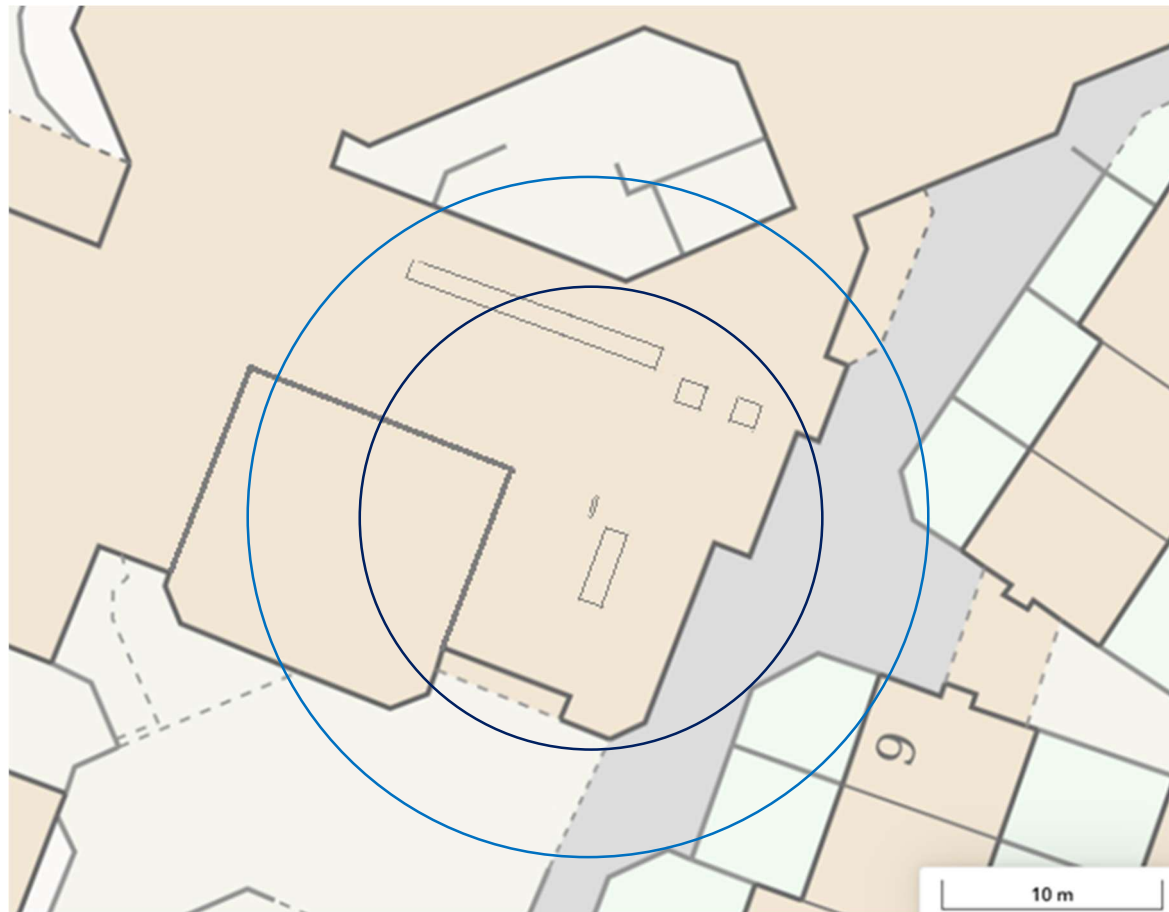


Noise Calculation for Heat Pump

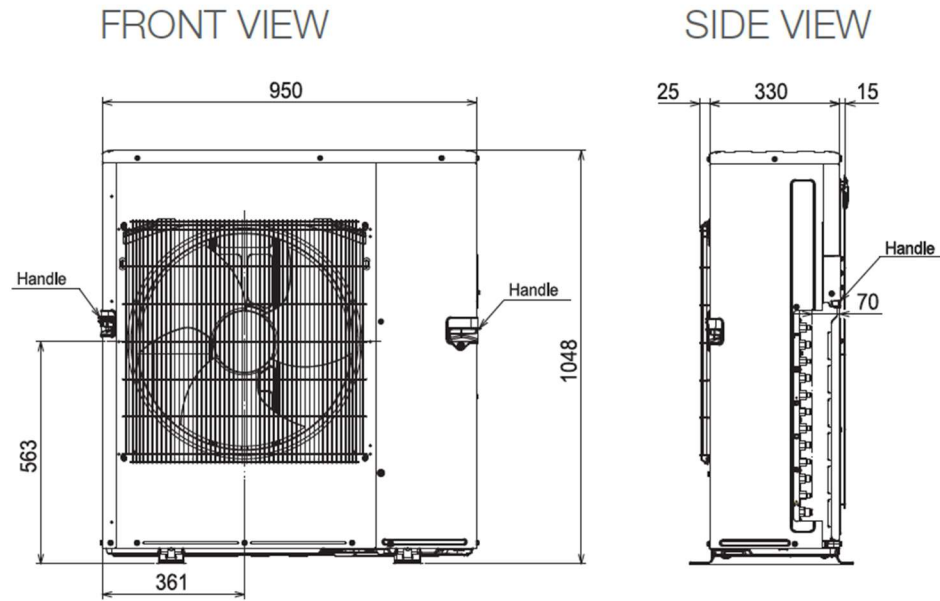
Supporting Information for Application for Planning Permission, 13774174

The plan below shows the approximate location of the heat pump on the flat church roof.

The dark blue circle shows a 12m radius from the lower right corner of the unit, the light blue at 15m radius.



The unit on the roof will be a Mitsubishi Electric MXZ-6F120VF2 condensing unit, 1048mm high x 950mm wide x 330mm deep, shown below.



The sound pressure level is 57dB(A) according to the manufacturer's catalogue:

R32



MXZ-F OUTDOOR UNITS		MXZ-2F33VF3	MXZ-2F42VF3	MXZ-2F53VF3	MXZ-3F54VF3	MXZ-3F68VF3	MXZ-4F72VF3	MXZ-4F83VF	MXZ-5F102VF	MXZ-6F122VF
NUMBER OF CONNECTABLE INDOOR UNITS		2	2	2	2-3	2-3	2-4	2-4	2-5	2-6
CAPACITY (kW)	Heating (nominal)	4.0 (1.0-4.1)	4.5 (1.0-4.8)	6.4 (1.1-7.0)	7.0 (2.6-9.0)	8.6 (2.6-10.6)	8.6 (3.4-10.7)	9.3 (3.4-11.6)	10.5 (4.1-14.0)	14.0 (3.5-16.5)
	Cooling (nominal)	3.3 (1.1-3.8)	4.2 (1.1-4.4)	5.3 (1.1-5.6)	5.4 (2.9-6.8)	6.8 (2.9-8.4)	7.2 (3.7-8.8)	8.3 (3.7-9.2)	10.2 (3.9-11.0)	12.2 (3.5-13.5)
	Heating (UK)	3.32 (0.83-3.40)	3.74 (0.84-3.99)	5.38 (0.92 - 5.88)	5.81 (2.16-7.47)	7.14 (2.16-8.80)	7.14 (2.82-8.89)	7.8 (2.82-9.63)	8.7 (3.40-11.63)	11.6 (2.90-13.71)
	Cooling (UK)	3.23 (1.07-3.72)	4.12 (1.08-4.32)	5.30 (1.10-5.60)	5.3 (2.85-6.67)	6.66 (2.84-8.23)	7.0 (3.59-8.56)	8.2 (3.67-9.12)	10.1 (3.86-10.90)	12.1 (3.47-13.39)
COP / EER (nominal)*		4.40 / 3.90	5.10 / 4.30	4.10 / 3.79	4.60 / 4.10	4.50 / 3.70	4.60 / 3.90	4.65 / 4.21	4.60 / 3.64	4.23 / 3.33
SCOP (ηsc) / SEER (ηsc) (BS EN14825)		4.16 / 6.13	4.60 / 8.69	4.6 / 8.6	4.61 / 8.52	4.12 / 7.96	4.07 / 8.13	4.72 (185.8%) / 8.51 (337.4%)	4.65 (183%) / 8.21 (325.4%)	4.65 (183.1%) / 7.65 (303%)
ErP ENERGY EFFICIENCY CLASS		Heating/Cooling	A+ / A++	A++ / A+++	A++ / A+++	A+ / A++	A+ / A++	A++ / A+++	A++ / A++	A++ / A++
