

Ventilation Survey

Graceville State School

Department of Education

13 April 2022



The Power of Commitment

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Executive summary

This report is subject to, and must be read in conjunction with, the limitations set out in section 1.2 and the assumptions and qualifications contained throughout the Report.

This report summarises the findings of the ventilation audit of Graceville State School, Graceville, Brisbane.

An inspection of the school was carried out on 09 February 2022. The inspection included measuring CO₂ levels in classrooms using Aranet4 CO₂ sensors. The findings were recorded. In addition to this, a logger was left in classroom RG00N01 (N Block) at the request of the teacher, in order to ascertain the effect of closing windows on the field side of the classroom to limit noise ingress from children playing outside.

In general, CO₂ levels were noted to be under 800ppm in all areas other than the F Block classrooms. It is assumed that the layouts of the F block classrooms, with a deep floor space and foyer and a nib wall between the classroom and foyer, as well as several closed windows at the time of the inspection, hampered cross ventilation and resulted in slightly higher CO₂ levels than the other classrooms. For this block in particular, it is recommended that windows are kept open on both sides of the classroom in order to facilitate effective cross ventilation.

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1. Introduction

1.1 Purpose of this report

GHD were requested by Education Queensland to inspect and review several schools in the Brisbane, Queensland area to provide qualitative assessment of the effectiveness of the natural and mechanical ventilation systems serving various classrooms and administration areas and advise the department of any perceived shortcomings or inefficiencies.

This report summarises the findings of the inspection of Graceville State School, Graceville, Brisbane.

1.2 Scope and limitations

The scope of the ventilation assessment at Graceville State School is to develop a qualitative assessment of classroom ventilation.

Carbon dioxide (CO₂) monitors provided by Education Queensland provided a point-in-time assessment of CO₂ concentration. Education Queensland have determined, in consultation with OzSAGE guidelines (OzSAGE, 2021), that an upper limit of 800ppm represents acceptable air quality.

It must be noted that the measure of CO₂ levels is not a measure of the probability of the spread of the SARS COVID-19 virus. The measure of CO₂ levels was used as an indication of the effectiveness of the ventilation strategy (ie natural, mechanical or hybrid systems) for a particular area. This report does not investigate the probability of spread of the SARS-Covid-19 virus.

No heat load calculations were carried out and the capacity or effectiveness of cooling systems was not reviewed.

GHD's investigations were limited to determining the effectiveness of the installed natural and mechanical ventilation systems. The quality of installation and / or maintenance was not reviewed.

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The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared. The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section 1.3 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

1.3 Assumptions

It is assumed that the mechanical ventilation systems were designed in accordance with the requirements of AS1668.2 – 2012: *Australian Standard – the use of ventilation and airconditioning in buildings – Part 2: Mechanical ventilation in buildings*.

It is assumed that all fan unit filters were intact and clean at the time of our inspections.

2. Methodology

The audit involved a physical inspection of the associated classrooms / administration areas.

The inspection commenced with the key areas and classrooms as identified by the principal or business manager of the school, followed by a general inspection of randomly selected classrooms. Where possible, at least one classroom in each building / block was inspected. Where several similar classrooms existed in a block, the perceived "worst case" classroom was selected. This included smaller classrooms with higher student densities and centrally located classrooms with less windows than perimeter classrooms with windows on more than 2 facades. Testing was undertaken in occupied classrooms only.

Commercially available Aranet4 CO₂ sensors were used to measure the space CO₂ levels. The sensors were as procured and not recalibrated. For monitoring purposes, the measurement interval was set to 1 minute. For recording purposes, the interval was set to 5 minutes.

A commercially available Testo 425 thermal anemometer was used to measure fresh air fan airflows. The unit is as procured and has not been recalibrated.

The classroom inspection involved the following:

1. Placement of the CO₂ sensor in a centrally located position, as far as possible from open windows and doors. The sensor was left to refresh the CO₂ level readings while the doors and windows serving the area were measured.
2. The measurement of all openable doors and windows serving the area inspected. Refer to mark-ups in Appendix A.
3. Where present, recording the position and quantities of all installed airconditioning units and fresh air fan units.
4. When running and accessible, measuring fresh-air fan flow rates using a Testo 425 anemometer.

Following the inspection, areas or classrooms of interest were identified and an Aranet4 sensor was left for several days to record CO₂ levels. The sensors were then removed, and recorded data downloaded.

3. Observations

3.1 Site inspection

At Graceville State School, the following classrooms and areas were inspected (room numbers as per EQ building plans provided):

Table 1 *Inspected Rooms*

Block	Level	Room	Measured CO ₂ Level (max - ppm)	Observations
Admin	01	R10AC19	461	Classroom not in use at time of inspection.
		R10AC22	474	Classroom not in use at time of inspection.
D Block	01	R10DC67	524	
		R10DC69	506	
		R10DC71	569	
E Block	01	R10EC64	641	
		R10EC65	570	
F Block	01	R10FC57	526	
		R10FC58	968	All windows on one side of classroom closed.
		R10FC59	-	No recording taken.
		R10FC60	877	
		R10FC61	852	Only 2 open windows on one side of classroom.
G Block	Ground	RG0GC38	452	
		RG0GC45	502	
		RG0GC46	561	
		RG0GC53	-	No recording taken. Class not in use at time of inspection.
K Block	Ground	RG0KC01	483	
		R10KC02	481	
	01	R10KC03	443	
		RG0KC04	439	
M Block	Ground	New Room 1	440	
N Block	Ground	RG00N01	609	
O Block	Ground	RG000O1	580	
		RG000O2	647	
Q Block	01	New Room 1	783	
		R10Q103	741	
		R10Q105	474	
		R10Q106	513	
		R10Q107	464	
	02	R20Q102	510	
		R20Q203	489	
		R20Q204	623	

Block	Level	Room	Measured CO ₂ Level (max - ppm)	Observations
		R20Q205	516	
		R20Q206	464	

In general, the CO₂ levels in most classrooms were observed to be under 800ppm, with only 3 classrooms noted to be over as follows:

- R10FC58
- R10FC60
- R10FC61

It must be noted that all these classrooms are located in F block, level 1. The footprints of these classrooms are quite deep, and the layout of each classroom includes a foyer and the classroom. In almost all the classrooms, a nib wall separates the classroom and lobby area, possibly hampering airflow. Although there are several windows on both sides of each classroom, in several classrooms, many windows were closed at the time of the inspection. This combination could be resulting in marginally higher CO₂ levels than noted in other areas / classrooms. Note that none of the classrooms at Graceville State School, with the exception of the music room, are fitted with fresh air ventilation fans.

3.2 CO₂ Logging

3.2.1 Classroom RG00N01 (N Block)

An Aranet4 logger was left in Classroom RG00N01 (N Block) at the request of the teacher. The windows on the field side of the class are often kept closed to minimise noise in the classroom while children are playing on the field. The logger was installed during the inspection on 09 February 2022 and removed on 16 February 2022. During this time, the CO₂ levels did not exceed 657ppm (16 February 2022 at 08h19). Refer to Figure 1 below.

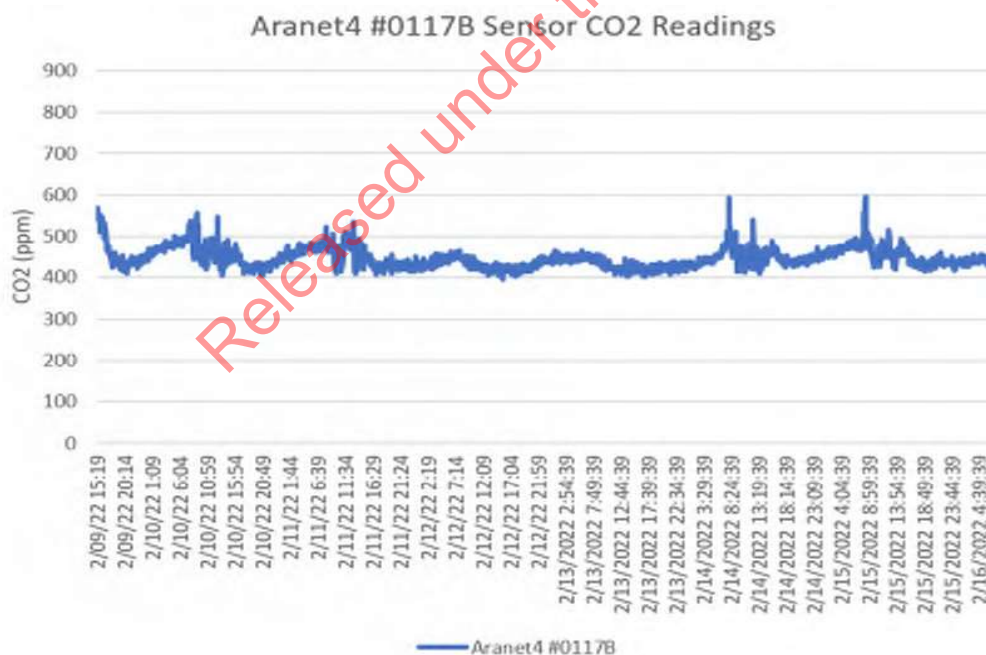


Figure 1 RG00N01 CO₂ levels

3.2.2 General purpose hall

Two Aranet4 loggers were left in the hall following a concern raised regarding higher activity levels from children during HPE lessons and after-hours classes.

As can be seen from the below, CO2 levels did not exceed 800ppm during the time installed.

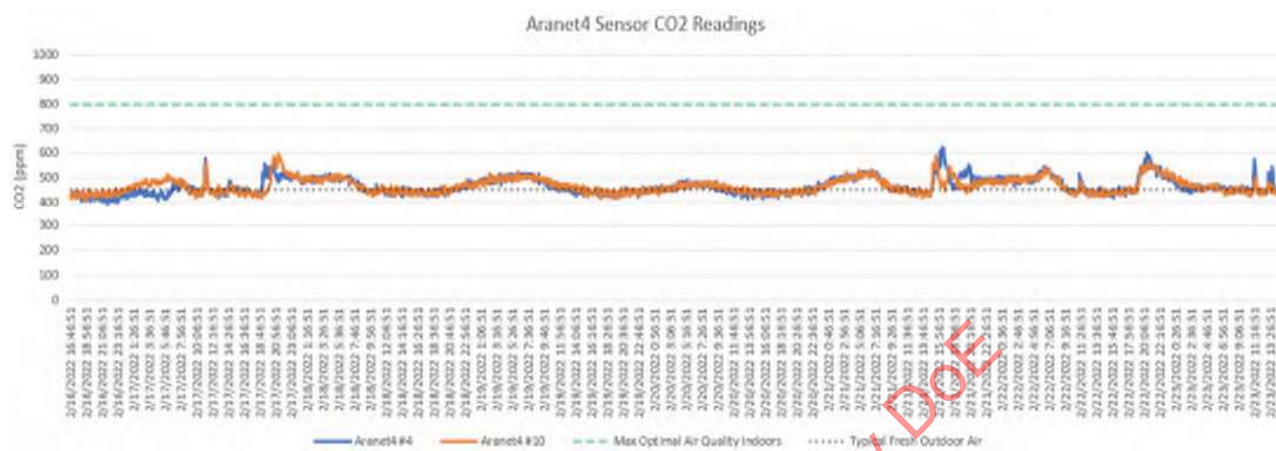


Figure 2 Hall CO₂ levels

4. Recommendations

In general, classrooms with several windows open, especially on at least 2 opposing sides of the room, were noted to have low CO₂ levels. In most cases, CO₂ levels did not exceed 800ppm.

In Block F, CO₂ levels exceeded 800ppm, though did not exceed 1000ppm. In room R10FC58, with the highest reading, the windows on one side of the classroom (opposite the foyer) were noted during our inspection to all be closed. This, in addition to the layout of the classroom, appears to be hampering adequate cross ventilation. We recommend that windows on both sides of the classrooms in this block are kept open in order to improve cross ventilation and reduce CO₂ levels.

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5. References

OzSAGE. (2021). *Protecting children from COVID-19 and making schools and childcare safer*. OzSAGE.

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Appendices

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Appendix A

Site Observations

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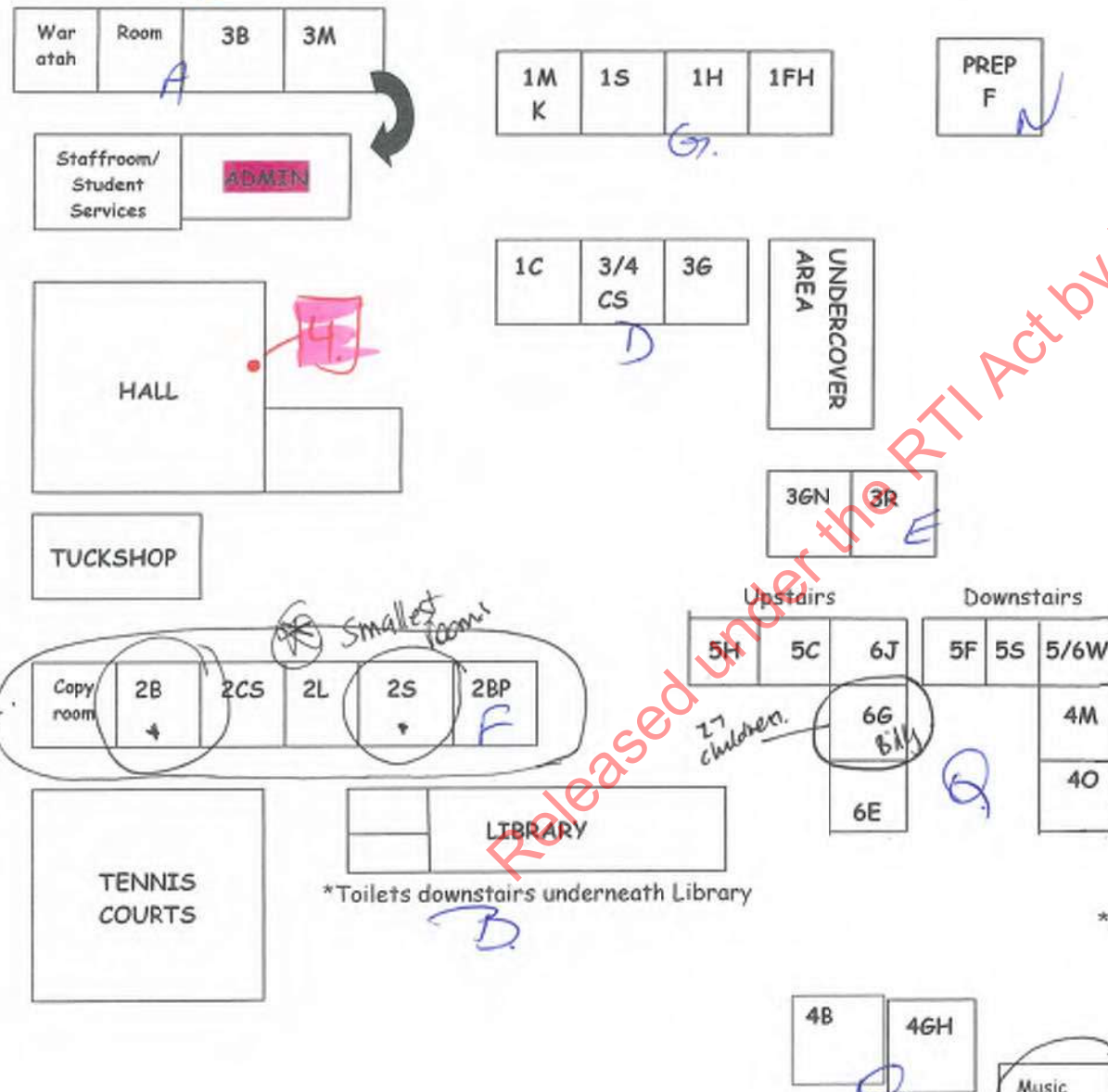
Graceville State School (1515)



REF	New_FLG	Local_Name
01	1515-CA1-S-000A	ADMIN BLOCK
02	1515-CA1-S-000C	C BLOCK
03	1515-CA1-S-000B	B BLOCK
04	1515-CA1-S-000F	F BLOCK
05	1515-CA1-S-000H	MULTI-PURPOSE HALL
06	1515-CA1-S-000M	M BLOCK
07	1515-CA1-S-000K	K BLOCK
09	1515-CA1-S-000G	G BLOCK
10	1515-CA1-S-000D	D BLOCK
11	1515-CA1-S-000E	E BLOCK
15	1515-CA1-G-OCA5	COVERED AREA 5 - WAITING (PARK TUCKSHOP)
16	1515-CA1-S-000T	TUCKSHOP
17	1515-CA1-S-0CA2	COVERED AREA 2 - EATING AREA
18	1515-CA1-S-0P01	POOL
19	1515-CA1-G-0VAL	OVN
20	1515-CA1-G-00TC	TENNIS COURT
22	1515-CA1-S-0P06	GRANDSTAND
23	1515-CA1-S-000P	SWIMMING POOL (AMENITIES BLOCK)
25	1515-CA1-G-S501	SHADE STRUCTURE 1 - LIBRARY VE
27	1515-CA1-G-OCA3	COVERED AREA 3 - TENNIS
28	1515-CA1-G-OCA4	COVERED AREA 4 - AFTER SCHOOL
29	1515-CA1-S-00KT	TOILETS - KT BLOCK
30	1515-CA1-S-0CA6	COVERED AREA 6 - POOL
31	1515-CA1-S-0P07	SHED
32	1515-CA1-G-OCA9	COVERED AREA 9 - POOL WEST
33	1515-CA1-G-S502	SHADE STRUCTURE 2 - POOL EAST
35	1515-CA1-G-S504	SHADE STRUCTURE 4 - OVAL END
36	1515-CA1-S-00HH	HH BLOCK
37	1515-CA1-S-0CA7	COVERED AREA 7 - WAITING (OXLE
38	1515-CA1-G-OCA1	COVERED AREA 1 - QUADRANGLE
39	1515-CA1-S-000N	N BLOCK
41	1515-CA1-S-000Q	Q BLOCK
43	1515-CA1-S-SH01	SHED 1 - MOWER
44	1515-CA1-G-PG06	CRICKET NETS
45	1515-CA1-G-PG05	HALF COURT - BASKETBALL
46	1515-CA1-S-SH03	SHED 3 - SPORTS
47	1515-CA1-S-SH02	SHED 2 - PREP
48	1515-CA1-S-000Q	Q BLOCK
49	1515-CA1-S-0CA8	COVERED AREA 8 - WAITING (ACAC
50	1515-CA1-S-CA10	COVERED AREA 10 - POOL SOUTH
52	1515-CA1-G-S505	SHADE STRUCTURE 5 - PLAYGROUND

