Gold Coast Health & Knowledge Precinct (GCHKP) - Research & Development Centre of Excellence

Acoustic Report

Detailed Design – Interim Issue

Prepared for: NorthWest Healthcare Australian Property Limited

Attention: Clare Solomon

Date: 29 June 2022

Prepared by: Carl Edser

Ref: 301050263

Stantec Australia Pty Ltd
Level 3, 52 Merivale Street, South Brisbane QLD 4101
Tel: +61 7 3811 4506 Web: www.stantec.com

\\WGE-BRI-FS-01\PROJECTS\301050263\PROJECT DOCUMENTATION\ACOUSTICS\DESIGN\REPORTS\AC-RE-002-301050263 GCHKP (ACOUSTIC - DD)_001.DOCX

Stantec

Revision

Revision	Date	Comment	Prepared By	Approved By
001_001	07/12/2021	Concept design	CE	MLL
002_001	29/06/2022	Detailed design – interim issue – for review and coordination	CE	MLL

Contents

Contents

1. Introduction

Stantec Australia Pty Ltd (Stantec) have been engaged by NorthWest Healthcare Australian Property Limited (NHA) to undertake acoustic assessment and provided design advice for the Gold Coast Health & Knowledge Precinct (GCHKP) – Research & Development Centre of Excellence project.

The project site is located on the corner of Hill Street and Nexus Way, Southport 4215, and is within the Economic Development Queensland – Parklands Priority Development Area (Parklands PDA).

This acoustic report:

- details the site setting in context with surrounding environment;
- identifies acoustic items to be addressed during the design stages of the project;
- outlines the results of noise measurements conducted at or near the project site;
- establishes environmental noise limits applicable at the nearest external noise sensitive land uses, as well as criteria relating to control of external noise source impacts on the proposed development; and
- provides details of acoustic assessments undertaken for the project and, subsequently, nominates noise mitigation options to be considered for future design stages.
- provides design advice and construction recommendations for achieve acoustic performance objectives nominated.

A glossary of acoustic terms used in this report a glossary is included in **Appendix A**.

The recommendations made in this report are specific to the building design at the date of issue of this report. The building design is subject to change during the following stages. Where this occurs, the assumptions made to inform the recommendations in the report may no longer be valid; therefore, further advice should be sought to ensure that the acoustic outcomes presented in this report are achieved.

The performance of products referred to in this report are made to meet the acoustic requirements only. It does not consider other aspects, including but not limited to thermal, wind, impact, structural, mechanical, national construction code, security and fire requirements. Relevant discipline reports, drawings and specifications should be referred to for conformance.

This report relates to this specific project and must not be applied to any other project without prior consultation with Stantec. Designs and conditions can vary between projects causing significant variations in acoustic performance and relevant subsequent advice to one project may not apply to another.

This report shall not be relied upon as providing any warranties or guarantees of construction quality regarding acoustics.

2. Referenced Documentation

2.1 Regulations, Policies, Standards and Design Guidelines

The following documents detailed in **Table 1** are relevant to the project and are referred to throughout this report.

Table 1: Applicable regulations, policies, standards and design guidelines referenced in this report

Title	Abbreviation
Association of Australasian Acoustical Consultants – Guideline for Healthcare Facilities (v2.0, July 2017)	AAAC Guideline
Australian Standard AS 1055.1-1997 Acoustics – Description and measurement of environmental noise	AS 1055
Queensland Environmental Protection Act 1994	EPA 1994
Queensland Environmental Protection (Noise) Policy 2019	EPP 2019
City of Gold Coast – City Plan v8 (effective 15 Dec 2020)	GCCC City Plan
International Standards Organization 9613-2:1996 Attenuation of sound during propagation outdoors – Part 2: General method of calculation	ISO 9613
Economic Development Queensland – Parklands Priority Development Area Development Scheme prepared December 2013)	Parklands PDA

2.2 Study Inputs

Acoustic assessment and the preparation of this report have been conducted based on the following received documentation detail in **Table 2**.

Table 2: Received documentation

Date Received	Detail	Revision / Date Prepared	Prepared by	Format
20/06/2021	Architectural drawings package	Issue A 17/06/2022	Design Worldwide Partnership (DWP)	pdf

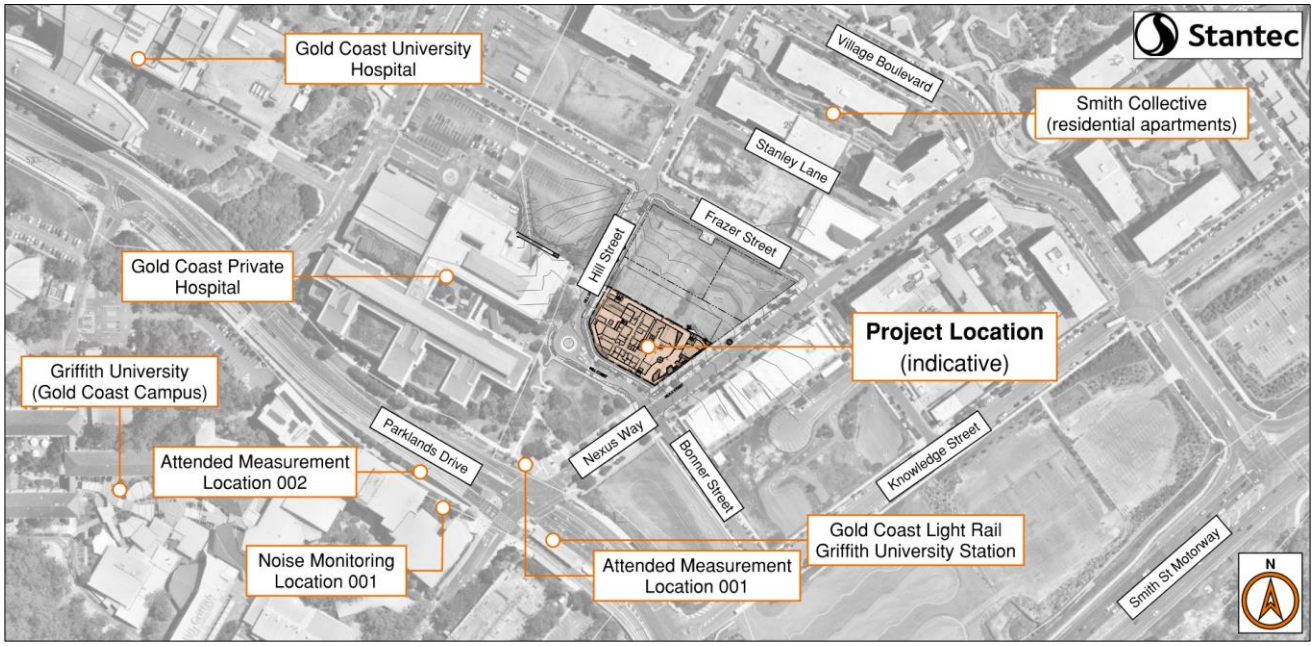
3. Project Details

3.1 Site Description

3.1.1 Project Location

The project study area is located on the corner of Hill Street and Nexus Way, Southport 4215, and is within the Economic Development Queensland – Parklands Priority Development Area. The project site has been shown in context with existing surrounding developments and noise monitoring locations (conducted by Stantec) in **Figure 1**.

Figure 1: Project site, surrounding land uses and noise monitoring locations



Source: Nearmap (image dated 13/11/2021 | 20-0579-AA1102-GROUND PLAN OVERALL_J – prepared by DWP | Image compiled by Stantec

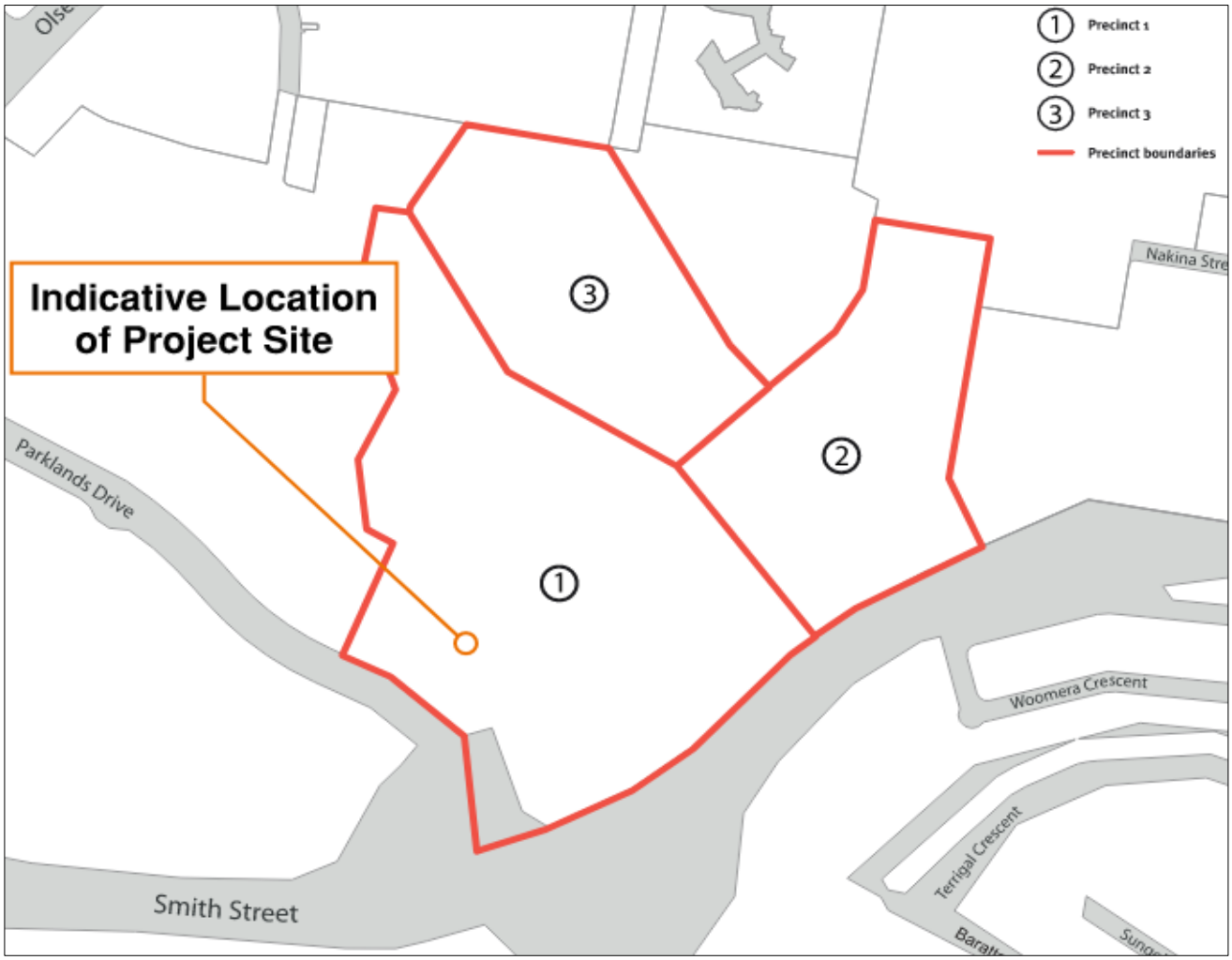
3.1.2 Surrounding Land Uses / Precinct

The current *Parklands Priority Development Area Development Scheme* was accessed and reviewed to determine the proposed and existing land uses and relevant Precinct for the proposed development (see **Figure 2**).

The following was identified:

- The project study area is situated within Precinct 1 (Health and Knowledge Precinct) of the Parklands PDA.
- Existing lots surrounding the proposed site are also located within Precinct 1 of the Parklands PDA.
- The nearest existing noise sensitive receivers to the project study area are:
  - 30 Village Boulevard Southport 4215 (residential uses)
  - Griffith University, Gold Coast Campus (GU); and
  - Gold Coast Private Hospital (GCPH).
- The project study area is not situated within the following noise contour categories:
  - Aircraft Noise Exposure Forecast (ANEF) contours;
  - Transport Noise Corridors – Railway (it is noted that the G:Link Light Rail is excluded from the contours); and
  - Transport Noise Corridors – Road.

Figure 2: Parklands PDA Scheme – Precinct Map



Source: Parklands Priority Development Area Development Scheme | Image compiled by Stantec

3.2 Proposed Layout

Based on the received documentation outlined in **Table 2**, the proposed development will consist of the following architectural volumes detailed in **Table 3**.

Table 3: Proposed layout and uses for the project

Level	Proposed Uses	
Basement 1 – 3	Car parking spaces DAS room Electrical services rooms End of trip facilities Fire pump room and water storage tanks	Generator plant room Grease arrestor Mechanical plant rooms Pump rooms Telecommunications room
Ground Floor	Café with associated kitchen space Forecourt (external) Loading dock Lobby	Gas storage Medical-related uses / laboratories / offices WC / amenities

Level	Proposed Uses	
Levels 1 – 7	Garden terrace Inpatient rooms (Level 5) Link bridge to GCPH (Level 1)	Medical-related uses / laboratories / offices Plant rooms / services cupboards / risers WC / amenities
Plant 1 – 2	Event area / Garden terrace	Plant rooms / services cupboards / risers

3.3 Existing Acoustic Conditions

3.3.1 Attended Noise Measurements – Road Traffic Noise

Attended noise measurements were conducted near the project site between 3 PM and 6 PM on Monday 25th October 2021. The purpose of conducting the attended noise measurements was to quantify noise levels associated with peak traffic vehicle movements along Parklands Drive, as well as noise levels associated with the light rail.

Subsequently, the measured data will be used for the purpose of established performance requirements of the building envelope such that internal noise level targets nominated in this report are achieved. A summary of the measured noise levels has been presented in **Table 4**.

Table 4: Summary of measured noise levels

ID #	Measurement Location	Start Time	Duration	Vehicle Count (Parkland Dr)	Heavy Vehicles	Light Rail Movements	Measured Noise Levels, dB(A)		
							L_{90}	L_{eq}	L_{10}
000	001	15:45	15 mins	158	3.2%	4	53	60	64
001	001	16:05	15 mins	160	3.0%	4	55	61	63
003	002	16:25	15 mins	144	4.2%	4	52	60	63
008	002	16:50	15 mins	133	2.3%	4	55	61	64
010	001	17:10	15 mins	117	1.7%	4	51	61	64

3.3.2 Attended Noise Measurements – Light Rail

Measurements of light rail movements were measured near the intersection of Parklands Drive and Engineering Drive at a distances of ≈ 2 m from the track. The intent of the measurements was to ascertain the maximum noise levels associated with the light rail.

The arithmetically averaged maximum noise levels from seven (7) light rail movements was L_{max} 81 dB(A) (± 4 dB). It is noted that the measurements were conducted for informative purposes only.

3.3.3 Noise Logging (Unattended Noise Measurements) Methodology

To quantify the existing noise environment near the project site and specify environmental noise limits, unattended noise monitoring (noise logging) was conducted from Tuesday 26th October 2021 to Thursday 28th October 2021. The indicative location of noise monitoring position has been shown in **Figure 1**.

Noise measurements were conducted following guidance from Australian Standard AS 1055:2018 – *Acoustics – Description and measurement of environmental noise*, and the instruments were configured as follows:

- A-weighting frequency response;
- FAST time response; and
- 15-minute intervals.

The sound level meter was calibrated before and after the measurement period. The instrument showed a drift less than ±1 dB during the course of monitoring; therefore, measurements are considered valid according to AS 1055:2018. A

summary of the averaged unattended noise levels recorded at the measurement location from Tuesday 26th October 2021 to Thursday 28th October 2021 has been presented in **Table 5**. For further details and full measured results, refer to **Appendix B**.

Table 5: Summary of relevant noise descriptors used to determine noise limits and inform acoustic assessment

Rating Background Level, RBL dB(A)			Background Noise Level, $L_{90,T}$ dB(A)			Equivalent Continuous Noise Level, L_{eq} dB(A)			$L_{10,18hr}$ dB(A)
Day [1)]	**Evening [1)]**	**Night [1)]**	**Day**	**Evening**	**Night**	**Day**	**Evening**	**Night**	
53	50	49	54	51	50	61	60	57	62

NOTES:

1) Day – 7 AM - 6 PM | Evening – 6 PM - 10 PM | Night – 10 PM - 7 AM

4. Acoustic Criteria

4.1 Environmental Noise Emissions

4.1.1 EDQ – Parklands Priority Development Area Development Scheme

As noted in **Section 3.1.2**, the project site is situated within Parklands Priority Development Area (Parklands PDA). The *Parklands Priority Development Area Development Scheme* (Parklands PDA Scheme, prepared by Economic Development Queensland, December 2013) was reviewed to determine any specific acoustic requirements for new developments.

Whilst no specific acoustic-related criteria (i.e., environmental noise limits) are outlined, the following is noted by the Parklands PDA Scheme:

> **3.3 PDA-wide criteria**
>
> *3.3.1 Urban design and sustainability*
>
> *The form, type and arrangement of buildings, streets and public spaces achieves good urban design and sustainability outcomes and:*
>
> - *…*
> - *ensures adequate visual and noise amenity.*
>
> **3.3.5 Community safety and development constraints**
>
> *Development will:*
>
> - *…*
> - *manage and minimise noise from transport corridors.*

Whilst no specific environmental noise limits are nominated by the abovementioned provisions, acoustic-related criteria contained within State-based legislation will be referenced and applied.

4.1.2 Queensland Government – Environmental Protection Act 1994

The objective of the Queensland Government Environmental Protection Act 1994 (EPA 1994) is *"to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends."*

To uphold this intent, and of relevance to acoustic assessment for the project, the EPA 1994 defines a series of noise-related standards in Chapter 8, Part 3B Offences relating to noise standards. The following sections are considered applicable:

Section 440R Building work

(1) A person must not carry out building work in a way that makes an audible noise—
(a) on a business day or Saturday, before 6.30a.m. or after 6.30p.m; or
(b) on any other day, at any time.
(2) The reference in subsection (1) to a person carrying out building work—
(a) includes a person carrying out building work under an owner-builder permit; and
(b) otherwise does not include a person carrying out building work at premises used by the person only for residential purposes.

Section 440T Pumps

(1) This section applies to premises at or for which there is a pump.
(2) An occupier of the premises must not use, or permit the use of, the pump on any day—
(a) before 7a.m, if it makes an audible noise; or

(b) from 7a.m. to 7p.m, if it makes a noise of more than 5dB(A) above the background level [1]; or
(c) from 7p.m. to 10p.m, if it makes a noise of more than 3dB(A) above the background level; or
(d) after 10p.m, if it makes an audible noise.

(3) Subsection (2) (a), (c) and (d) do not apply to a noise made at an educational institution, that is not more than 5dB(A) above the background level.

(4) In this section—

***pump** —*

(a) means an electrical, mechanical or pneumatic pump; and

Examples — liquid pump, air pump, heat pump

(b) includes a swimming pool pump and a spa blower.

Section 440U Air-conditioning equipment

(1) This section applies to premises at or for which there is air-conditioning equipment.

(2) An occupier of the premises must not use, or permit the use of, the equipment on any day:

(a) before 7am, if it makes a noise of more than 3dB(A) above the background level; or
(b) from 7am to 10pm, if it makes a noise of more than 5dB(A) above the background level; or
(c) after 10pm, if it makes a noise of more than 3dB(A) above the background level.

4.1.3 Queensland Government – Environmental Protection (Noise) Policy 2019

The Queensland Government Environmental Protection (Noise) Policy 2019 (EPP 2019) identifies environmental values to be enhanced or protected, states acoustic quality objectives, and provides a framework for making decisions about the acoustic environment.

Schedule 1 Acoustic Quality Objectives

The acoustic quality objectives are stated in Schedule 1 of the *Queensland Environmental Protection (Noise) Policy 2019.* In accordance with EPP 2019, the acoustic quality objectives are stated for a defined type of noise sensitive use and specified period of the day (reproduced in **Table 6**). The environmental values which EPP 2019 aims to enhance or protect are also stated. It is intended that the acoustic quality objectives be progressively achieved as part of achieving the purpose of EPP 2019 over the long term.

Table 6: Acoustic quality objectives as defined in Schedule 1 of the EPP 2019

Sensitive Receptor	Time of Day	Acoustic Quality Objectives [1)] (measured at the receptor) dB(A)			Environmental Value
		$L_{Aeq,adj,1hr}$	$L_{A10,adj,1hr}$	$L_{A1,adj,1hr}$	
residence (for outdoors)	daytime and evening	50	55	65	health and wellbeing
residence (for indoors)	daytime and evening	35	40	45	health and wellbeing
	night-time	30	35	40	health and wellbeing, in relation to the ability to sleep
childcare centre or kindergarten (for indoors)	when open for business, other than when the children usually sleep	35	—	—	health and wellbeing
hospital, surgery or other medical institution (for indoors)	visiting hours	35	—	—	health and wellbeing
hospital, surgery or other medical institution (for indoors)	anytime, other than visiting hours	30	—	—	health and wellbeing, in relation to the ability to sleep
commercial and retail activity (for indoors)	when the activity is open for business	45	—	—	health and wellbeing, in relation to the ability to converse

[1] *NOTE: According to the EPA 1994:*

- *Background level means the background A-weighted sound pressure level under the prescribed standard measured as $L_{A90,T}$.*
- *$L_{A90,T}$ means the A-weighted sound pressure level obtained using time weighting 'F' that is exceeded for 90% of the measuring period (T).*

Sensitive Receptor	Time of Day	Acoustic Quality Objectives [1] (measured at the receptor) dB(A)			Environmental Value
		$L_{Aeq,adj,1hr}$	$L_{A10,adj,1hr}$	$L_{A1,adj,1hr}$	
park or garden that is open to the public (whether or not on payment of an amount) for use other than for sport or organised entertainment	anytime	the level of noise that preserves the amenity of the existing park or garden			community amenity

NOTES:

1) *The $L_{Aeq,Adj,T}$ noise limits apply to all noise sources, whilst the $L_{A10,Adj,1hr}$ and $L_{A1,Adj,1hr}$ only apply to intermittent noise sources (i.e., excludes air conditioning).*

4.2 Internal Acoustic Performance

4.2.1 Overview

In the absence of a Project Brief or any other specific acoustic objectives nominated by the client, guidance for establishing internal acoustic performance criteria has been sought from current design guidelines prepared by the Association of Australasian Acoustical Consultants, as well as current and relevant Australian Standards.

The following documents were reviewed with a summary of the relevant performance objectives detailed in Guideline for Healthcare Facilities (AAAC Guideline, v2.0, July 2017).

In addition to the above, it is understood the project will target 6-star Green Star accreditation.

NOTE:

- The AAAC Guideline outlined above serve as reference tools only. Thus, some disparity between acoustic performance recommendations specified may occur which are based on Stantec's expert judgement and understanding of the project.

4.2.2 Acoustic Separation

AAAC Guideline

Acoustic separation between rooms is a term referring to the amount by which sound generated in one room is reduced by the intervening building structure as it passes to an adjacent room (horizontally and vertically). This may exist as both airborne (e.g., voice, music, loudspeakers / PA systems, equipment etc.) or impact (e.g., footfall, hammering etc.) forms.

There are several factors to consider when assessing the requirements for acoustic separation between two adjoining spaces. These include:

- Noise associated with typical activities of the occupant/s within a source room.
  NOTE: Occupant generated noise depends on the number of people involved in the activity and is typically loud in a 'live' environment and typically quiet in an absorptive or subdued environment.
- The background noise level and reverberation time within the room receiving the noise.
- The importance of the level of speech privacy for the occupant/s of either space and/or the sensitivity of occupant activities of both rooms to distraction and nuisance due to noise from other areas.

For Healthcare Facilities, AAAC Guideline nominate in-situ airborne sound isolation performance values (i.e., weighted level difference – D_w) for partition elements dividing internal uses. The performance ratings established are generally derived based on typical noise levels expected in one room, and the degree of tolerance to noise within the adjacent space (i.e., receiving room). A summary of the recommended acoustic separation performance requirements outlined by Table 5 of AAAC Guideline for Healthcare Facilities for relevant uses [2] is reproduced in **Table 7**.