MAX AIRFLOW (m³/min)		Heating/Cooling	33.7 / 32.9	33.3 / 27.7	34.7 / 32.7	43.0 / 42.1	43.0 / 42.1	71 / 55	74 / 62	77 / 63
SOUND PRESSURE LEVEL (dBA)		Heating/Cooling	50 / 49	50 / 44	51 / 46	50 / 46	53 / 48	54 / 48	51 / 49	56 / 52
SOUND POWER LEVEL (dBA)		Cooling	60	59	61	59	63	63	61	65
DIMENSIONS (mm)		Width x Depth x Height	800 x 285 x 550	800 x 285 x 550	800 x 285 x 550	840 x 330 x 710	840 x 330 x 710	840 x 330 x 710	950 x 330 x 796	950 x 330 x 1048
WEIGHT (kg)			33	37	37	58	58	59	62	87
ELECTRICAL SUPPLY			220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz
PHASE			Single	Single	Single	Single	Single	Single	Single	Single
POWER INPUT (kW)	Heating/Cooling (nominal)	0.909 / 0.846	0.88 / 0.98	1.56 / 1.40	1.52 / 1.32	1.91 / 1.84	1.87 / 1.85	2.00 / 1.97	2.28 / 2.80	3.31 / 3.66
	Heating/Cooling (UK)	0.82 / 0.68	0.90 / 0.78	1.40 / 1.20	1.38 / 1.06	1.73 / 1.47	1.69 / 1.48	1.80 / 1.57	2.09 / 2.66	3.04 / 3.44
STARTING CURRENT (A)			4.6	4.2	7.6	7.0	10.5	10.0	8.8	12.3
RUNNING CURRENT (A)		Heating/Cooling [MAX]	4.6 / 4.3 [10.0]	4.2 / 4.5 [12.2]	7.1 / 6.2 [10.2]	7.0 / 5.9 [18.0]	10.5 / 9.6 [18.0]	10.0 / 9.5 [18.0]	8.8 / 8.7 [21.4]	10.0 / 12.3 [21.4]
INTERCONNECTING CABLE No. CORES			4 Core	4 Core	4 Core	4 Core	4 Core	4 Core	4 Core	4 Core
TOTAL PIPE LENGTH (m)			20	30	30	50	60	60	70	80
MAX PIPE LENGTH PER INDOOR UNIT (m)			15	20	20	25	25	25	25	25
MAX HEIGHT DIFFERENCE (m)			10	15 (10 if OU higher than IU)	15 (10 if OU higher than IU)	15 (10 if OU higher than IU)	15 (10 if OU higher than IU)	15 (10 if OU higher than IU)	15	15
CHARGE REFRIGERANT (kg) / CO ₂ EQUIVALENT (t) - R32 (GWP 675)			0.8 / 0.54 (20m)	1.0 / 0.68 (30m)	1.0 / 0.68 (30m)	2.4 / 1.62 (50m)	2.4 / 1.62 (60m)	2.4 / 1.62 (60m)	2.4 / 1.62 (70m)	2.4 / 1.62 (80m)
FUSE RATING (BS88) - HRC (A)			16	16	16	25	25	25	25	32