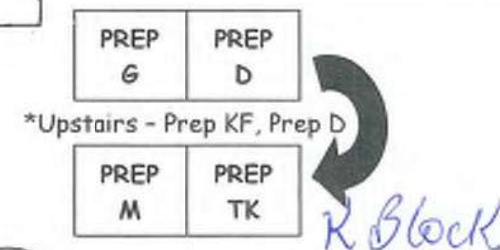
Data Updated by Dept. of Education - ISD School Mapping Team: 4 Feb 2022 // Images supplied by NearMap under Licence

Graceville State School 2022 Classes

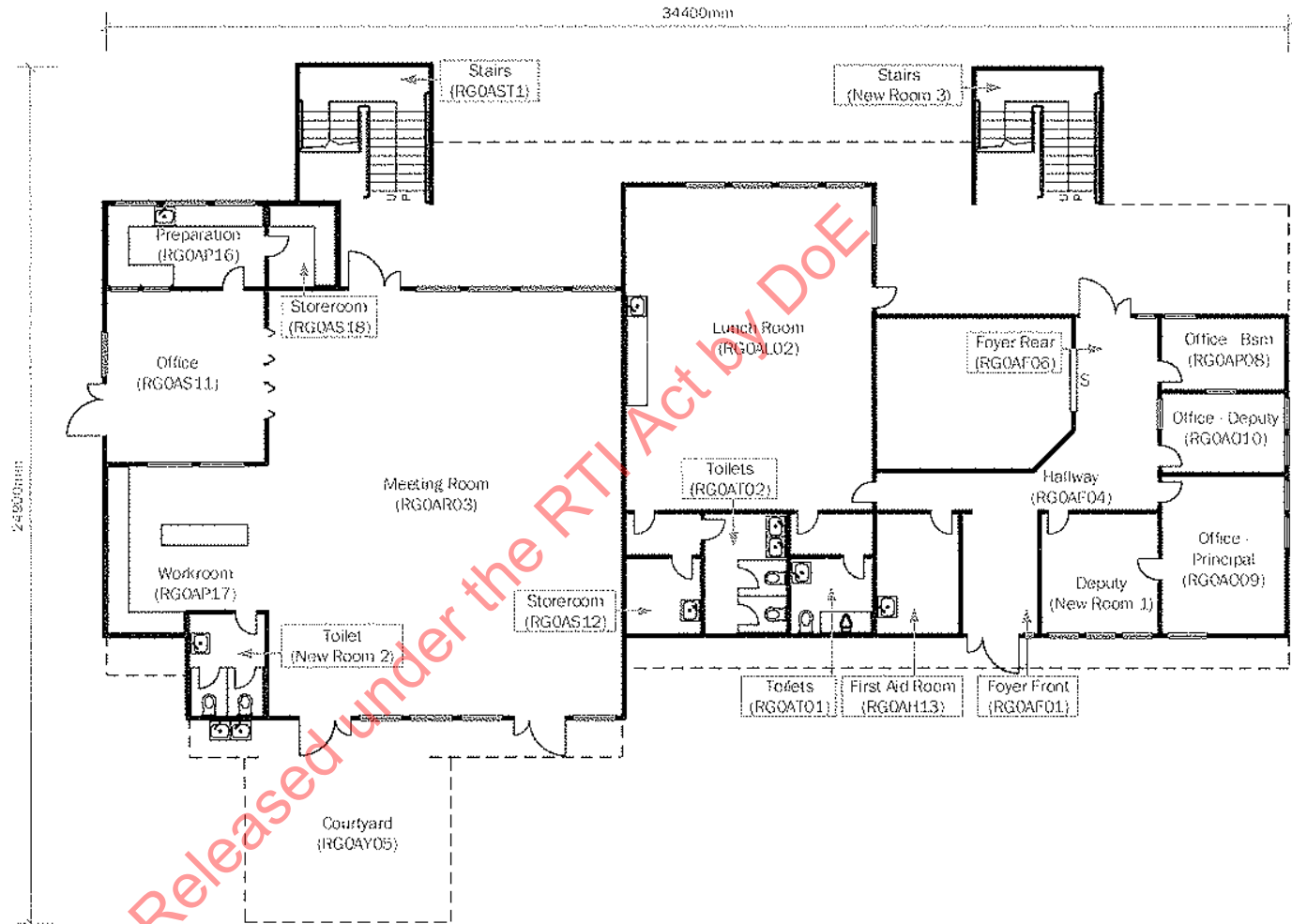


Teachers 2022

PrepM	Sharyn Malcolm
PrepG	Liz Gillespie
PrepF	Nikki Frederick
PrepD	Katy Duncan
PrepTK	Michelle Tink/Linda Kennedy
1C	Elisa Chudasko
1MK	Sanitha Mahabeer/Linda Kennedy
1H	Ailsa Hughes
1S	Hayley Salmond
1FH	Ange Harrison/Nicole Ford
2CS	Loretta Caton/Tessa Gray
2BP	Carolyn Brough/Alissa Payne
2S	Katherine Spalding
2L	Pamela Lambrides
2B	Grace Bailey
3GN	Ellen Gallagher/Alison Nash
3R	Danielle Ricketts
3M	Clara Maw
3G	Georgina Baartz
3B	Emily Bacic
3/4CS	Tina Cousins/Jessica Scott
4GH	Christie Goeldner/Ashleigh Hood
4O	Jeremy Osborn
4M	Sue Miller
4B	Millie Beckinsale
5H	Anne Hornstra
5S	Robyn Sheppard
5F	Natalie Fichera
5C	Matt Cook
5/6W	Amber Weekes
6J	Matthew Jordan
6G	Billy Guthrie
6E	Riley Cooper



1515-S-000A-GRND
Floor Footprint 561m²



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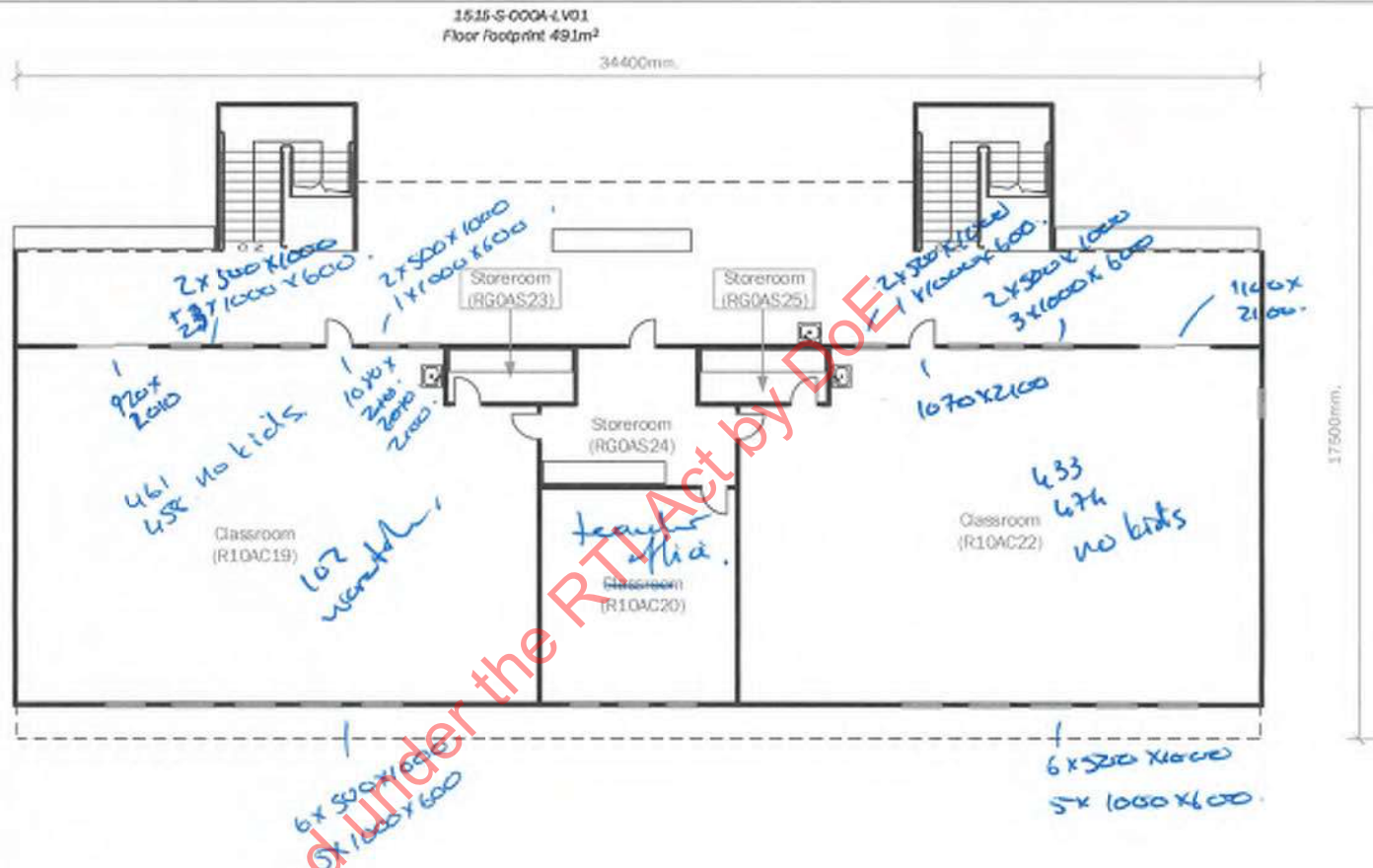
Notes

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Department of Education and Training

School: Graceville SS
Address: 23 Acacia Avenue, Graceville, QLD 4075.
Building Name: Acacia Block
Floor Level: Ground Level
Functional Location Code: 1515-S-000A-GRND



INDIVIDUAL ROOM DETAILS			ROOM DIMENSIONS			
FLC Code	Room Name	Floor Material	Room Area (m ²)	L (m)	W (m)	Ceiling Height (m)
R10AC19	Classroom	Vinyl/Carpet	133.3	9.6	14.3	2.9
R10AC20	Classroom	Carpet	18.8	6.0	4.8	2.9
R10AC22	Classroom	Vinyl/Carpet	133.3	9.6	14.3	2.9
RG0AS23	Storeroom	Vinyl	5.8	1.6	3.6	2.9
RG0AS24	Storeroom	Vinyl/Carpet	14.3	3.7	4.8	2.9
RG0AS25	Storeroom	Vinyl	5.8	1.6	3.6	2.9

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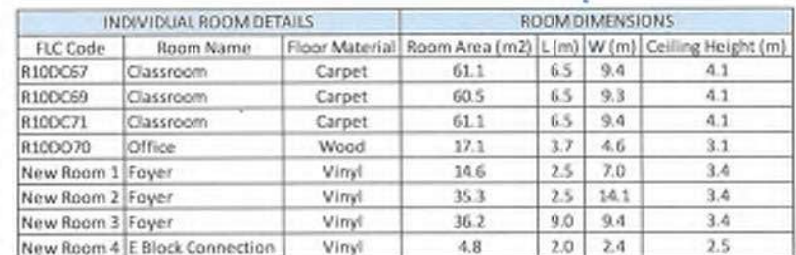
Rev. no.	Comment	Drawn	App'd	Date	Notes
0	Revised			23.05.2017	

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Department of Education and Training

School: Graceville SS
 Address: 23 Acacia Avenue, Graceville, QLD 4075
 Building Name: Admin Block
 Floor Level: Level 01
 Functional Location Code: 1515S-0004-LV01

[illegible]

Department of Education and Training

School	Greenville SS
Address	23 Acacia Avenue, Greenville, QLD 4075
Building Name	D Block
Floor Level	Level 01
Functional Location Code	15 15-S-0000-LV01

1515-S-000E-LV01
Floor Footprint 174m²

17400mm

F Block

Verandah
(RGDEVE1)

Store
(New Room 2)

65.
Classroom
(R10EC65)

36m.
Classroom
(R10EC64)

Foyer
(New Room 2)

Foyer
(New Room 1)

D Block



INDIVIDUAL ROOM DETAILS			ROOM DIMENSIONS			
FLC Code	Room Name	Floor Material	Room Area (m ²)	L (m)	W (m)	Ceiling Height (m)
R10EC64	Classroom	Carpet	53.3	7.3	7.3	3.4
R10EC65	Classroom	Carpet	53.3	7.3	7.3	3.4
New Room 1	Foyer	Vinyl	10.7	1.9	5.6	3.3
New Room 2	Foyer	Vinyl	12.8	1.9	6.7	3.3
New Room 3	Store	Wood	1.6	1.2	1.3	2.3
RGDEVE1	Verandah	Wood	28.5	17.2	2.5	2.5

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0	Revised			21.05.2017	

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Department of Education and Training

School: Graceville SS
Address: 23 Acacia Avenue, Graceville, QLD 4075
Building Name: E Block
Floor Level: Level 01
Functional Location Code: 1515-S-000E-LV01



INDIVIDUAL ROOM DETAILS				ROOM DIMENSIONS		
FLC Code	Room Name	Floor Material	Room Area (m ²)	L (m)	W (m)	Ceiling Height (m)
R10FC56	Teacher Aides Room	Carpet	46.8	6.4	7.3	3.0
R10FC57	Classroom	Carpet	46.8	6.4	7.3	3.0
R10FC58	Classroom	Carpet	46.8	6.4	7.3	3.0
R10FC59	Classroom	Carpet	46.8	6.4	7.3	3.0
R10FC60	Classroom	Carpet	46.8	6.4	7.3	3.0
R10FC61	Classroom	Carpet	46.8	6.4	7.3	3.0
New Room 1	Foyer	Vinyl	23.3	2.4	9.7	3.0
New Room 2	Foyer	Vinyl	17.6	2.4	7.3	3.0
New Room 3	Foyer	Vinyl	22.4	2.4	9.8	3.0
New Room 4	Foyer	Vinyl	29.6	2.4	12.3	3.0

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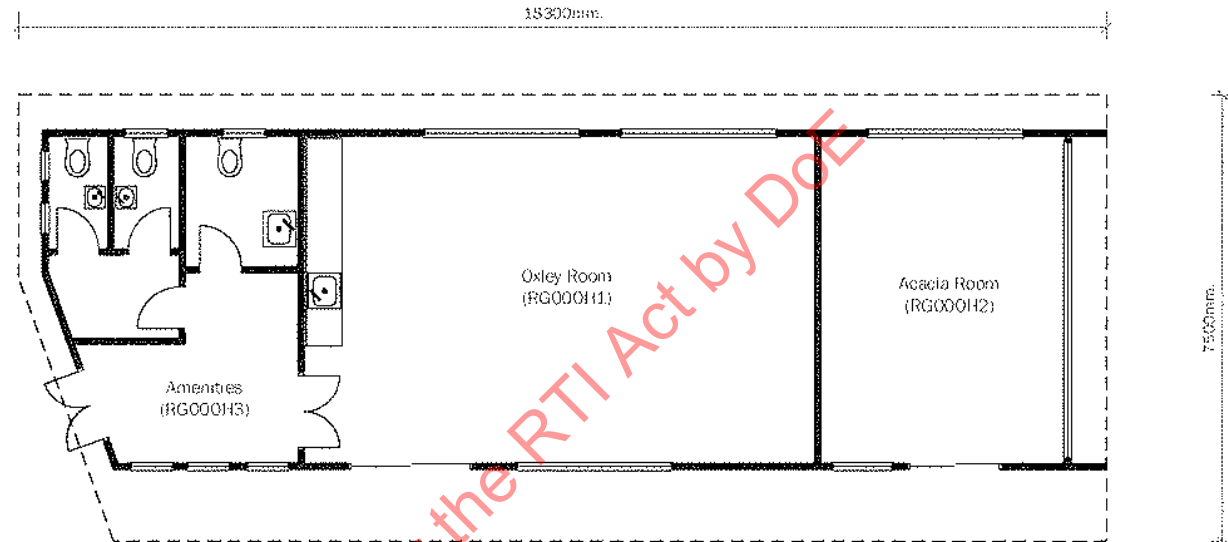
Department of Education and Training

School: Graceville SS
Address: 23 Ascia Avenue, Graceville, QLD 4075
Building Name: F Block
Floor Level: Level 01
Functional Location Code: 1515-S-000F-LV01



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1515-S-00HH-GRND
Floor Footprint 117m²



INDIVIDUAL ROOM DETAILS			ROOM DIMENSIONS			
FLC Code	Room Name	Floor Material	Room Area (m2)	L (m)	W (m)	Ceiling Height (m)
RG000H1	Oxley Room	Carpet	44.0	8.3	5.3	3.5
RG000H2	Acacia Room	Carpet	22.2	4.2	5.3	3.5
RG000H3	Amenities	Ceramic Tile	19.4	4.1	5.3	2.4

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Department of Education and Training

School: Graceville SS
Address: 23 Acacia Avenue, Graceville, QLD 4075.
Building Name: 1st Block
Floor Level: Ground Level
Functional Location Code: 1515-S-00HH-GRND

1515-S-000K-GRND
Floor Footprint 289m²

17000mm

3700mm
14900mm
2600mm

loures open

4x670x670 sliders
+ 4x700x550 loures.

loures closed

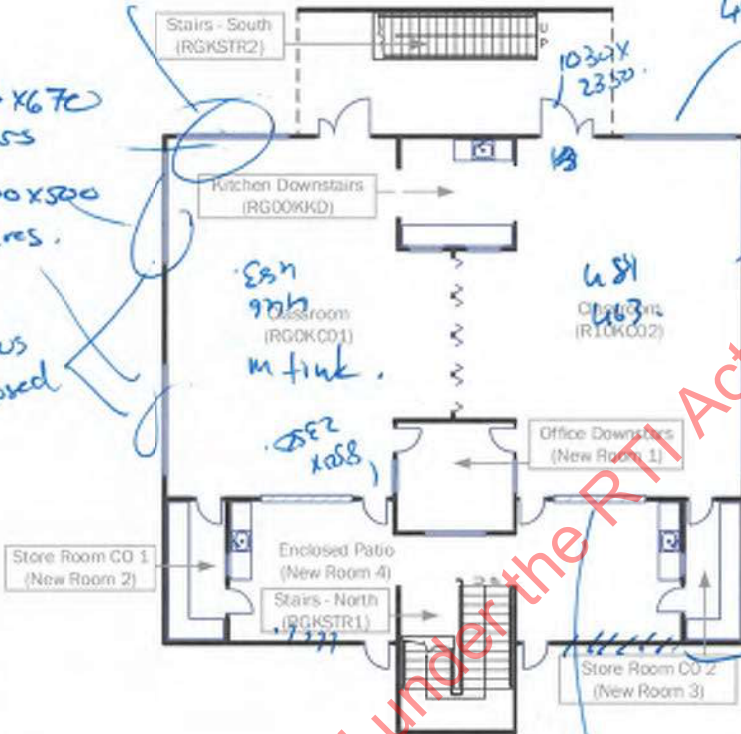
4x650x670 slider to all closed
+ 700x550 slider x 4 loure all open
4x650x670 slider all closed. To hand.
to open
+ all +
4x700x550 loure open.

S Mahabeer.

4x650x670 slider
+ 700x550x4 loure.

All work.