[2] *Refer to AAAC Guideline for Healthcare Facilities for any spaces not included in the table.*

Table 7: Acoustic separation performance recommendations outlined by AAAC Guideline for Healthcare Facilities

Usage	Indicative Acoustic Separation	
	Adjacent [1)]	**Corridor** [2)]
Consulting, examination, interview, counselling (also recommended for imaging uses)	D_w 40	D_w 25
Laboratories	D_w 40	D_w 25
Boardroom / conference rooms	D_w 45	D_w 25
Private offices	D_w 35	D_w 20
Executive offices	D_w 40	D_w 25
Amenities	D_w 40	D_w 15
Circulation / corridors	—	—

NOTES:

1) *Minimum values to nearby noise-sensitive enclosed rooms where no common door exists – where interconnecting doors are proposed, these criteria are very difficult to achieve without effective spatial planning. Discontinuous walls as defined by the National Construction Code are recommended for impact or wall attached noise sources.*
2) *To circulation corridor, where the intermediate partition is a solid wall with an operable door or air lock. Subtract 5 dB for listening areas with a visual connection (easily visible to the occupants of the space). Note that walls without a door onto a corridor would fall into the "Adjacent" category.*

Green Star Buildings Submission Guidelines v1 – Credit 12 Acoustic Comfort – Acoustic Separation

The following *acoustic separation* criteria is nominated under Credit 12 Acoustic Comfort of the Green Building Council of Australia (GBCA) Green Star Buildings Submission Guidelines v1 [3]:

The project must address noise transmission between enclosed spaces within the nominated area. There are two ways to demonstrate compliance:

- *Privacy; or*
- *Sound insulation.*

Privacy

Residential criteria omitted.

For all other spaces:

The sound insulation between internal spaces complies with: $D_w + L_{AeqT} > X$.

Where:

D_w = Weighted sound level difference measured between two spaces;

L_{AeqT} = Indoor ambient noise level in the space adjacent to the enclosed space.

X = 75 except for:

- *X = 60 for any partition with a door,*
- *X = 80 for walls/partitions separating areas with elevated privacy requirements (e.g., meeting rooms, classrooms, wards, etc.)*

Sound Insulation

[3] *It is noted that the acoustic performance requirements outlined by Green Star Design and As Built v1.3 Submission Guidelines are generally similar to those outlined by Green Star Buildings Submission Guidelines v1; however, excludes various criterion covered in the most recent version.*

The partition between the spaces should be constructed to achieve a weighted sound reduction index (dB R_w) of:

- *At least 45; for all partitions separating enclosed spaces which are:*
    - *Fixed without a door; and/or*
    - *Glazed partitions without a door**
- *At least 40, for all partitions fronting a room (from an open plan area);*
- *At least 35 (in composite with door and partition) for all partition types that contain a door; and*
- *At least 50 through floors between occupied spaces*

** The Acoustic Consultant can use their discretion to determine whether an R_w of 35 or 45 is more applicable when using glazed partitions. The selected Weighted Sound Reduction index must be justified in terms of adjoining space use, required levels of noise sensitivity between spaces and any other aspects which would help to achieve acoustic separation.*

Impact Noise Transfer

Impact noise transfer measured in accordance with ISO 16283-2 through a floor where:

- *Floors are located above nominated areas; or*
- *Adjacent spaces belonging to different tenancies which share a floor must not exceed dB $L_{nT,w}$:*
    - *55 for floors above residential accommodation spaces*
    - *60 for all other spaces*

4.2.3 Internal Noise Levels

AS 2107 and AAAC Guideline

The internal noise level criteria detailed in this section are based on the recommendations provided in the Australian / New Zealand Standard AS/NZS 2107:2016 '*Acoustics – Recommended design sound levels and reverberation times for building interiors*' (AS 2107), with additional recommendations provided in the AAAC Guideline.

Both AS 2107 and the AAAC Guideline provide recommendations for suitable internal noise levels (defined as the equivalent continuous A-weighted sound pressure level — $L_{Aeq,t}$) which aim to optimise the acoustic amenity in various occupied spaces. The AAAC Guideline also provides transient noise targets caused by intermittent / infrequent sources of short duration.

Internal noise levels are typical contributed to by the following sources:

- External noise intrusion (i.e., road traffic) via the building façade; and
- Noise from building services (internal and external).

The applicable recommended design values for the specific spaces to be contained within project are reproduced from the AAAC Guideline and AS 2107 in **Table 8**. Where the design changes and other spaces are introduced, refer to Table 1 of AS 2107 directly.

Table 8: Recommended internal noise levels (AS 2107 and AAAC Guideline)

Type of occupancy / activity	Design sound level range, $L_{eq,T}$ dB(A) (AS 2107)	Continuous noise target, $L_{eq,T}$ dB(A) (AAAC Guideline)	Transient noise target, L_{maxS} dB(A) [2] (AAAC Guideline)
Consulting, examination, interview, counselling (also recommended for imaging uses)	40 to 45	45	55
Laboratories	40 to 50	45	65
Boardroom / conference rooms	30 to 40	40	—
Private offices	35 to 40	40	—
Executive offices	35 to 40	40	—
Amenities	45 to 55	50	—

Type of occupancy / activity	Design sound level range, $L_{eq,T}$ dB(A) (AS 2107)	Continuous noise target, $L_{eq,T}$ dB(A) (AAAC Guideline)	Transient noise target, L_{maxS} dB(A) [2] (AAAC Guideline)
Circulation / corridors	< 50	50	65

NOTES:

1) *The design must reasonably and practically remove tonality, impulsiveness and modulation from building services noise. Where these characteristics remain, the indoor design sound level in **Table 8** must be lowered by 5 dB.*
2) *The AAAC Guideline states "Appropriate helicopter targets are recommended to be developed on the basis of the Transient Noise Target plus an additional 15 dB margin."*

Green Star Buildings Submission Guidelines v1 – Credit 12 Acoustic Comfort – Internal Noise Levels

The following *internal noise level* criteria nominated under Credit 12 Acoustic Comfort of the GBCA Green Star Buildings Submission Guidelines v1 have been reproduced below:

> *Internal ambient noise levels in the nominated areas must be no less than 5 dB below the lower range value and no greater than the upper range value relevant to the activity type in each space as recommended in AS/NZS 2107.*
>
> ***For buildings with sleeping areas***
>
> *In buildings with sleeping areas (e.g., residential, hotel, hospitals, etc), to achieve the Internal Noise performance requirements of this credit, noise levels must not exceed recommended Sleep Disturbance criteria as defined in the NSW EPA Road Noise Policy 2011:*
>
> - *Up to two noise events per night: maximum internal noise levels below 70 dB L_{Amax}; and*
> - *All other events: maximum internal noise levels below 55 dB L_{Amax}.*

4.2.4 Reverberation Time

AS 2107 and AAAC Guideline

Reverberation time can be described as the persistence of sound within a space, which will naturally decay with time. It is determined by the room volume and extent and sound absorptive performance of all surface finishes. Reverberation is most apparent once the source signal (i.e., speech, instrument, loudspeaker) has ceased emitting and can affect general noise build-up, speech intelligibility, and the like, when insufficiently controlled.

The applicable recommended design values for the specific spaces to be contained within project are reproduced from the AAAC Guideline and AS 2107 in **Table 8**. Where the design changes and other spaces are introduced, refer to Table 1 of AS 2107 directly.

Table 9: Recommended reverberation times (AS 2107 and AAAC Guideline)

Type of occupancy / activity	Design reverberation time, *T* s (AS 2107)	Minimum entire ceiling AS ISO 11654 Sound Absorption Class performance or area equivalent, unfurnished (AAAC Guideline) [1]
Consulting, examination, interview, counselling (also recommended for imaging uses)	0.4 to 0.6	B
Laboratories	0.4 to 0.7	B
Boardroom / conference rooms	0.6 to 0.8	B
Private offices	0.4 to 0.6	B
Executive offices	0.4 to 0.6	B
Amenities	—	—
Circulation / corridors	See Note 2	C

Type of occupancy / activity	Design reverberation time, *T* s (AS 2107)	Minimum entire ceiling AS ISO 11654 Sound Absorption Class performance or area equivalent, unfurnished (AAAC Guideline) [1)]

NOTES:

1) *Refer to **Figure 4** for details regarding sound absorption class ratings as per Table and Figure B.1 of Annex B in AS ISO 11654.*
2) *Reverberation time shall be minimised as far as practicable for noise control.*
3) *The AAAC Guideline states "The appropriate reverberation time shall be influenced by the use, volume and geometry of the space. Guidance from an acoustical engineer should be sought."*

Figure 3: Reverberation time for specific uses based on room volume as per Appendix A of AS 2107

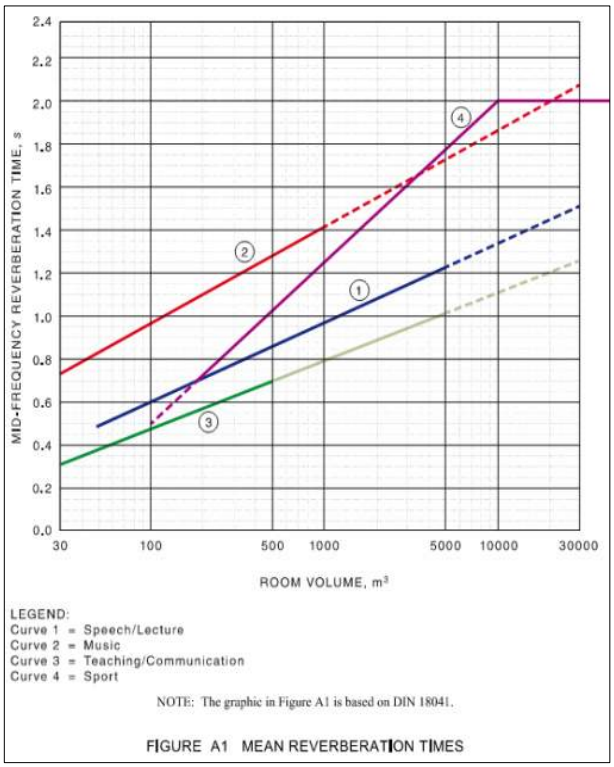
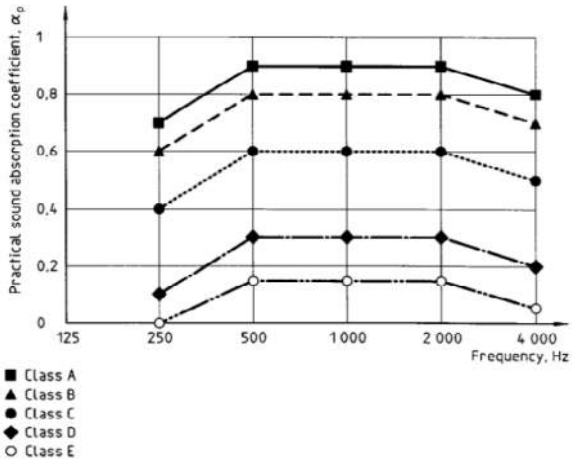


Figure 4: Sound absorption classes as defined by Annex B of AS ISO 11654

Sound absorption class	α_w
A	0,90; 0,95; 1,00
B	0,80; 0,85
C	0,60; 0,65; 0,70; 0,75
D	0,30; 0,35; 0,40; 0,45; 0,50; 0,55
E	0,25; 0,20; 0,15
Not classified	0,10; 0,05; 0,00



Green Star Buildings Submission Guidelines v1 – Credit 12 Acoustic Comfort – Reverberation

The following *reverberation time* criteria nominated under Credit 12 Acoustic Comfort of the GBCA Green Star Buildings Submission Guidelines v1 have been reproduced below:

> *The reverberation time in the nominated area must be not exceed the maximum for the intended use recommended in AS/NZS2107.*

4.2.5 Vibration

Human Exposure to Vibration

Acceptable values of human exposure to vibration are primarily dependent on the activity taking place in the occupied space (e.g., workshop, office, or residence) and the character of vibration (e.g., continuous or intermittent). In addition, specific values are dependent upon social and cultural factors, psychological attitudes, expected interference with privacy, and ultimately the individual's perception. Historically, the concept of base-curves has been used to assess human comfort as defined in *AS2670-1990 Evaluation of human exposure to whole body vibration – Part 2 Continuous and shock induced vibration in buildings (1 – 80 Hz).*

The baseline curves approximately coincide with the threshold of perception and are historically used to specify the maximum allowable vibration levels in critical working areas, such as a hospital operating theatre. Baseline curves for acceleration for vertical (Z-axis) and horizontal (X and Y-axis) directions are shown in **Figure 5**.

Figure 5: Vibration acceleration base curves – AS2670

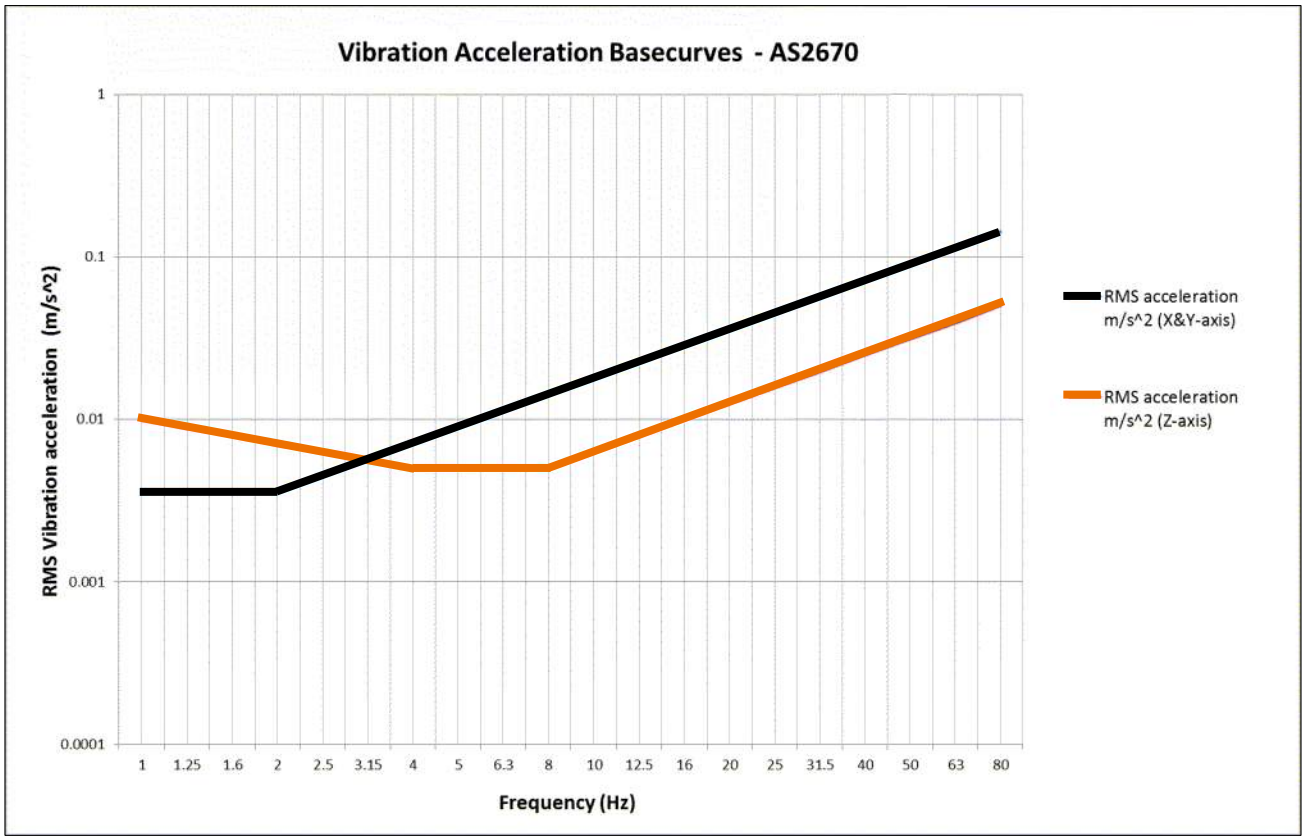


Table 10: Range of multiplying factors used as per AS2670 / BS6472 specifying magnitudes of continuous building vibration with respect to human response

Place	Time	Multiplication Factor – Continuous or intermittent vibration
Critical Working Areas (i.e., hospital operating theatres)	Day / Night	1 (see below notes)
Examination Rooms, Procedure Rooms and Accommodation areas	Day / Night	1.4
Office, Consulting Room	Day / Night	4

Vibration Sensitive Equipment

Notwithstanding the above, all sources of vibration must be controlled to ensure that the function and operation of sensitive medical equipment, is not diminished. The relevant criteria detailed in **Table 11** will be determined when further details are provided.

Table 11: Application and interpretation of then generic vibration criterion (VC) curves (Table 1, Gordon, 1991 4)

Vibration Criterion Curve	Maximum Vibration Level (μm/s, RMS)	Detail Size (μm)	Description of Use
Workshop (ISO)	800	N/A	Distinctly feelable vibration. Appropriate to workshops and non-sensitive areas.
Office (ISO)	400	N/A	Feelable vibration. Appropriate to offices and non-sensitive areas.

[4] Colin G. Gordon "Generic Vibration Criteria for Vibration-Sensitive Equipment" Proceedings of International Society for Optical Engineering (SPIE), Vol. 1619, November 1991.

Vibration Criterion Curve	Maximum Vibration Level (μm/s, RMS)	Detail Size (μm)	Description of Use
Residential Day (ISO)	200	75	Barely feelable vibration. Appropriate to sleep areas in most instances. Probably adequate for computer equipment, probe test equipment and low-power (to 20X) microscopes.
Operating Theatre (ISO)	100	25	Vibration not feelable. Suitable for sensitive sleep areas. Suitable in most instances for microscopes to 100X and for other equipment of low sensitivity.
VC-A	50	8	Adequate in most instances for optical microscopes to 400X, microbalances, optical balances, proximity and projection aligners, etc.
VC-B	25	3	An appropriate standard for optical microscopes to 1000X, inspection and lithography equipment (including steppers) to 3 micron line widths.
VC-C	12.5	1	A good standard for most lithography and inspection equipment to 1 micron detail size.
VC-D	6	0.3	Suitable in most instances for the most demanding equipment including electron microscopes (TEMs and SEMs) and E-Beam systems, operating to the limits of their capability.
VC-E	3	0.1	A difficult criterion to achieve in most instances. Assumed to be adequate for the most demanding of sensitive systems including long path, laser-based, small target systems and other systems requiring extraordinary dynamic stability.

NOTES:

1) *As measured in one-third octave bands of frequency over the frequency range 8 to 100 Hz.*
2) *The detail size refers to the line widths for microelectronics fabrication, the particle (cell) size for medical and pharmaceutical research, etc. The values given take into account the observation that the vibration requirements of many items depend upon the detail size of the process.*

4.2.6 Building Emergency Systems

Emergency smoke and fire systems ventilation systems may have to be designed to comply with the noise requirements specified in Clauses 4.6 and 4.17 of AS NZS 1668.1; therefore, the information below is provided for information.

Specifically, this states that *"The noise level during operation of the smoke control systems (including smoke-spill fans and air pressurization fans) shall not exceed 65 dBA in occupied spaces or 5 dBA above the ambient noise levels to a maximum level of 80 dBA. Noise levels in fire-isolated exits shall not exceed 80 dBA."*

The Building Code of Australia (BCA) also requires that a Building Fire Evacuation system complies with AS 1670.4. There are numerous mandatory requirements associated with this code with the main elements being should the building be fitted with specific alarm system:

- The ambient noise level at the indicator panel shall be not greater than 70 dB(A);
- Warning signals during the 'on' phases shall exceed by a minimum of 10 dB above the ambient sound pressure level averaged over a period of 60 seconds, shall not be less than 65 dB and not more than 105 dB;
- At all places within the zone where ambient noise levels are less than 85 dB(A), the speech transmission index (STI) shall be ≥ 0.50. The rating of speech intelligibility shall be in accordance with the common intelligibility scale (CIS) method of AS 60849, measured in accordance with Appendix A of the Code. The average speech sound pressure level shall not exceed 110 dB(A);
- Visual warning devices shall be installed in areas where the background A-weighted ambient noise level exceeds 95 dB(A); and
- The Warden Intercom Point (WIP) aural call signal shall have a sound pressure level (SPL) of not less than 80 dB(A) when measured at a distance of 1m from the WIP.

4.3 Construction Noise and Vibration Criteria

4.3.1 General

Construction of the Project will likely include earthworks and installation of structures using heavy machinery. These activities have the potential to cause adverse noise impacts onto the surrounding community. This section provides suitable criteria which may be incorporated in the Construction Management Plan.

Assessment criteria has been reproduced in this report from the following documents:

- British Standard 5228-2:2009 *Code of practice for noise and vibration control on construction and open sites - Part 2: Vibration*;
- British Standard BS 7385-2:1993 *Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from groundborne vibration*;
- German Standard DIN 4150-3:1999 *Structural vibration – Effects of vibration on structures*;

All reasonable and practicable control measures should be incorporated to meet the criteria as part of best practice.

Vibration criteria is provided for groundborne vibration, which refers to vibration caused by construction activities such as pile driving and compaction. Limits for airborne vibration are not provided. Whilst the latter may be produced as structural vibration induced by low frequency sound, these effects are rare, and would typically require a generation of acoustic energy at the receptor that is greater than that will be produced by the project.

4.3.2 Regulatory Noise Requirements

Refer to **Section 4.1.1**

4.3.3 Human Perception

Vibration can cause both annoyance to building occupiers and damage to structures. Vibration limits for construction have been extracted from British Standard BS 5228-2:2009, BS 7385-2:1993 and German Standard DIN 4150-3:1999.

Table B.1 of BS 5228-2:2009 provides guidance on effects of vibration levels in relation to human perception and disturbance, measured as Peak Particle Velocity (PPV). The guidance values are reproduced in **Table 12**. According to the standard, *"for construction it is considered more appropriate to provide guidance in terms of the PPV, since this parameter is likely to be more routinely measured based upon the more usual concern over potential building damage".*

Table 12: BS 5228-2 2009 Guidance on effects of vibration effects

PPV Vibration level, mm/s	Effect
0.14	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3	Vibration might be just perceptible in residential environments.
1.0	it is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

4.3.4 Building Damage

Table 1 of BS 7385-2:1993 provides guide values for transient vibration relating to cosmetic damage. The guide values are reproduced in **Table 13**. According to the standard, "minor damage is possible at vibration magnitudes which are greater than twice those given in Table 1 (of BS 7385-2:1993), and major damage to a building structure may occur at values greater than four times the tabulated values."

Table 13: BS 7385-2:1993 transient vibration guide values for cosmetic damage

Line (see Figure 6)	Type of Building	Peak component particle velocity in frequency range of predominant pulse	
		4 Hz to 15 Hz	**15 Hz and above**
1	Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
2	Unreinforced or light structures Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

NOTES:

1) Values referred to are at the base of the building on the side facing the source of vibration.

2) For line 2, at frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) should not be exceeded.

Figure 6: Transient vibration guide values for cosmetic damage

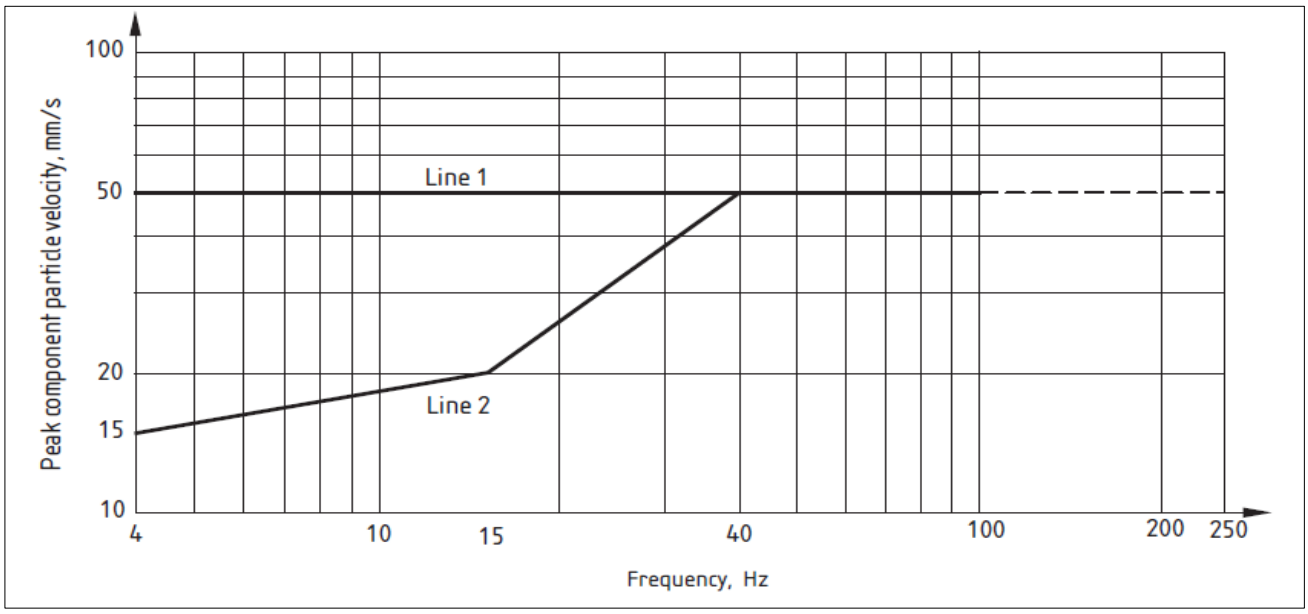


Table 1 of DIN 4150-3:1999 provides guidance values for vibration velocity at the foundation and in the plane of the highest floor of various types of buildings. The values are reproduced in **Table 14**. According to the standard, “experience has shown that if these values are complied with, damage that reduces the serviceability of the building will not occur”.

