

ABRAHAM MOSS LIBRARY & LEISURE CENTRE PLANNING CONDITION 12 - PLANT NOISE

Project name **Abraham Moss Leisure Centre**
Report no. **LP44107-RAM-B01-XX-RP-Y-60002**
Version **P01**
Date **10/01/2023**
Prepared by **Jonathan Howson**
Checked by **Ryan McNulty**
Approved by **Simon Taylor**

1. Introduction

This report provides an assessment of noise from plant serving the new Abraham Moss Leisure Centre in support of the relevant planning conditions for the scheme.

Condition 12 of permission 125033/VO/2019 requires that:

- 12) *(a) Before the building hereby approved is first used details of any externally mounted ancillary plant, equipment and servicing submitted for approval in writing by the City Council as local planning authority. The approved scheme shall be implemented prior to the first use of the development hereby approved. The plant selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (LAeq) below the typical background (LA90) level at the nearest noise sensitive location.*
- (b) Prior to the first use of the development, a verification report will be required to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic consultant's report. The report shall also undertake post completion testing to confirm that the noise criteria has been met. Any instances of non-conformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the agreed noise criteria.*
- Reason - To safeguard the amenities of the occupiers of nearby residential accommodation, pursuant to policies SP1 and DM1 of the Core Strategy.*

This report provides an assessment of noise emissions from the plant to address part a) of the condition. Post completion testing, as per part b), will be carried out as required following construction.

2. Proposed Plant

Plant serving the leisure centre includes:

- 4no. air handling units located on the roof plant deck, with atmosphere side attenuators
- 3no. outdoor condenser units on the roof plant deck

Details and sound power levels for the plant are given in Appendix 1. Locations of the plant are shown in Appendix 2.

3. Background Noise Survey

Ramboll measured noise levels around the site of the proposed Leisure Centre in March and May 2019.

Daytime measurements were made between 15:00 and 18:00 on Wednesday 20 March 2019 and night-time (early morning) measurements between 06:00 and 07:00 on Tuesday 21 May 2019.

Plant serving the Leisure Centre is not expected to run overnight, but it is possible that it may be turned on in the early hours of the morning from about 06:00 onwards for heating etc.

Noise levels were measured at the locations shown below in Figure 1.



Figure 1 – Survey positions and measured levels

4. Plant Noise Limits

Condition 12 requires that plant noise emissions (L_{Aeq}) are at least 5dB below the background noise level (L_{A90}) at the nearest noise sensitive properties.

The nearest noise sensitive properties to the Leisure Centre are the houses on Greenstead Avenue to the south-west (approximately 60m) and the houses on Crescent Road to the north-west (approximately 100m). Measurements made at Position 2 and 3 represent the background noise level during the day (after 07:00) and night (between 06:00 to 07:00) respectively.

On this basis, the cumulative noise level from any plant associated with the scheme should be limited to the following:

Noise Sensitive Property	Measured Background Noise Level	Proposed Plant Noise Rating Level
Houses on Greenstead Avenue	Day: 45dB L _{A90}	Day: 40dB L _{Aeq}
	Night: 43dB L _{A90}	Night: 38dB L _{Aeq}
	Day: 47dB L _{A90}	Day: 42dB L _{Aeq}
Houses on Crescent Road	Night: (expected to be similar or higher than Greenstead Av.)	Night: 38dB L _{Aeq}

Table 1 – Proposed plant noise limits

If the plant has any distinctive features such as tonality or intermittency, then penalties should be applied to the noise level in accordance with the procedures in British Standard 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*.

5. Plant Noise Levels

Noise emissions from all external plant associated with the Leisure Centre have been calculated using proprietary noise modelling software (CadnaA).

Plant has been represented using point sources located on the roof plant deck of the building. The building itself offers a large degree of screening to plant noise and the noise levels calculated at nearby properties are low.

The calculated noise levels are shown in the noise map below in Figure 2.