2400x
2400x
balky
shells



INDIVIDUAL ROOM DETAILS			ROOM DIMENSIONS			
FLC Code	Room Name	Floor Material	Room Area (m ²)	L (m)	W (m)	Ceiling Height (m)
RG00KKD	Kitchen Downstairs	Vinyl	11.2	3.5	3.2	2.7
RG00KC01	Classroom	Vinyl	62.3	8.3	10.2	2.7
*RG00KC02	Classroom	Vinyl	62.3	8.3	10.2	2.7
RGKSTR1	Stairs - North	Concrete	14.3	8.4	1.7	2.7
RGKSTR2	Stairs - South	Concrete	6.7	4.8	1.4	2.7
New Room 1	Office Downstairs	Vinyl	11.2	3.3	3.4	2.7
New Room 2	Store Room CO 1	Vinyl	7.2	1.8	4.0	2.7
New Room 3	Store Room CO 2	Vinyl	7.2	1.8	4.0	2.7
New Room 4	Enclosed Patio	Rubber	42.7	12.7	4.2	2.7



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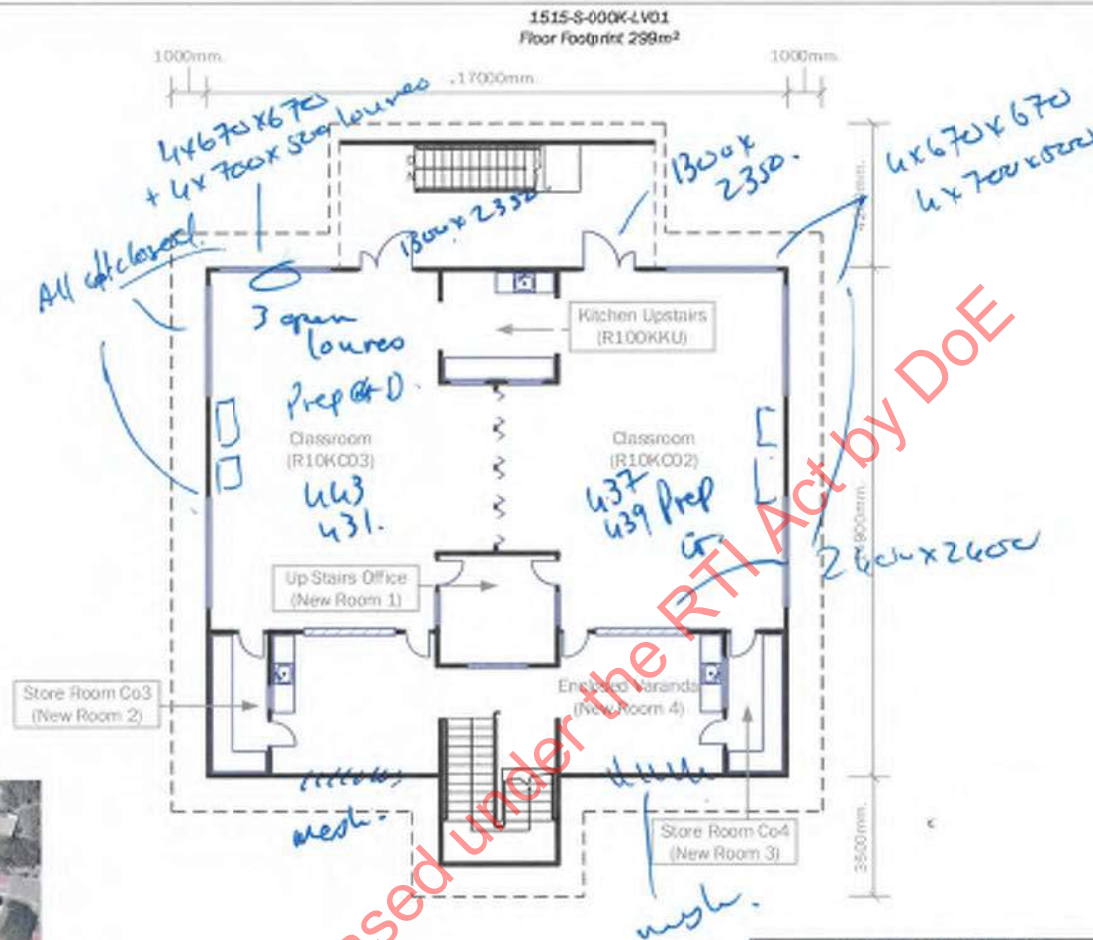
Rev. no.	Comment	Drawn	App'd	Date	Notes
0	Revised	6470(b) - Contain		22.05.2017	

* This room has historically been listed with an adjoining floor but has been moved here as per audit discovery.

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Department of Education and Training
School: Graceville SS
Address: 23 Acacia Avenue, Graceville, QLD 4075
Building Name: K Block
Floor Level: Ground Level
Functional Location Code: 1515-S-000K-GRND



INDIVIDUAL ROOM DETAILS			ROOM DIMENSIONS			
FLC Code	Room Name	Floor Material	Room Area (m ²)	L (m)	W (m)	Ceiling Height (m)
R100KKU	Kitchen Upstairs	Vinyl	11.2	3.5	3.2	2.7
R10KCO3	Classroom	Vinyl/Carpet	62.3	8.3	10.2	2.7
*R0KCO4	Classroom	Vinyl/Carpet	62.3	8.3	10.2	2.7
New Room 1	Up Stairs Office	Vinyl	11.2	3.4	3.3	2.7
New Room 2	Store Room Co3	Vinyl	7.2	1.8	4.0	2.7
New Room 3	Store Room Co4	Vinyl	7.2	1.8	4.0	2.7
New Room 4	Enclosed Varandah	Soft Rubber	42.7	12.7	4.2	2.7

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8	Revised			23.05.2017

Notes
 * This room has historically been listed with an adjoining floor but has been moved here as per audit discovery.
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Department of Education and Training
 School: Graceville SS
 Address: 23 Acacia Avenue, Graceville, QLD 4075
 Building Name: K Block
 Floor Level: Level 01
 Functional Location Code: 1515-S-000K-LV01



INDIVIDUAL ROOM DETAILS			ROOM DIMENSIONS			
FIC Code	Room Name	Floor Material	Room Area (m ²)	L (m)	W (m)	Ceiling Height (m)
RG0M002	Office	Carpet	11.5	3.7	3.1	3.5
RG0M001	Stairs	Timber	1.3	1.1	1.2	0.7
RG0M002	Stairs	Timber	1.0	0.9	1.1	0.6
RG0M003	Storeroom	Carpet	13.4	2.2	6.1	4.8
New Room 1	Classroom	Carpet	89.6	17.0	8.6	4.8

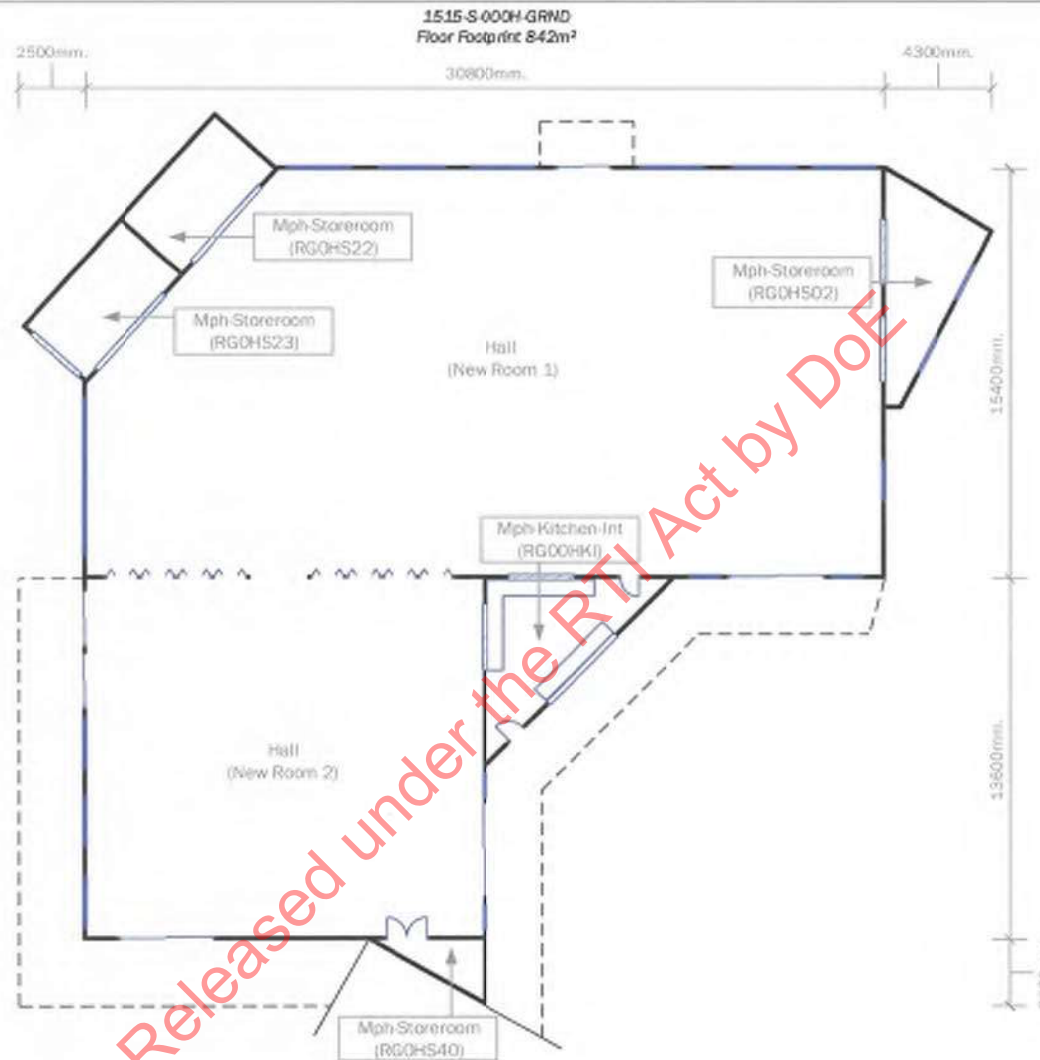
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01	Revised	01/13/01	01/13/01	03/05/2017

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School	Gracerville SS
Address	23 Acacia Avenue, Gracerville, QLD 4075
Building Name	M Block
Floor Level	Ground Level
Functional Location Code	2515-S-000M-QSND



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01	Revised	6470(b) - Contrary		23.05.2017	

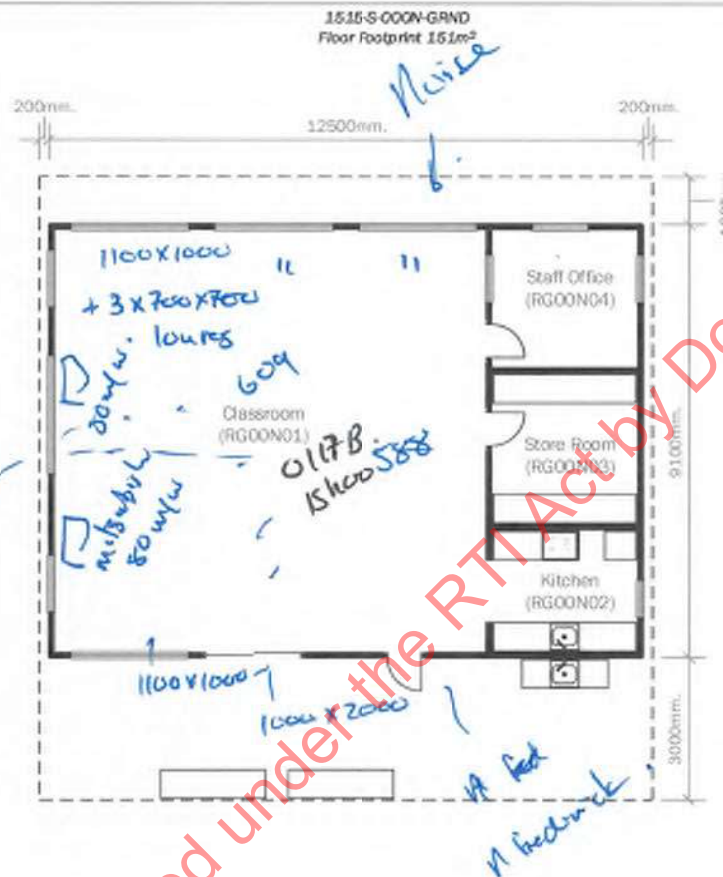
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Department of Education and Training

School: Graceville SS
 Address: 23 Acacia Avenue, Graceville, QLD 4075
 Building Name: Multi-Purpose Hall
 Floor Level: Ground Level
 Functional Location Code: 1515-S-0004-GRND

High level louvers
9x 700x350
No handle.



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INDIVIDUAL ROOM DETAILS			ROOM DIMENSIONS			
FLC Code	Room Name	Floor Material	Room Area (m ²)	L (m)	W (m)	Ceiling Height (m)
RG00N01	Classroom	Vinyl/Carpet	78.6	8.9	8.8	3.4
RG00N02	Kitchen	Vinyl	8.1	3.2	2.5	2.6
RG00N03	Store Room	Vinyl	10.4	3.2	3.2	3.4
RG00N04	Staff Office	Vinyl	9.4	3.2	2.8	2.9

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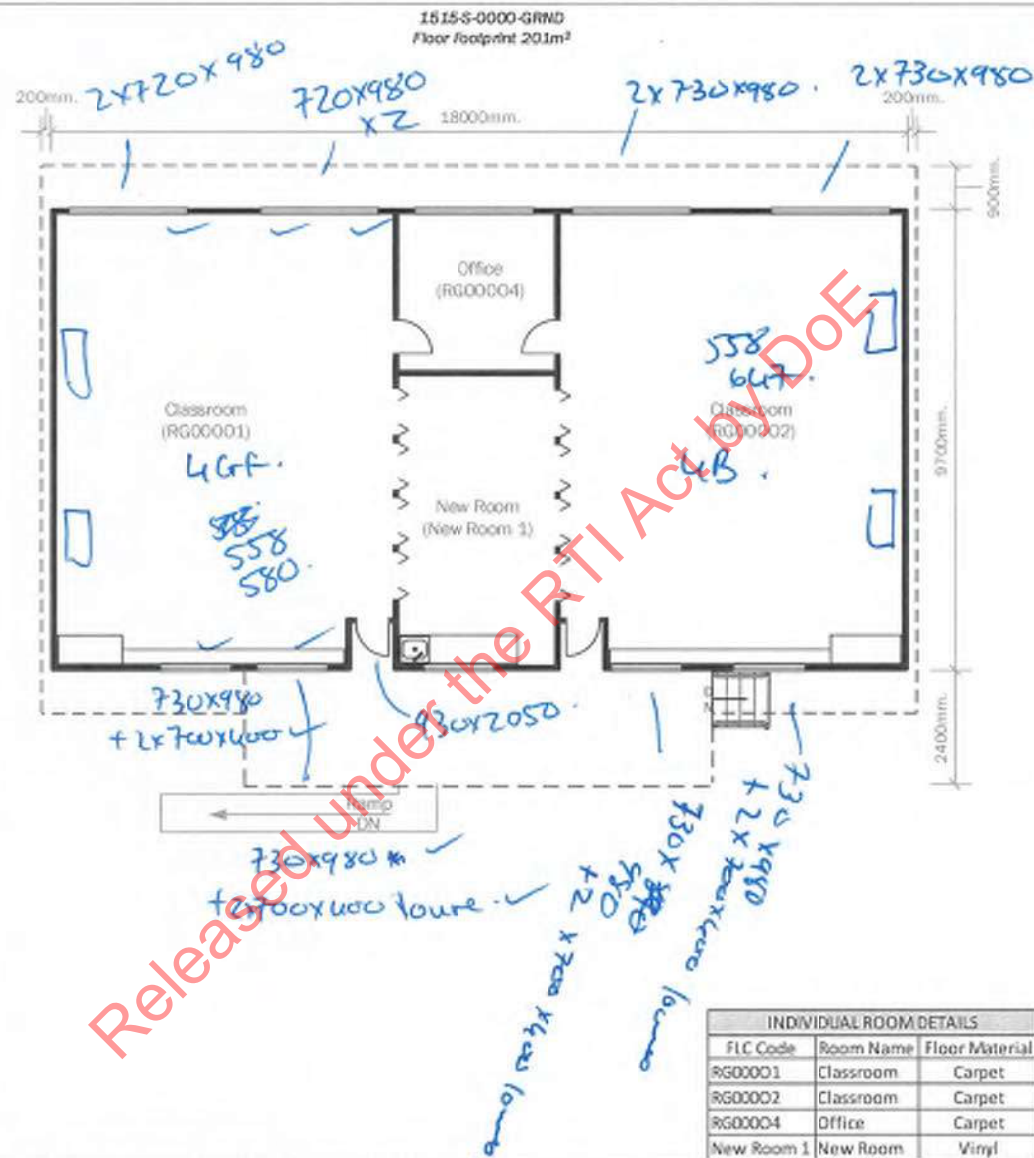
Rev. no.	Comment	Drawn	App'd	Date	Notes
0	Revised	47(300) - Corral		23.05.2017	

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Department of Education and Training

School: Graceville SS
Address: 23 Asolia Avenue, Graceville, QLD 4075.
Building Name: N Block
Floor Level: Ground Level
Functional Location Code: 1515-S-000N-GRND



INDIVIDUAL ROOM DETAILS			ROOM DIMENSIONS			
FLC Code	Room Name	Floor Material	Room Area (m ²)	L (m)	W (m)	Ceiling Height (m)
RG00001	Classroom	Carpet	67.1	7.1	9.4	3.3
RG00002	Classroom	Carpet	67.1	7.1	9.4	3.3
RG00004	Office	Carpet	11.8	3.4	3.5	2.8
New Room 1	New Room	Vinyl	19.9	3.4	5.9	3.3