Table 14: BS 7385-2:1993 transient vibration guide values for cosmetic damage

Type of Structure	Guideline values for velocity, in mm/s			
	Vibration at the foundation at a frequency of			**Vibration at horizontal plane of highest floor**
	1 Hz to 10 Hz	**10 Hz to 50 Hz**	**50 Hz to 100 Hz**	**All frequencies**
Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
Dwellings and buildings of similar design or use	5	5 to 15	5 to 20	15
Structures that because of their particular sensitivity to vibration, do not correspond to those listed in groups 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order)	3	3 to 8	8 to 10	8

Type of Structure	Guideline values for velocity, in mm/s			
	Vibration at the foundation at a frequency of			**Vibration at horizontal plane of highest floor**
	1 Hz to 10 Hz	**10 Hz to 50 Hz**	**50 Hz to 100 Hz**	**All frequencies**
NOTES: *1) At frequencies above 100 Hz, the values given in this column may be used as minimum values*				

In addition to the values presented in **Table 14**, DIN 4150-3:1999 states that where short-term vibration causes floors to vibrate, if vz is no greater than 20 mm/s when measured at the point of maximum velocity (which is usually at the centre of the floor), a reduction in the serviceability of the floor is not to be expected. In the case of buildings as in row 3 of **Table 14**, it may be necessary to lower this value to prevent minor damage.

5. Noise Impact Assessment

5.1 Assessment Overview

Noise emissions from the proposed development are required to comply with all relevant environmental noise limits established in **Section 4.1**. Based on the current level of documentation, the following noise sources assessable for this stage of the project have been identified;

- Rooftop plant and general inlet, discharge and breakout points;
- Rooftop event space / garden terrace; and
- Loading dock, carparking and vehicle access areas.

Due to the current stage of the project, detailed information regarding those noise sources identified above are not typically available. Therefore, general assumptions have been made (as stated) to determine the feasibility of the project from an acoustic standpoint and potential acoustic treatments / noise mitigation strategies to be further investigated during the design stages.

5.2 Building Services (Environmental Noise Emissions)

5.2.1 Proposed Layout

The reviewed architectural drawings indicate most major building services plant will be located on Level Plant 1 of the proposed development. The following building services have been identified and indicated in **Figure 7**:

- Air Handing Units
- Chillers
- Compressor Room
- Cooling Towers
- Heating Hot Water Room
- Hot Water Plant
- Lab Exhaust Fans and Discharge Flues (Level Plant 2)
- Lift Shaft Pressurisation Fans (Level Plant 2)
- Outside Air Preconditioning Units
- Smoke Exhaust System
- Stair Pressurisation Fans (Level Plant 1 & 2)
- Standby Power Generator
- Suction Room
- Toilet Exhaust Fans (Level Plant 2)
- Various Services Risers Discharge

Figure 7: Level Plant 1 layout

Source: 20-0579-AB1312_G prepared by dwp (31/05/2022) | Modified and annotated by Stantec

5.2.2 Mechanical Plant – Roof-mounted Plant

Noise emissions from this area, along with any other mechanical services plant proposed during future stages of the design, are required to comply with the environmental noise limits outlined in **Section 4.1**.

At the current stage, mechanical services plant selections have not been proposed and, therefore, detailed calculations of proposed selections could not be conducted. In lieu of this, a calculation was conducted based on first principle acoustic formulae to estimate the maximum sound power level (L_w) for combined plant which is expected to comply with the applicable noise limits at the closest sensitive receptors.

The following inputs and assumptions were considered:

1. Noise attenuation factors such as sound source directivity, building shielding effects, noise barriers and other noise controls are not applied (conservative);
2. The nearest existing noise sensitive receiver to the proposed development is the GCPH and is ≈ 60 m from the midpoint of the rooftop plant space.
3. The most stringent noise limit applicable at GCPH is set by EPP 2019, which nominates $L_{eq,adj,1hr}$ 30 dB(A) for hospital, surgery or other medical institution (for indoors) during non-visiting hours (i.e., 5 PM – 7 AM). It is conservatively assumed the existing façade of the GCPH facility provides and outdoor / indoor reduction of ≈ 15 dB to enclosed spaces.

Based on the assessment inputs and assumptions defined above, noise levels of all rooftop plant shall not exceed a combined sound power level of L_w 89 dB(A) to comply with assigned environmental noise limits during night-time periods. Refer to additional comments / notes provided in **Section 5.2.4**.

VIBRATION ISOLATION – DETAILS TO BE CONFIRMED

5.2.3 Emergency Power Generators

A standby power generator is proposed for location towards the south-east aspect of Level Plant 1 (refer to **Figure 7**), which is ≈ 30 m from the boundary of the nearest existing noise sensitive development (i.e., GCPH).

As it is likely that the generator will primarily operate during testing regimes within daytime hours (i.e., 7 AM – 6 PM) and only operate during night-time periods (i.e., 10 PM – 7 AM) in emergency situations (i.e., power-loss following bushfire / storm / flood etc.), Stantec considers that a reasonable environmental noise impact outcome is to assess all hours against the daytime noise limit of L_{eq} 59 dB(A) (i.e., daytime measured background noise level L_{Aeq} 54 dB(A) + 5 dB) at the boundary of the nearest noise sensitive receptor.

Should the approach above be considered is reasonable, the maximum permissible sound power level of the unit/s should not exceed L_w 96 dB(A). Refer to additional comments / notes provided in **Section 5.2.4**.

VIBRATION ISOLATION – DETAILS TO BE CONFIRMED

5.2.4 General Comments and Recommendations

It is noted that the above results are preliminary only, where the only purpose is to assess the viability of the project from a noise emissions perspective. Further assessment shall be conducted as finalised equipment selections and locations are detailed by the relevant design disciplines.

Instead, noise emissions from the relevant items described in the above sections shall be further assessed during subsequent design stages of the project, when specific details regarding the source type (e.g., operative periods, sound power levels, designated location, etc.) are developed. Necessary details and information for thorough completion of the noise impact assessment shall be requested from and coordinated with the design team. The requirements (if any) and the extent of noise control measures should be evaluated and specified during such stages to ensure the noise limits defined in this report are met.

It is generally advised that solid noise barriers are provided to all plant spaces along north and west aspects to aid noise mitigation to potential noise sensitive receptors in the future (e.g., adjacent lot to the north). Further, costing provisions shall be made for the following:

- Noise barriers or acoustic louvres;
- Acoustic attenuators;

- Sound absorptive wall linings to internal and external plant spaces;
- In-duct linings; and / or
- Quiet equipment selections or selections with custom silencer / muffler / attenuation options.

5.3 Carpark / Loading Dock (Environmental Noise Emissions)

The current site plan indicates three (3) car park levels proposed for the project and of the following arrangement:

- Basement B1 – B3: ≈ 140 parking spaces with access provided via at ramp from Hill Street at ground level;
- Basement B1: Ambulance Bay (such vehicles are typically exempt from acoustic assessment); and
- Ground Floor: Loading / Unloading Bay.

It is anticipated that noise emissions from these areas will generally occur during daytime hours (i.e., between 7 am – 6 pm) and on weekdays (i.e., Monday to Saturday). Since the nearest noise sensitive receive to the proposed development is the existing GCPH, noise emissions from the vehicle movements (excl. emergency vehicles) shall comply with the acoustic requirements outlined by EPP 2019 (i.e., $L_{eq,adj,1hr}$ 35 dB(A) for hospital, surgery or other medical institution – indoors, visiting hours (i.e., 7 AM – 5 PM)).

Further, for park or garden areas open to the public (i.e., piazza / collaborative green located at the lot towards the north of the project site), EPP 2019 infers that noise emissions from the proposed development are to a level that preserves the amenity of the existing park or garden (i.e., $L_{eq,day}$ 61 dB(A)).

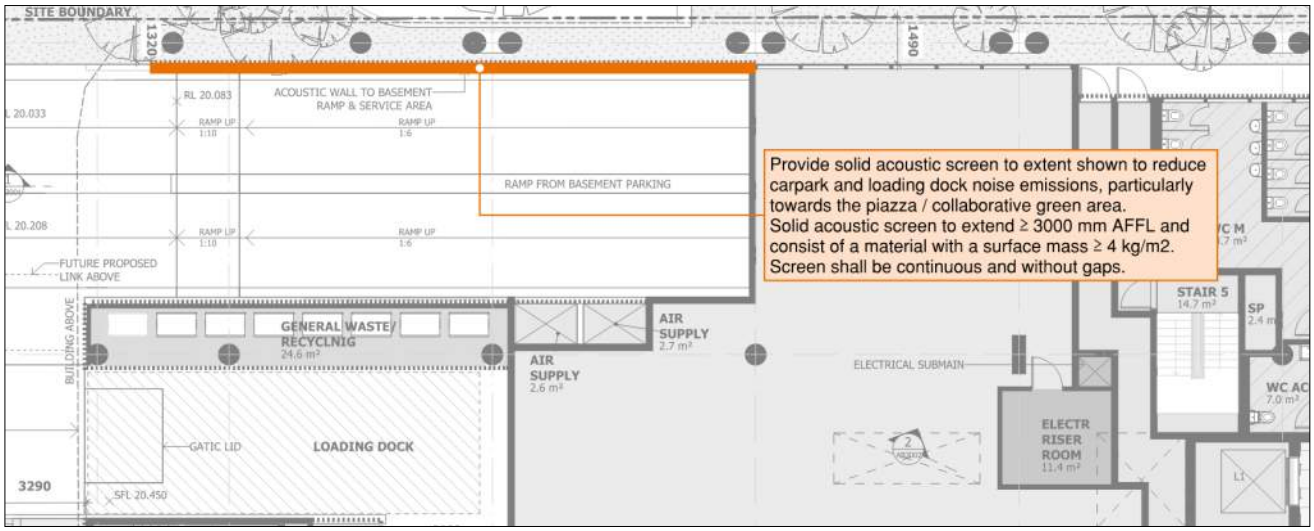
The following inputs and assumptions were considered:

- Passenger vehicles:
    - noise level of L_w 85 dB(A);
    - nominal vehicle speed of 5 km/h;
    - 2 vehicle movement in or out per 1 minute (i.e., 120 total movements / hr); and
    - vehicle door slams have been excluded from assessment as it is expected that sound propagation paths will be generally disrupted by solid perimeter walls assumed for each car parking level.
- Medium rigid vehicles:
    - noise level of L_w 96 dB(A);
    - nominal vehicle speed of 2 km/h;
    - 2 vehicle movements in or out per 1 hour; and
    - vehicle will not be permitted to idle for longer than 1 minute.
- It is conservatively assumed the existing façade of the GCPH facility provides and outdoor / indoor reduction of ≈ 15 dB to enclosed spaces.

Based on the above assessment inputs and assumptions, noise emissions from carpark and loading dock activities are generally expected to comply with the EPP 2019 internal noise assigned noise limits at adjacent internal noise sensitive areas at GCPH during daytime periods without requiring additional noise migration measures.

To mitigate noise impacts to the piazza / collaborative green area located towards the immediate north of the project site, continuous solid screening to the extent shown in **Figure 8** shall be applied. Continuous screening to consist of material with a min. surface mass ≥ 4 kg/m^2 (e.g., standard sheet metal, clear acrylic sheeting such as 4 mm Perspex / Plexiglass, concrete block), and shall extend ≥ 3000 mm AFFL. Further, to reduce reverberant noise build-up caused by primarily hard surface finishes, acoustic soffit liner or other sound absorbing material equivalent to NRC ≥ 0.85 shall be provided to at least 75 % (≈180 m^2) of the available ceiling area.

Figure 8: Recommended extent of acoustic screening for control of noise emissions



Source: 20-0579-AB1304_J prepared by dwp (31/05/2022) | Modified and annotated by Stantec

5.4 Rooftop Event Space / Garden Terrace

Infrequent use of the rooftop event space / garden terrace is expected and unlikely to incur significant activities generating continuous noise.

Further, based on the current architectural layouts, this space is well shielded from noise sensitive receptors located to the west and unlikely to significantly contribute to noise levels at the nearest noise sensitive receptors. Hence, no further assessment has been conducted.

6. Acoustic Design Recommendations (DD)

6.1 External Noise Impacts / Building Envelope Performance

6.1.1 Road Traffic Noise

The project site will be exposed to road traffic noise primarily generated by Parklands Drive which serves as a connection road between Smith Street Motorway and Olsen Avenue, as well as key destinations within the precinct, including:

- Griffith University (Gold Coast Campus);
- Gold Coast Private Hospital (GCPH);
- Gold Coast University Hospital (GCUH);
- Multiple residential apartments; and
- Small commercial establishments.

Based on the acoustic data obtained through noise logging and attended noise measurements conducted near the project site, a façade noise level of **L_{eq} 62 dB(A)** is estimated (includes a standard façade correction of +2.5 dB).

6.1.2 Light Rail Noise

It is likely that the proposed development will be exposed to some degree of noise associated with the G:Link Light Rail; however, based on the averaged maximum noise levels measured of Light Rail movements (i.e., L_{max} 81 dB(A) @ 2m, see **Section 3.3.2**), noise levels calculated to the façade of the proposed development are expected to be **L_{max} 47 dB(A)** (includes a standard façade correction of +2.5 dB). The predicted external noise levels are not considered significant.

6.1.3 Helicopter Noise

The build will be affected by noise generated by helicopters accessing the helipad atop the GCUH building. Noise intrusion from these movements has the potential to be disruptive; however, helicopters typically operate infrequently, often only in the event of emergency making noise emissions onsite relatively short in duration. As such, noise from helicopters will likely be a tolerated noise event by staff and patients.

The maximum measured noise levels (L_{max}) indicated in **Appendix B** were compared against the historical helicopter flight data for GCUH helipad. The average measured maximum noise level resulting from helicopter overflights was found to be **L_{max} 91 dB(A)**.

6.1.4 Building Envelope Performance

A noise intrusion assessment was conducted based on the worst-case façade noise levels estimates outlined in preceding sub-sections and compared against the internal noise level criteria nominated in **Section 4.2.3**. Internal noise level estimates have followed the calculation method from EN 12354-3:2000, for a typical room and window dimensions (curtain wall) based on the current architectural drawing set.

Based on the above, the façade system (including glass and framework) shall achieve an airborne sound isolation rating equivalent to **$R_w + C_{tr} \geq 30$** to achieve compliance with average continuous internal noise level and transient noise level targets identified.

Example glazing arrangements which satisfy the performance ratings specified above include:

- 8.38 mm laminated glass; or
- DGU – 6 mm standard glass + 12 mm airgap + 8 mm standard glass.

Alternative and preferred arrangements matching the nominated performance ratings are approved; however, shall be submitted to the acoustic engineer for review.

6.2 Internal Noise Levels – Mechanical Services

Continuous internal noise levels within an enclosed space typically consist of noise intrusion via the façade and from mechanical ventilation services.

Mechanical services shall be adequately designed such that resultant internal noise levels achieve compliance with the internal noise level targets identified in **Section 4.2.3**.

Acoustic assessment of proposed mechanical ventilation treatments to be conducted pending proposed equipment selections and layouts to be coordinated with the mechanical engineer. As a general recommendation and where practical to implement, in-ceiling fan-coil units should be strategically placed over non-sensitive rooms (e.g., storerooms, corridors or the like) to better enable the relevant criteria to be met. In addition, any condenser plant located outside the façade shall be placed away from windows of occupied spaces and trafficable areas. Costing provisions for acoustic attenuators, in-duct and in-ceiling treatments shall be made.

Where internal noise levels are expected to fall below internal design targets, it is recommended to implement sound conditioning systems to raise ambient noise levels. Design advice will be provided upon review of mechanical services layouts.

6.3 Acoustic Separation

6.3.1 Internal Partitions

This section shall be read in conjunction with the following appendices attached to the end of this report:

- **Appendix C**: Recommended sound isolation performance between internal spaces; and
- **Appendix D**: Recommended construction details of acoustic-rated partitions.

It is to be noted that alternative construction configurations of acoustic-rated partitions exist and are suitable provided these are proven to achieve the acoustic separation performance ratings specified in this report. Any alternatives to the recommendations provided in this report shall be submitted to the acoustic engineer for review.

The following general comments apply to acoustic-rated partitions nominated for this project:

- The installation of all framing, insulation and linings should be in accordance with manufacturer recommendations and requirements.
- Once completed, acoustically rated walls are to be clearly labelled above ceiling height to show the words **"Acoustic Wall - Do not penetrate without sealing".**
- All ratings assume that ceilings are formed within the rooms and are not continuous.
- Corridor R_w 35 partitions are required to have plasterboard lining on one side extend full height to prevent flanking around adjacent higher performance partitions.
- All partitions rated at R_w 35 extending to the ceiling must have mineral fibre or set plasterboard ceiling to one side of the partition, as minimum.
- It is highly recommended that all partitions marked to achieve $R_w \geq 40$ extend from the floor slab to the roof/ceiling over.
- All partitions rated at $R_w \geq 40$ require insulation inside the partitions up to ≥ 100 mm above the ceiling line.
- Where partitions with a high acoustic rating intersect with the façade, allowance should be made for the partitions to extend through internal lightweight linings to the solid areas of the façade.
- To achieve the acoustic ratings, all sealing and setting details recommended by the manufacturer are required both above and below the ceilings.
- The sound reduction properties of acoustic-rated partitions must be preserved by sealing flanking sound transmission paths during installation including, but not necessarily limited to, junctions between partitions and other building surfaces, air gaps around door sets, cut-outs for services and the like.
- Strategic placement should be applied wherever possible to avoid the use of double-glazing for acoustic purposes.
- Special consideration needs to be made for partition fixtures separating other areas which potentially have physical impact from benches connected to the wall or plumbing fixtures attached to walls. These partitions may need to be

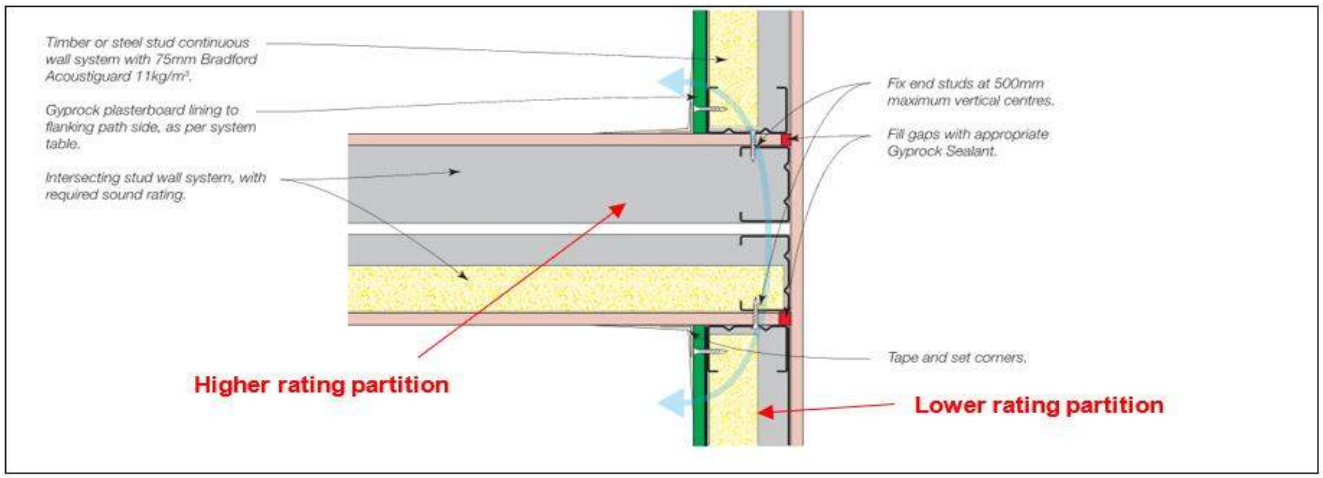
discontinuous partitions (e.g., type staggered or double stud walls) to avoid impact noise transfer generated e.g., by closing doors of kitchen joinery.

- Where isolated construction is specified, staggered studs, twin track construction, or resilient mounts may be used, whilst maintaining the linings specified in the partition details. In addition, and depending on the choice of plasterboard, it might be possible to exclude one layer of sheeting from some systems. This is to be evaluated depending on the preferred lining system on a case-by-case basis.

6.3.2 Wall Junctions

To maintain acoustic privacy provided by the higher rating walls, junctions with lower rating walls must be built such that the higher rating wall penetrates the lower rating partition. In addition, the higher performance partition must seal against the internal side of the outer lining within the lower rated wall. Note that the lower rated wall must have minimum one sheet extending from slab to slab. The above recommendations have been conceptualised in **Figure 9**.

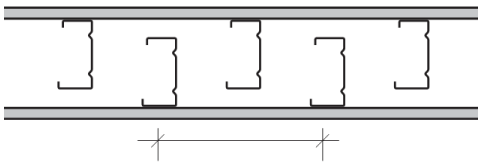
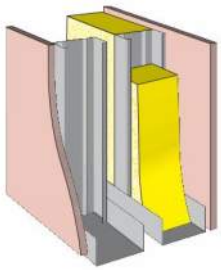
Figure 9: Wall junction concept (CSR Red Book)

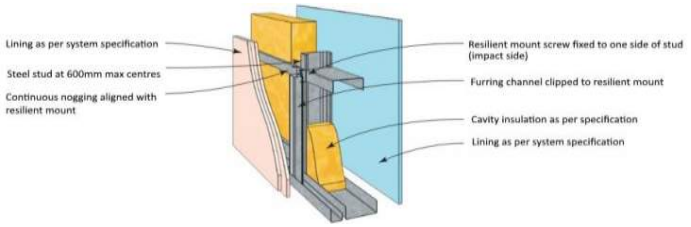


6.3.3 Isolated Partitions

Where isolated construction is specified, staggered studs, twin track construction, or resilient mounts may be used, whilst maintaining the linings specified in the partition details. Depending on the choice of board, a layer of board may be able to be dropped from some systems. This can be evaluated depending on the preferred lining system on a case-by-case basis.

Details are provided as follows:

• **Staggered studs:** These are limited by stud-height. CSR claim partition heights may be limited to about 3 610mm with 0.55 BMT stud, up to 4,690 mm with 1.15 BMT stud, when a 92 mm stud is used at 600 mm centres (refer to pages C27-C32 of the Gyprock – *The Red Book 01*). These may therefore not be preferable.	
• **Twin track construction:** As per image shown right (from Gyprock – *The Red Book 01*). Linings as per the partition details outlined in **Appendix C**.	

• **Resilient mount construction:** As per image shown right (Gyprock – *The Red Book 01)*. Linings as per the partition details outlined in **Appendix C**. It is noted that this option may add construction costs as resilient mounts are costly and are generally not preferred by partition and ceiling contractors.	

6.3.4 Non-full Height Partitions

It is highly recommended that all partitions marked on the plans rated $R_w \geq 45$ extend slab to the roof / slab over. Where full-height partitions are impractical, a plasterboard ceiling must be applied to enclose the space to preserve the required acoustic performance separation. It is noted that, where plasterboard ceilings are provided, additional sound absorptive treatments are required satisfy reverberation time requirements particular to each use.

