Contact Officer: Abena Dankwa
Our Ref: DA/28/2022

22 June 2023

Goora Gan Steiner School Incorporated
C/- Zone Planning Group
PO Box 5332
GLADSTONE QLD 4680

Dear Applicant

CHANGED NOTICE OF DECISION
PLANNING ACT 2016 S83

DA/28/2022 - MATERIAL CHANGE OF USE - IMPACT EDUCATIONAL ESTABLISHMENT (3 STAGES)
2744 ROUND HILL ROAD, AGNES WATER QLD 4677
LOT 36 RP 619982

Reference is made to the above Development Application and the Negotiated Notice of Decision dated 13 December 2022 and your request for a Change Application dated 26 April 2023.

I wish to advise that the Change Application was considered by Council at its 20 June 2023 General Meeting where it was resolved to approve the Change. So that these changes are consolidated into your approval, Council has issued the attached Changed Notice of Decision with the changes included.

Should you have any questions or require further clarification in relation to any matters raised in the Decision Notice, please do not hesitate to contact Council's Planning Officer Abena Dankwa on (07) 4970 0700.

Yours sincerely

T R MCDONALD
PRINCIPAL PLANNING LEAD

GLADSTONE
REGIONAL COUNCIL

CHANGED NOTICE OF DECISION - DA/28/2022
PLANNING ACT 2016 S83

Application:	Material Change of Use - Impact - Educational Establishment (3 Stages)
Applicant Name & Address:	Goora Gan Steiner School Incorporated C/- Zone Planning Group PO Box 5332 GLADSTONE QLD 4680
Owner:	Goora Gan Steiner School Incorporated
Subject Land:	2744 Round Hill Road, AGNES WATER QLD 4677
Location:	Lot 36 RP 619982
Zoning:	Rural Residential – Bicentennial Drive Enterprise
Site Area:	1.9Ha
Definition of Use:	Educational Establishment: *Premises used for training and instruction designed to impart knowledge and develop skills. The use may include outside hours school care for students or on–site student accommodation*.
Submissions Received:	One (1) Not Properly Made Submission
Application Received:	29 April 2022
Planning Scheme:	*Our Place Our Plan Gladstone Regional Council Planning Scheme Version 2*

You are advised that your application was Approved in Part - Change Application Minor. The conditions relevant to this approval are attached. These conditions are clearly identified to indicate whether the assessment manager or a concurrence agency imposed them.

1. NATURE OF CHANGES

The nature of the changes are: -

- Condition 1, 2, 8, 14, 16, 25 – Amended

2. BENCHMARKS APPLIED TO THE DEVELOPMENT

The following is a description of the assessment benchmarks applying to the development:

Benchmarks Applying to the Development	**Benchmark Reference**
State Planning Policy July 2017	• *State Interest - Natural Hazards, Risk and Resilience*

Benchmarks Applying to the Development	Benchmark Reference
Our Place Our Plan Gladstone Regional Council Planning Scheme Version 2	• *Strategic Framework* • *Bushfire Hazard Overlay Code;* • *Emerging Community Zone Code;* • *Development Design Code;* • *Landscaping Code.*

3. CURRENCY PERIOD FOR THE APPROVAL

The currency periods stated in section 85 of the *Planning Act 2016* apply to each aspect of development in this approval, as outlined below unless otherwise conditioned within this approval: -

✓ material change of use - 6 years

It is noted that the date the approval takes effect remains in accordance with the original Negotiated Notice of Decision dated 13 December 2022. This Changed Notice of Decision does not restart the above periods.

4. APPROVED PLANS

The approved plans and/or documents for this development approval are listed in the following table:

Drawing Number	Revision	Description	Author	Date
A110	**5**	**Site Plan and Landscape Plan**	**WD Architects**	**20/04/2023**
A120	1	Roadworks and Parking Layout	WD Architects	01/03/2022
A130	1	Staging Plan	WD Architects	01/03/2022
A1-300	**5**	**Administration Building Floor Plan**	**WD Architects**	**23/02/2023**
A400	2	Administration Building Sections	WD Architects	01/03/2022
A1-500	**2**	**Administration Building Elevations**	**WD Architects**	**01/03/2022**
A900	2	Administration Building Perspectives	WD Architects	01/03/2022
A2-300	**4**	**Classroom Building Floor Plan**	**WD Architects**	**23/02/2023**
A400	2	Classroom Building Sections	WD Architects	01/03/2022
A500	2	Classroom Building Elevations	WD Architects	01/03/2022
A900	2	Classroom Building Perspectives	WD Architects	01/03/2022
A300	**2**	**Proposed Library/Resource Centre Floor Plan**	**WD Architects**	**24/03/2023**

Drawing Number	Revision	Description	Author	Date
A500	**2**	**Proposed Library/Resource Centre Elevations and Sections**	**WD Architects**	**24/03/2023**
A900	**2**	**Proposed Library/Resource Centre Perspectives**	**WD Architects**	**24/03/2023**
A300	2	Specialty Classroom and Workshop Floor Plan	WD Architects	01/03/2022
A500	2	Specialty Classroom and Workshop Elevations and Sections	WD Architects	01/03/2022
A900	2	Specialty Classroom and Workshop Perspectives	WD Architects	01/03/2022

And supporting documents

Document Number	Revision	Description	Author	Date
21562	2	Effluent Disposal Report	Engineers Plus	27 April 2022
21562	0	Site Specific Stormwater Management Report	Engineers Plus	26 April 2022
-	A	Traffic Impact Assessment	Access Traffic Consulting	8 March 2022
21110	-	Noise Impact Assessment	SoundBase Consulting Engineers	21 April 2022

5. OTHER NECESSARY DEVELOPMENT PERMITS

Listed below are other development permits that are necessary to allow the development to be carried out: -

1. Operational Works
2. Building Works
3. Plumbing & Drainage Works

6. SUBMISSIONS

There were no properly made submissions about the application.

7. APPEAL RIGHTS

Schedule 1 of the *Planning Act 2016* details your appeal rights and the appeal rights of any submitters regarding this decision.

8. WHEN THE DEVELOPMENT APPROVAL TAKES EFFECT

This development approval takes effect:-

- From the time the decision notice is given, if there is no submitter and the applicant does not appeal the decision to the court.

OR

- If there is a submitter and the applicant does not appeal the decision, the earlier date of either:
    - When the submitter's appeal ends; or
    - The day the last submitter gives the assessment manager written notice that the submitter will not be appealing the decision.

OR

- Subject to the decision of the court, when the appeal is finally decided, if an appeal is made to the court.

This approval will lapse if:-

- for a material change of use, the first change of use under the approval does not start within the relevant period stated in section 3 of this Notice of Decision;
- for a reconfiguration, a plan for the reconfiguration is not given to the local government within the relevant period stated in section 3 of this Notice of Decision;
- for a development approval other than a material change of use or reconfiguration, the development does not substantially start within the relevant period stated in section 3 of this Notice of Decision.

Should you wish to discuss this matter further, please contact Council's Planning Officer Abena Dankwa on (07) 4970 0700.

Yours sincerely

T R MCDONALD
PRINCIPAL PLANNING LEAD

Attached: **Conditions**
Appeal Rights
Approved Plans

GLADSTONE REGIONAL COUNCIL

ASSESSMENT MANAGER CONDITIONS - DA/28/2022

Approved Documentation

1. Development is to be carried out generally in accordance with the submitted application including the following plans and supporting documentation except where amendments are required to satisfy the conditions of this approval:

Drawing Number	Revision	Description	Author	Date
A110	**5**	**Site Plan and Landscape Plan**	**WD Architects**	**20/04/2023**
A120	1	Roadworks and Parking Layout	WD Architects	01/03/2022
A130	1	Staging Plan	WD Architects	01/03/2022
A1-300	**5**	**Administration Building Floor Plan**	**WD Architects**	**23/02/2023**
A400	2	Administration Building Sections	WD Architects	01/03/2022
A1-500	**2**	**Administration Building Elevations**	**WD Architects**	**01/03/2022**
A900	2	Administration Building Perspectives	WD Architects	01/03/2022
A2-300	**4**	**Classroom Building Floor Plan**	**WD Architects**	**23/02/2023**
A400	2	Classroom Building Sections	WD Architects	01/03/2022
A500	2	Classroom Building Elevations	WD Architects	01/03/2022
A900	2	Classroom Building Perspectives	WD Architects	01/03/2022
A300	**2**	**Proposed Library/Resource Centre Floor Plan**	**WD Architects**	**24/03/2023**
A500	**2**	**Proposed Library/Resource Centre Elevations and Sections**	**WD Architects**	**24/03/2023**
A900	**2**	**Proposed Library/Resource Centre Perspectives**	**WD Architects**	**24/03/2023**
A300	2	Specialty Classroom and Workshop Floor Plan	WD Architects	01/03/2022
A500	2	Specialty Classroom and Workshop Elevations and	WD Architects	01/03/2022

Drawing Number	Revision	Description	Author	Date
		Sections		
A900	2	Specialty Classroom and Workshop Perspectives	WD Architects	01/03/2022

And supporting documents

Document Number	Revision	Description	Author	Date
21562	2	Effluent Disposal Report	Engineers Plus	27 April 2022
21562	0	Site Specific Stormwater Management Report	Engineers Plus	26 April 2022
-	A	Traffic Impact Assessment	Access Traffic Consulting	8 March 2022
21110	-	Noise Impact Assessment	SoundBase Consulting Engineers	21 April 2022

Operational Works

2. **A Development Permit for Operational Works must be obtained from Council prior to the commencement of Building Work for Stage 1. The Development Application for Operational Works is to include the following:**

   (a) Earthworks (including retaining walls);
   (b) Road works (including signage and vehicle access);
   (c) Stormwater Management (quantity, quality, flood and drainage control);

2b. **A Development Permit for Operational Works must be obtained from Council prior to the commencement of civil works for Stage 1. The Development Application for Operational Works is to include the following:**

   (a) Pedestrian / Cycle Footpath works;
   (b) Street lighting, electrical and telecommunications; and
   (c) Landscaping, environmental protection and associated works.

3. Development Applications for Operational Works shall be designed and constructed in accordance with Australian Standards, the Engineering Design Planning Scheme Policy under the Our Place Our Plan Gladstone Regional Council Planning Scheme or any other applicable standards at the time of lodgement. Prior to the commencement of the use, all Operational Works conditioned by this approval must be accepted "on maintenance" by Council.

   Advisory Note: The Capricorn Municipal Development Guidelines within the Engineering Design Planning Scheme Policy is the current document for preparing any Development Application for Operational Works which is found at http://www.cmdg.com.au/index.htm.

Building, Plumbing and Drainage Works

4. The Applicant is required to obtain a Development Permit and Building Final for Building Works in accordance with the *Planning Act 2016* for each stage. Construction is to comply with the *Building Act 1975*, the National Construction Code and the requirements of other relevant authorities.

5. The Applicant is required to obtain a Development Permit for Plumbing and Drainage Works and Plumbing and Drainage Final in accordance with the *Planning Act 2016* for each stage. Construction is to comply with the *Plumbing and Drainage Act 2018* and the requirements of other relevant authorities.

6. Prior to the commencement of the use for each stage, all plant and equipment (including air conditioners, exhaust fans and the like) are to be housed, screened and located so that these do not cause environmental nuisance or harm to other uses in the surrounding area.

7. Prior to the commencement of the use for each stage, all lighting at ground level and associated with illuminating ground level areas must be focused downwards and be provided with hoods, shades or other permanent devices to direct illumination downwards and not allow upward lighting to adversely affect the residential uses on this site and the adjoining the sites.

Water Infrastructure

8. **As part of the Development Application for Building Works for Stage 1, the Applicant must submit for approval to Council, an Engineering Services Report prepared by a Registered Professional Engineer of Queensland (RPEQ) that assess and recommends the necessary onsite water requirements for the entire proposed development, noting the relevant water standard qualities that must be adhered to**.

9. Prior to the commencement of the use for each stage, the Applicant must install and construct the necessary water facilities as per Condition 8 approved Engineering Services Report for onsite Water.

Sewerage Infrastructure

10. As part of any Development Application for Plumbing and Drainage Works, the Applicant must design and construct the onsite effluent disposal system as recommended in the approved Effluent Disposal Report.

11. As part of the Development Application for Plumbing and Drainage Works for Stage 1, the Applicant must install the recommended fencing and planting as outlined in the approved Effluent Disposal Report.

12. Any future request to connect into Council Sewerage Infrastructure once available shall be at the expense of the owner.

Stormwater Infrastructure

13. As part of the Development Application for Operational Works for Stage 1, the Applicant is to submit for approval by Council an amended Site Based Stormwater Management Plan. The Site Based Stormwater Management Plan must address both stormwater quantity and quality and be in accordance with the Engineering Design Planning Scheme Policy under the *Our Place Our Plan Our Place Our Plan Gladstone Regional Council Planning Scheme* and the *State Planning Policy – July 2017*. The Site Based Stormwater Management Plan must be certified by a Registered Professional Engineer of Queensland experienced in this type of work

Transportation Services

14. **As part of the Development Application for Operational Works for Stage 1, the Applicant must construct the auxiliary left turn and basic right turn design recommendations for the site as per the approved Traffic Impact Assessment Report prepared by Access Traffic Consulting and dated 8 March 2022.**

15. As part of the first application for Operational Works, the Applicant is to submit a Pedestrian/Cycle Network Plan demonstrating provision of a concrete footpath with a minimum width of 2.5 metres to be located within the road reserve and to be constructed:-

    - along the frontage of the subject site;
    - inclusive of a delineated road crossing of Round Hill Road;
    - continue along the northern side of Round Hill Road; and
    - connect into the footpath network at the frontage of 2853 Round Hill Road (Lot 214 on SP262272) required as a Condition of DA/18/2017 for the Shopping Centre.

    The design of which shall comply with Austroads Standards and Council's Standard Drawing Concrete Pathway/Bikeway Details and is to be certified by an RPEQ experienced in that type of work. The foothpath is to be constructed and on maintenance prior to the commencement of use of the first stage.

    Advisory Note: Council's standard drawing is located within the Capricorn Municipal Development Guidelines - Drawings and Specifications at http://www.cmdg.com.au/index.htm.

16. **An Operational Plan to address Pedestrian & Cycle safety of patrons of the facility shall be submitted to Council prior to commencement of the use. The Operational Plan shall outline strategies to improve road safety for patrons of the facility and how unsafe practices can be avoided.**

17. Prior to the commencement of Stage 1, a minimum of 18 car parking spaces are to be constructed on site generally in accordance with the approved plans, including designated disabled car parking spaces. These spaces and all vehicle movement areas are to be constructed, sealed, line marked, provided with wheel stops and maintained in accordance

with the Engineering Design Planning Scheme Policy under the Our Place Our Plan Gladstone Regional Council Planning Scheme and AS2890.1.

18. Prior to the commencement of Stage 1, a minimum of 10 bicycle spaces are to be constructed onsite within 30m walking distance to the entry of the use. All bicycle spaces are to be constructed in accordance with AS2890.3.

19. As part of the Development Application for Operational Works for Stage 1, a Commercial Driveway is to be constructed in accordance with Council's Standard Drawing Urban Commercial/Industrial Driveway.

    Advisory Note: Council's standard drawing is located within the Capricorn Municipal Development Guidelines - Drawings and Specifications at http://www.cmdg.com.au/index.htm.

20. Prior to the commencement of Stage 1, shade street trees are to be constructed within the designated vehicle parking area at a rate of 1 tree per 6 vehicle parking spaces in accordance with Table 9.3.5.3.2 - Plant Species List of the Landscaping Code of the Our Place Our Plan Gladstone Regional Council Planning Scheme and the Capricorn Municipal Development Guidelines - Landscaping C273 Construction Specification.

Landscaping

21. As part of the Development Application for Operational Works for Stage 1, all grassed footpath areas disturbed by the development are to be top dressed and turfed following completion of construction activity.

22. As part of the Development Application for Operational Works for Stage 1, a full Landscaping Plan is to be provided in accordance with Table 9.3.5.3.2 - Plant Species List of the Landscaping Code of the Our Place Our Plan Gladstone Regional Council Planning Scheme and the Capricorn Municipal Development Guidelines - Landscaping C273 Construction Specification. The Landscaping Plan must include all recommendations outlined in the supporting approved reports, approved plans and conditioned within this package. The full Landscaping Plan is to be certified by a Landscape Architect.

23. As part of the first Development Application for Operational Works for Stage 1, all landscaping areas are to be constructed with an appropriate irrigation system. Details of the irrigation system are to be provided as part of the full Landscaping Plan.

    Advisory Note: Council's construction specification is located Capricorn Municipal Development Guidelines - Drawings and Specifications at http://www.cmdg.com.au/index.htm.

24. As part of the Development Application for Operational Works for Stage 1, street trees are to be constructed along the Round Hill Road frontage, at a rate of 1 tree per 10m in accordance with Table 9.3.5.3.2 - Plant Species List of the Landscaping Code of the Our Place Our Plan Gladstone Regional Council Planning Scheme and the Capricorn Municipal Development Guidelines - Landscaping C273 Construction Specification.

Advisory Note: Council's standard drawing is located within the Capricorn Municipal Development Guidelines - Drawings and Specifications at http://www.cmdg.com.au/index.htm.

25. **Prior to the commencement of use of Stage 1, construction of a minimum 1.2m high post and wire fence for the full extent of the boundaries must be completed. Details of which are to be included within any Development Application for Building Works.**

Waste Management

26. As part of any Development Application for Operational Works for Stage 1, a Waste Management Plan is to be submitted and approved by Council. The Waste Management Plan is to be in accordance with the Waste Management Planning Scheme Policy of the Gladstone Regional Planning Scheme.

27. Prior to the commencement of the use for Stage 1, refuse bins are to be provided in accordance with the Waste Management Plan.

28. Prior to the commencement of the use for Stage 1, the waste storage area/s are to be sufficient in size to house all waste collection containers including recycling waste containers. The waste storage area/s must be suitably enclosed and imperviously paved, with a hose cock and hose fitted in close proximity to the enclosure to ensure the area can be easily and effectively cleaned.

29. Prior to the commencement of the use for Stage 1, open storage areas shall be adequately screened so as not to detract from the visual amenity of the area. One way of achieving compliance with this condition is as follows:

    a. Outdoor storage areas are situated in locations not visible from the street; and
    b. A 1.8m solid screen fence is located around storage areas.

Environmental Health

30. At all times, the development must achieve the noise generation levels set out in the *Environmental Protection (Noise) Policy 2019*, as amended.

31. At all times, the development must achieve the air quality design objectives set out in the *Environmental Protection (Air) Policy 2019*, as amended.

32. Upon commencement of the use, should service deliveries occur outside the timeframes of 7am-7pm, an Environmental Management Plan is to be submitted to Council for approval which outlines the management strategies to minimise noise impacts to the adjacent residential uses. The Environmental Management Plan is to be in accordance with the maximum limits as per the *Environmental Protection (Noise Policy) 2008* under the *Environmental Protection Act 1994*.

Lawful Commencement

33. Prior to the commencement of this use, the Applicant is to request that a Compliance Inspection be undertaken by Council to confirm that all conditions of this Development Permit are considered compliant.

34. Upon receipt of confirmation from Council that all conditions of this Development Permit are considered compliant, the Applicant is to notify Council within 20 business days that this approved use has lawfully commenced.

END OF CONDITIONS

Advice to Applicant:

An Adopted Infrastructure Charge Notice in relation to the infrastructure charges applicable to this development has been provided separately.

Schedule 1 Appeals

section 229

1 Appeal rights and parties to appeals

(1) Table 1 states the matters that may be appealed to—

(a) the P&E court; or

(b) a tribunal.

(2) However, table 1 applies to a tribunal only if the matter involves—

(a) the refusal, or deemed refusal of a development application, for—

(i) a material change of use for a classified building; or

(ii) operational work associated with building work, a retaining wall, or a tennis court; or

(b) a provision of a development approval for—

(i) a material change of use for a classified building; or

(ii) operational work associated with building work, a retaining wall, or a tennis court; or

(c) if a development permit was applied for—the decision to give a preliminary approval for—

(i) a material change of use for a classified building; or

(ii) operational work associated with building work, a retaining wall, or a tennis court; or

(d) a development condition if—

(i) the development approval is only for a material change of use that involves the use of a building classified under the Building Code as a class 2 building; and

(ii) the building is, or is proposed to be, not more than 3 storeys; and

(iii) the proposed development is for not more than 60 sole-occupancy units; or

(e) a decision for, or a deemed refusal of, an extension application for a development approval that is only for a material change of use of a classified building; or

(f) a decision for, or a deemed refusal of, a change application for a development approval that is only for a material change of use of a classified building; or

(g) a matter under this Act, to the extent the matter relates to the Building Act, other than a matter under that Act that may or must be decided by the Queensland Building and Construction Commission; or

(h) a decision to give an enforcement notice—

(i) in relation to a matter under paragraphs (a) to (g); or

(ii) under the *Plumbing and Drainage Act 2018*; or

(i) an infrastructure charges notice; or

(j) the refusal, or deemed refusal, of a conversion application; or

(l) a matter prescribed by regulation.

(3) Also, table 1 does not apply to a tribunal if the matter involves—

(a) for a matter in subsection (2)(a) to (d)—

(i) a development approval for which the development application required impact assessment; and

(ii) a development approval in relation to which the assessment manager received a properly made submission for the development application; or

(b) a provision of a development approval about the identification or inclusion, under a variation approval, of a matter for the development.

(4) Table 2 states the matters that may be appealed only to the P&E Court.

(5) Table 3 states the matters that may be appealed only to the tribunal.

(6) In each table—

(a) column 1 states the appellant in the appeal; and

(b) column 2 states the respondent in the appeal; and

(c) column 3 states the co-respondent (if any) in the appeal; and

(d) column 4 states the co-respondents by election (if any) in the appeal.

(7) If the chief executive receives a notice of appeal under section 230(3)(f), the chief executive may elect to be a co-respondent in the appeal.

(8) In this section—

storey see the Building Code, part A1.1.

Table 1
Appeals to the P&E Court and, for certain matters, to a tribunal

1. Development applications
For a development application other than an excluded application, an appeal may be made against—
(a) the refusal of all or part of the development application; or
(b) the deemed refusal of the development application; or
(c) a provision of the development approval; or
(d) if a development permit was applied for—the decision to give a preliminary approval.

Table 1
Appeals to the P&E Court and, for certain matters, to a tribunal

Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
The applicant	The assessment manager	If the appeal is about a concurrence agency's referral response—the concurrence agency	1 A concurrence agency that is not a co-respondent 2 If a chosen assessment manager is the respondent—the prescribed assessment manager 3 Any eligible advice agency for the application 4 Any eligible submitter for the application
2. Change applications For a change application other than an excluded application, an appeal may be made against— (a) the responsible entity's decision on the change application; or (b) a deemed refusal of the change application.			

Table 1
Appeals to the P&E Court and, for certain matters, to a tribunal

Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
1 The applicant 2 If the responsible entity is the assessment manager—an affected entity that gave a pre-request notice or response notice	The responsible entity	If an affected entity starts the appeal—the applicant	1 A concurrence agency for the development application 2 If a chosen assessment manager is the respondent—the prescribed assessment manager 3 A private certifier for the development application 4 Any eligible advice agency for the change application 5 Any eligible submitter for the change application
3. Extension applications For an extension application other than an extension application called in by the Minister, an appeal may be made against— (a) the assessment manager's decision on the extension application; or (b) a deemed refusal of the extension application.			

Table 1
Appeals to the P&E Court and, for certain matters, to a tribunal

Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
1 The applicant 2 For a matter other than a deemed refusal of an extension application—a concurrence agency, other than the chief executive, for the application	The assessment manager	If a concurrence agency starts the appeal—the applicant	If a chosen assessment manager is the respondent—the prescribed assessment manager
4. Infrastructure charges notices An appeal may be made against an infrastructure charges notice on 1 or more of the following grounds— (a) the notice involved an error relating to— (i) the application of the relevant adopted charge; or *Examples of errors in applying an adopted charge—* • the incorrect application of gross floor area for a non-residential development • applying an incorrect 'use category', under a regulation, to the development (ii) the working out of extra demand, for section 120; or (iii) an offset or refund; or (b) there was no decision about an offset or refund; or (c) if the infrastructure charges notice states a refund will be given—the timing for giving the refund; or (d) for an appeal to the P&E Court—the amount of the charge is so unreasonable that no reasonable relevant local government could have imposed the amount.			

Table 1 Appeals to the P&E Court and, for certain matters, to a tribunal			
Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
The person given the infrastructure charges notice	The local government that gave the infrastructure charges notice	—	—
5. Conversion applications An appeal may be made against— (a) the refusal of a conversion application; or (b) a deemed refusal of a conversion application.			
Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
The applicant	The local government to which the conversion application was made	—	—
6. Enforcement notices An appeal may be made against the decision to give an enforcement notice.			
Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
The person given the enforcement notice	The enforcement authority	—	If the enforcement authority is not the local government for the premises in relation to which the offence is alleged to have happened—the local government

Table 2
Appeals to the P&E Court only

1. Appeals from tribunal

An appeal may be made against a decision of a tribunal, other than a decision under section 252, on the ground of—

(a) an error or mistake in law on the part of the tribunal; or

(b) jurisdictional error.

Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
A party to the proceedings for the decision	The other party to the proceedings for the decision	—	—

2. Eligible submitter appeals

For a development application or change application other than an excluded application, an appeal may be made against the decision to approve the application, to the extent the decision relates to—

(a) any part of the development application or change application that required impact assessment; or

(b) a variation request.

Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
1 For a development application—an eligible submitter for the development application 2 For a change application—an eligible submitter for the change application	1 For a development application—the assessment manager 2 For a change application—the responsible entity	1 The applicant 2 If the appeal is about a concurrence agency's referral response—the concurrence agency	Another eligible submitter for the application

Table 2
Appeals to the P&E Court only

3. Eligible submitter and eligible advice agency appeals

For a development application or change application other than an excluded application, an appeal may be made against a provision of the development approval, or a failure to include a provision in the development approval, to the extent the matter relates to—

(a) any part of the development application or change application that required impact assessment; or

(b) a variation request.

Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
1 For a development application—an eligible submitter for the development application 2 For a change application—an eligible submitter for the change application 3 An eligible advice agency for the development application or change application	1 For a development application—the assessment manager 2 For a change application—the responsible entity	1 The applicant 2 If the appeal is about a concurrence agency's referral response—the concurrence agency	Another eligible submitter for the application

4. Compensation claims

An appeal may be made against—

(a) a decision under section 32 about a compensation claim; or

(b) a decision under section 265 about a claim for compensation; or

(c) a deemed refusal of a claim under paragraph (a) or (b).

Table 2 Appeals to the P&E Court only			
Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
A person dissatisfied with the decision	The local government to which the claim was made	—	—
5. Registered premises An appeal may be made against a decision of the Minister under chapter 7, part 4.			
Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
1 A person given a decision notice about the decision 2 If the decision is to register premises or renew the registration of premises—an owner or occupier of premises in the affected area for the registered premises who is dissatisfied with the decision	The Minister	—	If an owner or occupier starts the appeal—the owner of the registered premises
6. Local laws An appeal may be made against a decision of a local government, or conditions applied, under a local law about— (a) the use of premises, other than a use that is the natural and ordinary consequence of prohibited development; or (b) the erection of a building or other structure.			

Table 2 Appeals to the P&E Court only			
Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
A person who— (a) applied for the decision; and (b) is dissatisfied with the decision or conditions.	The local government	—	—

Table 3 Appeals to a tribunal only			
1. Building advisory agency appeals An appeal may be made against giving a development approval for building work to the extent the building work required code assessment against the building assessment provisions.			
Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
A building advisory agency for the development application related to the approval	The assessment manager	The applicant	1 A concurrence agency for the development application related to the approval 2 A private certifier for the development application related to the approval

Table 3
Appeals to a tribunal only

2. Inspection of building work

An appeal may be made against a decision of a building certifier or referral agency about the inspection of building work that is the subject of a building development approval under the Building Act.

Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
The applicant for the development approval	The person who made the decision	—	—

3. Certain decisions under the Building Act and the *Plumbing and Drainage Act 2018*

An appeal may be made against—

(a) a decision under the Building Act, other than a decision made by the Queensland Building and Construction Commission, if an information notice about the decision was given or required to be given under that Act; or

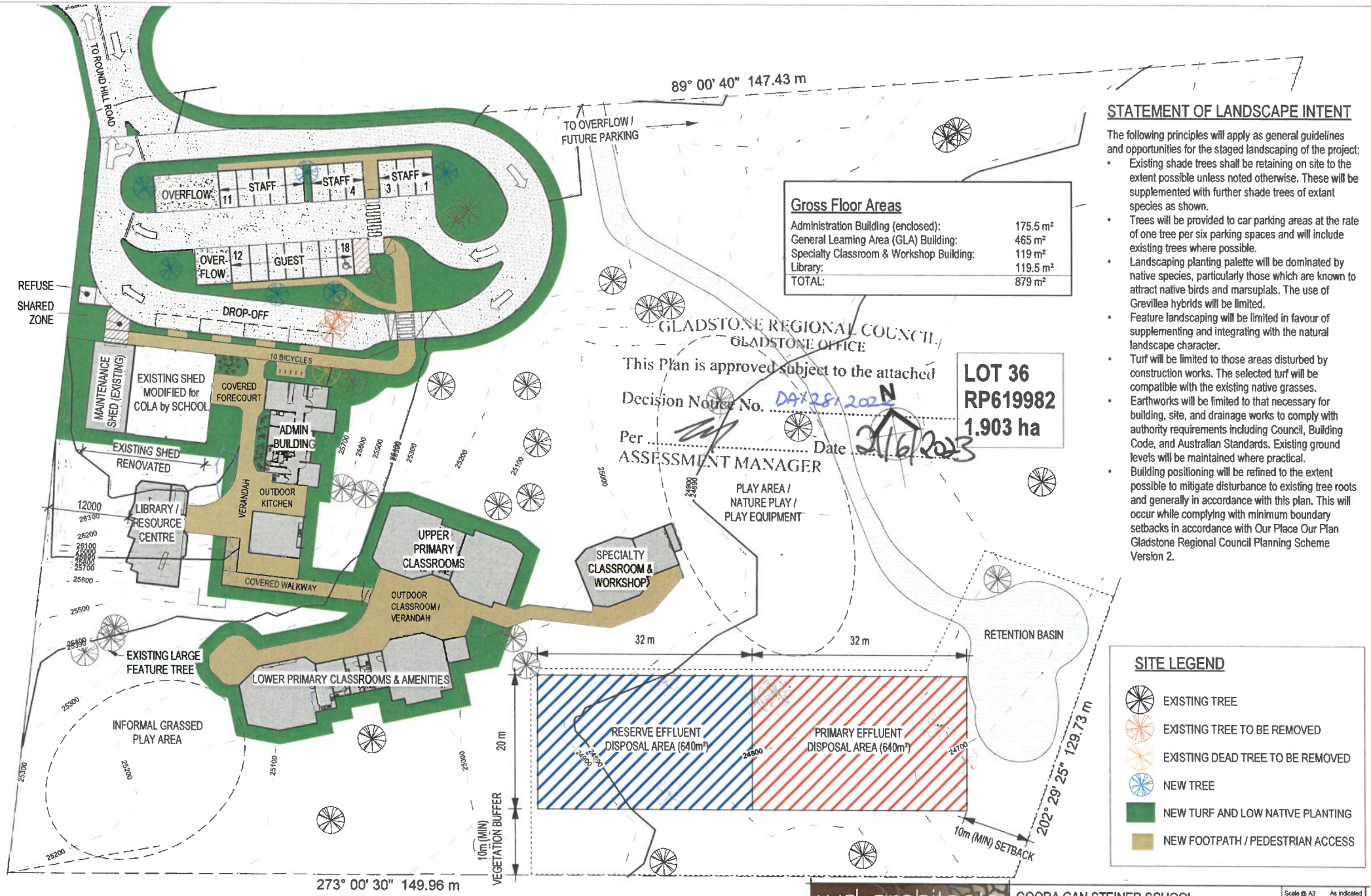
(b) a decision under the *Plumbing and Drainage Act 2018*, other than a decision made by the Queensland Building and Construction Commission, if an information notice about the decision was given or required to be given under that Act.

Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
A person who received, or was entitled to receive, an information notice about the decision	The entity that made the decision	—	—

4. Local government failure to decide application under the Building Act

An appeal may be made against a local government's failure to decide an application under the Building Act within the period required under that Act.

Table 3 Appeals to a tribunal only			
Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
A person who was entitled to receive notice of the decision	The local government to which the application was made	—	—
5. Failure to make a decision about an application or other matter under the *Plumbing and Drainage Act 2018* An appeal may be made against a failure to make a decision under the *Plumbing and Drainage Act 2018*, other than a failure by the Queensland Building and Construction Commission to make a decision, within the period required under that Act, if an information notice about the decision was required to be given under that Act.			
Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
A person who was entitled to receive an information notice about the decision	The entity that failed to make the decision	—	—



GLADSTONE REGIONAL COUNCIL
GLADSTONE OFFICE
This Plan is approved subject to the attached
Decision Notice No. DA/281/2022
Per ..... Date 21/6/2023
ASSESSMENT MANAGER

Gross Floor Areas

Administration Building (enclosed):	175.5 m²
General Learning Area (GLA) Building:	465 m²
Specialty Classroom & Workshop Building:	119 m²
Library:	119.5 m²
TOTAL:	879 m²

LOT 36
RP619982
1.903 ha

STATEMENT OF LANDSCAPE INTENT

The following principles will apply as general guidelines and opportunities for the staged landscaping of the project:

- Existing shade trees shall be retaining on site to the extent possible unless noted otherwise. These will be supplemented with further shade trees of extant species as shown.
- Trees will be provided to car parking areas at the rate of one tree per six parking spaces and will include existing trees where possible.
- Landscaping planting palette will be dominated by native species, particularly those which are known to attract native birds and marsupials. The use of Grevillea hybrids will be limited.
- Feature landscaping will be limited in favour of supplementing and integrating with the natural landscape character.
- Turf will be limited to those areas disturbed by construction works. The selected turf will be compatible with the existing native grasses.
- Earthworks will be limited to that necessary for building, site, and drainage works to comply with authority requirements including Council, Building Code, and Australian Standards. Existing ground levels will be maintained where practical.
- Building positioning will be refined to the extent possible to mitigate disturbance to existing tree roots and generally in accordance with this plan. This will occur while complying with minimum boundary setbacks in accordance with Our Place Our Plan Gladstone Regional Council Planning Scheme Version 2.

SITE LEGEND

- EXISTING TREE
- EXISTING TREE TO BE REMOVED
- EXISTING DEAD TREE TO BE REMOVED
- NEW TREE
- NEW TURF AND LOW NATIVE PLANTING
- NEW FOOTPATH / PEDESTRIAN ACCESS

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
5	Issued for minor change	20/04/2023
4	Issued for BGA funding	23/02/2023

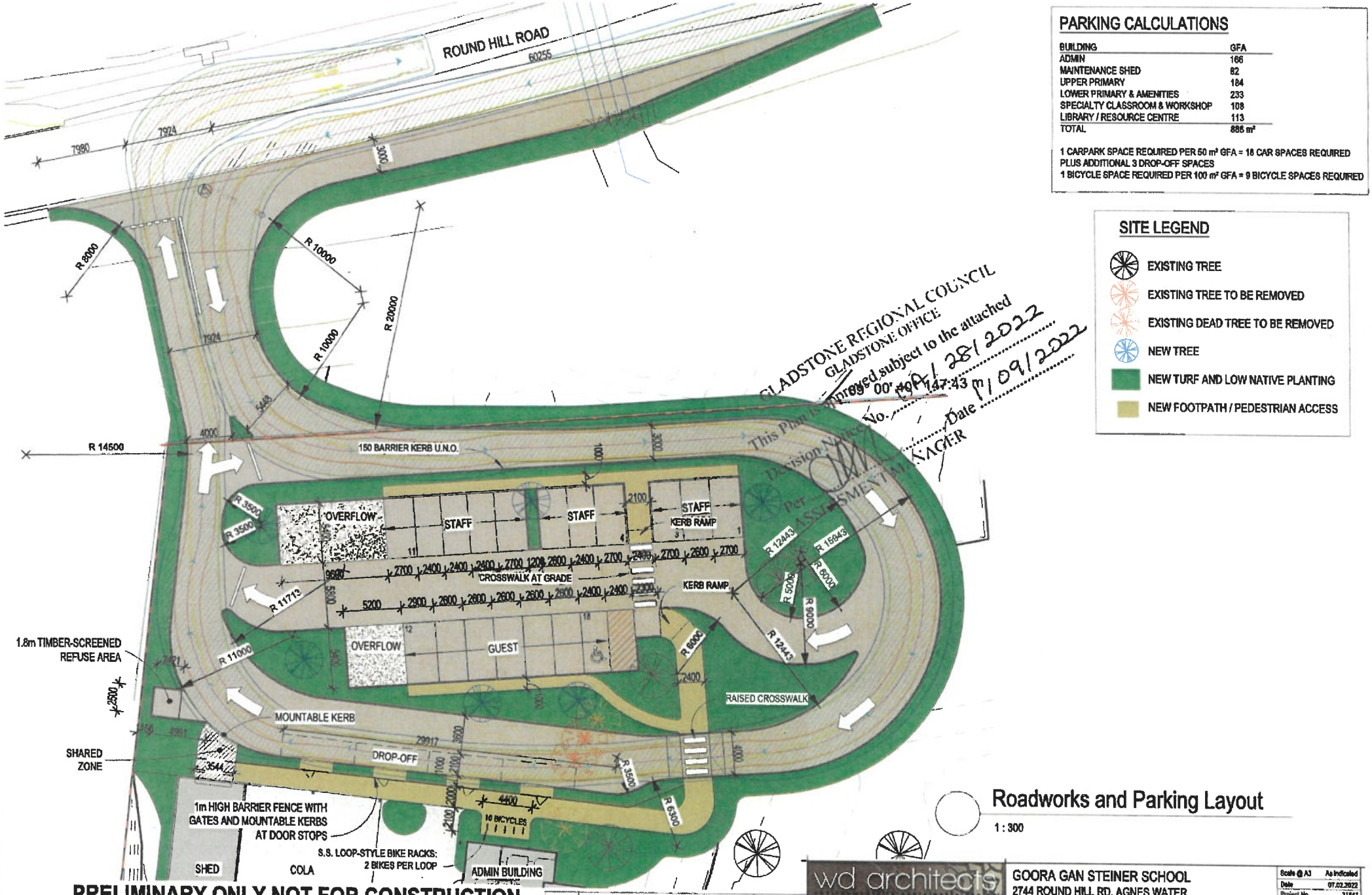
wd architects
118 Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 970 741

GOORA GAN STEINER SCHOOL
2744 ROUND HILL RD, AGNES WATER

SITE PLAN and LANDSCAPE PLAN

Scale @ A3	As indicated
Date	07.02.2022
Project No.	21641
Drawn by	AW/MLJES
Checked by	AW

A110 — 5 Revision



PARKING CALCULATIONS

BUILDING	GFA
ADMIN	166
MAINTENANCE SHED	82
UPPER PRIMARY	184
LOWER PRIMARY & AMENITIES	233
SPECIALTY CLASSROOM & WORKSHOP	108
LIBRARY / RESOURCE CENTRE	113
TOTAL	886 m²

1 CARPARK SPACE REQUIRED PER 50 m² GFA = 18 CAR SPACES REQUIRED
PLUS ADDITIONAL 3 DROP-OFF SPACES
1 BICYCLE SPACE REQUIRED PER 100 m² GFA = 9 BICYCLE SPACES REQUIRED

SITE LEGEND

- EXISTING TREE
- EXISTING TREE TO BE REMOVED
- EXISTING DEAD TREE TO BE REMOVED
- NEW TREE
- NEW TURF AND LOW NATIVE PLANTING
- NEW FOOTPATH / PEDESTRIAN ACCESS

GLADSTONE REGIONAL COUNCIL
GLADSTONE OFFICE
Approved subject to the attached
Conditions 00' 49" / 28 / 2022
No. 147.43 m / 09 / 2022
Date
This Plan is Approved
Division No.
Per
ASSESSMENT MANAGER

Roadworks and Parking Layout

1 : 300

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
1	Issued for approval	1/03/2022

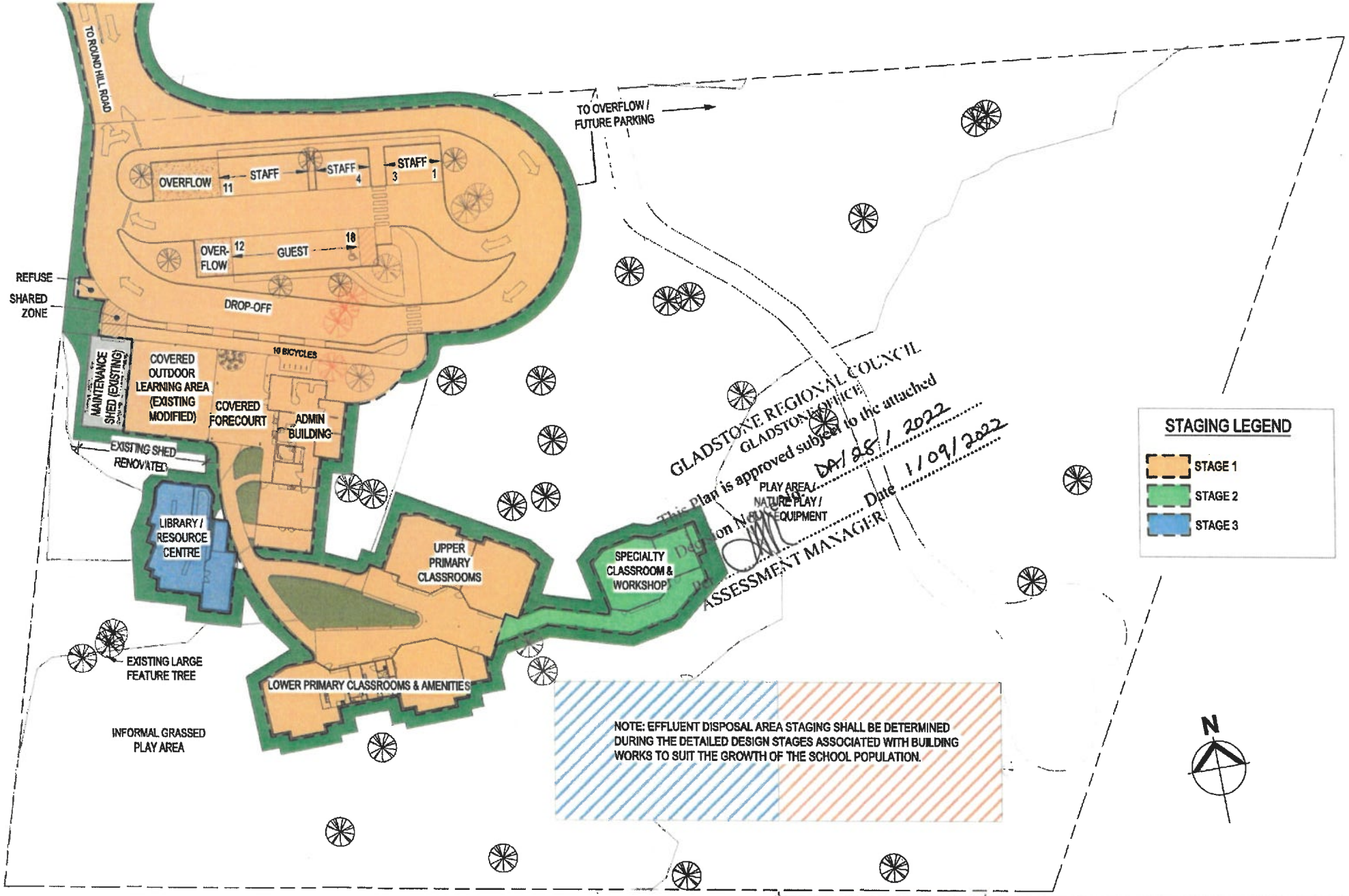
wd architects
118 Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 872 747

GOORA GAN STEINER SCHOOL
2744 ROUND HILL RD, AGNES WATER

ROADWORKS AND PARKING LAYOUT

Scale @ A3	As indicated
Date	07.02.2022
Project No.	21641
Drawn by	AW
Checked by	AW

A120 — 1 Revision



GLADSTONE REGIONAL COUNCIL
GLADSTONE OFFICE
This Plan is approved subject to the attached
Decision Notice DA/ 28 / 2022
Delegated Officer ..... Date 1/09/2022
ASSESSMENT MANAGER

PRELIMINARY ONLY NOT FOR CONSTRUCTION

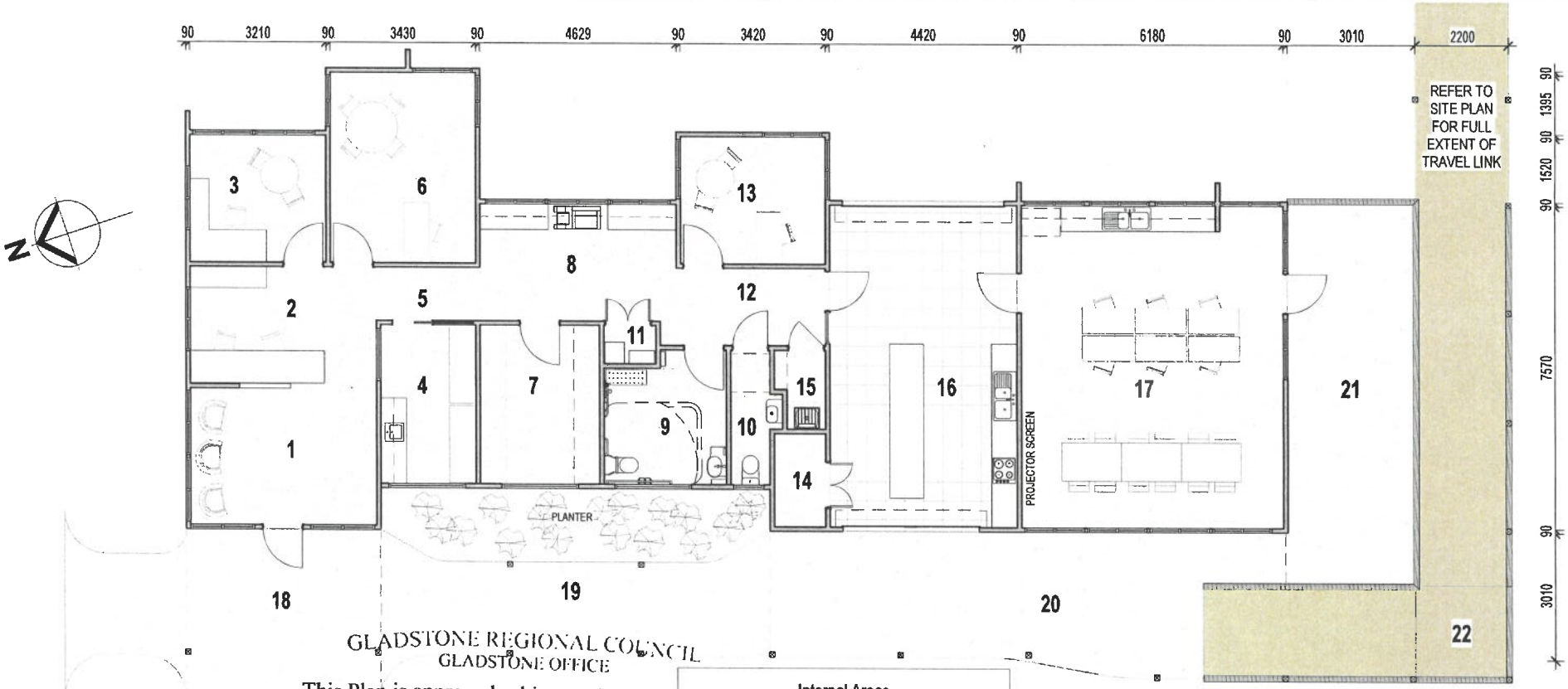
No.	Revision	Date
1	Issued for approval	1/03/2022

wd architects
118 Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 873 70

GOORA GAN STEINER SCHOOL
2744 ROUND HILL RD, AGNES WATER

STAGING PLAN

Scale @ A3	1:600
Date	07.02.2022
Project No.	21641
Drawn by	AW/ML
Checked by	AW
A130	1 Revision



GLADSTONE REGIONAL COUNCIL
GLADSTONE OFFICE

This Plan is approved subject to the attached

Decision Notice No. DA1281202

Per ..... Date 21/6/2023

ASSESSMENT MANAGER

SHED CONVERTED TO COLA BY SCHOOL (NOT BGA FUNDING)

Internal Areas

Number	Name	Area
1	RECEPTION	14 m²
2	ADMINISTRATION OFFICE	12 m²
3	REGISTRAR'S OFFICE	10 m²
4	SICK BAY	8 m²
5	CORRIDOR 1	3 m²
6	PRINCIPAL'S OFFICE	15 m²
7	STORE ROOM	10 m²
8	PHOTOCOPY/STATIONERY	13 m²
9	STAFF TOILET 1	8 m²
10	STAFF TOILET 2	3 m²
11	ELEC/COMMS	1 m²
12	CORRIDOR 2	7 m²
13	BUSINESS MANAGER'S OFFICE	10 m²
14	FLA STORAGE	3 m²
15	CLEANER	2 m²
16	FLEXIBLE LEARNING AREA	33 m²
17	STAFF ROOM	46 m²
Total: 17		199 m²

External Areas

Number	Name	Area
18	ENTRY PORTICO	36 m²
19	TRAVEL LINK 1	22 m²
20	WEST VERANDAH	35 m²
21	SOUTH VERANDAH	27 m²
22	TRAVEL LINK 2	60 m²
Total: 5		180 m²

0 1 2.5 5 10m

SCALE 1:100

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
5	Issued for BGA funding	23.02.2023
4	Issued for final costing	21.02.2023

wd architects
118 Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 920 791

GOORA GAN STEINER SCHOOL
2744 ROUND HILL RD, AGNES WATER
ADMINISTRATION BUILDING

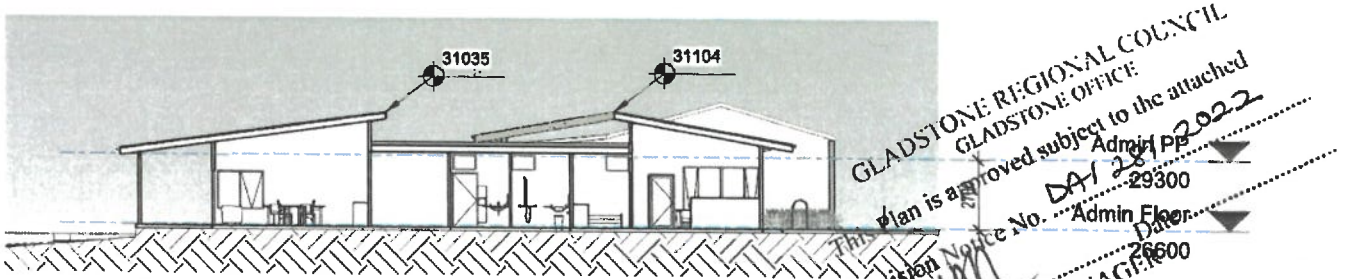
FLOOR PLAN

Scale @ A3	1: 100
Date	19.02.2023
Project No.	21641
Drawn by	AW
Checked by	AW

A1-300 | 5 Revision

Section 1

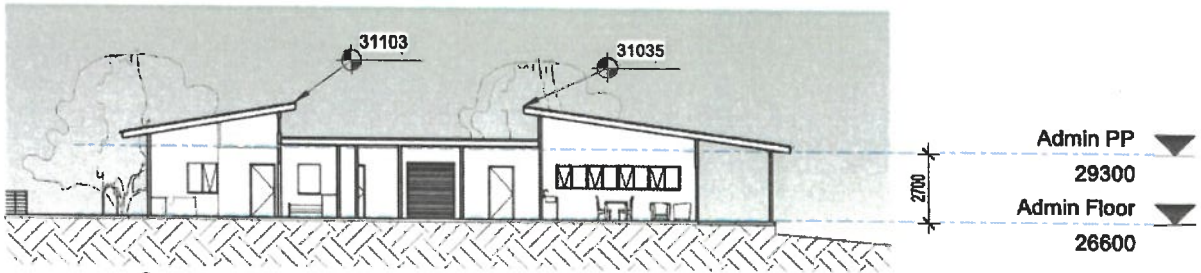
1 : 200



Section 2

1 : 200

GLADSTONE REGIONAL COUNCIL
GLADSTONE OFFICE
This plan is approved subject to the attached Decision Notice No. DA/ 28/ 2022
Date
Per ...
ASSESSMENT MANAGER



Section 3

1 : 200

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
2	Issued for approval	01.03.2022
1	Issued for coordination	15.02.2022

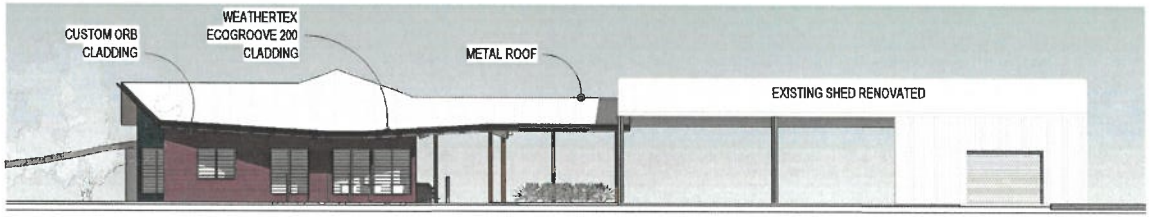
wd architects
118 Barnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 879 74

GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATER
ADMINISTRATION BUILDING and COLA

SECTIONS

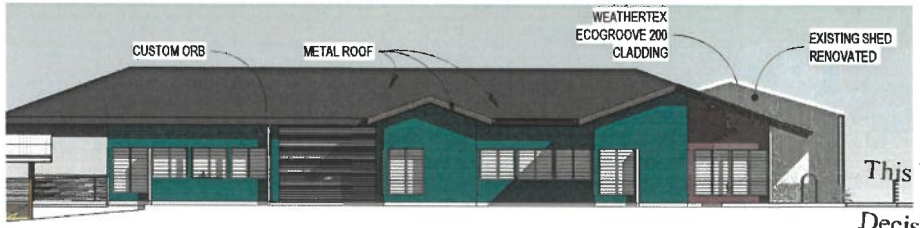
Scale @ A3	1 : 200
Date	21.01.22
Project No.	641
Drawn by	ML
Checked by	AW

A400 | 2 Revision



North Elevation

1 : 200



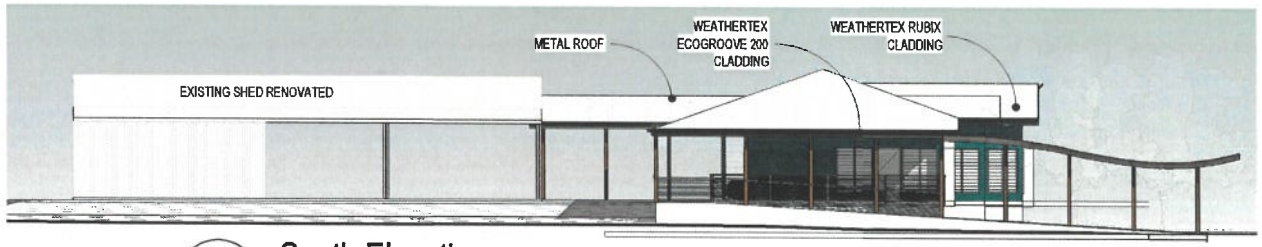
East Elevation

1 : 200

GLADSTONE REGIONAL COUNCIL
GLADSTONE OFFICE
This Plan is approved subject to the attached
Decision Notice No. DA/128/2022
Per ..... Date 21/6/2023
ASSESSMENT MANAGER

West Elevation

1 : 200



South Elevation

1 : 200

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
2	Issued for approval	01.03.2022
1	Issued for coordination	15.02.2022

wd architects
116 Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0449 970 761

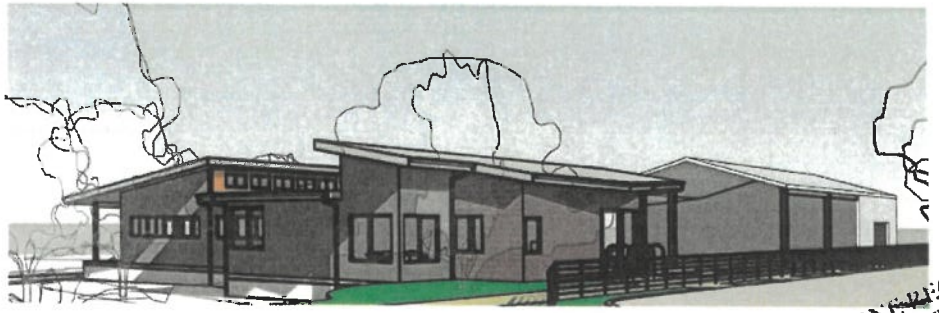
GOORA GAN STEINER SCHOOL
2744 ROUND HILL RD, AGNES WATER
ADMINISTRATION BUILDING

ELEVATIONS

Scale @ A3	1 : 200
Date	19.02.2023
Project No.	21641
Drawn by	AW
Checked by	AW

A1-500 | 2 Revision

North View



East View

South View

GLADSTONE REGIONAL COUNCIL
GLADSTONE OFFICE
This Plan is approved subject to the attached Decision Notice No. DA/28/2022
Per ..... Date 1/09/2022
ASSESSMENT MANAGER

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
2	Issued for approval	01.03.2022
1	Issued for coordination	15.02.2022

wd architects
118 Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 870 761

GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATER
ADMINISTRATION BUILDING and COLA

PERSPECTIVES

Scale @ A3	
Date	21.01.22
Project No.	941
Drawn by	ML
Checked by	AW

A900 | 2 Revision

GLADSTONE REGIONAL COUNCIL
GLADSTONE OFFICE
This Plan is approved subject to the attached
Decision Notice No. DA/128/2022
Per ..... Date 21/6/2023
ASSESSMENT MANAGER

Room Schedule		
Number	Name	Area
1	PREP CLASSROOM	100 m²
2	CLASSROOM	85 m²
3	CLASSROOM	85 m²
4	CLASSROOM	86 m²
5	SHARED STOREROOM	20 m²
6	STORAGE	11 m²
7	WITHDRAWAL ROOM	11 m²
8	KITCHEN	13 m²
9	CLEANER	2 m²
10	UNISEX TOILETS	17 m²
11	PWD TOILET	7 m²
12	PREP STOREROOM	10 m²
13	GLA COLA	120 m²
14	VERANDAH	72 m²
15	PREP COLA	41 m²
Grand total: 15		679 m²

0 1 5 10 20m
SCALE 1:200

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
4	Issued for BGA funding	23.02.2023
3	Revised for BGA application	01.12.2022

wd architects
116 Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0449 879 ...

GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATER
CLASSROOM BUILDINGS

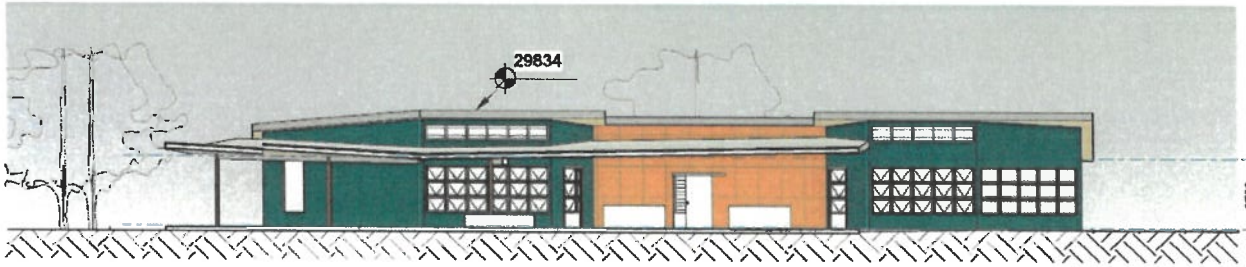
FLOOR PLAN

Scale @ A3	1 : 200
Date	19.02.23
Project No.	641
Drawn by	AW
Checked by	AW

A2-300 | 4 Revision

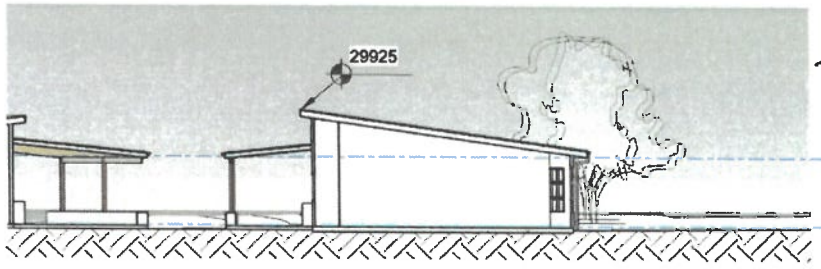
Section 1

1 : 200



Section 2

1 : 200



Section 3

1 : 200

GLADSTONE REGIONAL COUNCIL
GLADSTONE OFFICE
This Plan is approved subject to the attached
Decision Notice No. DA/28/2022
Date 1/09/2022
Per ..... GLA MANAGER
ASSESSMENT

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
2	Issued for approval	01.03.2022
1	Issued for coordination	15.02.2022

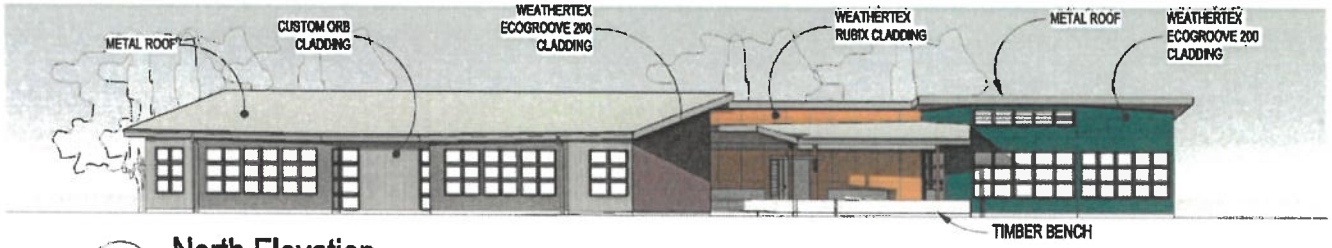
wd architects
118 Gamer Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 870 701

GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATER
CLASSROOM BUILDINGS

SECTIONS

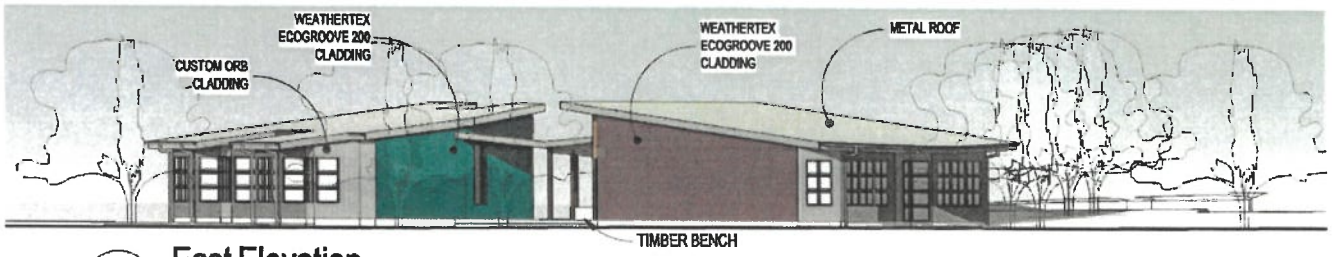
Scale @ A3	1 : 200
Date	07.02.22
Project No.	941
Drawn by	ML
Checked by	AW

A400 | 2 Revision



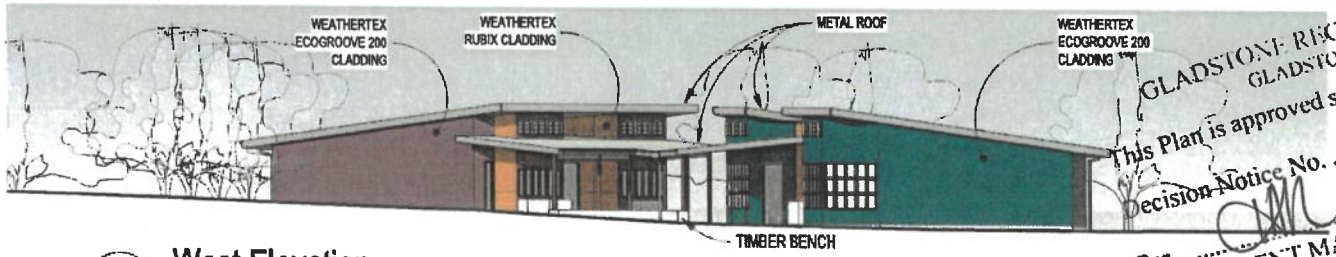
North Elevation

1 : 200



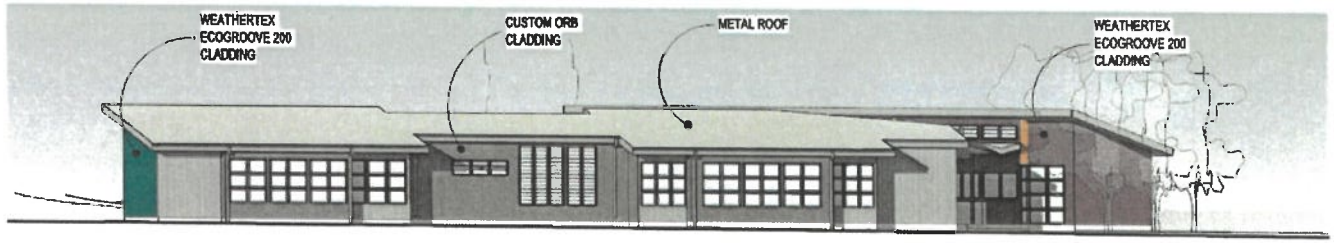
East Elevation

1 : 200



West Elevation

1 : 200



South Elevation

1 : 200

GLADSTONE REGIONAL COUNCIL
GLADSTONE OFFICE
This Plan is approved subject to the attached Decision Notice No. DA/28/2022 Date 1/09/2022
Per ..... ASSESSMENT MANAGER

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
2	Issued for approval	01.03.2022
1	Issued for coordination	15.02.2022

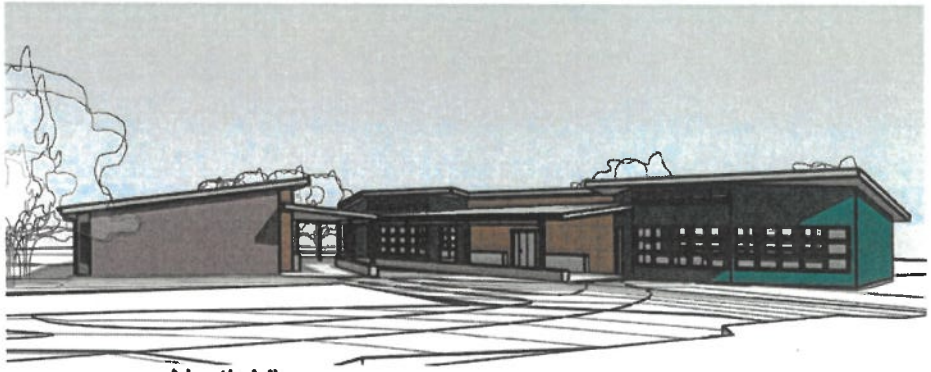
wd architects
118 Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 470 76

GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATER
CLASSROOM BUILDINGS

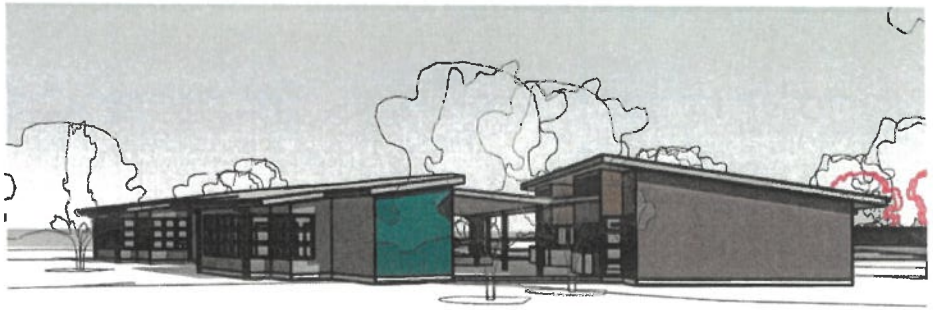
ELEVATIONS

A500 | 2 Revision

Scale @ A3 1 : 200
Date 07.02.22
Project No. 941
Drawn by ML
Checked by AW



North View



South East View

North West View

GLADSTONE REGIONAL COUNCIL
GLADSTONE OFFICE
This Plan is approved subject to the attached
Decision Notice No. DA/281 2022
Per ..... Date 1/09/2022
ASSESSMENT MANAGER

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
2	Issued for approval	01.03.2022
1	Issued for coordination	15.02.2022

wd architects
118 Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0345 870 76

GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATER
CLASSROOM BUILDINGS

PERSPECTIVES

Scale @ A3	
Date	07.02.22
Project No.	641
Drawn by	ML
Checked by	AW
A900	2 Revision

Room Schedule		
Number	Name	Area
04	STOREROOM	10 m²
05	LIBRARY	103 m²
06	VERANDAH	Not Enclosed
Grand total: 3		113 m²

GLADSTONE REGIONAL COUNCIL
GLADSTONE OFFICE
This Plan is approved subject to the attached
Decision Notice No. DA/28/2022
Per .....
ASSESSMENT MANAGER Date 21/6/2023

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
2	Revised site position and verandah	24.04.2023
1	Issued for approval	01.03.2022

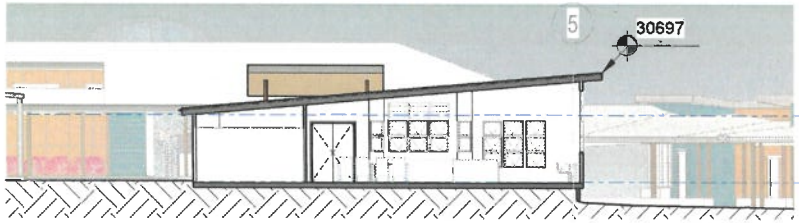
wd architects
118 Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 520 763

GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATER
PROPOSED LIBRARY/RESOURCE CENTRE

FLOOR PLAN

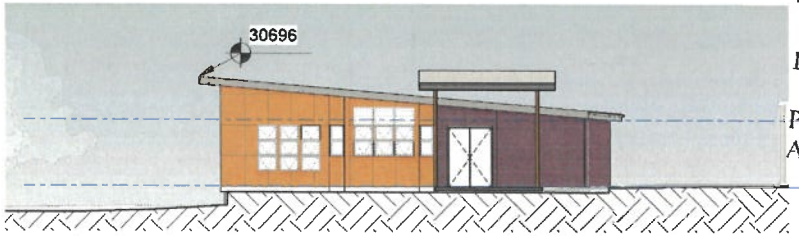
Scale @ A3	1 : 200
Date	07.02.22
Project No.	641
Drawn by	SP
Checked by	AW

A300 — 2 Revision



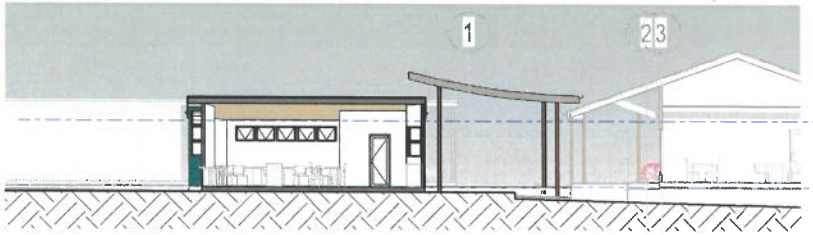
Section 1

1 : 200



Section 2

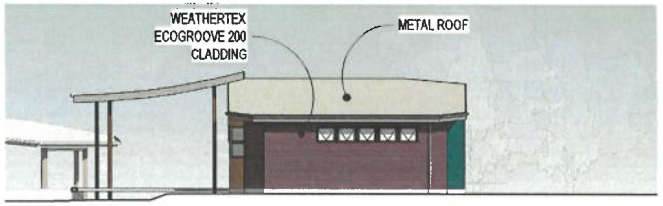
1 : 200



Section 3

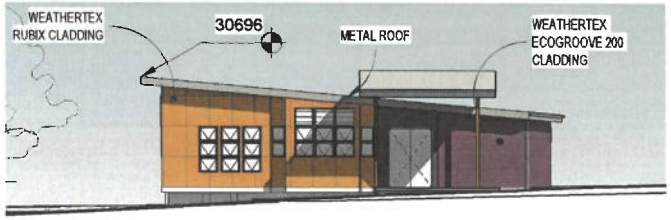
1 : 200

GLADSTONE REGIONAL COUNCIL
GLADSTONE OFFICE
This Plan is approved subject to the attached
Decision Notice No. DA12812022
Per
ASSESSMENT MANAGER
Date 21/6/2023



North Elevation

1 : 200

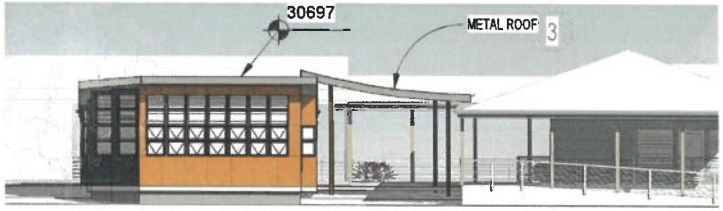


East Elevation

1 : 200

West Elevation

1 : 200



South Elevation

1 : 200

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
2	Revised site position and verandah	24.04.2023
1	Issued for approval	01.03.2022

wd architects
118 Garnet Street Loerey QLD 4568
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0449 970 74

GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATER
PROPOSED LIBRARY/RESOURCE CENTRE

ELEVATIONS AND SECTIONS

Scale @ A3	1 : 200
Date	07.02.22
Project No.	641
Drawn by	SP
Checked by	AW

A500 — 2 Revision

South View

GLADSTONE REGIONAL COUNCIL
GLADSTONE OFFICE
This Plan is approved subject to the attached
Decision Notice No. DA/28/2022
Per ..... Date 21/6/2023
ASSESSMENT MANAGER

PRELIMINARY ONLY NOT FOR CONSTRUCTION

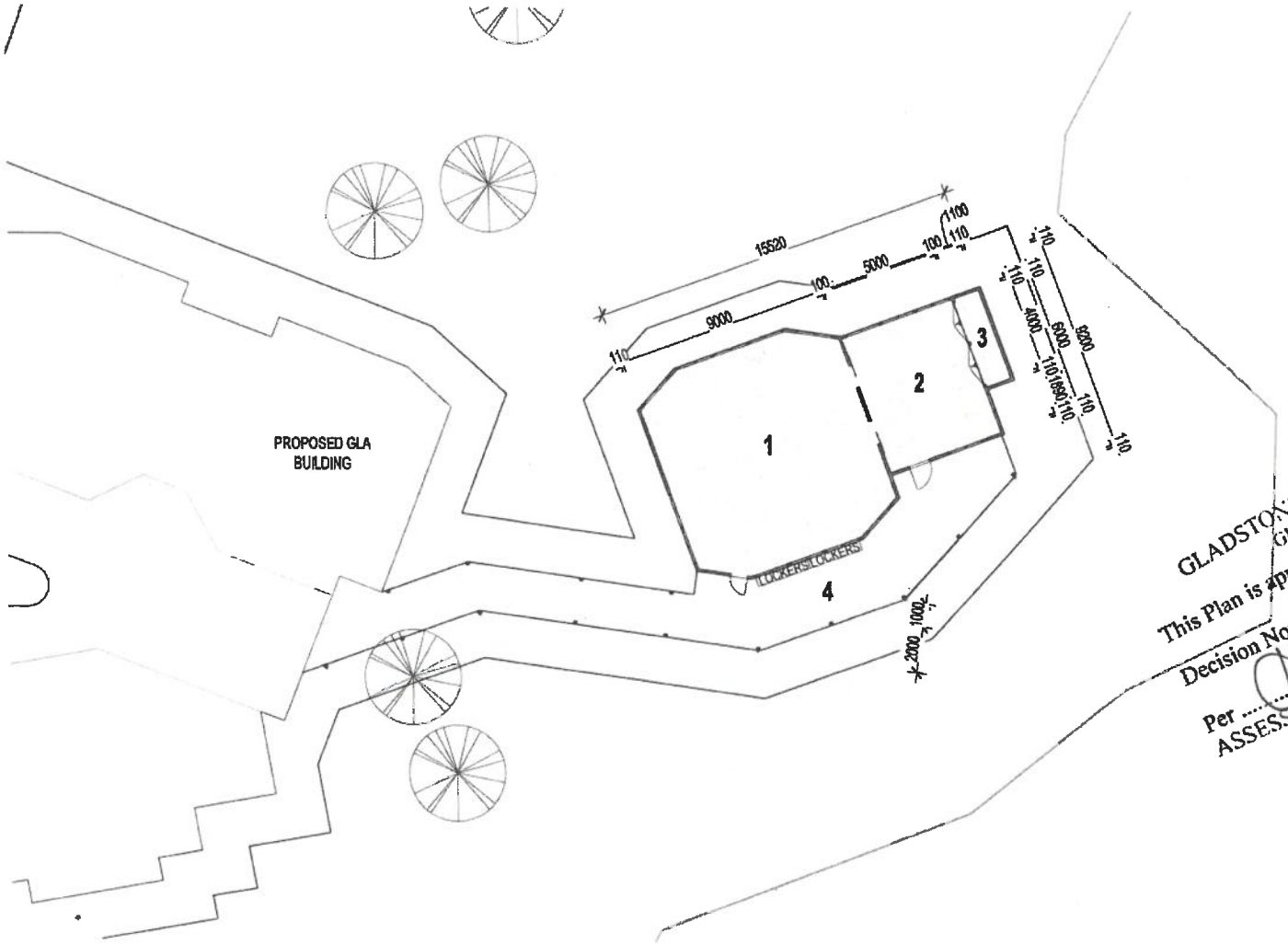
No.	Revision	Date
2	Revised site position and verandah	24.04.2023
1	Issued for approval	01.03.2022

wd architects
116 Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0449 970 761

GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATER
PROPOSED LIBRARY/RESOURCE CENTRE

PERSPECTIVES

Scale @ A3	
Date	07.02.22
Project No.	641
Drawn by	SP
Checked by	AW
A900	2 Revision



Room Schedule		
Number	Name	Area
1	SPECIALTY CLASSROOM	78 m²
2	WORKSHOP	30 m²
3	STORAGE	4 m²
4	COVERED AREA	82 m²
Grand total: 4		195 m²

GLADSTONE REGIONAL COUNCIL
GLADSTONE OFFICE
This Plan is approved subject to the attached Decision Notice No. DA/28/2022 Date 1/09/2022
Per .....
ASSESSMENT MANAGER

N

PRELIMINARY ONLY NOT FOR CONSTRUCTION

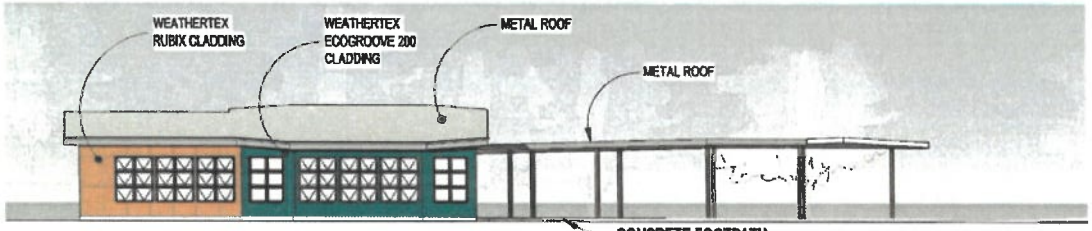
No.	Revision	Date
2	Issued for approval	01.03.2022
1	Issued for coordination	15.02.2022

wd architects
119 Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 870 70

GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATER
SPECIALTY CLASSROOM and WORKSHOP

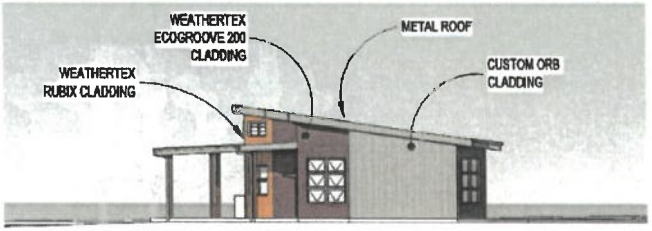
FLOOR PLAN

Scale @ A3	1:200
Date	07.02.22
Project No.	941
Drawn by	SP
Checked by	AW
A300	2 Revision



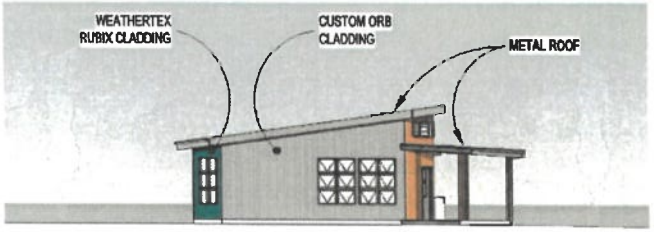
North Elevation

1 : 200



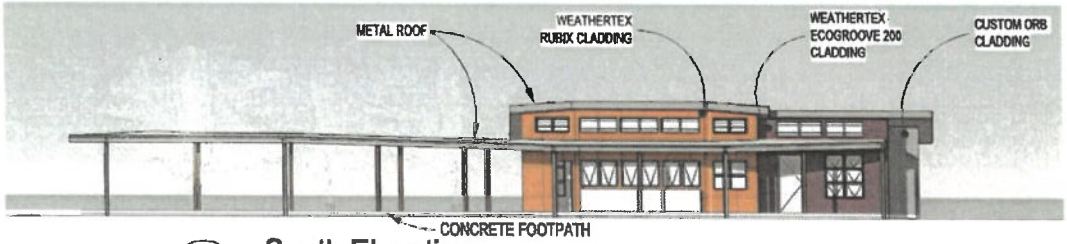
East Elevation

1 : 200



West Elevation

1 : 200



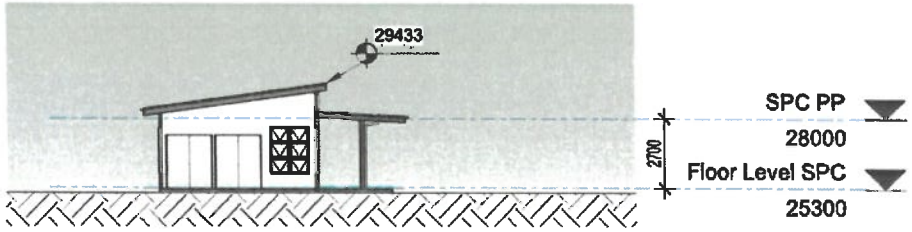
South Elevation

1 : 200

GLADSTONE REGIONAL COUNCIL
This Plan is approved subject to the attached Decision Notice No. DA/28/2022
Date 1/09/2022
Per
ASSESSMENT MANAGER

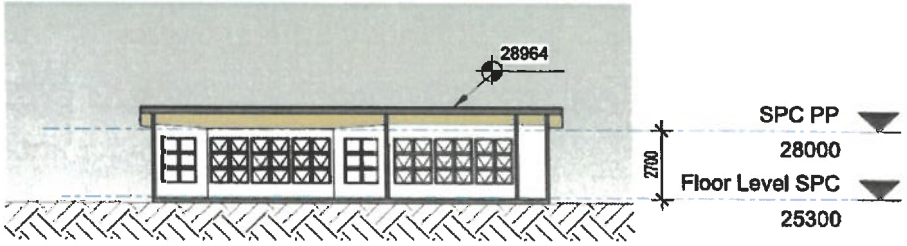
Section 1

1 : 200



Section 2

1 : 200



Section 3

1 : 200

PRELIMINARY ONLY NOT FOR CONSTRUCTION

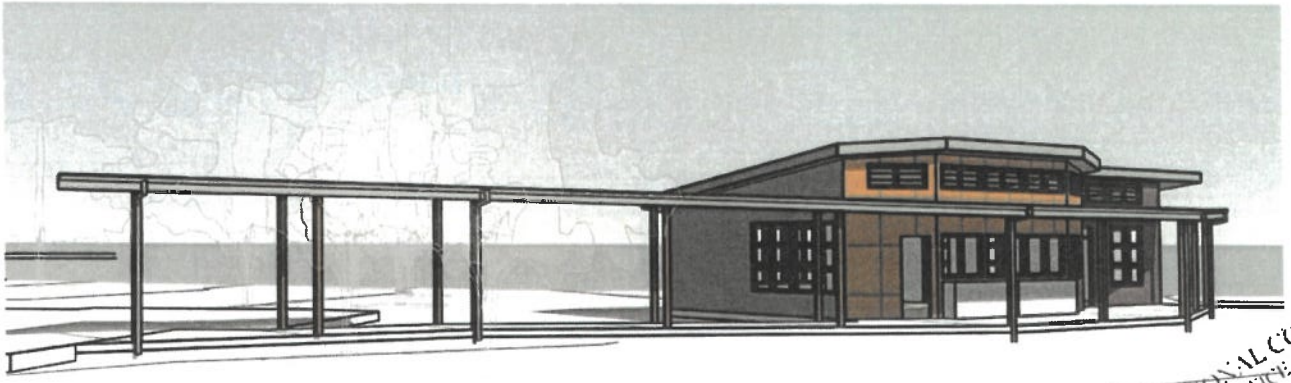
No.	Revision	Date
2	Issued for approval	01.03.2022
1	Issued for coordination	15.02.2022

wd architects
118 Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 870 70

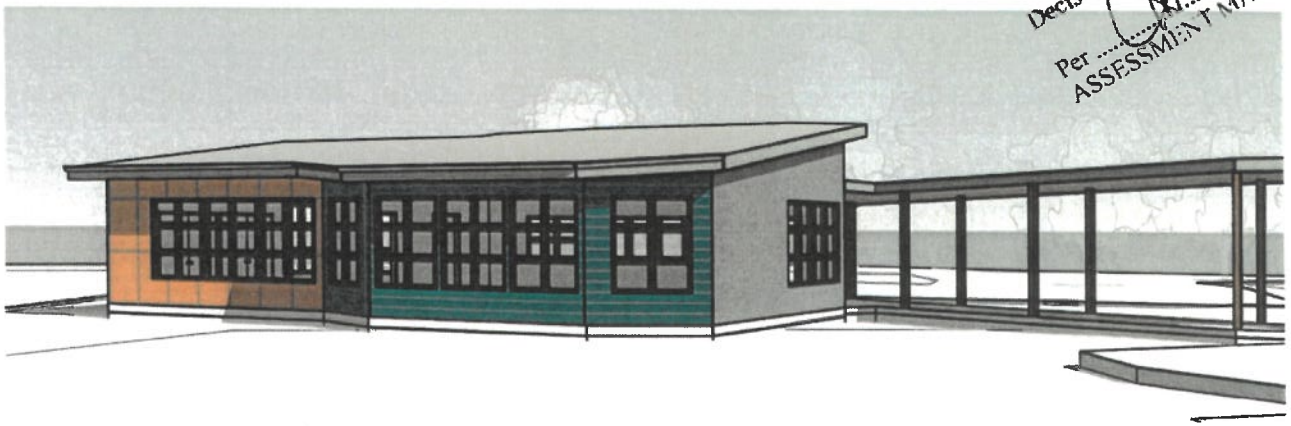
GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATER
SPECIALTY CLASSROOM and WORKSHOP

ELEVATIONS and SECTIONS

Scale @ A3	1 : 200
Date	07.02.22
Project No.	641
Drawn by	SP
Checked by	AW
A500	2 Revision



South West View



North West View

GLADSTONE REGIONAL COUNCIL
GLADSTONE OFFICE
This Plan is approved subject to the attached Decision Notice No. DA/28/2022
Per ..... Date 1/09/2022
ASSESSMENT MANAGER

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
2	Issued for approval	01.03.2022
1	Issued for coordination	15.02.2022

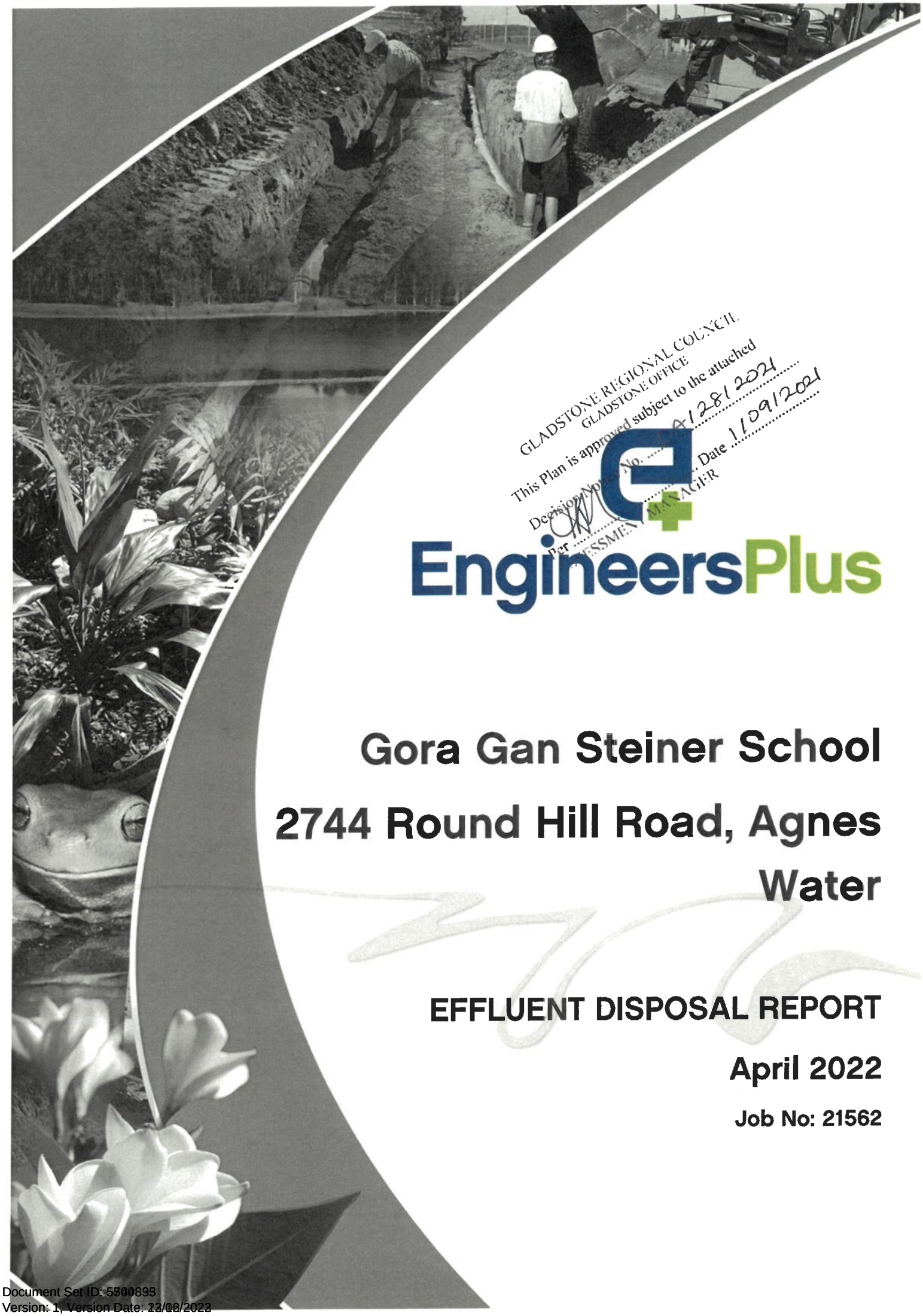
wd architects
118 Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 870 [illegible]

GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATER
SPECIALTY CLASSROOM and WORKSHOP

PERSPECTIVES

Scale @ A3	
Date	07.02.22
Project No.	841
Drawn by	BP
Checked by	AW

A900 — 2 Revision



GLADSTONE REGIONAL COUNCIL
GLADSTONE OFFICE
This Plan is approved subject to the attached
Decision Notice No. A1281/2021 Date 1/09/2021
Per ASSESSMENT MANAGER

EngineersPlus

Gora Gan Steiner School

2744 Round Hill Road, Agnes Water

EFFLUENT DISPOSAL REPORT

April 2022

Job No: 21562

Engineers Plus Pty Ltd

ABN 14 153 364 866

Email: admin@engineersplus.com.au

Rev	Date	Prepared	Initials	Reviewed	Initials
1	15/11/2021	Tom McLaughlin	TM	Kane Macready	KM
2	27/04/2022	Tom McLaughlin	TM	Kane Macready	KM

GORA GAN STEINER SCHOOL, AGNES WATERS

EFFLUENT DISPOSAL REPORT

TABLE OF CONTENTS

1. INTRODUCTION

Engineers Plus (E+) have been commissioned by *penArchi Architects* to prepare an Effluent Disposal Report for the proposed Goora Gan Steiner Primary School located at 2744 Round Hill Road, Agnes Water. The purpose of this report is to demonstrate that the proposed development can be serviced by an on-site wastewater treatment and effluent disposal system. This type of treatment method is required as the property is not located within the Gladstone Regional Council (GRC) sewerage service area.

Details of the proposed development are as follows:

Table 1 Development Information

Development Type	Rural Residential – Education Establishment
Planning Zone	Rural Residential
Lot and Plan	L36 RP619982
Local Authority	Gladstone Regional Council

The proposed development layout is presented in Appendix A.

2. SITE DESCRIPTION

The development is located at 2744 Round Hill Road, Agnes Water and has a total area of approximately 1.69 Ha.

The property gently falls from the western boundary to the eastern boundary with site levels ranging from 24.0m to 25.0m AHD.

The development site has identified a number environmental overlays including:-

- Regulated Vegetation.
- Coastal Protection.

These environmental objectives have been considered in the layout of the proposed development and in the preparation of this report. In addition, the site is also regulated by an Environmental Protection Regulation ERA 63- Sewage Treatment because the on-site sewerage treatment facilities proposed are greater than 21EP.

3. WASTEWATER TREATMENT AND EFFLUENT DISPOSAL

The development is located outside of the GRC's sewerage service area and therefore an on-site sewerage treatment and effluent disposal system is required.

3.1 Soils and Geology

Based on previous geotechnical testing in the vicinity of the proposed development (ie Soil and Land Information MVK Site 469) the soil is classified as a light clayey loam. In accordance with AS1547-2012 Table 5.1 the soil classification in the area would reflect a soil category of 4, which typically comprises of light to medium clays with moderate to weak structure.

An assessment of the development site also supports the soil category of 4 with sandy loams and light clay loams being present at ground level. The type and size of the effluent disposal area for the development has been based on a soil category 4 as defined by AS1547-2012.

3.2 Equivalent Population (EP)

The proposed primary school shall be developed in stages over a 5 to 15 year period and shall ultimately cater for approximately 90 students and staff. Based on recent information provided it is assumed that approximately 50 students and staff shall occupy the site in the initial stages of the development.

AS1547-2012 states that wastewater treatment and disposal systems shall be designed to cater for domestic waste from a range of equivalent populations as well as institutional facilities which may have a varying 5-day or 7-day operation that can be averaged out over a full week period. This development would fall into the category of an institutional facility.

Whilst this report shall provide advice on the total effluent disposal area required for the ultimate development, it is considered plausible to construct the disposal areas in a staged manner that aligns with the staged development of the school. Based on an assumed growth rate, the effluent disposal area could be initially constructed for 50 students and staff as Stage 1 works, followed by a further expansion at a later stage to cater for the ultimate stage, being 90 students and staff.

3.3 Effluent Flows

Typical sewage flows for Queensland primary schools has been based on literature supplied from the Queensland Government Planning Guidelines for Water Supply and Sewerage (ie DEWS Planning Guidelines for Water Supply and Sewerage – March 2014). Table A of these guidelines specify a sewerage demand range between 25 L/persons/day and 45 L/persons/day for a primary school facility that includes both staff and students combined.

In consideration of the rural nature of the site and the limited availability of potable water, it is assumed that sewage flows would be on the lower end of the range specified in the guidelines. This assumption would be reinforced further through the specification of water saving devices that are designed to reduce overall water usage and hence reduce overall domestic sewage production as well.

Applying the abovementioned design criterion, the effluent flows presented in Table 3 are expected for the development.

Table 2 Effluent Flow Calculation

	Stage 1	Ultimate
Equivalent Persons (EP)	50	90
Flow per EP	25 L/EP/day	25 L/EP/day
Total Daily Flow	1,250 L/day	2,250 L/day
Total Weekly Flow (5 days)	6.25 kL/week	11.25 kL/week

3.4 Effluent Quality and Wastewater Treatment

The required level of wastewater treatment is dependent on the proximity to surface water and groundwater sources. Typical parameters for each treatment standard are summarised in Table T5 of the Queensland Plumbing and Wastewater code. Table 3 provides an extract of information as it relates to the separation distance for the protection of surface water and groundwater.

Table 3 Wastewater Treatment Process Selection

Feature	Separation Distance (m)		
	Advanced Secondary	Secondary	Primary
Top of bank of permanent water course	10	30	50
Top of bank of intermittent water course			
Top of bank of lake, bay or estuary			
Top water level of surface water source used for agriculture, aquaculture or stock purposes			
Easement boundary of unlined open stormwater drainage channel			
Bore or a dam used or likely to be used for human or domestic consumption			
Unsaturated soil depth to a permanent water table (vertically)	0.3	0.6	1.2

Drainage flow paths through the site have been considered when selecting an appropriate treatment process along with the type and location of the effluent disposal areas. Separation distances shall take into account a significant drainage channel that is located at the rear of the property which accepts stormwater from the upstream and adjoining catchments and conveys these flow southwards towards Lady Elliott Drive.

3.4.1 Effluent Quality

Based on AS1546 and the Queensland Plumbing and Wastewater Code, the following characteristics are applicable to each effluent quality treatment standard.

3.4.1.1 Primary Effluent

Primary effluent quality does not have an effluent standard to test against and as such no compliance characteristics are listed. At the time of this report there are no primary effluent quality systems approved.

3.4.1.2 Secondary Quality Effluent

Secondary quality effluent has the following compliance characteristics:

- 90% of the samples taken over the test period shall have a BOD5 less than or equal to 20mg/L with no sample greater than 30mg/L.
- 90% of the samples taken over the test period shall have total suspended solids less than or equal to 30mg/L with no sample greater than 45 mg/L.

- where disinfection is provided, 90% of the samples taken over the test period shall have thermo tolerant coliform count (determined by either the most probably number of membrane filter technique) not exceeding 200 organisms per 100ml with no sample exceeding 1000 organisms per 100ml.
- where chlorination is the disinfection process, the total chlorine concentration shall be greater than or equal to 0.5 mg/L and less than 2.0 mg/L in four out of five samples taken.

3.4.1.3 Advanced Secondary Quality Effluent

Advanced secondary quality effluent has the following compliance characteristics:

- 90% of the samples taken over the test period shall have a BOD5 less than or equal to 10mg/L with no sample greater than 20 mg/L.
- 90% of the samples taken over the test period shall have total suspended solids less than or equal to 10 mg/L with no sample greater than 20 mg/L.
- where disinfection is provided, 90% of the samples taken over the test period shall have thermo tolerant coliform count (determined by either the most probable number of membrane filter technique) not exceeding 10 organisms per 100ml with no sample exceeding 200 organisms per 100ml.
- where chlorination is the disinfection process, the total chlorine concentration shall be greater than or equal to 0.5 mg/L and less than 2.0 mg/L in four out of five samples taken.

3.4.2 Wastewater Treatment

Due to the nature of the development and the risks associated with achieving and maintaining effluent quality standards in a school setting and the risk of uncontrolled discharges from a disposal facility to the adjoining watercourse, an advanced secondary wastewater treatment plant is considered an acceptable solution. For the purposes of this report, it is assumed that secondary quality effluent will be produced in order to reduce health and amenity risks.

Treatment plants of this type and size are considered an environment activity and regulated under ERA 63 because the peak treatment capacity is in excess of 21EP. In addition, any on-site wastewater treatment and effluent disposal systems will be required to conform with the Queensland Plumbing and Drainage Act and obtain approval from the Gladstone Regional Council.

Table 4 summerises the typical size of wastewater treatment plants based on AS1547:2012.

Table 4 Wastewater Treatment Plant Sizing

	Stage 1	**Ultimate**
Total EP	50	90
Total Daily Flow	1,250 L/day	2,250 L/day
Additional Storage	1,250 L	2,250 L
Plant Size (typical)	3,000 L	6,000 L

In accordance with AS1547.2012 wastewater treatment plants shall have additional storage of at least 24hrs of average flow to aid in the management of peak loads and wet weather events. In addition, sludge storage capacity should be designed for sludge removal every 3-5 years.

3.5 Effluent Disposal

AS1547:2012 identifies a number of effluent disposal methods based on a range of soil conditions and topography constraints. The following methods of disposal are typical solutions for developments of this nature.

- Trenches are mostly suited to sandy, permeable soils (categories 1 to 3) with the ability to disperse large volumes in a small surface area by dispersal into sub-soil layers.
- Irrigation areas rely on evaporation to disperse effluent and are limited by the ability of the soil to absorb the effluent. These areas tend to be fairly large and suit larger blocks.
- Evapo-transpiration/absorption/seepage systems use evaporation as well as percolation to dispose of the effluent. These areas are useful in clay-based soils (category 4 to 6) for providing an effective disposal solution.
- Mounds are utilised in areas where high water tables or poorly drained soils exist.

Based on the soil classification for this site, the most effective method of effluent disposal is by shallow sub-surface irrigation using drip lines. This method of disposal allows for evapo-transpiration, absorption and lateral drainage. It is considered that the optimum performance of a low pressure irrigation system is obtained by using effluent that has a secondary quality of BOD5 15 mg/L and TSS of 15 mg/L or better.

In accordance with AS1547.2012 Table 5.2, the Design Loading Rate (DLR) for a low pressure effluent disposal (LPED) application is 3.5mm/day or 25mm/week. Accordingly, this DLR has been used to size the effluent disposal areas.

3.5.1 Reserve Area/Wet Weather Storage

AS1547:2012 recommends that a reserve area be provided for maintenance purposes and to prevent hydraulic overloading during periods of inclement weather or when soils are saturated. Reserve areas can also aid in reducing blockages and restrictions as the primary treatment area can be taken off-line for maintenance and repair/replacement works.

Normally 100% of the primary treatment area is allocated as additional reserve area, which is typical of a conventional septic tank unit followed by a conventional trench land-application system. However, the reserve area maybe reduced or even eliminated if an advanced wastewater-treatment process is provided, or if additional in-line storage is provided or an alternative land-application system is utilised.

Another method to manage hydraulic overloading is the installation of wet weather storage tanks in conjunction with an existing irrigation area. This solution is common to sites where the potential risks associated with over-saturation, effluent overflow and environmental harm are high. Typically 3 to 5 days additional storage is adequate to mitigate the likelihood of most hydraulic overflows.

3.5.2 Wet Weather Control

Advanced secondary wastewater treatment plants with large effluent disposal areas often employ technology to control the treatment and land application process. Rain gauges or soil moisture probes can be used to control the rate of application, particularly during wet weather periods or until favourable irrigation conditions are present. Technology can determine if effluent can be returned to a disposal area or if it is required to be pumped and transported from site by a licensed contractor.

3.5.3 Vegetation Buffer Zone

To help reduce the risk of overflow due to oversaturation of the disposal areas it is common practise to install a vegetation buffer zone downstream of the disposal area to intercept lateral seepage through the soil. A typical buffer zone should consist of a strip of vegetation with water scavenging trees that have deep roots and have the ability to remove soil nutrients.

3.6 Effluent Disposal Areas

Table 5 summerises the required effluent disposal areas as per AS1547:2012 and the Queensland Plumbing and Wastewater Guidelines 2019.

Table 5 Effluent Disposal Area

	Stage 1	Ultimate
Total Weekly Flow (5 days)	6.25 kL/week	11.25 kL/week
Design Irrigation Rate	3.5mm/day or 17.5mm/week	3.5mm/day or 17.5mm/week
Disposal Area Required	360m^2	640m^2
Reserve Area/Effluent Storage (5 days)	360m^2 or 6kL of storage	640m^2 or 11kL of storage

3.6.1 Setback Distances

The Queensland Plumbing and Wastewater Code 2019 outlines the required setback distances from structures for sub-surface land applications for all methods of on-site wastewater treatment. Table 6 summarises a few examples of setback distances from typical building structures.

Table 6 Required Setbacks from Structures

Feature	Horizontal Separation Distance (m)		
	Up Slope	Down Slope	Level
Property Boundary, Building Footings, Retaining Wall Footings	2	4	2
In Ground Swimming Pools	6	6	6
In Ground Potable Water Tank	6	6	6

In relation to the set back requirements in the Queensland Plumbing and Wastewater Code, the effluent disposal areas including the reserve areas should be set back a minimum of 10m from a water course or water channel. This minimum distance is also advantageous in that it would allow for an appropriate vegetated buffer area to be provided between the disposal area and the southern property boundary.

3.7 Construction of Effluent Disposal Areas

The wastewater treatment plant and effluent disposal areas shall be constructed in accordance with the relevant codes and standards. These include, but not limited to the following:-

- AS1547.2012
- AS1546.2012
- Relevant Local Authority Guidelines and Policies.
- Queensland Plumbing and Wastewater Guidelines 2019; and
- Department of Local Government and Planning Guidelines and Policies.

3.8 Environmentally Relevant Activity (ERA 63)

ERA 63 – Sewage Treatment is a regulation under the Environmental Protection Act that requires all wastewater treatment plants with a peak capacity greater than 21EP to be licensed with the State Government. For small treatment plants there are model licensing and operating conditions that can be used when making an application for a respective license.

Licensing is required in order to demonstrate that the particular activity is being undertaken in an environmentally sustainable manner, with due care and responsibility to ensure that key activities such as effluent management, odour management and waste management are sustainable.

Further information relating to ERA 63 – Sewage Treatment can be found by visiting the DES website https://environment.des.qld.gov.au/__data/assets/pdf_file/0030/8841

4. MONITORING OF EFFLUENT DISPOSAL SYSTEMS

4.1 Final Effluent Monitoring

The amount of effluent irrigated or released should be monitored using a flow meter and data logger installed on the irrigation system. The following testing regime is recommended to be implemented:

Year 1 – Three (3) month intervals and thereafter, yearly intervals. The following parameters should be tested:-

- BOD (mg/L)
- SS (mg/L)
- pH
- Faecal Coli forms (cfu/100mL)
- Total N (mg/L), and
- Total P (mg/L).

4.2 Soil Monitoring

The reason for soil monitoring is to ensure that the irrigation rates are appropriate to the vegetation installed and that nutrients and salts are non-accumulating in the soil. The following testing regime is recommended to be implemented:-

Year 1 – Three (3) month intervals and thereafter, yearly intervals. The following parameters should be tested:

- Soil Structure
- pH
- Conductivity
- Exchangeable Cat ions
- SAR
- Total N (mg/L), and
- Total P (mg/L).

4.3 Seepage Monitoring

A perforated pipe should be installed downstream of the vegetation buffer zone to intercept any seepage that may bypass the land disposal system. Any seepage should be drained to a covered monitoring well where samples can be collected. The following testing regime is recommended to be implemented:-

End of Year 1 and thereafter, yearly intervals.

It is recommended that TDS (Total Dissolved Solids) is initially tested which would indicate the presence of seepage. If the TDS concentration was high in relation to the baseline readings the following additional tests should be undertaken:-

- BOD (mg/L)
- Faecal coli-forms (cfu/100mL)
- Total N (mg/L); and
- Total P (mg/L)

5. WATER EFFICIENCY DEVICES

To ensure the most efficient water supply and wastewater system, the following water efficient devices are recommended:-

- Installation of 6/3 flush toilets.
- Installation of waterless urinals.
- Maximise the use of rainwater tanks for toilet flushing, irrigation and outdoor use by ensuring that 100% of roof water is diverted to rainwater tanks.
- Installation of 7.5L/minute flow restrictors on all outdoor and internal tap ware; and
- Installation of 7.5L/minute shower roses.

These devices will reduce the overall water demand for the development which will lead to a water cost saving. In turn, these devices will reduce the amount of load on the wastewater treatment facility and the effluent disposal infrastructure. This will ensure an efficient treatment process and maximise the life of the effluent disposal area whilst minimising any risks associated with effluent overflow.

6. CONCLUSIONS

It is recommended that an advanced secondary wastewater treatment plant be installed with 640m^2 of effluent disposal area and a further 640m^2 of reserve storage (if required) to cater for the ultimate development of the site.

Whilst this report provides advice on the total effluent disposal area required for the ultimate development, it would also be considered appropriate to construct the disposal areas in a staged manner that aligns with the staged development of the school. Based on the assumed growth rates the effluent disposal area could be initially constructed for 50 students and staff as Stage 1 works, followed by a further expansion at a later stage to cater for the ultimate 90 students and staff.

The method of irrigation should be shallow sub-surface irrigation using low pressure drip lines. This method of disposal allows for evapo-transpiration and absorption with lateral drainage.

Both the size, level of treatment and disposal method should be confirmed during the building application stage. This includes testing of the in-situ soil to determine the appropriate soil classification. Water efficient devices should also be installed throughout the development to minimise water use and to maximise the life of the wastewater treatment plant and effluent disposal area.

Appendix A

Proposed Development Layout

N

TO ROUND HILL ROAD

89° 00' 40" 147.43 m

TO OVERFLOW / FUTURE PARKING

OVERFLOW 11 | STAFF | STAFF 4 | STAFF 3 1

OVER-FLOW 12 | GUEST | 18

DROP-OFF

REFUSE

SHARED ZONE

37544

13280

10 BICYCLES

MAINTENANCE SHED (EXISTING)

COVERED OUTDOOR LEARNING AREA (EXISTING MODIFIED)

COVERED FORECOURT

ADMIN BUILDING

4118 5942 EXISTING SHED RENOVATED

15086

LIBRARY / RESOURCE CENTRE

FUTURE LIBRARY REOURCE CENTRE

EXISTING LARGE FEATURE TREE

33470

INFORMAL GRASSED PLAY AREA

UPPER PRIMARY CLASSROOMS

SPECIALTY CLASSROOM & WORKSHOP

LOWER PRIMARY CLASSROOMS & AMENITIES

PLAY AREA / NATURE PLAY / PLAY EQUIPMENT

LOT 36
RP619982
1.903 ha

RETENTION BASIN

32 m

32 m

20 m

RESERVE EFFLUENT DISPOSAL AREA (640m²)

PRIMARY EFFLUENT DISPOSAL AREA (640m²)

10m (MIN) VEGETATION BUFFER

21518

10m (MIN) SETBACK

202° 29' 25" 129.73 m

273° 00' 30" 149.96 m

PARKING CALCULATIONS

BUILDING	GFA
ADMIN	166
MAINTENANCE SHED	82
UPPER PRIMARY	184
LOWER PRIMARY & AMENITIES	233
SPECIALTY CLASSROOM & WORKSHOP	108
LIBRARY / RESOURCE CENTRE	113
TOTAL	886 m²

1 CARPARK SPACE REQUIRED PER 50 m² GFA = 18 CAR SPACES REQUIRED
PLUS ADDITIONAL 3 DROP-OFF SPACES
1 BICYCLE SPACE REQUIRED PER 100 m² GFA = 9 BICYCLE SPACES REQUIRED

SITE LEGEND

- EXISTING TREE
- EXISTING TREE TO BE REMOVED
- EXISTING DEAD TREE TO BE REMOVED
- NEW TREE

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
1	Issued for coordination	15.02.2022

wd architects
environmentally sustainable design
11B Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 870 791

GOORA GAN STEINER SCHOOL
2744 ROUND HILL RD, AGNES WATER

SITE PLAN

Scale @ A3	1 : 500
Date	07.02.2022
Project No.	21641
Drawn by	AW/ML/ES
Checked by	AW

A110 | 1 Revision

Appendix B

Proposed Effluent Disposal Area

LEGEND:

PRIMARY EFFLUENT DISPOSAL AREA (640m²)

RESERVE EFFLUENT DISPOSAL AREA (640m²)

CONCEPT ONLY

REV	DESCRIPTION	APPD	DATE
A	FOR COMMENTS		21.11.21

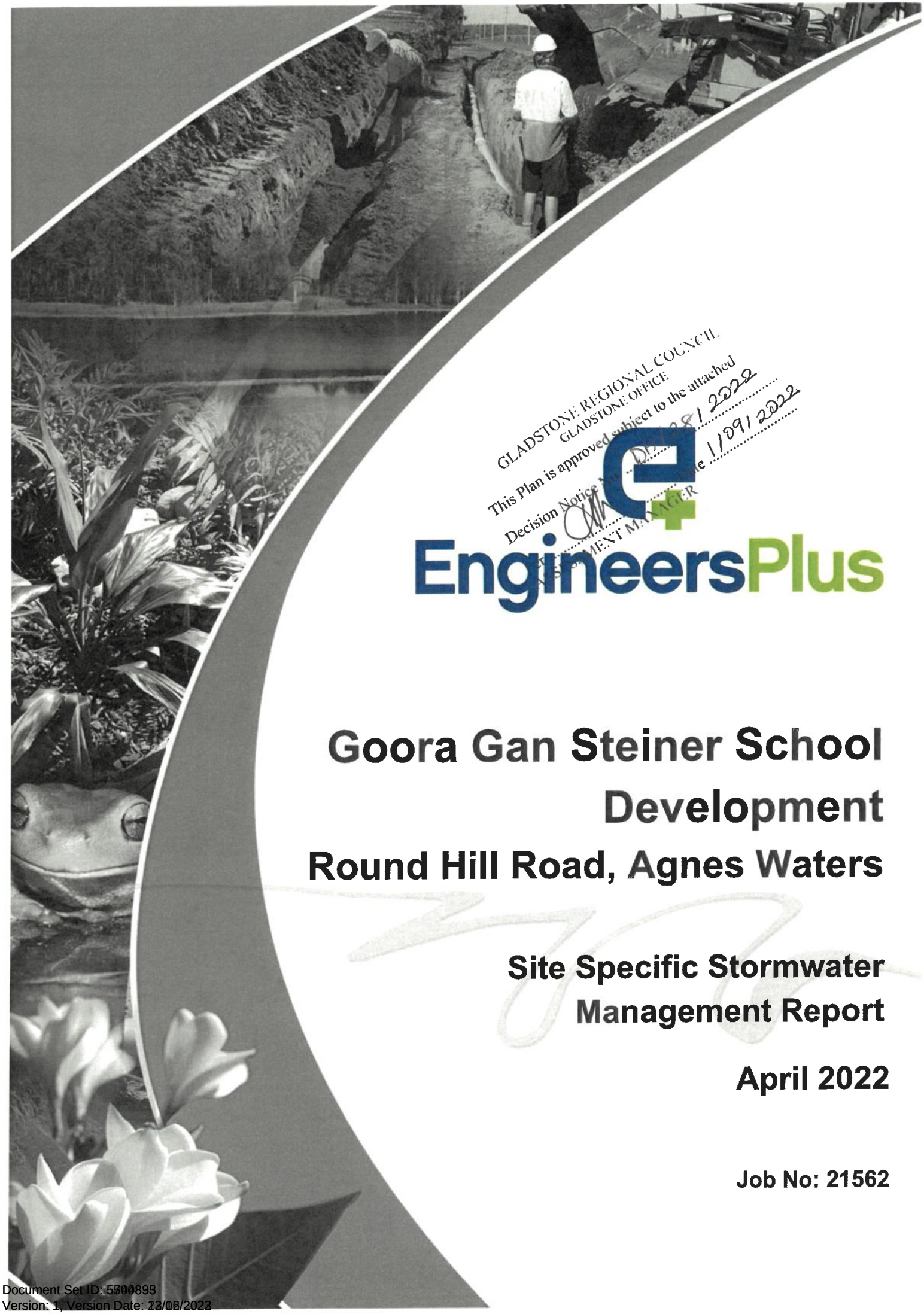
DESIGNED	T MCLAUGHLIN	CLIENT	GOORA GAN STEINER SCHOOL
DRAWN	J CHALLIES		
CHECKED	K MACREADY		
APPROVED	K MACREADY	RPEQ No.	DATE

EngineersPlus
ENGINEERS PLUS PTY LTD
www.engineersplus.com.au

PROJECT
GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATERS
EFFLUENT DISPOSAL AREA

ENGINEERS PLUS REFERENCE No. JOB 21249

A3	DRAWING No.	REVISION
	21562-01	A



GLADSTONE REGIONAL COUNCIL
GLADSTONE OFFICE
This Plan is approved subject to the attached Decision Notice No. DA 28/2022 dated 1/09/2022
ASSESSMENT MANAGER

EngineersPlus

Goora Gan Steiner School Development

Round Hill Road, Agnes Waters

Site Specific Stormwater Management Report

April 2022

Job No: 21562

Engineers Plus Pty Ltd

ABN 14 153 364 866

Email: admin@engineersplus.com.au

Rev	Date	Prepared	Initials	Reviewed	Initials
0	26/04/2022	David Lankinen	JDL	Kane Macready	KM

RELIANCE, USES and LIMITATIONS

This study, report and analyses have been based on the information available to Engineers Plus at the time of preparation. Engineers Plus accepts responsibility for the report and its conclusions to the extent that the information was sufficient and accurate at the time of preparation. Engineers Plus does not take responsibility for errors and omissions due to incorrect information or information not available to Engineers Plus at the time of preparation of the study, report or analysis.

GOORA GAN STEINER SCHOOL DEVELOPMENT

ROUND HILL ROAD, AGNES WATERS

SITE SPECIFIC STORMWATER MANAGEMENT REPORT

TABLE OF CONTENTS

1. PREAMBLE

1.1 Introduction

This Site Specific Stormwater Management Report sets out the planning, design and implementation of stormwater drainage to integrate two (2) distinct components of stormwater management, being water quantity and water quality. In general, a stormwater drainage system shall:-

(a) Prevent or minimise adverse social, environmental and flooding impacts on Council waterways, overland flow paths and constructed drainage networks.
(b) Ensure that the hydrological assessment and hydraulic design of pipe drainage, internal road flowpaths and channel works conform with Australian Rainfall and Runoff, QUDM, Waterway Design and relevant natural channel design guidelines.
(c) Achieve acceptable levels of stormwater quantity and quality mitigation by applying total water cycle management and water sensitive urban design principles.
(d) Comply with the Gladstone Regional Council Planning Scheme.

1.2 Hydrology and Hydraulics

1.2.1 Design Considerations

Design considerations for water quantity shall ensure that: -

(a) Design discharges are based on the ultimate development in the catchment.
(b) Future maintenance of drainage works is minimised whilst ensuring that design intent is maintained.
(c) Solutions are safe, particularly for children.
(d) Erosion and siltation both within and on adjoining properties is not increased as a result of the development.
(e) No detrimental effect or nuisance is caused to downstream and adjacent properties.
(f) Maximum flow hazard Depth-Velocity ratios comply with QUDM.