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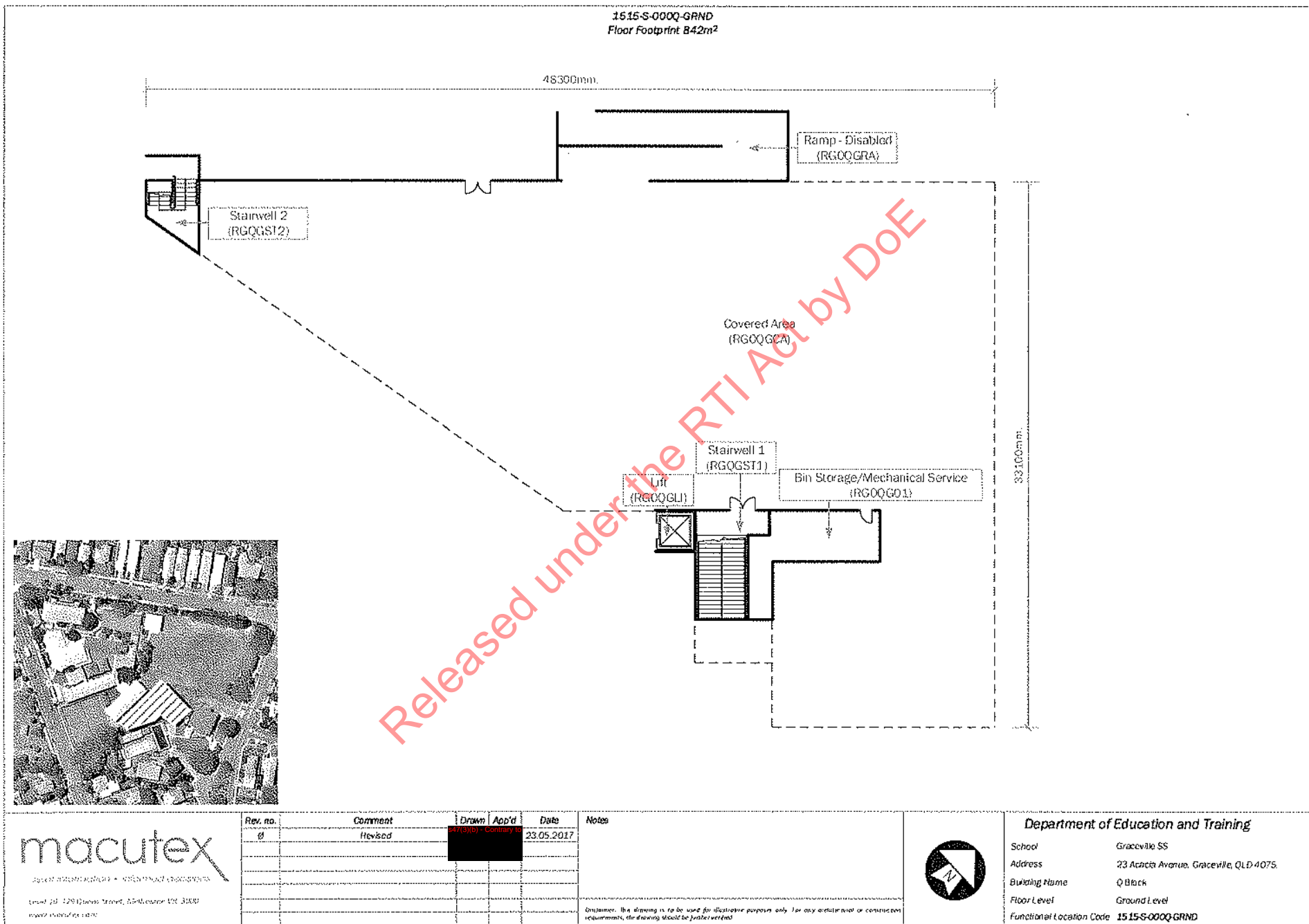
Rev. no.	Comment	Drawn	App'd	Date	Notes
8	Revised			23.05.2017	

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Department of Education and Training

School: Graceville SS
Address: 23 Acacia Avenue, Graceville, QLD 4075.
Building Name: O Block
Floor Level: Ground Level
Functional Location Code: 1515S-0000-GRND



Level 10, 279 Queens Street, Melbourne VIC 3000
water@melb.cym.com[illegible]

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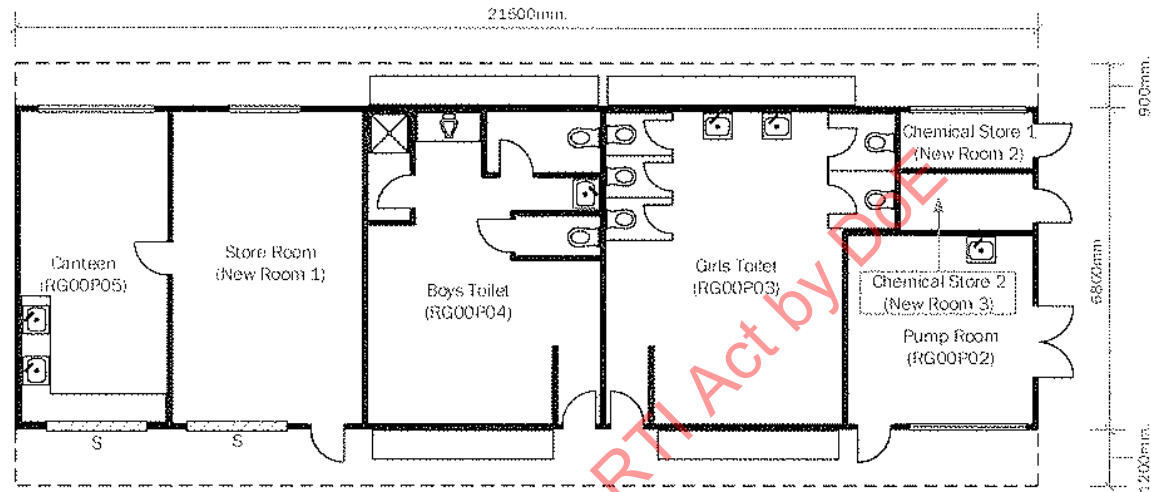


Department of Education and Training

School	Graceville SS
Address	23 Acacia Avenue, Graceville, QLD 4075
Building Name	Q Block
Floor Level	Level 01
Functional Location Code	1515-8-00001001



1515-S-000P-GRND
Floor Footprint 192m²



INDIVIDUAL ROOM DETAILS			ROOM DIMENSIONS			
FLC Code	Room Name	Floor Material	Room Area (m ²)	L (m)	W (m)	Ceiling Height (m)
RG00P02	Pump Room	Concrete	16.8	4.1	4.1	2.7
RG00P03	Girls Toilet	Epoxy	35.5	6.0	6.6	2.7
RG00P04	Boys Toilet	Epoxy	33.0	5.0	6.6	2.7
RG00P05	Canteen	Tile	18.5	2.8	6.6	2.8
New Room 1	Store Room	Concrete	27.1	4.1	6.6	2.8
New Room 2	Chemical Store 1	Concrete	3.6	3.0	1.2	2.7
New Room 3	Chemical Store 2	Concrete	3.6	3.0	1.2	2.7

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0	Revised	RG00P05 - Canteen		23.05.2017	

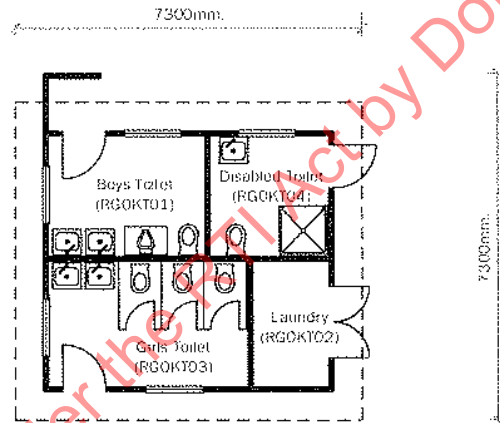
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Department of Education and Training

School: Graceville SS
Address: 23 Acacia Avenue, Graceville, QLD 4075.
Building Name: Swimming Pool (Amenities Block)
Floor Level: Ground Level
Functional Location Code: 1515-S-000P-GRND

1515-S-00KT-GRND
Floor Footprint 34m²



INDIVIDUAL ROOM DETAILS			ROOM DIMENSIONS			
FLC Code	Room Name	Floor Material	Room Area (m²)	L (m)	W (m)	Ceiling Height (m)
RGOKT01	Boys Toilet	Tiles	8.4	3.3	2.5	2.4
RGOKT02	Laundry	Concrete	3.8	1.5	2.5	2.4
RGOKT03	Girls Toilet	Tiles	10.7	4.2	2.5	2.4
RGOKT04	Disabled Toilet	Tiles	6.2	2.4	2.5	2.4

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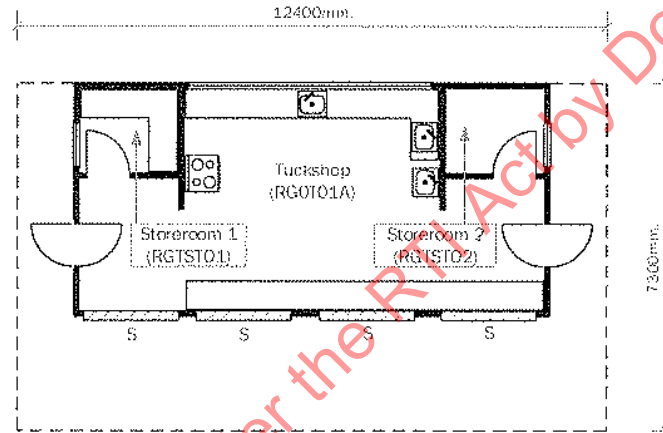
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Department of Education and Training

School: Graceville SS
Address: 23 Acacia Avenue, Graceville, QLD 4075.
Building Name: Toilets - 1st Block
Floor Level: Ground Level
Functional Location Code: 1515-S-00KT-GRND

1515-S-000T-GRND
Floor Footprint 91m²



INDIVIDUAL ROOM DETAILS			ROOM DIMENSIONS			
FLC Code	Room Name	Floor Material	Room Area (m ²)	L (m)	W (m)	Ceiling Height (m)
RGOT01A	Tuckshop	Vinyl	33.8	9.6	4.6	2.4
RGTST01	Storeroom 1	Vinyl	4.6	2.3	2.0	2.4
RGTST02	Storeroom 2	Vinyl	4.6	2.3	2.0	2.4

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Department of Education and Training

School: Graceville SS
Address: 23 Actalia Avenue, Graceville, QLD 4075.
Building Name: Tuckshop
Floor Level: Ground Level
Functional Location Code: 1515-S-000T-GRND



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➔ **The Power of Commitment**

Ventilation Survey

Bulimba State School

Department of Education

27 June 2022



The Power of Commitment

GHD

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Executive Summary

This report is subject to, and must be read in conjunction with, the limitations set out in section 1.2 and the assumptions and qualifications contained throughout the Report.

This report summarises the findings of the ventilation audit of Bulimba State School, Bulimba, Brisbane.

An inspection of the school was carried out on 24 May 2022. The inspection included measuring CO₂ levels in classrooms using a CEM DT-967 CO₂ sensor. The findings were recorded.

In general CO₂ levels under 800 ppm were noted in most classrooms with at least some windows and / or doors open.

CO₂ levels over 800 ppm were noted in 7 classrooms. In general, these rooms had windows and / or doors closed. Based on this, it is recommended at least some classroom windows and doors are kept open during the lessons.

It is further recommended that opening mechanism of windows in A block be inspected and repaired if required and the operation of the air conditioning unit serving B block classroom 1 on level 1 to be repaired.

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Contents

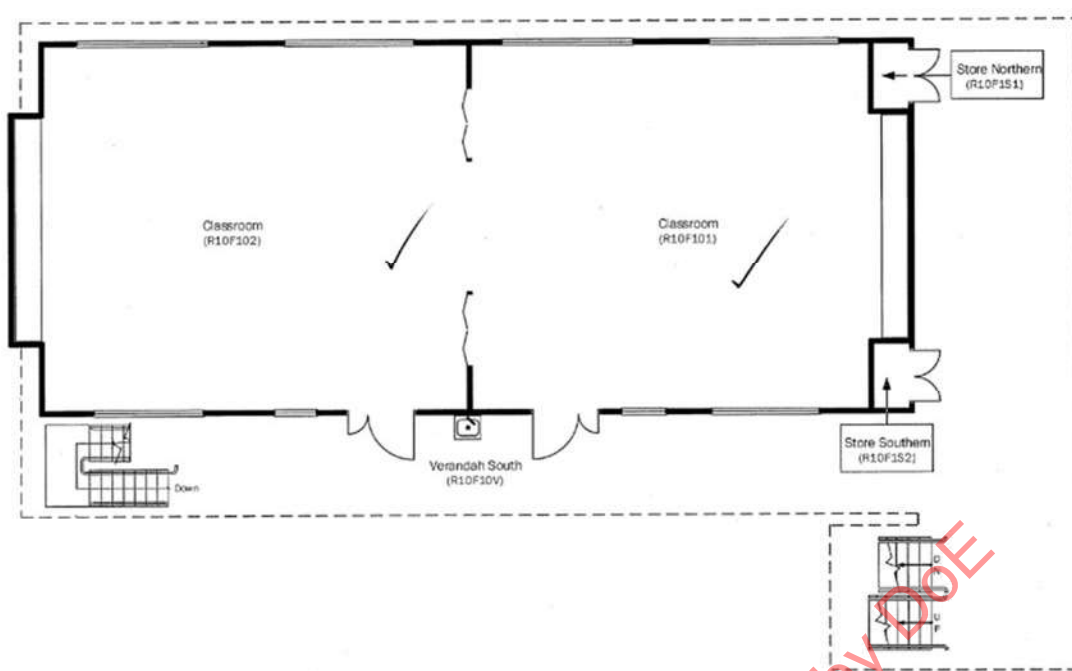
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6 – F Block Level 01 Layout

Figure

9

Appendices

Appendix A Site Observations

1. Introduction

1.1 Purpose of this report

GHD were requested by Education Queensland to inspect and review several schools in the Queensland area to provide qualitative assessment of the effectiveness of the natural and mechanical ventilation systems serving various classrooms and administration areas and advise the department of any perceived shortcomings or inefficiencies.

This report summarises the findings of the inspection of Bulimba State School, Bulimba, Brisbane.

1.2 Scope and limitations

The scope of the ventilation assessment at Bulimba State School is to develop a qualitative assessment of classroom ventilation.

Carbon dioxide (CO₂) monitors provided by Education Queensland provided a point-in-time assessment of CO₂ concentration. Education Queensland have determined, in consultation with OzSAGE guidelines [1], that an upper limit of 800ppm represents acceptable air quality.

It must be noted that the measure of CO₂ levels is not a measure of the probability of the spread of the SARS COVID-19 virus. The measure of CO₂ levels was used as an indication of the effectiveness of the ventilation strategy (i.e. natural, mechanical or hybrid systems) for a particular area. This report does not investigate the probability of spread of the SARS-Covid-19 virus.

No heat load calculations were carried out and the capacity or effectiveness of cooling systems was not reviewed.

GHD's investigations were limited to determining the effectiveness of the installed natural and mechanical ventilation systems. The quality of installation and / or maintenance was not reviewed.

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The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared. The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section 1.3 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

1.3 Assumptions

It is assumed that the mechanical ventilation systems were designed in accordance with the requirements of AS1668.2 – 2012: *Australian Standard – the use of ventilation and airconditioning in buildings – Part 2: Mechanical ventilation in buildings*.

It is assumed that all fan unit filters were intact and clean at the time of the inspections.

2. Methodology

The audit involved a physical inspection of the associated classrooms / administration areas.

The inspection commenced with the key areas and classrooms as identified by the principal or business manager of the school, followed by a general inspection of randomly selected classrooms. Where possible, at least one classroom in each building / block was inspected. Where several similar classrooms existed in a block, the perceived “worst case” classroom was selected. This included smaller classrooms with higher student densities and centrally located classrooms with less windows than perimeter classrooms with windows on more than 2 facades. Testing was undertaken in occupied classrooms.

A commercially available CEM DT-967 CO₂ sensor was used to measure point-in-time CO₂ levels. The sensor was as procured and not recalibrated. For recording CO₂ levels over a longer period of time, commercially available Aranet4 CO₂ sensors were used. For recording purposes, the interval was set to 5 minutes.

The classroom inspection involved the following:

1. Placement of the CEM DT-967 CO₂ sensor in a centrally located position, as far as possible from open windows and doors. The sensor was left to refresh the CO₂ level readings while the doors and windows serving the area were measured.
2. The measurement of all openable doors and windows serving the area inspected. Refer to mark-ups in Appendix A.
3. Where present, recording the state and quantities of all installed air conditioning units and fresh air fan units.

3. Observations

3.1 Site Inspection

At Bulimba State School, the following classrooms and areas were inspected (room numbers as per EQ building plans provided). Figures in red denote CO₂ levels over 800ppm.

Table 1 Inspected Rooms

Block	Level	Room	Measured CO ₂ Level (max - ppm)	Observations
A BLOCK	1	R100AFH	-	Hallway unoccupied 5% windows open. No AC installed. No fresh air fan installed.
	1	R10AF01	790	22 students, 1 staff. 20% windows open. Cross ventilation available and used. Door closed. AC 1 operation could not be verified. AC 2 operation could not be verified. No fresh air fan installed.
	1	R10AF04	611	18 students, 1 staff. 10% windows open. Cross ventilation available and used. Door 1 open. Door 2 closed. AC 1 operation could not be verified. AC 2 operation could not be verified. No fresh air fan installed.
	1	R10AF05	-	3 students, 2 staff. No windows open. Cross ventilation available but not used. Door 1 closed. Door 2 closed. AC 1 operation could not be verified. AC 2 operation could not be verified. No fresh air fan installed.
	1	R10AF06	928	20 students, 2 staff. No windows open. Corridor closed. Cross ventilation available but not used. Door 1 open. Door 2 closed. AC 1 operation could not be verified. AC 2 operation could not be verified. No fresh air fan installed.
	1	R10AF07	873	19 students, 1 staff. No windows open. Cross ventilation available but not used. Door open. AC 1 operation could not be verified. AC 2 operation could not be verified. No fresh air fan installed. Very difficult to open.
	2	R200ASH	-	Hallway unoccupied 5% windows open. Windows difficult to open. No AC installed. No fresh air fan installed.

Block	Level	Room	Measured CO ₂ Level (max - ppm)	Observations
	2	R20AS01	1428	25 students, 2 staff. 5% windows open. Cross ventilation available but not used. Door 1 closed. Door 2 closed. AC 1 operational and running. AC 2 operation could not be verified. No fresh air fan installed.
	2	R20AS03	948	25 students, 1 staff. No windows open. Cross ventilation available but not used. Door open. Door 2 closed. AC 1 operation could not be verified. AC 2 operation could not be verified. No fresh air fan installed.
	2	R20AS05	664	22 students, 1 staff. 10% windows open. Cross ventilation available and used. Door 1 open. Door 2 closed. AC 1 operational and running. AC 2 operation could not be verified. 1 AC running. No fresh air fan installed.
	2	R20AS06	675	23 students, 1 staff. No windows open. Cross ventilation available but not used. Door 1 open. Door 2 closed. AC 1 operation could not be verified. AC 2 operation could not be verified. No fresh air fan installed.
B BLOCK	1	R10BF01	798	18 students, 2 staff. 15% windows open. Cross ventilation available and used. Door 1 closed. Door 2 closed. AC 1 non-operational. Louvre blade does not open. AC 2 non-operational. No fresh air fan installed.
	1	R10BF02	712	17 students, 1 staff. 30% windows open. Cross ventilation available but not used. Door 1 closed. Door 2 closed. AC 1 operation could not be verified. AC 2 operation could not be verified. No fresh air fan installed.
	1	R10BF05	775	18 students, 2 staff. No windows open. Class just returned from break. Cross ventilation available but not used. Door 1 open. Door 2 closed. AC 1 operation could not be verified. AC 2 operation could not be verified. No fresh air fan installed.
	G	RG0BG04	592	17 students, 2 staff. 30% windows open. Cross ventilation available and used. Door 1 closed. Door 2 closed. AC 1 operation could not be verified. AC 2 operation could not be verified.