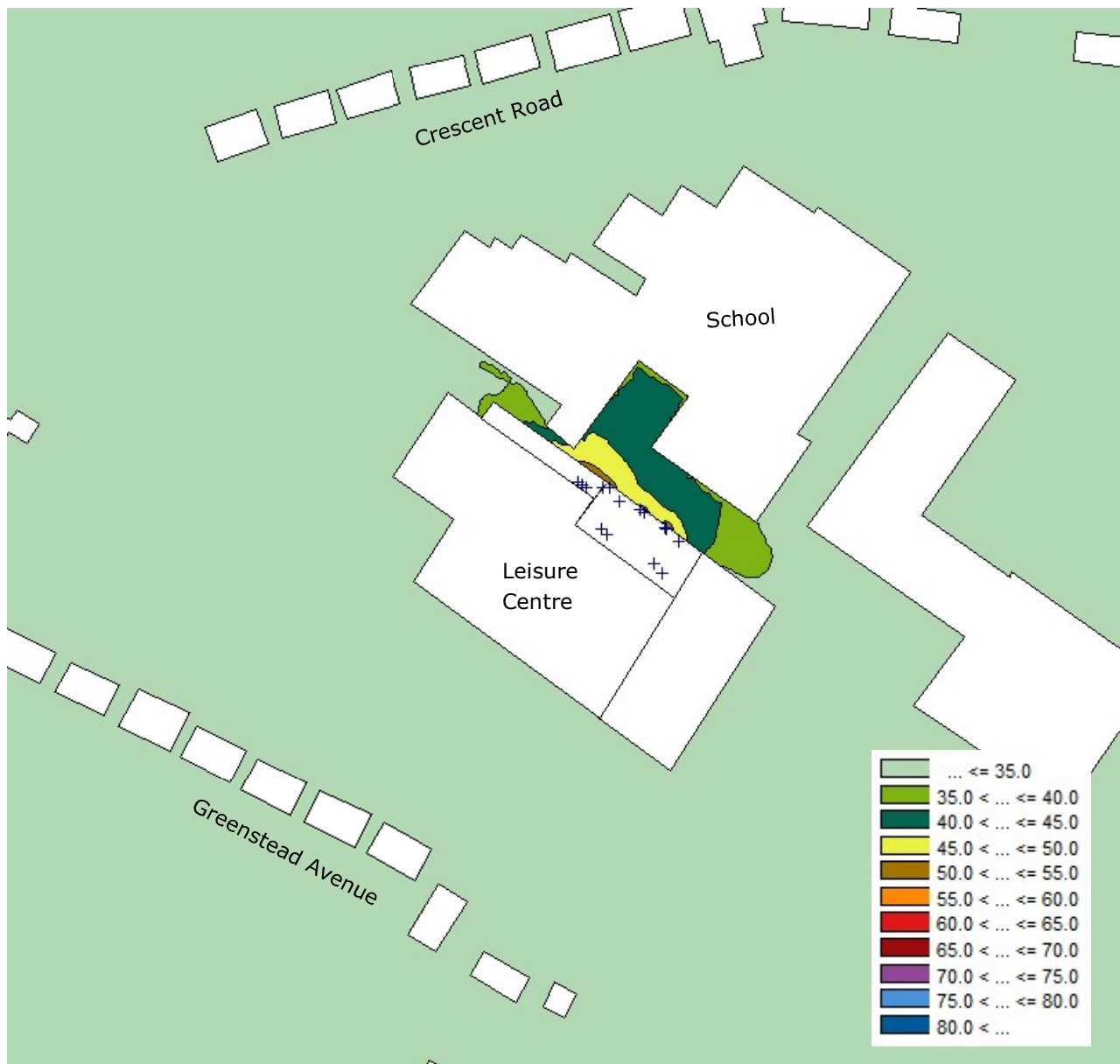


Figure 2 – Calculated plant noise levels, dB LAeq

The noise levels calculated at the nearest houses are very low, less than 20dB(A). This is well under the plant noise limit required to meet the planning condition requirements during the day or night, even allowing for any penalties for tonality or intermittency.

Noise levels at the facades of the school are around 40dB(A) which is at least 5dB lower than the general background noise levels at the site during school hours. Note that the modelling has assumed there is no screen around the plant deck. In practice a louvred screen is included along the plant deck edge which will reduce levels at the school further.

6. Conclusions

Based on modelling of all the external plant at the Leisure Centre running simultaneously at full duty, noise levels are significantly lower than existing background noise levels at the nearest properties (by more than the required 5dB). As such the requirements of Planning Condition 12a are achieved.

Appendix – Noise Survey Details

Time and Date: 20/03/2019 15:30 – 18:31

Equipment: NTi XL2 TA Sound Level Analyser (serial #A2A-09209-E0)

Calibrator CAL200 (serial #16089)

Personnel Present: Dominic Young (Ramboll)

Time and Date: 21/05/2019 05:57 – 06:37

Equipment: Bruel & Kjaer 2270 Sound Level Analyser (serial #2644605)

Calibrator type 4231 (serial #2642788)

Personnel Present: Ryan McNulty (Ramboll)

During both surveys the weather was dry, with no standing water on the roads. Wind speeds were low during all periods.