1.2.2 Flow Estimation

The design of urban stormwater drainage systems is based on QUDM and the Australian Rainfall and Run-off. A run-off / storage routing model has been used to estimate flows and analyse the hydraulics of the urban drainage system along with sizing of any flow mitigation infrastructure.

1.3 Water Quality

1.3.1 Design Considerations

Design considerations for water quality shall ensure that:-

a) Water quality is based on 'Water by Design' music modelling guidelines.
b) Flow discharges from the site shall comply with Gladstone Regional Council's pollution reduction objectives.
c) A 'MUSIC' water quality routing model is used to analyse the pollutant loadings for the site along with the sizing of water quality treatment devices.

1.4 GRC Planning Scheme Code Compliance

A compliance summary with Council's development codes is presented in Table 1.

Table 1 Summary Code Compliance

Performance Outcome	Acceptable Outcomes		Compliance
P01 Buildings are resilient to flooding and storm tide inundation by ensuring that : (a) They are sited and located to avoid or minimise risk to people and damage to property; and (b) Essential infrastructure effectively maintains its function during and immediately after flood and storm tide events.	**A01.1**	Finished floor Level of all habitable rooms is at or above flood hazard level (FHL)	Compliance – Floor levels set 300mm above max. WSL as per QUDM at detailed design phase.
P02 Buildings do not directly, indirectly or cumulatively change flood characteristics which may cause adverse impacts external to the development site.	**A02**	Building work does not involve filling within a flood hazard area as identified on a flood hazard map adopted by Council.	Compliance – Site **NOT** within Councils Flood Hazard Zone Overlay
P03 The height of buildings does not negatively impact on the visual amenity and streetscape of the surrounding area as a result of the raising of floor levels for flood immunity purposes.	**A03**	Where required to increase flood resilience by raising the habitable floor level when measured from ground level to the highest point of the roof is not greater than 9.5m	Compliance – Site **NOT** within Councils Flood Hazard Zone Overlay
P04 Development is sited and designed such that the potential risk to people and damage to property on the site from flooding or storm tide inundation is avoided or minimised.	**A04.1**	There is no intensification of residential uses on premises situated below the DFL, including the development of dual occupancy and multiple residential uses.	Compliance – Site **NOT** within Councils Flood Hazard Zone Overlay
	A04.2	No additional residential lots are created below the DFL	Compliance – Site **NOT** within Councils Flood Hazard Zone Overlay
	A04.3	Development that increases the number of people living or working in a flood or storm tide hazard area has an emergency evacuation plan for people to evacuate to a gathering point above the DFL in the face of advancing flood waters.	Compliance – Site **NOT** within Councils Flood Hazard Zone Overlay

2. INTRODUCTION

Engineers Plus have been commissioned by Goora Gan Steiner School to prepare a Site Specific Stormwater Management Report for a proposed School site located at 2744 Round Hill Road, Agnes Waters**. Appendix A** provides details on the location for the proposed development.

The intention of this report is to provide preliminary advice on stormwater quantity and quality infrastructure required to ensure that the development meets Council's development code. This assessment has been undertaken to ensure that no detrimental or adverse conditions are imposed on the downstream waterway or on adjacent properties.

2.1 Background

The proposed development comprises of an educational facility with a total land area of 1.903 Ha. **Appendix B** presents the proposed layout for the development.

The property description for the development site is Lot 36 RP619982.

This Stormwater Management Report has included all land within the proposed development site and all external contributing catchments. Any proposed infrastructure within the site will convey flows from a fully developed catchment.

The legal point of discharge for the site has been adopted as the existing open channel to the south of the site.

It is reasonable to expect the Council will impose conditions on the development to demonstrate that any change in the quantity, concentration or velocity of stormwater at the point of discharge and downstream of the point of discharge that will not create an actionable nuisance to downstream properties. In this instance the downstream property is public land through which a major flowpath traverses the site south to the ocean. There are no downstream properties that will be affected by the developed flows from the site. Properties adjoining the proposed downstream channel should be assessed to ensure that there is adequate freeboard during a major flood event.

3. PRE-DEVELOPED SITE DESCRIPTION

The development site has an area of approximately 1.903Ha and has a northern frontage to Round Hill Road. As per Gladstone Regional Council's (GRC) Planning Scheme 2014, the site is fit for the intended land use.

3.1 Topography

The site slopes to the south-eastern corner with gradients ranging from 4% to 1% and surface elevations from 27.0m to 24.5m AHD. The site has a natural overland flowpath that traverses through the site from the north to an existing drainage flowpath adjacent to the southern boundary. Currently there is a building located on the site.

External upstream catchments contribute flows to the site from the north across Round Hill Road. The topographical aerial view of the site is presented in **Appendix C**.

3.1.1 Open Channels

The site is drained by a natural overland flowpath that traverses the site from the north to the south-eastern corner. An inspection of the site has shown that the overland flowpath is functional and free flowing.

3.1.2 Vegetation

The site is naturally vegetated and consists predominately of natural grasses and sparsely treed areas.

3.2 Stormwater Catchments

Pre-developed and Post-developed catchments are shown in **Appendix D** and have been determined with available topographical contours.

3.3 Existing Infrastructure

3.3.1 Major Flowpaths

The overland flowpath that traverses through the site from the north is a natural open flowpath. A manning's roughness parameter of 0.06 has been adopted for the drainage flowpath through the site.

3.3.2 Road Culverts

Culvert structures on adjacent road reserves are summarised in Table 2.

Table 2 Existing Road Culvert Infrastructure

Location	Size	Condition
Round Hill Road	450 Dia. RCP	Operational

3.4 Zoning

The site is currently zoned 'Emerging Communities' in accordance with the Gladstone Planning Scheme. The site is bounded by the following land uses:-

- North: Rural Residential
- East: Rural Residential
- South: Rural Residential
- West: Rural Residential

Figure 1 provides a diagram of the land use for the proposed development and the adjoining properties. Fraction impervious ratios have been applied as per GRC Planning Scheme for existing and future land uses.

Figure 1 Planning Zone Map

3.5 Fraction Impervious Ratio for Landuse

Table 3 designates the adopted fraction impervious ratios that have been adopted for modelling purposes.

Table 3 Fraction Impervious Ratio Per Land Use

Zone	Fraction Impervious Ratio (%)
Commercial, Principal centre, District centre, Local centre, Neighbourhood centre, Industry, Community Facilities	100
High Density Residential	90
Medium Density Residential	80
Low Density Residential	65
Low Density Residential One (Min. 2,000m^2)	30
Open Space, Sports and Recreation	10
Rural Residential (>4,000m^2)	20
Rural Residential (>1 ha)	15
Rural Residential (>2 ha)	10
Rural / Pervious	2
Road	90

The fraction impervious ratio of 2% has been adopted for the existing conditions to reflect the natural state of the site.

4. INVESTIGATION

4.1 Methodology

A runoff routing model has been developed in XP Storm to quantify flows generated by the pre and post developed catchments. XP Storm is an industry recognised hydrological and hydraulic stormwater flow routing program that generates storm hydrographs and conveys these hydrographs through a system of overland flowpaths and drainage structures. Rainfall losses are calculated and subtracted from the rainfall burst temporal pattern to yield excess rainfall which is applied to the stormwater network. Storage areas such as retardation basins or road sag areas are utilised by the program to reduce the peak of the rainfall excess hydrographs and to mitigate additional flows produced from a post-developed catchment due to an increase in impervious area of the catchment.

4.2 Rainfall

XP Storm can generate design rainfall bursts for catchments in accordance with the guidelines recommended in Australian Rainfall and Runoff. Temporal rainfall burst patterns have been obtained from the Bureau of Meteorology website utilising ARR1987 rainfall data.

This method has been used within XP Storm to produce storms with recurrence intervals from 1 to 100 years and durations between 30 minutes and 72 hours. Flow results from these storm events were analysed to determine the critical storm duration for each recurrence interval. Peak flows from the critical storm event were then used in the flow routing model. Output hydrographs for the 2, 10 and 100 year storms were developed to determine critical storm events which are summarised in **Appendix F** and **Appendix G** for the pre-developed and post-developed scenarios respectively.

4.3 Losses

Losses have been applied to the pre-developed and post-developed models as presented in Table 4.

Table 4 Modelling Losses

	Surface	Initial Loss (mm/hr)	Continuing Loss (mm/hr)
Pre-developed	Pervious surfaces (sand)	35.0	2.5
Pre-developed	Pervious surfaces (non-sand)	15.0	2.5
Post-developed	Impervious	0.0	0.0

4.4 Mannings Roughness Coefficient

Values for the mannings roughness parameter ‘n’ adopted for modelling are summarised in Table 5.

Table 5 Mannings Roughness Co-efficient

Structure	Minimum	Maximum
Grassed Surface	0.03	0.05
Road Surface	0.02	0.022
Constructed Channels	0.03	0.06
Natural Channels	0.04	0.10
Hardstand areas	0.014	0.018

4.5 Legal Point of Discharge

The legal point of discharge for the development has been adopted as the existing open channel adjacent to the southern boundary of the site. The flows and maximum water surface levels in the drain have been modelled to ensure that there is a “no worsening” effect as a result of the proposed development.

4.6 Analysis Tailwater Level

Flows out letting to the existing drainage channel from the site have been maintained at pre-developed conditions in order to demonstrate that there will be no increase in flows as a result of the proposed development.

5. SITE RUNOFF

5.1 Pre-developed Runoff

Modelling has consisted of analysing flows generated from the proposed development. The parameters used for the pre-developed site include:-

- 1.09Ha of Pervious landuse (2% Impervious)
- 16.29Ha of Various landuses (% Impervious Varies)

The total catchment adopted for modelling purposes has including external catchments. Based on modelling, the existing stormwater runoff from the existing site is summarised in Table 6.

Table 6 Pre-developed Catchment Flows

	Flow (m3/s) / Critical Storm Duration (mins)
Area (Ha)	16.29
Q2	3.29 / 60 mins
Q100	8.12 / 60 mins

In addition, the pre-developed outlet flows from the proposed development site are summarised in Table 7.

Table 7 Pre-developed Stormwater Outlet Flows – Full Catchment

	Flow (m3/s) / Critical Storm Duration (mins)
	Full Catchment
Link	L E1 2
Area (Ha)	16.29
Q2	1.296 / 60
Q100	4.762 / 60

Detailed outputs from the XP Storm model are provided in **Appendix F**.

5.2 Post-developed Runoff

The development layout plan has been used to define infiltration parameters for the post-developed scenario. The parameters used for the post-developed catchment include:-

- 0.094Ha of Building (100% Impervious)
- 0.102Ha of Impervious Pathways (100% Impervious)
- 0.1519Ha of Road (100% Impervious)
- 1.573Ha of Open Space (10% Impervious)

The following assumptions have been made with regards to the layout:-

- All catchment landuse types have been modelled as per the proposed development layout plan. Any significant alterations to the development layout will require a review of this report.
- A fraction impervious ratio relevant to each landuse is in accordance with Gladstone Regional Council's Planning Scheme, which is considered a 'worst case' scenario for runoff flows.

Unmitigated post-developed catchment flows from the site are summarised in Table 8.

Table 8 Post-developed Stormwater Catchment Flows

	Flow (m3/s) / Critical Storm Duration (mins)
Area (Ha)	16.124
Q2	3.41 / 60 mins
Q100	8.428 / 60 mins

5.2.1 Mannings Roughness Coefficient

A Manning's roughness coefficient of 0.06 for flow conveyance in all natural and constructed channels was adopted for modelling purposes.

In general, post-developed stormwater runoffs increase due to the larger impervious area that arises from the construction of roads, houses and driveways.

Catchment areas for both the pre-developed and post-developed scenarios are essentially the same. The post-developed catchment is shown in **Appendix E**. XP Storm model hydrographs are presented in **Appendix H.**

6. STORMWATER QUANTITY MANAGEMENT

6.1 Attenuation of Discharge

Generally, it is a requirement to provide storage detention to attenuate the increase in flows from a developed catchment to ensure there are no adverse impacts on downstream waterways. Mitigation is generally achieved with the provision of detention by either basins or roadway surface storage including outlet culverts and high flow weirs that reduce peak outlet flows. A combination of storage, overflow weir and outlet culvert can provide the required quantity detention by lowering the peak flow rate of the storm hydrograph to equivalent or less than that of the pre-developed scenario.

Modelling was undertaken for the site to assess the flows and water levels conveyed to the existing downstream open channel to ensure flows and maximum water surface levels are not higher and are mitigated to that of the pre-developed conditions. The catchment areas are identical for both the pre-developed and post-developed scenarios.

For the development, the provision of detention at Node “D1 2” will be required as development flows will be conveyed through the site to the existing downstream open channel.

Table 9 summarises the stormwater flows for the mitigated post-developed scenario at the downstream outlet.

Table 9 Post-developed mitigated Stormwater Outlet Flows

	Flow (m3/s) / Critical Storm Duration (mins)
	Full Catchment
Link	L D1 1
Area (Ha)	16.124
Q2	1.118 / 60
Q100	4.68 / 60

Pre-developed and post-developed modelling was undertaken to evaluate the flows and the maximum downstream water surface levels and to determine the size and quantity of storage required to sufficiently mitigate the increased flows generated by the development. Modelling has determined that a detention basin is required for flow attenuation at node “D1 2”. Table 10 details the detention basin configuration required to mitigate post-developed flows.

Table 10 Proposed Detention Requirements - Basin “D1 2”

Node	**ARI**	**IL**	**Max. Vol (m^3)**	**WSL**	**Depth (m)**
D1 2	Q2	23.81	993	25.171	2.061
	Q100		1,118	25.299	2.189

A comparison of pre-developed and post-developed flow results are presented in Table 11. Results indicate that with the provision of detention storage there is sufficient mitigation of post-developed flows to pre-developed conditions.

Table 11 Pre-developed vs Post-developed Flow Comparison – Outlet Location

Outlet Results Summary		Max Flow (m3/s)					
Link (E / D)	Location	Q2			Q100		
		E	D	Diff	E	D	Diff
L E1 2 / L D1 1	Existing DS Channel	1.296	1.118	-0.178	4.762	4.68	-0.082

E – Existing Case Scenario, D – Developed Case Scenario

6.2 Overland Flow Paths

Internal roadways, constructed overland flowpaths and associated minor storm event pipework shall convey stormwater flows through the proposed site to the main drainage channel at the southern boundary.
Sizing of pipes and channels is shown in **Appendix J**.

6.3 Proposed Stormwater Pipe System

The stormwater pipe system shall be designed in accordance with QUDM and Gladstone Regional Council's Planning Scheme.
The major flowpath through the site has been modelled with a low flow pipe in addition to the overland flowpath profile. The low flow pipe has been included to alleviate future maintenance issues during prolonged periods of rainfall. The low flow pipe may be removed if the Client so wishes without any major detrimental effect to channel to channel conveyance conditional on Council approval.

6.4 Stormwater Infrastructure Layout

A Stormwater Infrastructure plan has been provided in **Appendix J** that includes the preliminary location and sizing of proposed stormwater infrastructure required to ensure compliance with Council's Planning Scheme.

7. WATER QUALITY MANAGEMENT

7.1 Overview

A MUSIC model for urban stormwater improvements was used to assess the post-developed site runoff quality for the proposed residential development and to determine the sizing of any stormwater quality treatment infrastructure.

The following outlines the adopted water quality objectives and a description of the chosen treatment measures for the proposed development. The following guidelines were adopted for this water quality assessment:

- Healthy Waterway's Water By Design MUSIC Modelling Guidelines (HW, 2010).
- Gladstone Regional Council Water Sensitive Urban Design Requirements

7.2 Construction Phase

Table 12 lists the pollutants identified by FCRC (2011) generated during a development's construction phase. Measures shall be taken during the construction phase to manage each of these pollutants. An erosion and sediment control plan will be prepared for the site and submitted as part of the operational works approval for each stage as developed.

Table 12 Pollutants Generally Generated During the Construction Phase

Pollutant	Sources
Litter	Paper, construction packaging, food packaging, cement bags, off-cuts
Sediment	Unprotected exposed soils and stockpiles during earthworks and building
Hydrocarbons	Fuel and oil spills, leaks from construction equipment
Toxic Materials	Cement slurry, asphalt prime, solvents, cleaning agents, wash waters (e.g. from tile works)
pH Altering Substances	Acid sulphate soils, cement slurry and wash waters

7.3 Operational Phase

Table 13 provides best practice load based design objectives set out by the Fraser Council Regional Council (2011) for site runoff during the operational phase of a development. These design objectives have been adopted as the water quality objectives for the proposed development.

Table 13 Operation phase design objectives

Parameter	Percent Reduction (%)
Suspended Solids	85
Total Nitrogen	45
Total Phosphorous	60
Gross Pollutants	90

Percent reductions in Table 13 are target reductions for comparing mitigated with unmitigated annual pollutant loads. The treatment train selected for the proposed development shall ensure that design objectives are met for all pollutants. Gladstone Regional Council's Water Sensitive Urban Design Guidelines (FCRC, 2011) list pollutants that are generally of concern during the operational phase of a development. These pollutants include:

- Litter
- Sediment
- Nutrients (N & P)
- Pathogens / Faecal Coliforms
- Hydrocarbons
- Heavy Metals
- Surfactants

Current water quality objectives (WQOs) for all pollutants other than litter, total N, total P and suspended solids are either not available or not comparable with the output of water quality models. Therefore, until more appropriate WQOs are available for these pollutants, the maximum possible reduction must be achieved, given the site topography and other constraints.

7.4 Configuration of Model

Due to the site configuration, the installation of bio-retention systems and sediment/pollutant reducing trash racks for water quality improvements is considered the best solution.

The fraction impervious ratio has been calculated for each sub-catchment from the developed land uses and this information has been used in the MUSIC model as road and pervious and impervious catchment nodes. The bio-retention basin has been sized to ensure that the treatment train achieves the specified water quality treatment targets.

8. WATER QUALITY MODELLING

8.1 Modelling Overview

An assessment of mitigated post-developed water quality runoff was undertaken using a 'MUSIC' water quality model. Healthy Waterways Water By Design MUSIC Modelling Guidelines (HW, 2010) were used to develop the MUSIC model parameters. Suspended solids, total nitrogen, total phosphorus and litter concentrations were estimated with the MUSIC model runoff generation parameters.

8.2 Modelling Inputs

8.2.1 Evapotranspiration

Monthly average evapotranspiration rates were obtained from the Bureau of Meteorology's Climatic Atlas of Australia. Table 14 summarises the adopted monthly evapotranspiration rates.

Table 14 Monthly Evapotranspiration Data

Month	Monthly Evapotranspiration	
	(mm/day)	(mm/month)
Jan	6.3	195
Feb	5.9	165
Mar	5.3	164
Apr	4.4	132
May	3.4	105
Jun	3.0	90
Jul	3.1	96
Aug	3.5	108
Sep	4.4	132
Oct	5.5	170
Nov	6.1	183
Dec	6.3	195

8.2.2 Rainfall

Six-minute rainfall data for Gladstone (Station 39123) was used as this station was the closest to the site with six-minute rainfall data. A rainfall period of ten years was used for all MUSIC modelling as recommended by Healthy Waterways (HW, 2010). The adopted period of analysis was 1 January 1990 to 31 December 1999.

8.2.3 Source Node Parameters

HW (2010) Table 3.7 provides recommended MUSIC rainfall-runoff parameters. Rainfall-runoff parameters for urban residential development have been adopted for this assessment. Appendix I details the source node parameters used for each catchment stage.

8.3 Modelling Parameters and Treatment Sizing

8.3.1 Bio-Retention System

Bio-retention system parameters were based on HW (2010) Table 4.7. A summary of the selected parameters are provided in **Appendix I**.

8.3.1.1 Treatment Sizing

The Water Quality treatment train proposed for this catchment and development includes a combination of the following:-

- Bio-retention basin (No. 1) - Nutrient removal (Constructed).
- Ecosol Trash Racks – Sediment and Nutrient removal (Prod. Number 170215).

Table 15 lists the key design criteria of the proposed bio-retention basins. A typical cross-section of a bio-retention basin is shown in Figure 2 and typical components in Figure 3.

Table 15 Bio-Retention Basin Key Design Criteria

Catchment	**Site**
Node	**D1 2**
Total Catchment Area (ha)	1.49
Impervious Area (Ha)	0.463
Extended Detention Depth (m)	0.3
Surface Area (m^2)	194
Filter Media Surface Area (m^2)	194
Filter Media Depth (m)	0.4
Overflow Weir Length (m)	2.0

It is understood that Council may prefer to adopt a regional water quality treatment facility to accommodate all the existing/proposed development in the area. In that case the total treatment area required for the site would be incorporated into the regional solution.

It should also be noted that for any alteration to the development layout there are a number of proprietary products available that can be installed in series in piped drainage systems. These systems can significantly reduce the area required for treatment but are much more expensive to install and maintain.

8.4 MUSIC Modelling Results

Table 16 summarises the mean annual pollutant loads from the proposed development for suspended solids, total nitrogen, total phosphorous and litter for mitigated and unmitigated post-development conditions for the entire treatment train. As presented, WQOs are achieved for suspended solids, total P, total N and gross pollutants for all catchments.

Table 16 MUSIC Modelling Results

Node	**Bio Basin Area (Area)**	**Pollutant**	**Annual Pollutant Load (kg/year)**		**Percent Reduction**	**WQO % Objective**
			Post Developed Unmitigated	**Post Developed Mitigated**		
D1 2	194m^2	TSS (kg/yr)	1,230	180	85.4	85
		TP (kg/yr)	3.07	1.08	64.9	60
		TN (kg/yr)	19.5	8.15	58.2	45
		GP (kg/yr)	79.1	0	100	90

Figure 2 Typical Bio-retention basin cross section

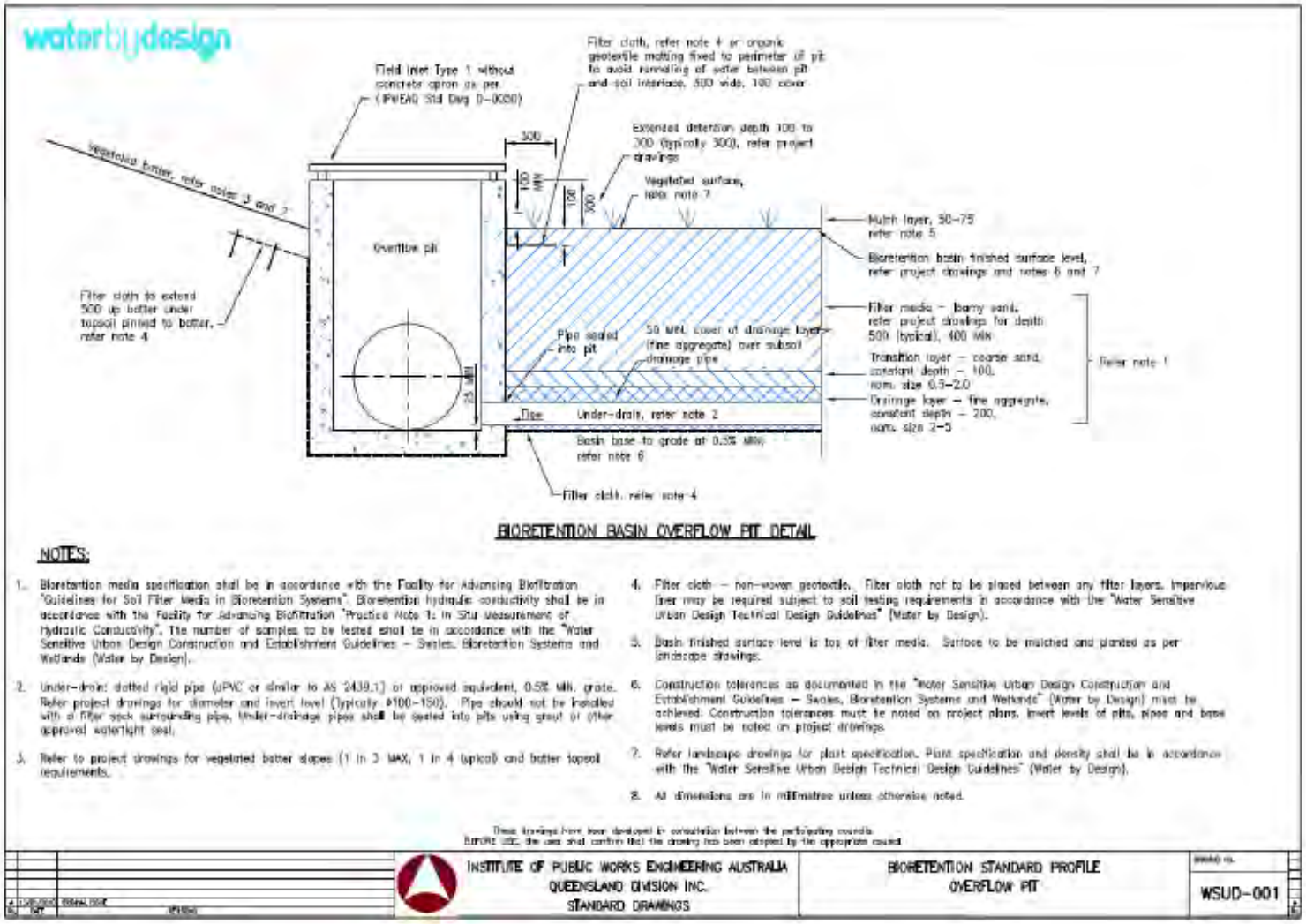
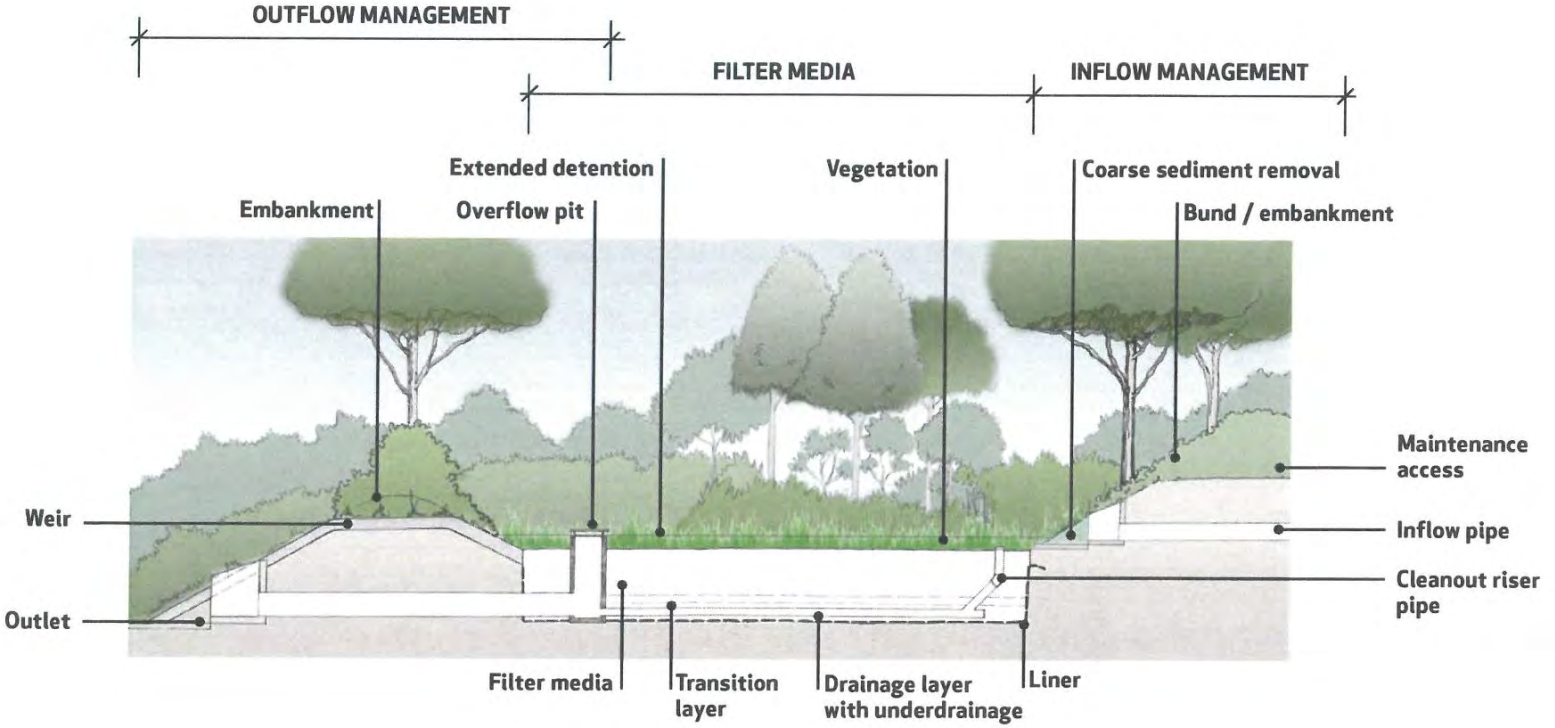


Figure 3 Typical components of a Bio retention basin



Bioretention Technical Design Guidelines waterbydesign 15

9. CONCLUSIONS

The intention of this report is to provide advice on the size of stormwater quantity and quality infrastructure to ensure compliance with Council's Stormwater Quality Objectives for the proposed development.

A runoff routing model was developed using XP Storm for the pre-developed and post-developed cases. This model shows that the post-developed stormwater runoff from the catchment area increases when compared to the pre-developed case because of an increase in impervious catchment area.

Detention is required to mitigate post developed flows and this been achieved with the provision of a detention basin at node "D1 2".

Bio-retention basin "D1 2" has been sized in order to achieve the WQO's and the State Planning guidelines.

A summary of the required drainage infrastructure is listed below:-

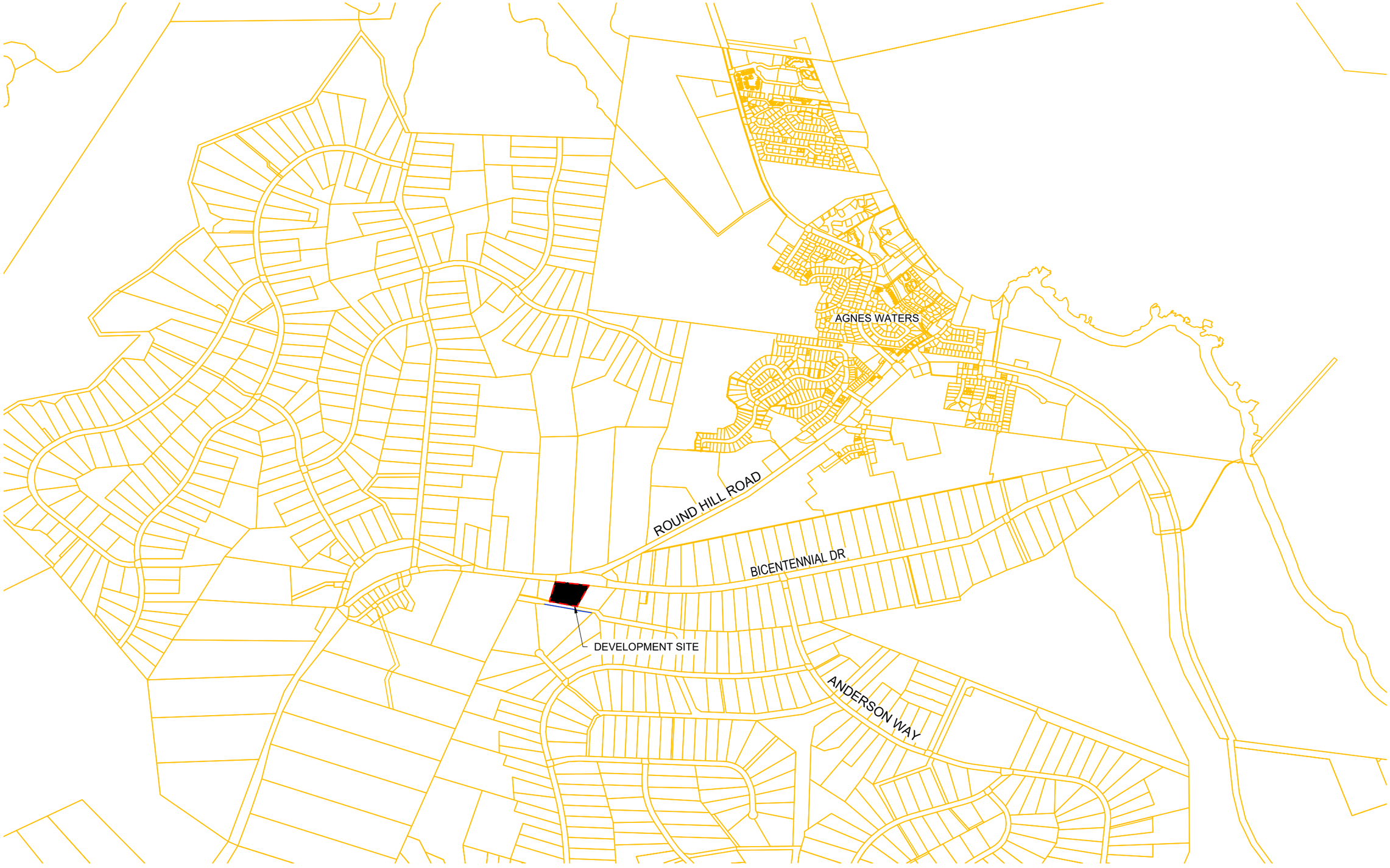
- Detention Basin - Nodes "D1 2"
- Bio-Retention Basin
- Internal drainage pipe system as shown in attached Appendices.

Regional water quality solutions may be Council's preferred option and as such the area of bio-retention basin required could be incorporated into a 'whole of catchment' regional solution and no water quality treatment would be constructed specifically for this development.

Refer to the Infrastructure Plan in **Appendix J** for details of the proposed drainage infrastructure.

Appendix A

Development Location



LEGEND

SITE BOUNDARY

LOCALITY PLAN

SCALE - 1:20,000

0 200 400 600m

1:20,000 (A3)

REV	DESCRIPTION	APPD	DATE
A	FOR COMMENTS	JDL	25.04.22

DESIGNED

DRAWN

CHECKED K MACREADY

APPROVED K MACREADY

CLIENT

GOORA GAN STEINER SCHOOL

RPEQ No. 7772

DATE OCT 2021

EngineersPlus

ENGINEERS PLUS PTY LTD

www.engineersplus.com.au

PROJECT

PROPOSED GOORA GAN STEINER SCHOOL

2744 ROUND HILL ROAD, AGNES WATERS

STORMWATER MANAGEMENT PLAN

LOCALITY PLAN

ENGINEERS PLUS REFERENCE No. 21562

A3

DRAWING No. 21562 SW01

REVISION A

Appendix B

Layout Plan

N

TO ROUND HILL ROAD

89° 00' 40" 147.43 m

TO OVERFLOW / FUTURE PARKING

OVERFLOW 11 | STAFF | STAFF 4 | STAFF 3 1

OVER-FLOW 12 | GUEST | 18

DROP-OFF

REFUSE

SHARED ZONE

10 BICYCLES

37544

13280

MAINTENANCE SHED (EXISTING)

COVERED OUTDOOR LEARNING AREA (EXISTING MODIFIED)

COVERED FORECOURT

ADMIN BUILDING

4118

5942

EXISTING SHED RENOVATED

15086

LIBRARY / RESOURCE CENTRE

FUTURE LIBRARY REOURCE CENTRE

EXISTING LARGE FEATURE TREE

33470

INFORMAL GRASSED PLAY AREA

21518

UPPER PRIMARY CLASSROOMS

SPECIALTY CLASSROOM & WORKSHOP

LOWER PRIMARY CLASSROOMS & AMENITIES

PLAY AREA / NATURE PLAY / PLAY EQUIPMENT

RETENTION BASIN

32 m

32 m

20 m

RESERVE EFFLUENT DISPOSAL AREA (640m²)

PRIMARY EFFLUENT DISPOSAL AREA (640m²)

10m (MIN) VEGETATION BUFFER

10m (MIN) SETBACK

202° 29' 25" 129.73 m

273° 00' 30" 149.96 m

LOT 36
RP619982
1.903 ha

PARKING CALCULATIONS

BUILDING	GFA
ADMIN	166
MAINTENANCE SHED	82
UPPER PRIMARY	184
LOWER PRIMARY & AMENITIES	233
SPECIALTY CLASSROOM & WORKSHOP	108
LIBRARY / RESOURCE CENTRE	113
TOTAL	886 m²

1 CARPARK SPACE REQUIRED PER 50 m² GFA = 18 CAR SPACES REQUIRED
PLUS ADDITIONAL 3 DROP-OFF SPACES
1 BICYCLE SPACE REQUIRED PER 100 m² GFA = 9 BICYCLE SPACES REQUIRED

SITE LEGEND

- EXISTING TREE
- EXISTING TREE TO BE REMOVED
- EXISTING DEAD TREE TO BE REMOVED
- NEW TREE

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
1	Issued for coordination	15.02.2022

wd architects
environmentally sustainable design
11B Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 870 791

GOORA GAN STEINER SCHOOL
2744 ROUND HILL RD, AGNES WATER

SITE PLAN

Scale @ A3	1 : 500
Date	07.02.2022
Project No.	21641
Drawn by	AW/ML/ES
Checked by	AW

A110 | 1 Revision

Appendix C

Existing Features and Aerial View

LEGEND

SITE BOUNDARY

AERIAL VIEW SCALE - 1:1,000

0 10 20 30m

1:1,000 (A3)

REV	DESCRIPTION	APPD	DATE
A	FOR COMMENTS	JDL	25.04.22

DESIGNED

DRAWN

CHECKED K MACREADY

APPROVED K MACREADY

CLIENT
GOORA GAN STEINER SCHOOL

RPEQ No. 7772

DATE OCT 2021

EngineersPlus
ENGINEERS PLUS PTY LTD
www.engineersplus.com.au

PROJECT
PROPOSED GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATERS
STORMWATER MANAGEMENT PLAN
EXISTING FEATURES PLAN / AERIAL VIEW

ENGINEERS PLUS REFERENCE No. 21562

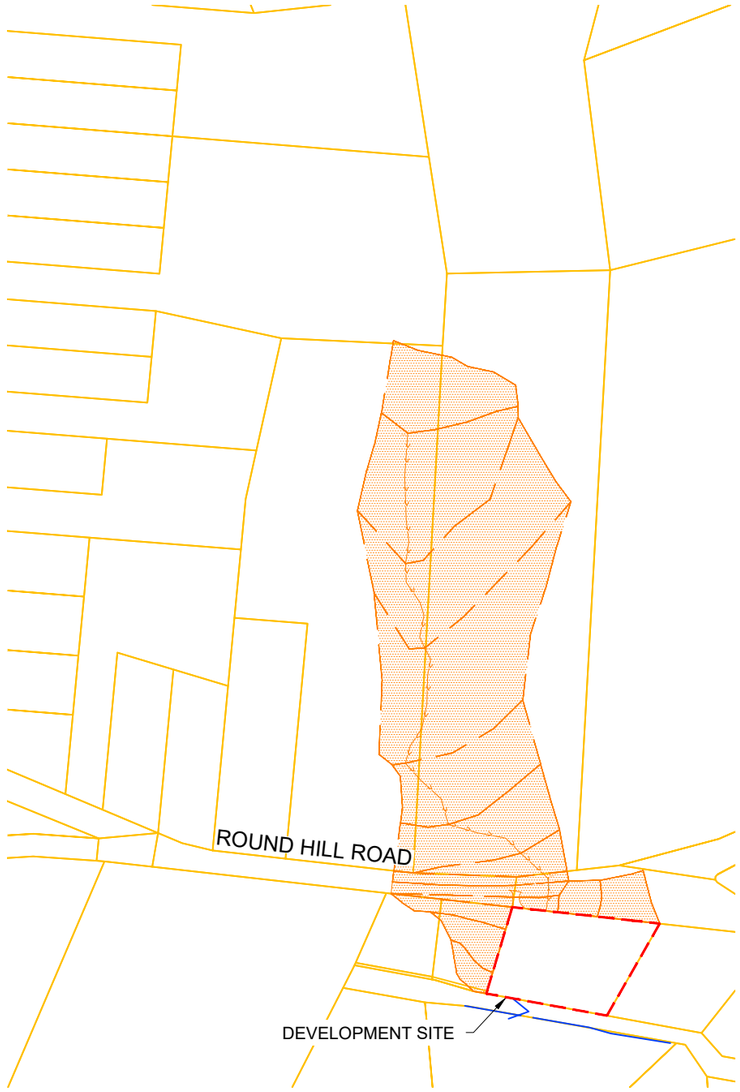
A3

DRAWING No. 21562 SW02

REVISION A

Appendix D

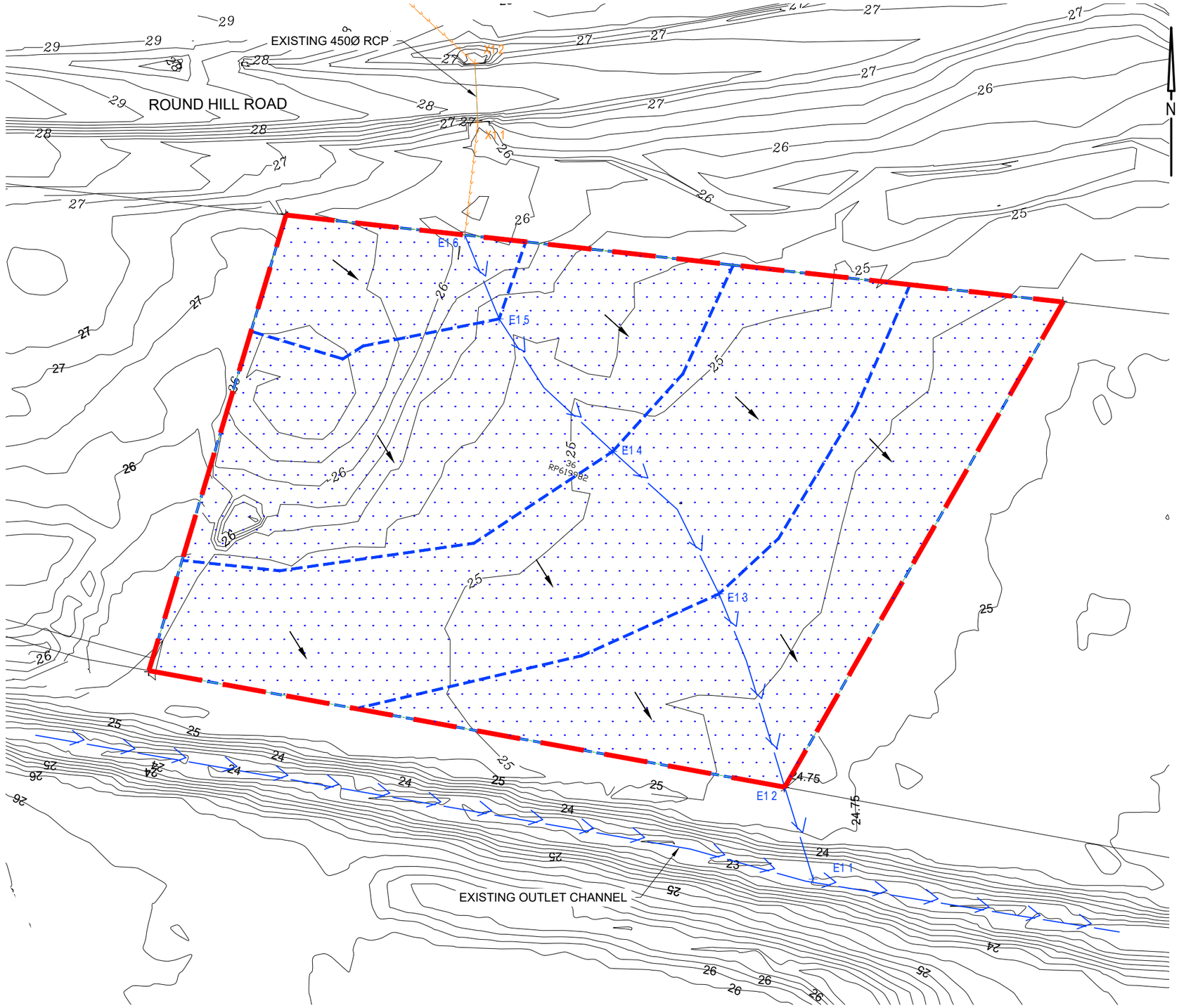
Catchment Plan - Pre-developed



EXTERNAL CATCHMENT PLAN

0 75 150 225m

1:7500 (A3)



SITE CATCHMENT PLAN - PRE DEVELOPED

SCALE - 1:2,000

0 20 40 60m

1:2,000 (A3)

LEGEND

- SITE BOUNDARY (STAGE 1)
- NODE NAME — MODELLING NODE (PRE DEVELOPED)
- DRAINAGE FLOWPATH
- RL — EXISTING CONTOUR
- CATCHMENT PERVIOUS

REV	DESCRIPTION	APPD	DATE
A	FOR COMMENTS	JDL	25.04.22

DESIGNED

DRAWN

CHECKED K MACREADY

APPROVED K MACREADY

CLIENT: GOORA GAN STEINER SCHOOL

RPEQ No. 7772

DATE OCT 2021

EngineersPlus
ENGINEERS PLUS PTY LTD
www.engineersplus.com.au

PROJECT
PROPOSED GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATERS
STORMWATER MANAGEMENT PLAN
CATCHMENT PLAN - PRE DEVELOPED

ENGINEERS PLUS REFERENCE No. 21562

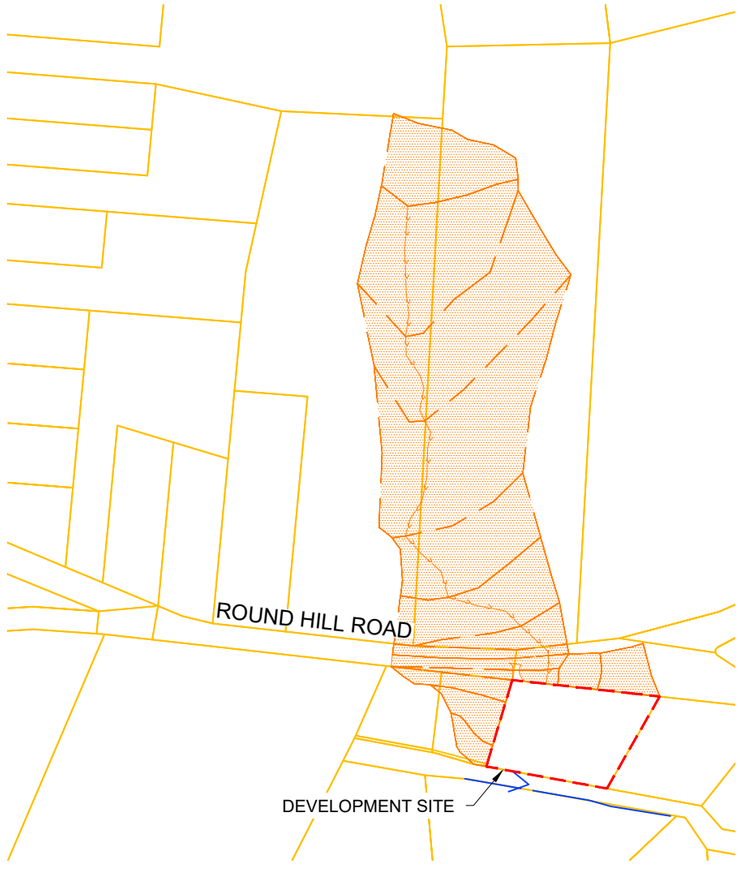
A3

DRAWING No. 21562 SW04

REVISION A

Appendix E

Catchment Plan – Post-developed



EXTERNAL CATCHMENT PLAN

0 75 150 225m

1:7500 (A3)

LEGEND

- SITE BOUNDARY
- NODE NAME — MODELLING NODE (POST DEVELOPED)
- WATER QUALITY CATCHMENT BOUNDARY
- DRAINAGE FLOWPATH
- RL — EXISTING CONTOUR
- CATCHMENT BUILDING
- CATCHMENT ROAD
- CATCHMENT IMPERVIOUS
- CATCHMENT OPEN SPACE

SITE CATCHMENT PLAN - POST DEVELOPED

SCALE - 1:2,000

0 20 40 60m

1:2,000 (A3)

REV	DESCRIPTION	APPD	DATE
A	FOR COMMENTS	JDL	25.04.22

DESIGNED

DRAWN

CHECKED K MACREADY

APPROVED K MACREADY

CLIENT: GOORA GAN STEINER SCHOOL

RPEQ No. 7772

DATE OCT 2021

EngineersPlus
ENGINEERS PLUS PTY LTD
www.engineersplus.com.au

PROJECT
PROPOSED GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATERS
STORMWATER MANAGEMENT PLAN
CATCHMENT PLAN - POST DEVELOPED

ENGINEERS PLUS REFERENCE No. 21562

A3

DRAWING No. 21562 SW05

REVISION A

Appendix F

Pre-developed Catchment Flows

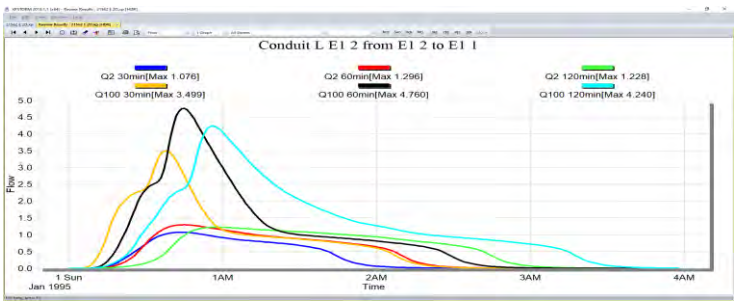
Table 17 Pre-developed Catchment Flows

Name	Landuse	S Cmt	Area (ha)	Slope (%)	Intensity (mm/hr)		Flow (m3/s)	
					Q5 (60min)	Q100 (60min)	Q2	Q100
E1 2	Rural	1	0.664	2.26			0.094	0.298
E1 2	Impervious	5	0.014	2.26			0.006	0.012
E1 3	Rural	1	1.004	2.26			0.193	0.482
E1 3	Impervious	5	0.02	2.26			0.008	0.017
E1 4	Rural	1	1.036	2.26			0.198	0.494
E1 4	Impervious	5	0.021	2.26			0.009	0.018
E1 5	Rural	1	0.404	2.26			0.098	0.237
E1 5	Impervious	5	0.008	2.26			0.003	0.007
E1 6	Road	1	0.018	2.26			0.007	0.015
E1 6	Impervious	5	0.162	2.26			0.068	0.141
X1 1	Road	1	0.029	2.26			0.011	0.024
X1 1	Impervious	5	0.265	2.26			0.112	0.231
X1 2	Rural	1	0.391	2.26			0.095	0.231
X1 2	Road	2	0.026	2.26			0.01	0.021
X1 2	Impervious	5	0.242	2.26			0.102	0.211
X1 3	Rural	1	1.23	2.26			0.154	0.507
X1 3	Impervious	5	0.025	2.26			0.01	0.021
X1 4	Rural	1	1.391	2.26			0.243	0.621
X1 4	Impervious	5	0.028	2.26			0.012	0.024
X1 5	Rural	1	3.149	2.26			0.418	1.103
X1 5	Impervious	5	0.064	2.26			0.027	0.055
X1 6	Rural	1	2.577	6.74			0.509	1.27
X1 6	Impervious	5	0.053	6.74			0.022	0.045
X1 7	Rural	1	2.218	8.88			0.486	1.196
X1 7	Impervious	5	0.045	8.88			0.018	0.038
X1 8	Rural	1	1.178	18.45			0.364	0.785
X1 8	Impervious	5	0.024	18.45			0.01	0.02
			16.29				**3.287**	**8.124**

Table 18 Pre-developed Link Flows (Stage 1)

Link	Flow Depth (m)		Max Velocity (m/s)		Max Flow (m3/s)	
	Q2	Q100	Q2	Q100	Q2	Q100
L E1 6	0.156	0.271	0.43	0.62	0.924	3.932
L E1 5	0.209	0.349	0.29	0.41	0.941	4.043
L E1 4	0.231	0.362	0.19	0.28	1.062	4.286
L E1 3	0.231	0.362	0.19	0.3	1.205	4.551
L E1 2	0.122	0.195	0.7	0.99	1.296	4.762

Figure 4 Pre-developed Outflow - Link L “E1 2”



Appendix G

Post-developed Catchment Flows

Table 19 Post-developed Catchment Flows

Name	Landuse	S Cmt	Area (ha)	Slope (%)	Flow (m3/s)	
					Q2	Q100
D1 2	Impervious	5	0.089	2.26	0.037	0.077
D1 2	Open Space	1	0.343	2.26	0.061	0.183
D1 3	Impervious	5	0.055	2.26	0.023	0.047
D1 3	Open Space	1	0.389	2.26	0.068	0.204
D1 4	Impervious	5	0.013	2.26	0.005	0.011
D1 4	Open Space	1	0.116	2.26	0.024	0.071
D1 5	Impervious	5	0.005	2.26	0.002	0.004
D1 5	Open Space	1	0.006	2.26	0.002	0.005
D1 5	Rural	2	0.197	2.26	0.035	0.104
D1 6	Road	1	0.016	2.26	0.005	0.012
D1 6	Impervious	5	0.151	2.26	0.063	0.131
D2 1	Impervious	5	0.103	2.26	0.043	0.089
D2 1	Open Space	1	0.131	2.26	0.027	0.08
D3 1	Impervious	5	0.017	2.26	0.007	0.014
D3 1	Open Space	1	0.151	2.26	0.03	0.09
D3 3	Impervious	5	0.032	2.26	0.013	0.027
D3 3	Open Space	1	0.095	2.26	0.033	0.07
D3 3	Rural	2	0.298	2.26	0.078	0.184
D3 4	Open Space	1	0.01	2.26	0.003	0.007
D3 4	Impervious	5	0.016	2.26	0.007	0.014
D3 4	Rural	2	0.261	2.26	0.071	0.164
D4 1	Impervious	5	0.022	2.26	0.009	0.019
D4 1	Open Space	1	0.13	2.26	0.027	0.079
D4 1	Rural	2	0.329	2.26	0.053	0.162
D5 1	Open Space	1	0.043	2.26	0.01	0.028
D5 1	Impervious	5	0.177	2.26	0.074	0.154
X1 1	Road	1	0.029	2.26	0.011	0.024
X1 1	Impervious	5	0.259	2.26	0.109	0.226
X1 2	Road	2	0.026	2.26	0.01	0.021
X1 2	Impervious	5	0.242	2.26	0.102	0.211
X1 2	Rural	1	0.391	2.26	0.095	0.231
X1 3	Impervious	5	0.025	2.26	0.01	0.021
X1 3	Rural	1	1.23	2.26	0.154	0.507
X1 4	Impervious	5	0.028	2.26	0.012	0.024
X1 4	Rural	1	1.391	2.26	0.243	0.621
X1 5	Impervious	5	0.064	2.26	0.027	0.055
X1 5	Rural	1	3.149	2.26	0.418	1.103
X1 6	Impervious	5	0.053	6.74	0.022	0.045
X1 6	Rural	1	2.577	6.74	0.509	1.27
X1 7	Impervious	5	0.045	8.88	0.018	0.038
X1 7	Rural	1	2.218	8.88	0.486	1.196
X1 8	Impervious	5	0.024	18.45	0.01	0.02
X1 8	Rural	1	1.178	18.45	0.364	0.785
		Total	**16.12**		**3.41**	**8.428**

Appendix H

Post-developed Mitigated Catchment Flows

Table 20 Post-developed Conduit Data

Link	Shape	Length (m)	No. of Cells	Width (m)	Dia / Ht (mm)	Slope (%)	"n"	US IL	DS IL
L D1 1 O	Trapezoidal	13	1	5.0	500	0.52	0.035	23.067	23.000
L D1 2 B	Circular	12.77	1		200	0.34	0.009	23.110	23.067
L D1 2 O	Trapezoidal	3	1	20.0	200	0.50	0.035	25.110	25.095
L D1 2 P	Circular	12.77	1		450	0.34	0.014	23.810	23.767
L D1 3 O	Natural	31.48	1	5.0	400	0.50	0.035	25.267	25.110
L D1 3 P	Circular	31.48	1		600	0.35	0.014	23.920	23.810
L D1 4 O	Natural	58.723	1	5.0	400	0.50	0.035	25.560	25.267
L D1 4 P	Circular	58.723	1		600	0.35	0.014	24.126	23.920
L D1 5 O	Natural	38.135	1	5.0	400	0.50	0.035	25.750	25.560
L D1 5 P	Circular	38.135	1		600	0.35	0.014	24.260	24.126
L D1 6 O	Natural	25.357	1	5.0	400	0.50	0.035	25.876	25.750
L D1 6 P	Circular	25.357	1		600	0.35	0.014	24.348	24.260
L D2 1 O	Trapezoidal	33.71	1	5.0	300	0.50	0.035	25.730	25.560
L D2 1 P	Circular	33.71	1		450	0.35	0.014	24.244	24.126
L D3 1	Trapezoidal	83.562	1	2.0	300	0.50	0.035	24.962	24.545
L D3 2	Trapezoidal	62.747	1	2.0	300	0.50	0.035	25.275	24.962
L D3 3	Trapezoidal	24.86	1	2.0	300	0.50	0.035	25.400	25.275
L D3 4	Trapezoidal	52.746	1	2.0	300	0.50	0.035	25.664	25.400
L D4 1	Trapezoidal	72.777	1	3.0	300	0.50	0.035	25.475	25.110
L D5 1 O	Trapezoidal	28.82	1	5.0	300	0.50	0.035	25.704	25.560
L D5 1 P	Circular	28.82	1		450	0.35	0.014	24.227	24.126

Table 21 Post Development Conduit Flows

Link	Flow Depth (m)		Max Velocity (m/s)		Max Flow (m3/s)	
	Q2	Q100	Q2	Q100	Q2	Q100
L D1 1 O	0.236	0.495	0.83	1.39	1.118	4.687
L D1 2 B	1.941	2.069	3.24	3.25	0.04	0.04
L D1 2 O	0.061	0.189	0.39	0.99	0.468	3.791
L D1 2 P	1.361	1.489	3.41	3.63	0.549	0.585
L D1 3 O	0.168	0.366	0.42	0.76	0.555	3.661
L D1 3 P	1.515	1.713	2.44	2.67	0.696	0.763
L D1 4 O	0.168	0.368	0.44	0.73	0.597	3.684
L D1 4 P	1.6	1.802	1.95	1.97	0.556	0.561
L D1 5 O	0.166	0.368	0.44	0.72	0.587	3.602
L D1 5 P	1.654	1.854	1.48	1.34	0.422	0.382
L D1 6 O	0.165	0.364	0.44	0.72	0.595	3.569
L D1 6 P	1.693	1.891	1.38	1.3	0.395	0.372
L D2 1 O	0.166	0.368	0	0.19	0	0.073
L D2 1 P	1.6	1.802	0.47	1.44	0.058	0.233
L D3 1	0.172	0.276	0.46	0.62	0.201	0.508
L D3 2	0.172	0.276	0.48	0.6	0.186	0.435
L D3 3	0.15	0.243	0.48	0.61	0.187	0.442
L D3 4	0.15	0.243	0.33	0.42	0.076	0.177
L D4 1	0.082	0.189	0.3	0.46	0.077	0.246
L D5 1 O	0.166	0.368	0.18	0.18	0.035	0.091
L D5 1 P	1.6	1.802	0.91	0.73	0.147	0.117