6.3.5 Fire-rated Walls

Fire-rated walls to plant rooms and to other spaces will require acoustic treatment. Where the partition is fire-rated, the plasterboard linings detailed in this report may be replaced by their fire-rated equivalents until the required fire rating is achieved, noting that the number of linings specified in the details are to be maintained for acoustics, even if the fire-rating requires less layers.

6.3.6 Internal Doors

Acoustic seals will be required to all doors where speech privacy is of importance. For costing purposes, it can be assumed that all doors in partitions marked up in **Appendix C** incorporate acoustic seals.

Recommended door construction details and associated performances have been provided in **Table 15**.

Table 15: Recommended door construction details

Door ID and R_w	Door Construction	Glazing Visor (glazing less than 15% of door area)	Glazed doors (glazing more than 50% of door area)	Acoustic Seals
D1 **$R_w \leq 25$**	Min. 35 mm solid core door; • Hinged • Min. 600 kg/m^3 • Standard aluminium or solid timber frame	Min. 4 mm monolithic	Min. 6 mm monolithic	N/A
D2 **R_w 30**	Min. 40 mm solid core door; • Hinged • Min. 600 kg/m^3 • Standard aluminium or solid timber frame	Min. 6 mm monolithic	Min. 6.38 mm laminated	• THRESHOLD: RP8(Si), RP38(Si), RP99Si, RP126Si, RP127Si, or RP128Si • PERIMETER: RP10(Si), RP47(Si), RP78(Si), RP84(Si), RP93(Si), RP94(Si), or RP120 • ASTRAGAL: 1 x any of the following: RP16(Si), or RP71(Si)
D3 **R_w 32-35**	Min. 44-50 mm solid core door; • Hinged • Min. 600-700 kg/m^3 • Steel, timber or aluminium frame rated to R_w 35	8.38 mm laminated	10.38 mm laminated	• THRESHOLD: Any of the following: RP38(Si), RP70(Si) • PERIMETER: Any of the following: RP24(Si), RP47(Si) • ASTRAGAL: 2 x RP16(Si)

Where practical, sliding and pivot doors should be avoided as these are typically difficult to adequately seal.

Acoustic door seals must be selected to meet numerous other considerations including but not limited to; integration with locking, security and closing hardware, floor finishes, smoke, fire and DDA requirements. With consideration of these elements, door seals should be of an acoustic-rated type and potentially selected from manufacturer's guidebooks:

- Raven
- Door Seals of Australia
- Kilargo Seal

Doors in acoustically rated partitions **must not** have ventilation grilles which will compromise the acoustic performance.

Aluminium extrusions in glazed doors should be packed with insulation.

The key to good acoustical performance of door seals is firm contact with the door leaf and adjustability to allow for surface non-conformances in the door surface and the floor.

An important aspect of a door seal maintaining acoustic performance is the accurate adjustment of the door frame and door latch. To ensure good door sealing the following should be maintained:

- Roller catches on doors should not be used unless in conjunction with a user engaged latching mechanism which can be used to hold the door leaf against seals when required.
- Threshold plates must be used with drop seals where broadloom carpets and carpet tiles with any pile height are used.
- Where glass doors are used in acoustically rated partitions, aluminium frames must be insulation filled.

6.3.7 Internal Glazing

Where internal glazing is required to partitions without doors, it should be selected to meet the acoustic ratings nominated in **Appendix C**.

Strategic placement should be applied wherever possible to avoid the use of double-glazing for acoustic purposes. Glazing constructions are required to be as follows with minimum thicknesses as nominated in **Table 16**. Indicative framing types and in-ceiling construction which aims to preserve the level of performance offered by the respective glazing systems have also been provided.

Table 16: Recommended glazing systems and associated performances

Sound Isolation Performance (R_w)	Glazing Construction	Frame Type	Typical "above ceiling" minimum construction - for standard MFT both sides with services penetrations
R_w 35	10.38 mm laminated glass	Frameless soft-edge mounting or tested proprietary frame system that maintains the R_w 35 rating (e.g. Optima Revolution, Capral Narrowline 400)	—
R_w 40	12.5 mm Viridian Vlam Hush laminated glass (no single glazed substitutions); *OR* Double glazed unit (DGU) consisting of; • 5 mm VFloat glass, 16 mm airgap and 8.5 mm Viridian Vlam Hush laminated glass or other performance tested combination.	Frameless soft-edge mounting or tested proprietary frame system that maintains the R_w 40 rating (e.g. Optima Revolution, Capral Narrowline 425)	13 mm standard PB (min. 8.3 kg/m^2) each side of 64 mm studs (50 mm thick 11 kg/m^3 insulation in cavity)

6.3.8 Services Penetrations

Air conditioning and / or ventilation openings in ceilings must not compromise the sound insulation between rooms and should be treated / modified accordingly.

Construction detailing provided in **Appendix E** applies where services penetrate acoustic-rated partitions to limit noise flanking.

Upon completion, acoustic-rated walls shall be clearly labelled above ceiling height and show the words ***"Acoustic Wall - Do not penetrate without sealing in accordance with specifications"***.

6.3.9 Floors – Airborne and Impact Sound Isolation

According to Green Star Buildings Submission Guidelines v1 – Credit 12 Acoustic Comfort, floors within the proposed development shall be sufficiently designed between tenancies to achieve:

- An airborne sound isolation rating equivalent to R_w 50; and
- An impact sound isolation rating equivalent to $L_{nT,w}$ 60.

Based on the review of current architectural documentation it is expected that the typical floor / ceiling construction between vertically separated tenancies will generally consist of:

- 300 mm concrete;
- Suspended ceiling grid with ≥ 1000 mm cavity; and
- Standard mineral fibre ceiling tile (CAC 35).

The above arrangement satisfies the acoustic performance requirements.

SLAB EDGE / FAÇADE JUNCTION DETAILING

To limit noise flanking between floors at the slab edge and curtain wall, provide

- ≥ 1.2 mm continuous steel smoke flashing; and
- Rockwool insulation (≥ 50 kg/m^3) to cavity width and slab depth.

6.4 Reverberation Control

Internal room acoustic design for any space is particularly dependent on respective reverberation time criterion. **Section 4.2.4** presents these criteria which have been based on the AS 2107.

It is generally assumed that tenancy spaces will facilitate consulting, examination, interview, counselling uses, where the applicable reverberation time target is T_{mf} 0.4 – 0.6 s.

Acoustic performance of ceiling TBC.

6.5 Mechanical Services

6.5.1 General

Air conditioning systems shall be designed to achieve indoor design sounds levels specified in the AS 2107 (see **Table 8**). This may require internally lined ducting, and/or attenuators in selected spaces, pending proposed equipment selections. NOTE: where internal noise levels from building services are likely to fall below the respective targets, sound conditioning systems shall be designed and installed to improve acoustic privacy between adjoining spaces.

6.5.2 Transfer Ducts

Mechanical ventilation transfer ducts from rooms backing onto corridors will require treatment, which may be as follows:

- Through / above any wall containing a door, apply internally insulated cushion head boxes (traditional sheet metal containing internal fibrous installation) connected with ≥ 2 m of acoustic flexible ductwork, or internally lined duct, as shown in mechanical drawings;

- Through any full-height wall up to R_w 50, use an arrangement equivalent or similar to a Fantech CTL or CTU style cross talk attenuator with internal linings. Where practical, it is recommended that openings to transfer ducts face the soffit above.

6.5.3 Transfer Grilles

Transfer grilles should incorporate unlined cushion heads connected with 2 m flexible ducting. The Insertion Loss (IL) performance values sought are as per **Table 17**. Generally, these may be achieved with an internally lined duct with non-perforated internal finish.

Table 17: Insertion Loss performance requirements (per 3 m of duct)

Duct diameter	Insertion Loss, dB						
	125 Hz	**250 Hz**	**500 Hz**	**1 kHz**	**2 kHz**	**4 kHz**	**8 kHz**
150 mm	22	39	37	31	31	34	21
300 mm	34	38	27	30	30	14	9
400 mm	35	34	21	27	27	13	9

6.5.4 FCU Breakout Noise Control

Refer to **Appendix F** for standard construction details to control breakout noise from fan coil units.

7. Conclusion

Stantec Australia Pty Ltd have been engaged by NorthWest Healthcare Australian Property Limited to undertake acoustic assessment and provided design advice for the Gold Coast Health & Knowledge Precinct– Research & Development Centre of Excellence project.

This acoustic report;

- outlines the acoustic services scope of works for the project;
- establishes relevant design criteria in accordance with current Australian Standards, Design Guidelines, Regulations and Policies;
- provides a review of relevant documentation for the proposed development.
- identifies potential acoustic-related issues to be addressed during subsequent design stages; and
- provides preliminary design recommendations and items for consideration by the design team which are specific to this project.

We trust that this report to be sufficient for your current requirements; however, should you have any queries, please do not hesitate to contact the undersigned on (07) 3029 5000.

Regards,

Carl Edser (Author)
Senior Acoustic Engineer for **Stantec**

Michael Lanchester (Reviewer)
Acoustics Section Manager (QLD) for **Stantec**

Appendix A Glossary of Acoustic Terms

TERM	DEFINITION
Adverse Weather	Weather conditions that affect noise (wind and temperature inversions) that occur at a particular site for a significant period of time. The previous conditions are for wind occurring more than 30% of the time in any assessment period in any season and/or for temperature inversions occurring more than 30% of the nights in winter).
Ambient Noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Assessment Location	The position at which noise measurements are undertaken or estimated.
Assessment Period	The period in a day over which assessments are made.
Attenuation	A reduction in the magnitude of sound.
A-weighting	A frequency dependent filter applied to an instrument-measured noise. In its simplest form, the filter is designed to replicate the relative sensitivity to loudness perceived by the human ear.
Background Noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the LA90 noise level.
Barrier	Solid walls or partitions, solid fences, earth mounds, earth berms, buildings, etc. used to reduce noise.
Ctr	A standard weighting curve which replicates low frequency noise, such as that from traffic. Often added to DnT,w or Rw to characterise airborne sound insulation performance.
dB	The abbreviation for decibel.
dB(A)	A-weighted sound level in decibels.
Dw	A single number value that represents a field measurement of the weighted level difference between two adjacent spaces separated by a partition. Dw = L1 – L2 where, L1 is the average sound pressure level in the source room; and L2 is the average sound pressure level in the receiver room.
Echo	Sound which can be distinguished by a listener as being a repetition of a sound previously heard.
Frequency	Frequency is synonymous to pitch. Frequency or pitch can be measured on a scale in units of Hertz (Hz). Most noise sources typically comprise of a vast, and often complex, range of frequencies.
Frequency Response	This is a characteristic of a system which has a measured response resulting from a known applied input. In a mechanical structure, the frequency response function (FRF) is the spectrum of the vibration of a structure divided by the spectrum of the input force to the system. To measure the frequency response of a mechanical system, one must measure the spectra of both the input force to the system and the vibration response.
Hertz	The frequency of vibration and sound is measured in hertz (Hz) and is representative of the number of cycles occurring per second.
Impulsive Noise	Noise having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise.
Intermittent Noise	Level that drops to the background noise level several times during the period of observation.
LA1	The A-weighted sound pressure level exceeded for 1 % of the measurement time period.
LA10	The A-weighted sound pressure level exceeded for 10 % of the measurement time period.
LA90	The A-weighted sound pressure level exceeded for 90 % of the measurement time period. Typically represents the background noise level of an environment.
LAeq	The equivalent continuous sound pressure level in dB(A). It is often accompanied by an additional suffix “T”, which is indicative of the measurement time period. (e.g. LAeq,15min, symbolising the measurement is evaluated over 15-minutes).

TERM	DEFINITION
LAmax	The maximum A-weighted sound pressure level recorded over the measurement period.
Modulation	A process by which a spectral component is modified by another component. In most instances regarding acoustics, this refers to the fluctuation (pulsing) in overall or frequency amplitude.
Noise Reduction Coefficient	A single number rating defining the sound absorption performance of a material based on the measured and averaged sound absorption coefficients from 250 - 2000 Hz.
Peak Particle Velocity	The peak particle velocity (PPV) is the most accepted and used indicator of vibration levels. Most regulations and standards prescribe vibrations thresholds in terms of the PPV. For each recorded waveform, the maximum particle velocity over the total recorded time is regarded as the peak particle velocity. This type of particle velocity must not be confused with the velocity with which the wave propagates through the medium.
Reverberation	The persistence of a sound within a space, which will naturally decay over time. Most apparent once the source signal has ceased emitting. Reverberation may have effects on speech intelligibility if not adequately controlled. Reverberation time, represented in seconds, can vary depending on the volume and surface finishes of the space.
Rw	Weighted sound reduction index. A single number value which represents the airborne sound insulation performance of a partition or building element that has been determined under laboratory testing conditions.
Sound Absorption	The ability of a material to absorb sound energy through its conversion into thermal energy.
Sound Level Meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound Power Level	The total sound energy radiated by a source, expressed in Watts. The sound power level is ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power.
Sound Pressure Level	The measured acoustic wave strength in a given environment and at a particular point of interest where the total sound level expressed is relative to a reference pressure, i.e. the threshold of human hearing. Sound pressure level is typically measured using a standard sound level meter with a microphone, expressed in decibels (dB).
Spectrum	The spectrum is the result of transforming a time domain signal to the frequency domain. Spectrum analysis is the procedure of doing the transformation, and it is most commonly done with an FFT analyser.
Tonal Noise	Containing a prominent frequency and characterised by a definite pitch.

Appendix B Noise Monitoring Details

Unattended noise logging was conducted from Tuesday 26th October 2021 to Thursday 28th October 2021 (inclusive) at the locations shown in **Figure 1** (coordinates in **Table 18**). These locations were selected as representative of the noise environment at and around the project site.

Table 18: Noise monitoring coordinates

Latitude	Longitude
-27.963031	153.384055

The following instrumentation was used:

- An NTi XL2 Class 1 sound level meter (S/N A2A-14215-E0), and Pulsar 105 Class 1 acoustic calibrator (S/N 72913). The instrument had a current calibration certificate by a certified National Association of Testing Authorities (NATA) acoustics laboratory at the time of measurements.

Noise measurements were conducted in accordance with Australian Standard AS 1055.1-1997 – *Acoustics – Description and measurement of environmental noise*, and the instruments were configured as follows:

- A-weighting frequency response;
- FAST time response;
- 15-minute intervals;

The sound level meter was calibrated before and checked at the end of the measurement period. The instrument showed a drift less than ±1 dB during the course of monitoring; therefore, measurements are considered valid according to AS1055.1-1997.

Noise monitoring results

The raw sound level meter files were post-processed to determine relevant long-term noise descriptors, some of which have been used to determine environmental noise limits applicable to the project.

Results and time trace plots of relevant noise descriptors are provided below (see **Table 19** and **Figure 10**). Where data was not measured for a full period (i.e., at the start and end of measurement), the cells are shown dashed in the table. In addition, the noise descriptor averages are presented.

A summary of weather observations by the Bureau of Meteorology (BoM) during the monitoring period is presented in **Table 20**. Where adverse weather (e.g., rain, excessive wind) occurred within the monitoring period, the measured data has been excluded.

Table 19: Summary of measured noise levels (rounded)

Noise descriptor	Average	26/10/21	27/10/21	28/10/21
$L_{A10(18hr),6am-12am}$	62		62	—
$L_{Aeq,7am-6pm}$	61		61	—
$L_{Aeq,6pm-10pm}$	60	60	59	—
$L_{Aeq,10pm-7am}$	57	56	57	—
$RBL_{,7am-6pm}$	53		53	—
$RBL_{,6pm-10pm}$	50	49	50	—
$RBL_{,10pm-7am}$	49	48	49	—
$L_{A90,7am-6pm}$	54		54	—
$L_{A90,6pm-10pm}$	51	51	52	—
$L_{A90,10pm-7am}$	50	49	50	—

Figure 10: Time trace of relevant noise descriptors – Noise Monitor 001

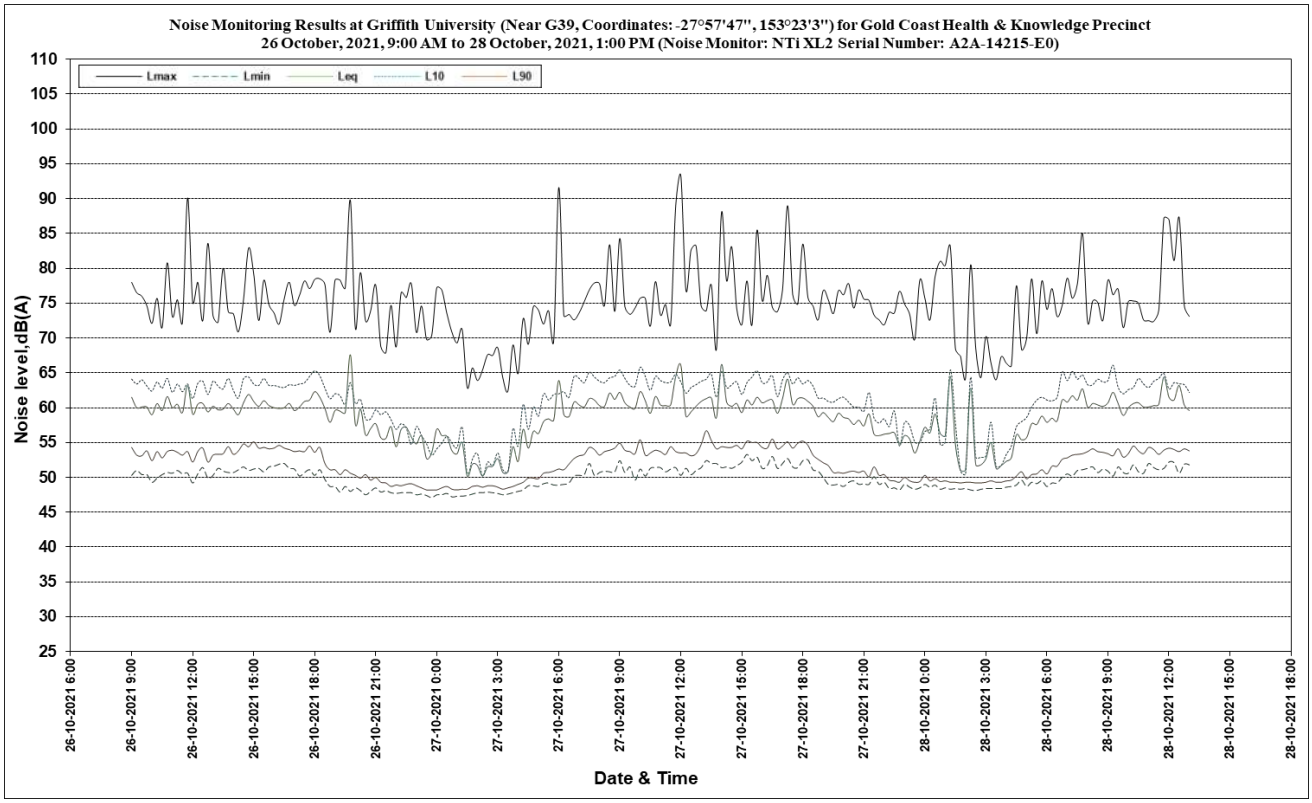


Table 20: Summary of BoM weather observations during unattended monitoring (monitored days highlighted)

Gold Coast, Queensland
October 2021 Daily Weather Observations

Observations from the Gold Coast Seaway, at the northern end of Southport Spit.

Australian Government
Bureau of Meteorology

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am						3pm					
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		km/h	local	°C	%	eighths		km/h	hPa	°C	%	eighths		km/h	hPa
1	Fr	17.1	24.2	19.4			SW	72	18:43	20.0	75		NNW	11	1011.8	23.1	68		NNE	26	1005.3
2	Sa	13.3	27.9	9.0			WNW	41	14:24	20.3	66		NW	11	1007.4	27.5	25		W	20	1002.6
3	Su	13.6	30.7	0.2			NE	39	16:05	23.9	42		NW	7	1007.9	29.9	23		NW	13	1002.8
4	Mo	17.5	27.8	0			NNE	35	13:12	25.1	51		NNW	11	1005.1	24.7	74		NNE	19	1000.6
5	Tu	14.5	26.1	0			NE	28	14:24	23.3	46		SE	9	1011.7	25.5	50		NNE	17	1008.4
6	We	11.4	24.3	0			ESE	33	12:55	23.3	31		SSE	15	1016.6	22.1	61		SE	28	1013.8
7	Th	14.5	25.7	0			NE	35	12:08	21.8	56		NNW	15	1016.5	22.6	62		NNE	22	1013.2
8	Fr	17.4	23.6	0.2			SE	44	11:44	23.0	65		ESE	7	1017.6	22.4	72		SE	28	1016.3
9	Sa	17.9	26.1	0			NNE	31	14:41	23.5	70		ENE	13	1020.0	24.6	65		NNE	20	1016.1
10	Su	19.7	27.2	0.2			NNW	35	07:50	24.4	58		NW	17	1017.4	24.3	64		NNE	24	1011.7
11	Mo	19.7	26.7	0			SE	39	17:35	23.7	57		NNW	17	1011.9	22.9	71		NNE	17	1008.4
12	Tu	16.8	21.0	24.0			SE	48	21:46	18.5	88		SE	9	1011.0	20.0	91		SE	11	1008.4
13	We	17.6	22.3	10.8			ESE	44	01:57	20.7	78		ESE	24	1013.7	18.8	92		ENE	22	1012.2
14	Th	18.6	24.7	37.0			NE	43	01:07	19.4	92		NNE	20	1013.3	23.0	71		NNE	13	1010.5
15	Fr	19.2	28.7	4.4			WNW	43	10:58	23.5	80		NW	17	1008.1	25.9	56		N	20	1004.1
16	Sa	13.2	27.2	0.2			WNW	41	14:31	23.1	29		SW	17	1010.0	26.8	21		W	26	1006.2
17	Su	13.4	24.7	0			E	24	11:04	22.6	35		NE	9	1016.0	23.5	45		E	15	1013.2
18	Mo	16.1	25.2	0			SW	44	16:10	23.5	65		SSE	11	1018.3	21.9	78		ENE	22	1014.2
19	Tu	14.9	23.7	40.2			S	22	23:24	21.6	69		SSE	9	1016.8	22.4	70		E	11	1013.2
20	We	15.5	25.0	0.2			S	43	22:24	22.5	67		SE	13	1016.0	23.9	68		ENE	26	1012.2
21	Th	17.6	24.0	0.2			S	35	00:48	21.8	74		ENE	20	1015.2	22.6	72		ENE	17	1012.5
22	Fr	18.5	26.4	5.8			N	35	13:01	23.5	74		ENE	7	1016.5	24.6	74		NE	19	1013.9
23	Sa	21.3	29.8	2.0			NNE	35	13:42	26.0	65		NW	17	1017.0	25.3	75		NNE	24	1012.7
24	Su	22.0	33.8	0			W	41	10:00	29.5	37		W	28	1011.9	26.3	56		E	17	1010.8
25	Mo	20.5	26.5	0			NE	26	13:09	24.3	70		E	11	1017.2	23.5	81		NE	11	1013.2
26	Tu	20.5	24.5	0.2			SE	33	12:40	21.4	79		SE	20	1018.6	23.5	71		SSE	17	1016.0
27	We	18.7	27.0	0.4			NE	30	14:18	23.9	73		ESE	13	1019.2	26.4	69		NE	19	1015.2
28	Th	21.9	28.7	0			NNE	35	13:37	25.8	68		NW	17	1015.3	25.6	70		N	20	1010.1
29	Fr	22.2	28.8	1.2			W	37	13:42	24.6	71		NNW	15	1012.4	24.4	57		WSW	17	1012.9
30	Sa	20.8	30.9	0			SSE	41	17:54	28.8	51		WNW	9	1013.8	25.4	69		SE	19	1012.3
31	Su	19.5	22.6	15.6			SSE	65	08:24	20.8	77		SSE	39	1021.3	20.8	65		SSE	35	1021.7
Statistics for October 2021																					
	Mean	17.6	26.3							23.2	63			14	1014.4	24.0	64			19	1011.1
	Lowest	11.4	21.0							18.5	29		#	7	1005.1	18.8	21		#	11	1000.6
	Highest	22.2	33.8	40.2			SW	72		29.5	92		SSE	39	1021.3	29.9	92		SSE	35	1021.7
	Total			171.2																	

Observations were drawn from Gold Coast Seaway (station 040764)

The Gold Coast Seaway site is an Automatic Weather Station (AWS) at the northern end of Southport Spit. If you are interested in the southern end of the Gold Coast, see the observations from Coolangatta.