A summary of survey results is given in this report (see figure 1), and full survey results are available on request.

Appendix 1 – Plant Data

QUOTATION

Reference :	AHU 01
Model :	TempAir 39T - EXT
Type :	Air Source Heat Pump / Externally Mounted
Configuration :	Double Stacked

Supply Duty :	3.020	m3/s @	250 Pa	Extract Duty :	3.020	m3/s @	250 Pa
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SUPPLY AIR SECTION	RETURN AIR SECTION	UNIT DETAILS
Motorised Air Inlet Damper Motorised Recirc Air Damper Filter Section Efficiency F7 Gauge PD Switch Compressor Section No of circuits 1 off (TANDEM) Refridgerant R410A Turn down ratio 10% Heat Recovery Section Thermal wheel 77% Winter Air on (°C) -5.0 Air off (°C) 13.8 Return air (°C) 20.0 Duty recovered (kW) 84 Summer Air on (°C) Air off (°C) Return air (°C) Duty recovered (kW) Indoor Coil Section Winter Air on (°C) 13.8 Air off (°C) 21.0 Summer Air on (°C) 28.0 Air off (°C) 21.0 Supply Fan Section Backward curved EC plug fan(s) No. of fans 1 x duty Inverter Integrated Electrical input (kW) 2.67 Running current (A) 3.98	Filter Section Efficiency G4 Gauge PD Switch Control Panel Section Panel recessed into unit BMS controller Heat Recovery Section Details as supply Extract Fan Section Backward curved EC plug fan(s) No. of fans 1 x duty Inverter Integrated Electrical input (kW) 2.47 Running current (A) 3.69 Outdoor Coil Section Air on 26°C dB/50%RH Max return air 33°C Motorised Discharge Damper COP* : 5.7 EER* : 4.9 <i>*compressors only</i> FLC* : 52.00 Amps <i>*electrical rating for fans, compressors and wheel</i> SFP* : 1.530w/l/s <i>*based upon clean filters</i> Fan Sound Power Spectrum (Lw) FREQ (Hz) 63 125 250 500 1K 2K 4K 8K Supply inlet 69 81 79 75 70 68 67 65 Supply outlet 73 86 82 82 79 74 72 70 Extract inlet 70 80 78 75 70 68 67 65 Extract outlet 73 85 82 82 79 73 72 69	Manufacturer : AirSource Ventilation Ltd Contact : Lisa Barry Phone no : 0161 425 8553. Quote ref : Q6241 Model Details : TempAir 39T - EXT Unit Height ¹ 2500mm Unit Width 2020mm Unit Length ² 4125mm Unit Weight 2642kg Supplied in ONE section <i>¹incl base frame & pitched roof</i> <i>²excludes 380mm weather cowls</i> Features : Inbuilt heat pump ✓ EC plug fans ✓ BACnet controls ✓ Recirc function ✓ Weather cowls ✓ Pool spec on extract only ✓
PLEASE NOTE: All specific data points (noise levels, coil pressure/flow rates etc.) are subject to design fluctuations. These will be confirmed when a construction drawing is produced.		

QUOTATION

Reference :	AHU 02
Model :	TempAir 67T - EXT
Type :	Air Source Heat Pump / Externally Mounted
Configuration :	Double Stacked