Figure 5 Post Development Outflow Link L “D1 1”

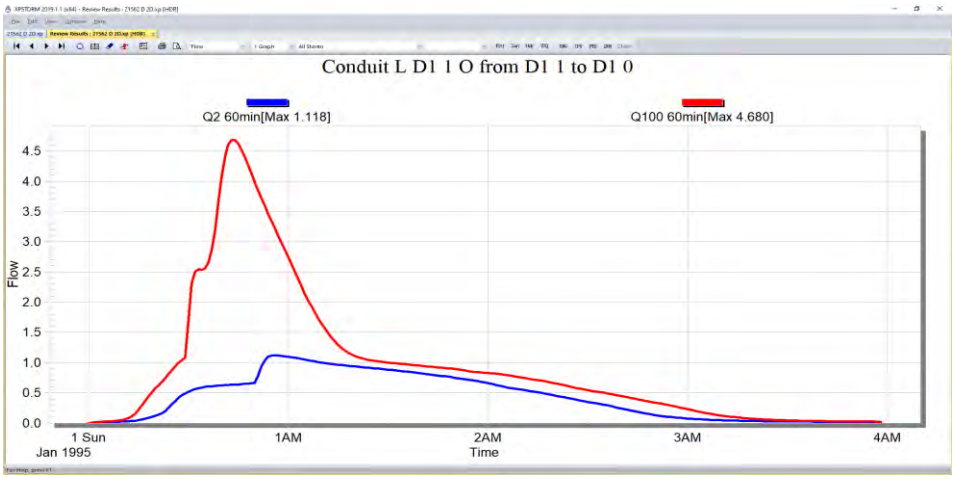
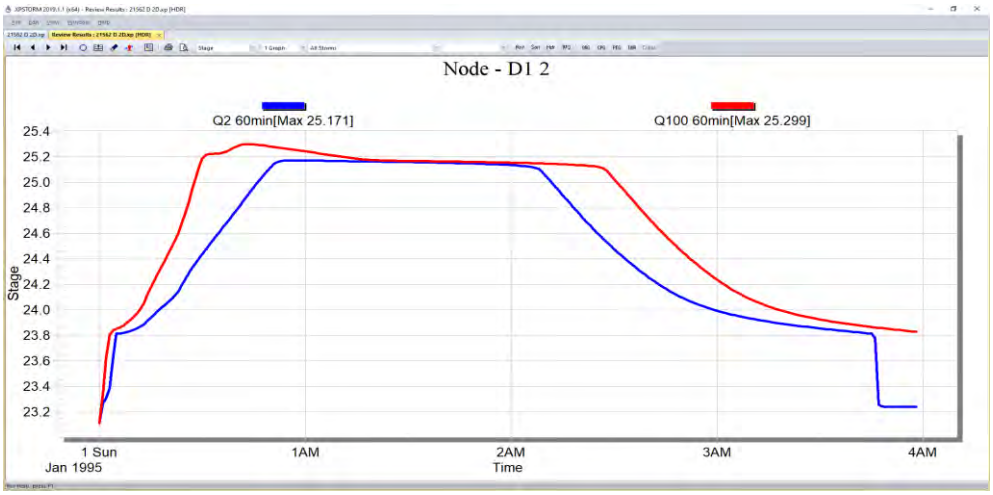


Figure 6 Post Development Max WSL – Detention Basin Node “D1 2”



Appendix I

MUSIC Modelling Parameters/Results

Figure 7 Water Quality Node Layout

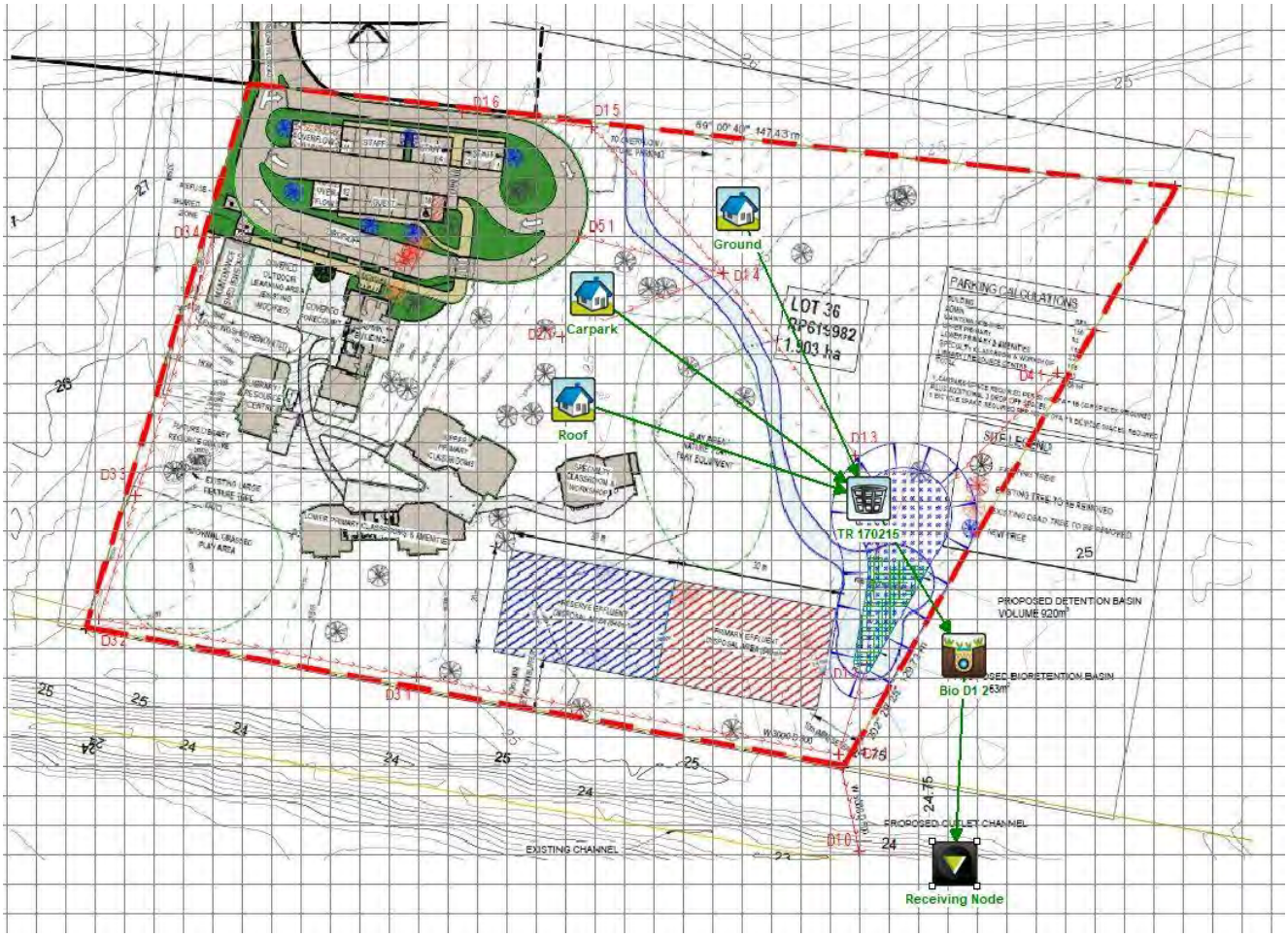


Table 22 MUSIC Source Node Rainfall-Runoff Parameters

Parameter	Urban Residential
Rainfall Threshold (mm)	1
Soil Capacity (mm)	500
Initial Storage (%)	10
Field Capacity (mm)	200
Infiltration Capacity Coefficient a	211
Infiltration Capacity Coefficient b	5.0
Initial Depth (mm)	50
Daily Recharge Rate (%)	28
Daily Drainage Rate (%)	27
Daily Deep Seepage Rate (%)	0

Table 23 MUSIC Pollutant Load Properties

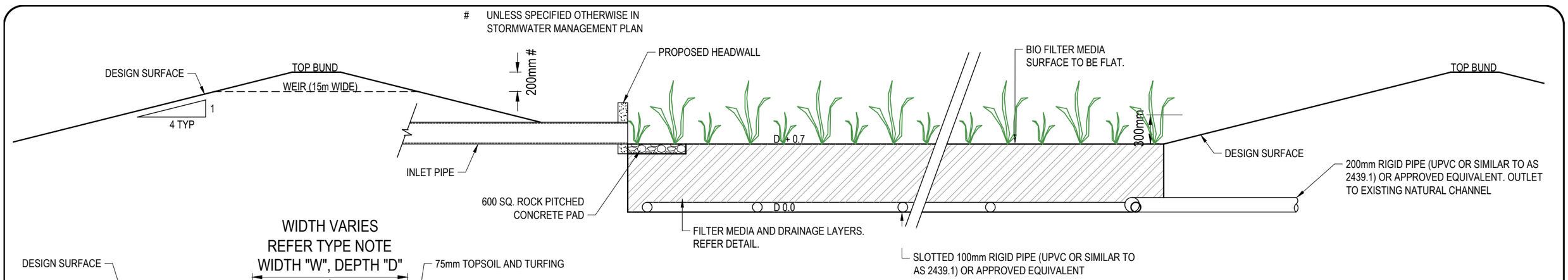
Roof	Total Suspended Solids (Log_{10} mg/L)		Total Phosphorus (Log_{10} mg/L)		Total Nitrogen (Log_{10} mg/L)	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Base Flow	1.1	0.17	-0.82	0.19	0.32	0.12
Storm Flow	2.2	0.32	-0.45	0.25	0.42	0.19
Road	**Total Suspended Solids (Log_{10} mg/L)**		**Total Phosphorus (Log_{10} mg/L)**		**Total Nitrogen (Log_{10} mg/L)**	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Base Flow	1.0	0.34	-0.97	0.31	0.20	0.20
Storm Flow	2.43	0.39	-0.3	0.31	0.26	0.23
Pervious	**Total Suspended Solids (Log_{10} mg/L)**		**Total Phosphorus (Log_{10} mg/L)**		**Total Nitrogen (Log_{10} mg/L)**	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Base Flow	1.00	0.34	-0.97	0.31	0.20	0.20
Storm Flow	2.18	0.39	-0.47	0.31	0.26	0.23

Table 24 MUSIC Bio-Retention Parameters

Catchment	Internal
Node	**D1 2**
Total Catchment Area (ha)	1.49
Impervious Catchment Area (Ha)	0.463
Low Flow Bypass (m^3/s)	0
High Flow Bypass (m^3/s)	100
Extended Detention Depth (m)	0.3
Surface Area (m^2)	194
Filter Media Surface Area (m^2)	194
Unlined Filter Media Perimeter (m)	58.8
Filter Media Depth (m)	0.4
Filter Media Hydraulic Conductivity (mm/hr)	200
TN Content of Filter Media (mg/kg)	500
Orthophosphate Content of Filter Media (mg/kg)	55
Exfiltration rate (mm/hr)	0.0
Is the base lined	No
Vegetated with Effective Nutrient Removing Plants	Yes
Overflow Weir Length	4.0m
Under Drain Present	Yes
Submerged Zone with Carbon Present	No
Outlet Pipe Dia. (m)	0.2

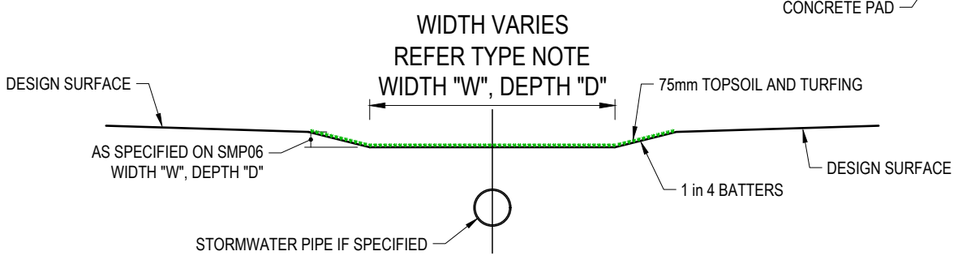
Figure 8 MUSIC Treatment Train Results – Bio D1

	Sources	Residual Load	% Reduction
Flow (ML/yr)	6.14	5.87	4.4
Total Suspended Solids (kg/yr)	1230	180	85.4
Total Phosphorus (kg/yr)	3.07	1.08	64.9
Total Nitrogen (kg/yr)	19.5	8.15	58.2
Gross Pollutants (kg/yr)	79.1	0	100



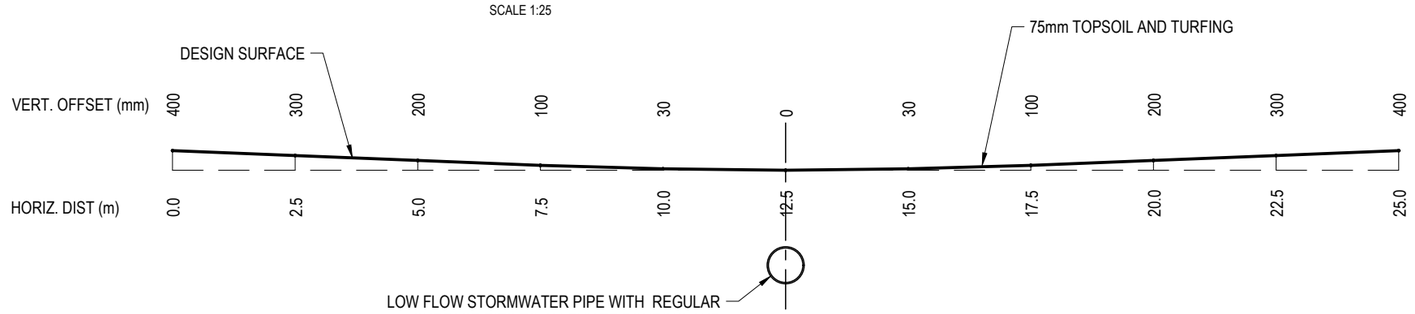
BIO-RETENTION TYPICAL SECTION

SCALE 1:25



TYPICAL SWALE SECTION

SCALE 1:25



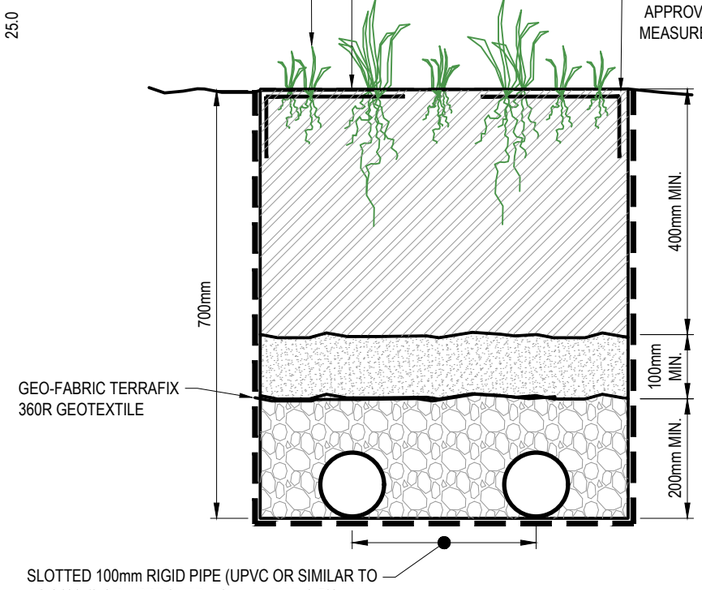
MAIN FLOWPATH SWALE PROFILE

NOT TO SCALE

TABLE 1 - SUB TROPICAL PLANT SPECIES

CORE SPECIES	COMMON NAME	TYPE
Carex appressa	Tall Sedge	Groundcover sedge
Ficinia nodosa	Knobby club-sedge	Groundcover sedge
Imperata cylindrica	Blady grass	Groundcover grass
Lepidosperma laterale	Variable sword-sedge	Groundcover sedge
Lomandra hystrix	River mat-rush	Groundcover herb
Lomandra longifolia	Spiny-headed mat-rush	Groundcover herb
Lomandra leucocephala	Woolly Mat-Rush	Groundcover herb
Pennisetum alopecuriodes	Swamp foxtail grass	Groundcover grass
Poa labillardieri	Common tussock grass	Groundcover grass
Themeda triandra (syn. T. australis)	Kangaroo grass	Groundcover grass
Melaleuca (Callistemon) sieberi	River bottlebrush	Shrub
Leptospermum liversidgei	Olive tea-tree	Shrub
Melaleuca thymifolia	Thyme honey myrtle	Shrub
Banksia robur	Swamp banksia	Small tree
Melaleuca linariifolia	Flax-leaved paperbark	Small tree
Melaleuca viridiflora	Broad leaved tea-tree	Small tree
Casuarina glauca	Swamp oak	Tree
Casuarina cunninghamiana	River sheoak	Tree
Lophostemon suaveolens	Swamp Mahogany	Tree
Melaleuca bracteata	Black tea-tree	Tree
Melaleuca quinquenervia	Broad-leaved paper bark	Tree

PLANT SPECIES AS PER TABLE 1. PLANTING DENSITY AND INSTALLATION TO BE CARRIED OUT IN ACCORDANCE WITH THE 'WATER SENSITIVE URBAN DESIGN' TECHNICAL DESIGN GUIDELINES FOR SOUTH EAST QUEENSLAND - VERSION 1 JUNE 2006 - TABLE A-1 AND A-2 AND/OR IN ACCORDANCE WITH APPROVED LANDSCAPE STATEMENT OF INTENT.



FILTER MEDIA

SANDY LOAM WITH 400-500mm/hr SATURATED HYDRAULIC CONDUCTIVITY. IN-SITU HYDRAULIC CONDUCTIVITY TO REACH 180mm/hr ONCE SETTLEMENT AND COMPACTION HAS TAKEN PLACE.

ORGANIC CONTENT 5% (w/w) MAX.
PARTICLE SIZE (w/w) <3% PASSING 0.05mm
(w/w) >97% PASSING 2mm
pH. BETWEEN 5.5-7.5
PHOSPHORUS CONCENTRATION <100mg/kg

TRANSITION LAYER

1MM COARSE SAND

DRAINAGE LAYER

2-5MM SCREENINGS COARSE SAND/GRAVEL

NOTE

BIO-RETENTION AREA TO BE PLANTED OUT AFTER ALL OTHER INSTALLION HAS BEEN COMPLETED.

BIO-RETENTION DETAIL

SCALE 1:10

0 100 200 300mm 1:10 (A3)

REV	DESCRIPTION	APPD	DATE
A	FOR COMMENTS	JDL	25.04.22

DESIGNED
DRAWN
CHECKED K MACREADY
APPROVED K MACREADY

CLIENT: GOORA GAN STEINER SCHOOL

RPEQ No. 7772 DATE OCT 2021

EngineersPlus
ENGINEERS PLUS PTY LTD
www.engineersplus.com.au

PROJECT
PROPOSED GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATERS
STORMWATER MANAGEMENT PLAN
DETAILS SHEET

ENGINEERS PLUS REFERENCE No. 21562

A3

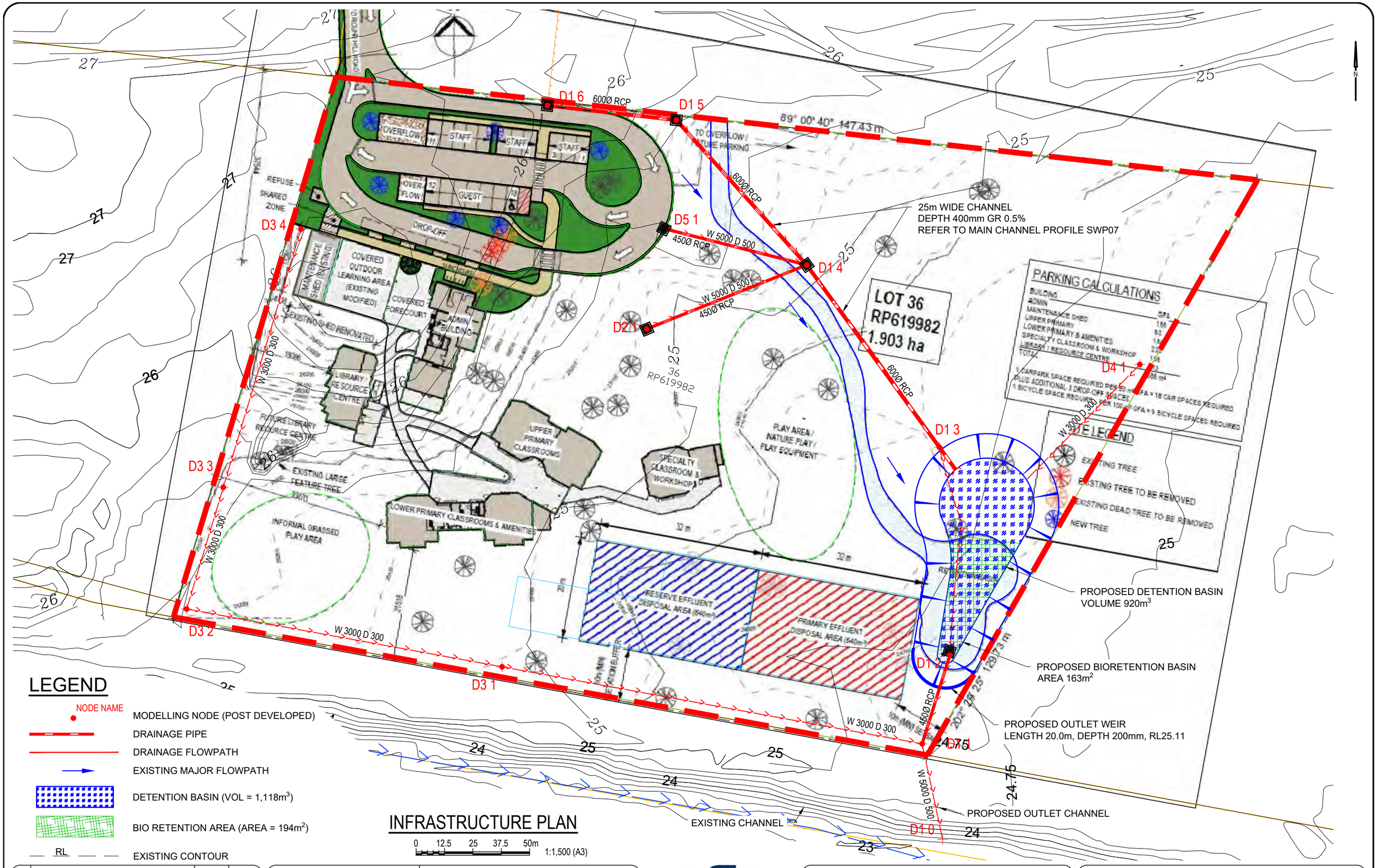
DRAWING No. 21562 SW07

REVISION A

Appendix J

Stormwater Drainage Infrastructure

INSERT DWG “21562 SMP-SW06”



LEGEND

- NODE NAME — MODELLING NODE (POST DEVELOPED)
- DRAINAGE PIPE
- DRAINAGE FLOWPATH
- EXISTING MAJOR FLOWPATH
- DETENTION BASIN (VOL = 1,118m³)
- BIO RETENTION AREA (AREA = 194m²)
- RL — EXISTING CONTOUR

INFRASTRUCTURE PLAN

0 12.5 25 37.5 50m — 1:1,500 (A3)

REV	DESCRIPTION	APPD	DATE
A	FOR COMMENTS	JDL	25.04.22

DESIGNED
DRAWN
CHECKED K MACREADY
APPROVED K MACREADY

CLIENT
GOORA GAN STEINER SCHOOL

RPEQ No. 7772
DATE OCT 2021

EngineersPlus
ENGINEERS PLUS PTY LTD
www.engineersplus.com.au

PROJECT
PROPOSED GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATERS
STORMWATER MANAGEMENT PLAN
INFRASTRUCTURE PLAN

ENGINEERS PLUS REFERENCE No. 21562

A3	DRAWING No. 21562 SW06	REVISION A

ACCESS TRAFFIC
CONSULTING

Goora Gan Steiner School

2744 Round Hill Road, Agnes Water

Traffic Impact Assessment

March 2022

Prepared for Engineers Plus Pty Ltd

Quality Information

Document	Traffic Impact Assessment
Client	Goora Gan Steiner School
Reference	GOO0121-001
Date	8 March 2022
Prepared By	Andrew Barrie

Revision History

Rev	Revision Date	Details	Authorised	
			Name / Position	Signature
A	08/03/2022	Final	Andrew Barrie Principal Traffic Engineer RPEQ 12801	

Table of Contents

1.0 Introduction

1.1 Project Background

The applicant proposes to establish an educational establishment (prep - grade 6 primary school) for up to 99 students on land formally described as Lot 36 on RP619982, or 2744 Round Hill Road, Agnes Water, Queensland, located to the south-west of the Round Hill Road / Bicentennial Drive intersection.

1.2 Project Context

Access Traffic Consulting (ATC) was commissioned by Goora Gan Steiner School Inc. to undertake a Traffic Impact Assessment (TIA) for the proposed educational establishment (the Project). The site on which the development is proposed to be located is within the Gladstone Regional Council local government area.

The proposed development will largely be accessed via the local government controlled road network, and accordingly the proposal has been assessed considering the relevant Council controls, including Council's Planning Scheme (the Gladstone Regional Council Planning Scheme Version 2, 2017).

This Traffic Impact Assessment (TIA) was carried out to determine the level of potential impacts of the Project on the operation of the local road network.

1.2.1 Study Area

As identified above, the proposed development is to be located to the south-west of the intersection of Round Hill Road and Bicentennial Road, at 2744 Round Hill Road over a land parcel formally described as Lot 36 on RP619982. The location of the subject property in context of the local area is shown in **Figure 1**.

Figure 1 Study Area – 2744 Round Hill Road (Lot 36 RP619982) **[Source: Qld Globe]**

2.0 Existing Conditions

2.1 Land Use and Zoning

The subject site (Lot 36 on RP619982) is approximately 19,030m² in area, and is currently zoned as Rural Residential under the Gladstone Regional Council Planning Scheme (2017), as shown in **Figure 2**. It is however within an area designated as 'Creative Enterprise Precinct' within the Agnes Water & Seventeen Seventy Structure Plan, as shown in **Figure 3** below.

The subject site currently accommodates a single residential dwelling positioned towards the north-western corner of the property.

Figure 2 Land Use Zoning (Lot 36 on RP619982) **[Source: GRC Online Mapping]**

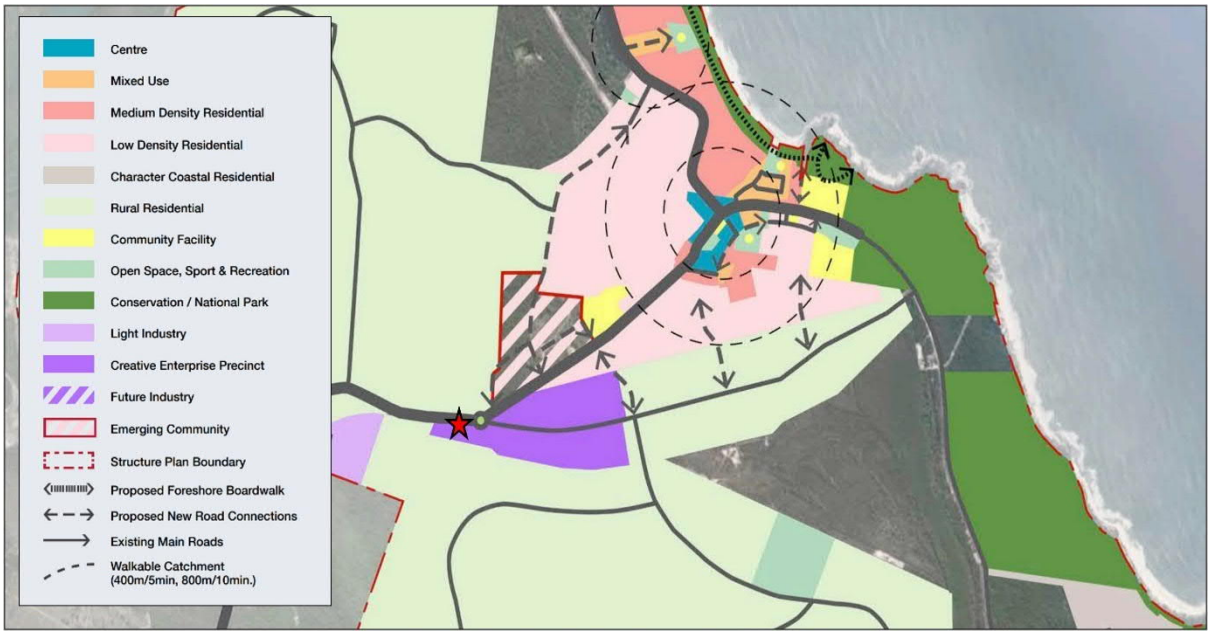


Figure 3 Extract from Agnes Water & Seventeen Seventy Structure Plan **[Source: GRC Planning Scheme]**

2.2 Adjacent Land Use / Approvals

As shown in **Figure 2** above, the land surrounding the subject site is generally zoned Rural Residential, with the exception of the land immediately to the south which is zoned Open Space.

A development approval (DA/83/2017) was granted in 2018 for a 24 lot rural residential subdivision on the parcel of land to the north of the subject site, on the opposite side of Round Hill Road (2773 Round Hill Road, described as Lot 7 on RO616792). An extract from the subdivision plan for this development is provided as **Figure 4** below.

As part of this development, it is understood that the existing priority-controlled intersection of Round Hill Road and Bicentennial Drive will be upgraded to a single circulating lane roundabout, with access to the approved rural residential development via the new (northern) approach.

This is discussed further in the following sections, which consider the operation of the Round Hill Road / Bicentennial intersection from a capacity perspective and the impact of the proposed development upon this intersection.

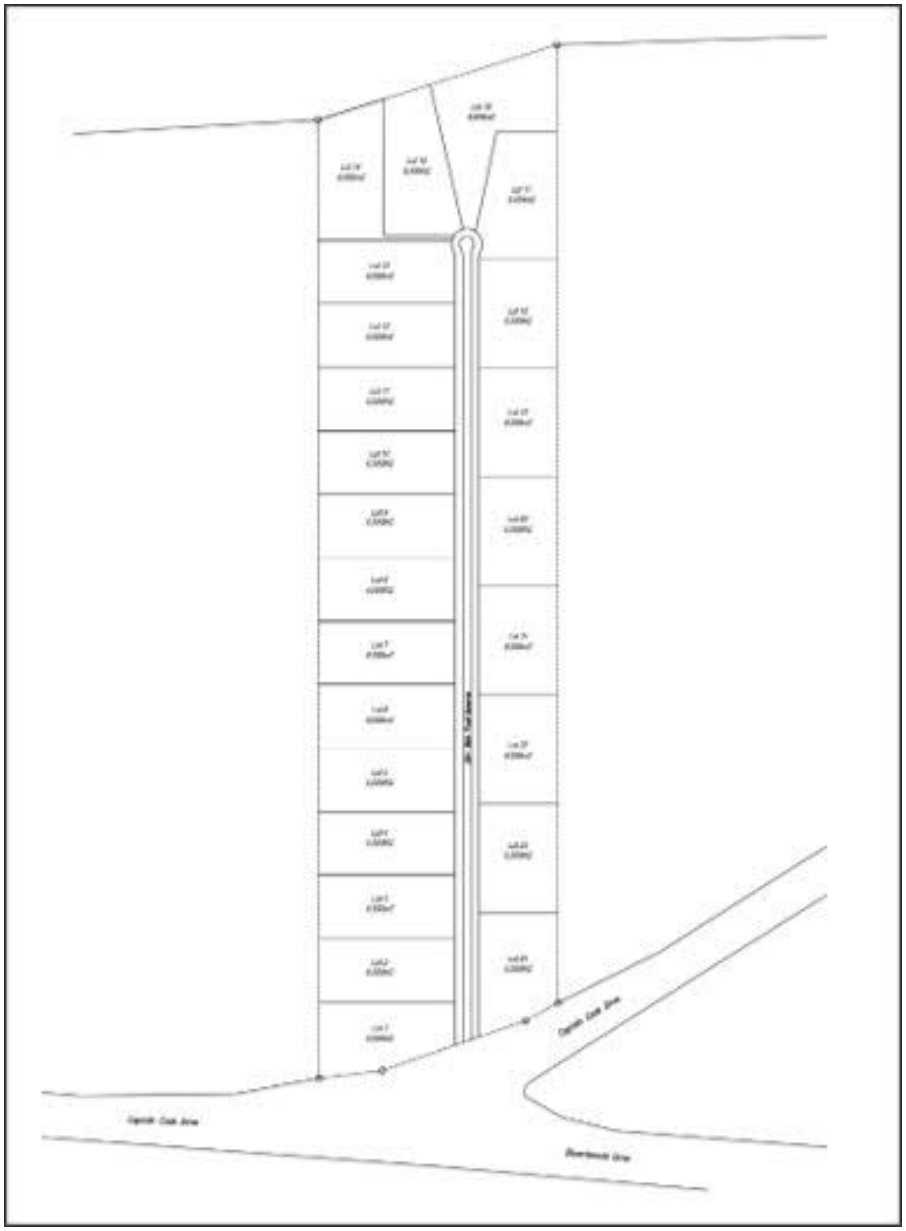


Figure 4 Extract from Subdivision Plan, 2773 Round Hill Road, Agnes Water [Source: Pinnacle Engineering Group TIA Report, October 2017]

2.3 Road Network Details

2.3.1 Existing Site Access

As previously noted, the subject site currently accommodates a single residential dwelling positioned towards the north-western corner of the property. This dwelling is accessed via an unsealed driveway which extends within the road verge parallel to (and to the south of) Round Hill Road, to the west of the property, and connects with Round Hill Road via a shared unsealed rural property access fronting the property at 2730 Round Hill Road. **Figure 5** below shows the existing site access arrangements.

A concrete driveway has been constructed to the west of the aforementioned unsealed rural property access, however it is understood that this is intended to provide access to/from the property at 2730 Round Hill Road only.

Figure 5 Existing Site Access **[Source: Qld Globe]**

2.3.2 Road Links

The key roads in proximity to the site include Round Hill Road, and Bicentennial Drive.

Further detail on each of these roads is provided in the following sections.

2.3.2.1 Round Hill Road

Round Hill Road is a local government controlled road (GRC) designated as a Rural Arterial under Council's road hierarchy. It generally runs in a northeast-southwest direction, connecting from Fingerboard Road at its southern end to Captain Cook Drive at Agnes Water at its northern end.

In the vicinity of the subject site, Round Hill Road is a two-lane, two-way undivided rural road of approximately 6.0m – 6.5m width, with limited or no road shoulders provided (as shown in **Figure 6** below).

A posted speed of limit of 80km/hr applies on Round Hill Road in the vicinity of the subject site.

Figure 6 Round Hill Road - Current Configuration

The following table summarises scheduled upgrades to and in proximity to Round Hill Road, as identified in Council's Local Government Infrastructure Plan (LGIP), Plans for Trunk Infrastructure (PFTI), SC3.2 Schedule of works, Table SC3.2.3 – Transport network.

This information identifies the 'Agnes Water Second Arterial Route', which will effectively form a western 'bypass' of Agnes Water town to access Seventeen Seventy. **Figure 7** over page indicates that the intention is for this new road to connect to Round Hill Road at the Bicentennial Drive intersection, however this plan (dated 15/11/16) is superseded by the 2018 approval for the residential development on the site at 2773 Round Hill Road, as discussed in **Section 2.2** (which would preclude this road alignment).

In addition, the Agnes Water & Seventeen Seventy Structure Plan (refer **Figure 3**) appears to show this connection further to the east on Round Hill Road. Accordingly, it is assumed that the intention is for the Agnes Water Second Arterial Route to connect to Round Hill Road further to the east, with adequate separation from the Bicentennial Drive intersection.

Table 1: Summary of Council's Scheduled Roadworks, Round Hill Road **[Source: GRC LGIP]**

Asset ID	LGIP ID	Asset Name	Establishment Timing	Establishment Cost
R-AGW-002, R-AGW-006	Agnes Water Second Arterial Route (Round Hill Road - Captain Cook Drive)	New road (Sub Arterial) including two intersections (Round Hill Road and Captain Cook Drive)	2044	$10,380,995 ($2015)
R-AGW-003	Round Hill Road (various rural sections)	Road upgrade (provision of sealed road shoulders in deficient areas to ensure a consistent formation width)	2023	$900,000
R-AGW-004	Round Hill Road / Captain Cook Drive Intersection	Intersection upgrade (roundabout)	2044	$876,000

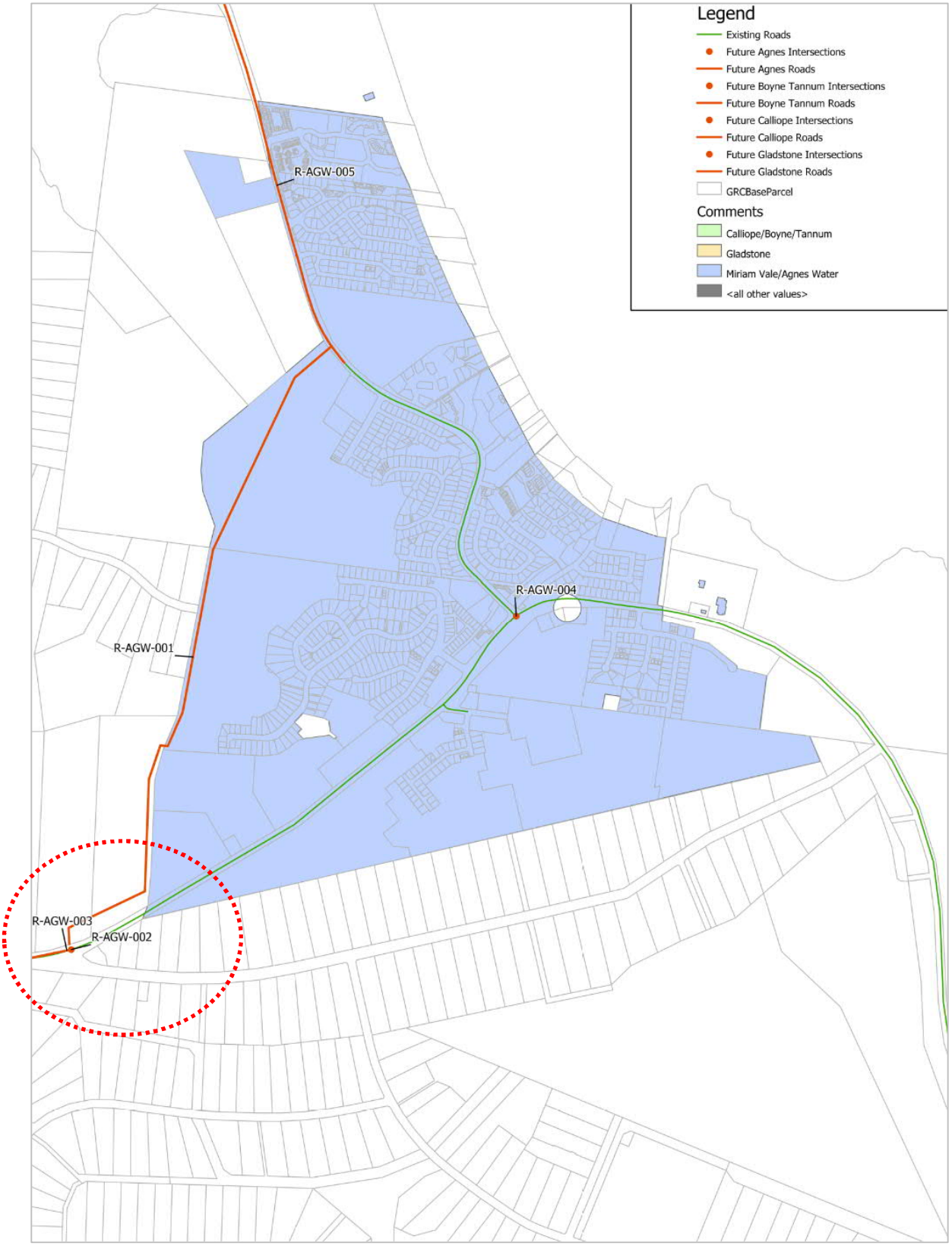


Figure 7 Extract from GRC Map 19 – PFTI – Agnes Water (15/11/2016) **[Source: GRC LGIP]**

2.3.2.2 Bicentennial Drive

Bicentennial Drive is a local government controlled road (GRC) designated as a Rural Collector under Council's road hierarchy. It generally runs in an east-west direction, connecting from Round Hill Road at its western end to Springs Road at its eastern end.

In the vicinity of the subject site, Bicentennial Drive is a two-lane, two-way undivided rural road of approximately 7.0m width, with narrow road shoulders of approximately 1.0m width provided.

A posted speed of limit of 60km/hr applies on Bicentennial Drive in the vicinity of the subject site.

2.3.3 Pedestrian and Cyclist Facilities

There is limited existing pedestrian or cyclist pathway infrastructure in the vicinity of the proposed development site, which is a result of the rural, high speed nature of Round Hill Road (which is not a high demand route for pedestrians and/or cyclists).

Further, there are no planned pedestrian or cyclist pathways in proximity to the site which are identified in Council's Local Government Infrastructure Plan (LGIP), Plans for Trunk Infrastructure (PFTI).

2.3.4 Public Transport Facilities

Whilst bus shuttle and tourist services operate locally, it is understood that no Council-operated bus services currently operate in Agnes Water or the surrounding areas.

Notwithstanding this, it is also understood that Agnes Water Buses / Scifleet School Buses currently operates a school bus service which includes pickup / drop off movements at both the Discovery Christian College and the Agnes Waters State School in the area.

2.3.5 Key Intersections

The key intersection in proximity to the site is the Round Hill Road / Bicentennial Drive intersection. This is currently a priority (give-way) controlled T-intersection, with Round Hill Road forming the major approach and Bicentennial Drive forming the minor approach.

As shown in **Figure 8** below, a channelised right turn is currently provided for the right turn movement from Round Hill Road into Bicentennial Drive. This lane is approximately 100m in length, including taper.

Figure 8 Round Hill Road / Bicentennial Drive Intersection **[Source: Queensland Globe]**

2.3.5.1 Current Traffic Volumes

Traffic counts were undertaken at the Round Hill Road / Bicentennial Drive intersection on Thursday 9 September 2021. The detailed results of these counts are included in **Appendix A**, with the recorded traffic volumes during the following recorded AM and PM peak hours summarised in the figures below:

- AM Peak Hour: 8:00am – 9:00am
- PM Peak Hour: 4:00pm – 5:00pm

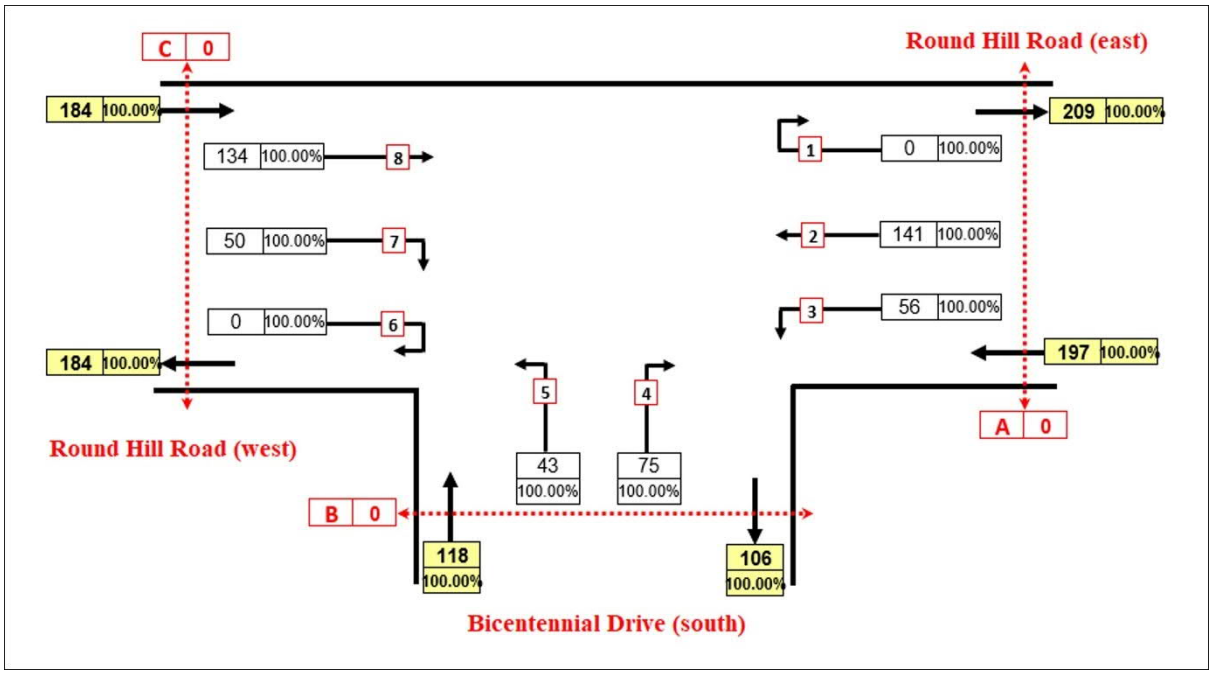


Figure 9 AM Peak Hour Traffic Volumes (8:00am – 9:00am)

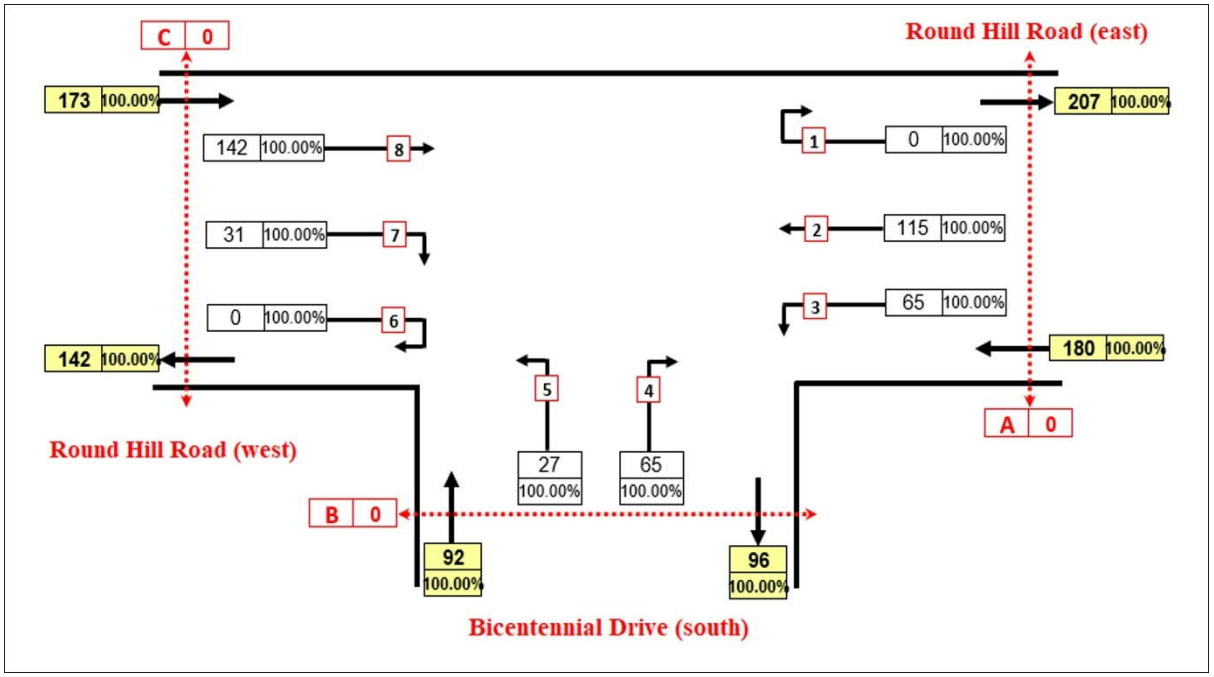


Figure 10 PM Peak Hour Traffic Volumes (4:00pm – 5:00pm)

However given the nature of the proposed development (i.e. a primary school), the development traffic generation of the development during the observed road network peak (4:00pm – 5:00pm) is expected to be negligible. Accordingly, the 3:00pm – 4:00pm period has been assessed as the critical afternoon peak period in the analyses undertaken. The recorded background traffic volumes at the intersection during this period are as shown in **Figure 11** below.

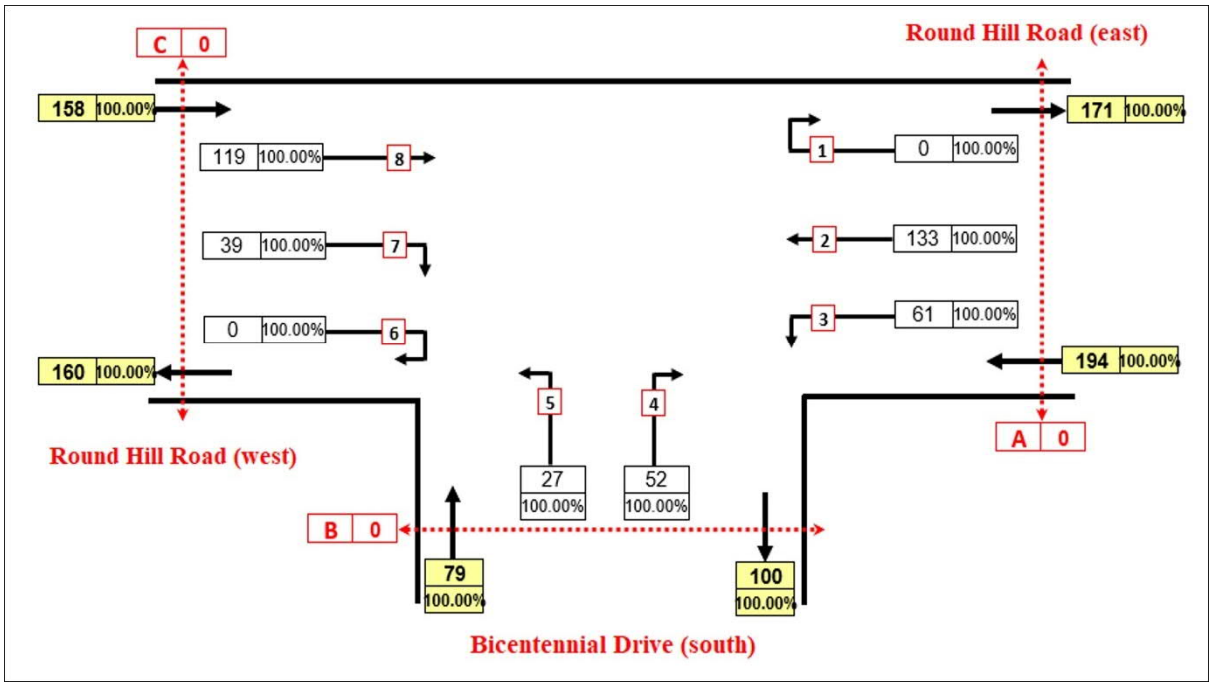


Figure 11 PM School Peak Hour Traffic Volumes (3:00pm – 4:00pm)

2.3.5.2 Current Intersection Performance

The current (2022) performance of the Round Hill Road / Bicentennial Drive intersection has been assessed for the critical AM and PM peak periods, based upon the traffic volumes outlined in the figures above. A 3% per annum compound growth rate was applied to all turning movement volumes at the intersection in order to forecast future year traffic volumes based upon the 2021 traffic count data.

The resulting estimated 2022 traffic volumes at the Round Hill Road / Bicentennial Drive intersection are as shown in the figures below.

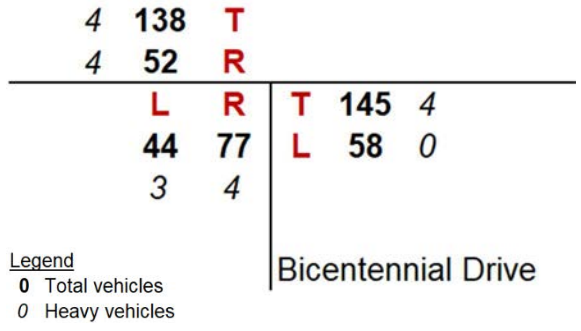


Figure 12a: 2022 AM Peak Existing Volumes

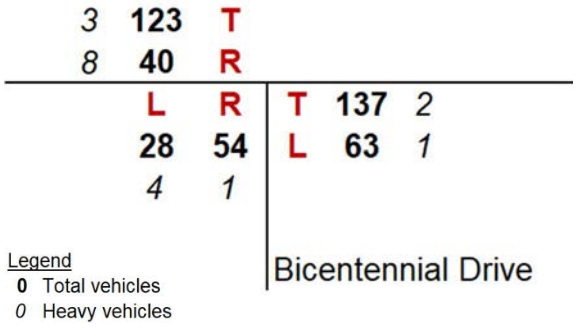


Figure 12b: 2022 PM Peak Existing Volumes

The current intersection performance has been assessed, based upon its existing geometry and the volumes summarised above. The detailed results of the analyses undertaken using SIDRA are provided in **Appendix B** and summarised in the table following.

Table 2 SIDRA Results (2022 Existing)

Analysis Scenario	Intersection Degree of Saturation	Critical Movement Level of Service	Intersection Average Delay (sec)	Maximum 95% Back of Queue Length (m)
Round Hill Road / Bicentennial Drive intersection				
2022 AM Peak	0.144	LOS A	3.3	4.3
2022 PM Peak	0.111	LOS A	3.0	2.7

As demonstrated by the results summarised in the table above, the existing Round Hill Road / Bicentennial Drive intersection is currently operating well within acceptable capacity limits, based upon existing (2022) traffic volumes and its existing geometry.

2.3.5.3 Road Safety

Reference has been made to the published crash data in Queensland Globe (https://qldglobe.information.qld.gov.au/) which is available for the period from 2001 - 2019. This data reveals that there have been no recorded crashes at the Round Hill Road / Bicentennial Drive intersection, or within 500m of the intersection, between 2012 and 2018.

It is noted however that there was a fatal crash on Bicentennial Drive approximately 500m from Round Hill Road in 2007. This was a multi-vehicle accident which occurred between a through vehicle and an opposing vehicle turning right (Crash DCA Code 202).

In addition, it is understood that there was a recent multi-vehicle crash at the Round Hill Road / Bicentennial Drive intersection in September 2021, which involved multiple hospitalisations. However, given how recent this crash was, it is not yet included in the published crash data in Queensland Globe, therefore limited information is available on the details of this crash.

In summary, the available traffic data has indicated that there is limited crash history at the intersection over the last 5-10 years. Based on this limited history, the expected future upgrade of the intersection to a roundabout and the visual inspection completed, no significant road safety issues have been identified at either the intersection or the relevant sections of Round Hill Road and Bicentennial Drive in the vicinity of the Project site that would require rectification or mitigation as part of the proposed development.

3.0 Proposed Development Details

3.1 Development Site Plan

As identified in the plans included as **Appendix C** and the extract from the site plan provided as **Figure 13** below, it is proposed that the subject site be used to establish an educational establishment (prep – grade 6 primary school), known as Goora Gan Steiner School.

This school is currently temporarily located in the Agnes Water Surf Club. The Surf Club was leased for six years, enabling the school to establish a permanent site, which is the development proposed under this application.

The school will ultimately service up to 99 students, with the following approximate student numbers expected:

- 2024 (year of opening): 65 students
- 2025: 75 students
- 2026: 85 students
- 2027: 99 students

The forecast ultimate capacity of the school is therefore 99 students and 11 staff members, and the total GFA of the school will be approximately 893m^2, including 249m^2 administration space, 417m^2 classroom space, 114m^2 library space, and 113m^2 specialty space (excluding all outdoor areas).

The traffic elements of the proposed site layout have been considered in light of the recommendations made in Council's Planning Scheme and the requirements of the relevant standards, as outlined in the following sections.

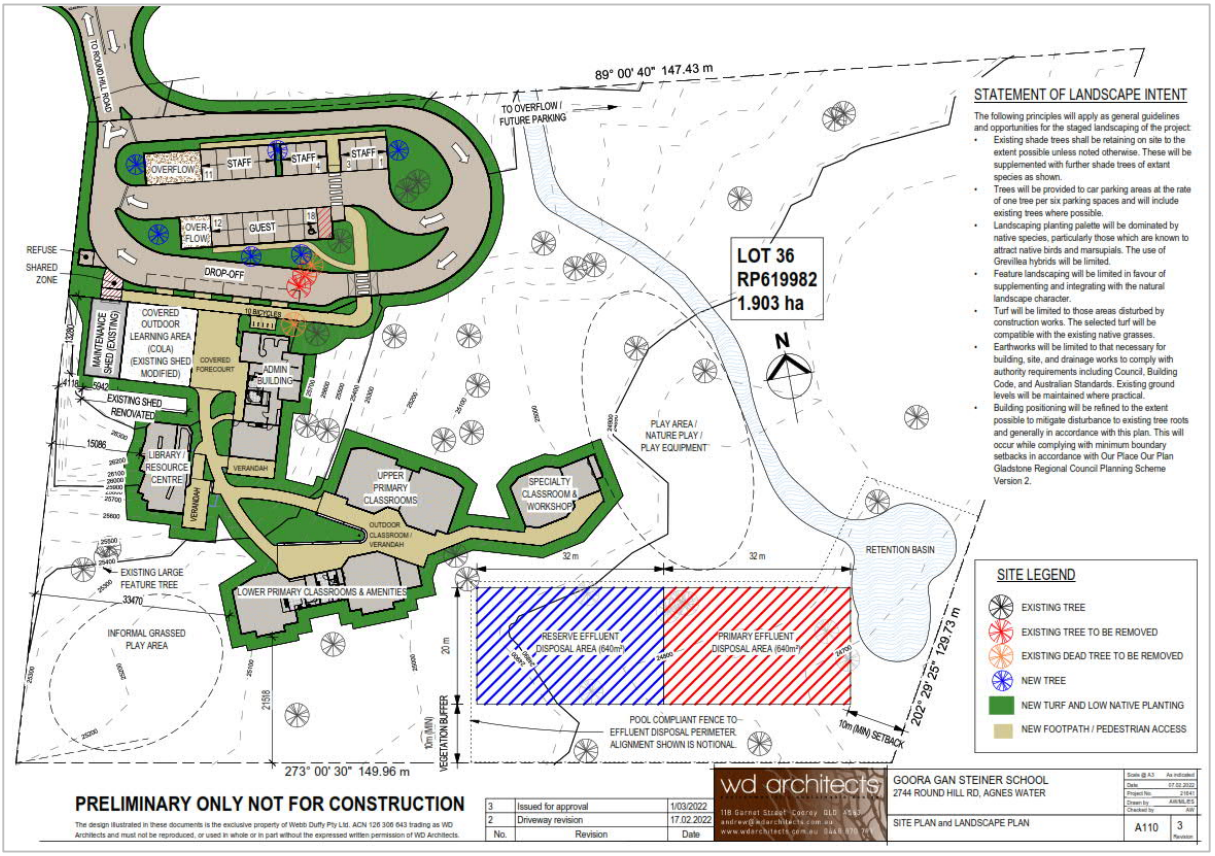


Figure 13 Proposed Plan of Development **[Source: WD Architects]**

3.2 Vehicle Access

As previously noted, the subject site is located to the south-east of the Round Hill Road / Bicentennial Drive intersection.

Whilst Bicentennial Drive is the lowest order road to which the site has frontage, vehicular access onto this road is not feasible in this instance given the limited site frontage to this road which would result in any site access onto this road being positioned too close to the Round Hill Road intersection.

As shown in the site plan included in **Appendix C** and the extract from this plan provided as **Figure 13**, vehicular access to the subject site is therefore proposed onto Round Hill Road adjacent to the western site boundary, in order to maximise separation from the Bicentennial Drive intersection. The proposed access location achieves approximately 210m separation from Bicentennial Drive intersection (measured centreline to centreline).