Appendix C Acoustic Performance Markups

Stantec

SKETCH TITLE *Prepared By: CE*

GOLD COAST HEALTH & KNOWLEDGE PRECINCT
Sound Isolation Performance Requirements (DD)

PROJECT No.	SKETCH No.	DATE	REV
301050263	AC-SK-001	29/06/2022	001

NOTE:
- BUILDING SPRINKLER PROTECTED THROUGHOUT

PARKING SCHEDULE

Description	Count
B1	
ACCESSIBLE PARKING SPACE	4
PARKING SPACE: 90°/ CLASS 2/ C1	20
PARKING SPACE: 90°/ CLASS 2/ C1 (STAFF ONLY)	5

Acoustic Separation Performance

Partition Performance (incl. glazing and operable walls)

- Rw ≥35
- Rw ≥40
- Rw ≥45
- Rw ≥50
- Discontinuous or staggered stud construction to minimise structure-borne noise. Coloured, dashed line represents the sound insulation rating of partition. In practice, discontinuous or staggered stud construction takes priority and may extend the full length of a wall to avoid inconsistencies.

Door Performance

- D1 Rw 25
- D2 Rw 30
- D3 Rw 32-35

Notes

Verify all dimensions and levels on site and report any discrepancies to dwp for direction prior to the commencement of work.

Drawings are to be read in conjunction with all other contract documents.

Use figured dimensions only. Do not scale from drawings. dwp cannot guarantee the accuracy of content and format for copies of drawings issued electronically. The completion of the Issue Details Checked and Authorised section isconfirmation of the status of the drawing. The drawing shall not be used forconstruction unless endorsed 'For Construction' and authorised for issue.

DEPARTMENT LEGEND

- ENG ELECTR
- ENG MECH
- STORAGE
- VERTICAL TRAVEL

SCHEMATIC DESIGN
NOT TO BE USED DURING CONSTRUCTION

Issue	Description	Date	Chk	Auth
A	FOR INFORMATION	17.06.22	NC	AH

Architect/ Designer
dwp
www.dwp.com

Client
NorthWest Hea
Properties REIT

Location
SOUTHPORT
QLD 4215

File Name: BIM 360://20-0579_Gold Coast Health & Knowledge Precinct/20-0579-AR-GCHKP-CENTRAL-R19.rvt

NOTE:
- BUILDING SPRINCLER PROTECTED THROUGHOUT

PARKING SCHEDULE	
Description	Count
B1	
ACCESSIBLE PARKING SPACE	4
PARKING SPACE: 90°/ CLASS 2/ C1	20
PARKING SPACE: 90°/ CLASS 2/ C1 (STAFF ONLY)	5

Acoustic Separation Performance

Partition Performance (incl. glazing and operable walls)

- Rw ≥35
- Rw ≥40
- Rw ≥45
- Rw ≥50
- Discontinuous or staggered stud construction to minimise structure-borne noise. Coloured, dashed line represents the sound insulation rating of partition. In practice, discontinuous or staggered stud construction takes priority and may extend the full length of a wall to avoid inconsistencies.

Door Performance

- D1 Rw 25
- D2 Rw 30
- D3 Rw 32-35

SKETCH TITLE *Prepared By: CE*

GOLD COAST HEALTH & KNOWLEDGE PRECINCT
Sound Isolation Performance Requirements (DD)

PROJECT No.	SKETCH No.	DATE	REV
301050263	AC-SK-001	29/06/2022	001

SCHEMATIC DESIGN
NOT TO BE USED DURING CONSTRUCTION

Issue	Description	Date	Chk	Auth
A	FOR INFORMATION	17.06.22	NC	AH

Architect/ Designer
dwp
www.dwp.com

Client
NorthWest Hea
Properties REIT

Location
SOUTHPORT
QLD 4215

DEPARTMENT LEGEND
- ENG ELECTR
- ENG MECH
- STORAGE
- VERTICAL TRAVEL

Notes

The information contained in this document is copyright and may not be used or reproduced for any other project or purpose.

Verify all dimensions and levels on site and report any discrepancies to dwp for direction prior to the commencement of work.

Drawings are to be read in conjunction with all other contract documents.

Use figured dimensions only. Do not scale from drawings. dwp cannot guarantee the accuracy of content and format for copies of drawings issued electronically. The completion of the Issue Details Checked and Authorised section iconfirmation of the status of the drawing. The drawing shall not be used forconstruction unless endorsed 'For Construction' and authorised for issue.

File Name: BIM 360://20-0579_Gold Coast Health & Knowledge Precinct/20-0579-AR-GCNKP-CENTRAL-R19.rvt

EXTENT OF BASEMENT BELOW

EXTENT OF BASEMENT BELOW

SKETCH TITLE

Prepared By: CE

GOLD COAST HEALTH & KNOWLEDGE PRECINCT
Sound Isolation Performance Requirements (DD)

PROJECT No.	SKETCH No.	DATE	REV
301050263	AC-SK-001	29/06/2022	001

Stantec

WATER TANK 34.5 m²
AIR INTAKE 2.6 m²
AIR INTAKE 2.6 m²
MECH- SUPPLY AIR PLANT ROOM 63.2 m²
MECH PLENUM
WATER PUMP 31.3 m²
SITE BOUNDARY
GREASE TRAP 1718.0 m²
STAFF ONLY
BUILDING ABOVE
RAMP UP 1:6
RAMP UP 1:8
SFL 16.600
RAMP FROM GROUND LEVEL
SFL 16.850
SUBSTATION 109.5 m²
AIR INTAKE 2.6 m²
AIR INTAKE 2.6 m²
MSB 75.2 m²
SP 2.4 m²
STAIR 5 14.2 m²
GATIC LID OVER
ENERGEX TX LOADING DOCK 34.9 m²
BIKE ROOM 92.0 m²
TO BE VALIDATED
EL CUPB 3.5 m²
RAMP FROM B2 TO B1
RAMP UP 1:6
PWD AND STAFF ONLY
COMMS 30.6 m²
DAS ROOM
STAIR 2 15.0 m²
STAIR PRESS 6.1 m²
BIKE REPAIR
AIR EXHAUST 5.7 m²
AIR EXHAUST 6.0 m²
EOTF 33.2 m²
LIFT SHAFT
BUILDING ABOVE
SITE BOUNDARY
STAIR 4 14.0 m²
SPRINKLER CONTROL VALVE 17.5 m²
FIRE PUMP ROOM 41.8 m²
FIRE TANK 2 43.3 m²
FIRE TANK 1 52.9 m²
SITE BOUNDARY
4200 8400 8400 8400 8400 4200 4200 8400

NOTE:
- BUILDING SPRINKLER PROTECTED THROUGHOUT

PARKING SCHEDULE

Description	Count
B1	
ACCESSIBLE PARKING SPACE	4
PARKING SPACE: 90°/ CLASS 2/ C1	20
PARKING SPACE: 90°/ CLASS 2/ C1 (STAFF ONLY)	5

Acoustic Separation Performance

Partition Performance (incl. glazing and operable walls)

- Rw ≥35
- Rw ≥40
- Rw ≥45
- Rw ≥50
- Discontinuous or staggered stud construction to minimise structure-borne noise. Coloured, dashed line represents the sound insulation rating of partition. In practice, discontinuous or staggered stud construction takes priority and may extend the full length of a wall to avoid inconsistencies.

Door Performance

- D1 Rw 25
- D2 Rw 30
- D3 Rw 32-35

Notes

The information contained in this document is copyright and may not be used or reproduced for any other project or purpose.

Verify all dimensions and levels on site and report any discrepancies to dwp for direction prior to the commencement of work.

Drawings are to be read in conjunction with all other contract documents.

Use figured dimensions only. Do not scale from drawings. dwp cannot guarantee the accuracy of content and format for copies of drawings issued electronically. The completion of the Issue Details Checked and Authorised section isconfirmation of the status of the drawing. The drawing shall not be used forconstruction unless endorsed 'For Construction' and authorised for issue.

DEPARTMENT LEGEND

- ENG
- ENG ELECTR
- ENG FIRE
- ENG HYD
- ENG MECH
- EOTF
- VERTICAL TRAVEL

SCHEMATIC DESIGN

NOT TO BE USED DURING CONSTRUCTION

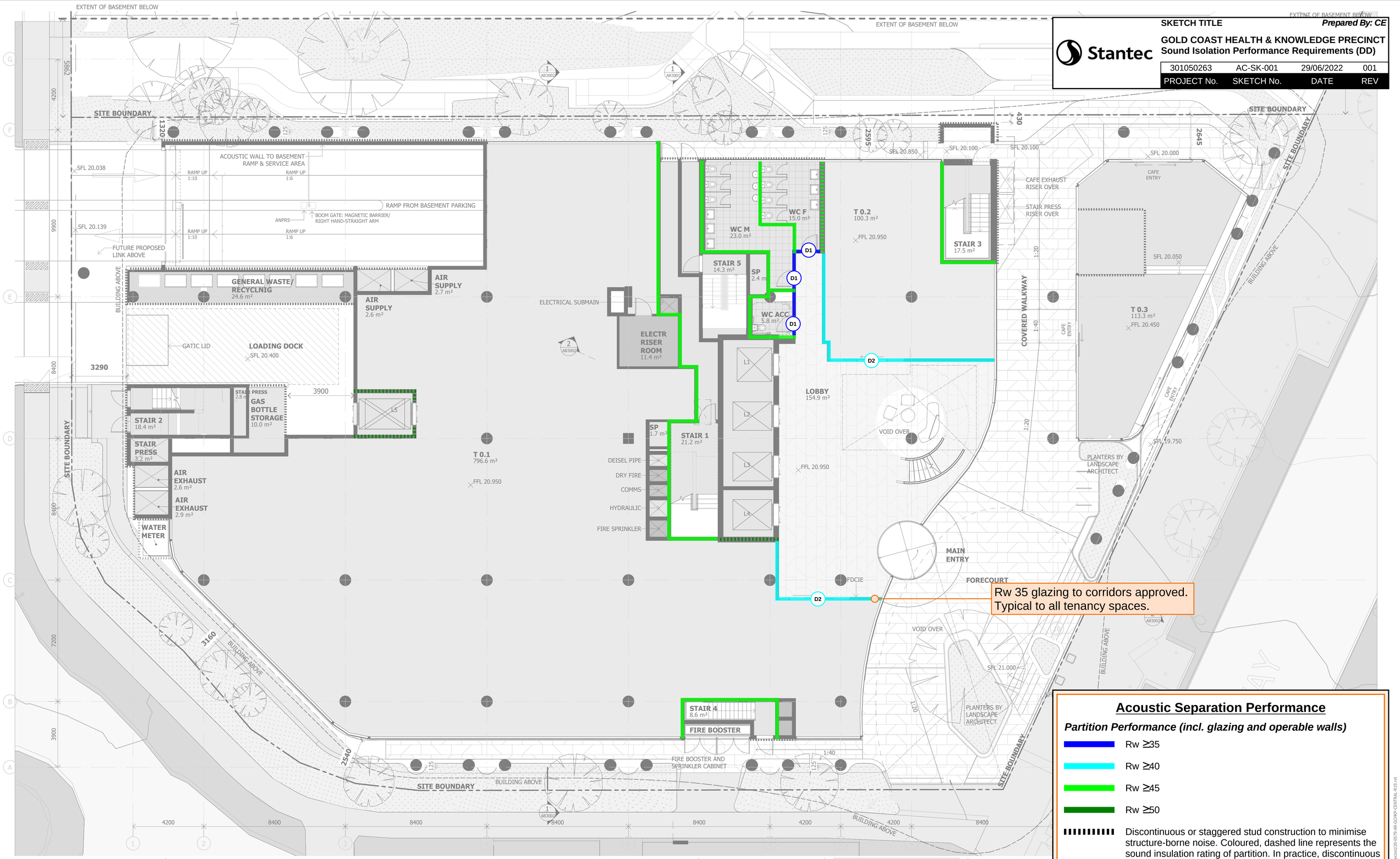
Issue	Description	Date	Chk	Auth
A	FOR INFORMATION	17.06.22	NC	AH

Architect/ Designer
dwp
www.dwp.com

Client
NorthWest Hea
Properties REIT

Location
SOUTHPORT
QLD 4215

File Name: BIN 360://20-0579_Gold Coast Health & Knowledge Precinct/20-0579-AR-GCHKP-CENTRAL-R19.rvt



Stantec

SKETCH TITLE *Prepared By: CE*

GOLD COAST HEALTH & KNOWLEDGE PRECINCT
Sound Isolation Performance Requirements (DD)

PROJECT No.	SKETCH No.	DATE	REV
301050263	AC-SK-001	29/06/2022	001

Acoustic Separation Performance

Partition Performance (incl. glazing and operable walls)

- Rw ≥35
- Rw ≥40
- Rw ≥45
- Rw ≥50
- Discontinuous or staggered stud construction to minimise structure-borne noise. Coloured, dashed line represents the sound insulation rating of partition. In practice, discontinuous or staggered stud construction takes priority and may extend the full length of a wall to avoid inconsistencies.

Door Performance

- D1 Rw 25
- D2 Rw 30
- D3 Rw 32-35

Notes

Verify all dimensions and levels on site and report any discrepancies to dwp for direction prior to the commencement of work.

Drawings are to be read in conjunction with all other contract documents.

Use figured dimensions only. Do not scale from drawings. dwp cannot guarantee the accuracy of content and format for copies of drawings issued electronically. The completion of the Issue Details Checked and Authorised section isconfirmation of the status of the drawing. The drawing shall not be used forconstruction unless endorsed 'For Construction' and authorised for issue.

DEPARTMENT LEGEND

- AMENITIES
- ENG
- ENG ELECTR
- ENG FIRE
- ENG HYD
- ENG MECH
- LOBBY COMMON
- T 0.1_IMAGING
- T 0.2_PATHOLOGY
- T 0.3_CAFE
- VERTICAL TRAVEL

SCHEMATIC DESIGN
NOT TO BE USED DURING CONSTRUCTION

Issue	Description	Date	Chk	Auth
A	FOR INFORMATION	17.06.22	NC	AH

Architect/ Designer
dwp
www.dwp.com

Client
NorthWest Hea
Properties REIT

Location
SOUTHPORT
QLD 4215

File Name: BIM 360://20-0579_Gold Coast Health & Knowledge Precinct/20-0579-AR-GCHKP-CENTRAL-R19.rvt

Minimum performance shown. This should be reviewed with regard to the contents of the plant room and its activity.

SITE BOUNDARY

PROPOSED FUTURE PEDESTRIAN LINK BRIDGE

MECH PLANT 30.7 m²

T 1.1 806.1 m²

STAIR 3 20.9 m²

STAIR 3 20.9 m²

CAFE EXHAUST RISER

STAIR PRESS RISER

LOBBY RELIEF RISER

CIRCULATION 120.4 m²

CIRCULATION 138.3 m²

STAIR 2 18.4 m²

CHILLED WATER RISER 1m x 1.5m

LOBBY RELIEF RISER

STAIR PRESS RISER

OUTSIDE AIR RISER

SM EXH & LOBBY REL RIS ~9 SQM

COMMON EXH RIS

SERVICE CORRIDOR

STAIR 1 21.2 m²

STAIR PRESS RISER

HYD RIS

DRY FIRE RIS

EL RIS

FIRE SPR. RIS

PIPE RIS

COMMUN RIS

FFL 26.200

VOID

REFER TO LANDSCAPE

GARDEN/ TERRACE 115.1 m²

FFL 26.150

T 1.3 391.4 m²

FFL 26.200

T 1.2 190.1 m²

FFL 26.200

Rw 35 glazing to corridors approved. Typical to all tenancy spaces.

Acoustic Separation Performance

Partition Performance (incl. glazing and operable walls)

- Rw ≥35
- Rw ≥40
- Rw ≥45
- Rw ≥50
- Discontinuous or staggered stud construction to minimise structure-borne noise. Coloured, dashed line represents the sound insulation rating of partition. In practice, discontinuous or staggered stud construction takes priority and may extend the full length of a wall to avoid inconsistencies.

Door Performance

- D1 Rw 25
- D2 Rw 30
- D3 Rw 32-35

DEPARTMENT LEGEND

- AMENITIES
- ENG ELECTR
- ENG FIRE
- ENG HYD
- ENG MECH
- GARDEN
- LINK
- T 1.1
- T 1.2
- T 1.3
- TRAVEL COMMON
- VERTICAL TRAVEL

SCHEMATIC DESIGN

NOT TO BE USED DURING CONSTRUCTION

Issue	Description	Date	Chk	Auth
A	FOR INFORMATION	17.06.22	NC	AH

Architect/ Designer
dwp
www.dwp.com

Client
NorthWest Hea
Properties REIT

Location
SOUTHPORT
QLD 4215

Stantec

SKETCH TITLE — *Prepared By: CE*

GOLD COAST HEALTH & KNOWLEDGE PRECINCT
Sound Isolation Performance Requirements (DD)

PROJECT No.	SKETCH No.	DATE	REV
301050263	AC-SK-001	29/06/2022	001

Notes

Verify all dimensions and levels on site and report any discrepancies to dwp for direction prior to the commencement of work.

Drawings are to be read in conjunction with all other contract documents.

Use figured dimensions only. Do not scale from drawings. dwp cannot guarantee the accuracy of content and format for copies of drawings issued electronically. The completion of the Issue Details Checked and Authorised section isconfirmation of the status of the drawing. The drawing shall not be used forconstruction unless endorsed 'For Construction' and authorised for issue.

File Name: BIM 360://20-0579_Gold Coast Health & Knowledge Precinct/20-0579-AR-GCHKP-CENTRAL-R19.rvt

Stantec

SKETCH TITLE *Prepared By: CE*

GOLD COAST HEALTH & KNOWLEDGE PRECINCT
Sound Isolation Performance Requirements (DD)

PROJECT No.	SKETCH No.	DATE	REV
301050263	AC-SK-001	29/06/2022	001

SITE BOUNDARY
135
T 2.2
194.7 m²
T 2.1
401.4 m²
STAIR 3
20.9 m²
CAFE EXHAUST RISER
STAIR PRESS RISER
LOBBY RELIEF RISER
3030
PROPOSED FUTURE PEDESTRIAN LINK BRIDGE (BELOW)
LIFT LOBBY
249.7 m²
OUTSIDE AIR RISER
SM EXH & LOBBY REL RIS ~9 SQM
COMMON EXH RIS
STAIR 1
21.2 m²
SERVICE CORRIDOR
STAIR PRESS RISER
STAIR 2
18.4 m²
WATER RISER
1m x 1.5m
LOBBY RELIEF RISER
STAIR PRESS RISER
L1
L2
L3
L4
L5
HYD RIS
DRY FIRE RIS
EL RIS
FIRE SPR. RIS
PIPE RIS
COMMUN RIS
T 2.2
585.9 m²
FFL 30.700
T 2.1
354.0 m²
Door location assumed
FFL 30.700
GARDEN
65.4 m²
FFL 30.650
Rw 35 glazing to corridors approved.
Typical to all tenancy spaces.
VOID
SITE BOUNDARY
2520
745
2015
1640
480
250
390
4200
9900
8400
8400
7200
3900
4200
8400
8400
8400
8400
4200
4200
8400

Acoustic Separation Performance

Partition Performance (incl. glazing and operable walls)

- Rw ≥35
- Rw ≥40
- Rw ≥45
- Rw ≥50
- Discontinuous or staggered stud construction to minimise structure-borne noise. Coloured, dashed line represents the sound insulation rating of partition. In practice, discontinuous or staggered stud construction takes priority and may extend the full length of a wall to avoid inconsistencies.

Door Performance

- D1 Rw 25
- D2 Rw 30
- D3 Rw 32-35

DEPARTMENT LEGEND

- AMENITIES
- ENG ELECTR
- ENG FIRE
- ENG HYD
- ENG MECH
- GARDEN
- T 2.1
- T 2.2
- TRAVEL COMMON
- VERTICAL TRAVEL

SCHEMATIC DESIGN
NOT TO BE USED DURING CONSTRUCTION

Issue	Description	Date	Chk	Auth
A	FOR INFORMATION	17.06.22	NC	AH

Architect/ Designer
dwp
www.dwp.com

Client
NorthWest Hea
Properties REIT

Location
SOUTHPORT
QLD 4215

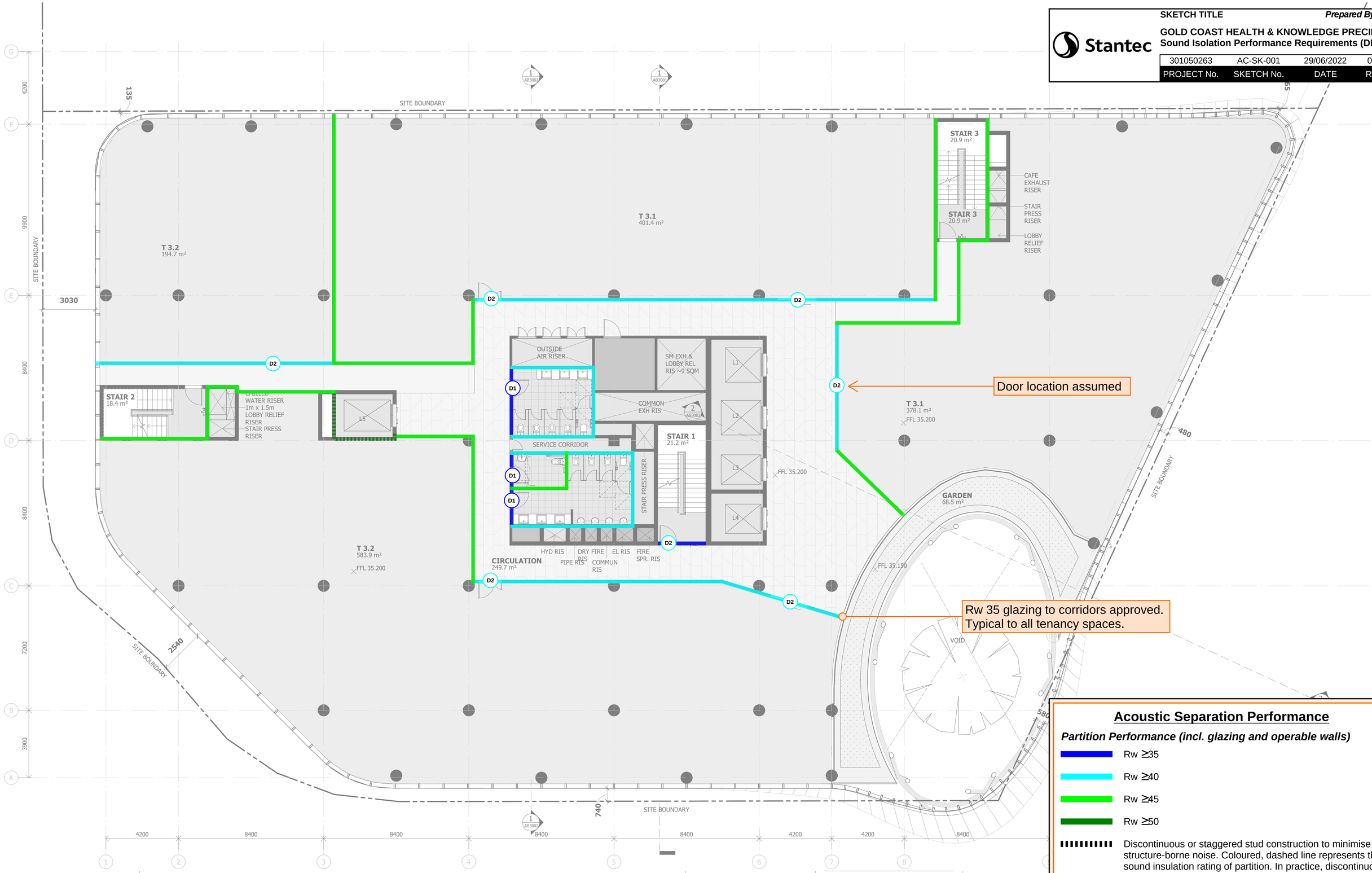
File Name: BIM 360://20-0079_Gold Coast Health & Knowledge Precinct/20-0079-AR-GCHKP-CENTRAL-R19.rvt

Stantec

SKETCH TITLE *Prepared By: CE*

GOLD COAST HEALTH & KNOWLEDGE PRECINCT
Sound Isolation Performance Requirements (DD)

PROJECT No.	SKETCH No.	DATE	REV
301050263	AC-SK-001	29/06/2022	001



Acoustic Separation Performance

Partition Performance (incl. glazing and operable walls)

- Rw ≥35
- Rw ≥40
- Rw ≥45
- Rw ≥50
- Discontinuous or staggered stud construction to minimise structure-borne noise. Coloured, dashed line represents the sound insulation rating of partition. In practice, discontinuous or staggered stud construction takes priority and may extend the full length of a wall to avoid inconsistencies.