The unit is approximately 14.5m from the assessment point (1m in front of an upstairs window) on the nearest dwelling, which is house number 6 on Victoria Way. Using the MCS 020 Planning Standards for Permitted Development of Wind Turbines and Air Source Heat Pumps on Domestic Premises, as implemented in the MCS Heat Pump Heat Loss Calculator Spreadsheet (Version 1.10), produces the following table.

ASHP - Sound Power Level

1. Sound power level (dB)	57
2. Sound pressure level (dB)	Q4 - "Two Reflective Surfaces"
3.Distance from heat pump to assessment position (meters)	12
4. dB Distance Reduction	-26
5. Barriers Between heat pump and assessment position	Visible
6.Sound pressure level @ assessment position	31
7. Background noise level (dB)	40
8. Differential between 6. & 7.	9
9. Decibel Correction (dB)	40.5
10. Final Result (dB)	✓ 41.0
	Pass

The assumptions are that there are two reflective surfaces, being the flat roof and the wall supporting the church roof just behind the heat pump. A 12m distance has been used as the options are only 12m or 15m. Even using the smaller measurement, the result is 40.5dB, rounded up to 41dB, which is a pass.

The exact position of the heat pump is not yet fixed, depending on a structural assessment of the roof underneath it. However, it cannot go further towards the nearest house because of a skylight. So, the noise from any feasible position of the heat pump is acceptable.

Note too that the nearest classrooms within St. John's Primary school are even further away. (They are on the far side of the internal courtyard directly to the North of the heat pump).