The vertical and horizontal alignment of Round Hill Road in proximity to the proposed site access location is such that sightlines are essentially unrestricted to the east and the west, and therefore the following AS2890.1 and Austroads sight distance requirements are able to be achieved:

- 111m desirable sight distance based upon 80km/hr frontage road speed (AS2890.1);
- 226m safe intersection sight distance (SISD) assuming 90km/hr design speed, 2.5 second reaction time, and 3.0 second observation time (Austroads Guide to Road Design Part 4A);
- 111m minimum gap sight distance (MGSD) assuming 80km/hr 85th percentile speed and 5 second critical gap acceptance (Austroads Guide to Road Design Part 4A).

This intersection is proposed to operate as a priority-controlled T-intersection, with Round Hill Road as the priority (major road) approaches, and the new site access road to the proposed development as the minor road approach.

Based on the turning warrants assessment undertaken for this access intersection with the traffic volumes forecast to be generated by the proposed development and allowing for background traffic growth on Round Hill Road (refer Section 5.1), it is recommended that the AULs and BAR turn treatments be provided on the eastern and western approaches.

Based upon Figure 8.3 in Austroads Guide to Road Design Part 4A and Figure A 28 in Austroads Guide to Road Design Part 4, the required geometry for these turn lane treatments are as follows:

Left Turn Treatment (AUL(s))

- D = 55m (diverge / deceleration length)
- T = 25m (taper length)

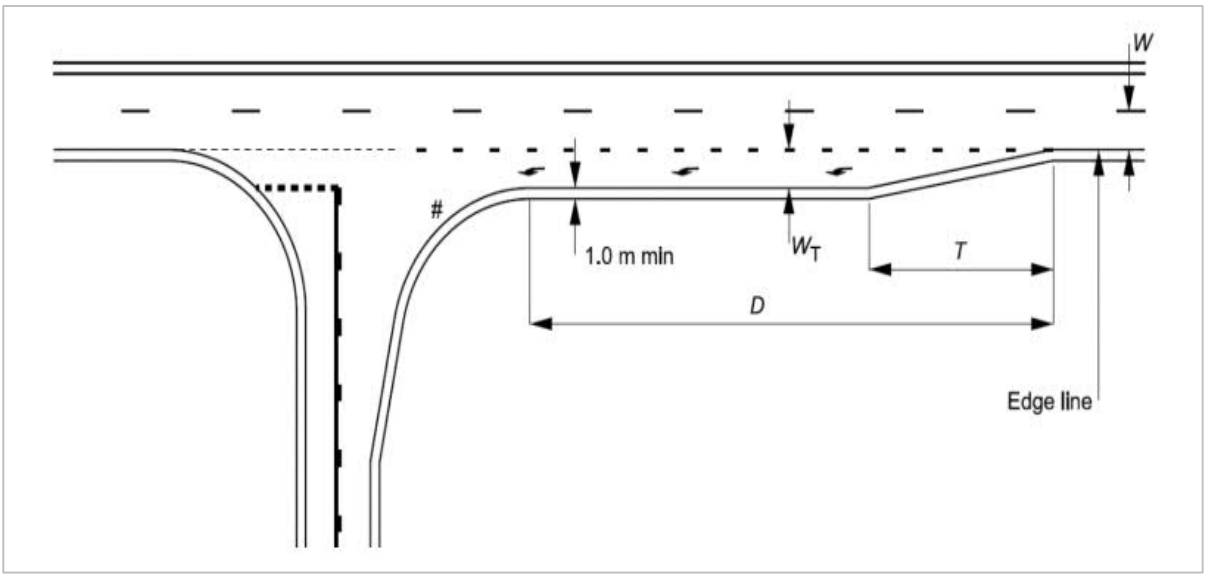


Figure 14 Rural AUL(s) treatment with a short left-turn lane **[Source: AGRD Part 4A, Figure 8.3]**

Right Turn Treatment (BAR)

- A = (0.5VF/3.6)
- S = 12.5m minimum
- X = 10 – 15m
- C = 6.5m minimum

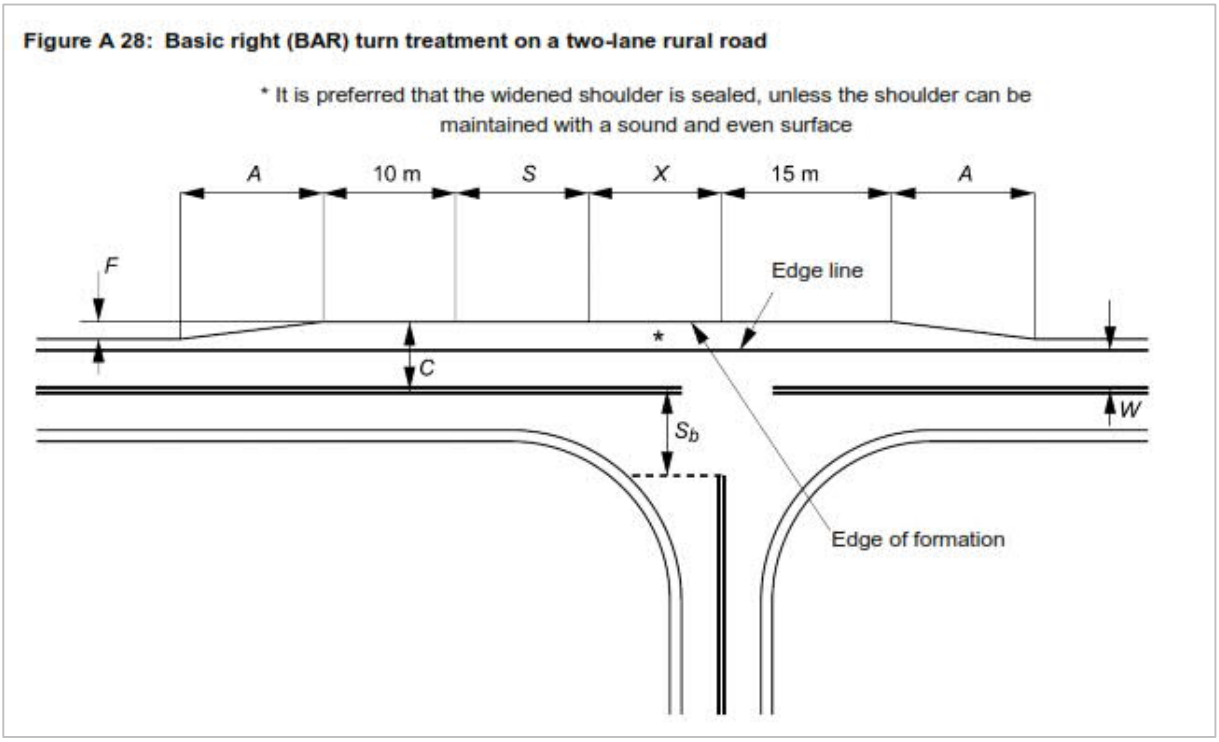


Figure 15 Basic Right (BAR) turn treatment on a two-lane rural road [Source: AGRD Part 4, Figure A 28]

Due to the 210m separation between the proposed site access and the Round Hill Road / Bicentennial Drive intersection, it is understood that the required geometry for the site access as outlined above would be able to be accommodated with the existing configuration of the Round Hill Road / Bicentennial Drive intersection, as well as the proposed future configuration of this intersection (i.e. a roundabout, as discussed in Section 2.2).

In summary, the proposed access intersection geometry is considered to be appropriate (considering turn warrants requirements) and adequate from a capacity perspective (refer Section 5.1) noting that the detail of the access intersection will be developed at the Operational Works stage in response to the conditions of the development application approval.

3.3 Internal Site Facilities

3.3.1 Parking Facilities

Table SC6.10.2.1 of Council's Planning Scheme stipulates car parking requirements for various land uses, including educational establishments, for which the minimum required level of car parking provision is specified as follows:

"1 car space per 50m2 of gross floor area, plus an off–street area sufficient in size to accommodate three vehicles for pick–up and set–down purposes"

The application of the above car parking rate to the proposed development (which will have an approximate GFA of 893m^2) leads to a car parking requirement of 18 spaces, plus an off–street area sufficient in size to accommodate three vehicles for pick–up and set–down purposes.

As shown in the site plan included in **Appendix C** and the extract from this plan provided as **Figure 13**, the proposed on-site car park will accommodate 18 vehicles, in addition to an off–street area sufficient in size to accommodate four (4) vehicles for pick–up and set–down purposes. Council's minimum car parking requirements are therefore satisfied.

Notwithstanding this, additional overflow car parking areas within the car park would accommodate an additional six (6) parked cars, in the unlikely event that the on-site parking demand exceeds the 18 formal parking spaces provided.

As such it can be seen that the proposed parking provision on site is in accordance with the recommendations in Council's Planning Scheme and is expected to be adequate to cater for the demand generated by the proposed development.

3.3.2 Car Park Design

The design of the car park meets the following requirements stipulated in AS2890.1:

- Staff (low turnover) parking spaces are 2.4m wide x 5.4m long, in accordance with the requirements for User Class 1A car parking;
- Visitor (short-term) parking spaces are 2.6m wide x 5.4m long, in accordance with the requirements for User Class 3 car parking;
- The parking aisle providing access to the 90 degree parking spaces is 5.8m wide, in accordance with the requirement for User Class 1A and User Class 3 car parking; and
- The parallel drop-off bays are 2.1m wide x 6.6m long with a 3.6m wide one-way aisle providing access to these spaces, in accordance with AS2890.1 (Figure 2.5) requirements.

In summary, the proposed car parking arrangements and dimensions meet the requirements of the relevant standards and are considered to be acceptable and supportable from a traffic engineering perspective.

The layout of the parking area and internal traffic arrangements involve a legible one-way traffic circulation arrangement, with considerable entering queue storage (i.e. in the order of 100m from Round Hill Road to the first car parking space).

In light of the above, the proposed car park is expected to operate satisfactorily from a traffic engineering perspective, without any unacceptable impact upon the frontage road network.

3.3.3 Service Vehicle Arrangements

Council's Planning Scheme does not stipulate specific service vehicle requirements based upon land use. However given an understanding of the nature of the development and its intended operation, the facility has been designed to accommodate up to a 12.5m rigid vehicle (Austroads Bus). This is considered an appropriate vehicle to represent the occasional coach expected to service the site for camps / excursions, as well as a refuse collection vehicle.

The vehicle tracking diagram included as **Appendix D** which demonstrates that a vehicle of this size could access the site, circulate as required, and exit the site in a forward direction.

Furthermore, the proposed site access intersection would be configured to accommodate the aforementioned design vehicle, with the detail of this intersection to be developed and refined at operational works stage.

3.4 Pedestrian and Cyclist Facilities

3.4.1 Internal Infrastructure

Table SC6.10.2.1 of Council's Planning Scheme stipulates bicycle parking requirements for various land uses, including educational establishments, for which the minimum required level of bicycle parking provision is specified as follows:

"1 space per 100m2 of gross floor area (minimum 6 spaces)"

The application of the above bicycle parking rate to the proposed development (which will have an approximate GFA of 893m^2) leads to a bicycle parking requirement of 9 spaces.

As shown in the site plan included in **Appendix C** and the extract from this plan provided as **Figure 13**, provision is made for parking of 10 bicycles in front of the administration building. Council's minimum bicycle parking requirements are therefore satisfied.

In relation to pedestrian provisions, the design of the car park includes dedicated pedestrian pathways from all parking spaces to the school buildings, and zebra crossings of parking aisles / circulation roadways to prioritise pedestrian movement across these roadways.

3.4.2 External Provisions

In relation to external pedestrian and cyclist provisions, as previously noted, there is limited existing pedestrian or cyclist pathway infrastructure in the vicinity of the proposed development site, which is a result of the rural, high speed nature of Round Hill Road (which is not a high demand route for pedestrians and/or cyclists).

Further, there are no planned pedestrian or cyclist pathways in proximity to the site which are identified in Council's Local Government Infrastructure Plan (LGIP), Plans for Trunk Infrastructure (PFTI).

Given the remoteness of the site from Agnes Water and the fact that it is more than 2km to any significant residential catchment, it is considered neither necessary nor appropriate that external pedestrian and cyclist paths be provided in conjunction with the proposed development. It is anticipated that travel to/from the school will be undertaken by private vehicle (i.e. not by active transport modes).

3.5 Public Transport

It is also understood that as part of the proposed development, a proposal will be made to augment the existing school bus service to extend the route slightly to incorporate pickup / drop off movements at the proposed Goora Gan Steiner School.

4.0 Traffic Volumes

Traffic analyses have been undertaken of the following critical intersections, to assess the impact of the proposed development:

- Round Hill Road / Site Access
- Round Hill Road Bicentennial Drive (existing configuration)
- Round Hill Road Bicentennial Drive (upgraded (roundabout) configuration)

The following sections detail how the relevant traffic volumes at the key points of the surrounding road network were established as part of the traffic assessment undertaken.

For the purpose of these analyses, it has been assumed that the development will be operating at capacity in 2027, with a 10-year design horizon of 2037 in accordance with standard practice.

As previously noted, given the nature of the proposed development, the critical peak periods for assessment have been determined to be as follows:

- 8:00am – 9:00am
- 3:00pm – 4:00pm

4.1 Background Traffic Volumes

4.1.1 Base Traffic Volumes

As previously noted, a 3% per annum compound growth rate was applied to all turning movement volumes on Round Hill Road and Bicentennial Drive in order to forecast future year traffic volumes based upon the 2021 traffic count data.

The resulting estimated 2027 and 2037 traffic volumes are as shown in the figures below.

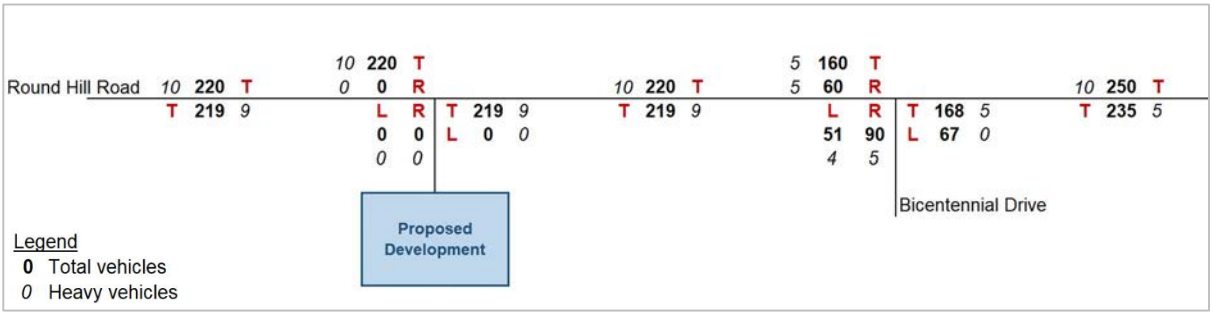


Figure 16 2027 AM Peak Hour Forecast Background Traffic Volumes

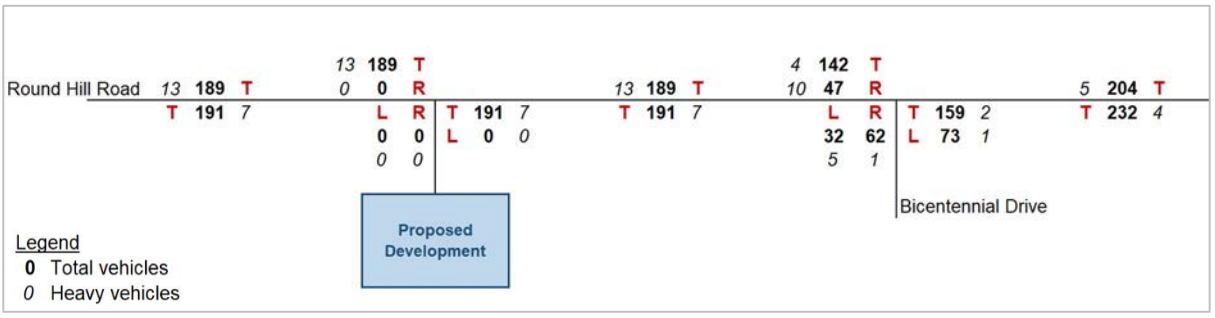


Figure 17 2027 PM Peak Hour Forecast Background Traffic Volumes

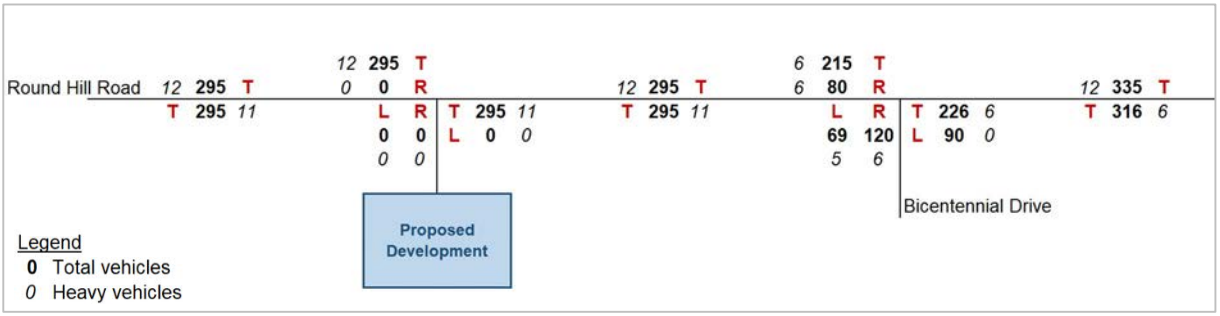


Figure 18 2037 AM Peak Hour Forecast Background Traffic Volumes

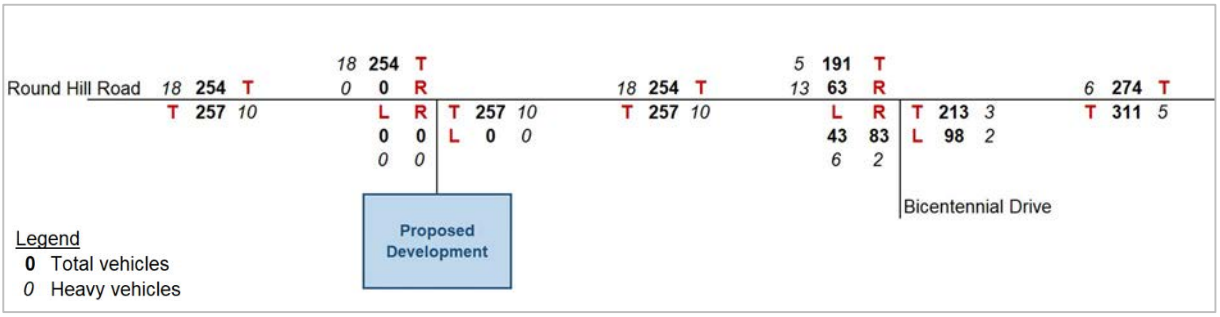


Figure 19 2037 PM Peak Hour Forecast Background Traffic Volumes

4.1.2 Adjacent Approved Development Traffic Volumes

As previously noted, a development approval (DA/83/2017) was granted in 2018 for a 24 lot rural residential subdivision on the parcel of land to the north of the subject site, on the opposite side of Round Hill Road (2773 Round Hill Road, described as Lot 7 on RO616792).

As part of this development, it is understood that the existing priority-controlled intersection of Round Hill Road and Bicentennial Drive will be upgraded to a single circulating lane roundabout, with access to the approved rural residential development via the new (northern) approach.

The table below summarises the assumptions applied in order to forecast the traffic generation and distribution of this approved development.

Table 3 Development Traffic Calculations (Approved Development)

AM Peak	PM Peak
Traffic Generation (Peak Hours)	
• 24 residential lots • Peak Hour Generation Rate = 0.85 trips per residence • Additional Traffic Volumes (from Remaining Lots) = 0.85 x 24 = 21 trips.	
Arrival / Departure Split	
• 20% traffic inbound; and • 80% traffic outbound.	• 80% traffic inbound; and • 20% traffic outbound.
Trip Distribution	
• 100% traffic are new trips; of which - 60% to/from the east via Round Hill Road. - 40% to/from the west via Round Hill Road.	• 100% traffic are new trips; of which - 60% to/from the east via Round Hill Road. - 40% to/from the west via Round Hill Road.

Based on the calculations summarised above, the resultant traffic volumes from the approved residential development opposite the subject site were established (assuming full build out), with the resultant AM and PM peak hour volumes shown in the figures below.

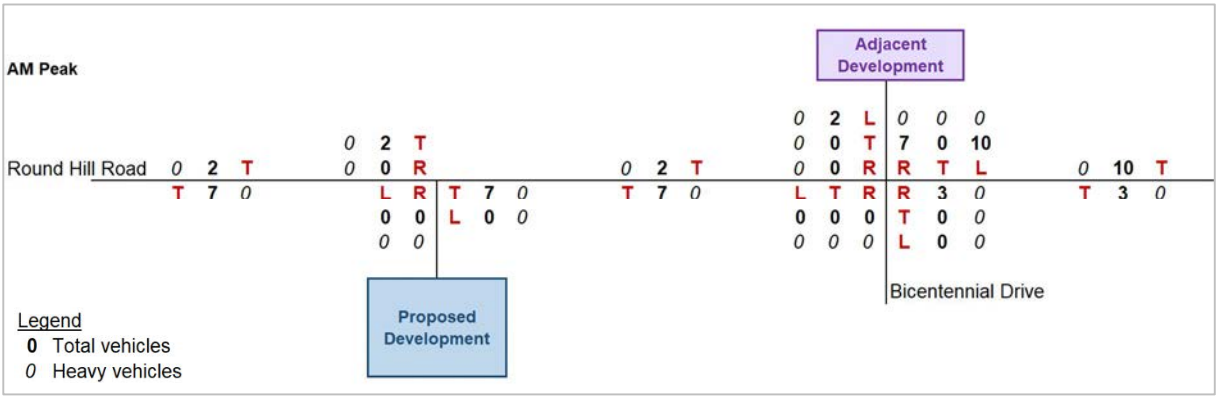


Figure 20 Adjacent Development AM Peak Hour Traffic Volumes

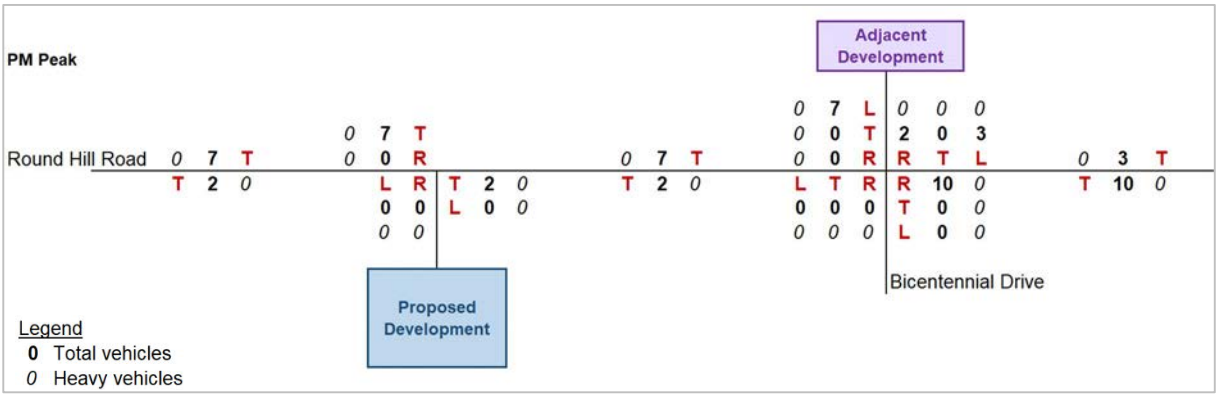


Figure 21 Adjacent Development PM Peak Hour Traffic Volumes

4.1.3 Pre-development Traffic Volumes

The pre-development traffic volumes were then established by combining the forecast background traffic volumes and the volumes expected from the approved residential development opposite. The resultant pre-development traffic volumes for the network are summarised in the figures below.

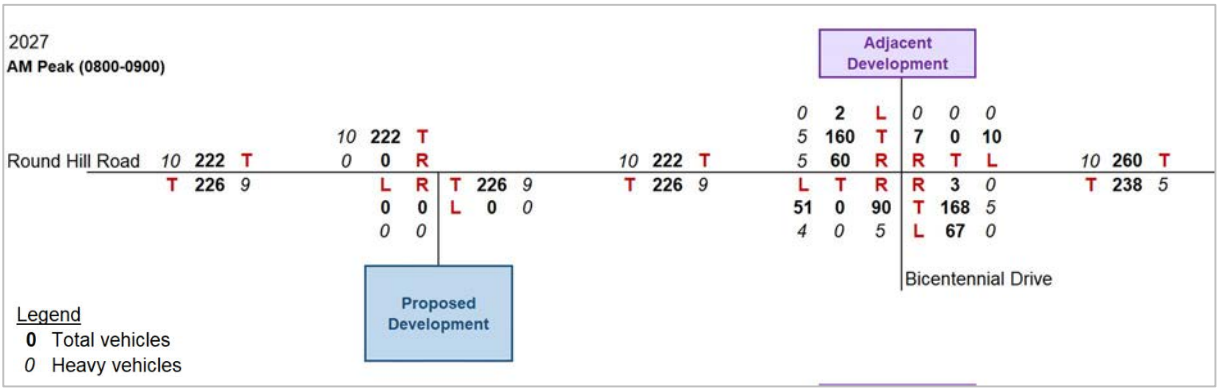


Figure 22 2027 AM Peak Hour Forecast Pre-Development Traffic Volumes

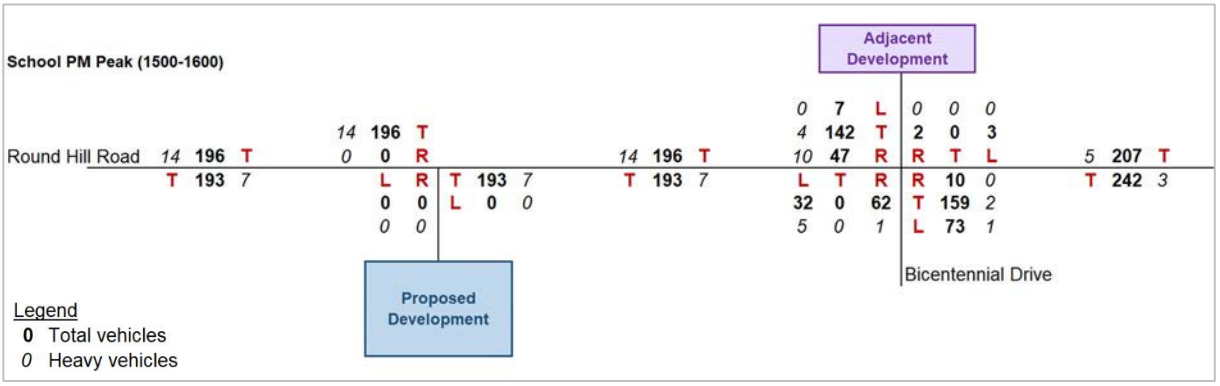


Figure 23 2027 PM Peak Hour Forecast Pre-Development Traffic Volumes

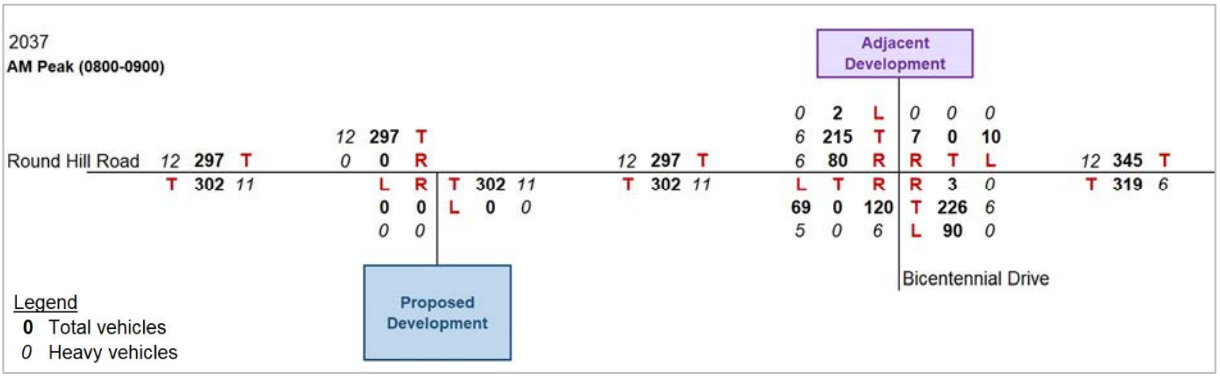


Figure 24 2037 AM Peak Hour Forecast Pre-Development Traffic Volumes

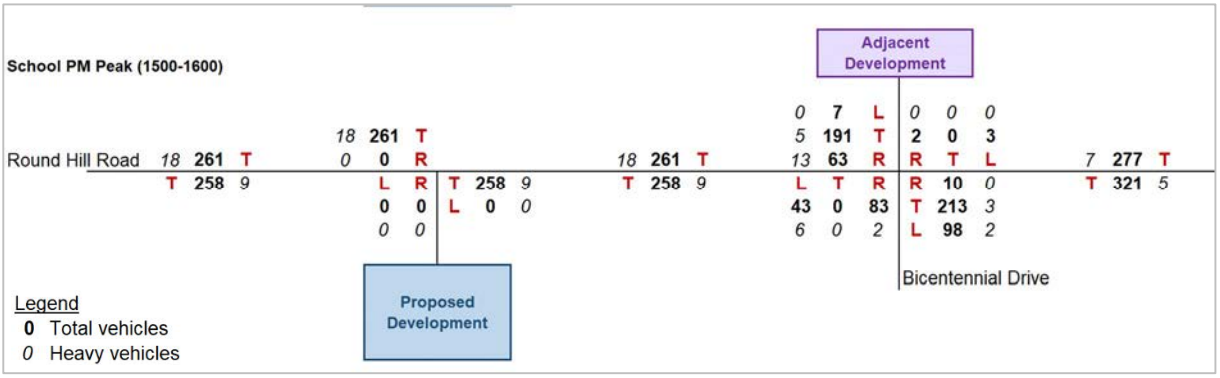


Figure 25 2037 PM Peak Hour Forecast Pre-Development Traffic Volumes

4.2 Proposed Development Traffic Volumes

4.2.1 Development Traffic Generation and Distribution

In order to forecast the traffic generation of the proposed development, reference has been made to the RMS Document Trip Generation Surveys, Schools, Analysis Report (Table 6.2 (Primary School, Regional averages)).

This document suggests the following trip generation rates:

- AM Peak Hour: 1.23 trips per student
- PM Peak Hour: 1.01 trips per student

The application of the above rates to the school (based upon its ultimate capacity) suggests the following traffic generation during the peak hours:

- AM Peak Hour: 122 trips
- PM Peak Hour: 100 trips

The assumptions outlined in the table below were applied in order to forecast the proposed development traffic generation and upon the adjacent road network. The directional splits outlined in the table below were adopted from the RMS Document Trip Generation Surveys, Schools, Analysis Report.

Table 4 Development Traffic Calculations (Proposed Development)

AM Peak	PM Peak
Traffic Generation (Peak Hours)	
• 99 students • 1.23 trips per student • 122 trips	• 99 students • 1.01 trips per student • 100 trips
Arrival / Departure Split	
• 51% traffic inbound; and • 49% traffic outbound.	• 49% traffic inbound; and • 51% traffic outbound.
Trip Distribution	
• 100% traffic are new trips; of which - 75% to/from the east via Round Hill Road; - 20% to/from Bicentennial Drive; and - 5% to/from the west via Round Hill Road.	• 100% traffic are new trips; of which - 75% to/from the east via Round Hill Road; - 20% to/from Bicentennial Drive; and - 5% to/from the west via Round Hill Road.

The resulting forecast development traffic volumes during the critical peak periods are as outlined in the following figures.

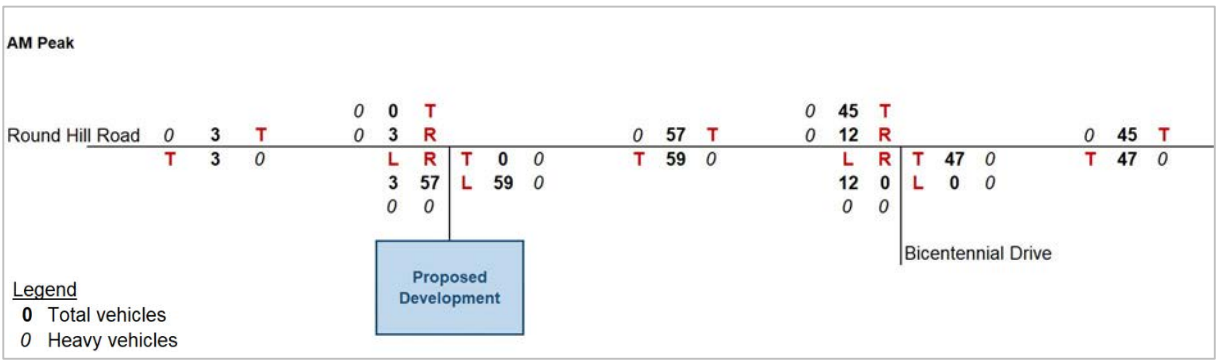


Figure 26 AM Peak Hour Forecast Development Traffic Volumes

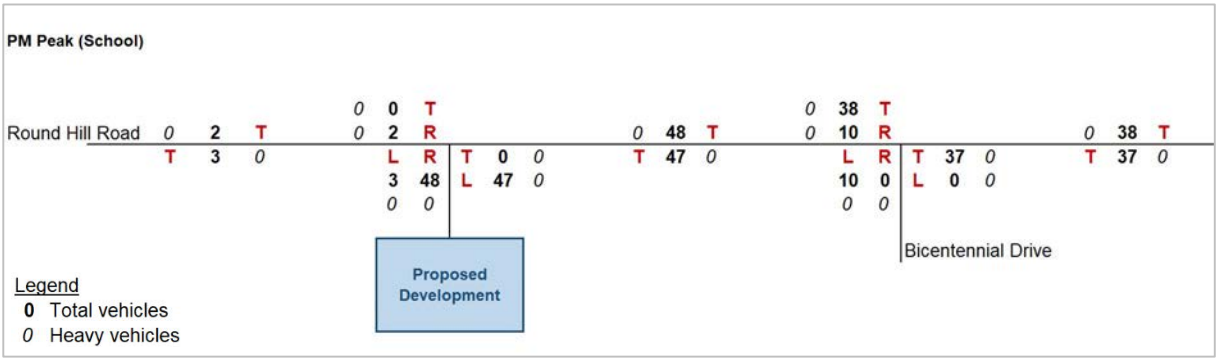


Figure 27 PM Peak Hour Forecast Development Traffic Volumes

4.3 Post Development Traffic Volumes

The post development traffic volumes at the proposed access intersection and on the surrounding road network were established by adding the estimated traffic volumes from the proposed development to the calculated pre development traffic volumes. The resulting forecast design volumes at the 2027 and 2037 design horizons are as shown in **the figures below.**

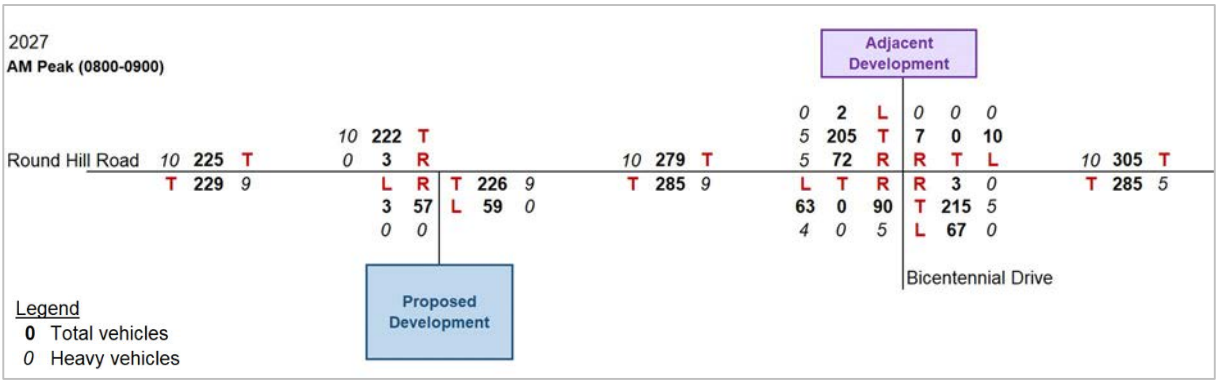


Figure 28 2027 AM Peak Hour Forecast Post Development Traffic Volumes

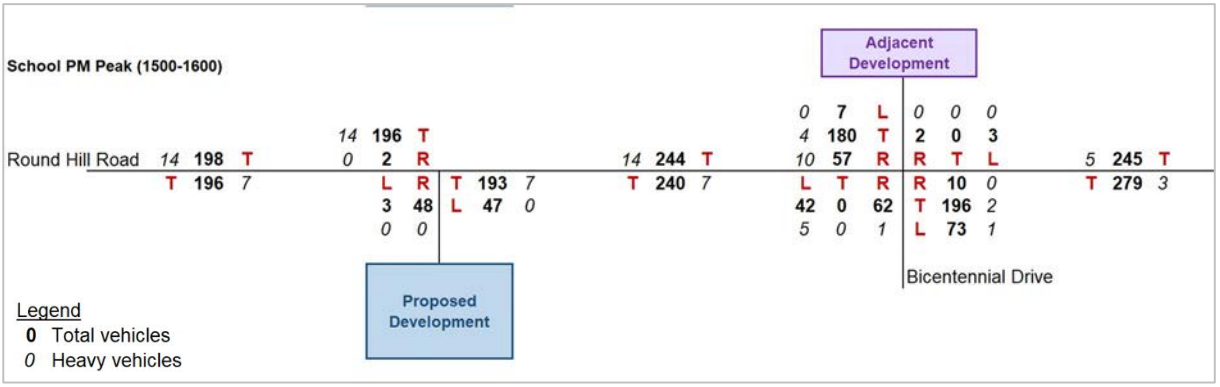


Figure 29 2027 PM Peak Hour Forecast Post Development Traffic Volumes

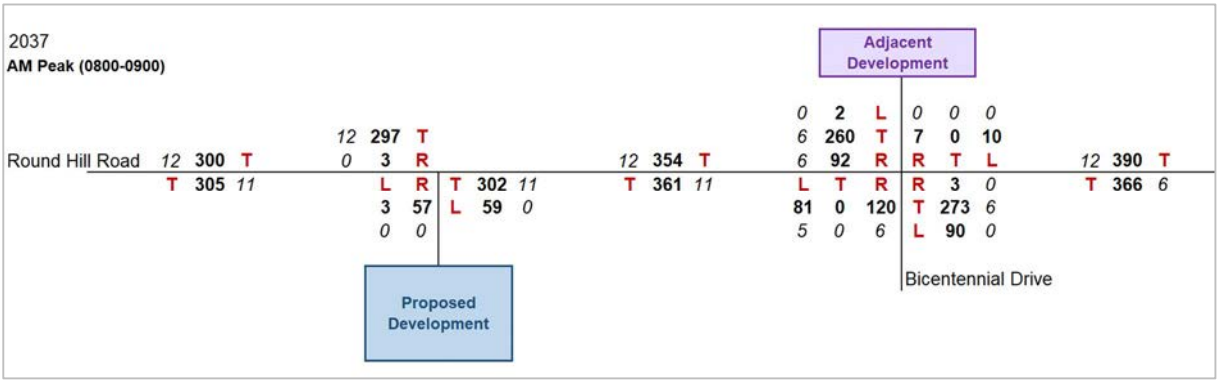


Figure 30 2037 AM Peak Hour Forecast Post Development Traffic Volumes

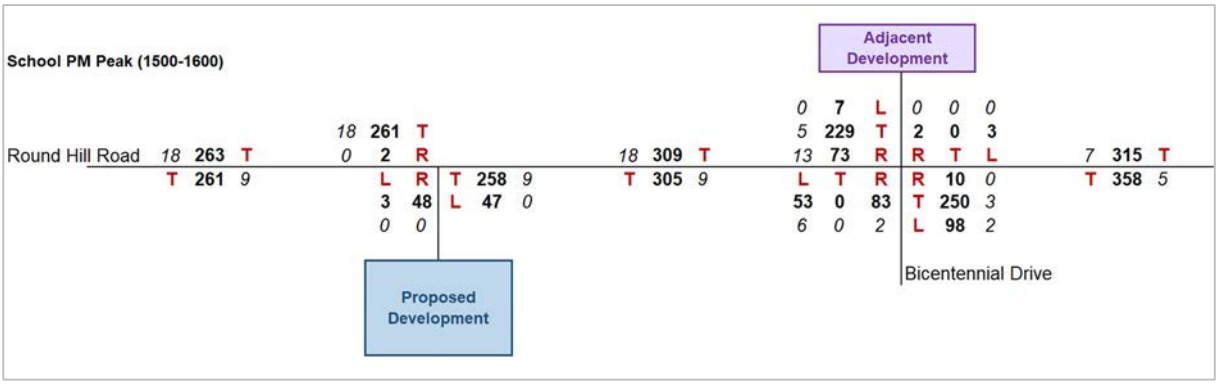


Figure 31 2037 PM Peak Hour Forecast Post Development Traffic Volumes

The above traffic volumes have been used as the basis of traffic analysis undertaken at the site access intersection as well as the Round Hill Road / Bicentennial Drive intersection, as outlined in the following sections

5.0 Traffic Impact Assessment

Traffic analyses have been undertaken of the following critical intersections, to assess the impact of the proposed development:

- Round Hill Road / Site Access
- Round Hill Road Bicentennial Drive (existing configuration)
- Round Hill Road Bicentennial Drive (upgraded (roundabout) configuration)

The following sections detail the results of the assessment of the impact of the proposed development on these elements of the local road network.

5.1 Site Access Intersection

5.1.1 Turn Warrants Assessment

A turn warrants assessment was undertaken to establish the required turn treatments at the proposed site access intersection with Round Hill Road. This assessment was undertaken for the expected traffic volumes at the identified 10 year (2037) design horizon as identified in Section 4.3 above.

The results of this assessment are shown in **Figure 32** below, and reveal that the following treatments are warranted on Round Hill Road at the site access intersection, based upon the forecast traffic volumes:

- AUL(s): Short auxiliary left turn treatment
- BAR: Basic right turn treatment

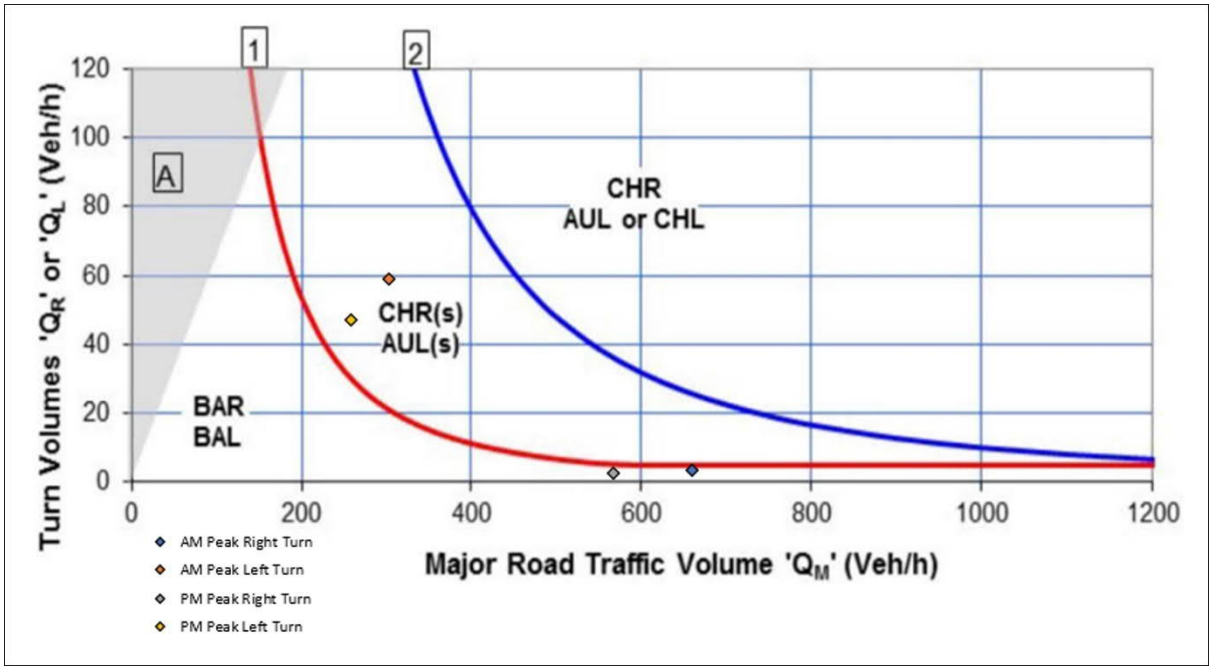


Figure 32 Turn Warrants Assessment – Round Hill Road / Site Access Intersection (2037 Post Development)

5.1.2 Capacity Assessment

The forecast AM and PM peak traffic volumes at the proposed Round Hill Road / Site Access intersection were utilised to undertake preliminary intersection analysis (using SIDRA software) to establish the operational performance of the intersection under both the expected 2027 and 2037 post development traffic conditions, assuming the intersection configuration as discussed in **Section 5.1.1** above.

A summary of the results is provided in **Table 5** below, with further detailed results included for reference as **Appendix E**.

Table 5 SIDRA Results (Post Development)

Analysis Scenario	Intersection Degree of Saturation	Critical Movement Level of Service	Intersection Average Delay (sec)	Maximum 95% Back of Queue Length (m)
Round Hill Road / Site Access intersection				
2027 AM Peak – Post Development	0.126	LOS A	1.6	2.5
2027 PM Peak – Post Development	0.113	LOS A	1.4	2.0
2037 AM Peak – Post Development	0.168	LOS A	1.4	3.1
2037 PM Peak – Post Development	0.149	LOS A	1.2	2.3

The results above indicate that the proposed configuration of the Round Hill Road / Site Access intersection is expected to operate well within acceptable capacity limits under all post development scenarios assessed. This is indicated by all values for DOS, LOS, average delay and vehicle queueing being well within acceptable limits of operation for a priority-controlled intersection.

Considering road safety at the site access intersection, the provision of the basic right turn lane and short auxiliary left turn lane treatments to cater for the anticipated turning movements from Round Hill Road is considered to adequately address any safety impacts of the proposed development, noting that this is the treatment recommended based upon the forecast turning movement volumes, based upon the provisions of Austroads.

The available sight distances from the proposed access intersection have been considered based upon the vertical and horizontal alignments of the frontage road and based on the assessment undertaken are expected to be more than adequate to meet the relevant requirements, as previously discussed.

In light of the above considerations, is it concluded that the proposed configuration of the Round Hill Road / Site Access intersection is adequate to cater for the expected traffic volumes from the proposed development, and the operation of the site is expected to have a minimal impact on the operation of the surrounding road network as a result of the access intersection.

5.2 Round Hill Road / Bicentennial Drive Intersection

The forecast AM and PM peak traffic volumes at the Round Hill Road / Bicentennial Drive intersection were utilised to undertake preliminary intersection analysis (using SIDRA software) to establish the operational performance of the intersection under the post development traffic conditions, assuming both the existing configuration, and the upgraded configuration (single circulating lane roundabout) which is proposed to be delivered as part of the approved residential development to the north. A summary of the results is provided in **Table 6** below, with further detailed results included for reference as **Appendix F**.

Table 6 SIDRA Results (Post Development)

Analysis Scenario	Intersection Degree of Saturation	Critical Movement Level of Service	Intersection Average Delay (sec)	Maximum 95% Back of Queue Length (m)
Round Hill Road / Bicentennial Drive intersection – Existing Configuration				
2037 AM Peak – Post Development	0.340	LOS A	4.0	12.1
2037 PM Peak – Post Development	0.211	LOS A	3.3	6.2
Round Hill Road / Bicentennial Drive intersection – Upgraded Configuration (Roundabout)				
2027 AM Peak – Post Development	0.219	LOS B	5.7	9.5
2027 PM Peak – Post Development	0.205	LOS B	5.4	8.3
2037 AM Peak – Post Development	0.286	LOS B	5.9	13.4
2037 PM Peak – Post Development	0.268	LOS B	5.5	11.7

The results above indicate that both the existing and proposed configurations of the Round Hill Road / Bicentennial Drive intersection are expected to operate well within acceptable capacity limits under all post development scenarios assessed. This is indicated by all values for DOS, LOS, average delay and vehicle queueing being well within acceptable limits of operation.

In light of the above, is it concluded that both the existing and proposed configurations of the Round Hill Road / Bicentennial Drive intersection are adequate to cater for the expected traffic volumes from the proposed development, and the operation of the site is expected to have a minimal impact on the operation of the surrounding road network.

6.0 Summary and Recommendation

The key points and findings of this assessment can be summarised as follows:

Development Overview

- The applicant proposes to establish an educational establishment (prep – grade 6 primary school) for up to 99 students on land formally described as Lot 36 on RP619982, or 2744 Round Hill Road, Agnes Water, Queensland, located to the south-west of the Round Hill Road / Bicentennial Drive intersection.

Vehicular Site Access Arrangements

- Vehicular access to the subject site is proposed onto Round Hill Road adjacent to the western site boundary, in order to maximise separation from the Bicentennial Drive intersection. The proposed access location achieves approximately 210m separation from Bicentennial Drive intersection (measured centreline to centreline).
- The site access intersection is proposed to operate as a priority-controlled T-intersection, with Round Hill Road as the priority (major road) approaches, and the new site access road to the proposed development as the minor road approach.
- Based on the turning warrants assessment undertaken for this access intersection with the traffic volumes forecast to be generated by the proposed development and allowing for background traffic growth on Round Hill Road, it is recommended that the AULs and BAR turn treatments be provided on the eastern and western approaches.
- Due to the 210m separation between the proposed site access and the Round Hill Road / Bicentennial Drive intersection, it is understood that the required geometry for the site access as outlined above would be able to be accommodated with the existing configuration of the Round Hill Road / Bicentennial Drive intersection, as well as the proposed future configuration of this intersection (i.e. a roundabout).
- The vertical and horizontal alignment of Round Hill Road in proximity to the proposed site access location is such that sightlines are essentially unrestricted to the east and the west, and therefore the AS2890.1 and Austroads sight distance requirements are able to be achieved.
- In summary, the proposed access intersection geometry is considered to be appropriate (considering turn warrants requirements) and adequate from a capacity perspective, noting that the detail of the access intersection will be developed at the Operational Works stage in response to the conditions of the development application approval.

Car Parking Provision and Layout

- The proposed parking provision on site is in accordance with the recommendations in Council's Planning Scheme and is expected to be adequate to cater for the demand generated by the proposed development.
- The layout of the car parking area and internal traffic arrangements involve a legible one-way traffic circulation arrangement, with considerable entering queue storage (i.e. in the order of 100m from Round Hill Road to the first car parking space).

Vehicle Servicing Provisions

- The design vehicle (i.e. a 12.5m long rigid vehicle) could access the site, circulate as required, and exit the site in a forward direction. It is anticipated that this detail would be addressed at detailed design stage.

Pedestrian / Cyclist Provisions

- Provision is made for parking of 10 bicycles in front of the administration building. Council's minimum bicycle parking requirements are therefore satisfied.
- In relation to pedestrian provisions, the design of the car park includes dedicated pedestrian pathways from all parking spaces to the school buildings, and zebra crossings of parking aisles / circulation roadways to prioritise pedestrian movement across these roadways.

External Traffic Considerations and Impact

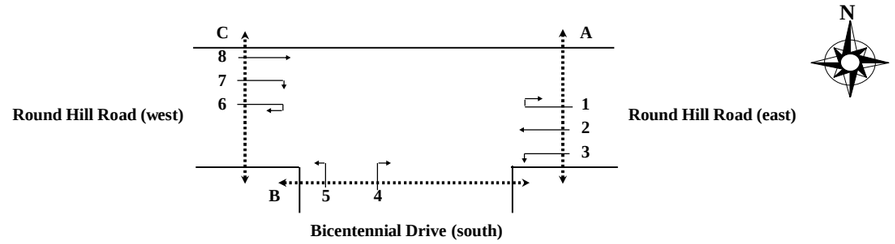
- A development approval (DA/83/2017) was granted in 2018 for a 24 lot rural residential subdivision on the parcel of land to the north of the subject site, on the opposite side of Round Hill Road (2773 Round Hill Road, described as Lot 7 on RO616792). As part of this development, it is understood that the existing priority-controlled intersection of Round Hill Road and Bicentennial Drive will be upgraded to a single circulating lane roundabout, with access to the approved rural residential development via the new (northern) approach.
- Both the existing and proposed configurations of the Round Hill Road / Bicentennial Drive intersection are expected to operate well within acceptable capacity limits under all post development scenarios assessed at the 2027 and 2037 design horizons. This is indicated by all values for DOS, LOS, average delay and vehicle queueing being well within acceptable limits of operation.
- It is therefore concluded that both the existing and proposed configurations of the Round Hill Road / Bicentennial Drive intersection are adequate to cater for the expected traffic volumes from the proposed development, and the operation of the site is expected to have a minimal impact on the operation of the surrounding road network.

In light of the above considerations, it is recommended that the proposed educational establishment be approved from a traffic engineering perspective.