Door Performance

- D1 Rw 25
- D2 Rw 30
- D3 Rw 32-35

Notes

The information contained in this document is copyright and may not be used or reproduced for any other project or purpose.

Verify all dimensions and levels on site and report any discrepancies to dwp for direction prior to the commencement of work.

Drawings are to be read in conjunction with all other contract documents.

Use figured dimensions only. Do not scale from drawings. dwp cannot guarantee the accuracy of content and format for copies of drawings issued electronically. The completion of the Issue Details Checked and Authorised section isconfirmation of the status of the drawing. The drawing shall not be used forconstruction unless endorsed 'For Construction' and authorised for issue.

DEPARTMENT LEGEND

- AMENITIES
- ENG ELECTR
- ENG FIRE
- ENG HYD
- ENG MECH
- GARDEN
- T 3.1
- T 3.2
- TRAVEL COMMON
- VERTICAL TRAVEL

SCHEMATIC DESIGN
NOT TO BE USED DURING CONSTRUCTION

Issue	Description	Date	Chk	Auth
A	FOR INFORMATION	17.06.22	NC	AH

Architect/ Designer
dwp
www.dwp.com

Client
NorthWest Hea
Properties REIT

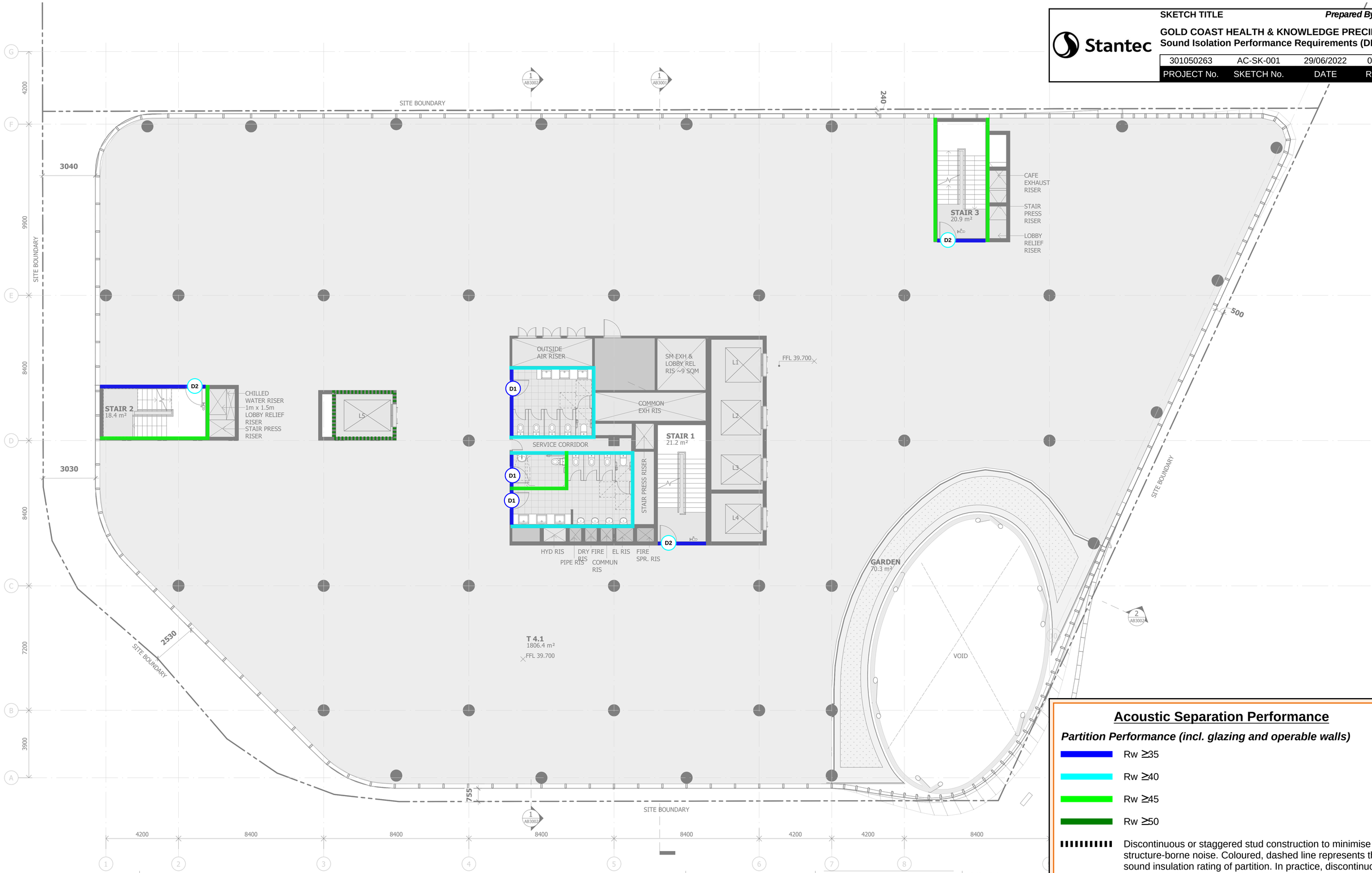
Location
SOUTHPORT
QLD 4215

File Name: BIM 360://20-0579_Gold Coast Health & Knowledge Precinct/20-0579-AR-GCHKP-CENTRAL-R19.rvt

SKETCH TITLE *Prepared By: CE*

GOLD COAST HEALTH & KNOWLEDGE PRECINCT
Sound Isolation Performance Requirements (DD)

PROJECT No.	SKETCH No.	DATE	REV
301050263	AC-SK-001	29/06/2022	001



Acoustic Separation Performance

Partition Performance (incl. glazing and operable walls)

- Rw ≥35
- Rw ≥40
- Rw ≥45
- Rw ≥50
- Discontinuous or staggered stud construction to minimise structure-borne noise. Coloured, dashed line represents the sound insulation rating of partition. In practice, discontinuous or staggered stud construction takes priority and may extend the full length of a wall to avoid inconsistencies.

Door Performance

- D1 Rw 25
- D2 Rw 30
- D3 Rw 32-35

Notes

The information contained in this document is copyright and may not be used or reproduced for any other project or purpose.

Verify all dimensions and levels on site and report any discrepancies to dwp for direction prior to the commencement of work.

Drawings are to be read in conjunction with all other contract documents.

Use figured dimensions only. Do not scale from drawings. dwp cannot guarantee the accuracy of content and format for copies of drawings issued electronically. The completion of the Issue Details Checked and Authorised section isconfirmation of the status of the drawing. The drawing shall not be used forconstruction unless endorsed 'For Construction' and authorised for issue.

DEPARTMENT LEGEND

- AMENITIES
- ENG ELECTR
- ENG FIRE
- ENG HYD
- ENG MECH
- GARDEN
- T 4.1
- VERTICAL TRAVEL

SCHEMATIC DESIGN

NOT TO BE USED DURING CONSTRUCTION

Issue	Description	Date	Chk	Auth
A	FOR INFORMATION	17.06.22	NC	AH

Architect/ Designer
dwp
www.dwp.com

Client
NorthWest Hea
Properties REIT

Location
SOUTHPORT
QLD 4215

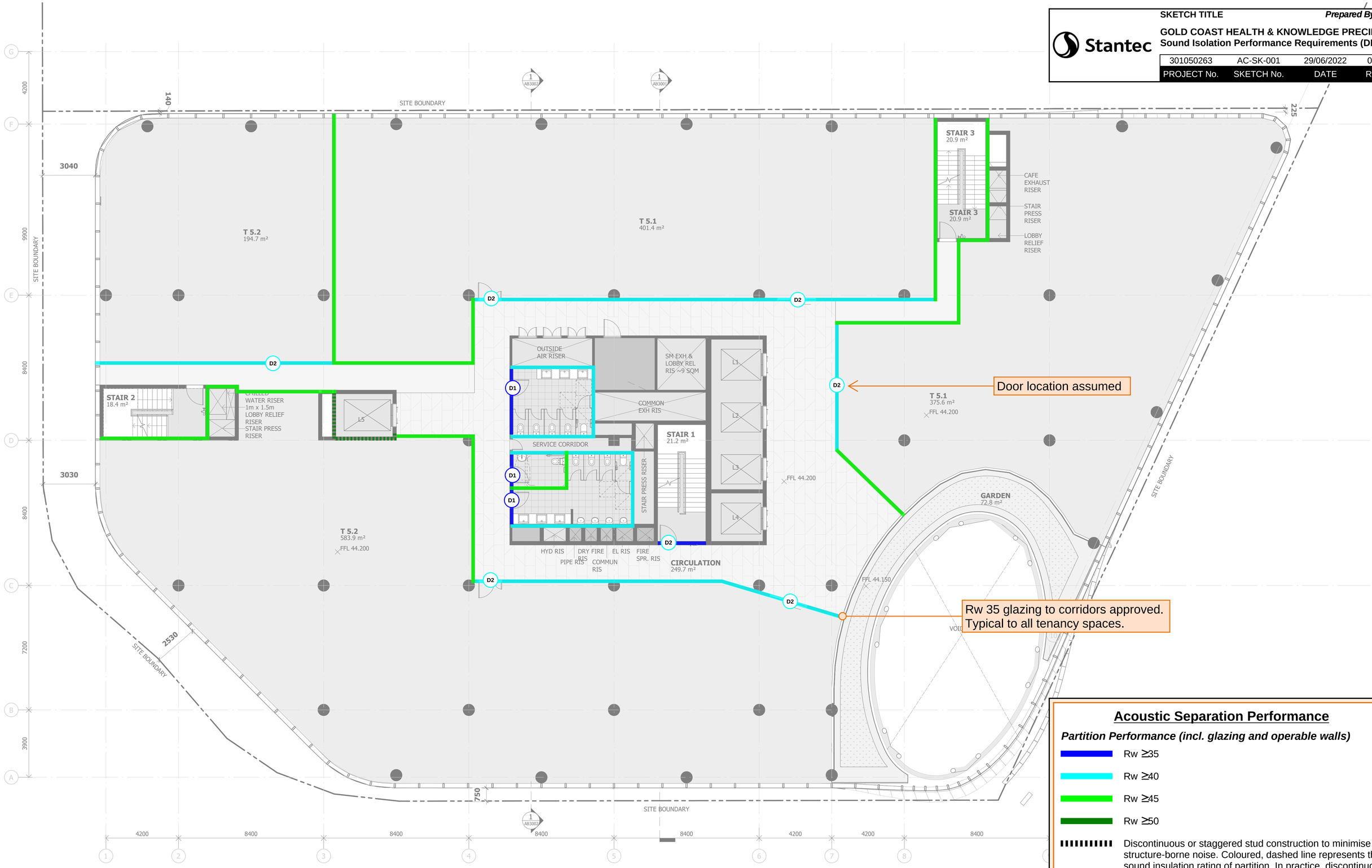
File Name: BIM 360://20-0079_Gold Coast Health & Knowledge Precinct/20-0079-AR-GCKKP-CENTRAL-R19.rvt

Stantec

SKETCH TITLE *Prepared By: CE*

GOLD COAST HEALTH & KNOWLEDGE PRECINCT
Sound Isolation Performance Requirements (DD)

PROJECT No.	SKETCH No.	DATE	REV
301050263	AC-SK-001	29/06/2022	001



Acoustic Separation Performance

Partition Performance (incl. glazing and operable walls)

- Rw ≥35
- Rw ≥40
- Rw ≥45
- Rw ≥50
- Discontinuous or staggered stud construction to minimise structure-borne noise. Coloured, dashed line represents the sound insulation rating of partition. In practice, discontinuous or staggered stud construction takes priority and may extend the full length of a wall to avoid inconsistencies.

Door Performance

- D1 — Rw 25
- D2 — Rw 30
- D3 — Rw 32-35

Notes

The information contained in this document is copyright and may not be used or reproduced for any other project or purpose.

Verify all dimensions and levels on site and report any discrepancies to dwp for direction prior to the commencement of work.

Drawings are to be read in conjunction with all other contract documents.

Use figured dimensions only. Do not scale from drawings. dwp cannot guarantee the accuracy of content and format for copies of drawings issued electronically. The completion of the Issue Details Checked and Authorised section isconfirmation of the status of the drawing. The drawing shall not be used forconstruction unless endorsed 'For Construction' and authorised for issue.

DEPARTMENT LEGEND

- AMENITIES
- ENG ELECTR
- ENG FIRE
- ENG HYD
- ENG MECH
- GARDEN
- T 5.1
- T 5.2
- TRAVEL COMMON
- VERTICAL TRAVEL

SCHEMATIC DESIGN
NOT TO BE USED DURING CONSTRUCTION

Issue	Description	Date	Chk	Auth
A	FOR INFORMATION	17.06.22	NC	AH

Architect/ Designer
dwp
www.dwp.com

Client
NorthWest Hea
Properties REIT

Location
SOUTHPORT
QLD 4215

File Name: BIM 360://20-0079_Gold Coast Health & Knowledge Precinct/20-0079-AR-GCHKP-CENTRAL-R19.rvt

SKETCH TITLE *Prepared By: CE*

GOLD COAST HEALTH & KNOWLEDGE PRECINCT
Sound Isolation Performance Requirements (DD)

PROJECT No.	SKETCH No.	DATE	REV
301050263	AC-SK-001	29/06/2022	001

T 2.0 118.7 m²
T 2.1 113.4 m²
T 2.2 102.2 m²
T 2.3 89.1 m²
T 2.4 89.7 m²
T 2.5 64.9 m²
STAIR 3 20.9 m²
T 2.6 79.0 m²
T 2.7 85.2 m²
T 2.8 100.8 m²
T 2.9 68.2 m² FFL 48.700
T 2.10 94.5 m² FFL 48.700
T 2.11 99.4 m²
T 2.12 99.4 m²
T 2.13 129.7 m² FFL 48.700
T 2.14 162.7 m²
STAIR 1 21.2 m²
STAIR 2 18.4 m²
CIRCULATION 310.0 m² FFL 48.700
GARDEN 72.9 m²
FFL 48.650
VOID

CAFE EXHAUST RISER
STAIR PRESS RISER
LOBBY RELIEF RISER
CHILLED WATER RISER 1m x 1.5m
LOBBY RELIEF RISER
STAIR PRESS RISER
OUTSIDE AIR RISER
SM EXH & LOBBY REL RIS ~9 SQM
COMMON EXH RIS
SERVICE CORRIDOR
STAIR PRESS RISER
HYD RIS
DRY FIRE RIS
EL RIS
FIRE SPR. RIS
PIPE RIS
COMMUN RIS
L1
L2
L3
L4
L5

SITE BOUNDARY
135
225
480
2540
740
3030
4200
9900
8400
8400
7200
3900
4200
8400
8400
8400
8400
4200
4200
8400

D1 Rw 25
D2 Rw 30

Rw 35 glazing to corridors approved. Typical to all tenancy spaces.

Acoustic Separation Performance

Partition Performance (incl. glazing and operable walls)

- Rw ≥35
- Rw ≥40
- Rw ≥45
- Rw ≥50
- Discontinuous or staggered stud construction to minimise structure-borne noise. Coloured, dashed line represents the sound insulation rating of partition. In practice, discontinuous or staggered stud construction takes priority and may extend the full length of a wall to avoid inconsistencies.

Door Performance

- D1 Rw 25
- D2 Rw 30
- D3 Rw 32-35

DEPARTMENT LEGEND

- AMENITIES
- ENG ELECTR
- ENG FIRE
- ENG HYD
- ENG MECH
- GARDEN
- T 6.0
- TRAVEL COMMON
- VERTICAL TRAVEL

SCHEMATIC DESIGN
NOT TO BE USED DURING CONSTRUCTION

Issue	Description	Date	Chk	Auth
A	FOR INFORMATION	17.06.22	NC	AH

Architect/ Designer
dwp
www.dwp.com

Client
NorthWest Hea
Properties REIT

Location
SOUTHPORT
QLD 4215

Notes

The information contained in this document is copyright and may not be used or reproduced for any other project or purpose.

Verify all dimensions and levels on site and report any discrepancies to dwp for direction prior to the commencement of work.

Drawings are to be read in conjunction with all other contract documents.

Use figured dimensions only. Do not scale from drawings. dwp cannot guarantee the accuracy of content and format for copies of drawings issued electronically. The completion of the Issue Details Checked and Authorised section isconfirmation of the status of the drawing. The drawing shall not be used forconstruction unless endorsed 'For Construction' and authorised for issue.

File Name: BIM 360://20-0079_Gold Coast Health & Knowledge Precinct/20-0079-AR-GCHKP-CENTRAL-R19.rvt

SKETCH TITLE

GOLD COAST HEALTH & KNOWLEDGE PRECINCT
Sound Isolation Performance Requirements (DD)

Prepared By: CE

PROJECT No.	SKETCH No.	DATE	REV
301050263	AC-SK-001	29/06/2022	001

SITE BOUNDARY
135
225
480
740
2540
3030
4200
9900
8400
8400
7200
3900
4200
8400
8400
8400
8400
4200
4200
8400

STAIR 2
18.4 m²
CHILLED WATER RISER 1m x 1.5m
LOBBY RELIEF RISER
STAIR PRESS RISER

L5

OUTSIDE AIR RISER
ELECTR RISER ROOM
11.4 m²
SM EXH & LOBBY REL RIS ~9 SQM
COMMON EXH RIS
SERVICE CORRIDOR
STAIR 1
21.2 m²
STAIR PRESS RISER
HYD RIS
DRY FIRE RIS
PIPE RIS
COMMUN RIS
EL RIS
FIRE SPR. RIS
L1
L2
L3
L4
FFL 53.200

STAIR 3
20.9 m²
CAFE EXHAUST RISER
STAIR PRESS RISER
LOBBY RELIEF RISER

T 7.1
1805.3 m²

GARDEN
72.9 m²

FFL 53.150
VOID

D1
D2

1 AB3002
1 AB3001
2 AB3002

Acoustic Separation Performance

Partition Performance (incl. glazing and operable walls)

- Rw ≥35
- Rw ≥40
- Rw ≥45
- Rw ≥50
- Discontinuous or staggered stud construction to minimise structure-borne noise. Coloured, dashed line represents the sound insulation rating of partition. In practice, discontinuous or staggered stud construction takes priority and may extend the full length of a wall to avoid inconsistencies.

Door Performance

- D1 Rw 25
- D2 Rw 30
- D3 Rw 32-35

Notes

The information contained in this document is copyright and may not be used or reproduced for any other project or purpose.

Verify all dimensions and levels on site and report any discrepancies to dwp for direction prior to the commencement of work.

Drawings are to be read in conjunction with all other contract documents.

Use figured dimensions only. Do not scale from drawings. dwp cannot guarantee the accuracy of content and format for copies of drawings issued electronically. The completion of the Issue Details Checked and Authorised section isconfirmation of the status of the drawing. The drawing shall not be used forconstruction unless endorsed 'For Construction' and authorised for issue.

DEPARTMENT LEGEND

- AMENITIES
- ENG ELECTR
- ENG FIRE
- ENG HYD
- ENG MECH
- GARDEN
- T 7.1
- VERTICAL TRAVEL

SCHEMATIC DESIGN
NOT TO BE USED DURING CONSTRUCTION

Issue	Description	Date	Chk	Auth
A	FOR INFORMATION	17.06.22	NC	AH

Architect/ Designer
dwp
www.dwp.com

Client
NorthWest Hea
Properties REI

Location
SOUTHPORT
QLD 4215

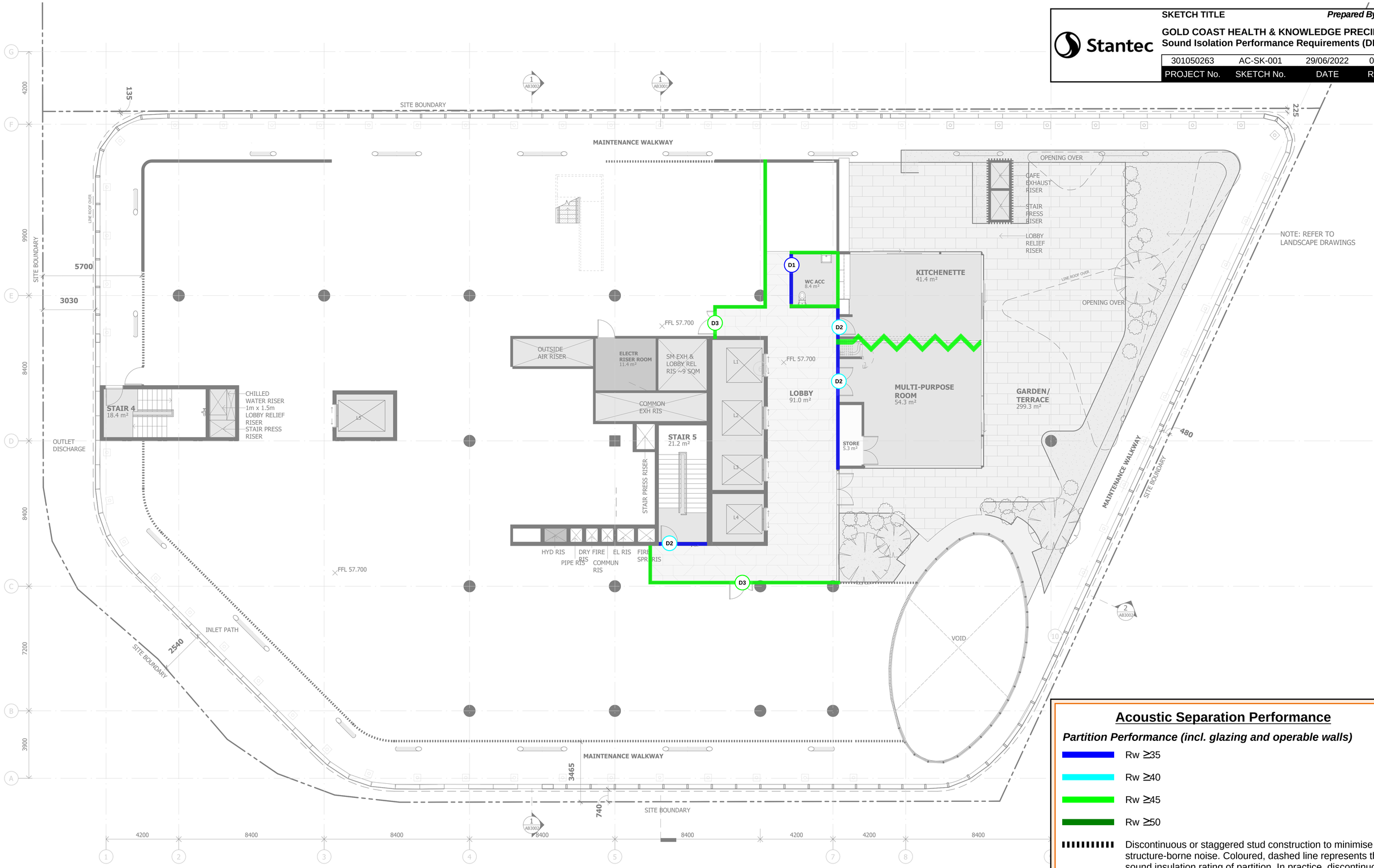
File Name: BIM 360://20-0079_Gold Coast Health & Knowledge Precinct/20-0079-AR-GCHKP-CENTRAL-R19.rvt

Stantec

SKETCH TITLE *Prepared By: CE*

GOLD COAST HEALTH & KNOWLEDGE PRECINCT
Sound Isolation Performance Requirements (DD)

PROJECT No.	SKETCH No.	DATE	REV
301050263	AC-SK-001	29/06/2022	001



Acoustic Separation Performance

Partition Performance (incl. glazing and operable walls)

- Rw ≥35
- Rw ≥40
- Rw ≥45
- Rw ≥50
- Discontinuous or staggered stud construction to minimise structure-borne noise. Coloured, dashed line represents the sound insulation rating of partition. In practice, discontinuous or staggered stud construction takes priority and may extend the full length of a wall to avoid inconsistencies.