Block	Level	Room	Measured CO ₂ Level (max - ppm)	Observations
				No fresh air fan installed.
CC BLOCK	G	RG0OCG2	457	16 students, 1 staff. 80% windows open. Cross ventilation available and used. Door 1 closed. Door 2 closed. AC operational and not running. Fresh air fan operation could not be verified.
	1	R10C101	521	17 students, 1 staff. 20% windows open. Cross ventilation available and used. Door open. AC operation could not be verified. Fresh air fan operation could not be verified.
	1	R10C104	646	4 students, 1 staff. 20% windows open. Cross ventilation available but not used. Door closed. Mesh above door AC operation could not be verified. Fresh air fan operation could not be verified.
	3	R30C303	555	23 students, 1 staff. 50% windows open. Cross ventilation available and used. Door closed. AC operation could not be verified. Fresh air fan operation could not be verified.
	3	R30C304	1050	25 students, 1 staff. No windows open. Cross ventilation available but not used. Door closed. AC operational and running. Fresh air fan operation could not be verified.
F BLOCK	1	R10F101	1240	22 students, 3 staff. Windows closed. Cross ventilation available but not used. Door 1 open. Door 2 closed. AC 1 operation could not be verified. AC 2 operation could not be verified. No fresh air fan installed.
	1	R10F102	1030	18 students, 1 staff. 15% windows open. Cross ventilation available but not used. Door 1 closed. Door 2 closed. AC 1 operation could not be verified. AC 2 operation could not be verified. No fresh air fan installed.
	2	R20F201	715	16 students, 2 staff. 20% windows open. Cross ventilation available and used. Door 1 open. Door 2 closed. AC operation could not be verified. No fresh air fan installed.

Block	Level	Room	Measured CO ₂ Level (max - ppm)	Observations
	2	R20F202	752	14 students, 1 staff. No windows open. Cross ventilation available and used. Door 1 closed. Door 2 closed. AC 1 operation could not be verified. AC 2 operation could not be verified. No fresh air fan installed.
	3	R30F301	508	19 students, 2 staff. 20% windows open. Cross ventilation available and used. Door 1 closed. Door 2 closed. AC 1 operation could not be verified. AC 2 operation could not be verified. No fresh air fan installed.
	3	R30F302	592	24 students, 2 staff. 20% windows open. Cross ventilation available and used. Door closed. Door 2 closed. AC operation could not be verified. AC 2 operation could not be verified. No fresh air fan installed.
	4	R40F401	704	24 students, 2 staff. 15% windows open. Cross ventilation available and used. Door open. Door 2 closed. AC 1 operational and running. AC 2 operational and running. No fresh air fan installed.
	4	R40F402	779	24 students, 1 staff. 5% windows open. Cross ventilation available and used. Door open. Door 2 closed. AC operation could not be verified. AC 2 operation could not be verified. No fresh air fan installed.
	G	RG0FG01	758	18 students, 1 staff. No windows open. Cross ventilation available and used. Door 1 open. Door 2 closed. Door 3 closed. AC 1 operation could not be verified. AC 2 operation could not be verified. No fresh air fan installed.
	G	RG0FG02	515	16 students, 1 staff. 5% windows open. Cross ventilation available and used. Door 1 open. Door 2 closed. Door 3 closed. AC 1 operation could not be verified. AC 2 operation could not be verified. No fresh air fan installed.
N BLOCK NORTHERN SIDE (1)		R10N101	780	11 students, 1 staff. Windows closed. Cross ventilation available but not used. Door open. AC 1 operational and running. AC 2 operation could not be verified. Fresh air fan operational and running.

Block	Level	Room	Measured CO ₂ Level (max - ppm)	Observations
		R10N102	558	16 students, 1 staff. 80% windows open. Cross ventilation available and used. Door open. AC 1 operational and running. AC 2 operation could not be verified. Fresh air fan operation could not be verified.
		R10N105	765	2 students. No windows open. Cross ventilation unavailable. No external doors. AC operation could not be verified. No fresh air fan installed.
N BLOCK SOUTHERN SIDE (2)		R10N103	784	20 students, 1 staff. 10% windows open. Cross ventilation available but not used. Door closed. AC 1 operation could not be verified. AC 2 operation could not be verified. Fresh air fan operational and running.
		R10N104	544	18 students, 2 staff. 30% windows open. Cross ventilation available and used. Door open. AC 1 operation could not be verified. AC 2 operation could not be verified. Fresh air fan operation could not be verified.

In general, the CO₂ levels in most classrooms were observed to be under 800 ppm. However, the following areas were noted to have CO₂ levels in excess of the 800ppm threshold:

3.1.1 A Block

The HVAC systems in A Block consist of wall mounted split units that cool the classroom, with the exception of R10AF07 which contains a window-wall unit that appears to be redundant and a wall mounted unit. There are no fresh air fans installed to A Block. The A Block classrooms rely on natural cross ventilation to ensure adequate fresh air supply to the classrooms, with openable doors and windows on opposite sides of the classrooms.

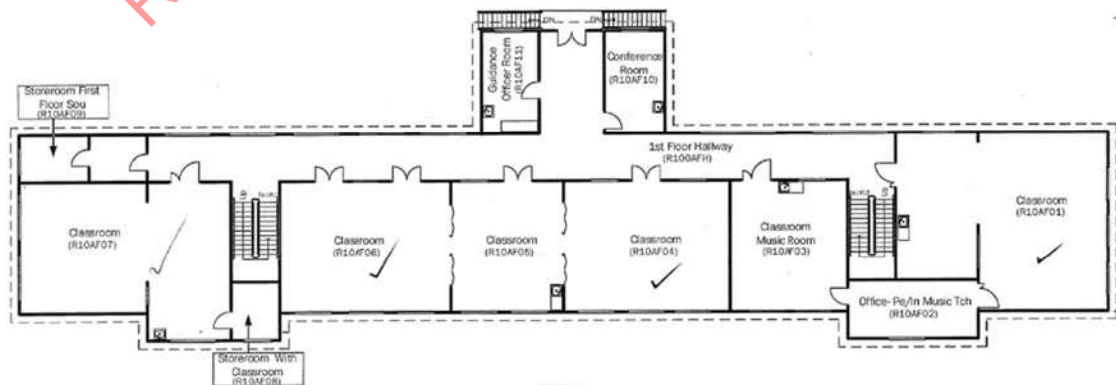


Figure 1 – A Block Level 01 Layout

During the inspection of A Block, CO₂ levels over 800 ppm were found in half of the classrooms in A Block. The classrooms with CO₂ levels over 800 ppm were R10AF06, R10AF07, R20AS01 and R20AS03 with CO₂ level reading of 928 ppm, 873 ppm, 1428 ppm and 948 ppm respectively.

R20AS01 had the highest CO₂ level reading, and it is believed to be heavily influenced by having both the doors and windows closed. The other classrooms had the doors opened and produced CO₂ levels readings below 1000 ppm. It is suspected that classrooms with windows and / or doors closed hampered air movement and cross ventilation in the room.

The classrooms of A block open out to a common hallway on level 1 (R100ARH) and level 2 (R200ASH). It is noted that windows in the hallway are often closed because of aged and broken opening mechanisms. These windows are zip tied to prevent mechanisms moving from natural forces. The other openable windows in the hallway were found to be difficult to open. Furthermore, due to the absence of window overhangs and louvres, it was reported that windows typically remained shut on rainy days due to the potential rain ingress. It is suspected that combination of closed doors and / or windows hampered natural cross ventilation and resulted in the higher CO₂ levels.



Figure 2 – A Block Hallway Window



Figure 3 – A Block Zip Tied Opening Mechanism

3.1.2 C Block Teaching

The HVAC systems in C Block consist of cassette split units that cool the classroom and ducted ceiling mounted fresh air fans, interlocked with the air conditioning units, that supply outside air to the classrooms when running.

During the inspection of C Block, a CO₂ level over 800ppm was noted in R30C304 with a CO₂ level of 1050 ppm.

All classrooms in C Block with the exception of R30C304 had windows and / or doors opened. These classrooms had CO₂ levels readings under 800 ppm. R30C304 was the only classroom with both the windows and door closed, and as a result this hampered outside fresh air entering the room. Furthermore, it was noted that the air conditioning units in R30C304 appeared to be operational, but the same could not be said for the fresh air fan. Fresh air fan operations could not be verified. With all doors and windows closed and no relief of supplied air, it is suspected that a lack of adequate natural or mechanical cross ventilation resulted in the high CO₂ levels observed.



Figure 4 – C Block AC Cassette with Fresh Air Grilles



Figure 5 – C Block Typical Fresh Air Louvre

3.1.3 F Block

The HVAC systems in F Block consist of a combination of wall mounted and under-ceiling type split units that cool the classrooms. There are no fresh air fans installed to F Block. The F Block classrooms rely on natural cross ventilation to ensure adequate fresh air supply to the classrooms, with openable windows on opposite sides of the classrooms.

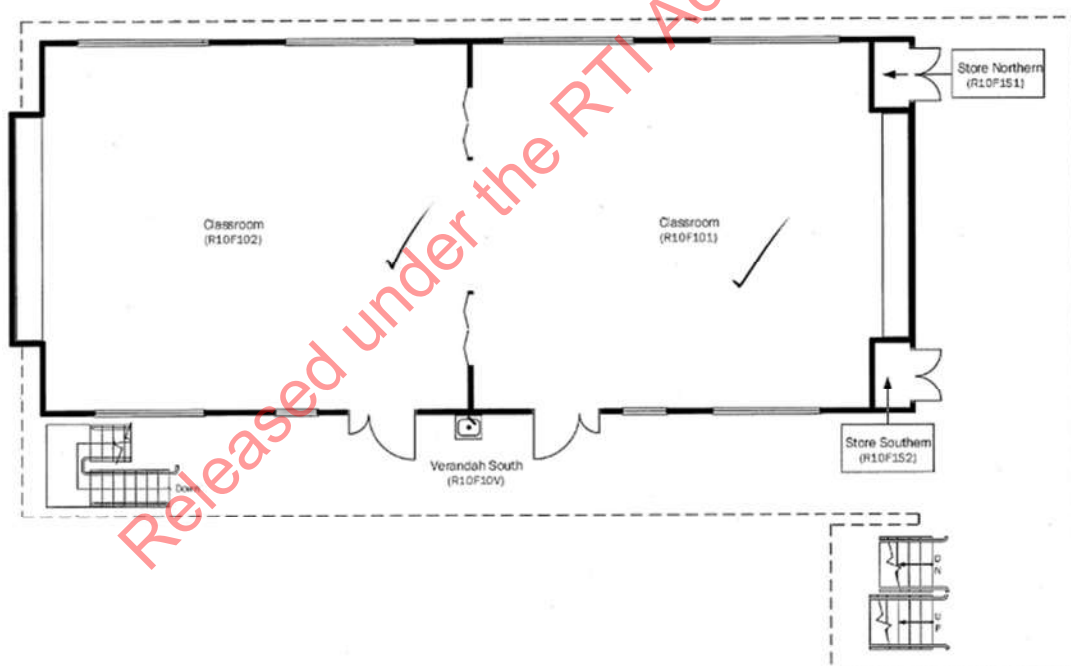


Figure 6 – F Block Level 01 Layout

During the inspection of F Block, CO₂ levels under 800 ppm were noted in all the classrooms, with the exemption of R10F101 and R10F102 with CO₂ levels readings of 1240 ppm and 1030 ppm respectively.

The air conditioning units in R10F101 and R10F102 were turned off. R10F101 had the windows closed and door opened whereas R10F102 had the door closed and 5% of windows opened. It is believed that the lack of outside fresh air naturally ventilating the classrooms resulted in the higher CO₂ levels. The other classrooms with CO₂ levels under 800 ppm had larger percentages of windows opened and / or the door opened which allowed outside fresh air to provide air movement in the classrooms.

4. Recommendations

In general, low CO₂ levels were noted in most classrooms during the inspection. In most cases, high CO₂ levels have been noted in classrooms where windows and doors were kept closed during lessons. Classrooms where some windows were kept open were noted to have lower CO₂ levels. As such, it is recommended at least some classroom windows, and the classroom doors, are kept open during lessons.

In classrooms with fresh air fans installed and running, high CO₂ levels were noted when doors and windows were kept closed. It is suspected that a lack of relief for supplied outside air contributed to inefficient fan operation and air distribution. If the fresh air fans are run, it is recommended at least one window on the façade opposite the fan is opened to allow for air relief and adequate cross-ventilation of the room.

All windows in A Block in both classrooms and hallways must be inspected and repaired to ensure they are easily operable.

The following air conditioning unit was not functional at the time of the inspection and requires repair:

1. B Block R10BF01.

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5. References

[1] OzSAGE, "Protecting children from COVID-19 and making schools and childcare safer," OzSAGE, 2021.

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Appendices

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Appendix A

Site Observations

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Building Name	ECIdentifier1	Room Name	ECIdentifier2	Local Room Number	Students	Teachers	Hours	Start Time	End Time	Cross Ventilation	Cross Ventilation %	Whisper Percentage	Handwashed	CO2 Level	CO2 Comments	Classroom Ventilation Survey ID	Classroom Ventilation Survey Date	Classroom Ventilation Survey Score	Classroom Ventilation Survey Comment
A BLOCK_1		1 Classroom	R10A106	24h	20	2				Yes	No	0%		828	Comidor closed.	1	1	0	1
A BLOCK_1		1 Classroom	R10A105	24h	20	1				Yes	No	0%		848		1	1	0	1
A BLOCK_1		1 Classroom	R10A107	20	0	0				Yes	Yes	0%				0	1	0	0
A BLOCK_1		1 Classroom	R10A108	20	19	1				Yes	No	0%		871		1	1	0	1
A BLOCK_1		1 Classroom	R10A109	20	22	1				Yes	No	0%		864	Class had just returned. Cross vent issue with hallway.	1	1	0	1
A BLOCK_1		1 Classroom	R10A110	20	22	1				Yes	Yes	10%		864	Teacher reports Windows difficult to open. Also, closed when raining due to rain ingress - no overhang	1	1	0	1
A BLOCK_1		1 Classroom	R10A111	4J	22	1				Yes	Yes	20%		790		1	1	0	1
A BLOCK_1		1 Classroom	R10A112	4J	22	1				Yes	No	0%		828		1	1	0	1
A BLOCK_1		1 Classroom	R10A113	4H	25	2				Yes	No	0%		1420		1	1	0	1
A BLOCK_1		1 Classroom	R10A114	4H	19	1				Yes	No	0%		811	Window opened then closed again when inspection started. All operable.	1	1	0	1
A BLOCK_1		1 Classroom	R10A115	0	0	0				Yes	No	0%		775	Windows difficult to open. 10 with zip ties.	0	1	0	0
A BLOCK_1		1 Classroom	R10A116	0	0	0				Yes	No	0%		712	Class just returned from break.	1	1	0	1
A BLOCK_1		1 Classroom	R10A117	3P	17	1				Yes	No	30%		738		1	1	0	1
A BLOCK_1		1 Classroom	R10A118	18	2	1				Yes	Yes	15%		862		1	1	0	1
A BLOCK_1		1 Classroom	R10A119	17	2	1				Yes	Yes	30%		862		1	1	0	1
A BLOCK_1		1 Classroom	R10A120	4	1	1				Yes	No	20%		848		1	1	0	1
A BLOCK_1		1 Classroom	R10A121	17	1	1				Yes	Yes	20%		821		1	1	0	1
A BLOCK_1		1 Classroom	R10A122	25	1	1				Yes	No	0%		1090		1	1	0	1
A BLOCK_1		1 Classroom	R10A123	23	1	1				Yes	Yes	50%		865		1	1	0	1
A BLOCK_1		1 Classroom	R10A124	16	1	1				Yes	Yes	80%		407		1	1	0	1
A BLOCK_1		1 Classroom	R10A125	18	1	1				Yes	Yes	0%		758	Kids back from break 15 min ago	1	1	0	1
A BLOCK_1		1 Classroom	R10A126	22	2	1				Yes	No	0%		1340		1	1	0	1
A BLOCK_1		1 Classroom	R10A127	16	2	1				Yes	Yes	20%		715		1	1	0	1
A BLOCK_1		1 Classroom	R10A128	24	2	1				Yes	Yes	20%		862		1	1	0	1
A BLOCK_1		1 Classroom	R10A129	14	1	1				Yes	Yes	0%		762		1	1	0	1
A BLOCK_1		1 Classroom	R10A130	16	1	1				Yes	Yes	0%		815		1	1	0	1
A BLOCK_1		1 Classroom	R10A131	18	1	1				Yes	No	15%		1030		1	1	0	1
A BLOCK_1		1 Classroom	R10A132	24	1	1				Yes	Yes	0%		775		1	1	0	1
A BLOCK_1		1 Classroom	R10A133	19	2	1				Yes	Yes	20%		508		1	1	0	1
A BLOCK_1		1 Classroom	R10A134	24	1	1				Yes	Yes	15%		704		1	1	0	1
A BLOCK_1		1 Classroom	R10A135	18	1	1				Yes	Yes	80%		588		1	1	0	1
A BLOCK_1		1 Classroom	R10A136	11	1	1				Yes	No	0%		792		1	1	0	1
A BLOCK_1		1 Classroom	R10A137	104	20	1				No	No	0%		765		0	1	0	1
A BLOCK_1		1 Classroom	R10A138	104	20	1				Yes	No	10%		794		1	1	0	1
A BLOCK_1		1 Classroom	R10A139	104	18	2				Yes	Yes	30%		544		1	1	0	1