Appendix A – Traffic Count Data (Round Hill Road / Bicentennial Drive Intersection)

AUSTRAFFIC INTERSECTION COUNT

Site No.: 1 **Weather:** Fine
Location: Round Hill Road/Bicentennial Drive, Agnes wWater
Day/Date: Thursday, 9 September 2021
AM Peak: *Hour ending - 9:00 AM*
PM Peak: *Hour ending - 5:00 PM*



TIME (1/4 hr end)	Movement 1				Movement 2				Movement 3				Movement 4				Movement 5				Movement 6				Movement 7				Movement 8				Pedestrian Movements		
	Light Vehicles	*Heavy Vehicles*	***Total***	*Cyclists*	*Light Vehicles*	*Heavy Vehicles*	***Total***	*Cyclists*	*Light Vehicles*	*Heavy Vehicles*	***Total***	*Cyclists*	*Light Vehicles*	*Heavy Vehicles*	***Total***	*Cyclists*	*Light Vehicles*	*Heavy Vehicles*	***Total***	*Cyclists*	*Light Vehicles*	*Heavy Vehicles*	***Total***	*Cyclists*	*Light Vehicles*	*Heavy Vehicles*	***Total***	*Cyclists*	*Light Vehicles*	*Heavy Vehicles*	***Total***	*Cyclists*	**A**	**B**	**C**
6:15 AM	0	0	**0**	0	11	1	**12**	0	1	0	**1**	0	6	0	**6**	0	4	0	**4**	0	0	0	**0**	0	4	0	**4**	0	9	0	**9**	0	0	0	0
6:30 AM	0	0	**0**	0	15	1	**16**	0	1	0	**1**	0	4	0	**4**	0	2	0	**2**	0	0	0	**0**	0	2	1	**3**	0	8	1	**9**	0	0	0	0
6:45 AM	0	0	**0**	0	13	1	**14**	0	3	0	**3**	0	8	1	**9**	0	7	1	**8**	0	0	0	**0**	0	5	0	**5**	0	3	1	**4**	0	0	0	0
7:00 AM	0	0	**0**	0	14	1	**15**	0	4	0	**4**	0	3	0	**3**	0	4	0	**4**	0	1	0	**1**	0	5	1	**6**	0	7	1	**8**	0	0	1	0
7:15 AM	0	0	**0**	0	19	0	**19**	0	2	1	**3**	0	3	0	**3**	0	9	0	**9**	0	0	0	**0**	0	7	1	**8**	0	5	1	**6**	1	0	0	0
7:30 AM	0	0	**0**	0	12	1	**13**	1	6	0	**6**	0	6	0	**6**	0	12	0	**12**	0	0	0	**0**	0	13	0	**13**	0	7	0	**7**	0	0	0	0
7:45 AM	0	0	**0**	0	12	1	**13**	0	3	0	**3**	0	9	0	**9**	0	20	1	**21**	0	0	0	**0**	0	6	1	**7**	0	13	1	**14**	1	0	0	0
8:00 AM	0	0	**0**	0	16	1	**17**	0	16	0	**16**	0	5	1	**6**	0	7	1	**8**	0	0	0	**0**	0	7	0	**7**	0	12	2	**14**	0	0	2	0
8:15 AM	0	0	**0**	0	26	0	**26**	0	6	0	**6**	0	9	1	**10**	0	13	0	**13**	0	0	0	**0**	0	9	2	**11**	0	32	1	**33**	0	0	0	0
8:30 AM	0	0	**0**	0	27	0	**27**	0	19	0	**19**	0	26	1	**27**	0	6	2	**8**	0	0	0	**0**	0	6	0	**6**	0	28	1	**29**	0	0	0	0
8:45 AM	0	0	**0**	0	36	3	**39**	0	17	0	**17**	0	13	1	**14**	0	13	0	**13**	0	0	0	**0**	0	13	2	**15**	0	39	0	**39**	0	0	0	0
9:00 AM	0	0	**0**	0	48	1	**49**	0	14	0	**14**	0	23	1	**24**	0	8	1	**9**	0	0	0	**0**	0	18	0	**18**	0	31	2	**33**	0	0	0	0
3 hr Total	**0**	**0**	**0**	**0**	**249**	**11**	**260**	**1**	**92**	**1**	**93**	**0**	**115**	**6**	**121**	**0**	**105**	**6**	**111**	**0**	**1**	**0**	**1**	**0**	**95**	**8**	**103**	**0**	**194**	**11**	**205**	**2**	**0**	**3**	**0**
AM Peak	**0**	**0**	**0**	**0**	**137**	**4**	**141**	**0**	**56**	**0**	**56**	**0**	**71**	**4**	**75**	**0**	**40**	**3**	**43**	**0**	**0**	**0**	**0**	**0**	**46**	**4**	**50**	**0**	**130**	**4**	**134**	**0**	**0**	**0**	**0**

TIME (1/4 hr end)	Movement 1				Movement 2				Movement 3				Movement 4				Movement 5				Movement 6				Movement 7				Movement 8				Pedestrian Movements		
	Light Vehicles	*Heavy Vehicles*	***Total***	*Cyclists*	*Light Vehicles*	*Heavy Vehicles*	***Total***	*Cyclists*	*Light Vehicles*	*Heavy Vehicles*	***Total***	*Cyclists*	*Light Vehicles*	*Heavy Vehicles*	***Total***	*Cyclists*	*Light Vehicles*	*Heavy Vehicles*	***Total***	*Cyclists*	*Light Vehicles*	*Heavy Vehicles*	***Total***	*Cyclists*	*Light Vehicles*	*Heavy Vehicles*	***Total***	*Cyclists*	*Light Vehicles*	*Heavy Vehicles*	***Total***	*Cyclists*	**A**	**B**	**C**
3:15 PM	0	0	**0**	0	33	0	**33**	0	18	1	**19**	0	17	0	**17**	0	7	2	**9**	2	0	0	**0**	0	9	2	**11**	0	34	0	**34**	0	0	0	0
3:30 PM	0	0	**0**	0	42	1	**43**	0	13	0	**13**	0	12	0	**12**	0	6	2	**8**	0	0	0	**0**	0	6	1	**7**	0	34	0	**34**	0	0	0	0
3:45 PM	0	0	**0**	0	30	0	**30**	0	18	0	**18**	0	6	0	**6**	0	4	0	**4**	0	0	0	**0**	0	9	1	**10**	0	23	1	**24**	0	0	0	0
4:00 PM	0	0	**0**	0	26	1	**27**	0	11	0	**11**	0	16	1	**17**	0	6	0	**6**	0	0	0	**0**	0	7	4	**11**	0	25	2	**27**	0	0	0	0
4:15 PM	0	0	**0**	0	30	3	**33**	0	17	0	**17**	0	13	0	**13**	0	4	1	**5**	0	0	0	**0**	0	10	0	**10**	0	38	1	**39**	0	0	0	0
4:30 PM	0	0	**0**	0	30	2	**32**	0	15	1	**16**	1	21	2	**23**	0	6	1	**7**	0	0	0	**0**	0	4	0	**4**	0	42	0	**42**	0	0	0	0
4:45 PM	0	0	**0**	0	22	0	**22**	0	13	0	**13**	0	15	0	**15**	0	5	1	**6**	0	0	0	**0**	0	14	0	**14**	0	32	0	**32**	0	0	0	0
5:00 PM	0	0	**0**	0	27	1	**28**	0	18	1	**19**	0	14	0	**14**	0	8	1	**9**	0	0	0	**0**	0	3	0	**3**	0	29	0	**29**	0	0	0	0
5:15 PM	0	0	**0**	0	34	0	**34**	0	16	1	**17**	0	10	0	**10**	1	0	0	**0**	0	0	0	**0**	0	8	0	**8**	0	30	1	**31**	0	0	2	0
5:30 PM	0	0	**0**	0	21	1	**22**	0	15	0	**15**	0	10	0	**10**	0	3	0	**3**	0	0	0	**0**	0	10	0	**10**	0	25	2	**27**	0	0	0	0
5:45 PM	0	0	**0**	0	23	0	**23**	0	13	0	**13**	0	7	0	**7**	0	4	0	**4**	0	0	0	**0**	0	2	0	**2**	0	33	0	**33**	0	0	0	0
6:00 PM	0	0	**0**	0	22	0	**22**	0	4	0	**4**	0	8	0	**8**	0	0	0	**0**	0	0	0	**0**	0	4	0	**4**	0	29	0	**29**	0	0	0	0
3 hr Total	**0**	**0**	**0**	**0**	**340**	**9**	**349**	**0**	**171**	**4**	**175**	**1**	**149**	**3**	**152**	**1**	**53**	**8**	**61**	**2**	**0**	**0**	**0**	**0**	**86**	**8**	**94**	**0**	**374**	**7**	**381**	**0**	**0**	**2**	**0**
PM Peak	**0**	**0**	**0**	**0**	**109**	**6**	**115**	**0**	**63**	**2**	**65**	**1**	**63**	**2**	**65**	**0**	**23**	**4**	**27**	**0**	**0**	**0**	**0**	**0**	**31**	**0**	**31**	**0**	**141**	**1**	**142**	**0**	**0**	**0**	**0**

Appendix B – Results of SIDRA Modelling (2022 Existing)

MOVEMENT SUMMARY

Site: 2 [EXIST 2022 AM Peak (Site Folder: Round Hill Rd - Bicentennial Drv)]

Round Hill Road / Bicentennial Drive
Existing Intersection Configuration
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Bicentennial Drive														
1	L2	44	3	46	6.8	0.144	6.2	LOS A	0.6	4.3	0.38	0.64	0.38	55.3
3	R2	77	4	81	5.2	0.144	8.3	LOS A	0.6	4.3	0.38	0.64	0.38	55.2
Approach		121	7	127	5.8	0.144	7.5	LOS A	0.6	4.3	0.38	0.64	0.38	55.3
East: Round Hill Road														
4	L2	58	0	61	0.0	0.113	7.0	LOS A	0.0	0.0	0.00	0.19	0.00	71.6
5	T1	145	4	153	2.8	0.113	0.0	LOS A	0.0	0.0	0.00	0.19	0.00	76.5
Approach		203	4	214	2.0	0.113	2.0	NA	0.0	0.0	0.00	0.19	0.00	75.1
West: Round Hill Road														
11	T1	138	4	145	2.9	0.077	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
12	R2	52	4	55	7.7	0.039	7.5	LOS A	0.2	1.3	0.32	0.61	0.32	57.2
Approach		190	8	200	4.2	0.077	2.1	NA	0.2	1.3	0.09	0.17	0.09	72.1
All Vehicles		514	19	541	3.7	0.144	3.3	NA	0.6	4.3	0.12	0.29	0.12	68.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2 [EXIST 2022 PM Peak (Site Folder: Round Hill Rd - Bicentennial Drv)]

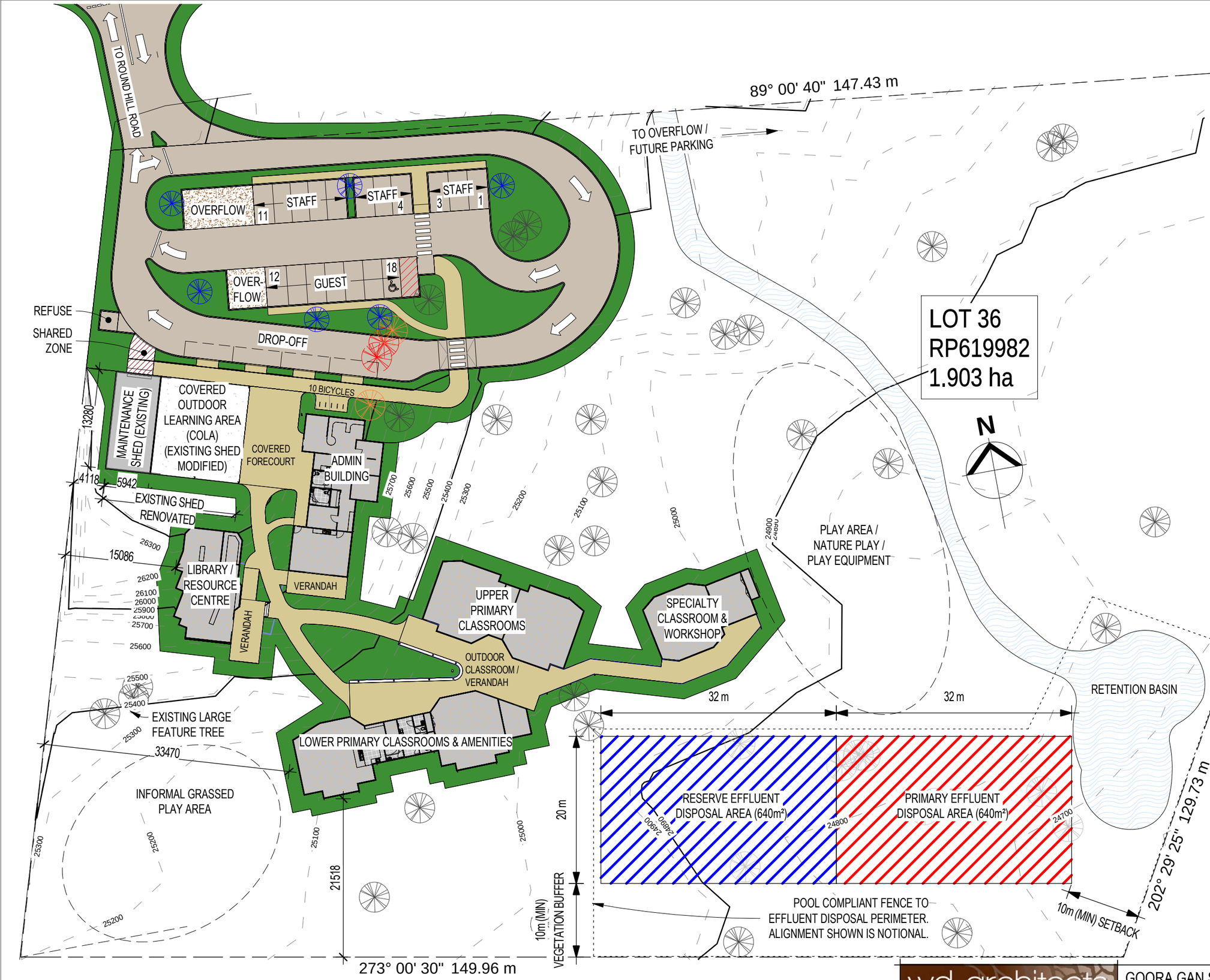
Round Hill Road / Bicentennial Drive
Existing Intersection Configuration
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Bicentennial Drive														
1	L2	28	4	29	14.3	0.094	6.2	LOS A	0.4	2.7	0.35	0.63	0.35	53.7
3	R2	54	1	57	1.9	0.094	7.8	LOS A	0.4	2.7	0.35	0.63	0.35	56.4
Approach		82	5	86	6.1	0.094	7.2	LOS A	0.4	2.7	0.35	0.63	0.35	55.4
East: Round Hill Road														
4	L2	63	1	66	1.6	0.111	7.0	LOS A	0.0	0.0	0.00	0.21	0.00	70.8
5	T1	137	2	144	1.5	0.111	0.0	LOS A	0.0	0.0	0.00	0.21	0.00	76.3
Approach		200	3	211	1.5	0.111	2.2	NA	0.0	0.0	0.00	0.21	0.00	74.5
West: Round Hill Road														
11	T1	123	3	129	2.4	0.068	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
12	R2	40	8	42	20.0	0.032	7.8	LOS A	0.1	1.1	0.33	0.61	0.33	56.6
Approach		163	11	172	6.7	0.068	1.9	NA	0.1	1.1	0.08	0.15	0.08	72.6
All Vehicles		445	19	468	4.3	0.111	3.0	NA	0.4	2.7	0.09	0.26	0.09	69.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Appendix C – Proposed Development Plans



STATEMENT OF LANDSCAPE INTENT

The following principles will apply as general guidelines and opportunities for the staged landscaping of the project:

- Existing shade trees shall be retaining on site to the extent possible unless noted otherwise. These will be supplemented with further shade trees of extant species as shown.
- Trees will be provided to car parking areas at the rate of one tree per six parking spaces and will include existing trees where possible.
- Landscaping planting palette will be dominated by native species, particularly those which are known to attract native birds and marsupials. The use of Grevillea hybrids will be limited.
- Feature landscaping will be limited in favour of supplementing and integrating with the natural landscape character.
- Turf will be limited to those areas disturbed by construction works. The selected turf will be compatible with the existing native grasses.
- Earthworks will be limited to that necessary for building, site, and drainage works to comply with authority requirements including Council, Building Code, and Australian Standards. Existing ground levels will be maintained where practical.
- Building positioning will be refined to the extent possible to mitigate disturbance to existing tree roots and generally in accordance with this plan. This will occur while complying with minimum boundary setbacks in accordance with Our Place Our Plan Gladstone Regional Council Planning Scheme Version 2.

SITE LEGEND

- EXISTING TREE
- EXISTING TREE TO BE REMOVED
- EXISTING DEAD TREE TO BE REMOVED
- NEW TREE
- NEW TURF AND LOW NATIVE PLANTING
- NEW FOOTPATH / PEDESTRIAN ACCESS

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
3	Issued for approval	1/03/2022
2	Driveway revision	17.02.2022

wd architects
environmentally sustainable design
11B Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 870 791

GOORA GAN STEINER SCHOOL
2744 ROUND HILL RD, AGNES WATER

SITE PLAN and LANDSCAPE PLAN

Scale @ A3	As indicated
Date	07.02.2022
Project No.	21641
Drawn by	AW/ML/ES
Checked by	AW

A110 | 3 Revision

Appendix D – Vehicle Tracking Diagram (12.5m Rigid Vehicle)

PARKING CALCULATIONS

BUILDING	GFA
ADMIN	166
MAINTENANCE SHED	82
UPPER PRIMARY	184
LOWER PRIMARY & AMENITIES	233
SPECIALTY CLASSROOM & WORKSHOP	108
LIBRARY / RESOURCE CENTRE	113
TOTAL	886 m²

1 CARPARK SPACE REQUIRED PER 50 m² GFA = 18 CAR SPACES REQUIRED
PLUS ADDITIONAL 3 DROP-OFF SPACES
1 BICYCLE SPACE REQUIRED PER 100 m² GFA = 9 BICYCLE SPACES REQUIRED

SITE LEGEND

- EXISTING TREE
- EXISTING TREE TO BE REMOVED
- EXISTING DEAD TREE TO BE REMOVED
- NEW TREE
- NEW TURF AND LOW NATIVE PLANTING
- NEW FOOTPATH / PEDESTRIAN ACCESS

ROUND HILL ROAD
60255
7980
7924
3000
R 8000
R 10000
R 20000
R 10000
7924
5448
4000
R 14500
89° 00' 40" 147.43 m
150 BARRIER KERB U.N.O.
1000
3000
R 3500
R 3500
OVERFLOW
5400
STAFF
STAFF
2100
STAFF
KERB RAMP
4
3
1
11
2700 2400 2400 2400 2700 1200 2600 2400 2700 2400 2700 2600 2700
9600
CROSSWALK AT GRADE
R 12443
R 15943
R 6000
R 5000
R 9000
R 12443
5800
5200 2900 2600 2600 2600 2600 2600 2400 2400 2300
KERB RAMP
R 11713
18
12
OVERFLOW
GUEST
5400
1000
R 6000
2400
R 11000
2421
1.8m TIMBER-SCREENED
REFUSE AREA
2500
RAISED CROSSWALK
MOUNTABLE KERB
1150
4991
29917
3600
4000
SHARED
ZONE
3544
DROP-OFF
1000
2100
R 3500
2000
4400
R 6300
10 BICYCLES
1m HIGH BARRIER FENCE WITH
GATES AND MOUNTABLE KERBS
AT DOOR STOPS
S.S. LOOP-STYLE BIKE RACKS:
2 BIKES PER LOOP
SHED
COLA
ADMIN BUILDING

Roadworks and Parking Layout

1 : 300

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
1	Issued for approval	1/03/2022

wd architects
environmentally sustainable design
11B Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 870 791

GOORA GAN STEINER SCHOOL
2744 ROUND HILL RD, AGNES WATER

ROADWORKS AND PARKING LAYOUT

Scale @ A3	As indicated
Date	07.02.2022
Project No.	21641
Drawn by	AW
Checked by	AW

A120 | 1 Revision

Appendix E – Results of SIDRA Modelling (Site Access Intersection)

MOVEMENT SUMMARY

Site: 1 [POST 2027 AM Peak (Site Folder: Round Hill Rd - School Access)]

Round Hill Road / Goora Gan Steiner School Access
Proposed Access Configuration
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: School Access														
1	L2	3	0	3	0.0	0.095	4.7	LOS A	0.4	2.5	0.52	0.72	0.52	55.0
3	R2	57	0	60	0.0	0.095	7.5	LOS A	0.4	2.5	0.52	0.72	0.52	54.7
Approach		60	0	63	0.0	0.095	7.3	LOS A	0.4	2.5	0.52	0.72	0.52	54.7
East: Round Hill Road														
4	L2	59	0	62	0.0	0.033	6.9	LOS A	0.0	0.0	0.00	0.63	0.00	57.5
5	T1	226	9	238	4.0	0.125	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
Approach		285	9	300	3.2	0.125	1.5	NA	0.0	0.0	0.00	0.13	0.00	76.1
West: Round Hill Road														
11	T1	222	10	234	4.5	0.126	0.0	LOS A	0.0	0.2	0.01	0.01	0.01	79.7
12	R2	3	0	3	0.0	0.126	8.1	LOS A	0.0	0.2	0.01	0.01	0.01	70.0
Approach		225	10	237	4.4	0.126	0.1	NA	0.0	0.2	0.01	0.01	0.01	79.6
All Vehicles		570	19	600	3.3	0.126	1.6	NA	0.4	2.5	0.06	0.14	0.06	75.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1 [POST 2027 School PM Peak (Site Folder: Round Hill Rd - School Access)]

Round Hill Road / Goora Gan Steiner School Access
Proposed Access Configuration
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: School Access														
1	L2	3	0	3	0.0	0.074	4.6	LOS A	0.3	2.0	0.48	0.68	0.48	56.0
3	R2	48	0	51	0.0	0.074	6.8	LOS A	0.3	2.0	0.48	0.68	0.48	55.7
Approach		51	0	54	0.0	0.074	6.6	LOS A	0.3	2.0	0.48	0.68	0.48	55.7
East: Round Hill Road														
4	L2	47	0	49	0.0	0.027	6.9	LOS A	0.0	0.0	0.00	0.63	0.00	57.5
5	T1	193	7	203	3.6	0.107	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
Approach		240	7	253	2.9	0.107	1.4	NA	0.0	0.0	0.00	0.12	0.00	76.4
West: Round Hill Road														
11	T1	196	14	206	7.1	0.113	0.0	LOS A	0.0	0.1	0.01	0.01	0.01	79.8
12	R2	2	0	2	0.0	0.113	7.8	LOS A	0.0	0.1	0.01	0.01	0.01	70.1
Approach		198	14	208	7.1	0.113	0.1	NA	0.0	0.1	0.01	0.01	0.01	79.7
All Vehicles		489	21	515	4.3	0.113	1.4	NA	0.3	2.0	0.05	0.13	0.05	76.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1 [POST 2037 AM Peak (Site Folder: Round Hill Rd - School Access)]

Round Hill Road / Goora Gan Steiner School Access
Proposed Access Configuration
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: School Access														
1	L2	3	0	3	0.0	0.118	5.0	LOS A	0.4	3.1	0.59	0.81	0.59	52.5
3	R2	57	0	60	0.0	0.118	9.3	LOS A	0.4	3.1	0.59	0.81	0.59	52.2
Approach		60	0	63	0.0	0.118	9.1	LOS A	0.4	3.1	0.59	0.81	0.59	52.2
East: Round Hill Road														
4	L2	59	0	62	0.0	0.033	6.9	LOS A	0.0	0.0	0.00	0.63	0.00	57.5
5	T1	302	11	318	3.6	0.167	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
Approach		361	11	380	3.0	0.167	1.2	NA	0.0	0.0	0.00	0.10	0.00	76.9
West: Round Hill Road														
11	T1	297	12	313	4.0	0.168	0.0	LOS A	0.0	0.3	0.01	0.01	0.01	79.8
12	R2	3	0	3	0.0	0.168	8.7	LOS A	0.0	0.3	0.01	0.01	0.01	70.1
Approach		300	12	316	4.0	0.168	0.1	NA	0.0	0.3	0.01	0.01	0.01	79.7
All Vehicles		721	23	759	3.2	0.168	1.4	NA	0.4	3.1	0.05	0.12	0.05	76.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1 [POST 2037 School PM Peak (Site Folder: Round Hill Rd - School Access)]

Round Hill Road / Goora Gan Steiner School Access
Proposed Access Configuration
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: School Access														
1	L2	3	0	3	0.0	0.088	4.8	LOS A	0.3	2.3	0.55	0.75	0.55	54.0
3	R2	48	0	51	0.0	0.088	8.2	LOS A	0.3	2.3	0.55	0.75	0.55	53.8
Approach		51	0	54	0.0	0.088	8.0	LOS A	0.3	2.3	0.55	0.75	0.55	53.8
East: Round Hill Road														
4	L2	47	0	49	0.0	0.027	6.9	LOS A	0.0	0.0	0.00	0.63	0.00	57.5
5	T1	258	9	272	3.5	0.142	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
Approach		305	9	321	3.0	0.142	1.1	NA	0.0	0.0	0.00	0.10	0.00	77.1
West: Round Hill Road														
11	T1	261	18	275	6.9	0.149	0.0	LOS A	0.0	0.2	0.01	0.01	0.01	79.8
12	R2	2	0	2	0.0	0.149	8.2	LOS A	0.0	0.2	0.01	0.01	0.01	70.2
Approach		263	18	277	6.8	0.149	0.1	NA	0.0	0.2	0.01	0.01	0.01	79.8
All Vehicles		619	27	652	4.4	0.149	1.2	NA	0.3	2.3	0.05	0.11	0.05	76.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Appendix F – Results of SIDRA Modelling (Round Hill Road / Bicentennial Drive Intersection)

MOVEMENT SUMMARY

Site: 2 [POST 2037 AM Peak (Site Folder: Round Hill Rd - Bicentennial Drv)]

Round Hill Road / Bicentennial Drive
Existing Intersection Configuration
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Bicentennial Drive														
1	L2	81	5	85	6.2	0.340	7.5	LOS A	1.7	12.1	0.58	0.81	0.70	52.5
3	R2	120	6	126	5.0	0.340	13.6	LOS B	1.7	12.1	0.58	0.81	0.70	52.4
Approach		201	11	212	5.5	0.340	11.1	LOS B	1.7	12.1	0.58	0.81	0.70	52.5
East: Round Hill Road														
4	L2	90	0	95	0.0	0.200	7.0	LOS A	0.0	0.0	0.00	0.16	0.00	72.0
5	T1	273	6	287	2.2	0.200	0.0	LOS A	0.0	0.0	0.00	0.16	0.00	76.9
Approach		363	6	382	1.7	0.200	1.8	NA	0.0	0.0	0.00	0.16	0.00	75.6
West: Round Hill Road														
11	T1	260	6	274	2.3	0.144	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
12	R2	92	6	97	6.5	0.082	8.2	LOS A	0.4	2.6	0.45	0.68	0.45	56.9
Approach		352	12	371	3.4	0.144	2.2	NA	0.4	2.6	0.12	0.18	0.12	72.3
All Vehicles		916	29	964	3.2	0.340	4.0	NA	1.7	12.1	0.17	0.31	0.20	67.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2 [POST 2037 PM Peak (Site Folder: Round Hill Rd - Bicentennial Drv)]

Round Hill Road / Bicentennial Drive
Existing Intersection Configuration
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Bicentennial Drive														
1	L2	53	6	56	11.3	0.211	6.7	LOS A	0.8	6.2	0.52	0.75	0.52	52.7
3	R2	83	2	87	2.4	0.211	11.1	LOS B	0.8	6.2	0.52	0.75	0.52	54.4
Approach		136	8	143	5.9	0.211	9.4	LOS A	0.8	6.2	0.52	0.75	0.52	53.7
East: Round Hill Road														
4	L2	98	2	103	2.0	0.192	7.0	LOS A	0.0	0.0	0.00	0.18	0.00	70.9
5	T1	250	3	263	1.2	0.192	0.0	LOS A	0.0	0.0	0.00	0.18	0.00	76.6
Approach		348	5	366	1.4	0.192	2.0	NA	0.0	0.0	0.00	0.18	0.00	74.9
West: Round Hill Road														
11	T1	229	5	241	2.2	0.126	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
12	R2	73	13	77	17.8	0.069	8.5	LOS A	0.3	2.4	0.45	0.67	0.45	56.3
Approach		302	18	318	6.0	0.126	2.1	NA	0.3	2.4	0.11	0.16	0.11	72.6
All Vehicles		786	31	827	3.9	0.211	3.3	NA	0.8	6.2	0.13	0.27	0.13	69.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2 [POST 2027 AM Peak (Site Folder: Round Hill Rd - Bicentennial Drv)]

Round Hill Road / Bicentennial Drive / Res Development Access Proposed Roundabout Intersection Configuration (Conditioned)

Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Bicentennial Drive														
1	L2	63	4	66	6.3	0.141	4.9	LOS A	0.8	5.6	0.41	0.61	0.41	52.3
2	T1	1	0	1	0.0	0.141	5.0	LOS A	0.8	5.6	0.41	0.61	0.41	53.8
3	R2	90	5	95	5.6	0.141	10.2	LOS B	0.8	5.6	0.41	0.61	0.41	53.7
Approach		154	9	162	5.8	0.141	8.0	LOS A	0.8	5.6	0.41	0.61	0.41	53.1
East: Round Hill Road														
4	L2	67	0	71	0.0	0.215	4.1	LOS A	1.2	8.8	0.26	0.42	0.26	54.8
5	T1	215	5	226	2.3	0.215	4.3	LOS A	1.2	8.8	0.26	0.42	0.26	56.2
6	R2	3	0	3	0.0	0.215	9.3	LOS A	1.2	8.8	0.26	0.42	0.26	56.4
Approach		285	5	300	1.8	0.215	4.3	LOS A	1.2	8.8	0.26	0.42	0.26	55.9
North: Resdential Development Access														
7	L2	10	0	11	0.0	0.018	5.3	LOS A	0.1	0.6	0.48	0.57	0.48	53.0
8	T1	1	0	1	0.0	0.018	5.5	LOS A	0.1	0.6	0.48	0.57	0.48	54.3
9	R2	7	0	7	0.0	0.018	10.6	LOS B	0.1	0.6	0.48	0.57	0.48	54.5
Approach		18	0	19	0.0	0.018	7.4	LOS A	0.1	0.6	0.48	0.57	0.48	53.6
West: Round Hill Road														
10	L2	2	0	2	0.0	0.217	4.2	LOS A	1.3	9.4	0.29	0.48	0.29	53.8
11	T1	205	5	216	2.4	0.217	4.4	LOS A	1.3	9.4	0.29	0.48	0.29	55.2
12	R2	72	5	76	6.9	0.217	9.5	LOS A	1.3	9.4	0.29	0.48	0.29	55.0
Approach		279	10	294	3.6	0.217	5.7	LOS A	1.3	9.4	0.29	0.48	0.29	55.1
All Vehicles		736	24	775	3.3	0.217	5.7	LOS A	1.3	9.4	0.31	0.48	0.31	54.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2 [POST 2027 School PM Peak (Site Folder: Round Hill Rd - Bicentennial Drv)]

Round Hill Road / Bicentennial Drive / Res Development Access
Proposed Roundabout Intersection Configuration (Conditioned)
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Bicentennial Drive														
1	L2	42	5	44	11.9	0.095	4.9	LOS A	0.5	3.6	0.38	0.59	0.38	52.1
2	T1	1	0	1	0.0	0.095	4.8	LOS A	0.5	3.6	0.38	0.59	0.38	53.8
3	R2	62	1	65	1.6	0.095	9.9	LOS A	0.5	3.6	0.38	0.59	0.38	53.9
Approach		105	6	111	5.7	0.095	7.9	LOS A	0.5	3.6	0.38	0.59	0.38	53.2
East: Round Hill Road														
4	L2	73	1	77	1.4	0.204	4.0	LOS A	1.2	8.2	0.22	0.41	0.22	54.8
5	T1	196	2	206	1.0	0.204	4.2	LOS A	1.2	8.2	0.22	0.41	0.22	56.4
6	R2	10	0	11	0.0	0.204	9.2	LOS A	1.2	8.2	0.22	0.41	0.22	56.5
Approach		279	3	294	1.1	0.204	4.3	LOS A	1.2	8.2	0.22	0.41	0.22	56.0
North: Resdential Development Access														
7	L2	3	0	3	0.0	0.006	4.9	LOS A	0.0	0.2	0.43	0.52	0.43	53.3
8	T1	1	0	1	0.0	0.006	5.1	LOS A	0.0	0.2	0.43	0.52	0.43	54.7
9	R2	2	0	2	0.0	0.006	10.2	LOS B	0.0	0.2	0.43	0.52	0.43	54.8
Approach		6	0	6	0.0	0.006	6.7	LOS A	0.0	0.2	0.43	0.52	0.43	54.0
West: Round Hill Road														
10	L2	7	0	7	0.0	0.187	4.0	LOS A	1.1	7.9	0.24	0.46	0.24	54.1
11	T1	180	4	189	2.2	0.187	4.2	LOS A	1.1	7.9	0.24	0.46	0.24	55.5
12	R2	57	10	60	17.5	0.187	9.5	LOS A	1.1	7.9	0.24	0.46	0.24	55.0
Approach		244	14	257	5.7	0.187	5.5	LOS A	1.1	7.9	0.24	0.46	0.24	55.4
All Vehicles		634	23	667	3.6	0.204	5.4	LOS A	1.2	8.2	0.26	0.46	0.26	55.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 2 [POST 2037 AM Peak (Site Folder: Round Hill Rd - Bicentennial Drv)]

Round Hill Road / Bicentennial Drive / Res Development Access
Proposed Roundabout Intersection Configuration (Conditioned)
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Bicentennial Drive														
1	L2	81	5	85	6.2	0.195	5.3	LOS A	1.1	8.1	0.49	0.65	0.49	52.0
2	T1	1	0	1	0.0	0.195	5.4	LOS A	1.1	8.1	0.49	0.65	0.49	53.5
3	R2	120	6	126	5.0	0.195	10.5	LOS B	1.1	8.1	0.49	0.65	0.49	53.5
Approach		202	11	213	5.4	0.195	8.4	LOS A	1.1	8.1	0.49	0.65	0.49	52.9
East: Round Hill Road														
4	L2	90	0	95	0.0	0.282	4.2	LOS A	1.8	12.7	0.32	0.44	0.32	54.5
5	T1	273	6	287	2.2	0.282	4.4	LOS A	1.8	12.7	0.32	0.44	0.32	56.0
6	R2	3	0	3	0.0	0.282	9.5	LOS A	1.8	12.7	0.32	0.44	0.32	56.1
Approach		366	6	385	1.6	0.282	4.4	LOS A	1.8	12.7	0.32	0.44	0.32	55.6
North: Resdential Development Access														
7	L2	10	0	11	0.0	0.020	5.9	LOS A	0.1	0.7	0.55	0.60	0.55	52.6
8	T1	1	0	1	0.0	0.020	6.1	LOS A	0.1	0.7	0.55	0.60	0.55	54.0
9	R2	7	0	7	0.0	0.020	11.2	LOS B	0.1	0.7	0.55	0.60	0.55	54.1
Approach		18	0	19	0.0	0.020	8.0	LOS A	0.1	0.7	0.55	0.60	0.55	53.3
West: Round Hill Road														
10	L2	2	0	2	0.0	0.286	4.4	LOS A	1.9	13.4	0.37	0.50	0.37	53.5
11	T1	260	6	274	2.3	0.286	4.6	LOS A	1.9	13.4	0.37	0.50	0.37	54.8
12	R2	92	6	97	6.5	0.286	9.7	LOS A	1.9	13.4	0.37	0.50	0.37	54.7
Approach		354	12	373	3.4	0.286	5.9	LOS A	1.9	13.4	0.37	0.50	0.37	54.8
All Vehicles		940	29	989	3.1	0.286	5.9	LOS A	1.9	13.4	0.38	0.51	0.38	54.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Organisation: ACCESS TRAFFIC CONSULTING | Licence: PLUS / 1PC | Processed: Tuesday, 8 March 2022 2:12:27 PM
Project: C:\ACCESS TRAFFIC\Projects\2021\GOO0121-001\4. Technical\3. SIDRA\GOO0121-001_School.sip9

MOVEMENT SUMMARY

Site: 2 [POST 2037 School PM Peak (Site Folder: Round Hill Rd - Bicentennial Drv)]

Round Hill Road / Bicentennial Drive / Res Development Access
Proposed Roundabout Intersection Configuration (Conditioned)
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Bicentennial Drive														
1	L2	53	6	56	11.3	0.130	5.2	LOS A	0.7	5.1	0.44	0.62	0.44	51.9
2	T1	1	0	1	0.0	0.130	5.1	LOS A	0.7	5.1	0.44	0.62	0.44	53.6
3	R2	83	2	87	2.4	0.130	10.3	LOS B	0.7	5.1	0.44	0.62	0.44	53.6
Approach		137	8	144	5.8	0.130	8.3	LOS A	0.7	5.1	0.44	0.62	0.44	52.9
East: Round Hill Road														
4	L2	98	2	103	2.0	0.267	4.1	LOS A	1.7	11.7	0.27	0.43	0.27	54.6
5	T1	250	3	263	1.2	0.267	4.3	LOS A	1.7	11.7	0.27	0.43	0.27	56.1
6	R2	10	0	11	0.0	0.267	9.3	LOS A	1.7	11.7	0.27	0.43	0.27	56.3
Approach		358	5	377	1.4	0.267	4.4	LOS A	1.7	11.7	0.27	0.43	0.27	55.7
North: Resdential Development Access														
7	L2	3	0	3	0.0	0.006	5.4	LOS A	0.0	0.2	0.49	0.53	0.49	53.0
8	T1	1	0	1	0.0	0.006	5.6	LOS A	0.0	0.2	0.49	0.53	0.49	54.4
9	R2	2	0	2	0.0	0.006	10.6	LOS B	0.0	0.2	0.49	0.53	0.49	54.5
Approach		6	0	6	0.0	0.006	7.2	LOS A	0.0	0.2	0.49	0.53	0.49	53.8
West: Round Hill Road														
10	L2	7	0	7	0.0	0.242	4.2	LOS A	1.5	11.0	0.30	0.47	0.30	53.9
11	T1	229	5	241	2.2	0.242	4.4	LOS A	1.5	11.0	0.30	0.47	0.30	55.3
12	R2	73	13	77	17.8	0.242	9.7	LOS A	1.5	11.0	0.30	0.47	0.30	54.7
Approach		309	18	325	5.8	0.242	5.6	LOS A	1.5	11.0	0.30	0.47	0.30	55.1
All Vehicles		810	31	853	3.8	0.267	5.5	LOS A	1.7	11.7	0.31	0.48	0.31	55.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

ACCESS TRAFFIC
CONSULTING

TRAFFIC IMPACT ASSESSMENTS | SITE FEASIBILITY STUDIES | INTERSECTION ANALYSIS
ROAD SAFETY AUDITS | ROAD SAFETY INVESTIGATIONS | PAVEMENT IMPACT ASSESSMENTS
TRANSPORT ROUTE ASSESSMENTS | TRANSPORT PLANNING | ACCESS MANAGEMENT STATEGIES
PEER REVIEWS | PARKING FACILITY DESIGN | SERVICE FACILITY DESIGN

SoundBASE
Consulting Engineers

GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATER
NOISE IMPACT ASSESSMENT

Prepared for:

Melissa Thomson

Goora Gan Steiner School
1 Surf Club Avenue
Agnes Water QLD 4677

21 April 2022

Job Number: 21110
Document ID: 21110-01-R01A-Noise Impact Assessment

ABN: 43 622 949 553
PO Box 1194 Mt Ommaney QLD 4074
www.soundbase.com.au

EXECUTIVE SUMMARY

The Goora Gan Steiner School is proposing to develop a permanent school site at 2722 Round Hill Road at Agnes Water. The real property description is Lot 36 on RP619982.

The local authority is the Gladstone Regional Council. A Pre-lodgement Meeting was held with Council on the 29th of June 2021. In the Pre-lodgement Meeting Minutes Council requested details regarding how the proposed educational establishment will not negatively impact upon the rural residential amenity of the locality.

The assessment contained within this report has determined that:

- The significant noise sources associated with a Steiner School are:
    - On-site vehicle activities during the morning drop-off and afternoon pick-up, as well as the off-peak period during the day.
    - Learning activities, including music practice and workshop noise.
    - Crowd noise due to students assembling in the Covered Outdoor Learning Area (COLA).
    - Noise emissions from performance, amplified devices in the COLA.
    - Outdoor play in the designated play areas.
    - Mechanical plant and equipment such as air-conditioning condensers.
- Using typical source levels for the different activities, SoundPLAN modelling has determined that the noise sources that could potentially impact upon existing and future residences are use of the carpark during morning drop-off and afternoon pick-up, staff and students talking in the COLA and outdoor performance in the COLA.
- Constructing acoustic barriers along the northern, western and eastern sides of the carpark to control noise emissions is not recommended as:
    - Outside of the morning drop-off and afternoon pick-up periods, use of the carpark will not result in noise emission levels exceeding the derived limit of 42dBA $L_{Aeq,\ adj,\ 1hr}$ at existing or future residences.
    - During the morning drop-off and afternoon pick-up periods the noise from the carpark will be similar to that emitted by commercial uses in the Bicentennial Drive Enterprise Precinct and the low impact industry to the west, but without the volume of medium and heavy vehicles that would be expected for commercial or industrial uses (only a single bus is expected to use the carpark during those periods). The duration of any elevated noise levels will also be significantly less (maximum two hours out of every workday) compared to eight or nine hours for a commercial or industrial premises.

- It is common for schools, kindergartens and childcare centres to be located immediately adjacent to residential uses and operate successfully without the need for any acoustic amelioration measures. In this instance, the location of the school within the Bicentennial Drive Enterprise Precinct increases the separation to existing and future residences. When coupled with the small size of the school, the impact on existing or future residences will be insignificant.
- In the future the ambient noise levels in the local area will increase due to traffic growth on Round Hill Road and nearby commercial and residential developments. At the same time, the adoption of emerging technology such as electric passenger vehicles will reduce the noise emissions associated with use of the carpark over the long-term.
- Regular use of the carpark on weekends and after hours will not occur, resulting in reduced overall noise emission levels compared to a commercial use.

- To control noise from the COLA the adoption of a Noise Management Plan (NMP) is recommended. The NMP allows use of the COLA during daytime hours only, with restrictions around the use of amplified and unamplified sources. In the situation where a complaint is received by the school, the NMP also allows for the resolution of the complaint by identifying the source of the complaint and behaviour modifications to prevent the cause of the complaint from reoccurring.
- Even though the analysis has identified the carpark and COLA as the noise emission sources most likely to cause a potential exceedance of the derived limits, acoustic design advice has been provided to the architect during the design process to minimise the noise emitted from other sources. Those measures include:
  - Ensuring that the external building envelopes are constructed to meet or exceed the sound reduction ratings presented in Table 1.
  - Applying acoustically absorptive finishes that achieve minimum NRC 0.9 to the ceiling/soffits of outdoor learning and congregation areas.
  - Using landscaping to block line-of-sight between the school and surrounding lots.
  - Adopting a buy-quiet approach for the air-conditioning condensers, whereby the chosen units emit a sound power level less than the 70dBA assumed in the assessment.
- With the above measures implemented, the noise emission levels from the school will be equal to or less than a commercial use on the same lot. The proposed educational establishment is unlikely to negatively impact upon the rural residential amenity of the locality.

DOCUMENT CONTROL PAGE

Project Details	Client Details
Job number: 21110 Goora Gan Steiner School 2744 Round Hill Road, Agnes Water Noise Impact Assessment	Melissa Thomson Goora Gan Steiner School 1 Surf Club Avenue Agnes Water QLD 4677

Revision	Date	Document Quality Verification			
A	21/04/2022	**Document ID**	21110-01-R01A-Noise Impact Assessment		
		Comment	Original issue to Client.		
			Author	**Reviewed**	**Authorised**
		Signature	M. Hayne	M. Hayne	M. Hayne
		Name	Michael Hayne	Michael Hayne	Michael Hayne
		Document ID			
		Comment			
			Author	**Reviewed**	**Authorised**
		Signature			
		Name			
		Document ID			
		Comment			
			Author	**Reviewed**	**Authorised**
		Signature			
		Name			

The work contained within this technical report was conducted in accordance with the SoundBASE Consulting Engineers Pty Ltd Quality Assurance System. There should be no reliance on the information contained in this technical report unless the report has been reviewed and authorised.

The information contained in this technical report has been prepared specifically for the nominated Client and project detailed above. If this document is reproduced or distributed, it must be reproduced or distributed in full.

The advice contained herein relates to acoustics only and no liability is accepted for design and construction issues falling outside of the area of acoustic engineering such as, but not limited to, structural engineering, fire engineering, thermal performance, buildability and waterproofing.

TABLE OF CONTENTS

1. INTRODUCTION

The Goora Gan Steiner School is proposing to develop a permanent school site at 2722 Round Hill Road at Agnes Water. The site location is indicated in Figure 1. The real property description is Lot 36 on RP619982.

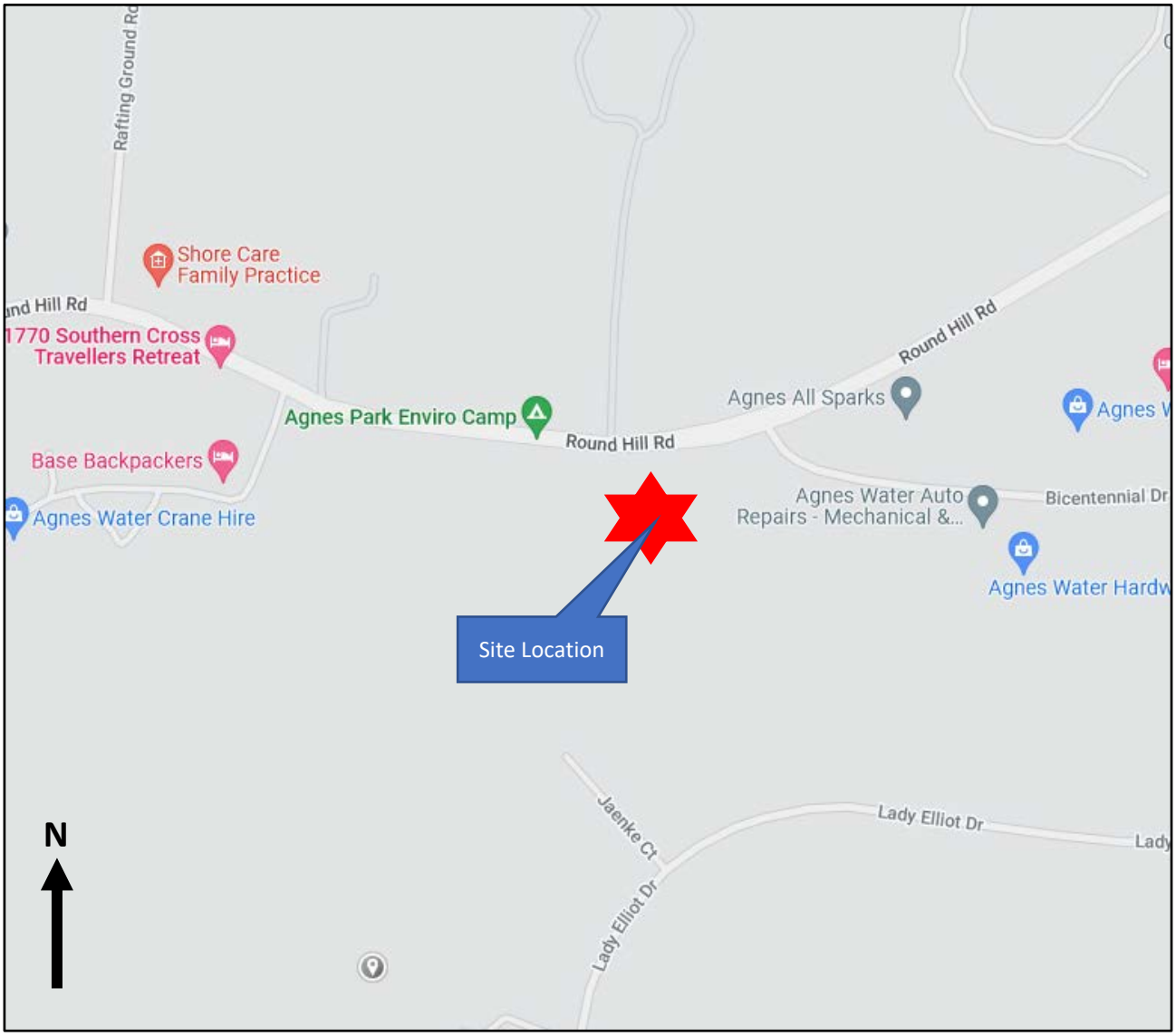


Figure 1: Site location (source: Google Maps)

The local authority is the Gladstone Regional Council (GRC). A Pre-lodgement Meeting was held with Council on the 29th of June 2021. In the Pre-lodgement Meeting Minutes Council has requested details how the proposed educational establishment will not negatively impact upon the rural residential amenity of the locality.

SoundBASE Consulting Engineers have been commissioned by the Goora Gan Steiner School to prepare a Noise Impact Assessment for the proposed development.

2. SITE AND SURROUNDING AREA

An aerial photograph showing the site and surrounding area is presented in Figure 2. It can be seen that the site is located on the southern side of Round Hill Road, close to the intersection with Bicentennial Drive.

Figure 2: Site and surrounding area (source: QLD Globe)

Th site presently contains a shed that will be repurposed as part of the development. Wherever possible, existing flora will be retained across the site and incorporated into the design to maintain the biodiversity.

Under the Gladstone Regional Council Planning Scheme V2 the site is zoned Rural Residential and is located within the Bicentennial Drive Enterprise Precinct as shown in Figure 3. The Bicentennial Drive Enterprise Precinct is stated by Council to provide additional overall outcomes:

- Supports a range of low impact business activities (not including shop, shopping centre or showroom), tourism uses and creative enterprises that operate on larger land parcels.
- Land use activities do not adversely affect the viability of the Agnes Water town centre.
- Development is able to function appropriately without reticulated water and sewerage infrastructure.

Figure 3: Zoning (source: Gladstone Regional Council)

Figure 4 shows a magnified aerial photograph of the site and adjoining lots. It can be seen that the Open Space Zone to the south of the site contains a watercourse, with the lots to the north and south of the Open Space Zone containing ponds and dams. As such, future development near-to the southern boundary of the site is unlikely to occur.

As the adjoining lots to the east and west are in the Bicentennial Drive Enterprise Precinct, future development on those lots will consist of low impact business activities, tourism uses or creative enterprises that will not typically be affected by noise from school activities.

The locations of the nearest noise-sensitive receivers to the site (existing and future) are therefore existing and future residences on surrounding rural residential lots located to the north, northeast, south and west.

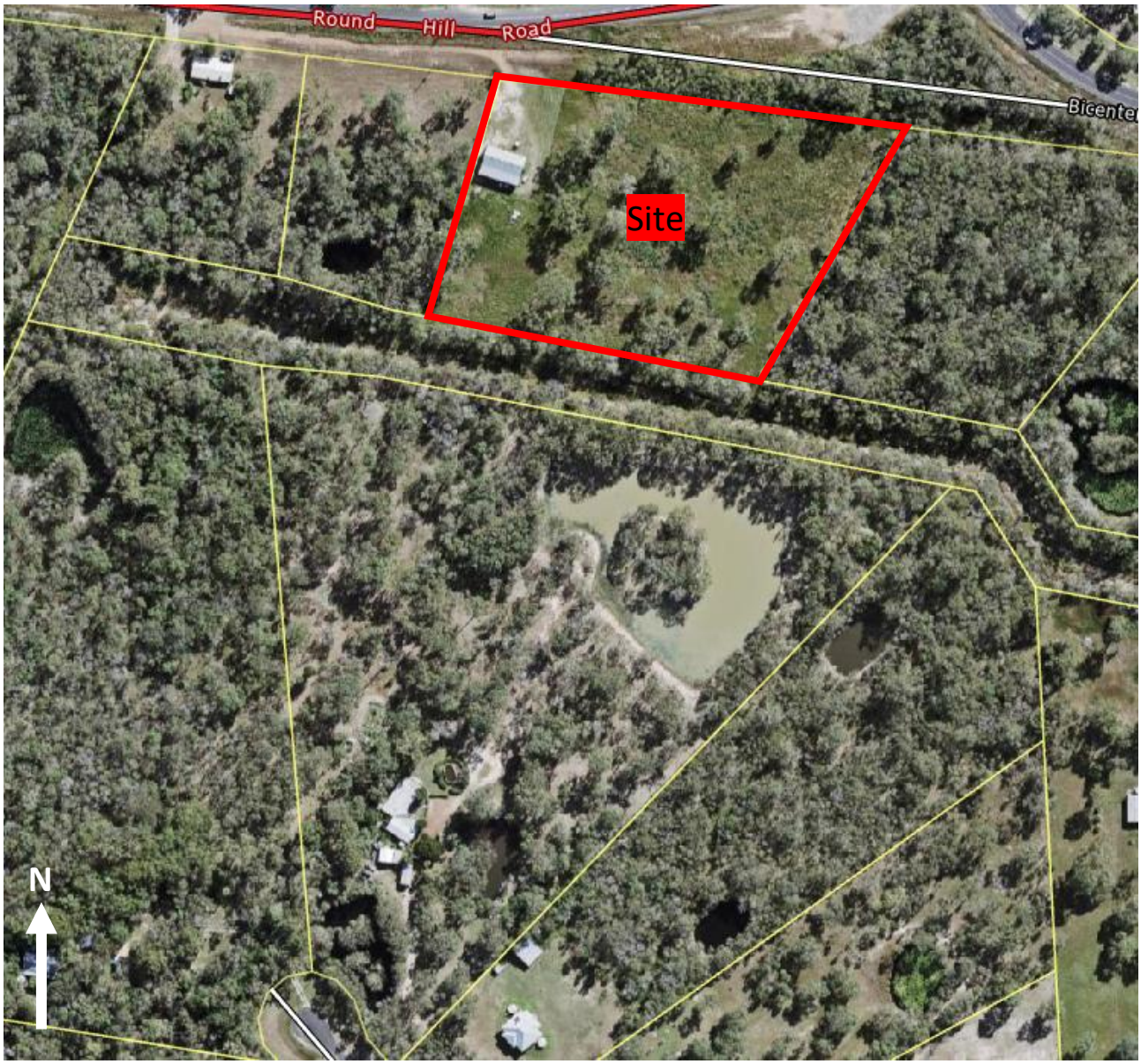


Figure 4: Aerial photograph of the site and adjoining lots (source: QLD Globe)

3. PROPOSED DEVELOPMENT

3.1. School Facilities

A plan showing the layout of the site and staging is presented in Figure 5. The complete architectural plans are contained in Appendix A.

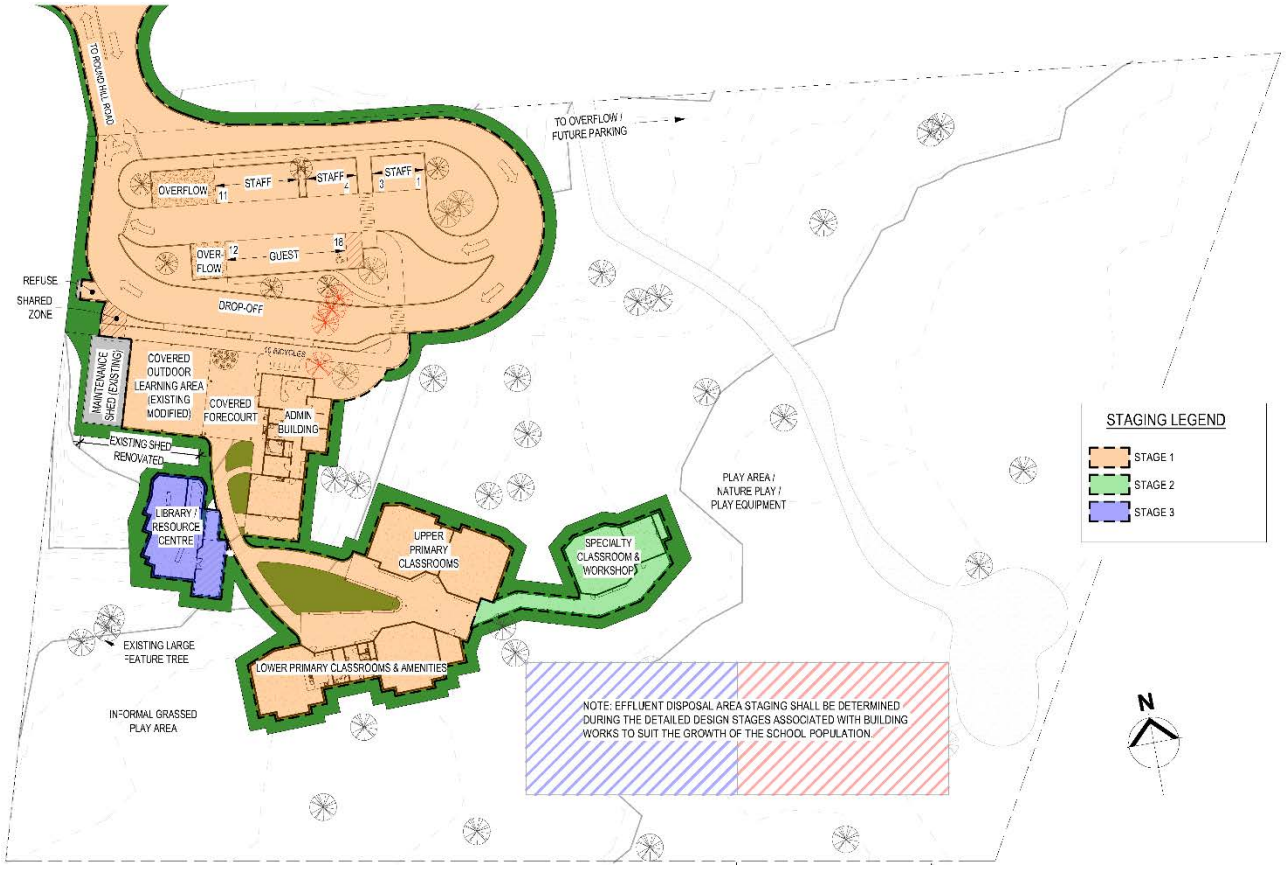


Figure 5: Site plan showing staging

It is proposed to develop the school over three stages:

- Stage 1 will involve constructing the driveway and carpark, converting the existing shed into an Outdoor Learning Area, construction of the Admin Building, Covered Forecourt, Upper Primary Classrooms and Lower Classrooms and Amenities.
- Stage 2 involves constructing a Specialty Classroom and Workshop;
- Stage 3 will involve construction of the Library/Resource Centre.

Part of the existing shed will be used as the Maintenance Shed. Carparking for staff and guests will be provided for 18 vehicles, with another six overflow carparks for peak periods. Additional overflow parking (used when the school is holding events) will be available along the northern boundary of the site.

There will be an effluent disposal area located towards the southeast corner of the site, which will be fenced off from the school grounds. There will also be an overland flow path and retention basin as shown.

An informal grassed play area will be provided at the southwest corner of the site, while a play area/nature play/play equipment will be provided immediately to the east of the classrooms. There will be no sports oval or playing fields constructed at the school.

It is intended that the Admin Building, Classrooms and Library/resource Centre will be air-conditioned.

3.2. School Operations

The school will be constructed to accommodate up to 99 prep to year six students, with 65 students expected in 2024, 75 students in 2025, 85 students in 2026 and 95 students by 2027. At full capacity of 99 students, the school is expected to employ 11 staff.

The normal operating hours of the school will be:

- Staff: 8:00am to 3:00pm Monday to Friday;
- Students: 8:30am to 2:30pm Monday to Friday.

For school excursions small shuttle buses (up to 15 students/staff) will typically be used. Larger coaches (seating up to 57) will be used once or twice a year. Refuse collection will occur weekly during the daytime.

The music program used in primary Steiner schools typically utilises the recorder for Prep to year 2, with students playing stringed instruments (violin, viola or cello) from year 3 onwards.

The operation of a Steiner school coupled with its size means that noisy announcements, tones and music (as typically found in schools) will not be required to signal the commencement and end of learning periods.

Groundskeeping and maintenance activities are expected to occur during the daytime, with the noise emissions being similar to that of a rural residential allotment.

3.3. Building Constructions

Ther buildings will be constructed with on-ground slabs. The constructions of the elements comprising the external building envelopes are summarised in Table 1. The acoustic performance of each element has been presented in terms of the weighted sound reduction index, R_w. It can be seen that the lowest performing elements will be the insulated roof panel system and louvre windows. When the area of each element is also considered, it is clear that the ability of each building to mitigate noise breaking in or out of the building will be limited by the roof/ceiling.

Within each building, surface mounted sound absorption treatments will be used to meet the recommended reverberation times contained in Australian Standard AS/NZS 2107:2016 *Acoustics* –

Recommended Design Sound Levels and Reverberation Times for Building Interiors. Those absorption treatments will typically include panels fixed to the ceilings and at high levels of the walls, with acoustic pinboards at lower level.

In addition, the Outdoor Covered Learning Area and the Covered area between the classrooms will have an acoustically absorptive soffit that achieves a minimum Noise Reduction Coefficient (NRC) of 0.9. This will be achieved using the Stramit Acoustic Panel System or similar (https://www.stramit.com.au).

Table 1: Proposed constructions of the external building envelope

Element	Construction	Acoustic Performance, R_w
Roof/ceiling	Insulated roof panel system (i.e.: InsulRoof or equal)	26
Wall Type 1	Custom Orb Cladding external 45mm cavity batten 25mm Phenolic (Kooltherm or equal) Sarking 120mm CLT walls (mass timber construction)	41
Wall Type 2	Weathertex cladding external 45mm cavity batten 25mm Phenolic insulation (Kooltherm or equal) Sarking 120mm CLT walls	42
Glazing	6.38mm awning windows 6.38mm fixed glazing 6.38mm louvres	32 32 26
Doors	44mm solid-core door with acoustic seals to head, jambs and threshold.	30

4. EXISTING AMBIENT NOISE LEVELS

To give an indication of the typical ambient noise levels in the area, noise logging was conducted between Friday the 17th and Friday the 24th of September 2021. The noise logger was positioned as indicated in Figure 6, with the microphone in free-field conditions 1.35m above ground level.

Figure 6: Noise logging location

The test instrumentation consisted of:

- Rion NL-22 Class 2 Sound Level meter, serial # 01273555
- Calibrator: Pulsar Model 105 Acoustics Calibrator, serial # 78353

All instrumentation has current NATA calibrations. The Rion was field calibrated before and after measurement, with no drift observed between the calibrations.

The results from the logging are presented in Table 2 and Appendix B. During The logging period a weather station was used to monitor the local conditions as presented in Appendix C. There was no rainfall during the logging. The results presented in Table 2 and Appendix B include values for the

average[1] L_{Amax}[2], L_{A01}[3], L_{A10}[4], L_{Aeq}[5] and L_{A90}[6] parameters for each of the day, evening and night periods[7].

Table 2: Noise logging results

Parameter	Time of Day	Measured Level (dBA)		
		Minimum	Maximum	Average
L_{Amax}	Daytime (7:00am to 6:00pm)	63.2	64.5	63.8
	Evening (6:00pm to 10:00pm)	56.9	60.2	58.5
	Night-time (10:00pm to 7:00am)	53.9	57.8	56.2
L_{A01}	Daytime (7:00am to 6:00pm)	56.3	57.3	56.9
	Evening (6:00pm to 10:00pm)	53.4	55.8	54.8
	Night-time (10:00pm to 7:00am)	47.1	52.2	49.8
L_{A10}	Daytime (7:00am to 6:00pm)	52.5	53.1	52.9
	Evening (6:00pm to 10:00pm)	47.5	51.6	50.3
	Night-time (10:00pm to 7:00am)	38.1	47.2	41.7
L_{Aeq}	Daytime (7:00am to 6:00pm)	49.8	51.0	50.4
	Evening (6:00pm to 10:00pm)	39.5	48.3	45.7
	Night-time (10:00pm to 7:00am)	40.5	45.7	43.1
L_{A90}	Daytime (7:00am to 6:00pm)	43.2	50.2	45.5
	Evening (6:00pm to 10:00pm)	32.3	46.5	37.4
	Night-time (10:00pm to 7:00am)	29.9	36.3	32.4

During the site visits the ambient noise levels were observed to be primarily influenced by bird song and distant road traffic noise.

From the logging results, the rating background levels (RBL), determined as the median of the daily 10th percentile of the L_{A90} noise levels, are:

- Daytime (7:00am to 6:00pm): 41dBA
- Evening (6:00pm to 10:00pm): 31dBA
- Night-time (10:00pm to 7:00am): 30dBA

[1] Averages are presented as the arithmetic average of the measured parameters over consecutive 15-minute intervals throughout each period of the day, evening and night, apart from L_{Aeq} data which is calculated as a logarithmic average.

[2] L_{Amax} is the maximum A-weighted sound pressure level occurring during the sample period

[3] L_{A01} is the A-weighted sound pressure level exceeded for 1% of the time

[4] L_{A10} is the A-weighted sound pressure level exceeded for 10% of the time

[5] L_{Aeq} is the equivalent or energy-averaged A-weighted sound pressure level

[6] L_{A90} is the A-weighted sound pressure level exceeded for 90% of the time

[7] Parameters such as the $L_{Aeq,\ 11hr}$, $L_{Aeq,4hr}$, $L_{Aeq,\ 9hr}$ etc that quantify transport noise have not been presented as they are not relevant to the scope of this Noise Impact Assessment.