Door Performance

- D1 Rw 25
- D2 Rw 30
- D3 Rw 32-35

DEPARTMENT LEGEND

- AMENITIES
- ENG ELECTR
- ENG FIRE
- ENG MECH
- GARDEN
- ROOF TOP
- STORAGE
- TRAVEL COMMON
- VERTICAL TRAVEL

SCHEMATIC DESIGN
NOT TO BE USED DURING CONSTRUCTION

Issue	Description	Date	Chk	Auth
A	FOR INFORMATION	17.06.22	NC	AH

Architect/ Designer
dwp
www.dwp.com

Client
NorthWest Hea
Properties REIT

Location
SOUTHPORT
QLD 4215

Notes

The information contained in this document is copyright and may not be used or reproduced for any other project or purpose.

Verify all dimensions and levels on site and report any discrepancies to dwp for direction prior to the commencement of work.

Drawings are to be read in conjunction with all other contract documents.

Use figured dimensions only. Do not scale from drawings. dwp cannot guarantee the accuracy of content and format for copies of drawings issued electronically. The completion of the Issue Details Checked and Authorised section isconfirmation of the status of the drawing. The drawing shall not be used forconstruction unless endorsed 'For Construction' and authorised for issue.

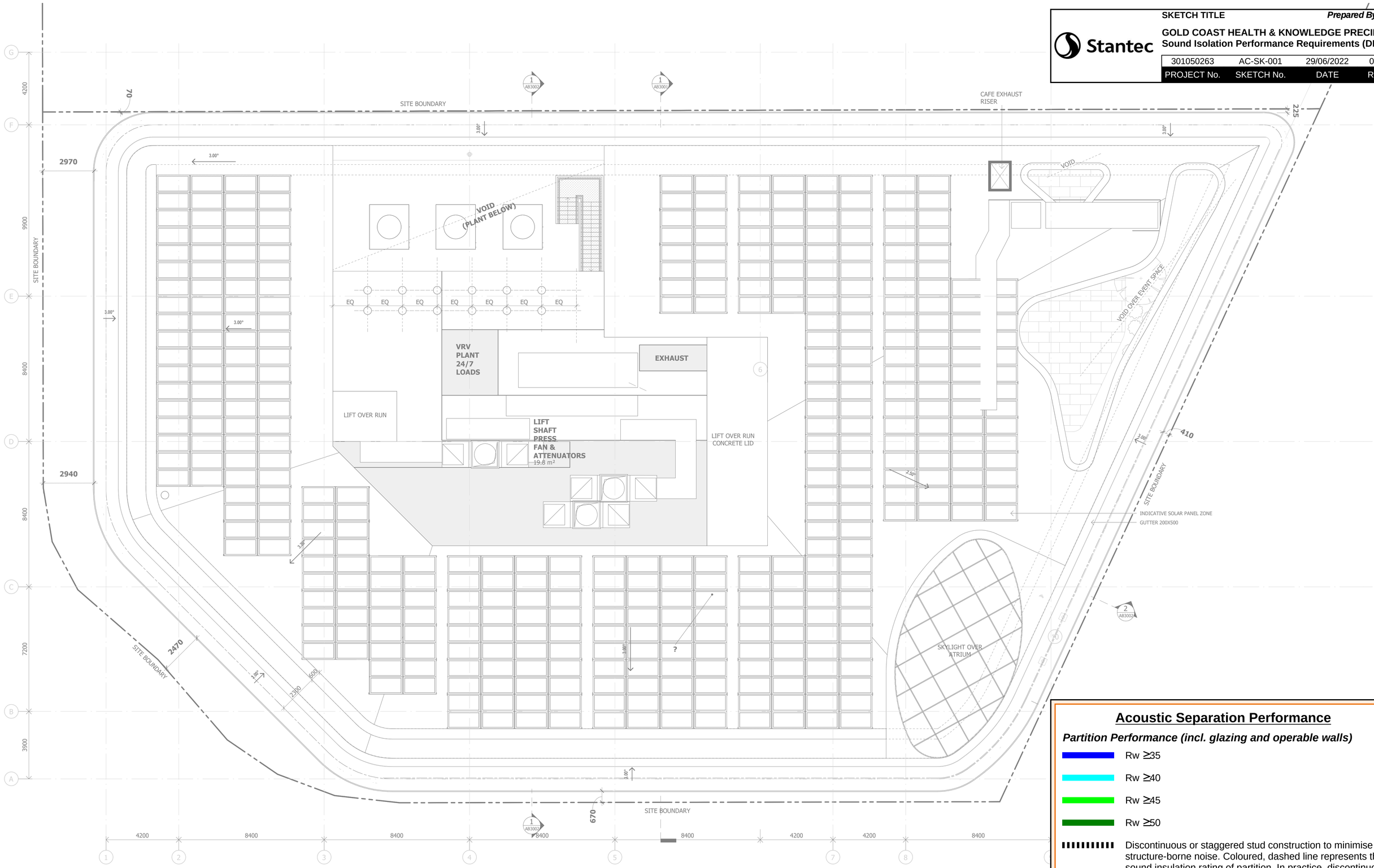
File Name: BIM 360://20-1079_Gold Coast Health & Knowledge Precinct/20-1079-AR-GCHKP-CENTRAL-R19.rvt

Stantec

SKETCH TITLE *Prepared By: CE*

GOLD COAST HEALTH & KNOWLEDGE PRECINCT
Sound Isolation Performance Requirements (DD)

PROJECT No.	SKETCH No.	DATE	REV
301050263	AC-SK-001	29/06/2022	001



Acoustic Separation Performance

Partition Performance (incl. glazing and operable walls)

- Rw ≥35
- Rw ≥40
- Rw ≥45
- Rw ≥50
- Discontinuous or staggered stud construction to minimise structure-borne noise. Coloured, dashed line represents the sound insulation rating of partition. In practice, discontinuous or staggered stud construction takes priority and may extend the full length of a wall to avoid inconsistencies.

Door Performance

- D1 — Rw 25
- D2 — Rw 30
- D3 — Rw 32-35

Notes

Verify all dimensions and levels on site and report any discrepancies to dwp for direction prior to the commencement of work.

Drawings are to be read in conjunction with all other contract documents.

Use figured dimensions only. Do not scale from drawings. dwp cannot guarantee the accuracy of content and format for copies of drawings issued electronically. The completion of the Issue Details Checked and Authorised section isconfirmation of the status of the drawing. The drawing shall not be used forconstruction unless endorsed 'For Construction' and authorised for issue.

DEPARTMENT LEGEND

PLANT

SCHEMATIC DESIGN

NOT TO BE USED DURING CONSTRUCTION

Issue	Description	Date	Chk	Auth
A	FOR INFORMATION	17.06.22	NC	AH

Architect/ Designer
dwp
www.dwp.com

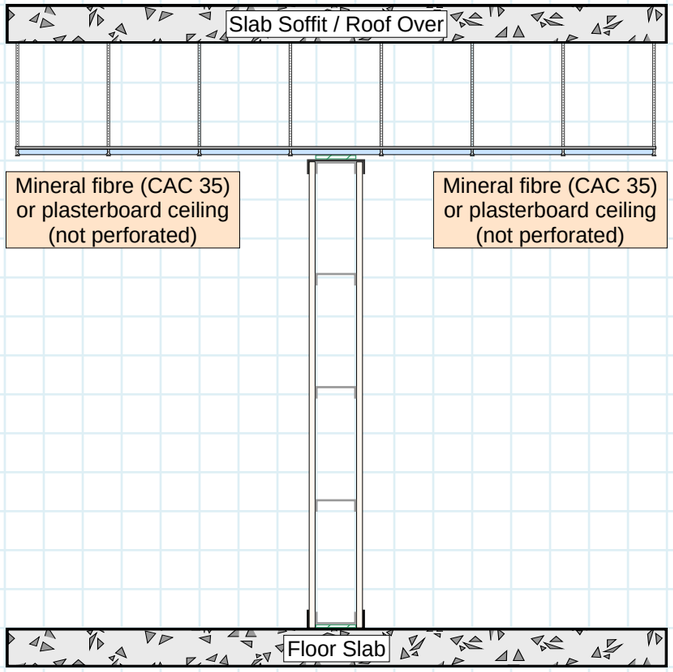
Client
NorthWest Hea
Properties REIT

Location
SOUTHPORT
QLD 4215

File Name: BIM 360://20-0579_Gold Coast Health & Knowledge Precinct/20-0579-AR-GCHKP-CENTRAL-R19.rvt

Appendix D Standard Acoustic-rated Partition Construction

R_w 35 Partition
Option 1



Rw 35 - Option 1

Side 1: 13 mm standard plasterboard

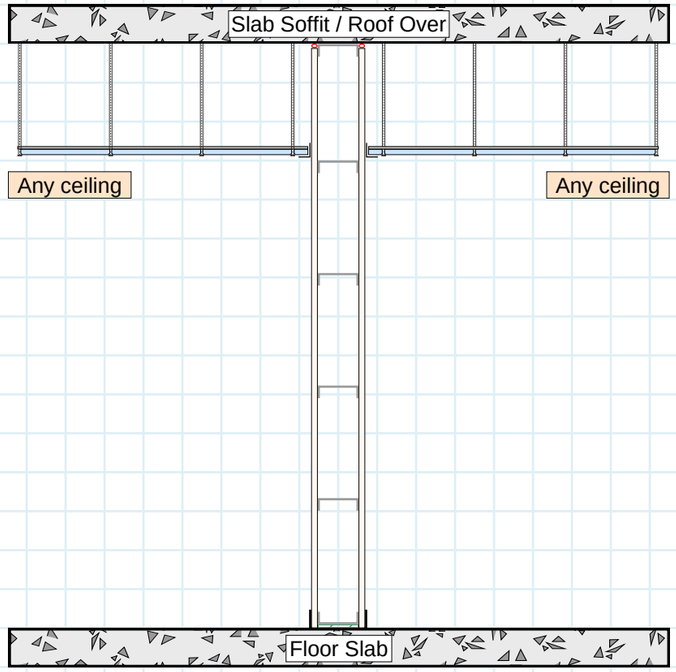
Frame / Cavity: ≥ 64 mm steel or timber studs without insulation

Side 2: 13 mm standard plasterboard

Sealing: Two rows of 2000 Series Black Closed Cell Foam Tape 25mm width between headtrack and ceiling and bottom-track and carpet (firm seal)

Marking: [redacted]

R_w 35 Partition
Option 2



Rw 35 - Option 2

Side 1: 13 mm standard plasterboard

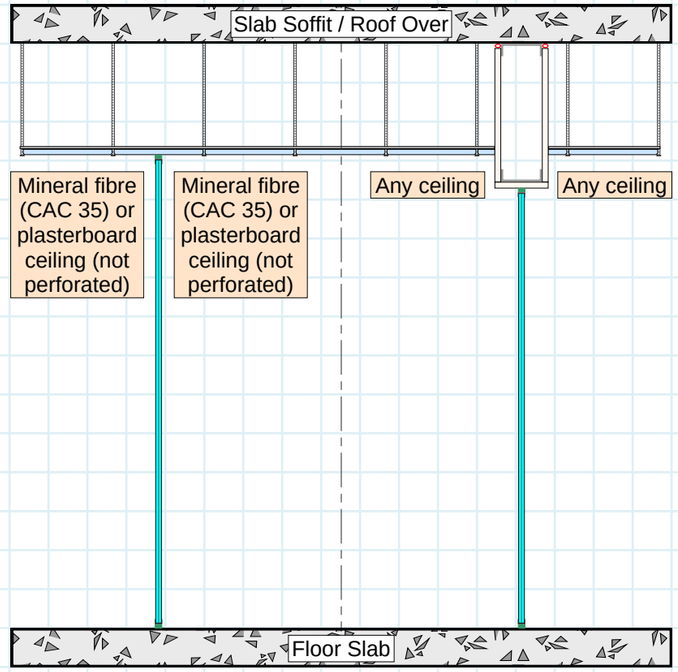
Frame / Cavity: ≥ 64 mm steel or timber studs without insulation

Side 2: 13 mm standard plasterboard

Sealing: Two rows of 2000 Series Black Closed Cell Foam Tape 25mm width between bottom-track and carpet and non-hardening seal at top-track both sides.

Marking: [redacted]

R_w 35 Glazed Partition
Option 1 *Option 2*



Rw 35 - Glazed Partition

Option 1 - Mineral-fibre ceilings / Set plasterboard ceilings

Glazing Type: 10.38 mm laminated glass

In-ceiling construction: None

Ceiling: Plasterboard or mineral fibre ceiling tiles (CAC ≥ 35) both sides of partition

Option 2 - Other ceilings with openings or perforations

Glazing Type: 10.38 mm laminated glass

In-ceiling construction: 13 mm standard plasterboard | ≥ 64 mm steel or timber studs without insulation | 13 mm standard plasterboard

Marking: [redacted]

Notes:

- All ratings assume that ceilings are formed within the rooms and not continuous.
- Where ceilings adjoining the partitions are set plasterboard on both sides of the partition, a single layer of board can be deleted above ceilings for Rw 45 and 50 partitions.
- ≥ 6mm fibre-cement board can be substituted for 13mm plasterboard in wet and impact areas.
- Drawings not to scale

Weblinks

Plasterboard: 1. USG Boral 2. CSR Gyprock 3. Knauf

Steel Studs: 1. Rondo 2. Studco Systems

Glasswool Insulation: 1. Bradford Acoustigard Insulation

Partition Head - Foam Tape: 1. Closed Cell Foam Single Sided Closure Tape

Baffleblock and others: 1. Bradford Martini Easy Baffle

Stantec

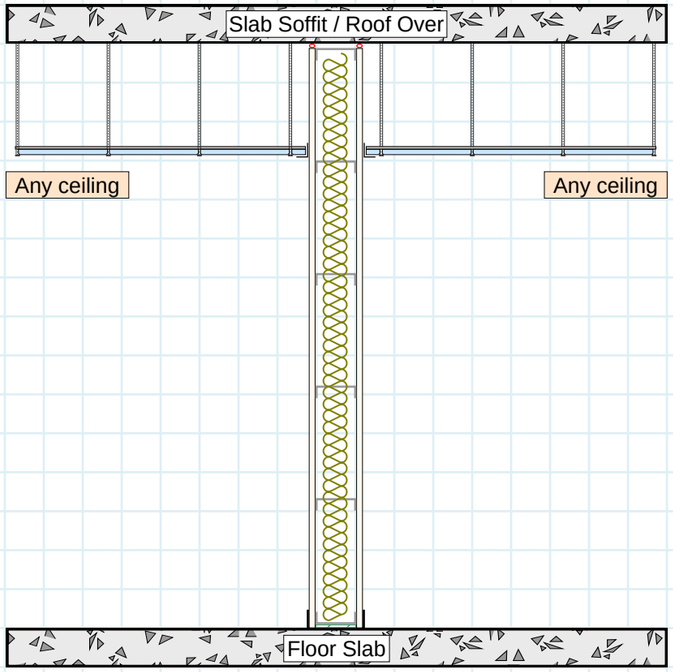
SKETCH TITLE *Prepared By: CE*

GOLD COAST HEALTH & KNOWLEDGE PRECINCT
Standard Acoustic-rated Partition Construction Types (DD)

PROJECT No.	SKETCH No.	DATE	REV
301050263	AC-SK-002	29/06/2022	001

R_w 40 Partition

Option 1 (preferred)



Rw 40 - Option 1

Side 1: 13 mm standard plasterboard

Frame / Cavity: ≥ 64 mm steel or timber studs containing glasswool insulation (≥ 75 mm @ 14 kg/m³)

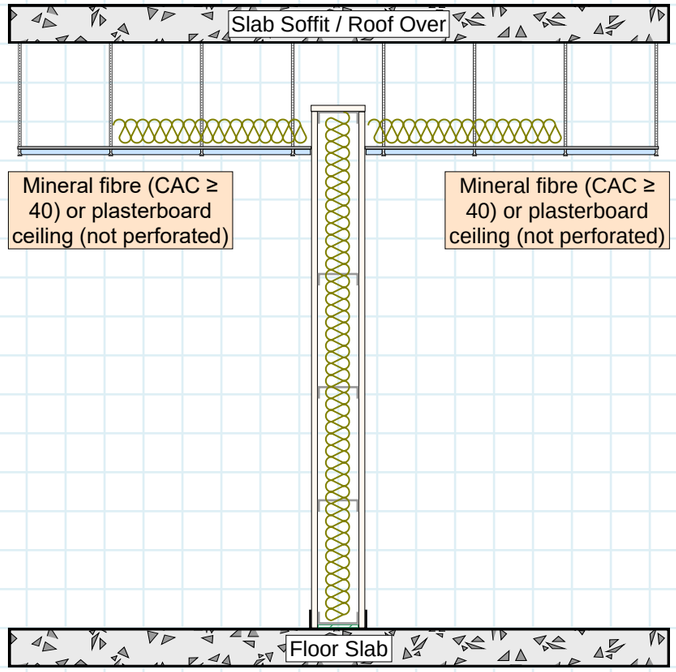
Side 2: 13 mm standard plasterboard

Sealing: Two rows of 2000 Series Black Closed Cell Foam Tape 25mm width between bottom-track and carpet and non-hardening seal at top-track both sides.

Marking:

R_w 40 Partition

Option 2



Rw 40 - Option 2

Side 1: 13 mm standard plasterboard

Frame / Cavity: ≥ 64 mm steel or timber studs containing glasswool insulation (≥ 75 mm @ 14 kg/m³). Partition to cut through ceiling grid and extend 100 mm above ceiling line.

Side 2: 13 mm standard plasterboard

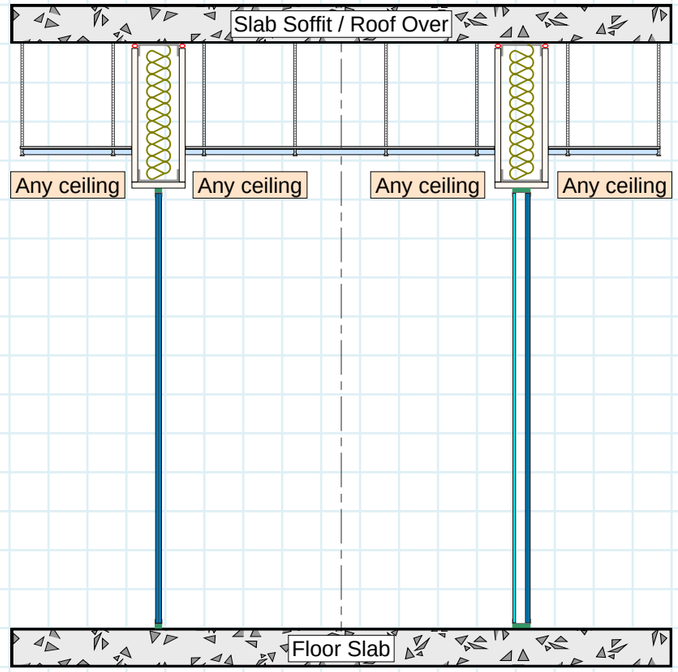
Ceiling: Plasterboard or mineral fibre ceiling tiles (CAC ≥ 40) both sides of partition and 150 mm 11 kg/m³ insulation above ceiling extending 1200mm each side of partition. Insulation not required if plasterboard to both sides.

Sealing: Two rows of 2000 Series Black Closed Cell Foam Tape 25mm width between bottom-track and carpet and non-hardening seal at top-track both sides.

Marking:

R_w 40 Glazed Partition

Option 1 ***Option 2***



Rw 40 - Glazed Partition

Option 1 - Single Glass

Glazing Type: 12.5 mm Viridian Vlam Hush laminated glass (no single glazed substitutions)

In-ceiling construction: 13 mm standard plasterboard | ≥ 64 mm steel or timber studs containing glasswool insulation (≥ 75 mm @ 14 kg/m³) | 13 mm standard plasterboard

Option 2 - Double Glazing Unit

Glazing Type: 5 mm VFloat glass | 16 mm airgap | 8.5 mm Viridian Vlam Hush laminated glass or other performance tested combination (alternative configurations shall be submitted to acoustic engineer for review).

In-ceiling construction: as defined for Option 1 above

Marking:

Notes:

- All ratings assume that ceilings are formed within the rooms and not continuous.
- Where ceilings adjoining the partitions are set plasterboard on both sides of the partition, a single layer of board can be deleted above ceilings for Rw 45 and 50 partitions.
- ≥ 6mm fibre-cement board can be substituted for 13mm plasterboard in wet and impact areas.
- Drawings not to scale

Weblinks

Plasterboard: 1. USG Boral **2.** CSR Gyprock **3.** Knauf

Steel Studs: 1. Rondo **2.** Studco Systems

Glasswool Insulation: 1. Bradford Acoustigard Insulation

Partition Head - Foam Tape: 1. Closed Cell Foam Single Sided Closure Tape

Baffleblock and others: 1. Bradford Martini Easy Baffle

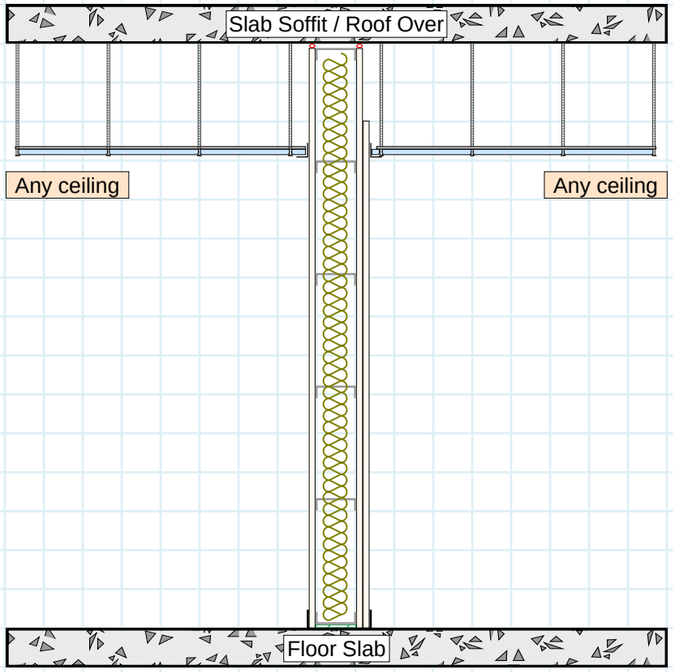
Stantec

SKETCH TITLE ***Prepared By: CE***

GOLD COAST HEALTH & KNOWLEDGE PRECINCT
Standard Acoustic-rated Partition Construction Types (DD)

301050263	AC-SK-002	29/06/2022	001
PROJECT No.	SKETCH No.	DATE	REV

R_w 45 Partition
Option 1 (preferred)



Rw 45 - Option 1

Side 1: 13 mm standard plasterboard

Frame / Cavity: ≥ 64 mm steel or timber studs containing glasswool insulation (≥ 75 mm @ 14 kg/m^3)

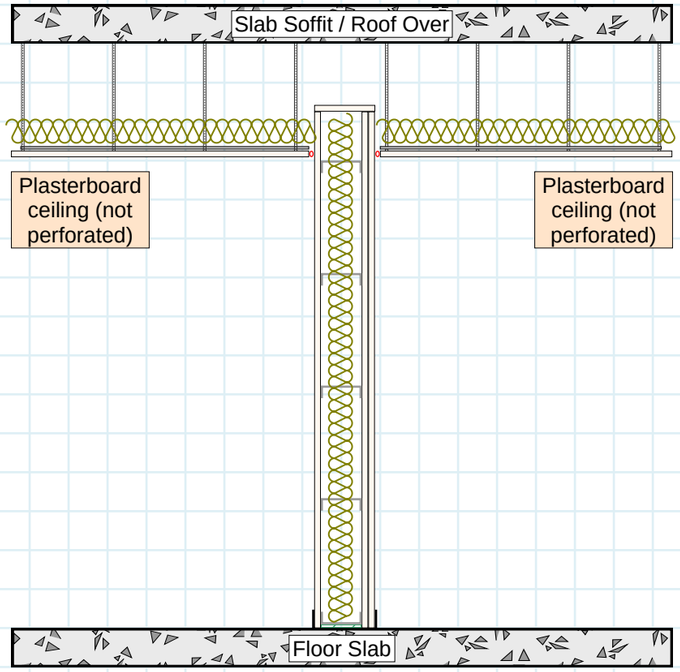
Side 2: 2 x 13 mm standard plasterboard (NOTE: second layer to extend at least 100 mm above ceiling line)

Note: Alternatively, use one layer of 13 mm acoustic-rated plasterboard (≥ 13 kg/m^3) to both side of partition.