Supply Duty :	4.450	m3/s @	250 Pa	Extract Duty :	4.450	m3/s @	250 Pa
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SUPPLY AIR SECTION	RETURN AIR SECTION	UNIT DETAILS																																													
Motorised Air Inlet Damper Motorised Recirc Air Damper Filter Section Efficiency F7 Gauge PD Switch Compressor Section No of circuits 1 off (TANDEM) Refridgerant R410A Turn down ratio 10% Heat Recovery Section Thermal wheel 80% Winter Air on (°C) -5.0 Air off (°C) 14.4 Return air (°C) 20.0 Duty recovered (kW) 129 Summer Air on (°C) 28.0 Air off (°C) 25.6 Return air (°C) 25.0 Duty recovered (kW) 13 Indoor Coil Section Winter Air on (°C) 14.4 Air off (°C) 21.0 Summer Air on (°C) 26.6 Air off (°C) 16.0 Supply Fan Section Backward curved EC plug fan(s) No. of fans 2 x duty Inverter Integrated Electrical input (kW) 3.65 Running current (A) 5.59	Filter Section Efficiency G4 Gauge PD Switch Control Panel Section Panel recessed into unit BMS controller Heat Recovery Section Details as supply Extract Fan Section Backward curved EC plug fan(s) No. of fans 2 x duty Inverter Integrated Electrical input (kW) 3.41 Running current (A) 5.24 Outdoor Coil Section Air on 26°C dB/50%RH Max return air 33°C Motorised Discharge Damper COP* : 6.2 EER* : 5.3 <i>*compressors only</i> FLC* : 82.00 Amps <i>*electrical rating for fans, compressors and wheel</i> SFP* : 1.410 w/l/s <i>*based upon clean filters</i> Fan Sound Power Spectrum (Lw) <table><tr><td>FREQ (Hz)</td><td>63</td><td>125</td><td>250</td><td>500</td><td>1K</td><td>2K</td><td>4K</td><td>8K</td></tr><tr><td>Supply inlet</td><td>69</td><td>81</td><td>77</td><td>73</td><td>70</td><td>68</td><td>65</td><td>61</td></tr><tr><td>Supply outlet</td><td>71</td><td>83</td><td>79</td><td>80</td><td>77</td><td>73</td><td>69</td><td>65</td></tr><tr><td>Extract inlet</td><td>68</td><td>82</td><td>77</td><td>73</td><td>69</td><td>68</td><td>65</td><td>60</td></tr><tr><td>Extract outlet</td><td>71</td><td>84</td><td>79</td><td>79</td><td>76</td><td>72</td><td>68</td><td>65</td></tr></table>	FREQ (Hz)	63	125	250	500	1K	2K	4K	8K	Supply inlet	69	81	77	73	70	68	65	61	Supply outlet	71	83	79	80	77	73	69	65	Extract inlet	68	82	77	73	69	68	65	60	Extract outlet	71	84	79	79	76	72	68	65	Manufacturer : AirSource Ventilation Ltd Contact : Lisa Barry Phone no : 0161 425 8553. Quote ref : Q6241 Model Details : TempAir 67T - EXT Unit Height ¹ 3000mm Unit Width 2620mm Unit Length ² 4095mm Unit Weight 3559kg Supplied in ONE section <i>¹incl base frame & pitched roof</i> <i>²excludes 380mm weather cowls</i> Features : Inbuilt heat pump ✓ EC plug fans ✓ BACnet controls ✓ Recirc function ✓ Weather cowls ✓
FREQ (Hz)	63	125	250	500	1K	2K	4K	8K																																							
Supply inlet	69	81	77	73	70	68	65	61																																							
Supply outlet	71	83	79	80	77	73	69	65																																							
Extract inlet	68	82	77	73	69	68	65	60																																							
Extract outlet	71	84	79	79	76	72	68	65																																							
PLEASE NOTE: All specific data points (noise levels, coil pressure/flow rates etc.) are subject to design fluctuations. These will be confirmed when a construction drawing is produced.																																															

QUOTATION

Reference :	AHU 03
Model :	TempAir 45T - EXT
Type :	Air Source Heat Pump / Externally Mounted
Configuration :	Double Stacked

Supply Duty :	3.690	m3/s @	250 Pa	Extract Duty :	3.690	m3/s @	250 Pa
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SUPPLY AIR SECTION	RETURN AIR SECTION	UNIT DETAILS
Motorised Air Inlet Damper Motorised Recirc Air Damper Filter Section Efficiency F7 Gauge PD Switch Compressor Section No of circuits 1 off (TANDEM) Refridgerant R410A Turn down ratio 10% Heat Recovery Section Thermal wheel 78% Winter Air on (°C) -5.0 Air off (°C) 13.9 Return air (°C) 20.0 Duty recovered (kW) 103 Summer Air on (°C) Air off (°C) Return air (°C) Duty recovered (kW) Indoor Coil Section Winter Air on (°C) 13.9 Air off (°C) 21.0 Summer Air on (°C) 28.0 Air off (°C) 21.0 Supply Fan Section Backward curved EC plug fan(s) No. of fans 1 x duty Inverter Integrated Electrical input (kW) 3.68 Running current (A) 5.53	Filter Section Efficiency G4 Gauge PD Switch Control Panel Section Panel recessed into unit BMS controller Heat Recovery Section Details as supply Extract Fan Section Backward curved EC plug fan(s) No. of fans 1 x duty Inverter Integrated Electrical input (kW) 3.40 Running current (A) 5.13 Outdoor Coil Section Air on 26°C dB/50%RH Max return air 33°C Motorised Discharge Damper COP* : 5.8 EER* : 4.9 <i>*compressors only</i> FLC* : 57.20 Amps <i>*electrical rating for fans, compressors and wheel</i> SFP* : 1.730 w/l/s <i>*based upon clean filters</i> Fan Sound Power Spectrum (Lw) FREQ (Hz) 63 125 250 500 1K 2K 4K 8K Supply inlet 75 79 85 81 75 73 70 71 Supply outlet 80 84 90 87 84 79 77 75 Extract inlet 75 81 84 70 75 73 71 71 Extract outlet 80 85 89 87 84 79 77 75	Manufacturer : AirSource Ventilation Ltd Contact : Lisa Barry Phone no : 0161 425 8553. Quote ref : Q6241 Model Details : TempAir 45T - EXT Unit Height ¹ 2600mm Unit Width 2220mm Unit Length ² 4255mm Unit Weight 2750kg Supplied in ONE section <i>¹incl base frame & pitched roof</i> <i>²excludes 380mm weather cowls</i> Features : Inbuilt heat pump ✓ EC plug fans ✓ BACnet controls ✓ Recirc function ✓ Weather cowls ✓
PLEASE NOTE: All specific data points (noise levels, coil pressure/flow rates etc.) are subject to design fluctuations. These will be confirmed when a construction drawing is produced.		