5. NOISE CRITERIA

The noise emissions and immissions associated with the development must comply with the requirements detailed in the Gladstone Regional Council Planning Scheme. In addition, the criteria contained in Gladstone Regional Council's Noise Nuisance Guidelines should be achieved in case of complaints.

5.1. Gladstone Regional Council Planning Scheme

The school is to be located within a Rural Residential zone. The Rural Zone Code contained in the Gladstone Regional Council Planning Scheme states that for all assessable development there are several design and amenity assessment benchmarks that must be achieved. The benchmarks applicable to noise and vibration are reproduced in Table 3.

Table 3: Design and amenity assessment benchmarks

Performance Outcome	Acceptable Outcome
PO12 Development minimises potential conflicts with, or impacts on, other uses having regard to vibration, odour, dust or other emissions.	**AO12.1** Development achieves air quality design objectives set out in the *Environmental Protection (Air) Policy 2008*, as amended.
	AO12.2 Development that involves the storage of materials on site that are capable of generating air contaminants either by wind or when disturbed are managed by: (a) Being wholly enclosed in storage bins, or (b) A water program so material cannot become airborne.
PO13 Development prevents or minimises the generation of noise that: (a) Nuisance is not caused to adjoining premises or other nearby sensitive land uses, and (b) Desired ambient noise levels in residential areas are not exceeded	**AO13** Development achieves the noise generation levels set out in the *Environmental Protection (Noise) Policy 2008*, as amended.
PO14 Development does not unduly impact on the existing amenity and character of the locality having regard to: (a) The scale, siting and design of buildings and structures, (b) Visibility from roads and other public viewpoints, screening vegetation and landscaping, (c) The natural landform and avoidance of visual scarring, and	No acceptable outcome is nominated.

Performance Outcome	Acceptable Outcome
(d) Vibration, odour, dust spray draft and other emissions.	
PO15 All uses: (a) Minimise noise, duct, odour or other nuisance from existing lawful uses including rural and industrial uses. **(b)** Minimise nuisance caused by noise, vibration and dust emissions generated by the state-controlled road and rail network in the vicinity of the land.	No acceptable outcome is nominated.

From Table 3:

- PO12 and PO14 both mention vibration, with noise potentially being classified as other emission. There are no vibration impacts associated with the proposed development, while noise emissions are addressed under PO13. Hence satisfying PO13 via AO13 will also satisfy PO12 and PO14.
- PO15 is satisfied as a review of surrounding land uses and infrastructure have not identified any existing uses that might impact upon the school. The State Planning Policy Interactive Mapping System does not show any transport noise corridors in the vicinity of the site. Hence Po15 is also achieved.

To meet PO13 there are two sets of noise emission criteria in the *Environmental Protection (Noise) Policy 2008* (EPP(Noise)). These are the acoustic quality objectives and control of background creep.

5.1.1. Acoustic Quality Objectives

The acoustic quality objectives contained in Schedule 1 of the EPP(Noise) are used to assess the cumulative impact of noise sources such as mechanical plant and equipment, vehicle activities and learning activities. The applicable acoustic quality objectives, applied at surrounding residences, are presented in Table 4.

Table 4: Acoustic quality objectives

Sensitive Receptor	Period	Acoustic Quality Objectives (dBA)			Environmental Value
		$L_{Aeq,\ adj,\ 1hr}$	$L_{A10,\ adj,\ 1hr}$	$L_{A01,\ adj,\ 1hr}$	
Dwelling (for outdoors)	7am to 10pm	50	55	65	Health and wellbeing
Dwelling (for indoors)	7am to 10pm	35	40	45	Health and wellbeing
	10pm to 7am	30	35	40	Health and wellbeing in relation to the ability to sleep

To convert the indoor criteria into their equivalent outdoor criteria, a 7dB reduction from outside to inside has been adopted. The resulting strictest limits external to the receptor are presented in Table 5. As the school will not operate during the night-time, only the acoustic quality objectives for the period 7:00am to 10:00pm are applicable, with the $L_{Aeq,\ adj,\ 1hr}$ parameter being relevant[8].

Table 5: Strictest limits external to the receiver based upon the acoustic quality objectives

Period	Acoustic Quality Objectives (dBA)		
	$L_{Aeq,\ adj,\ 1hr}$	$L_{A10,\ adj,\ 1hr}$	$L_{A01,\ adj,\ 1hr}$
7am to 10pm	42	47	52
10pm to 7am	37	42	47

5.1.2. Background Creep

Part 4, Section 10 of the EPP(Noise) states that with regards to controlling background creep:

> *To the extent that it is reasonable to do so, noise from an activity must not be –*
>
> *(a) For noise that is continuous noise measured by $L_{A90,T}$ – more than nil dBA greater than the existing acoustic environment measured by $L_{A90,T}$.*

For continuous noise such as mechanical plant, achieving a nil exceedance is impossible as adding any noise to an existing level of noise will cause an increase in the overall noise level. As such, the interpretation of this requirement has been that continuous noise, quantified as the component $L_{A90,T}$, does not exceed the existing ambient $L_{A90,T}$. Adopting that approach, the background creep limits can be derived as presented in Table 6, where the rating background levels (RBLs) represent the background noise level.

Table 6: Background creep limits

Period	RBL (dBA)	Component noise Limit, $L_{A90,T}$ (dBA)
Daytime (7am to 6pm)	41	41
Evening (6pm to 10pm)	31	31
Night-time (10pm to 7am)	30	30

5.2. Noise Nuisance Guidelines

The Noise Nuisance Guidelines (Fact Sheet No. 0025) issued by Gladstone Regional Council details prohibited times and noise criteria for different noise generation categories. The applicable categories for a school, prohibited times and noise criteria are reproduced in Table 7. The criteria in

[8] For an activity having multiple concurrent noise sources that very in time, the $L_{Aeq,\ adj,\ 1hr}$ parameter best characterises the noise emissions. Source data are also available in terms of L_{Aeq} which can be used to make predictions, whereas L_{A10} and LK_{A01} noise data are rarely available.

Table 7 are based upon the default noise standards contained in the *Environmental Protection Act 1994*.

Table 7: Noise nuisance guidelines

Category	Prohibited Times & Noise Criteria
Regulated devices (lawn mower, power tools etc)	Must not operate a regulated device in a way that make audible noise: (a) On a Sunday or public holiday, before 8:00am of after 7:00pm; or (b) Ona Saturday or a business day, before 7:00am of after 7:00pm.
Pumps	Must not use or allow use: (a) Before 7:00am or after 10:00pm on any day, if the noise is audible; or (b) From 7:00am to 7:00pm on any day, if the noise is more than 5dBA above background noise levels; or (c) Before 7:00am of after 10:00pm on any day, if the noise is more than 3dBA above background.
Air-conditioning	Must not use or allow use: (a) From 7:00am to 10:00pm on any day, if the noise is more than 5dBA above background noise levels; or (b) Before 7:00am of after 10:00pm on any day, if the noise level is more than 3dBA above background.
Indoor venues	Must not use or allow use: (a) Before 7:00am on any day if the noise is audible; or (b) From 7:00am to 10:00pm on any day if the noise is more than 5dBA above background; or (c) From 10:00pm to midnight, if the noise is more than 3dBA above the background level.
Open-air event	Must not use or allow use: (a) Before 7:00am on any day if the noise is audible; or (b) From 7:P00am to 10:00pm on any day if the noise is more than 70dBA; of (c) From 10:00pm to midnight, if the use causes noise of more than the lessor of 50dBA or 10dBA above the background level.
Amplified devices:	Must not use or allow use: (a) On a business day from 7:00am to 10:00pm or any other day between 8:00am to 6:00pm, if the noise is more than 10dBA above background level; or (b) Before 7:00am or after 10:00pm on a business day; or (c) Before 8:00am of after 6:00pm on any other day.

Table 8 details the outcomes that will achieve compliance with the noise nuisance criteria presented in Table 7. As long as groundskeeping activities using regulated devices is limited to between 7:00am and 7:00pm on a business or Saturday, complying with the acoustic quality objectives in Table 5 and meeting background creep requirements (for continuous noise sources) in Table 6, Council noise nuisance criteria will be met.

Table 8: Outcomes that achieve compliance with the noise nuisance criteria

Category	Outcome to Achieve Compliance
Regulated devices (lawn mower, power tools etc)	Groundskeeping activities are limited to between 7:00am and 7:00pm on a business or Saturday.
Pumps	Pumps are selected, running times controlled and acoustically treated (if necessary) to achieve the following L_{A90} component limits: • Daytime: 44dBA • Evening: 34dBA • Night-time: 30dBA If the background creep limits presented in Table 6 are achieved, the above limits will automatically be achieved.
Air-conditioning	Outdoor condensers are selected, running times controlled and acoustically treated (if necessary) to achieve the following L_{A90} component limits: • Daytime: 44dBA • Evening: 34dBA • Night-time: 30dBA If the background creep limits presented in Table 5 are achieved, the above limits will automatically be achieved.
Indoor venues	The external building envelope is acoustically designed and the building air-conditioned (to allow doors and windows to be closed) to achieve the following L_{Aeq} limits: • Daytime: 46dBA • Evening: 36dBA During the night-time no indoor events are to be held. Achieving compliance with the $L_{Aeq, adj, 1hr}$ limits in Table 5 will automatically result in these emission limits being achieved.
Open-air event	Open air events are located, orientated and source levels controlled to achieve the following L_{Aeq} limits : • Daytime: 70dBA During the evening and night-time no open air events are to be held. It is also noted that the specified limits are intended to be used for non-regular events (typically occurring no more than once per month) rather than every day or weekly events. Achieving compliance with the $L_{Aeq, adj, 1hr}$ limits in Table 5 will automatically result in these emission limits being achieved.
Amplified devices:	Outdoor speakers are selected, orientated and source levels controlled to achieve the following L_{Aeq} limit: • Daytime: 51dBA Outdoor speakers will not be used during the evening and night-time. Achieving compliance with the $L_{Aeq, adj, 1hr}$ limits in Table 5 will automatically result in these emission limits being achieved.

6. ASSESSMENT OF NOISE EMISSIONS

The assessment of noise emissions has involved identifying significant sources of noise (in consultation with the School), preparing a SoundPLAN model and predicting the noise emissions for comparison against the acoustic quality objectives in Table 5 and background creep limits in Table 6.

The noise emissions have been assessed for the school at its ultimate capacity of 99 students and 11 staff.

6.1. Software

Noise emissions from the site have been predicted using the SoundPLAN v8.2 computer program. SoundPLAN is an integrated software package for noise and air pollution evaluation developed in Germany by Braunstein + Berndt GmbH. It has been configured to predict the noise emissions from the site in accordance with International Standard ISO 9613-2:1996 *Acoustics – Attenuation of Sound during Propagation Outdoors – Part 2: General Method of Calculation*.

6.2. Topographic Information

Topographic contours for the surrounding area are based upon digital elevation model data provided by the Queensland Government. Locations of surrounding features have been determined from aerial photographs and site inspection. The positioning of the buildings and sources has been done as per the plans contained in Appendix A.

6.3. Noise Sources

The significant noise sources associated with a Steiner School are:

1. On-site vehicle activities during the morning drop-off and afternoon pick-up, as well as the off-peak period during the day.
2. Learning activities, including music practice and workshop noise.
3. Crowd noise due to students assembling in the Covered Outdoor Learning Area.
4. Noise emissions from performance, amplified devices in the Covered Outdoor Learning Area.
5. Outdoor play in the designated play areas.
6. Mechanical plant and equipment such as air-conditioning condensers.

Formal sports related activities do not usually occur at Stener Schools and as such, basketball noise, whistle noise etc have not been considered.

A summary of the noise sources and how they have been included in the SoundPLAN model are presented in Table 9. At any point in time, there will potentially be noise emissions from the mechanical plant and equipment plus the noise emission from one other source.

Table 9: Summary of the noise sources

Source	Description
Vehicle activities	Modelled in accordance with the Bayerisches Landesamt für Umwelt (BayLfU) parking noise study prepared by the Bavarian State Office for the Environment as implemented in SoundPLAN. Assumes 18 carparks used by staff and visitors, with drop-off/pick-up of 99 students generating 1.23 trips per student during the morning peak[9] Outside of the morning and afternoon peak periods, six trips per hour are predicted. As refuse collection will occur weekly during the daytime, noise emissions from that activity are minor and have not been considered.
Learning activities	Workshop noise is understood to be minimal, consisting of rotary tools (e.g.: Dremel) associated with activities such as jewellery making. Music noise will consist of an ensemble playing within the classroom with the doors and windows closed. The noise breaking out of the specialist classroom has been determined based upon the constructions presented in Table 1, assuming a string ensemble is playing with a source sound power level of 95dBA[10].
Crowd noise in Covered Outdoor Learning Area	The sound power level of 110 people has been determined assuming that the ceiling to the Covered Outdoor Learning Area will be acoustically absorptive to minimise reverberant noise build-up. The source sound power levels have been predicted using the algorithms presented in Hayne et al. (2011)[11].
Performance and amplified devices in the Covered Outdoor Learning Area	Performance will consist of a music ensemble playing and/or singing. Loud instruments such as drums and brass are not expected to be a common occurrence, with stringed instruments being the most common music source. A source sound power level of 95dBA, typical of a string ensemble, has been assumed.
Outdoor play in the informal grassed play area and play area/nature play/play equipment	Around 15 children playing in each outdoor area resulting in an emitted sound power level of 80dBA as assigned by SoundPLAN.
Mechanical plant and equipment	The exact size, type and location of the air-conditioning condensers is presently unknown. However based upon a cooling load of 100-150W/m^2 for air-conditioned areas, it is expected that condensers in the range of 11kW to 20kW would be required, with seven condensers required to air-condition the classrooms, Admin and the Library/Resource Centre. For a 3-phase 20kw condenser the emitted sound power level is around 70dBA. The condensers will be located at the rear of the buildings away from outdoor areas and the covered walkways.

[9] As per the Traffic Impact Assessment prepared by Access Traffic Consulting

[10] Kahle, Ekhard (1995), 'Influence of Size and Composition of the orchestra on the Perception of Room Acoustical Quality', Institute for Research and Coordination in Acoustics/Music, Centre Pompidou, Paris.

[11] Hayne, M.J., Taylor, J.C., Rumble, R.H. and Mee, D.J. (2011), 'Prediction of Noise from Small to Medium Sized Crowds' in *Proceedings of ACOUSTICS 2011*, 2-4 November 2011, Gold Coast, Australia.

The resulting source sound power levels used for the sources (with the exception of the vehicle activities), are presented in Table 10. The sound power levels presented in Table 10 do not include any penalty adjustments for tonality and/or impulsiveness.

Table 10: Source sound power levels used in the modelling

Source	L_{eq} Octave Band Sound Power Level (dBA)								Total L_w (dBA)
	63	125	250	500	1k	2k	4k	8k	
Learning activities (total breaking out of building)	54	60	71	76	60	53	43	33	77
Crowd noise in the COLA	-	79	83	90	90	87	80	-	94
Performance in the COLA	66	75	82	89	91	89	84	75	95
Children playing – per play area	25	43	59	71	76	75	69	60	80
20kW a/c – per condenser	-	61	62	65	63	58	55	50	70

6.4. Noise Modelling Results

The noise emissions were predicted for a number of scenarios as presented in Appendix D. Those scenarios consisted of:

- Figure 7: LA90 noise emissions from the air-conditioning condensers for comparison against background creep limits
- Figure 8: $LAeq_{, adj, 1hr}$ noise emissions from carpark activities and air-conditioning condensers during the morning drop-off
- Figure 9: $LAeq_{, adj, 1hr}$ noise emissions from off-peak use of the carpark and air-conditioning condensers
- Figure 10: $LAeq_{, adj, 1hr}$ noise emissions due to off-peak use of the carpark, learning activities and operation of the air-conditioning condensers
- Figure 11: $LAeq_{, adj, 1hr}$ noise emissions from off-peak use of the carpark, the designated outdoor play areas and operation of the air-conditioning condensers
- Figure 12: $LAeq_{, adj, 1hr}$ noise emissions from off-peak use of the carpark, students and staff talking in the COLA and operation of the air-conditioning condensers
- Figure 13: $LAeq_{, adj, 1hr}$ noise emissions from off-peak use of the carpark, musical performance in the COLA and operation of the air-conditioning condensers

For every scenario a penalty has been applied to adjust the results to account for potential tonality and impulsiveness. The noise emissions were predicted at a gird spacing of 1m, with the receivers located 1.5m above ground level. The meteorological conditions have used a relative humidity and temperature based upon the winter average for the area.

Reviewing the results shows that:

- Figure 7: The background creep criterion of 41dBA L_{A90} will be achieved at all surrounding noise-sensitive receivers.

- Figure 8: During the morning drop-off and afternoon pick-up, the acoustic quality objective $L_{Aeq, adj, 1hr}$ limit of 42dBA will be exceeded at locations on several of the rural residential lots located to the north, northwest and west. However, if the predicted levels are compared against the acoustic quality objective for outdoor areas (50dBA $L_{Aeq, adj, 1hr}$) and the existing daytime ambient noise level of 50dBA L_{Aeq}, those levels are only exceeded at the two rural residential lots to the north on the opposite side of Round Hill Road.

- Figure 9: Outside of the morning and afternoon peak periods, use of the carpark and air-conditioning condensers operating will potentially result in an exceedance of the acoustic quality objective of 42dBA $L_{Aeq, adj, 1hr}$ at the two rural residential lots to the north on the opposite side of Round Hill Road. For the lots to the north, the exceedance of the 42dBA $L_{Aeq, adj, 1hr}$ limit is very minor (around 2dB), occurs on those lots in locations where future residences are unlikely to be located, is well below the acoustic quality objective for outdoor areas (50dBA $L_{Aeq, adj, 1hr}$) and the existing daytime ambient noise level of 50dBA L_{Aeq}. Hence, noise from off-peak usage of the carpark and driveway is unlikely to cause nuisance.

- Figure 10: The predicted emissions levels due to learning activities, off-peak use of the carpark and air-conditioning condensers operating is very similar to that shown in Figure 9, with the same comments applying with regard to the potential exceedance of the derived emission limit. This indicates that when the doors and windows are closed, the constructions detailed in Table 1 will be adequate in attenuating noisy indoor learning activities.

- Figure 11: With children playing in the designated outdoor play areas, off-peak use of the carpark and air-conditioning condensers operating the noise emission levels are also very similar to those shown in Figure 9, with the same rationalisation of the potential exceedances applying. The slight increase in noise emissions to the south are insignificant, as that land contains multiple dams and ponds which will never be built upon.

- Figure 12: Staff and students talking in the COLA, off-peak use of the carpark and air-conditioning condensers operating will potentially result in noise emissions to the rural residential lots to the north and south. The emission pattern is due to noise spilling out from the COLA being partially reflected and partially screened by the Maintenance Shed, Admin and Library/Resource Centre. While the 42dBA $L_{Aeq, adj, 1hr}$ limit is exceeded, the exceedance of the acoustic quality objective for outdoor areas (50dBA $L_{Aeq, adj, 1hr}$) and the existing daytime ambient noise level of 50dBA L_{Aeq} is very minor (< 2dB). For the rural residential lots to the south, the noise emissions will never impinge upon future residences due to the presence of the dams and ponds.

- Figure 13: Outdoor performance in the COLA, off-peak use of the carpark and air-conditioning condensers operating will result in significant noise emissions to existing and

future residences to the south and north. While the 42dBA $L_{Aeq,\ adj,\ 1hr}$ limit is exceeded on surrounding lots, the exceedance of the acoustic quality objective for outdoor areas (50dBA $LA_{eq,\ adj,\ 1hr}$) and the existing daytime ambient noise level of 50dBA L_{Aeq} is still minor (3dB).

Based upon the above, the noise sources most likely to potentially impact upon existing and future residences are use of the carpark during morning drop-off and afternoon pick-up, staff and students talking in the COLA and outdoor performance in the COLA.

6.5. Noise Amelioration Measures

The noise amelioration measures have been determined based upon ensuring that the rural residential amenity of the locality is maintained.

6.5.1. Carpark

While it is possible to reduce the noise emissions from carparking activities by constructing acoustic barriers along the northern, western and eastern sides of the carpark[12], that approach is not recommended as:

- Outside of the morning drop-off and afternoon pick-up periods, use of the carpark will not result in noise emission levels exceeding the derived limit of 42dBA $L_{Aeq,\ adj,\ 1hr}$ at existing or future residences.
- During the morning drop-off and afternoon pick-up periods the noise from the carpark will be similar to that emitted by commercial uses in the Bicentennial Drive Enterprise Precinct and the low impact industry to the west, but without the volume of medium and heavy vehicles that would be expected for commercial or industrial uses (only a single bus is expected to use the carpark during those periods). The duration of any elevated noise levels will also be significantly less (maximum two hours out of every workday) compared to eight or nine hours for a commercial or industrial premises.
- It is common for schools, kindergartens and childcare centres to be located immediately adjacent to residential uses and operate successfully without the need for any acoustic amelioration measures. In this instance, the location of the school within the Bicentennial Drive Enterprise Precinct increases the separation to existing and future residences. When coupled with the small size of the school, the impact on existing or future residences will be insignificant.
- In the future the ambient noise levels in the local area will increase due to traffic growth on Round Hill Road and nearby commercial and residential developments. At the same time, the adoption of emerging technology such as electric passenger vehicles will reduce the noise emissions associated with use of the carpark over the long-term.

[12] Modelling has identified that 2.0m high acoustic barriers will reduce the $L_{Aeq,\ adj,\ 1hr}$ noise emission levels at nearby residences by around 6dB. However, barriers will adversely impact upon visual amenity and potentially create a security problem at the school.

- Regular use of the carpark on weekends and after hours will not occur, resulting in reduced overall noise emission levels compared to a commercial use.

6.5.2. COLA

Enclosing the COLA to prevent noise emissions is inconsistent with the design intent for that space. Given that all of the noise emissions from the COLA will be due to activities that can be controlled by the school, implementing a Noise Management Plan (NMP) is recommended[13]. The NMP would limit the occurrence of potentially noisy activities and set source levels (for unamplified and amplified sources) that would be adopted by the school[14].

A NMP for the control of noise emissions from the COLA is presented in Appendix E. The NMP allows use of the COLA during daytime hours only, with restrictions around the use of amplified and unamplified sources. In the situation where a complaint is received by the school, the NMP also allows for the resolution of the complaint by identifying the source of the complaint and behaviour modifications to prevent the cause of the complaint from reoccurring.

The unamplified source level of 80dBC @ 3m will allow the use of instruments such as a string quartet, guitar or recorders. Instruments such as brass, woodwind or drums will not generally be able to meet the specified source level.

6.5.3. Other Sources

Even though the analysis has identified the carpark and COLA as the noise emission sources most likely to cause a potential exceedance of the derived limits, acoustic design advice has been provided to the architect during the design process to minimise the noise emitted from other sources. Those measures include:

- Ensuring that the external building envelopes are constructed to meet or exceed the sound reduction ratings presented in Table 1.
- Applying acoustically absorptive finishes that achieve minimum NRC 0.9 to the ceiling/soffits of outdoor learning and congregation areas.
- Using landscaping and buildings to block line-of-sight between sources and surrounding lots.
- Adopting a buy-quiet approach for the air-conditioning condensers, whereby the chosen units emit a sound power level less than the 70dBA assumed in the assessment.

[13] A NMP is a frequently utilised and accepted tool to control noise emissions from multi-purpose school halls across Queensland that have not been constructed to contain noise due to budgetary constraints.

[14] The source level of 80dBC @ 3m has been determined based upon the SoundPLAN results to achieve a noise emission level of 42dBA at nearby receivers.

7. CONCLUSIONS

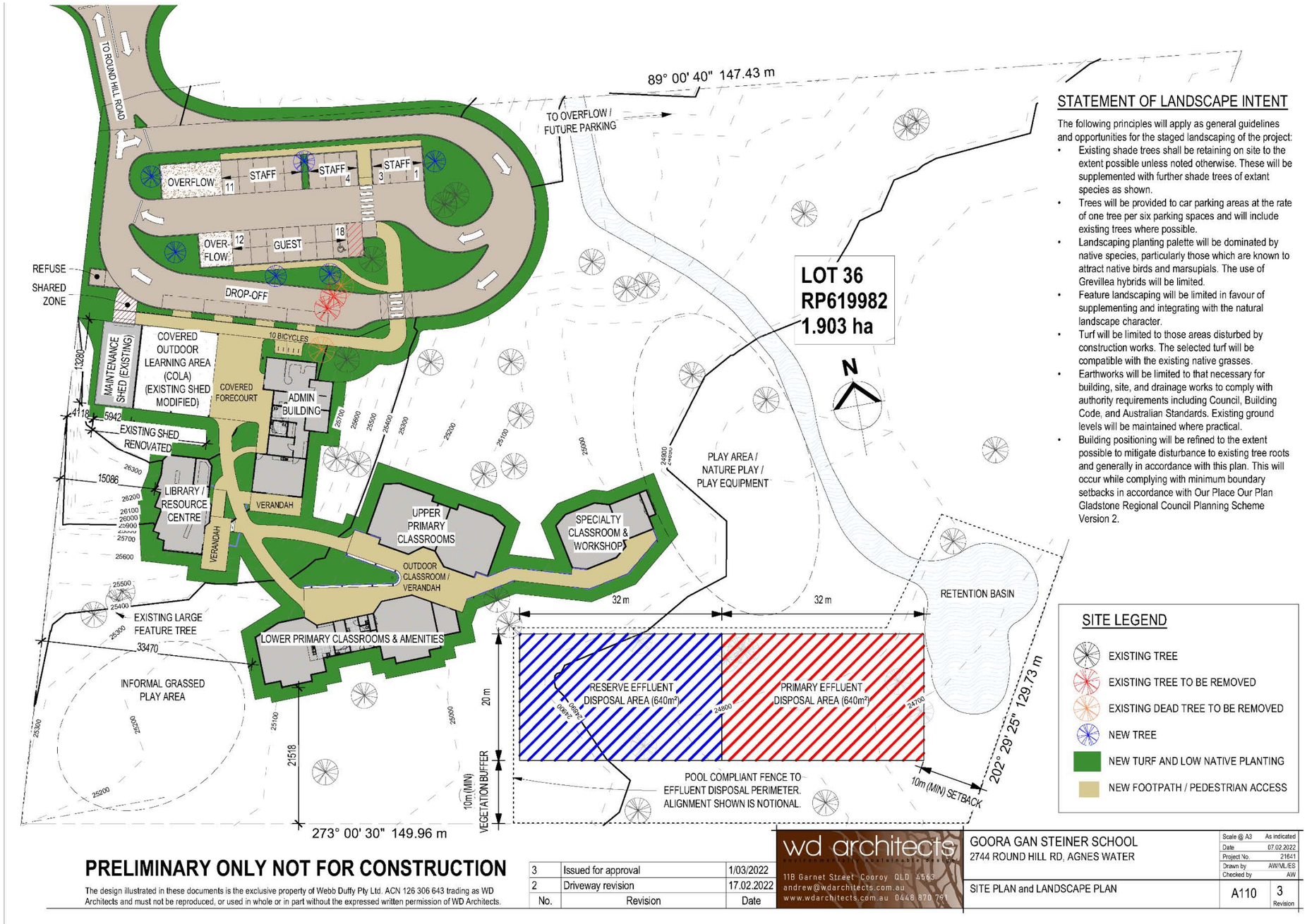
The assessment contained in this report has determined that:

- The significant noise sources associated with a Steiner School are:
    - On-site vehicle activities during the morning drop-off and afternoon pick-up, as well as the off-peak period during the day.
    - Learning activities, including music practice and workshop noise.
    - Crowd noise due to students assembling in the Covered Outdoor Learning Area (COLA).
    - Noise emissions from performance, amplified devices in the COLA.
    - Outdoor play in the designated play areas.
    - Mechanical plant and equipment such as air-conditioning condensers.
- Using typical source levels for the different activities, SoundPLAN modelling has determined that the noise sources that could potentially impact upon existing and future residences are use of the carpark during morning drop-off and afternoon pick-up, staff and students talking in the COLA and outdoor performance in the COLA.
- Constructing acoustic barriers along the northern, western and eastern sides of the carpark to control noise emissions is not recommended as:
    - Outside of the morning drop-off and afternoon pick-up periods, use of the carpark will not result in noise emission levels exceeding the derived limit of 42dBA $L_{Aeq,\ adj,\ 1hr}$ at existing or future residences.
    - During the morning drop-off and afternoon pick-up periods the noise from the carpark will be similar to that emitted by commercial uses in the Bicentennial Drive Enterprise Precinct and the low impact industry to the west, but without the volume of medium and heavy vehicles that would be expected for commercial or industrial uses (only a single bus is expected to use the carpark during those periods). The duration of any elevated noise levels will also be significantly less (maximum two hours out of every workday) compared to eight or nine hours for a commercial or industrial premises.
    - It is common for schools, kindergartens and childcare centres to be located immediately adjacent to residential uses and operate successfully without the need for any acoustic amelioration measures. In this instance, the location of the school within the Bicentennial Drive Enterprise Precinct increases the separation to existing and future residences. When coupled with the small size of the school, the impact on existing or future residences will be insignificant.

- In the future the ambient noise levels in the local area will increase due to traffic growth on Round Hill Road and nearby commercial and residential developments. At the same time, the adoption of emerging technology such as electric passenger vehicles will reduce the noise emissions associated with use of the carpark over the long-term.
- Regular use of the carpark on weekends and after hours will not occur, resulting in reduced overall noise emission levels compared to a commercial use.

- To control noise from the COLA the adoption of a Noise Management Plan (NMP) is recommended. The NMP allows use of the COLA during daytime hours only, with restrictions around the use of amplified and unamplified sources. In the situation where a complaint is received by the school, the NMP also allows for the resolution of the complaint by identifying the source of the complaint and behaviour modifications to prevent the cause of the complaint from reoccurring.
- Even though the analysis has identified the carpark and COLA as the noise emission sources most likely to cause a potential exceedance of the derived limits, acoustic design advice has been provided to the architect during the design process to minimise the noise emitted from other sources. Those measures include:
  - Ensuring that the external building envelopes are constructed to meet or exceed the sound reduction ratings presented in Table 1.
  - Applying acoustically absorptive finishes that achieve minimum NRC 0.9 to the ceiling/soffits of outdoor learning and congregation areas.
  - Using landscaping to block line-of-sight between the school and surrounding lots.
  - Adopting a buy-quiet approach for the air-conditioning condensers, whereby the chosen units emit a sound power level less than the 70dBA assumed in the assessment.
- With the above measures implemented, the noise emission levels from the school will be equal to or less than a commercial use on the same lot. The proposed educational establishment is unlikely to negatively impact upon the rural residential amenity of the locality.

APPENDIX A: ARCHITECTURAL PLANS



STATEMENT OF LANDSCAPE INTENT

The following principles will apply as general guidelines and opportunities for the staged landscaping of the project:

- Existing shade trees shall be retaining on site to the extent possible unless noted otherwise. These will be supplemented with further shade trees of extant species as shown.
- Trees will be provided to car parking areas at the rate of one tree per six parking spaces and will include existing trees where possible.
- Landscaping planting palette will be dominated by native species, particularly those which are known to attract native birds and marsupials. The use of Grevillea hybrids will be limited.
- Feature landscaping will be limited in favour of supplementing and integrating with the natural landscape character.
- Turf will be limited to those areas disturbed by construction works. The selected turf will be compatible with the existing native grasses.
- Earthworks will be limited to that necessary for building, site, and drainage works to comply with authority requirements including Council, Building Code, and Australian Standards. Existing ground levels will be maintained where practical.
- Building positioning will be refined to the extent possible to mitigate disturbance to existing tree roots and generally in accordance with this plan. This will occur while complying with minimum boundary setbacks in accordance with Our Place Our Plan Gladstone Regional Council Planning Scheme Version 2.

SITE LEGEND

- EXISTING TREE
- EXISTING TREE TO BE REMOVED
- EXISTING DEAD TREE TO BE REMOVED
- NEW TREE
- NEW TURF AND LOW NATIVE PLANTING
- NEW FOOTPATH / PEDESTRIAN ACCESS

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
3	Issued for approval	1/03/2022
2	Driveway revision	17.02.2022

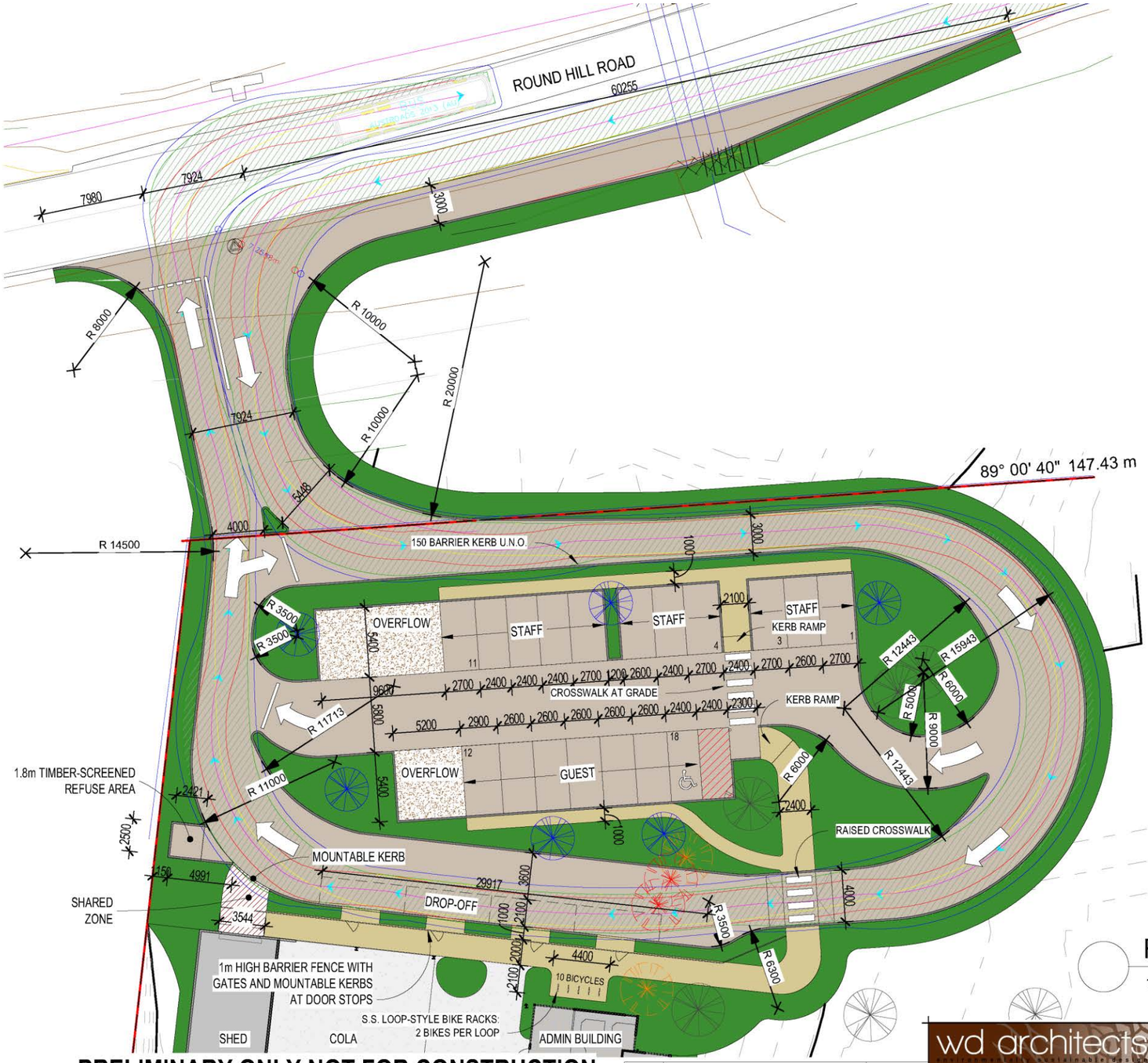
wd architects
11B Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 870 791

GOORA GAN STEINER SCHOOL
2744 ROUND HILL RD, AGNES WATER

SITE PLAN and LANDSCAPE PLAN

Scale @ A3	As indicated
Date	07.02.2022
Project No.	21641
Drawn by	AW/ML/ES
Checked by	AW

A110 — 3 Revision



PARKING CALCULATIONS

BUILDING	GFA
ADMIN	166
MAINTENANCE SHED	82
UPPER PRIMARY	184
LOWER PRIMARY & AMENITIES	233
SPECIALTY CLASSROOM & WORKSHOP	108
LIBRARY / RESOURCE CENTRE	113
TOTAL	886 m²

1 CARPARK SPACE REQUIRED PER 50 m² GFA = 18 CAR SPACES REQUIRED
PLUS ADDITIONAL 3 DROP-OFF SPACES
1 BICYCLE SPACE REQUIRED PER 100 m² GFA = 9 BICYCLE SPACES REQUIRED

SITE LEGEND

- EXISTING TREE
- EXISTING TREE TO BE REMOVED
- EXISTING DEAD TREE TO BE REMOVED
- NEW TREE
- NEW TURF AND LOW NATIVE PLANTING
- NEW FOOTPATH / PEDESTRIAN ACCESS

Roadworks and Parking Layout

1 : 300

PRELIMINARY ONLY NOT FOR CONSTRUCTION

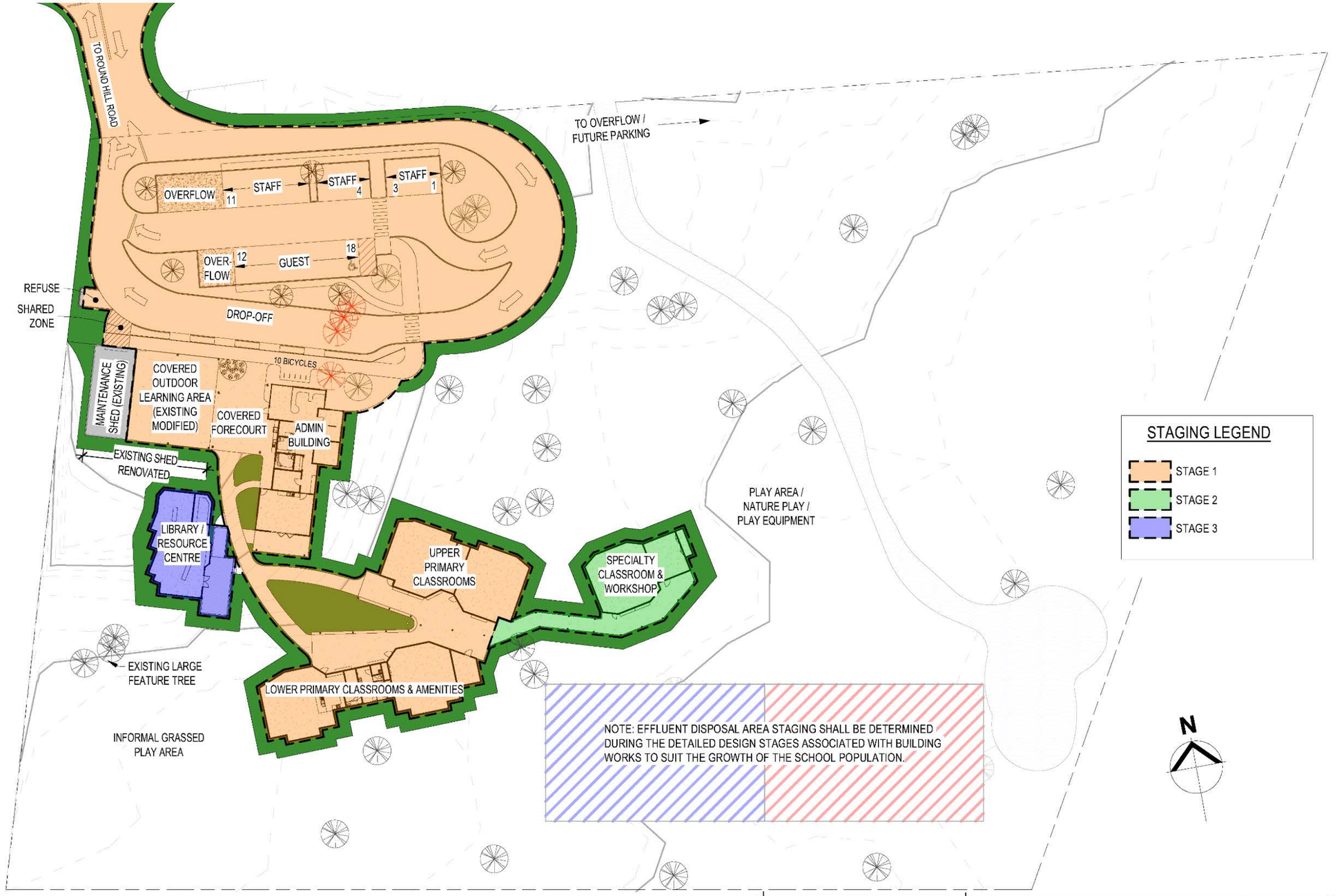
No.	Revision	Date
1	Issued for approval	1/03/2022

wd architects
environmentally sustainable design
11B Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 870 791

GOORA GAN STEINER SCHOOL
2744 ROUND HILL RD, AGNES WATER

ROADWORKS AND PARKING LAYOUT

Scale @ A3	As indicated
Date	07.02.2022
Project No.	21641
Drawn by	AW
Checked by	AW
A120	1 Revision



PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
1	Issued for approval	1/03/2022

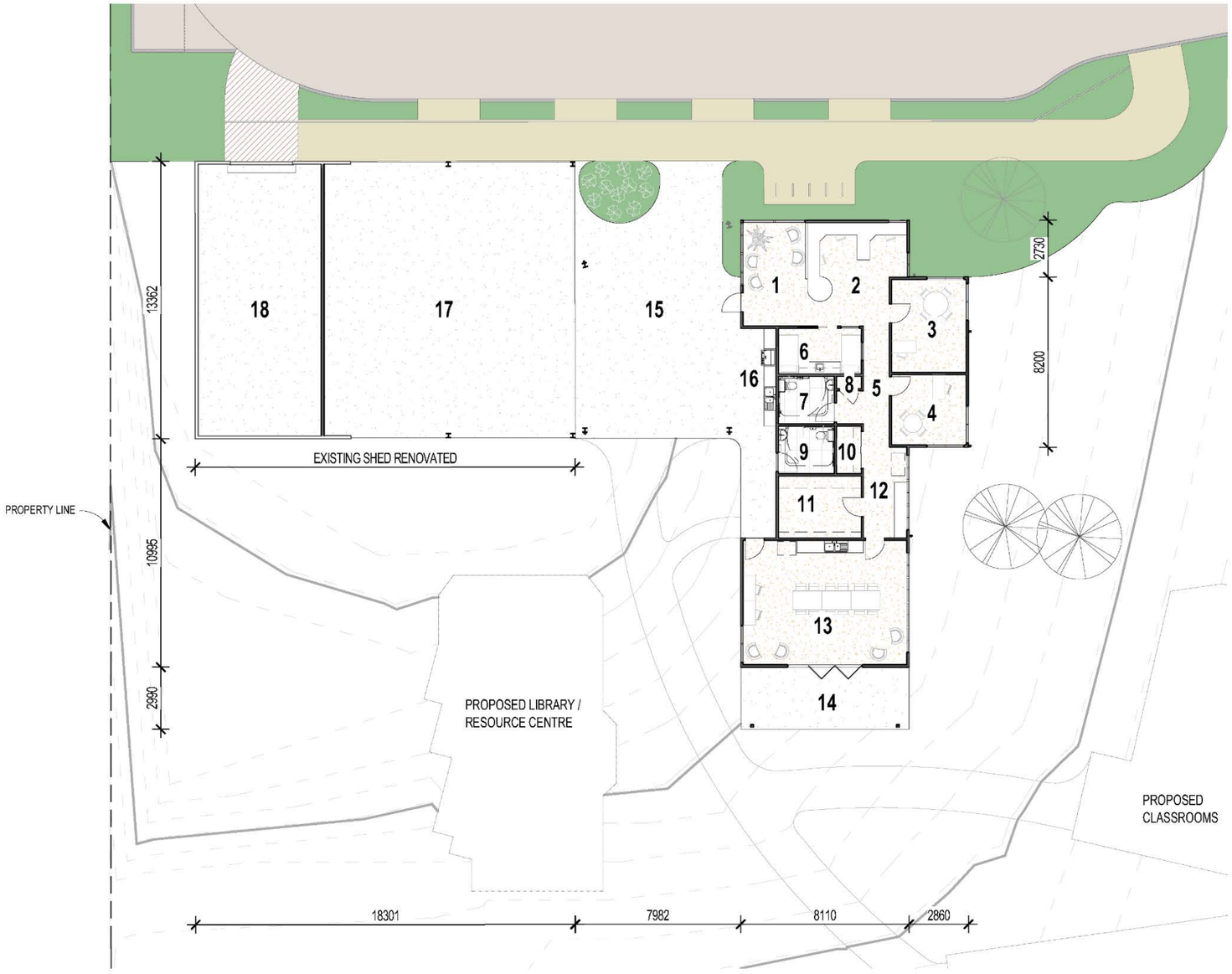
wd architects
environmentally sustainable design
11B Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 870 791

GOORA GAN STEINER SCHOOL
2744 ROUND HILL RD, AGNES WATER

STAGING PLAN

Scale @ A3	1 : 500
Date	07.02.2022
Project No.	21641
Drawn by	AW/ML
Checked by	AW

A130 — 1 Revision



Room Schedule		
Number	Name	Area
1	RECEPTION	15 m²
2	ADMINISTRATION OFFICE	22 m²
3	PRINCIPAL'S OFFICE	16 m²
4	OFFICE	12 m²
5	CORRIDOR	9 m²
6	SICK BAY	9 m²
7	STAFF TOILET 1	6 m²
8	ELEC/COMMS	1 m²
9	STAFF TOILET 2	6 m²
10	SERVER	3 m²
11	RECORDS/STORE ROOM	12 m²
12	PHOTOCOPY/STATIONARY	9 m²
13	STAFF ROOM	47 m²
14	STAFF COVERED AREA	24 m²
15	ENTRY COVERED AREA	113 m²
16	OUTDOOR KITCHEN	11 m²
17	COVERED OUTDOOR LEARNING AREA	162 m²
18	MAINTENANCE SHED	82 m²
Grand total: 18		559 m²

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
2	Issued for approval	01.03.2022
1	Issued for coordination	15.02.2022

wd architects
environmentally sustainable design
11B Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 870 791

GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATER
ADMINISTRATION BUILDING and COLA

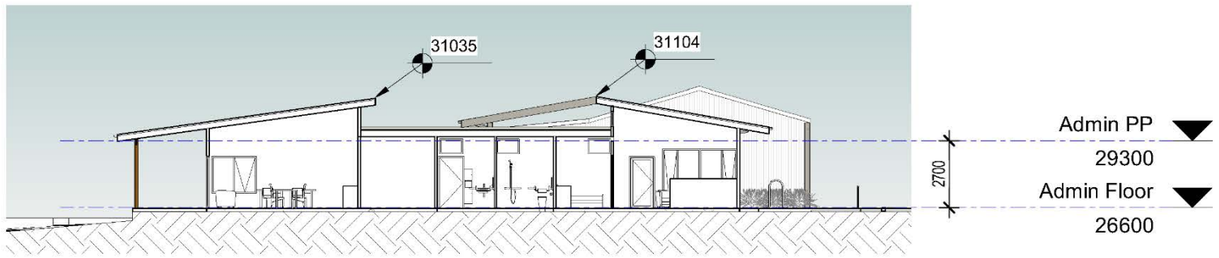
FLOOR PLAN

Scale @ A3	1 : 200
Date	21.01.22
Project No.	641
Drawn by	AW/ML
Checked by	AW

A300 — 2 Revision

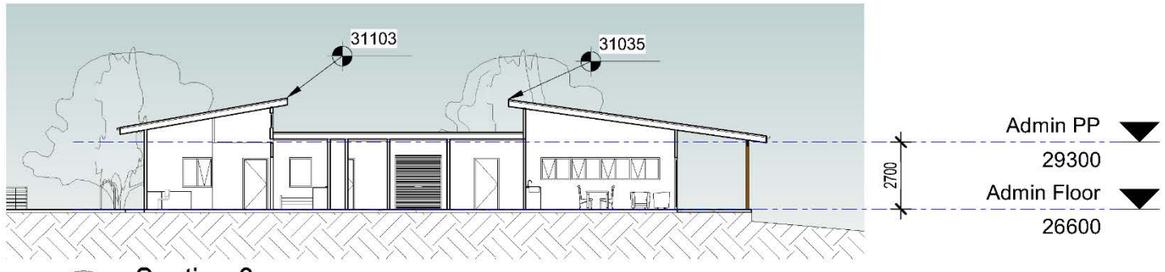
Section 1

1 : 200



Section 2

1 : 200



Section 3

1 : 200

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
2	Issued for approval	01.03.2022
1	Issued for coordination	15.02.2022

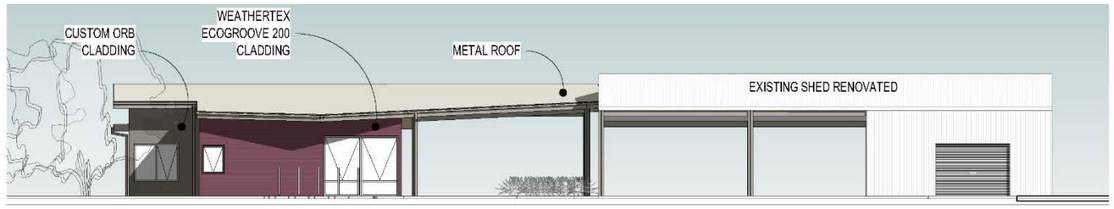
wd architects
environmentally sustainable design
11B Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 870 791

GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATER
ADMINISTRATION BUILDING and COLA

SECTIONS

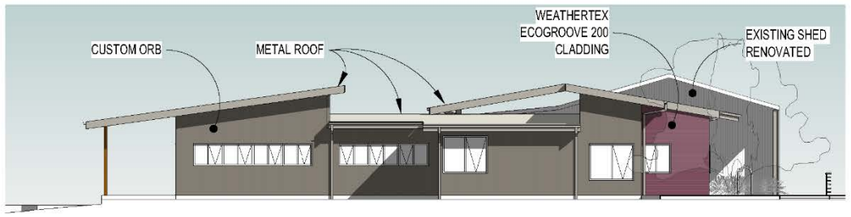
Scale @ A3	1 : 200
Date	21.01.22
Project No.	641
Drawn by	ML
Checked by	AW

A400 — 2 Revision



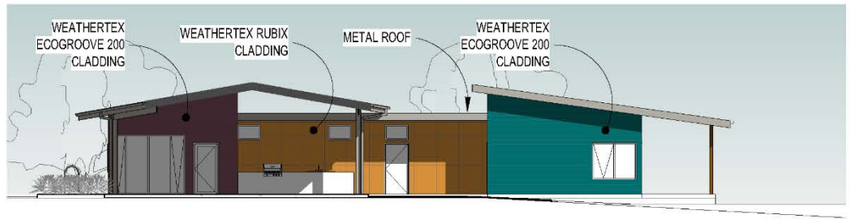
North Elevation

1 : 200



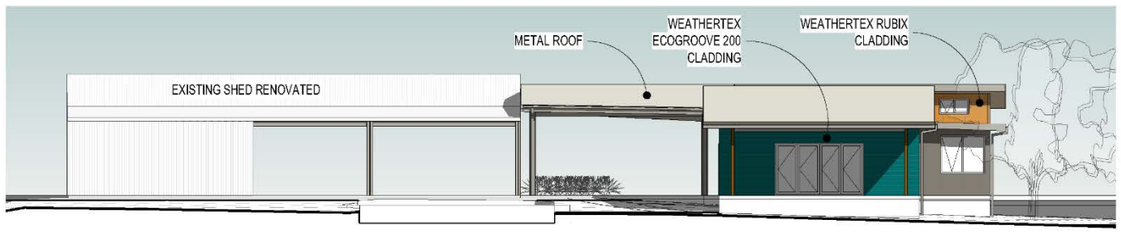
East Elevation

1 : 200



West Elevation

1 : 200



South Elevation

1 : 200

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
2	Issued for approval	01.03.2022
1	Issued for coordination	15.02.2022

wd architects
11B Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 870 791

GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATER
ADMINISTRATION BUILDING and COLA

ELEVATIONS

Scale @ A3	1 : 200
Date	21.01.22
Project No.	641
Drawn by	ML
Checked by	AW

A500 — 2 Revision

North View

East View

South View

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
2	Issued for approval	01.03.2022
1	Issued for coordination	15.02.2022

wd architects
environmentally sustainable design
11B Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 870 791

GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATER
ADMINISTRATION BUILDING and COLA

PERSPECTIVES

Scale @ A3	
Date	21.01.22
Project No.	641
Drawn by	ML
Checked by	AW

A900 — 2 Revision

Room Schedule		
Number	Name	Area
1	CLASSROOM	100 m²
2	CLASSROOM	85 m²
3	CLASSROOM	85 m²
4	CLASSROOM	85 m²
5	STOREROOM	7 m²
6	STOREROOM	7 m²
7	STORAGE	2 m²
8	STORAGE	2 m²
9	CLEANERS	2 m²
10	UNISEX TOILETS	16 m²
11	PWD TOILET	7 m²
12	STOREROOM	4 m²
13	COVERED AREA	179 m²
14	WITHDRAWAL ROOM	15 m²
Grand total: 14		596 m²

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
2	Issued for approval	01.03.2022
1	Issued for coordination	15.02.2022

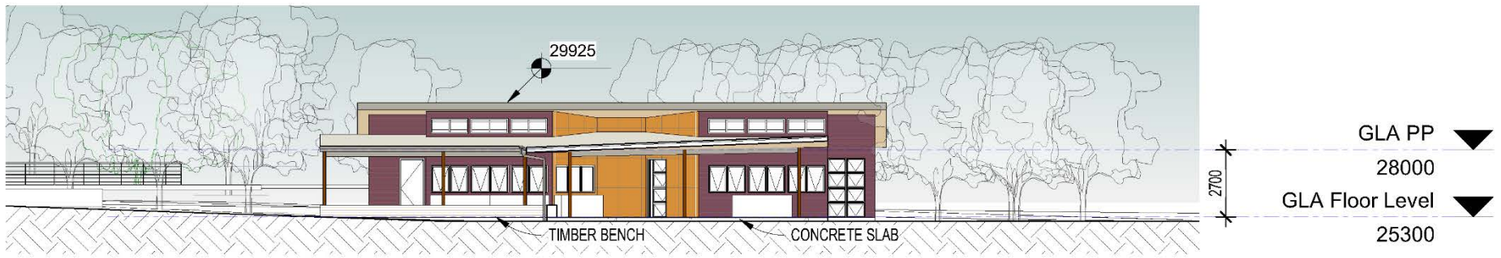
wd architects
environmentally sustainable design
11B Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 870 791

GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATER
CLASSROOM BUILDINGS

FLOOR PLAN

Scale @ A3	1 : 200
Date	07.02.22
Project No.	641
Drawn by	AW
Checked by	AW

A300 — 2 Revision

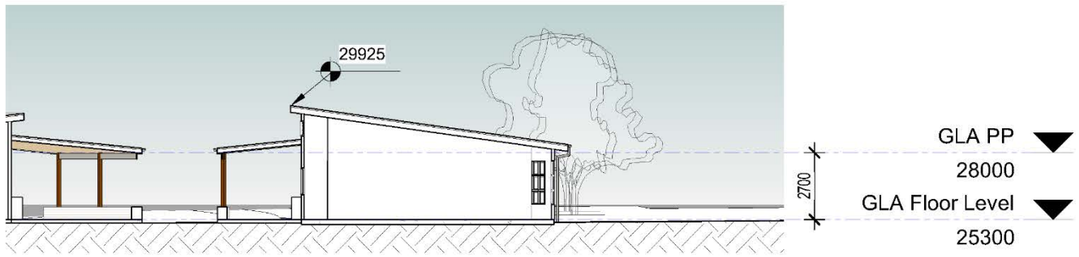


Section 1

1 : 200

Section 2

1 : 200



Section 3

1 : 200

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
2	Issued for approval	01.03.2022
1	Issued for coordination	15.02.2022

wd architects
environmentally sustainable design
11B Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 870 791

GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATER
CLASSROOM BUILDINGS

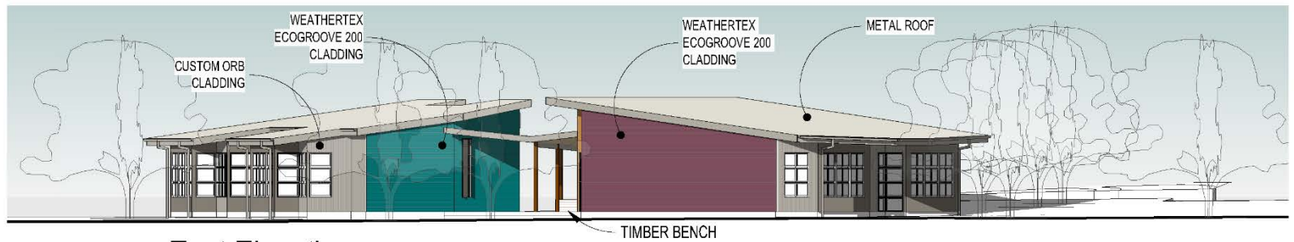
SECTIONS

Scale @ A3	1 : 200
Date	07.02.22
Project No.	641
Drawn by	ML
Checked by	AW

A400 — 2 Revision

North Elevation

1 : 200

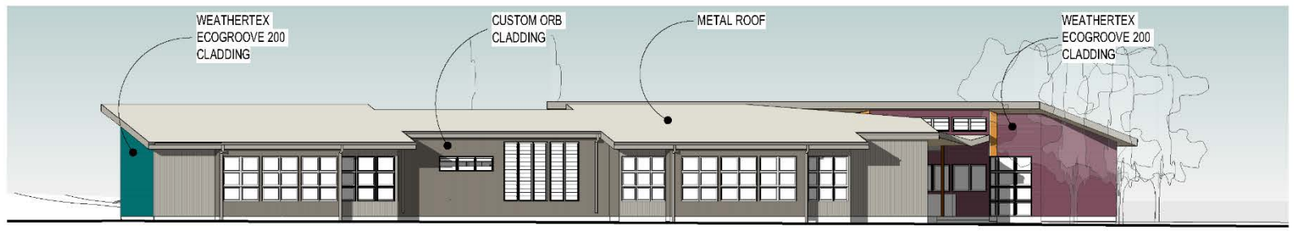


East Elevation

1 : 200

West Elevation

1 : 200



South Elevation

1 : 200

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
2	Issued for approval	01.03.2022
1	Issued for coordination	15.02.2022

wd architects
environmentally sustainable design
11B Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 870 791

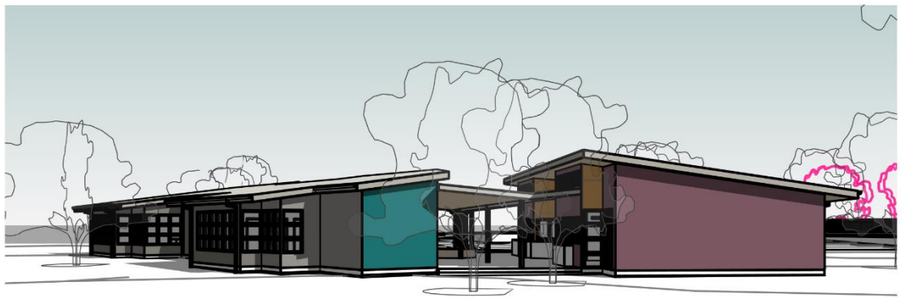
GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATER
CLASSROOM BUILDINGS