Sealing: Two rows of 2000 Series Black Closed Cell Foam Tape 25 mm width between bottom-track and carpet and non-hardening seal at top-track both sides.

Marking:

R_w 45 Partition
Option 2



Rw 45 - Option 2

Side 1: 13 mm standard plasterboard

Frame / Cavity: ≥ 64 mm steel or timber studs containing glasswool insulation (≥ 75 mm @ 14 kg/m^3). Partition to cut through ceiling grid and extend 100 mm above ceiling line.

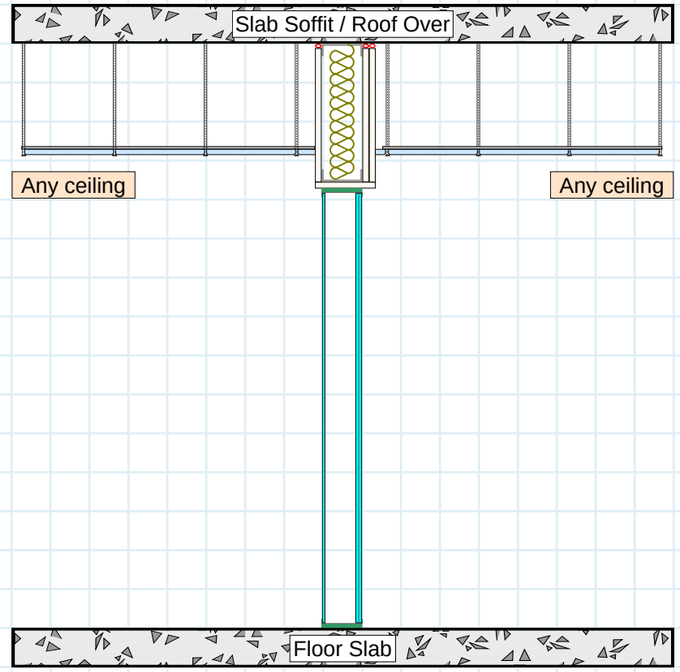
Side 2: 2 x 13 mm standard plasterboard extend at least 100 mm above ceiling line)

Ceiling: Plasterboard ceiling both sides of partition with 150 mm 11 kg/m^3 insulation above entire ceiling.

Sealing: Two rows of 2000 Series Black Closed Cell Foam Tape 25 mm width between bottom-track and carpet and non-hardening seal at top-track both sides.

Marking:

R_w 45 Glazed Partition



Rw 45 - Glazed Partition

Glazing Type: Double glazing unit consisting of 6 mm toughened glass, ≥ 50 mm cavity and 10.38 mm laminated glass (alternative configurations shall be submitted to acoustic engineer for review).

In-ceiling construction: 13 mm standard plasterboard | ≥ 64 mm steel or timber studs containing glasswool insulation (≥ 75 mm @ 14 kg/m^3) | 2 x 13 mm standard plasterboard.

Marking:

Notes:

- All ratings assume that ceilings are formed within the rooms and not continuous.
- Where ceilings adjoining the partitions are set plasterboard on both sides of the partition, a single layer of board can be deleted above ceilings for Rw 45 and 50 partitions.
- ≥ 6mm fibre-cement board can be substituted for 13mm plasterboard in wet and impact areas.
- Drawings not to scale

Weblinks

Plasterboard: 1. USG Boral **2.** CSR Gyprock **3.** Knauf

Steel Studs: 1. Rondo **2.** Studco Systems

Glasswool Insulation: 1. Bradford Acoustigard Insulation

Partition Head - Foam Tape: 1. Closed Cell Foam Single Sided Closure Tape

Baffleblock and others: 1. Bradford Martini Easy Baffle

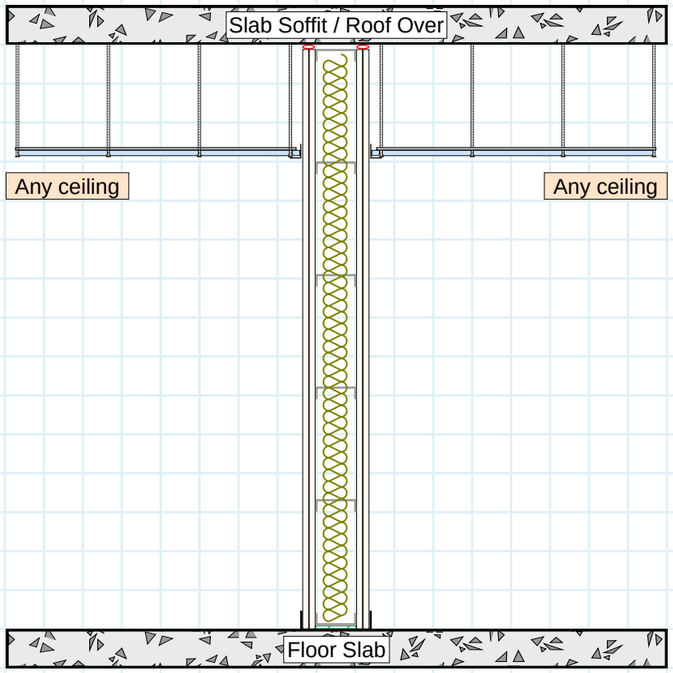
Stantec

SKETCH TITLE ***Prepared By: CE***

GOLD COAST HEALTH & KNOWLEDGE PRECINCT
Standard Acoustic-rated Partition Construction Types (DD)

301050263	AC-SK-002	29/06/2022	001
PROJECT No.	SKETCH No.	DATE	REV

R_w 50 Partition



Rw 50

Side 1: 2 x 13 mm standard plasterboard

Frame / Cavity: ≥ 76 mm steel stud 0.55 mm BMT containing glasswool insulation (≥ 75 mm @ 14 kg/m³).

Side 2: 2 x 13 mm standard plasterboard

Sealing: Two rows of 2000 Series Black Closed Cell Foam Tape 25 mm width between bottom-track and carpet and non-hardening seal at top-track both sides.

Marking:

Notes:

- All ratings assume that ceilings are formed within the rooms and not continuous.
- Where ceilings adjoining the partitions are set plasterboard on both sides of the partition, a single layer of board can be deleted above ceilings for Rw 45 and 50 partitions.
- ≥ 6mm fibre-cement board can be substituted for 13mm plasterboard in wet and impact areas.
- Drawings not to scale

Weblinks

Plasterboard: 1. USG Boral **2.** CSR Gyprock **3.** Knauf

Steel Studs: 1. Rondo **2.** Studco Systems

Glasswool Insulation: 1. Bradford Acoustigard Insulation

Partition Head - Foam Tape: 1. Closed Cell Foam Single Sided Closure Tape

Baffleblock and others: 1. Bradford Martini Easy Baffle

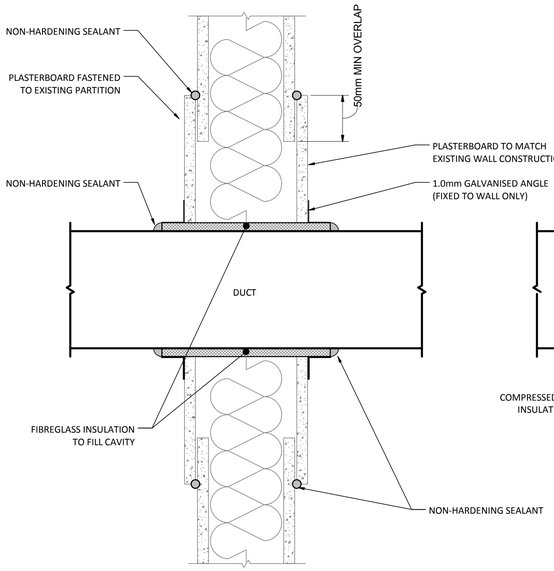
Stantec

SKETCH TITLE — *Prepared By: CE*

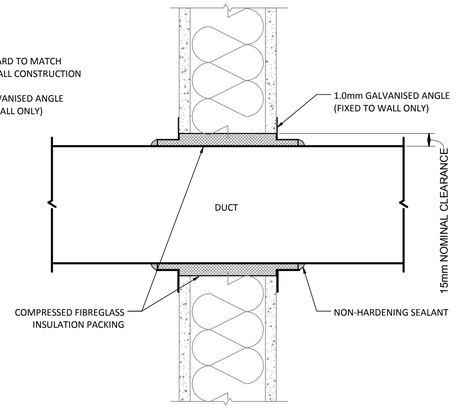
GOLD COAST HEALTH & KNOWLEDGE PRECINCT
Standard Acoustic-rated Partition Construction Types (DD)

PROJECT No.	SKETCH No.	DATE	REV
301050263	AC-SK-002	29/06/2022	001

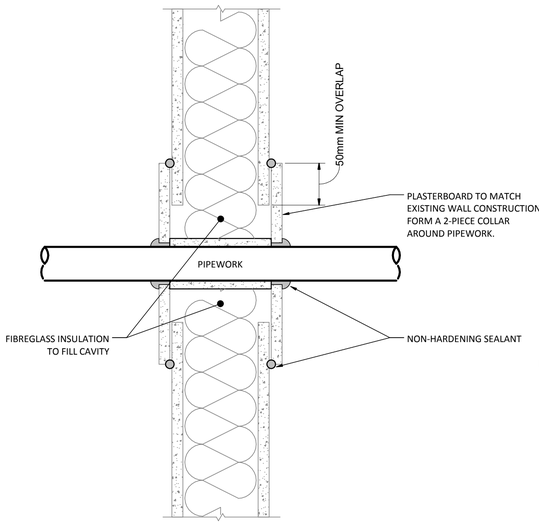
Appendix E Acoustic Treatment of Services Penetrations



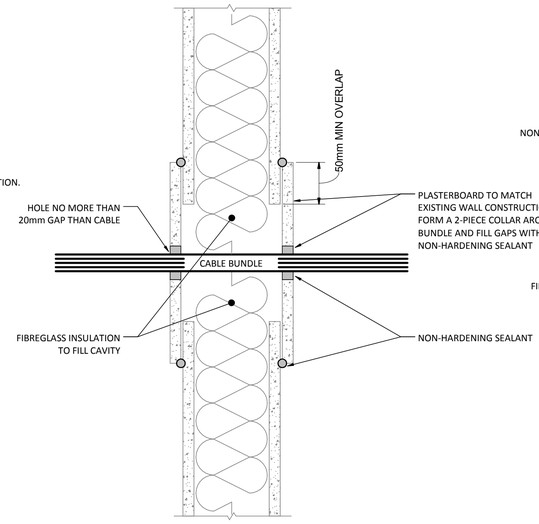
1 DUCT PENETRATION ALL DUCT INSULATION TYPES 1 (LARGE HOLE)
NOT TO SCALE



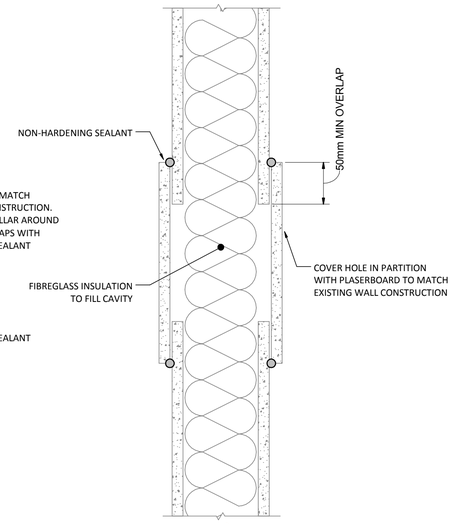
2 DUCT PENETRATION ALL DUCT INSULATION TYPES 2 (SMALL HOLE)
NOT TO SCALE



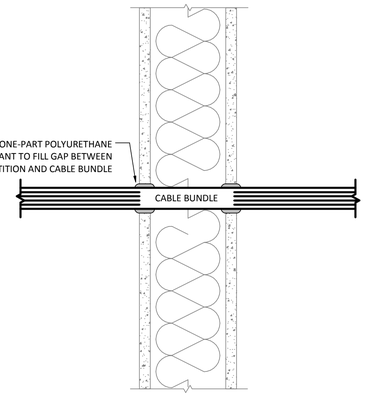
3 PIPE PENETRATION (LARGE HOLE)
NOT TO SCALE



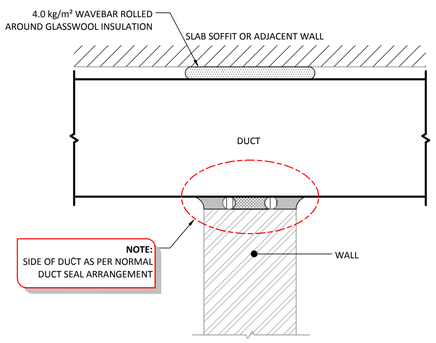
4 CABLE PENETRATION
NOT TO SCALE



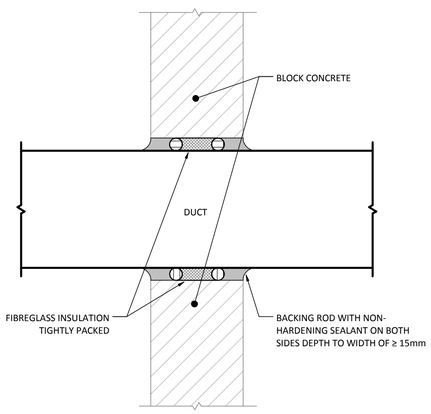
5 SEAL - HOLE IN PARTITION
NOT TO SCALE



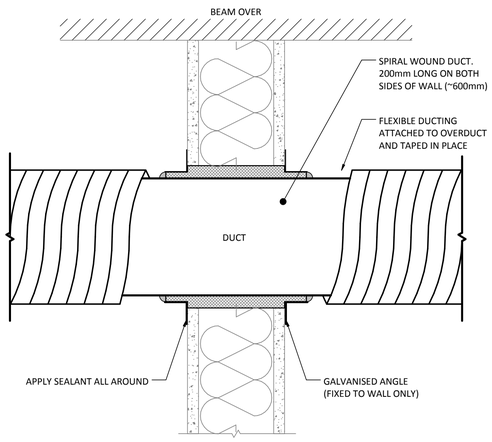
6 CABLE BUNDLE PENETRATION
NOT TO SCALE



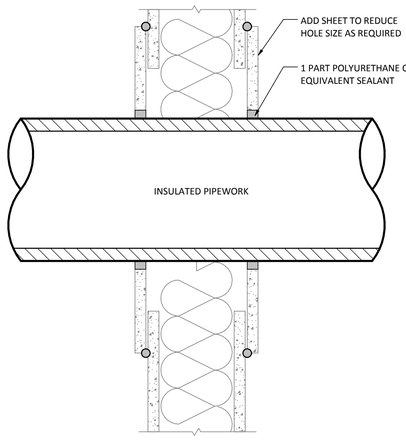
B DUCT PENETRATION DETAIL AGAINST SLAB OR ANOTHER DUCT
NOT TO SCALE



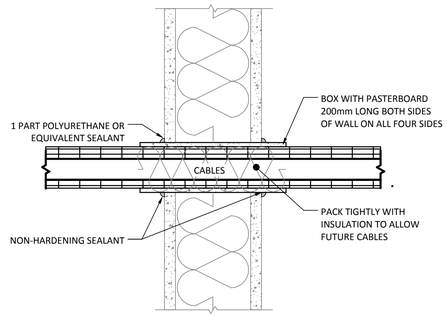
C DUCT SOLID WALL PENETRATION
NOT TO SCALE



D FLEXIBLE DUCT PENETRATION DETAIL
NOT TO SCALE



E PIPEWORK PENETRATION TREATMENT
NOT TO SCALE



F CABLE TRAY PENETRATIONS
NOT TO SCALE

REV	DESCRIPTION	DRAWN	APP'D	DATE
A		MGB	ML	

ARCHITECT/CLIENT:

Stantec

DESIGNED :	MLL	VERIFIED
DRAWN :	MGB	APPROVED FOR TENDER
SCALE @ A1 :	1 : 25	APPROVED FOR CONSTRUCTION

A1 DRAWING - BUILDING SERVICES GROUP

PROJECT:

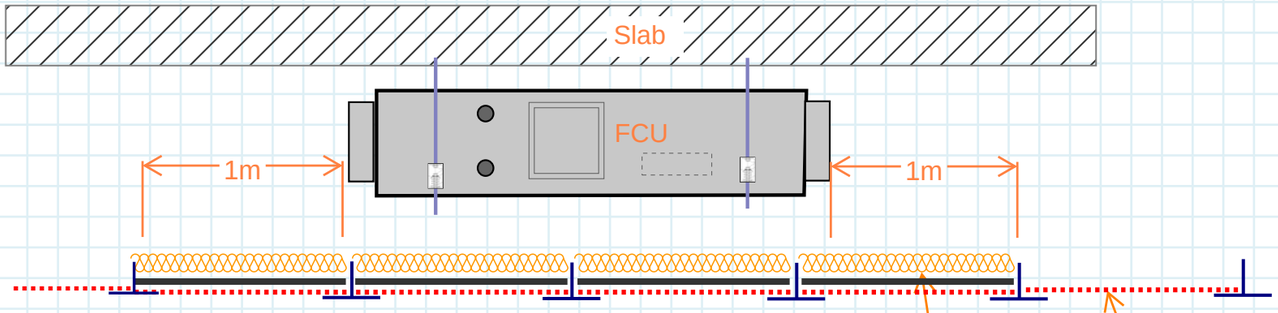
TITLE:
ACOUSTIC SERVICES
PENETRATION DETAILS

TENDER ISSUE
NOT FOR CONSTRUCTION

PROJECT No.	DRAWING No.	REVISION
	N1.01	A

Appendix F FCU Breakout Noise Control

Mineral Fiber Ceiling - Option 1



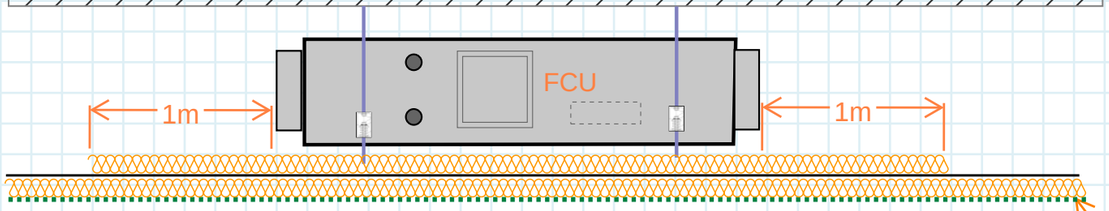
Additional Treatments (1m in each direction from the sides of the FCU)

1. Add solid plasterboard tile (https://www.gyprock.com.au/products/ceiling-tiles-freshtone) or Wavebar (4kg/m2) over proposed tiles. (if used, wavebar must be cut to the same size at the time and adhered to the tile)

2. Add insulation over (50mm Polyester or glasswool ≥14 kg/m^3)

Existing
Ceiling tiles in Grid

Perforated Plasterboard Ceiling



Additional Treatments (1m in each direction from the sides of the FCU)

1. Add solid plasterboard over perforated plasterboard or Wavebar (4kg/m2) over proposed ceiling.

2. Add insulation over perforated ceiling and solid ceiling (50mm Polyester or glasswool ≥14 kg/m^3)

Existing /Proposed
Perforated Plasterboard ceiling

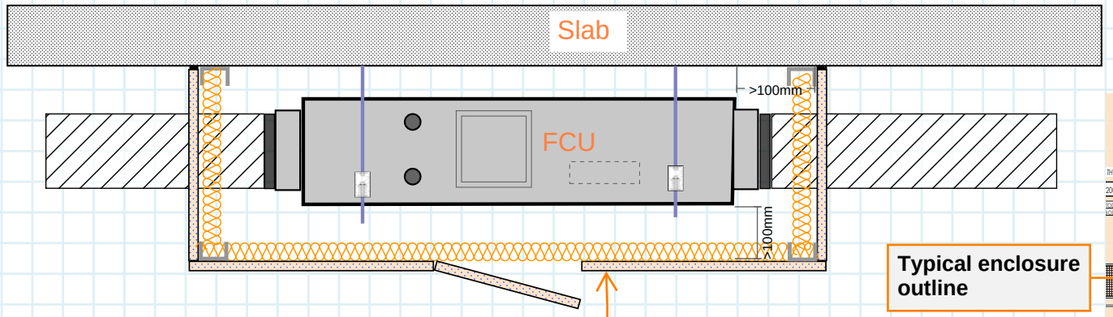
Stantec

SKETCH TITLE — *Prepared By: CE*

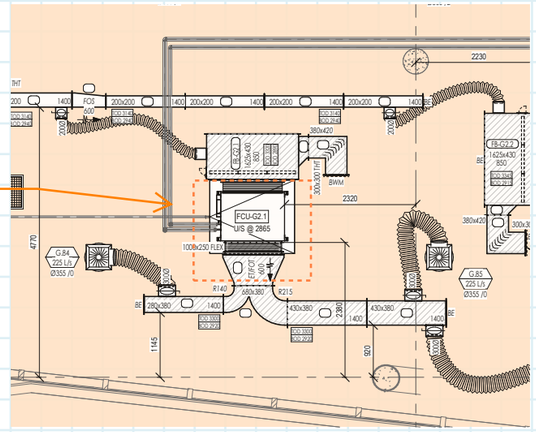
GOLD COAST HEALTH & KNOWLEDGE PRECINCT
In-ceiling Fan Coil Unit
Acoustic treatment options / arrangements

PROJECT No.	SKETCH No.	DATE	REV
301050263	AC-SK-003	29/06/2022	001

No Ceiling Built-up enclosure



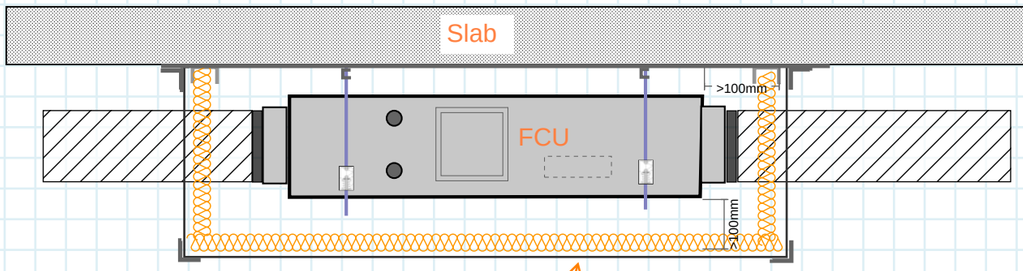
Typical enclosure outline



Additional Treatments (Built-up enclosure)

1. Construct Frame with outer layer more than 75mm from FCU
2. Line outer face of frame with 13mm plasterboard or 12mm MDF sealed to be airtight.
3. Use only acoustic access panels rated to Rw+Ctr 25.
4. Add insulation with enclosure. (50mm Polyester or glasswool ≥14 kg/m^3)

No Ceiling Prefabricated FCU in a



Additional Treatments (Factory or ground-built folded sheet-metal enclosure)

1. Use folded 1.0mm steel, construct and enclosure for housing of unit using methods applied to duct fabrication. Reinforce/support as required with steel angles.
2. Use only Bullocks 1.0mm access panels in enclosure walls.
3. Caulk and seal to all penetrations.
4. Add insulation with enclosure. (50mm Polyester or glasswool ≥14 kg/m^3)

Stantec

SKETCH TITLE — *Prepared By: CE*

GOLD COAST HEALTH & KNOWLEDGE PRECINCT
In-ceiling Fan Coil Unit
Acoustic treatment options / arrangements

PROJECT No.	SKETCH No.	DATE	REV
301050263	AC-SK-003	29/06/2022	001

Design with
community in mind

Level 3
52 Merivale Street
South Brisbane QLD 4101
Tel +61 7 3811 4506

For more information, please visit
www.stantec.com

Stantec