QUOTATION

Reference :	AHU 04
Model :	ASV1650-3020 EXT
Type :	Pool Air Handling Unit / Externally Mounted
Configuration :	Double Stacked

Supply Duty :	9.000	m3/s @	250 Pa	Extract Duty :	9.000	m3/s @	250 Pa
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SUPPLY AIR SECTION	RETURN AIR SECTION	UNIT DETAILS						
Motorised Air Inlet Damper Motorised Recirc Air Damper Filter Section Efficiency G4 Gauge PD Switch Filter Section Efficiency F7 Gauge PD Switch Heat Recovery Section Thermal wheel 75% Winter Air on (°C) -5.0 Air off (°C) 21.4 Return air (°C) 30.0 Duty recovered (kW) 292 LPHW Heating Coil Air on (°C) -5.0 Air off (°C) 35.0 Duty (kW) 444 LPHW 70/50 Supply Fan Section Backward curved EC plug fan(s) No. of fans 3 x duty Inverter Integrated Electrical input (kW) 10.74 Running current (A) 15.97	Filter Section Efficiency G4 Gauge PD Switch Control Panel Section Panel recessed into unit BMS controller Heat Recovery Section Details as supply Extract Fan Section Backward curved EC plug fan(s) No. of fans 3 x duty Inverter Integrated Electrical input (kW) 7.95 Running current (A) 11.85 Motorised Discharge Damper FLC* : 59.00 Amps <i>*electrical rating for fans, compressors and wheel</i> SFP* : 1.670 w/l/s <i>*based upon clean filters</i>	Manufacturer : AirSource Ventilation Ltd Contact : Lisa Barry Phone no : 0161 425 8553. Quote ref : Q6241 Model Details : ASV1650-3020 EXT Unit Height ¹ 3600mm Unit Width 3020mm Unit Length ² 4500mm Unit Weight 4660kg Supplied in ONE section <i>*incl base frame</i> Features : Pool Spec on supply & Extract ✓ EC plug fans ✓ BACnet controls ✓ Recirc function ✓ LPHW Heating Coil						
Fan Sound Power Spectrum (Lw)								
FREQ (Hz)	63	125	250	500	1K	2K	4K	8K
Supply inlet	75	84	89	85	79	77	75	72
Supply outlet	80	88	94	90	87	81	78	76
Extract inlet	76	90	86	82	77	75	74	72
Extract outlet	79	93	88	88	85	79	78	75
PLEASE NOTE: All specific data points (noise levels, coil pressure/flow rates etc.) are subject to design fluctuations. These will be confirmed when a construction drawing is produced.								