BuildingName	RoomName	EQIdentifier2	Type	Quantity	WasTheACOn	ACState	Type1	Quantity1	WasTheACOn1	ACState1	ACComments
A BLOCK_1	1_Classroom4	R10AF04	Split System Wall Mounte 2	No	Operation could not be verified	Split System Wall Mounte	No	Operation could not be verified			
A BLOCK_1	2_Classroom6	R20AS06	Split System Wall Mounte 2	No	Operation could not be verified	Split System Wall Mounte	No	Operation could not be verified			
A BLOCK_1	2_Classroom3	R20AS03	Split System Wall Mounte 2	No	Operation could not be verified	Split System Wall Mounte	No	Operation could not be verified			
A BLOCK_1	1_Classroom5	R10AF05	Split System Wall Mounte 1	No	Operation could not be verified	Split System Wall Mounte	No	Operation could not be verified			
A BLOCK_1	1_Classroom6	R10AF06	Split System Wall Mounte 2	No	Operation could not be verified	Split System Wall Mounte	No	Operation could not be verified			
A BLOCK_1	2_Classroom5	R20AS05	Split System Wall Mounte 2	Yes	Operational	Split System Wall Mounte	No	Operation could not be verified			1 AC running.
A BLOCK_1	1_Classroom7	R10AF07	Window+Wall	1	No	Operation could not be verified	Split System Wall Mounte 2	No	Operation could not be verified		
A BLOCK_1	2_Classroom1	R20AS01	Split System Wall Mounte 2	Yes	Operational	Split System Wall Mounte	No	Operation could not be verified			
A BLOCK_1	1_Classroom1	R10AF01	Split System Wall Mounte 2	No	Operation could not be verified	Split System Wall Mounte	No	Operation could not be verified			
B BLOCK_10	1_First Floor, Room 2	R10BF02	Split System Wall Mounte 2	No	Operation could not be verified	Split System Wall Mounte	No	Operation could not be verified			
B BLOCK_10	1_Classroom First Floor	R10BF05	Split System Wall Mounte 2	No	Operation could not be verified						
B BLOCK_10	G_Classroom	RG0BG04	Split System Wall Mounte 2	No	Operation could not be verified						
B BLOCK_10	1_Classroom1	R10BF01	Split System Wall Mounte 2	No	Non-operational						1 unit not operational. Louvre doesn't open.
CC BLOCK_9	1_Class room GLA00017-CA1-S-00CC-L001-R10C104			No	Operation could not be verified						
CC BLOCK_9	1_Class room GLA030017-CA1-S-00CC-L001-R10C101	Cassette		1	No	Operation could not be verified					Have on fan grilles
CC BLOCK_9	3_Class room GLA100017-CA1-S-00CC-L003-R30C304	Cassette		Yes	Operational						
CC BLOCK_9	G_Mus ic Room 0017-CA1-S-00CC-GRND-RG00C	Cassette		1	No	Operational					
CC BLOCK_9	3_Class room GLA090017-CA1-S-00CC-L003-R30C303	Cassette		No	Operation could not be verified						
F BLOCK_4	4_Classroom2	R40F402	Split System Wall Mounte 2	No	Operation could not be verified						
F BLOCK_4	2_Classroom2	R20F202	Split System Wall Mounte 2	No	Operation could not be verified						
F BLOCK_4	G_Classroom2	RG0F302	Split System Wall Mounte 2	No	Operation could not be verified						
F BLOCK_4	3_Classroom2	R30F302	Split System Wall Mounte 2	No	Operation could not be verified						
F BLOCK_4	3_Classroom1	R30F301	Split System Wall Mounte 2	No	Operation could not be verified						
F BLOCK_4	2_Classroom1	R20F201	Split System Wall Mounte 2	No	Operation could not be verified						
F BLOCK_4	G_Classroom1	RG0F01	Under Ceiling	2	No	Operation could not be verified					
F BLOCK_4	1_Classroom1	R10F101	Split System Wall Mounte 2	No	Operation could not be verified						1 of 2 on.
F BLOCK_4	4_Classroom1	R40F401	Split System Wall Mounte 2	Yes	Operational						
F BLOCK_4	1_Classroom2	R10F102	Split System Wall Mounte 2	No	Operation could not be verified						
N BLOCK NORTHERN SIDE (1)_30		R10N101	Split System Wall Mounte 1	Yes	Operational	Split System Wall Mounte 1	No	Operation could not be verified			
N BLOCK NORTHERN SIDE (1)_30		R10N105	Split System Wall Mounte 1	No	Operation could not be verified	Split System Wall Mounte 0	No	Operation could not be verified			
N BLOCK NORTHERN SIDE (1)_30		R10N102	Split System Wall Mounte 1	Yes	Operational	Split System Wall Mounte 1	No	Operation could not be verified			
N BLOCK SOUTHERN SIDE (2)_31		R10N104	Split System Wall Mounte 2	No	Operation could not be verified						
N BLOCK SOUTHERN SIDE (2)_31		R10N103	Split System Wall Mounte 2	No	Operation could not be verified						

BuildingName	RoomName	EQIdentifier2	LocalRoomName	Widthmm	Heightmm	Quantity	Wasthedooropen1	Widthmm1	Heightmm1	Quantity1	Wasthedooropen2	DoorComments
A BLOCK_1	1_Classroom4	R10AF04	4D	1050	2400	1	Yes	1050	2400		No	
A BLOCK_1	2_Classroom5	R20AS05	2P	1050	2420	1	Yes	1050	2420	1	No	
A BLOCK_1	1_Classroom5	R10AF05	Breakout Room	1050	2400	1	No	1050	2400		No	
A BLOCK_1	2_Classroom1	R20AS01	4HB	1050	2080	1	No	1150	2400		No	
A BLOCK_1	2_Classroom3	R20AS03	2B	1050	2420	1	Yes	1150	2400		No	
A BLOCK_1	2_Classroom6	R20AS06		1150	2400	1	Yes	1050	2420		No	
A BLOCK_1	1_Classroom1	R10AF01	4J	1050	2400	0	No	1150	2400	1	No	
A BLOCK_1	1_Classroom7	R10AF07	2C	1150	2400	1	Yes					
A BLOCK_1	1_Classroom6	R10AF06	2Hh	1050	2400	1	Yes	1050	2400	1	No	
B BLOCK_10	1_Classroom First Floor	R10BF05		1180	2380	1	Yes	820	2050		No	
B BLOCK_10	G_Classroom	RG0BG04	3WD	1180	2380	1	No	820	2050	1	No	
B BLOCK_10	1_Classroom1	R10BF01		1090	2390	1	No				No	
B BLOCK_10	1_First Floor, Room 2	R10BF02	3P	1090	2390	1	No	820	2050		No	
CC BLOCK_9	3_Class room GLA100017-CA1-S-00CC-L003-R30C304			900	2080	1	No					Mesh above door
CC BLOCK_9	1_Class room GLA030017-CA1-S-00CC-L001-R10C101			910	2070	1	Yes					
CC BLOCK_9	3_Class room GLA090017-CA1-S-00CC-L003-R30C303			900	2080	1	No					
CC BLOCK_9	1_Class room GLA060017-CA1-S-00CC-L001-R10C104			920	2280	1	No					Mesh above door
CC BLOCK_9	G_Music Room 0017-CA1-S-00CC-GRND-RG00C1			900	2080	1	No				No	
F BLOCK_4	G_Classroom2	RG0FG02		1300	1990	1	Yes	650	1990	2	Yes	
F BLOCK_4	1_Classroom2	R10F102		1300	1990	1	No	1120	2380	0	No	
F BLOCK_4	3_Classroom2	R30F302		1300	1990	1	No	1120	2380	1	Yes	
F BLOCK_4	3_Classroom1	R30F301		1300	1990	1	No	700	2350	1	Yes	Slider middle panel doesn't open.
F BLOCK_4	1_Classroom1	R10F101		1300	1990	1	Yes	1120	2380	0	No	
F BLOCK_4	4_Classroom1	R40F401		1310	1990	1	Yes				No	
F BLOCK_4	G_Classroom1	RG0FG01		1300	1990	1	Yes	650	1990	2	No	
F BLOCK_4	2_Classroom2	R20F202		1300	1990	1	No	700	2350	1	No	
F BLOCK_4	2_Classroom1	R20F201		1300	1990	1	Yes	1120	2380	0	No	
F BLOCK_4	4_Classroom2	R40F402		1310	1990	1	Yes				No	
N BLOCK NORTHERN SIDE (1)_30	R10N102		N102	920	2390	1	Yes					
N BLOCK NORTHERN SIDE (1)_30	R10N101		N101	920	2390	1	Yes					
N BLOCK SOUTHERN SIDE (2)_31	R10N103		104	920	2390	1	No					
N BLOCK SOUTHERN SIDE (2)_31	R10N104		N104	920	2390	1	Yes					

BuildingName	RoomName	EQIdentifier2	Widthmm	Heightmm	Depthmm	Quantity	Velocityms	FlowRate	FanState	Wasthefanrunni	FlowRate	FanComments
CC BLOCK_9	3_Class room GLA09	0017-CA1-S-00CC-L003-R30C303						0,00	Operation could not be verified	No	0,00	
CC BLOCK_9	G_Mus ic Room	0017-CA1-S-00CC-GRND-RG00C						0,00	Operation could not be verified	No	0,00	Intake outside, Function could not be verified.
CC BLOCK_9	1_Cl ass room GLA06	0017-CA1-S-00CC-L001-R10C104						0,00	Operation could not be verified	No	0,00	
CC BLOCK_9	1_Cl assroom GLA03	0017-CA1-S-00CC-L001-R10C101						0,00	Operation could not be verified	No	0,00	
CC BLOCK_9	3_Class room GLA10	0017-CA1-S-00CC-L003-R30C304						0,00	Operation could not be verified	No	0,00	
N BLOCK NORTHERN SIDE (1)_30	R10N101		480	480	48			0,00	Operational	Yes	0,00	
N BLOCK NORTHERN SIDE (1)_30	R10N102		480	480	48			0,00	Operation could not be verified	No	0,00	
N BLOCK SOUTHERN SIDE (2)_31	R10N103		480	480	48			0,00	Operational	Yes	0,00	
N BLOCK SOUTHERN SIDE (2)_31	R10N104		480	480	48			0,00	Operation could not be verified	No	0,00	

600	630	16	600	700	7
1020	680	2	1000	400	18
1140	680	14	800	720	3
1020	790	8	1020	830	8
1020	830	7	1020	940	3
790	1750	18	810	1750	2
			1220	1750	3
1020	920	7	1020	940	3
1020	920	6	1020	940	6
1020	940	3	1020	920	3
550	1040	2	550	350	10
550	1040	4	550	350	15
550	1150	10	550	350	17
550	1030	2	550	350	11
550	1030	1	550	350	17
550	1150	10	550	350	17
550	1150	12	550	350	14
550	1150	10	550	350	17
550	740	10	550	350	12
550	1030	2	550	350	18
550	1030	1	550	350	17
790	980	6	450	450	6
790	980	6	450	450	6
790	980	2	450	450	6
790	980	6	450	450	6
790	980	6	450	450	6



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Ventilation Survey

Stanthorpe State High School

Department of Education

28 June 2022



The Power of Commitment

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Executive Summary

This report is subject to, and must be read in conjunction with, the limitations set out in section 1.2 and the assumptions and qualifications contained throughout the report.

This report summarises the findings of the ventilation audit of Stanthorpe State High School, Stanthorpe, Queensland.

An inspection of the school was carried out on 26 May 2022. The inspection included measuring CO₂ levels in classrooms using a CEM DT-967 CO₂ sensor. The findings were recorded.

In general CO₂ levels under 800 ppm were noted in most classrooms with at least some windows and / or doors open.

CO₂ levels over 800 ppm were noted in 7 classrooms. The majority of these rooms were noted to have most of the doors and / or windows closed and non-operational fresh air fans. Based on this, it is recommended at least some classroom windows and doors are kept open during the lessons.

It is further recommended that the operation of the mechanical ventilation systems serving M Block Science Labs and D Block Music Prac Room be verified, and the fans replaced or repaired where necessary.

In RG0DL01, we recommend the vertical sliding windows are repaired to allow for easy opening by staff and students.

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Appendices

Appendix A Site Observations

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1. Introduction

1.1 Purpose of this report

GHD were requested by Education Queensland to inspect and review several schools in the Queensland area to provide qualitative assessment of the effectiveness of the natural and mechanical ventilation systems serving various classrooms and administration areas and advise the department of any perceived shortcomings or inefficiencies.

This report summarises the findings of the inspection of Stanthorpe State High School, Stanthorpe, carried out on 26 May 2022.

1.2 Scope and limitations

The scope of the ventilation assessment at Stanthorpe State High School is to develop a qualitative assessment of classroom ventilation.

Carbon dioxide (CO₂) monitors provided by Education Queensland provided a point-in-time assessment of CO₂ concentration. Education Queensland have determined, in consultation with OzSAGE guidelines [1], that an upper limit of 800ppm represents acceptable air quality.

It must be noted that the measure of CO₂ levels is not a measure of the probability of the spread of the SARS COVID-19 virus. The measure of CO₂ levels was used as an indication of the effectiveness of the ventilation strategy (i.e. natural, mechanical or hybrid systems) for a particular area. This report does not investigate the probability of spread of the SARS-Covid-19 virus.

No heat load calculations were carried out and the capacity or effectiveness of cooling systems was not reviewed.

GHD's investigations were limited to determining the effectiveness of the installed natural and mechanical ventilation systems. The quality of installation and / or maintenance was not reviewed.

This report has been prepared by GHD for Department of Education and may only be used and relied on by Department of Education for the purpose agreed between GHD and Department of Education as set out in section 1.1 of this report. GHD otherwise disclaims responsibility to any person other than Department of Education arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible. The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared. The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section 1.3 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

1.3 Assumptions

It is assumed that the mechanical ventilation systems were designed in accordance with the requirements of AS1668.2 – 2012: *Australian Standard – the use of ventilation and airconditioning in buildings – Part 2: Mechanical ventilation in buildings*.

It is assumed that all fan unit filters were intact and clean at the time of the inspections.

2. Methodology

The audit involved a physical inspection of the associated classrooms / administration areas.

The inspection commenced with the key areas and classrooms as identified by the principal or business manager of the school, followed by a general inspection of randomly selected classrooms. Where possible, at least one classroom in each building / block was inspected. Where several similar classrooms existed in a block, the perceived "worst case" classroom was selected. This included smaller classrooms with higher student densities and centrally located classrooms with less windows than perimeter classrooms with windows on more than 2 facades. Testing was undertaken in occupied classrooms.

A commercially available CEM DT-967 CO₂ sensor was used to measure point-in-time CO₂ levels. The sensor was as procured and not recalibrated. For recording CO₂ levels over a longer period of time, commercially available Aranet4 CO₂ sensors were used. For recording purposes, the interval was set to 5 minutes.

The classroom inspection involved the following:

1. Placement of the CEM DT-967 CO₂ sensor in a centrally located position, as far as possible from open windows and doors. The sensor was left to refresh the CO₂ level readings while the doors and windows serving the area were measured.
2. The measurement of all openable doors and windows serving the area inspected. Refer to mark-ups in Appendix A.
3. Where present, recording the quantities and condition of all installed airconditioning units and fresh air fan units.

3. Observations

3.1 Site Inspection

At Stanthorpe State High School, the following classrooms and areas were inspected (room numbers as per EQ building plans provided). Figures in red denote CO₂ levels over 800ppm.

Table 1 Inspected Rooms

Block	Level	Room	Measured CO ₂ Level (max - ppm)	Observations
A BLOCK	G	RG0AL01	642	6 students, 1 staff. 5% windows open. Cross ventilation available but not used. Door closed. AC operational and running. Fresh air fan operational and running.
	1	R100A01	670	14 students, 1 staff. 10% windows open. Cross ventilation available and used. Door 50% open. AC operational and running. Fresh air fan operational and running.
	1	R100A02	677	14 students, 1 staff. 25% windows open. Cross ventilation available and used. Door closed. AC operational and running. Fresh air fan operational and running.
	1	R100A03	929	16 students, 1 staff. 5% windows open. Cross ventilation available but not used. Door closed. AC operation could not be verified. Fresh air fan operation could not be verified.
	1	R100A04	786	16 students, 1 staff. 15% windows open. Cross ventilation available but not used. Door closed. AC operational and running. Fresh air fan operational and running.
	1	R100A05	591	15 students, 1 staff. 30% windows open. Cross ventilation available but not used. Door open. AC operational and running. Fresh air fan operational and running.
	1	R100A08	1095	16 students, 1 staff. No windows open. Cross ventilation available but not used. Door closed. AC not running. Fresh air fan operation could not be verified.
(B) MANUAL ARTS	G	RG00B07	589	16 students, 1 staff. No windows open. Cross ventilation available but not used. Door closed. AC operation could not be verified. Fresh air fan operation could not be verified.

C BLOCK	G	RG0CL01	775	17 students, 1 staff. 10% windows open. Cross ventilation available but not used. Door closed. AC operation could not be verified. No fresh air fan installed.
	1	R100C01	870	17 students, 1 staff. 15% windows open. Cross ventilation available but not used. Door closed. AC operational and running. Fresh air fan operational and running.
	1	R100C02	1008	19 students, 2 staff. 10% windows open. Cross ventilation available but not used. Door closed. AC operational and running. Fresh air fan non-operational.
	1	R100C03	625	17 students, 1 staff. 40% windows open. Cross ventilation available and used. Door closed. AC operation could not be verified. Fresh air fan operational and running.
	1	R100C04	625	9 students, 1 staff. 40% windows open. Cross ventilation available and used. Door closed. AC operation could not be verified. Fresh air fan operation could not be verified.
	1	R100C06	522	17 students, 1 staff. 20% windows open. Cross ventilation available and used. Door closed. AC operation could not be verified. Fresh air fan operation could not be verified.
D BLOCK	G	RG0DL01	467	9 students, 1 staff. 15% windows open. Cross ventilation available but not used. Door closed. AC operational and running. Fresh air fan operational and not running. Vertical sliding windows unopenable.
	G	RG0DL02	-	Unoccupied. No windows openable. Door closed. No AC installed. Ventilation fan not operational.
	G	RG0DL05	683	18 students, 1 staff. No windows open. Cross ventilation available but not used. Door closed. AC operational and not running. Fresh air fan operation could not be verified.
	1	R100D01	685	7 students, 1 staff. 15% windows open. Cross ventilation available but not used. Door closed. AC operation could not be verified. Fresh air fan operation could not be verified - may have run delay.
	1	R100D02	486	15 students, 1 staff. 20% windows open. Cross ventilation available and used. Door open. AC operation could not be verified. Fresh air fan operation could not be verified.

E BLOCK	G	RG0DL01	981	15 students, 1 staff. 10% windows open. Cross ventilation available but not used. Door closed. AC operational and running. Fresh air fan operational and running.
	G	RG0DL03	730	16 students, 1 staff. No windows open. Cross ventilation available but not used. Door open. AC operation could not be verified. No fresh air fan installed.
E BLOCK	1	R100E01	545	17 students, 1 staff. 25% windows open. Cross ventilation available and used. Door open. AC operational and running. Fresh air fan operational and running.
	1	R100E02	653	17 students, 1 staff. 60% windows open. Cross ventilation available and used. Door closed. AC operational and running. Fresh air fan operational and running.
	1	R100E03	702	20 students, 1 staff. 50% windows open. Cross ventilation available but not used. Door closed. AC operation could not be verified. Fresh air fan operation could not be verified.
	1	R100E05	681	14 students, 1 staff. 100% windows open. Cross ventilation available and used. Door closed. AC operation could not be verified. Fresh air fan operation could not be verified.
	1	R100E06	602	19 students, 1 staff. 100% windows open. Cross ventilation available and used. Door closed. AC operation could not be verified. Fresh air fan operation could not be verified.
F BLOCK	G	RG00FO4	613	19 students, 1 staff. 40% windows open. Cross ventilation available and used. Door closed. AC operational and running. Fresh air fan operational and running.
BLOCK	G	RG00I04	685	16 students, 1 staff. 10% windows open. Cross ventilation available but not used. Door closed. AC operation could not be verified. No fresh air fan installed.
(J) RESOURCE CENTRE	G	RG00J01	495	0 students, 3 staff. 15% windows open. Door 50% open. AC operation could not be verified. No fresh air fan installed.
(K) HOME ECONOMICS	G	RG00K02	538	13 students, 3 staff. 40% windows open. Cross ventilation available and used. Door closed. AC not running. Fresh air fan not running.

	G	RG00K04	426	3 students, 0 staff. No windows open. Cross ventilation unavailable. Door closed. No AC installed. No fresh air fan installed.
	G	RG00K09	479	15 students, 2 staff. 40% windows open. Cross ventilation available and used. Door closed. No AC installed. No fresh air fan installed.
(L) BLOCK	1	*RG00L04	482	8 students, 1 staff. 20% windows open. Cross ventilation available and used. Door open. No AC installed. No fresh air fan installed.
(M) SCIENCE BLOCK	G	RG00M02	885	9 students, 1 staff. No windows open. Cross ventilation available but not used. Door closed. AC operation could not be verified. Fresh air fan operational and not running.
	G	RG00M04	817	11 students, 1 staff. No windows open. Cross ventilation available but not used. Door closed. AC operation could not be verified. Fresh air fan operational and not running.
Q BLOCK	G	RG00Q03	513	6 students, 1 staff. No windows open. Cross ventilation available but not used. Door open. AC and not running. No fresh air fan installed.
S BLOCK	G	RG00S01	450	1 student, 1 staff. 5% windows open. Cross vent available if teacher rooms open Cross ventilation available and used. Door open. AC operation could not be verified. No fresh air fan installed.
	G	RG00S04	495	1 student, 1 staff. No windows open. Open to classroom Cross ventilation available and used. Door open. AC operation could not be verified. No fresh air fan installed.
	G	RG00S07	450	Unoccupied. 5% windows open. No external door. No AC installed. No fresh air fan installed.
	G	RG00S09	433	Unoccupied. 50% windows open. No external door. No AC installed. No fresh air fan installed.
(T) BLOCK - TRADE TRAINING CEN	G	RG00T05	418	10 students, 3 staff. 45% windows open. Cross ventilation available and used. Door open. No AC installed. Fresh air fan operational and running.

(V) BLOCK - TRADE TRAINING CEN	G	RG00V04	583	12 students, 1 staff. 30% windows open. Cross ventilation available and used. Door open. AC operation could not be verified. Fresh air fan operation could not be verified.
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In general, the CO₂ levels in most classrooms were observed to be under 800 ppm. However, the following areas were noted to have CO₂ levels in excess of the 800ppm threshold:

3.1.1 A Block

The HVAC systems in A Block consist of under ceiling split air conditioning units that cool the classrooms and wall mounted filter / fan units, interlocked with the air conditioning units, that supply outside air to the classrooms when running. The only exception to this arrangement is R100A08 where room contains 3 heater bars suspended from ceiling and a wall mounted filter / fan unit.



Figure 1 – A Block Under Ceiling Heater Bar



Figure 2 – A Block Under Ceiling AC Unit

During the inspection of A Block, CO₂ levels under 800 ppm were noted in all the occupied classrooms, with the exception of R100A03 and R100A08 with CO₂ levels of 929 ppm and 1095 ppm respectively.

All the air conditioning units and fans were running in the classrooms, with the exception of R100A03 and R100A08. It must be noted that the windows and doors of R100A03 and R100A08 were closed compared to the other classrooms where either the door or windows were opened.

Windows on the South-East façade of Level 1 classrooms of A Block typically consist of awning windows (2 row by 3-5 column configuration) and louvre windows at high level. It must be noted that opening of some awning windows on the bottom row are restricted by the position of the classroom's air conditioning outdoor condenser units as shown in Figure 3. Although the opening of awning windows on the bottom row are limited, other windows on that façade can easily be opened to allow outside air to flow into the room and provide air movement into rooms.



Figure 3 – A Block Level 1 South-East Window Arrangement

Based on the above, it is suspected that a lack of adequate natural cross ventilation and fresh air fans turned off contributed to the high CO₂ levels noted.

3.1.2 C Block

The HVAC systems in C Block consist of under ceiling split air conditioning units that cool the classrooms and wall mounted filter / fan units, interlocked with the air conditioning units, that supply outside air to the classrooms when running. The only exception to this arrangement is RG0CL01 where the room contains wall mounted split air conditioning systems without any fresh air ventilation fan.



Figure 4 – C Block Wall mounted Split Indoor Unit



Figure 5 – C Block Faulty Wall mounted Filter / Fan Unit

During the inspection of C block, CO₂ levels under 800 ppm were noted in all the occupied classrooms, with the exception of R100C01 and R100C02 with CO₂ levels of 929 ppm and 1095 ppm respectively.

Air conditioning units were running in R100C01 and R100C02 however it was observed that the fresh air fans were not operational. It is suspected the fans are either faulty or on a time delay. It is believed that fresh air entered the classroom through opened windows as the doors were closed. Classrooms with CO₂ level under 800 ppm found to have more than 25% of the windows opened in the room and utilised natural cross ventilation by opening windows on opposite ends of the classroom. It must be noted that R100C01 and R100C02 had the smallest percentage of windows opened and cross ventilation was not utilised.

The window arrangement on the South-East façade of Level 1 classrooms of C Block are similar to A Block, and as noted in A Block, the opening of some awning windows on the bottom row in classrooms of C Block is restricted by the location of the room's air conditioning outdoor condenser unit. Other windows on that façade can be easily opened to allow outside air to naturally flow into the room.



Figure 6 – C Block Level 1 South-East Window Arrangement

Based on the above, it is suspected that a lack of adequate cross ventilation and non-operational / faulty fresh air fans contributed to the high CO₂ levels noted.

3.1.3 E Block

The HVAC systems in E Block consist of under ceiling split air conditioning units that cool the classrooms and wall mounted filter / fan units, interlocked with the air conditioning units, that supply outside air to the classrooms when running.

During the inspection of E block, CO₂ levels under 800 ppm were noted in all the occupied classrooms, with the exception of RG0DL01 with a CO₂ level of 981 ppm.

At the time of inspection, it must be noted that RG0DL01 and RD0GL03 had all the windows closed whereas other classrooms in E Block had more than 25% of windows opened. It is suspected that the opened door in RD0GL03 allowed outside fresh air to enter the room which kept the CO₂ level under 800 ppm. The same could not be said for RG0DL01 as it did not have the door opened. Furthermore, although the air conditioning units and fans were operational in RG0DL01, the absence of relief paths to outside could have resulted in a higher CO₂ level reading.

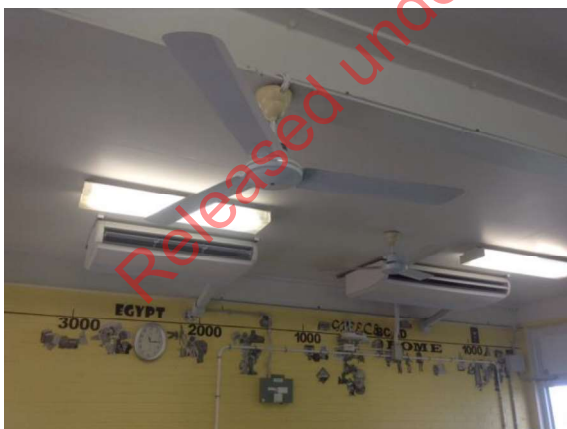


Figure 7 – E Block RG0DL01 under ceiling Indoor Unit



Figure 8 – E Block RG0DL01 Music Classroom

Based on the above, although the fresh air fan was turned on and supplying outside air into the room, it is suspected that a lack of adequate cross ventilation and suitable relief for supplied fresh air contributed to the high CO₂ levels noted.

3.1.4 M Block

The HVAC systems in M Block consist of wall mounted split air conditioning units that cool the classrooms and wall mounted filter / fan units, interlocked with the air conditioning units, that supply outside air to the classrooms when running.



Figure 9 – M Block RG00M02 mounted Split Indoor Unit

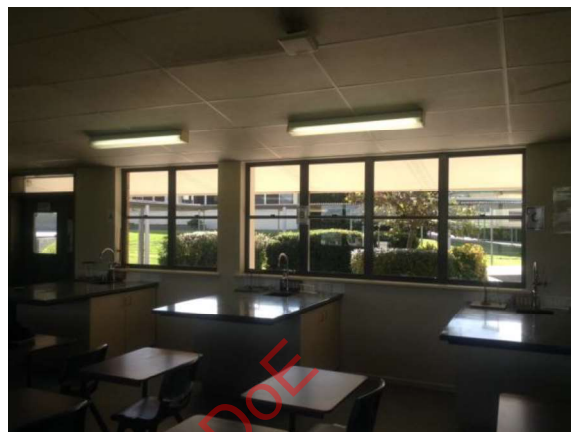


Figure 10 – M Block RG00M02 Science Lab 1

During the inspection of M block, CO₂ levels over 800ppm were noted in RG00M02 and RG00M04 with CO₂ levels of 885 ppm and 817 ppm respectively. These levels continued to rise after leaving the rooms.

Both air conditioning units and fans were not running in the classrooms. Furthermore, doors and windows of both classrooms were also closed. Although the wall mounted fans were not running, it was identified that they were operational and not faulty.

Based on the above, it is suspected that a combination of closed doors and windows and turned off wall mounted fresh air fans contributed to the high CO₂ levels due to the lack of adequate cross ventilation.

3.2 D Block RG0DL02 Music Prac Room

During the inspection of D Block, RG0DL02 (Music Prac Room), it was noted that the classroom windows were not openable. It is suspected that the windows were fixed in order to limit noise egress during rehearsals. A mechanical ventilation system is installed, comprising an acoustically treated ducted ventilation fan supplying air to the room, and an air relief louvre on the opposite façade with an internally lined duct to limit noise transfer.



Figure 11 – RG0DL02 Ventilation Fan

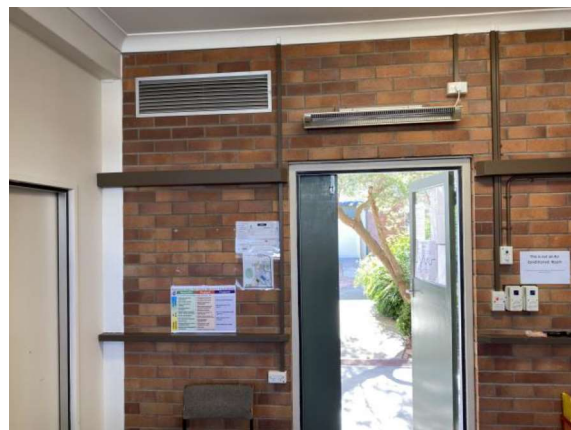


Figure 12 – RG0DL02 Relief Air Louvre

During the inspection, it was noted that the fresh air fan was not operational. With the windows not openable, there is no source of fresh outside air to the room.

4. Recommendations

In general, low CO₂ levels were noted during the inspection. In most cases, high CO₂ levels have been noted in classrooms where windows and doors were kept closed during lessons. Classrooms where some windows were kept open were noted to have lower CO₂ levels. As such, it is recommended at least some classroom windows, and the classroom doors, are kept open during lessons.

In classrooms with fresh air fans installed and running, high CO₂ levels were noted when doors and windows were kept closed. It is suspected that a lack of relief for supplied outside air contributed to inefficient fan operation and air distribution. If the fresh air fans are run, it is recommended at least one window on the façade opposite the fan is opened to allow for air relief and adequate cross-ventilation of the room.

The following fresh air fans were not functional at the time of the inspection and require repair:

1. C Block R100C01,
2. C Block R100C02,
3. D Block RG0DL02.

The following kitchen exhaust system was not functional at the time of the inspection and requires repair:

1. K Block RG00K02.



Figure 13 – D Block RG0DL02 Music Prac Room



Figure 14 – K Block RG00K02 Home Economics K02

In D Block, RG0DL01, we recommend the vertical sliding windows are repaired to allow for easy opening by staff and students.

5. References

[1] OzSAGE, "Protecting children from COVID-19 and making schools and childcare safer," OzSAGE, 2021.

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Appendices

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Appendix A

Site Observations

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BuildingName	EQIdentifier1	RoomName	EQIdentifier2	LocalRoomName	NumberofOccupants	NumberofStudents	NumberofStaff	NumberofStaff	CrossVentilation	CrossVentilation	Waterpercentageofwindows	CO2Level	CO2Comments	ClassroomVentilationSurveyQ	ClassroomVentilationSurveyW	ClassroomVentilationSurveyS	ClassroomVentilationSurveyH	ConditioningQ2
A BLOCK_2		1_Classroom A06	R100A06		16	1			Yes	No	0%	1095		0	1	1	1	1
C BLOCK_4		1_Jal Imm Room C02	R100C02		19	2			Yes	No	15%	1098		1	1	1	1	1
D BLOCK_3		GL_General Needs Room	R000L05		18	1			Yes	No	0%	683		1	1	1	1	1
A BLOCK_2		1_Classroom A03	R100A03		18	1			Yes	No	0%	829		1	1	1	1	1
S BLOCK_3		GL_Turning Room S09	R000S09		15	1			Yes	Yes	20%	433	Open to classroom	0	1	0	0	0
D BLOCK_3		1_Jalway Centre D02	R100D02		15	1			Yes	Yes	20%	466		1	1	1	1	1
C BLOCK_18		GL_Classroom C03	R000C03		6	1			Yes	No	0%	513		1	1	0	1	1
J BLOCK_38		GL_C01	R00001		17	1			Yes	Yes	10%	775		1	1	0	1	1
C BLOCK_4		GL_Classroom C01	R000C01		17	1			Yes	No	10%	479		1	1	0	0	0
D BLOCK_2		1_Jalway Centre D01	R100D01		7	1			Yes	No	15%	885		1	1	1	1	1
(K) HOME ECONOMICS_14		GL Home Economics H09	R000H09		15	2			Yes	Yes	40%	479		1	1	0	0	0
(T) BLOCK- TRADE TRAINING CEN_4	2064-CA-1-6-0001	GL_Engineering T05	R000T05		10	3			Yes	Yes	45%	418		1	1	1	0	1
S BLOCK_43		GL_Turning Room S07	R000S07		0	0			Yes	Yes	5%	455		0	1	0	0	0
S BLOCK_43	2064-CA-1-6-0001	GL_Sci Classroom S01	R000S01		1	1			Yes	Yes	5%	450	Gross vent available if teacher rooms open	1	1	0	1	1
A BLOCK_2		1_Classroom A04	R100A04		16	1			Yes	No	55%	736	Lv opposite self open	1	1	1	1	1
C BLOCK_4		1_Science Lab C06	R100C06		17	1			Yes	Yes	20%	522		1	1	1	1	1
A BLOCK_2		1_Classroom A05	R100A05		15	1			Yes	No	30%	591	Lv opposite self open	1	1	1	1	1
I BLOCK_38	2064-CA-1-6-0001	GL_Classroom B04	R000B04		16	1			Yes	No	10%	685		2	1	0	2	2
F BLOCK_7	2064-CA-1-6-0001	GL_Ag Science Lab F04	R000F04		19	1			Yes	Yes	40%	612		1	1	1	1	1
A BLOCK_2	2064-CA-1-6-0001	GL_Science Lab A01	R000A01		6	1			Yes	No	5%	642	LW opposite open with cat on	1	1	1	1	1
E BLOCK_3		1_Classroom E02	R100E02		17	1			Yes	Yes	60%	653		1	1	1	1	1
C BLOCK_4	2064-CA-1-6-0001	1_Classroom C04	R100C04		9	1			Yes	Yes	40%	623		1	1	1	1	1
(M) SCIENCE BLOCK_15	2064-CA-1-6-0001	GL_Science Lab M02	R000M02		9	1			Yes	No	0%	385	And drinking	1	1	1	1	1
D BLOCK_3	2064-CA-1-6-0001	GL_Music Room D01	R000D01		9	1			Yes	No	15%	467	5 min after break	1	1	1	1	1
E BLOCK_3	2064-CA-1-6-0001	GL_Music Classroom D03	R000D03		16	1			Yes	No	0%	730		1	1	0	1	1
E BLOCK_3		GL_Music Room D01	R000D01		15	1			Yes	No	10%	861		1	1	1	1	1
C BLOCK_2		1_Jal Imm Room C01	R100C01		17	1			Yes	No	15%	878		1	1	1	1	1
(B) MANUAL ARTS_3	2064-CA-1-6-0001	GL_Graphics Room B07	R000B07		16	1			Yes	No	10%	508	Loosely not sealed and large vent room	1	1	1	1	1
E BLOCK_3		1_Technics Room E06	R100E06		19	1			Yes	Yes	100%	652		1	1	1	1	1
E BLOCK_3	2064-CA-1-6-0001	1_Classroom E01	R100E01		17	1			Yes	Yes	25%	545		1	1	1	1	1
E BLOCK_3		1_Business Ed E03	R100E03		20	1			Yes	No	50%	702		1	1	1	1	1
(L) RESOURCE CENTRE_10	2064-CA-1-6-0001	GL_Classroom J01	R000J01		0	0			Yes	Yes	10%	495		1	1	0	1	1
(K) HOME ECONOMICS_14	2064-CA-1-6-0001	GL_Cooking Room K04	R000K04		24	3	55		No	No	0%	495	Cv only	1	1	0	0	0
D BLOCK_2		GL_Catering Kitchen K02	R000K02		13	3			Yes	Yes	40%	538		1	1	1	1	1
(L) BLOCK_35		GL_Music Prep Room D02	R000D02		3	1			No	No	0%	482	Vent fan not working, no operable Windows, no AC	1	0	1	0	0
E BLOCK_2	2064-CA-1-6-0001	1_Classroom L04	*R000L04		8	1			Yes	Yes	20%	482		1	1	0	0	0
(V) BLOCK- TRADE TRAINING CEN_4	2064-CA-1-6-0001	GL_General Learning Area- Bus R000V04			12	1			Yes	Yes	30%	563		1	1	1	1	1
A BLOCK_2		1_Classroom A02	R100A02		14	1			Yes	Yes	10%	676		1	1	1	1	1
C BLOCK_4		1_Classroom C03	R100C03		17	1			Yes	Yes	40%	623		1	1	1	1	1
S BLOCK_3		GL_Sci Classroom S04	R000S04		1	1			Yes	Yes	0%	495	Open to classroom	1	1	1	1	1
E BLOCK_3		1_Computer Room E05	R100E05		14	1			Yes	Yes	100%	681		1	1	1	1	1
E BLOCK_3		New			1	1			Yes	Yes	0%	681		1	1	0	1	1
A BLOCK_2		1_Classroom A01	R100A01		14	1			Yes	Yes	10%	676		1	1	1	1	1
(M) SCIENCE BLOCK_15		GL_Science Lab M04	R000M04		11	1			Yes	No	0%	817	And drinking	1	1	1	1	1