Index	Qty	Model	Description	Unit Price	Net Price
VRF 1					
Library					
100.1	4	PEFY-P40VMA-E3 (410570)	PEFY-P40VMA-E3 DUCTED INDOOR	£710.00	£2,840.00
cash office					
100.2	1	PLFY-P15VFM-E1.TH (293009)	PLFY-P15VFM-E1.TH INDOOR UNIT	£630.00	£630.00
100.3	1	SLP-2FA (289069)	SLP-2FA GRILLE	£88.00	£88.00
staff/office					
100.4	1	PLFY-P40VFM-E1.TH (293013)	PLFY-P40VFM-E1.TH INDOOR UNIT	£735.00	£735.00
100.5	1	SLP-2FAE (288760)	SLP-2FAE Wired panel (3D i-see sensor)	£116.00	£116.00
staff welfare					
100.6	1	PLFY-P15VFM-E1.TH (293009)	PLFY-P15VFM-E1.TH INDOOR UNIT	£630.00	£630.00
100.7	1	SLP-2FAE (288760)	SLP-2FAE Wired panel (3D i-see sensor)	£116.00	£116.00
100.8	1	CMB-P108V-JA (314222)	CMB-P108V-JA BC CONTROLLER R410A	£2,884.00	£2,884.00
100.9	1	PURY-EP250YNW-A (314076)	PURY-EP250YNW-A OUTDOOR UNIT R410A	£7,027.00	£7,027.00
Subtotal:					£15,066.00
VRF 2					
Dance					
200.1	2	PLFY-P80VEM-E (303650)	PLFY-P80VEM-E CEILING CASSETTE R410A	£892.00	£1,784.00
200.2	2	PLP-6BA GRILLE (202694)	PLP-6BA GRILLE	£164.00	£328.00

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Squash 1				
200.3	1	PLFY-P25VFM-E1.TH (293011)	PLFY-P25VFM-E1.TH INDOOR UNIT	£656.00
200.4	1	SLP-2FA (289069)	SLP-2FA GRILLE	£88.00
Squash 2				
200.5	1	PLFY-P25VFM-E1.TH (293011)	PLFY-P25VFM-E1.TH INDOOR UNIT	£656.00
200.6	1	SLP-2FA (289069)	SLP-2FA GRILLE	£88.00
Prog Gym				
200.7	2	PLFY-P40VEM-E (303647)	PLFY-P40VEM-E CEILING CASSETTE R410A	£731.00
200.8	2	PLP-6BA GRILLE (202694)	PLP-6BA GRILLE	£164.00
200.9	1	CMB-P106V-J (314218)	CMB-P106V-J BC CONTROLLER R410A	£2,193.00
200.10	1	PURY-EP300YNW-A (314077)	PURY-EP300YNW-A OUTDOOR UNIT R410A	£8,573.00
Subtotal:				£16,156.00
VRF Heat Pump to serve Main Gym				
300.1	4	PLFY-P100VEM-E (303651)	PLFY-P100VEM-E CEILING CASSETTE R410A	£981.00
300.2	4	PLP-6BA GRILLE (202694)	PLP-6BA GRILLE	£164.00
costing purpose only				
300.3	3	CMY-Y102LS-G2 BRANCH PIPES R410A (241518)	CMY-Y102LS-G2 BRANCH PIPES R410A	£76.00
300.4	1	PUHY-P350YNW-A (313870)	PUHY-P350YNW-A.TH OUTDOOR UNIT R410A	£7,838.00
Subtotal:				£7,838.00

Appendix 2 – Plant Layout

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE LATEST EDITIONS OF THE BRITISH STANDARDS INSTITUTION (BSI) STANDARDS, THE INSTITUTION OF ENGINEERING TECHNOLOGISTS (IET) WIRING REGULATIONS (BS 7671), AND THE INSTITUTION OF MECHANICAL ENGINEERS (IMECH) REFRIGERATION REGULATIONS (BS 2909).

2. THE DRAWING SHALL BE USED IN CONJUNCTION WITH THE PROJECT SPECIFICATION AND THE PROJECT MANUAL.

3. ALL WORK SHALL BE COMPLETED BY THE DATE SPECIFIED IN THE PROJECT MANUAL.

4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE LOCAL AUTHORITY.

5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING SERVICES AND STRUCTURES.

6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING SERVICES AND STRUCTURES.

7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING SERVICES AND STRUCTURES.

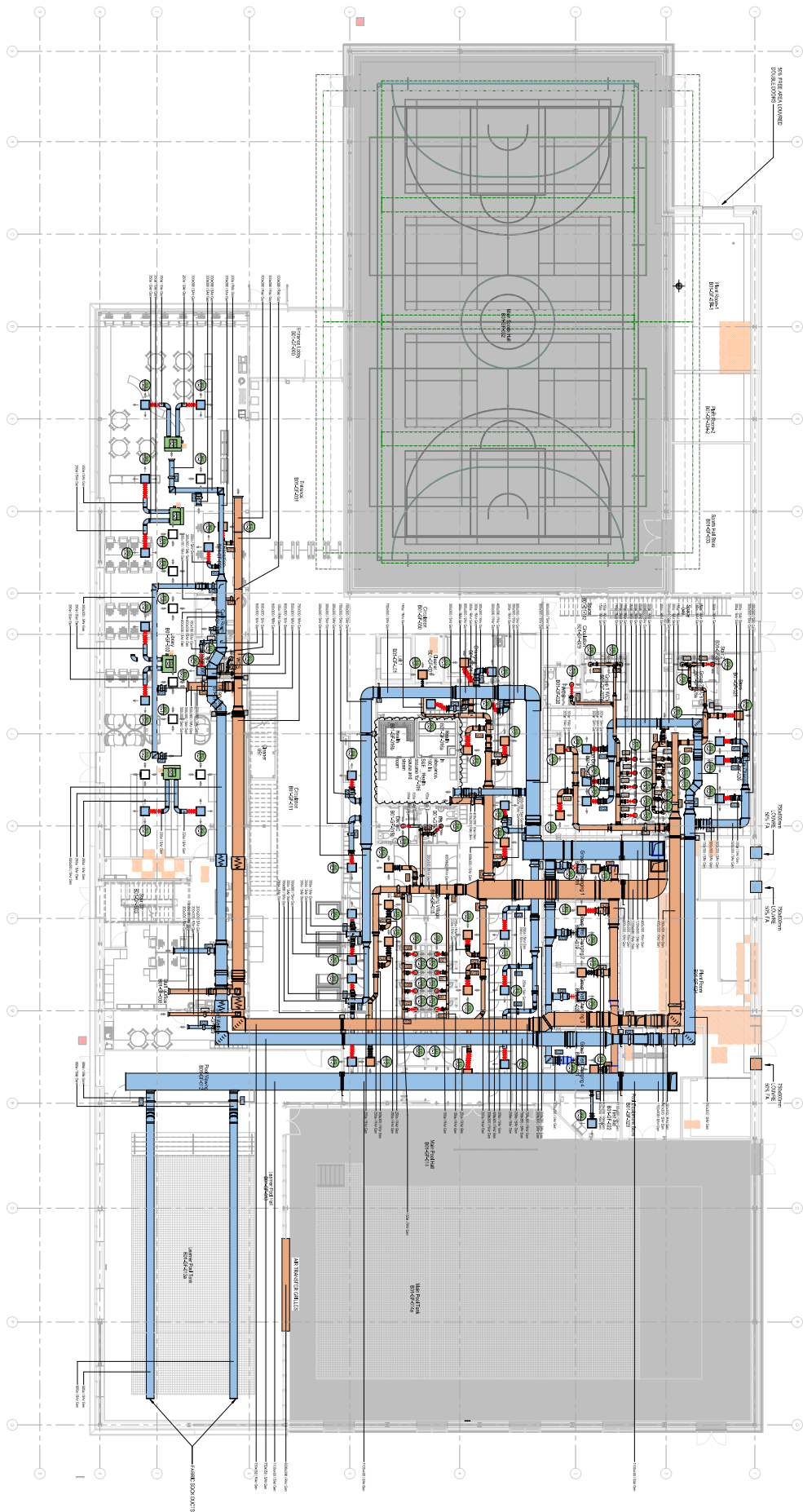
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING SERVICES AND STRUCTURES.

9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING SERVICES AND STRUCTURES.

10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING SERVICES AND STRUCTURES.

NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE LATEST EDITIONS OF THE BRITISH STANDARDS INSTITUTION (BSI) STANDARDS, THE INSTITUTION OF ENGINEERING TECHNOLOGISTS (IET) WIRING REGULATIONS (BS 7671), AND THE INSTITUTION OF MECHANICAL ENGINEERS (IMECH) REFRIGERATION REGULATIONS (BS 2909).
2. THE DRAWING SHALL BE USED IN CONJUNCTION WITH THE PROJECT SPECIFICATION AND THE PROJECT MANUAL.
3. ALL WORK SHALL BE COMPLETED BY THE DATE SPECIFIED IN THE PROJECT MANUAL.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE LOCAL AUTHORITY.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING SERVICES AND STRUCTURES.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING SERVICES AND STRUCTURES.
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9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING SERVICES AND STRUCTURES.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING SERVICES AND STRUCTURES.



B.D.P.