BuildingName	RoomName	EQIdentifier2	LocalRoomNar	Type	Quantity	WastheACon	ACState	Type1	Quantity1	WastheACon1	ACState1	ACComments
C BLOCK_4	G_Classroom CL01	RG0CL01		Split System Wall Mounte	2	No	Operation could not be verified	Window-Wall				
A BLOCK_2	G_Science Lab A101	RG0AL01		Under Ceiling	2	Yes	Operational					
Q BLOCK_19	G_Classroom Q03	RG00Q03										Heating X 5
D BLOCK_5	1_Literacy Centre D01	R100D01		Under Ceiling	1	No	Operation could not be verified					
E BLOCK_6	G_Music Storeroom D103	RG0DL03		Window-Wall	2	No	Operation could not be verified					
D BLOCK_5	1_Literacy Centre D02	R100D02		Under Ceiling	3	No	Operation could not be verified					
(M) SCIENCE BLOCK_15	G_Science Lab 1 M02	RG00M02		Split System Wall Mounte	2	No	Operation could not be verified					
C BLOCK_4	1_Classroom C04	R100C04		Under Ceiling	2	No	Operation could not be verified					
(J) RESOURCE CENTRE_10	G_Classroom J01	RG00J01		Cassette	5	No	Operation could not be verified					
F BLOCK_7	G_Ag Science Lab F04	RG00F04		Split System Wall Mounte	2	Yes	Operational					
(M) SCIENCE BLOCK_15	G_Science Lab 2 M04	RG00M04		Split System Wall Mounte	2	No	Operation could not be verified					
S BLOCK_43	G_Seu Classroom S01	RG00S01		Split System Wall Mounte	2	No	Operation could not be verified					
E BLOCK_6	1_Computer Room E05	R100E05		Under Ceiling	2	No	Operation could not be verified					
C BLOCK_4	1_Ital Imm Room C02	R100C02		Under Ceiling	2	Yes	Operational					
I BLOCK_58	G_Gla01	RG00I01		Split System Wall Mounte	2	No	Operation could not be verified					
E BLOCK_6	1_Classroom E01	R100E01		Under Ceiling	2	Yes	Operational					
A BLOCK_2	1_Classroom A08	R100A08		Under Ceiling	0							
D BLOCK_5	G_Special Needs Room	RG0DL05		Under Ceiling	2	No	Operational					
(B) MANUAL ARTS_3	G_Graphics Room B07	RG00B07		Under Ceiling	2	No	Operation could not be verified					
C BLOCK_4	1_Ital Imm Room C01	R100C01		Under Ceiling	2	Yes	Operational					
S BLOCK_43	G_Seu Classroom S04	RG00S04		Split System Wall Mounte	2	No	Operation could not be verified					
(V) BLOCK - TRADE TRAINING CEN_47	G_General Learning Area - Bus	RG00V04		Split System Wall Mounte	3	No	Operation could not be verified					
D BLOCK_5	G_Music Room D101	RG0DL01		Under Ceiling	2	Yes	Operational					
I BLOCK_58	G_Classroom I04	RG00I04		Split System Wall Mounte	2	No	Operation could not be verified					
(K) HOME ECONOMICS_14	G_Catering Kitchen K02	RG00K02										Heating
C BLOCK_4	1_Classroom C03	R100C03		Under Ceiling	2	No	Operation could not be verified					
A BLOCK_2	1_Classroom A03	R100A03		Under Ceiling	2	No	Operation could not be verified					
E BLOCK_6	1_Classroom E02	R100E02		Under Ceiling	2	Yes	Operational					
E BLOCK_6	G_Music Room D101	RG0DL01		Under Ceiling	2	Yes	Operational					
C BLOCK_4	1_Science Lab C06	R100C06		Under Ceiling	1	No	Operation could not be verified	Under Ceiling	1	No	Operation could not be verified	
A BLOCK_2	1_Classroom A04	R100A04		Under Ceiling	2	Yes	Operational					
A BLOCK_2	1_Classroom A02	R100A02		Under Ceiling	2	Yes	Operational					
A BLOCK_2	1_Classroom A01	R100A01		Under Ceiling	2	Yes	Operational					
A BLOCK_2	1_Classroom A05	R100A05		Under Ceiling	2	Yes	Operational					
E BLOCK_6	1_Business Ed E03	R100E03		Under Ceiling	2	No	Operation could not be verified					
E BLOCK_6	1_Textiles Room E06	R100E06		Split System Wall Mounte	2	No	Operation could not be verified					
I BLOCK_58	G_Classroom I04	RG00I04		Split System Wall Mounte	2	Yes	Operational					

BuildingName	RoomName	EQIdentifier	LocalRoom	Nar	Widthmm	Heightmm	Quantity	Wasthedooropen	1 Widthmm	Heightmm	1	Quantity	Wasthedooropen	2 Widthmm	Heightmm	2	Quantity	Wasthedooropen	3 DoorComments
C BLOCK_4	G_Classroom CL01	RG0CL01			1060	2350	1	No	840	2060	1	No							
S BLOCK_43	G_Seu Classroom S04	RG00S04			900	2040	1	Yes											
C BLOCK_4	1_Ital Imm Room C02	R100C02			1060	2070	1	No											
A BLOCK_2	1_Classroom A01	R100A01			970	2030	1	Yes											50% open
E BLOCK_6	G_Music Room D01	RG0DL01			1060	2060	1	No											
D BLOCK_5	G_Music Prac Room D02	RG0DL02			1060	2040	1	No											
D BLOCK_5	1_Literacy Centre D01	R100D01			1060	2060	1	No											
E BLOCK_6	1_Computer Room E05	R100E05			1060	2050	1	No											
E BLOCK_6	G_Music Storeroom D03	RG0DL03			900	2040	1	Yes	1130	2330	1	No							
D BLOCK_5	1_Literacy Centre D02	R100D02			1060	2140	1	Yes											
(K) HOME ECONOMICS_14	G_Catering Kitchen K02	RG00K02			1280	2040	1	No											
E BLOCK_6	1_Classroom E02	R100E02			1060	2050	1	No											
(M) SCIENCE BLOCK_15	G_Science Lab 2 M04	RG00M04			1280	2040	1	No	880	2040	1	No							
(T) BLOCK - TRADE TRAINING CEN_4	G_Engineering T05	RG00T05			2880	4200	1	Yes	1220	4200	1	Yes		3100	4200	1	Yes		Open hallway
(J) RESOURCE CENTRE_10	G_Classroom J01	RG00J01			900	2160	2	Yes	1020	2040	2	No							50% open
(K) HOME ECONOMICS_14	G_Dining Room K04	RG00K04			930	2020	2	No											
E BLOCK_6	1_Business Ed E03	R100E03			1060	2050	1	No											
(K) HOME ECONOMICS_14	G_Home Ec Kitchen K09	RG00K09			1280	2040	1	No											
(L) BLOCK_35	1_Classroom L04	*RG00L04			1760	2030	1	Yes											50%
C BLOCK_4	1_Science Lab C06	R100C06			800	2030	1	No	1060	2063	1	No							
I BLOCK_58	G_Classroom I04	RG00I04			910	2050	1	No											
I BLOCK_58	G_Gla01	RG00I01			910	2050	1	No											
A BLOCK_2	1_Classroom A05	R100A05			970	2030	1	Yes											50% open
F BLOCK_7	G_Ag Science Lab F04	RG00F04			1050	2050	1	No											
D BLOCK_5	G_Music Room D01	RG0DL01			1060	2060	2	No											
C BLOCK_4	1_Classroom C04	R100C04			1060	2070	1	No											
I BLOCK_58	G_Classroom I04	RG00I04			1050	2050	1	Yes											
A BLOCK_2	1_Classroom A03	R100A03			970	2030	1	No											
(V) BLOCK - TRADE TRAINING CEN_4	G_General Learning Area - Bu	RG00V04			900	2040	1	Yes											
E BLOCK_6	1_Textiles Room E06	R100E06			890	2040	1	No											
E BLOCK_6	1_Classroom E01	R100E01			970	2030	1	Yes											
D BLOCK_5	G_Special Needs Room	RG0DL05			1060	2060	1	No	940	2010		No							
C BLOCK_4	1_Classroom C03	R100C03			1060	2070	1	No											
A BLOCK_2	G_Science Lab A01	RG0AL01			1060	2010	1	No											
C BLOCK_4	1_Ital Imm Room C01	R100C01			1060	2070	1	No											
(M) SCIENCE BLOCK_15	G_Science Lab 1 M02	RG00M02			1280	2040	1	No	880	2040	1	No							
A BLOCK_2	1_Classroom A04	R100A04			970	2030	1	No											
Q BLOCK_19	G_Classroom Q03	RG00Q03			900	2040	1	Yes											
(B) MANUAL ARTS_3	G_Graphics Room B07	RG00B07			1200	2060	2	No											
S BLOCK_43	G_Seu Classroom S01	RG00S01			900	2040	1	Yes											
A BLOCK_2	1_Classroom A02	R100A02			970	2030	1	No											

BuildingName	RoomName	EQIdentifier2	LocalRoomName	Widthmm	Heightmm	Depthmm	Quantity	Velocitym/s	FlowRate	FanState	Wasthefanrunni	FlowRate	FanComments
C BLOCK_4	1_Science Lab C06	R100C06		480	480	48			0,00	Operation could not be verified	No	0,00	
C BLOCK_4	1_Classroom C04	R100C04		480	480	48			0,00	Operation could not be verified	No	0,00	
A BLOCK_2	1_Classroom A03	R100A03		480	480	48			0,00	Operation could not be verified	No	0,00	
A BLOCK_2	1_Classroom A05	R100A05		480	480	48			0,00	Operational	Yes	0,00	
D BLOCK_5	1_Literacy Centre D01	R100D01		480	480	48	1		0,00	Operation could not be verified	No	0,00	May have run delay...
E BLOCK_6	1_Textiles Room E06	R100E06		480	480	48			0,00	Operation could not be verified	No	0,00	
A BLOCK_2	1_Classroom A01	R100A01		480	480	48			0,00	Operational	Yes	0,00	
(B) MANUAL ARTS_3	G_Graphics Room B07	RG00B07		480	480	48	1		0,00	Operation could not be verified	No	0,00	
A BLOCK_2	1_Classroom A04	R100A04		480	480	48			0,00	Operational	Yes	0,00	
D BLOCK_5	1_Literacy Centre D02	R100D02		480	480	48	1		0,00	Operation could not be verified	No	0,00	
(V) BLOCK - TRADE TRAINING CEN_47	G_General Learning Area - Bus	RG00V04		450	450	50	2		0,00	Operation could not be verified	No	0,00	Roof fans
D BLOCK_5	G_Music Prac Room DI02	RG00DL02		480	480	48	1		0,00	Non-operational	No	0,00	
(T) BLOCK - TRADE TRAINING CEN_48	G_Engineering T05	RG00T05							0,00	Operational	Yes	0,00	
A BLOCK_2	1_Classroom A02	R100A02		480	480	48			0,00	Operational	Yes	0,00	
E BLOCK_6	1_Classroom E01	R100E01		480	480	48			0,00	Operational	Yes	0,00	
(K) HOME ECONOMICS_14	G_Catering Kitchen K02	RG00K02		450	450	50	2		0,00			0,00	Canopy not working
D BLOCK_5	G_Special Needs Room	RG00DL05		480	480	48	1		0,00	Operation could not be verified	No	0,00	
C BLOCK_4	1_Classroom C03	R100C03		480	480	48			0,00	Operational	Yes	0,00	
D BLOCK_5	G_Music Room DI01	RG00DL01		480	480	48	1		0,00	Operational	No	0,00	
F BLOCK_7	G_Ag Science Lab F04	RG00F04		480	480	48			0,00	Operational	Yes	0,00	
E BLOCK_6	1_Classroom E02	R100E02		480	480	48			0,00	Operational	Yes	0,00	
C BLOCK_4	1_Ital Imm Room C02	R100C02		480	480	48			0,00	Non-operational	No	0,00	Fan faulty should be running
C BLOCK_4	1_Ital Imm Room C01	R100C01		480	480	48			0,00	Operational	Yes	0,00	
(M) SCIENCE BLOCK_15	G_Science Lab 2 M04	RG00M04		450	450	50	2		0,00	Operational	No	0,00	
E BLOCK_6	1_Computer Room E05	R100E05		480	480	48			0,00	Operation could not be verified	No	0,00	
(M) SCIENCE BLOCK_15	G_Science Lab 1 M02	RG00M02		450	450	50	2		0,00	Operational	No	0,00	
E BLOCK_6	1_Business Ed E03	R100E03		480	480	48			0,00	Operation could not be verified	No	0,00	
A BLOCK_2	G_Science Lab AI01	RG00AL01		480	480	48			0,00	Operational	Yes	0,00	
A BLOCK_2	1_Classroom A08	R100A08		420	320	48			0,00	Operation could not be verified	No	0,00	
E BLOCK_6	G_Music Room DI01	RG00DL01		480	480	48			0,00	Operational	Yes	0,00	

BuildingName	RoomName	EQSRef/2	LocalRoomName	Whatpercentageofwindowisw	Widthmm	Heightmm	Quantity	Widthmm1	Heightmm1	Quantity1	Widthmm2	Heightmm2	Quantity2	Widthmm3	Heightmm3	Quantity3	Widthmm4	Heightmm4	Quantity4	Widthmm5	Heightmm5	Quantity5	Widthmm6	Heightmm6	Quantity6	Widthmm7	Heightmm7	Quantity7	Widthmm8	Heightmm8	Quantity8	WindowComments	
D BLOCK_5	L_Literacy Centre D62	R100D02		20%	1100	500	6	1100	520	6	1100	620	6	1100	640	6	1100	600	9														
C BLOCK_4	L_Classroom C03	R100C03		40%	1060	660	4	1060	660	4	550	500	11	1100	700	6																	Bottom Windows shut b/c ac
F BLOCK_18	Q_Classroom B4	R00B04		10%	830	1010	1	720	1010	4	730	430	6																				
Q BLOCK_19	Q_Classroom C03	R00C03		0%	1060	660	5	1060	660	5	1060	700	6	500	960	6																	
E BLOCK_9	Q_Music Roomroom D03	R00D03		0%	1020	620	5	1020	560	5																							
A BLOCK_2	L_Classroom A08	R100A08		0%	1060	680	5	1060	660	5	550	500	10	960	740	5	850	660	1	850	660	1											
E BLOCK_9	Q_Music Room D01	R00D01		10%	410	1080	11																										
(T) BLOCK - TRADE TRAINING CEN	Q_Engineering T05	R00T05		45%	400	600	10																										
(K) HOME ECONOMICS_14	Q_Home Ec Kitchen K09	R00K09		40%	1000	1520	8	1000	700	0																							
A BLOCK_2	L_Classroom A04	R100A04		15%	1060	680	4	1060	660	3	550	500	11	960	740	4																	
C BLOCK_4	L_Jail Imm Room C01	R100C01		15%	1060	680	4	1060	660	4	550	500	9	1100	700	3																	
E BLOCK_9	L_Textiles Room E06	R100E06		100%	460	1170	5	460	960	4																							
C BLOCK_4	L_Science Lab C06	R100C06		20%	1060	660	6	1060	660	6	550	500	14	1120	700	8	520	840	6														
Q BLOCK_19	Q_Music Room D01	R00D01		15%	1010	600	8	1010	550	8	1000	600	7	1000	840	6																	
A BLOCK_2	L_Classroom A05	R100A05		30%	1060	660	4	1060	660	3	550	500	9	960	740	4																	
S BLOCK_43	Q_Tutoring Room S07	R00S07		5%	1000	920	0	600	300	0	390	930	1	270	930	1																	
S BLOCK_43	Q_Sex Classroom S04	R00S04		0%	1000	920	2	600	300	6																							
(K) HOME ECONOMICS_14	Q_Dining Room K04	R00K04		0%	540	1650	2																										
(B) MANUAL ARTS_3	Q_Graphics Room B07	R00B07		10%	700	430	1	760	830	1	600	430	13	830	630	12	750	430		800	630	1	800	800	10								
C BLOCK_4	Q_Classroom C01	R00C01		10%	460	620	16	460	620	4																							
C BLOCK_4	L_Jail Imm Room C02	R100C02		15%	1060	680	4	1060	660	4	550	500	11	1100	700	6																	
I BLOCK_56	Q_G01	R00G01			830	1010	1	720	1010	4	730	430	6																				
S BLOCK_43	Q_Tutoring Room S09	R00S09		50%	1000	920	0	600	300	0	390	930	1	270	930	1																	
(N) SCIENCE BLOCK_15	Q_Science Lab 2 M04	R00M04		0%	700	450	15																										
(K) HOME ECONOMICS_14	Q_Catering Kitchen K02	R00K02		40%	1000	1520	8	1000	700	1																							
A BLOCK_2	L_Classroom A03	R100A03		0%	1060	680	4	1060	660	3	550	500	11	960	740	4																	
A BLOCK_2	L_Classroom A01	R100A01		10%	1060	680	4	1060	660	3	550	500	9																				
E BLOCK_9	L_Classroom E02	R100E02		60%	460	1170	5	460	1090	4																							
A BLOCK_2	L_Classroom A02	R100A02		0%	1060	680	4	1060	660	3	550	500	9	960	740	4																	
S BLOCK_43	Q_Sex Classroom S01	R00S01		0%	1000	920	2	600	300	6																							
D BLOCK_6	Q_Special Needs Room	R00D05		0%	1010	600	4	1010	550	4	1000	600	4	1000	840	4																	
C BLOCK_4	L_Classroom C04	R100C04		40%	1060	680	5	1060	660	5	550	500	13	1100	700	7																	
A BLOCK_2	Q_Science Lab M01	R00M01		5%	1020	660	5	450	350	13	1000	600	7																				
F BLOCK_7	Q_Ag Science Lab F04	R00F04		40%	550	1350	5	450	1200	4																							
D BLOCK_5	L_Literacy Centre D01	R100D01		15%	1100	700	4	1110	620	3	1110	620	3	1110	600	3																	
E BLOCK_9	New			0%	460	630	18																										
(N) SCIENCE BLOCK_15	Q_Science Lab 1 M02	R00M02		25%	700	450	13																										
E BLOCK_9	L_Classroom E01	R100E01		100%	460	1170	5	460	1090	4																							
E BLOCK_9	L_Computer Room E05	R100E05		100%	460	1170	5	460	1090	4																							
(L) BLOCK_39	L_Classroom L04	R00L04		20%	950	1150	9			800	430	3	830	630	0	750	430	0	800	630	0	800	800	0									One set of window covered by shelf
E BLOCK_9	L_Business Ed E03	R100E03		50%	460	1170	7	460	1090	6																							
(V) BLOCK - TRADE TRAINING CEN	Q_General Learning Area - Bar	R00V04		30%	520	1080	1	850	1000	5																							
(G) RESOURCE CENTRE_10	Q_Classroom J01	R00J01		10%	970	1030	13	970	520	3																							



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