For Review & Comment

Project Name: [Project Name]
Project Number: [Project Number]
Project Location: [Project Location]
Project Date: [Project Date]
Project Status: [Project Status]

Item	Description	Quantity	Unit	Price
1	Item 1	1	Unit	1.00
2	Item 2	2	Unit	2.00
3	Item 3	3	Unit	3.00
4	Item 4	4	Unit	4.00
5	Item 5	5	Unit	5.00
6	Item 6	6	Unit	6.00
7	Item 7	7	Unit	7.00
8	Item 8	8	Unit	8.00
9	Item 9	9	Unit	9.00
10	Item 10	10	Unit	10.00



1. **INTRODUCTION** AND THE PROBLEM STATEMENT: The first slide introduces the topic of the presentation, which is the impact of climate change on the global environment. It highlights the urgency of the issue and the need for a comprehensive understanding of the problem.
2. **DEFINITION OF KEY TERMS**: This slide defines the key terms used throughout the presentation, ensuring clarity and consistency in the discussion.
3. **SCOPE AND LIMITATIONS**: The third slide outlines the scope of the study, detailing the geographical areas and time periods covered, as well as the limitations of the research.
4. **RESEARCH OBJECTIVES**: This slide presents the primary objectives of the research, which are to analyze the current state of climate change and to propose effective mitigation strategies.
5. **LITERATURE REVIEW**: The fifth slide provides a brief overview of the existing literature on climate change, highlighting key findings and gaps in the current knowledge.
6. **METHODS**: This slide describes the research methods employed, including data collection techniques, analysis tools, and the overall research design.
7. **RESULTS**: The seventh slide presents the initial findings of the research, showing the extent of climate change and the potential impacts on the environment.
8. **DISCUSSION**: This slide discusses the implications of the findings, comparing them with existing research and highlighting the unique contributions of the study.
9. **CONCLUSIONS**: The ninth slide summarizes the main conclusions of the research, emphasizing the need for immediate action to address climate change.
10. **REFERENCES**: The final slide lists the references used in the presentation, providing a comprehensive list of sources for further reading.

- DUCTWORK TO BE TREATED TO PROTECT AGAINST THE HIGH CHLORINE ENVIRONMENT

PTS	QUEST ID	Single hit	T2	Q1
200	200010	Single hit	A	400
201	200015	Single hit	A	400
202	200020	Single hit	A	400
203	200025	Single hit	A	400
204	200030	Single hit	A	400
205	200035	Single hit	A	400
206	200040	Single hit	A	400
207	200045	Single hit	A	400
208	200050	Single hit	A	400
209	200055	Single hit	A	400
210	200060	Single hit	A	400
211	200065	Single hit	A	400
212	200070	Single hit	A	400
213	200075	Single hit	A	400
214	200080	Single hit	A	400
215	200085	Single hit	A	400
216	200090	Single hit	A	400
217	200095	Single hit	A	400
218	200100	Single hit	A	400
219	200105	Single hit	A	400
220	200110	Single hit	A	400
221	200115	Single hit	A	400
222	200120	Single hit	A	400
223	200125	Single hit	A	400
224	200130	Single hit	A	400
225	200135	Single hit	A	400
226	200140	Single hit	A	400
227	200145	Single hit	A	400
228	200150	Single hit	A	400
229	200155	Single hit	A	400
230	200160	Single hit	A	400
231	200165	Single hit	A	400
232	200170	Single hit	A	400
233	200175	Single hit	A	400
234	200180	Single hit	A	400
235	200185	Single hit	A	400
236	200190	Single hit	A	400
237	200195	Single hit	A	400
238	200200	Single hit	A	400
239	200205	Single hit	A	400
240	200210	Single hit	A	400
241	200215	Single hit	A	400
242	200220	Single hit	A	400
243	200225	Single hit	A	400
244	200230	Single hit	A	400
245	200235	Single hit	A	400
246	200240	Single hit	A	400
247	200245	Single hit	A	400
248	200250	Single hit	A	400
249	200255	Single hit	A	400
250	200260	Single hit	A	400
251	200265	Single hit	A	400
252	200270	Single hit	A	400
253	200275	Single hit	A	400
254	200280	Single hit	A	400
255	200285	Single hit	A	400
256	200290	Single hit	A	400
257	200295	Single hit	A	400
258	200300	Single hit	A	400
259	200305	Single hit	A	400
260	200310	Single hit	A	400
261	200315	Single hit	A	400
262	200320	Single hit	A	400
263	200325	Single hit	A	400
264	200330	Single hit	A	400
265	200335	Single hit	A	400
266	200340	Single hit	A	400
267	200345	Single hit	A	400
268	200350	Single hit	A	400
269	200355	Single hit	A	400
270	200360	Single hit	A	400
271	200365	Single hit	A	400
272	200370	Single hit	A	400
273	200375	Single hit	A	400
274	200380	Single hit	A	400
275	200385	Single hit	A	400
276	200390	Single hit	A	400
277	200395	Single hit	A	400
278	200400	Single hit	A	400
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