ELEVATIONS

Scale @ A3	1 : 200
Date	07.02.22
Project No.	641
Drawn by	ML
Checked by	AW

A500 — 2 Revision

North View



South East View

North West View

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
2	Issued for approval	01.03.2022
1	Issued for coordination	15.02.2022

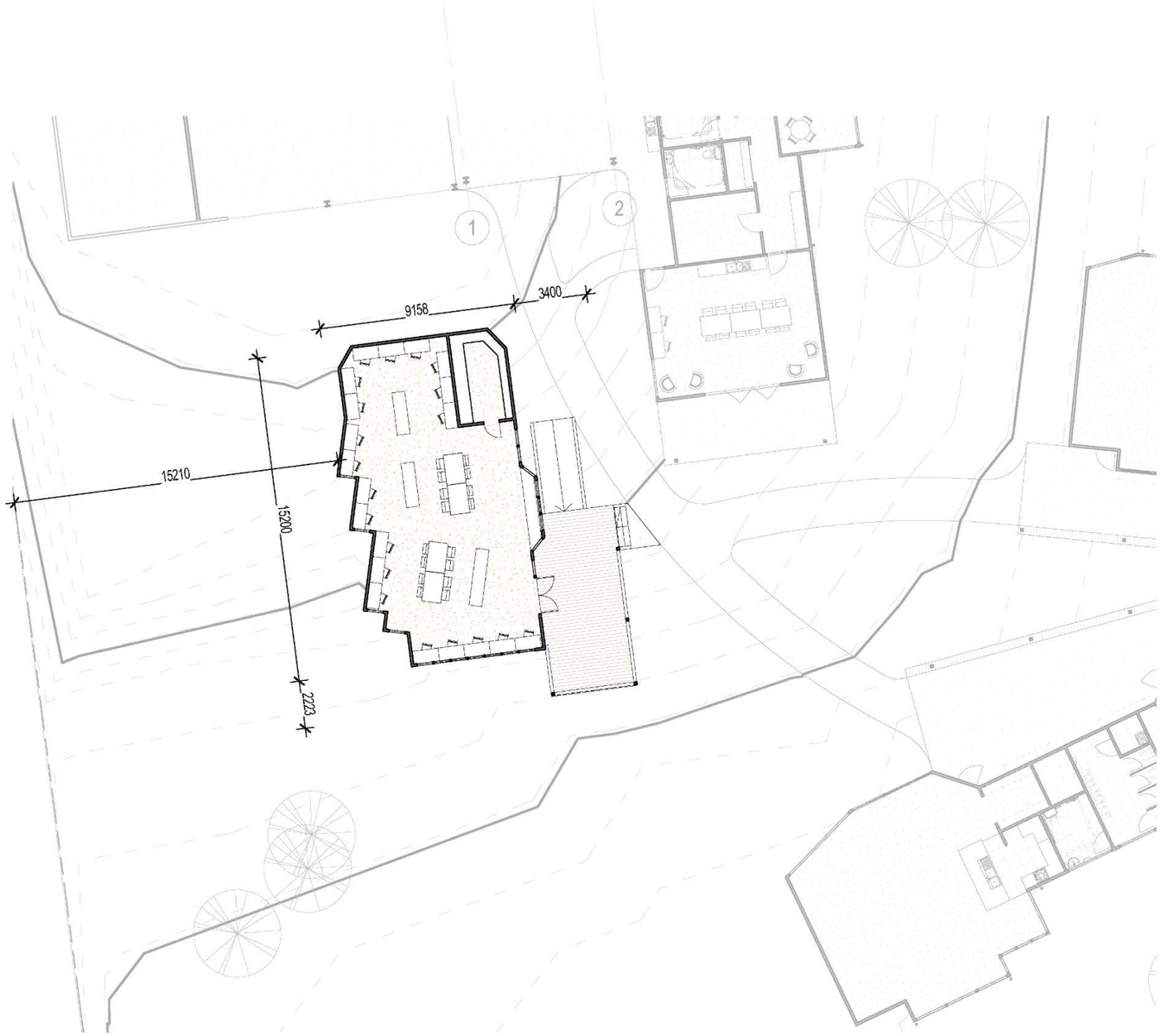
wd architects
environmentally sustainable design
11B Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 870 791

GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATER
CLASSROOM BUILDINGS

PERSPECTIVES

A900 | 2 Revision

Scale @ A3	
Date	07.02.22
Project No.	641
Drawn by	ML
Checked by	AW



Room Schedule		
Number	Name	Area
04	STOREROOM	10 m²
05	LIBRARY	103 m²
06	VERANDAH	33 m²
Grand total: 3		147 m²

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
1	Issued for approval	01.03.2022

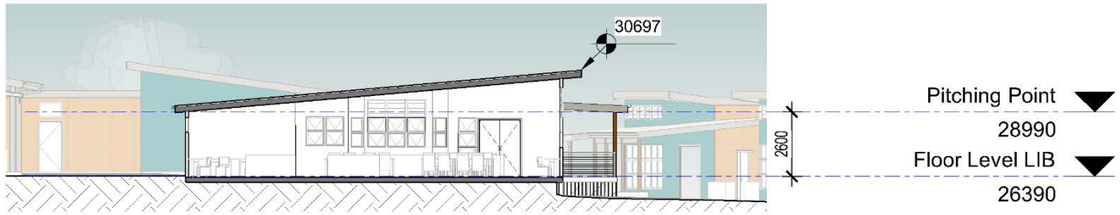
wd architects
11B Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 870 791

GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATER
PROPOSED LIBRARY/RESOURCE CENTRE

FLOOR PLAN

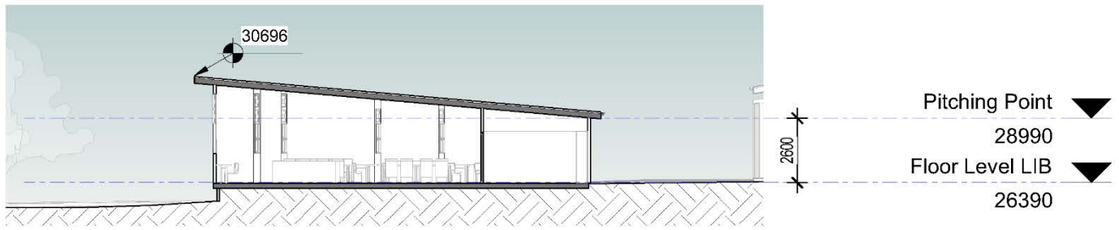
Scale @ A3	1 : 200
Date	07.02.22
Project No.	641
Drawn by	SP
Checked by	AW

A300 — 1 Revision



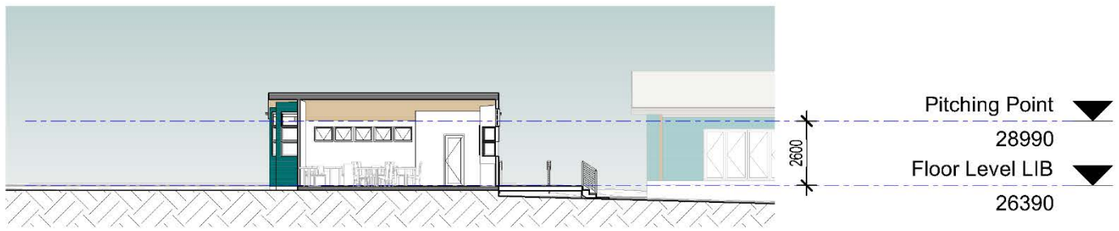
Section 1

1 : 200



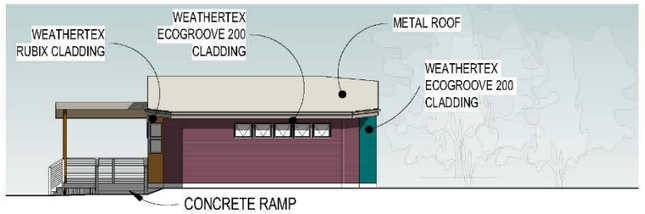
Section 2

1 : 200



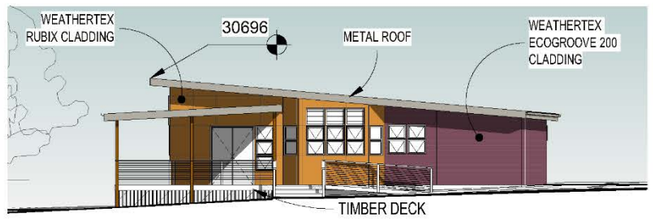
Section 3

1 : 200



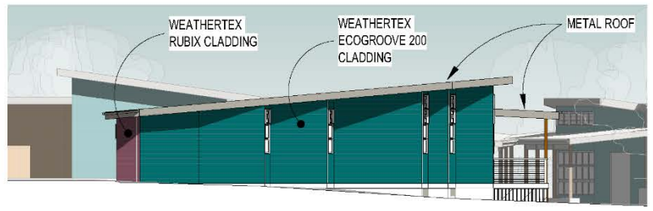
North Elevation

1 : 200



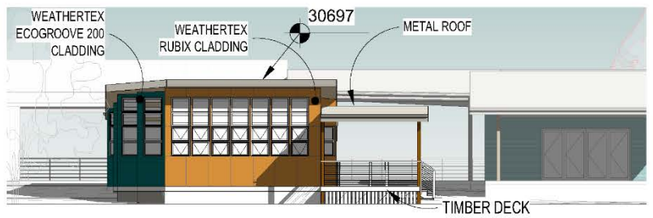
East Elevation

1 : 200



West Elevation

1 : 200



South Elevation

1 : 200

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
1	Issued for approval	01.03.2022

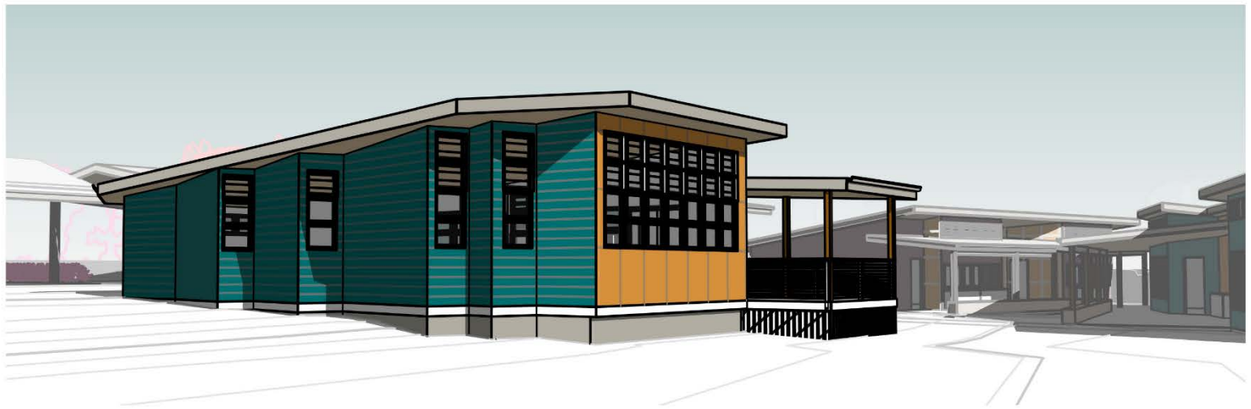
wd architects
environmentally sustainable design
11B Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 870 791

GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATER
PROPOSED LIBRARY/RESOURCE CENTRE

ELEVATIONS AND SECTIONS

Scale @ A3	1 : 200
Date	07.02.22
Project No.	641
Drawn by	SP
Checked by	AW

A500 — 1 Revision



South View

East View

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
1	Issued for approval	01.03.2022

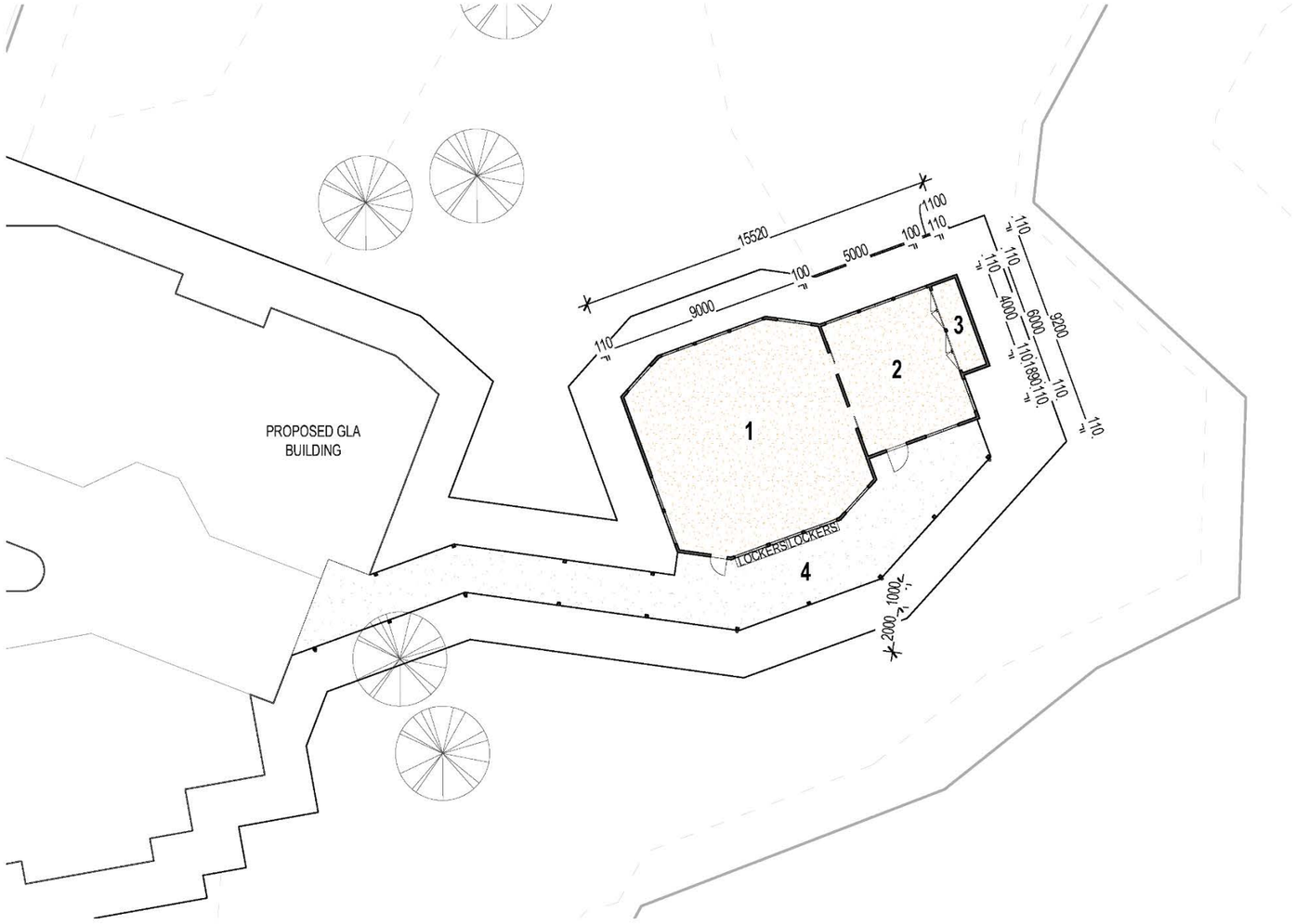
wd architects
environmentally sustainable design
11B Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 870 791

GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATER
PROPOSED LIBRARY/RESOURCE CENTRE

PERSPECTIVES

Scale @ A3	
Date	07.02.22
Project No.	641
Drawn by	SP
Checked by	AW

A900 — 1 Revision



Room Schedule		
Number	Name	Area
1	SPECIALTY CLASSROOM	78 m²
2	WORKSHOP	30 m²
3	STORAGE	4 m²
4	COVERED AREA	82 m²
Grand total: 4		195 m²

N

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
2	Issued for approval	01.03.2022
1	Issued for coordination	15.02.2022

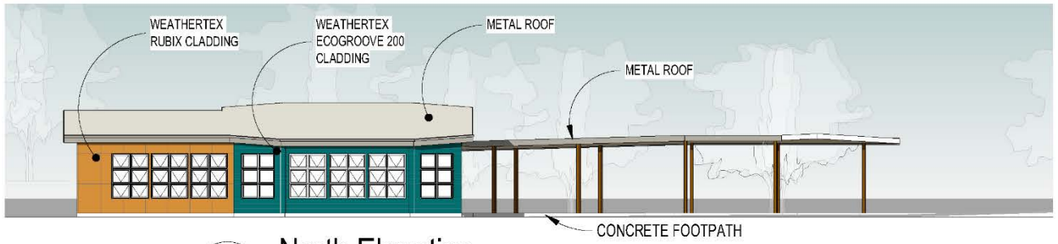
wd architects
environmentally sustainable design
11B Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 870 791

GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATER
SPECIALTY CLASSROOM and WORKSHOP

FLOOR PLAN

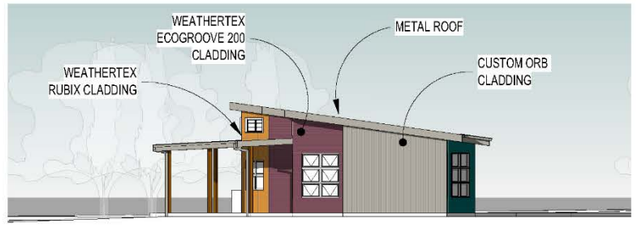
Scale @ A3	1 : 200
Date	07.02.22
Project No.	641
Drawn by	SP
Checked by	AW

A300 — 2 Revision



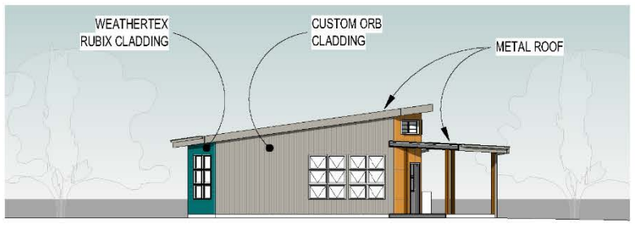
North Elevation

1 : 200



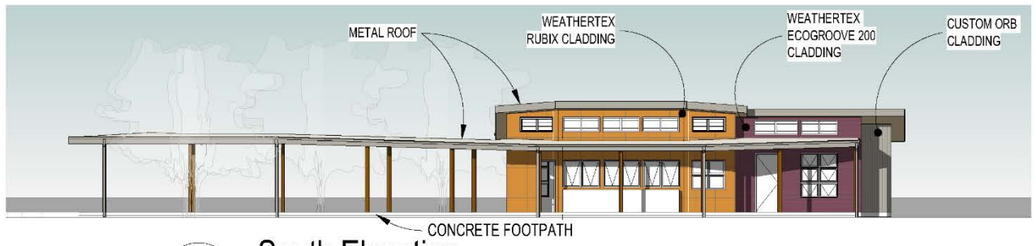
East Elevation

1 : 200



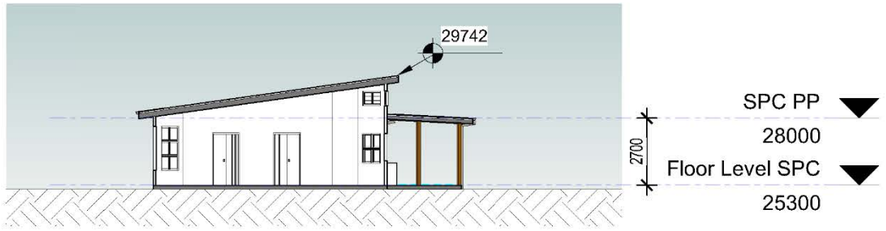
West Elevation

1 : 200



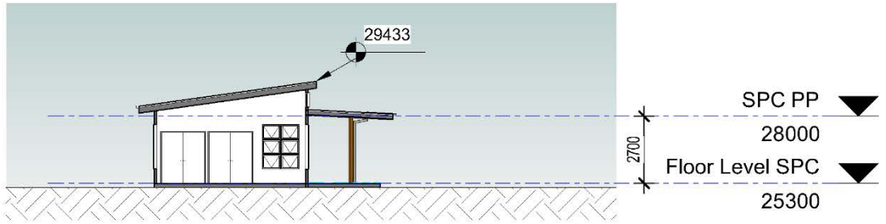
South Elevation

1 : 200



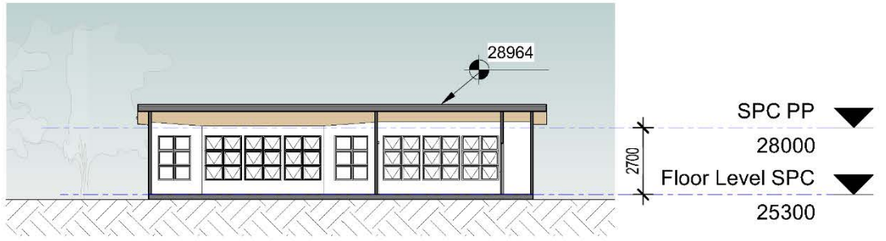
Section 1

1 : 200



Section 2

1 : 200



Section 3

1 : 200

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
2	Issued for approval	01.03.2022
1	Issued for coordination	15.02.2022

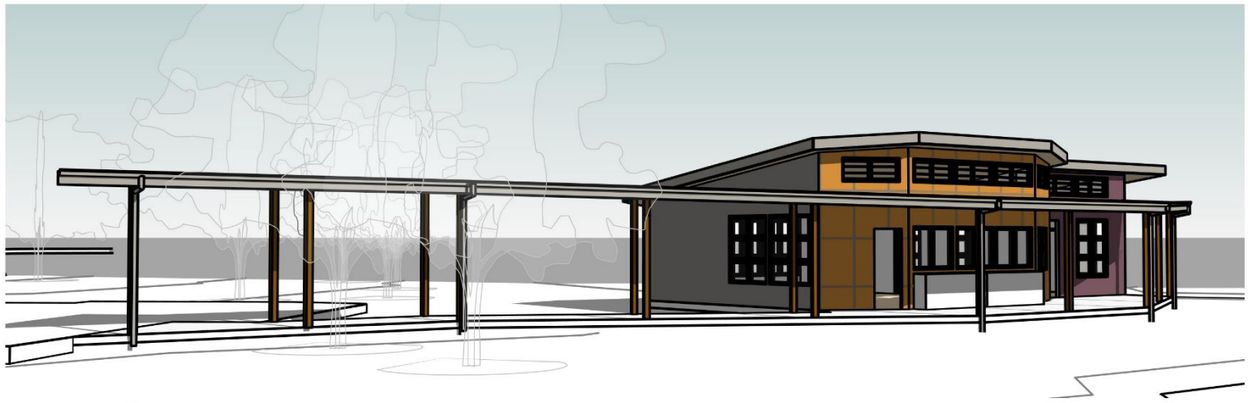
wd architects
environmentally sustainable design
11B Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 870 791

GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATER
SPECIALTY CLASSROOM and WORKSHOP

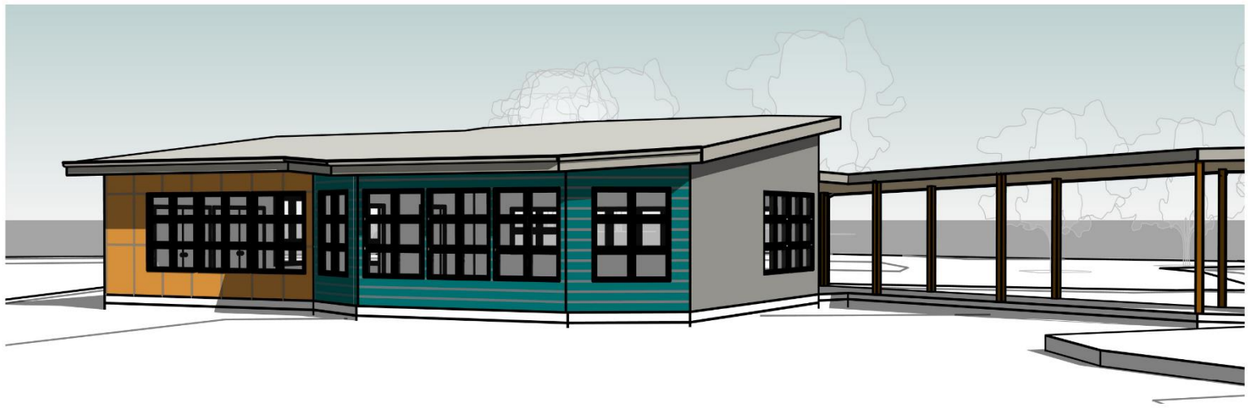
ELEVATIONS and SECTIONS

A500 | 2 Revision

Scale @ A3	1 : 200
Date	07.02.22
Project No.	641
Drawn by	SP
Checked by	AW



South West View



North West View

PRELIMINARY ONLY NOT FOR CONSTRUCTION

No.	Revision	Date
2	Issued for approval	01.03.2022
1	Issued for coordination	15.02.2022

wd architects
environmentally sustainable design
11B Garnet Street Cooroy QLD 4563
andrew@wdarchitects.com.au
www.wdarchitects.com.au 0448 870 791

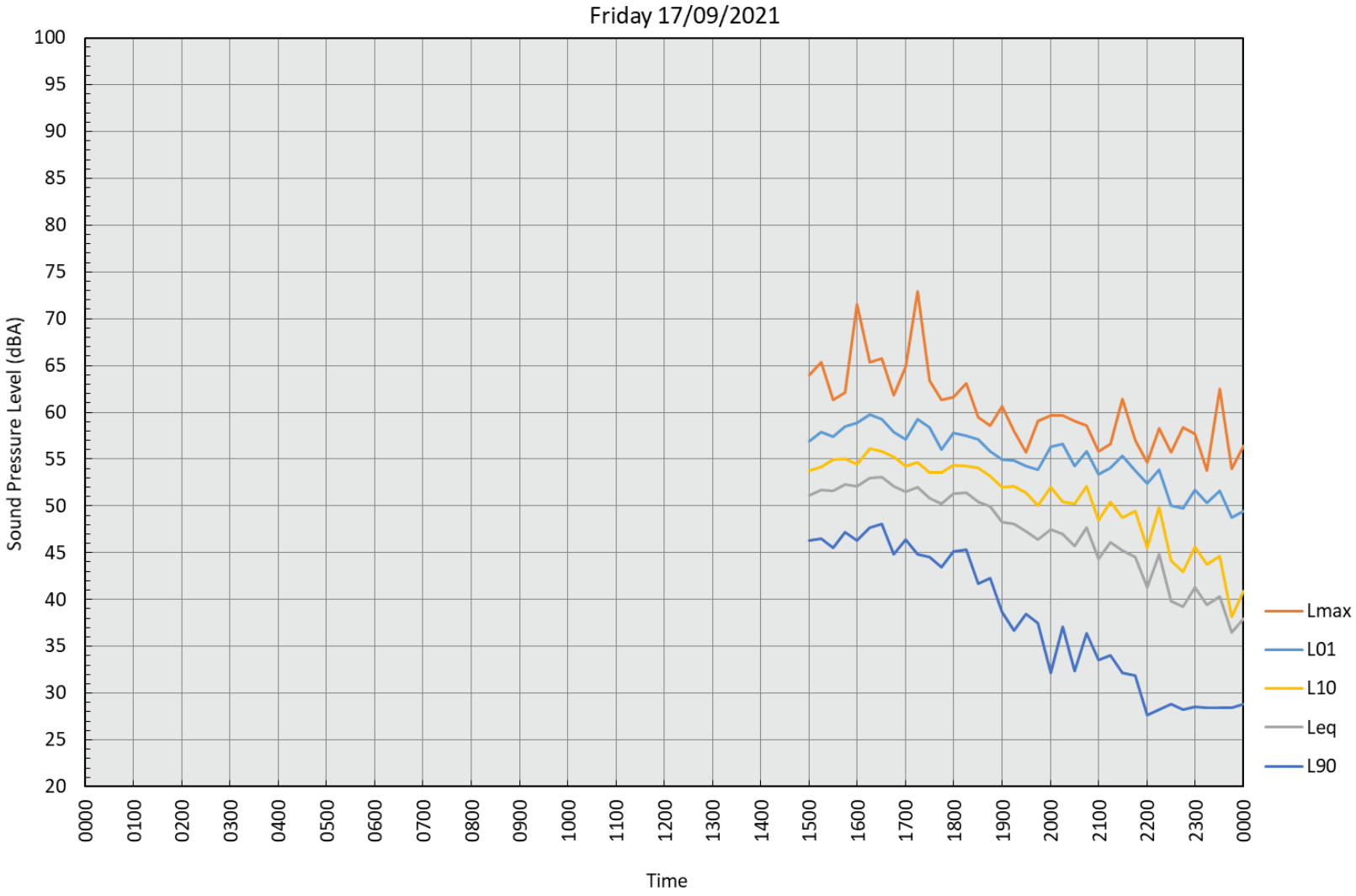
GOORA GAN STEINER SCHOOL
2744 ROUND HILL ROAD, AGNES WATER
SPECIALTY CLASSROOM and WORKSHOP

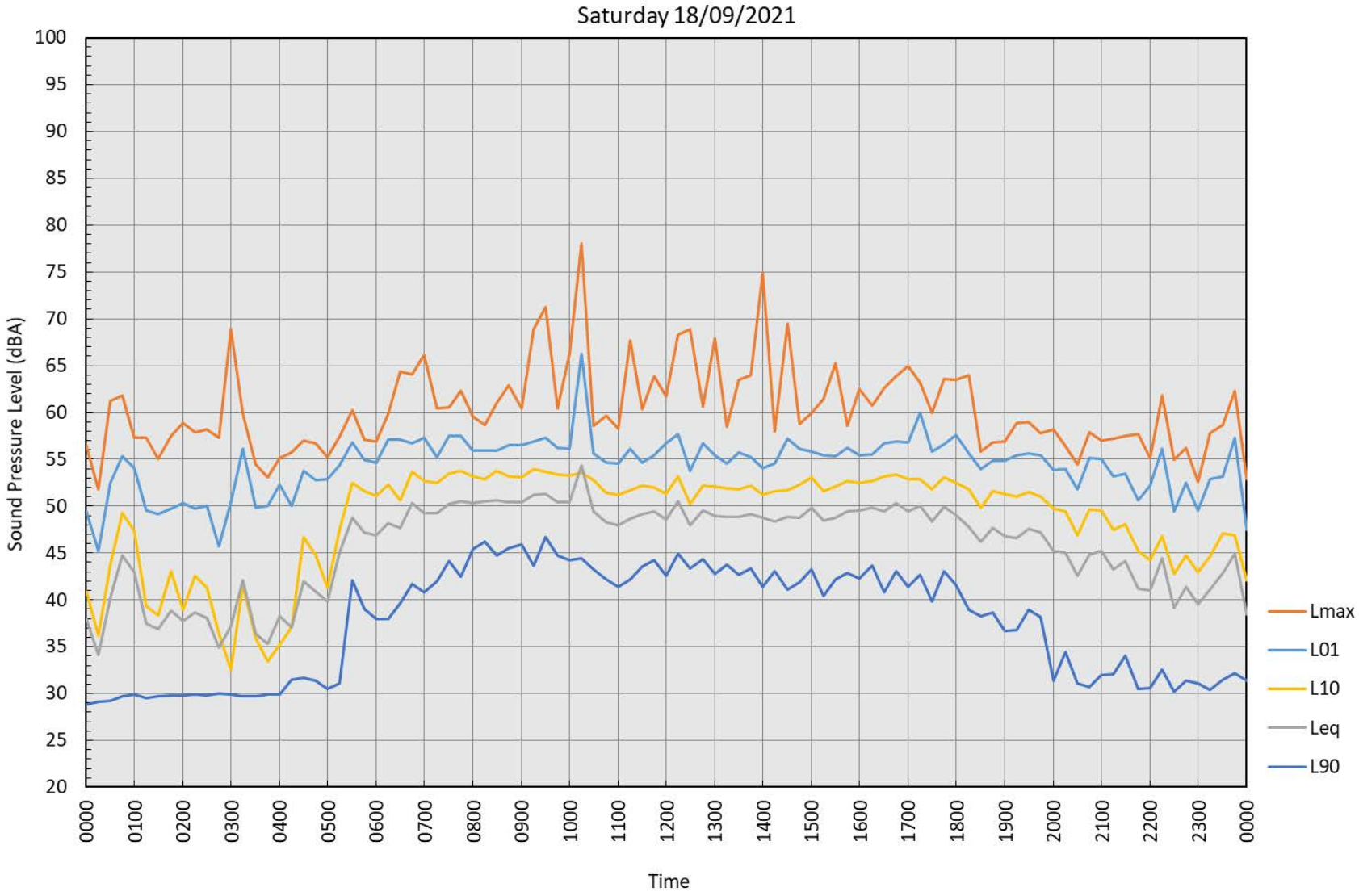
PERSPECTIVES

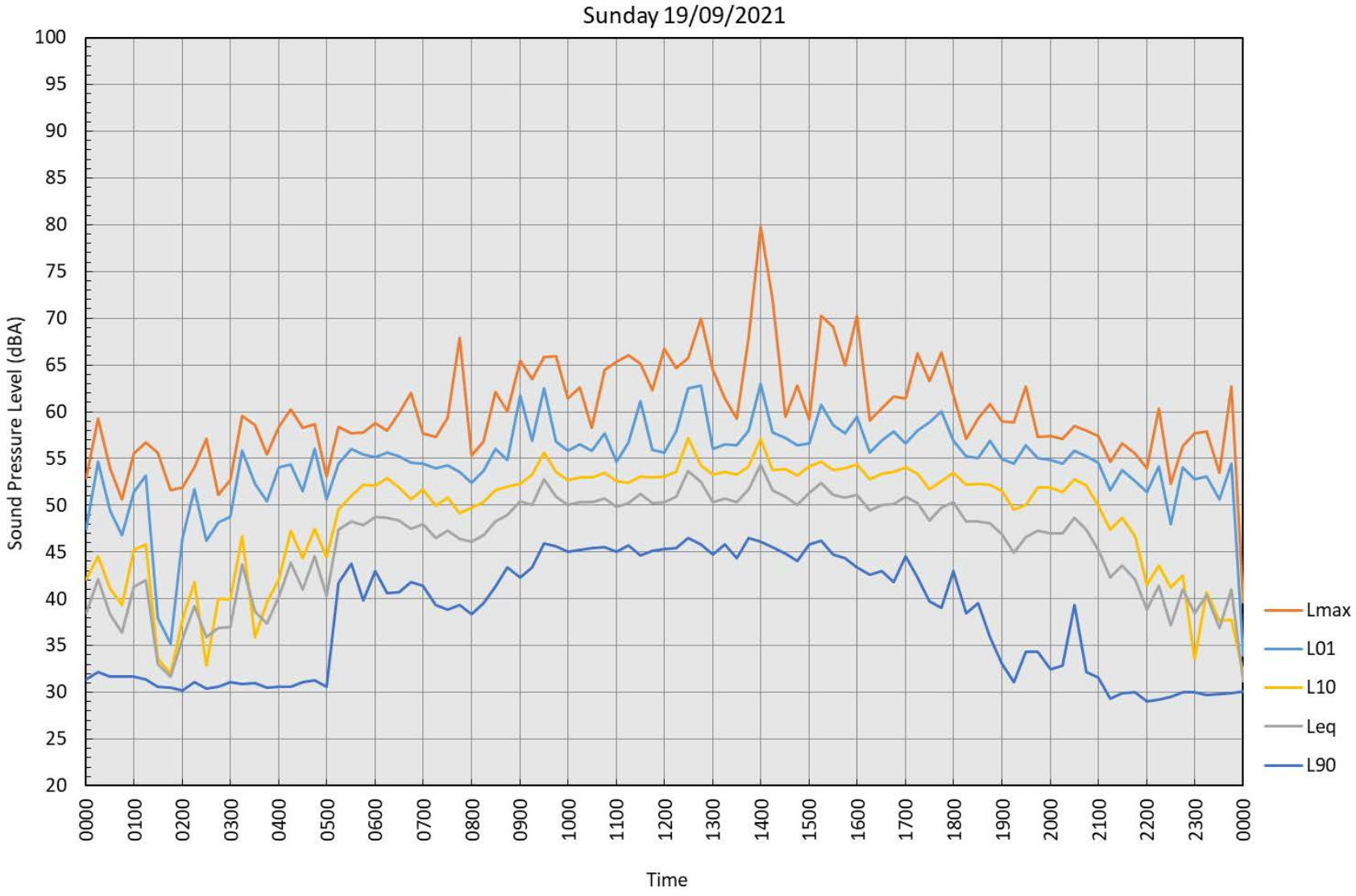
Scale @ A3	
Date	07.02.22
Project No.	641
Drawn by	SP
Checked by	AW

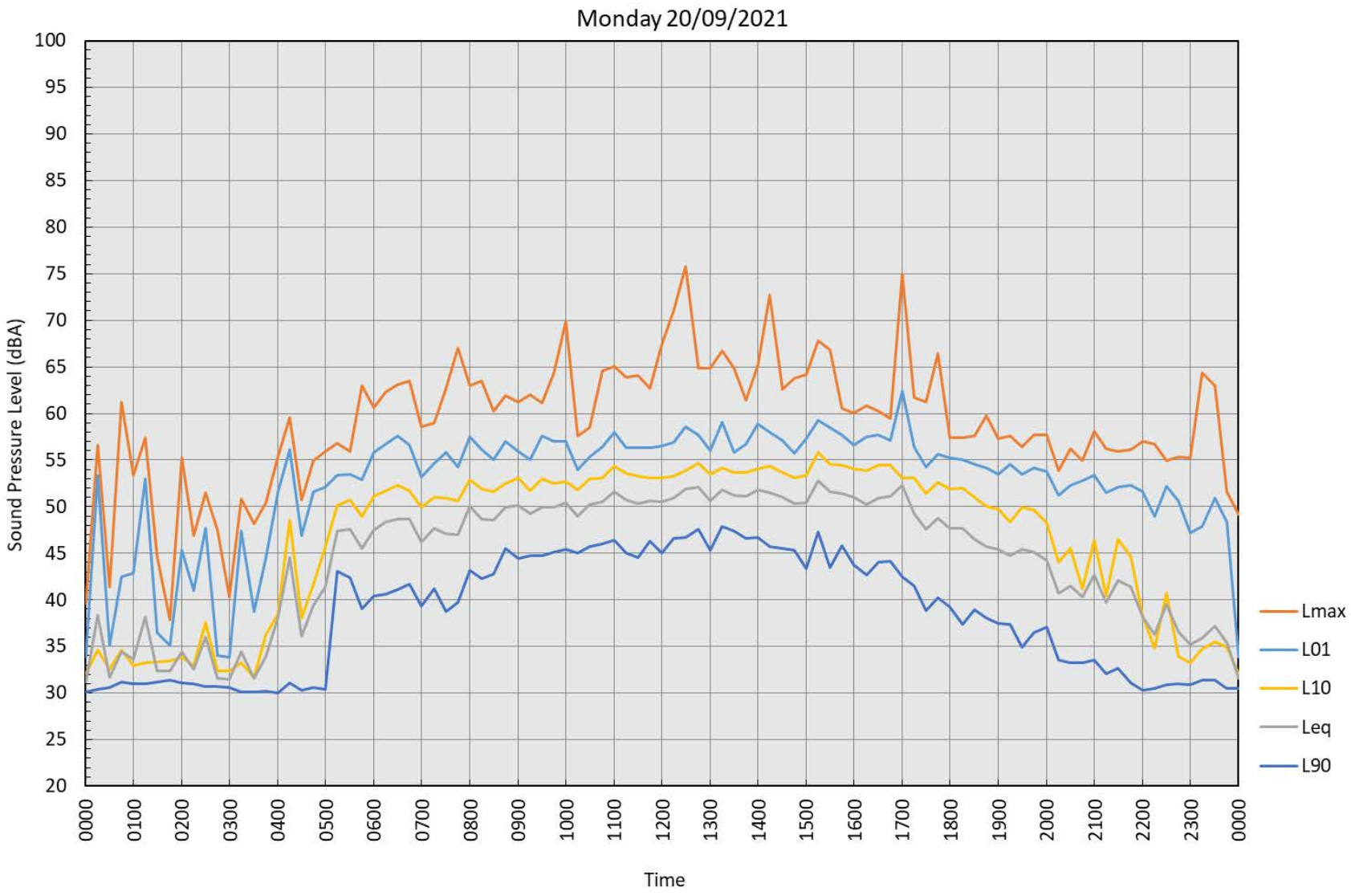
A900 — 2 Revision

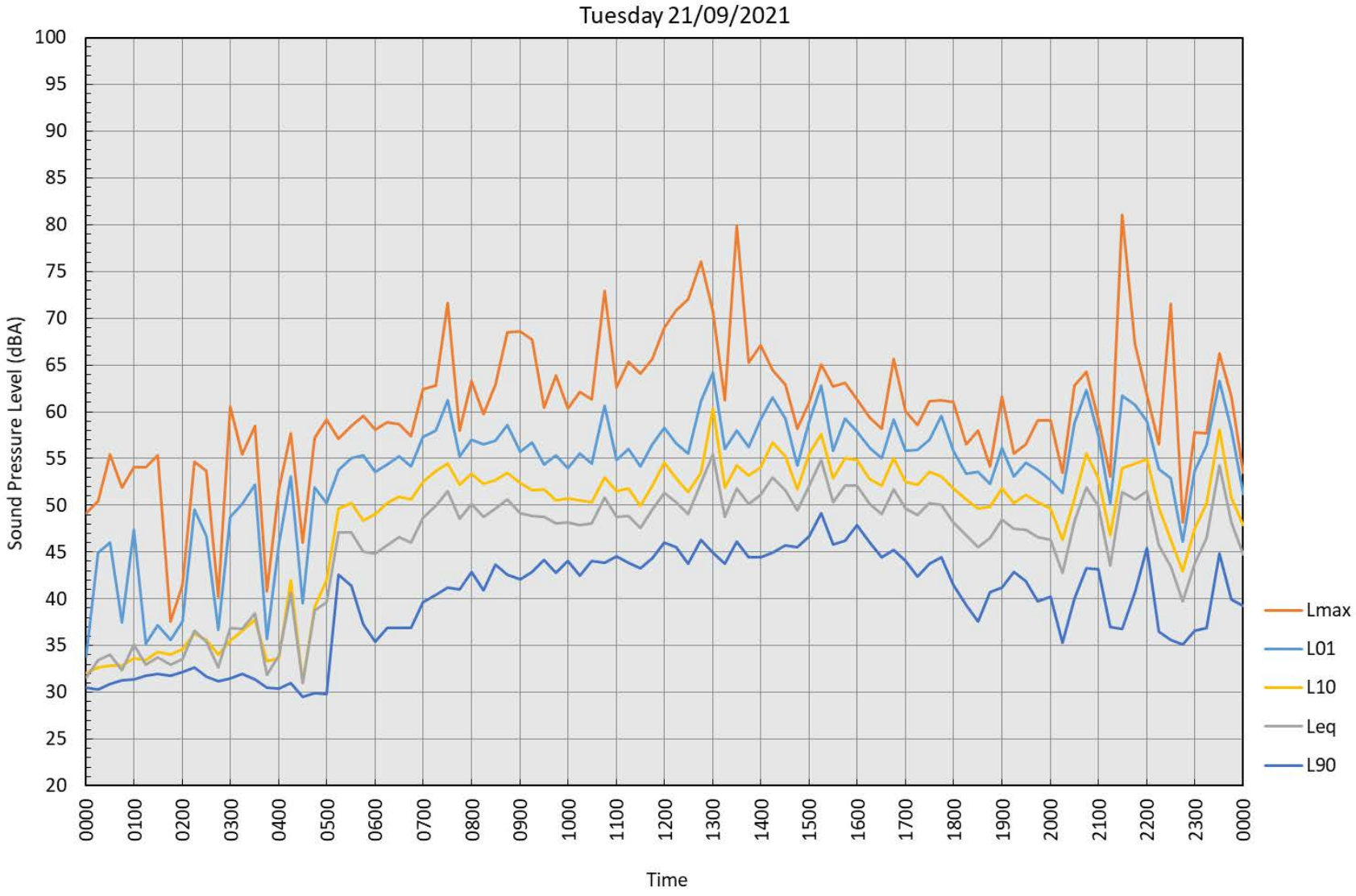
APPENDIX B: NOISE LOGGING RESULTS

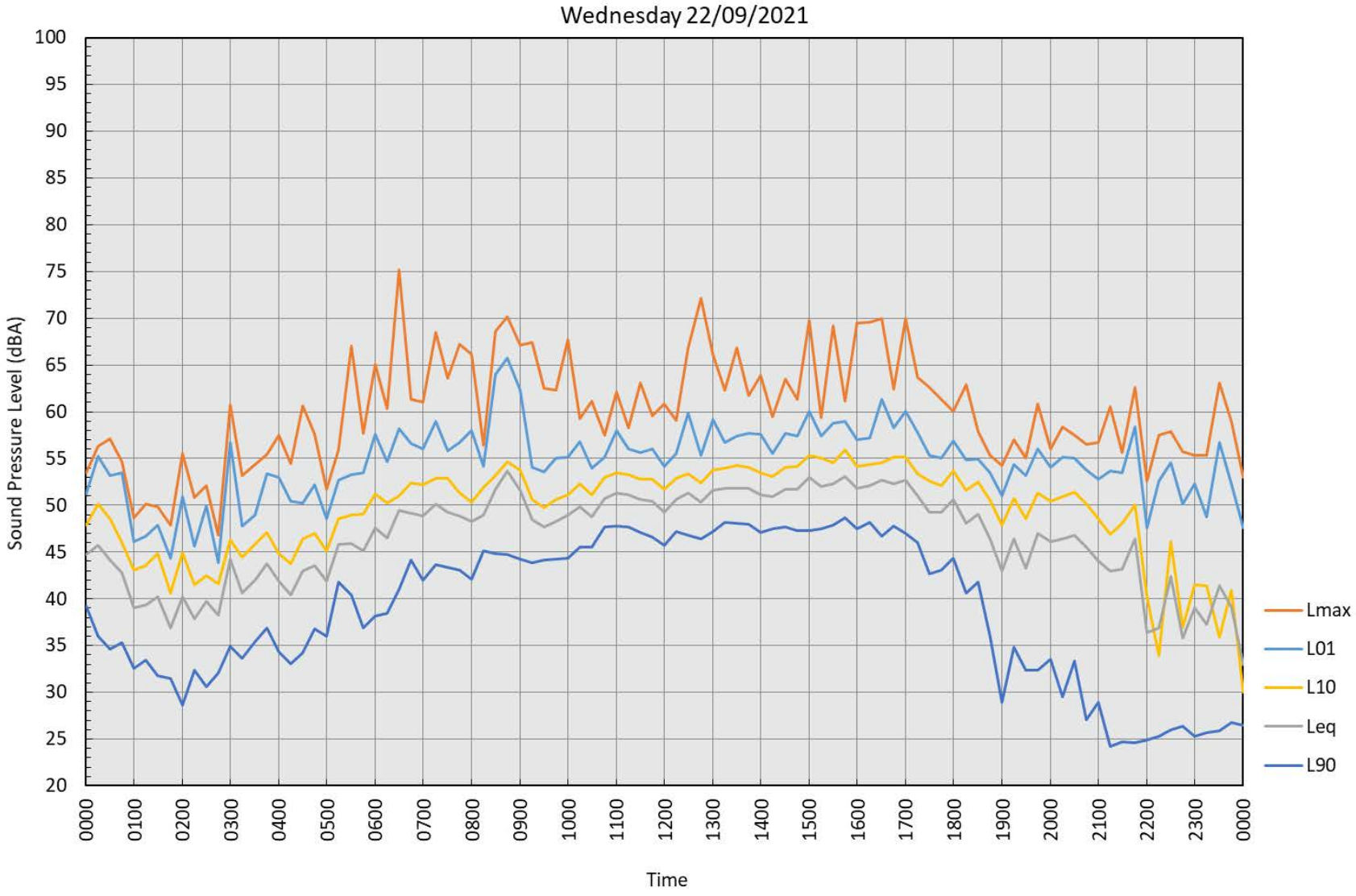


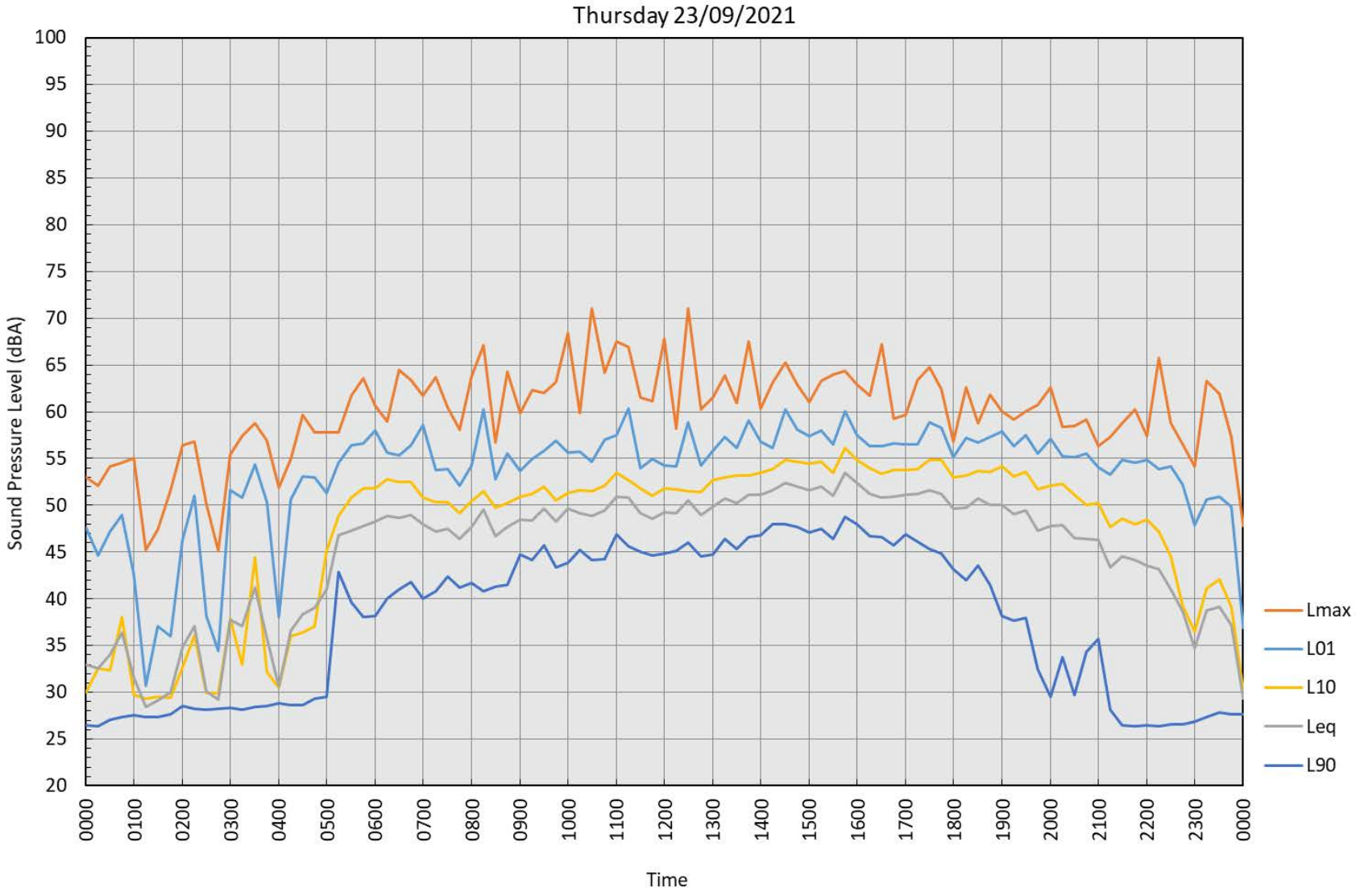


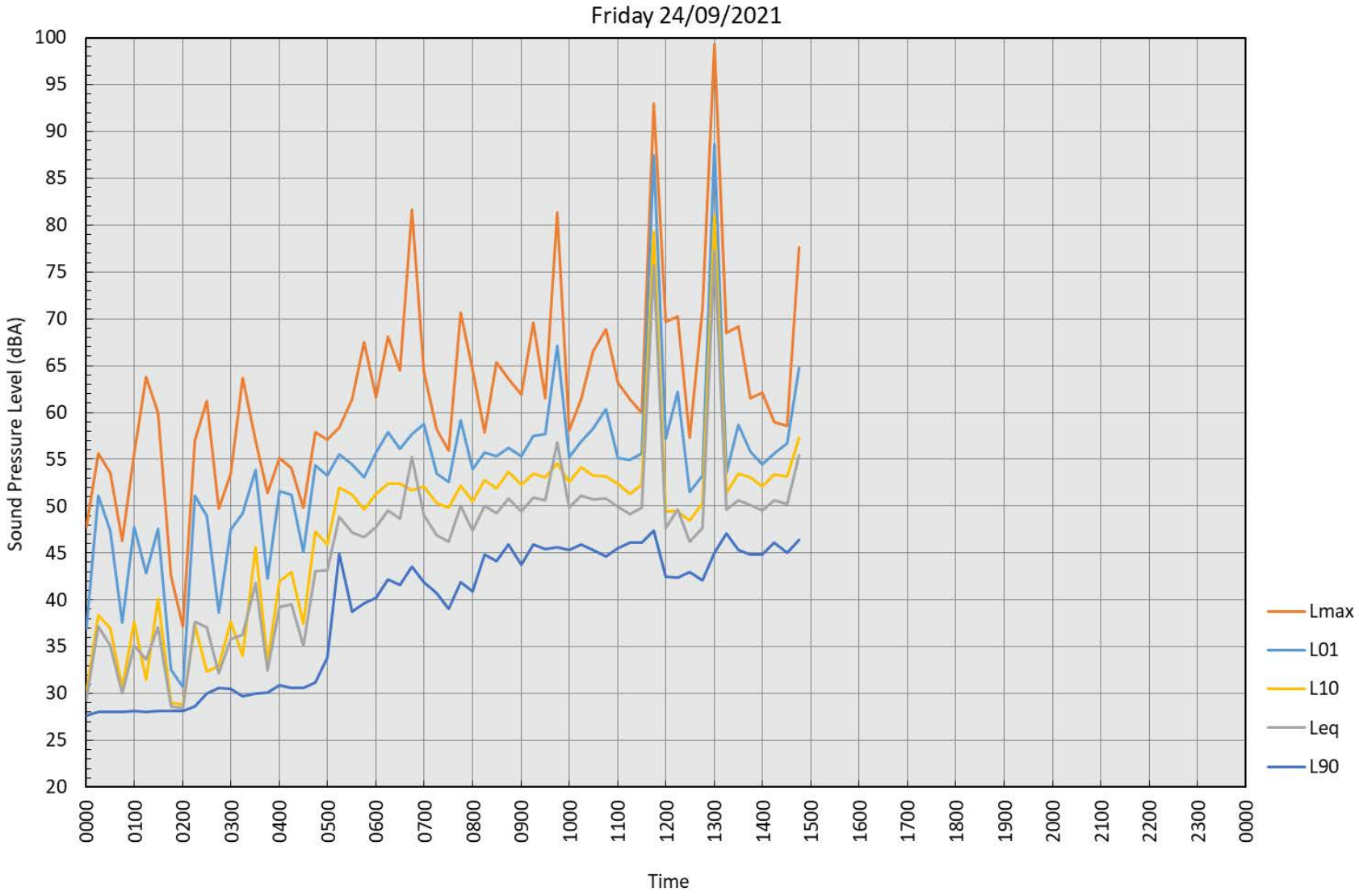




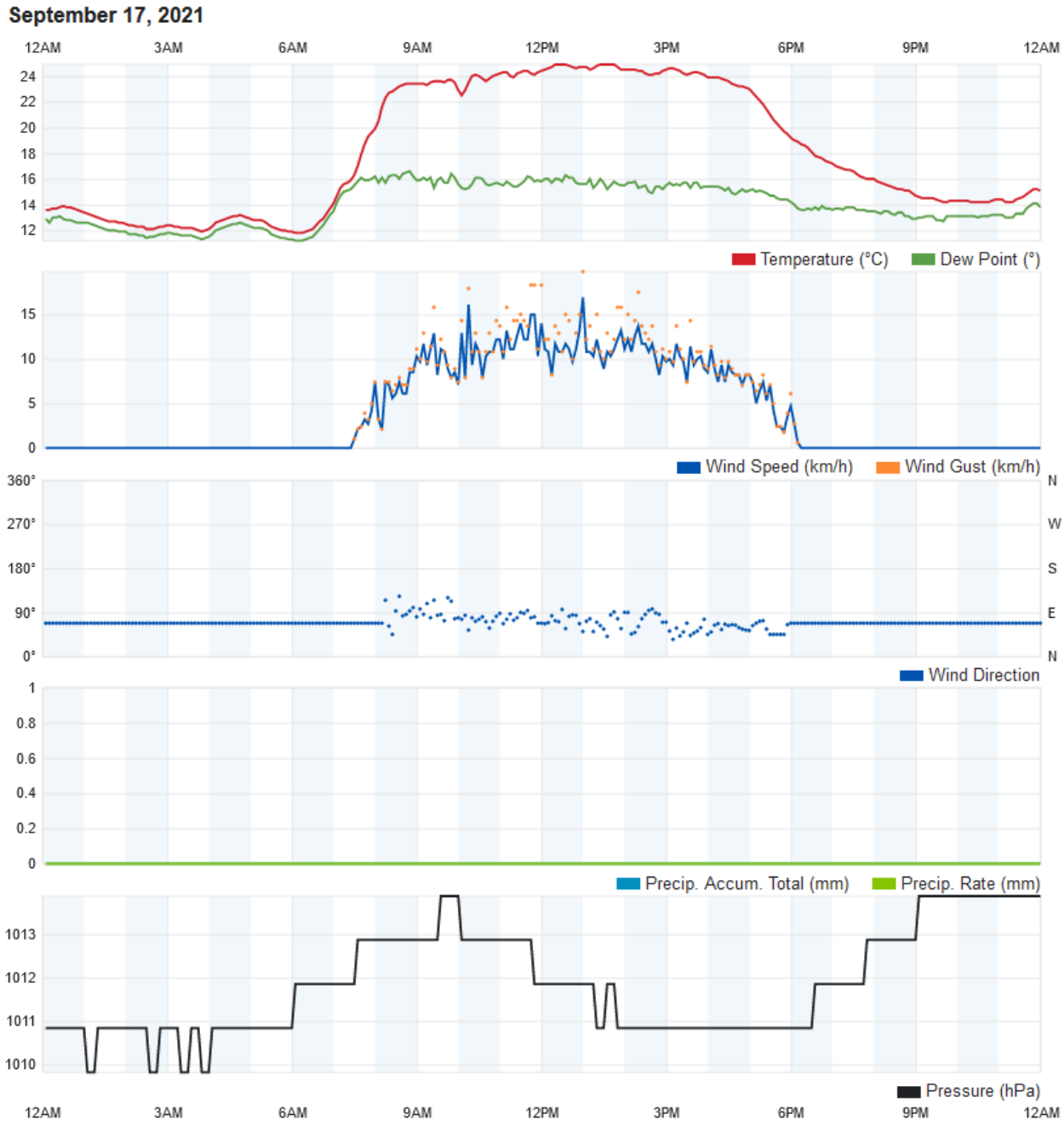


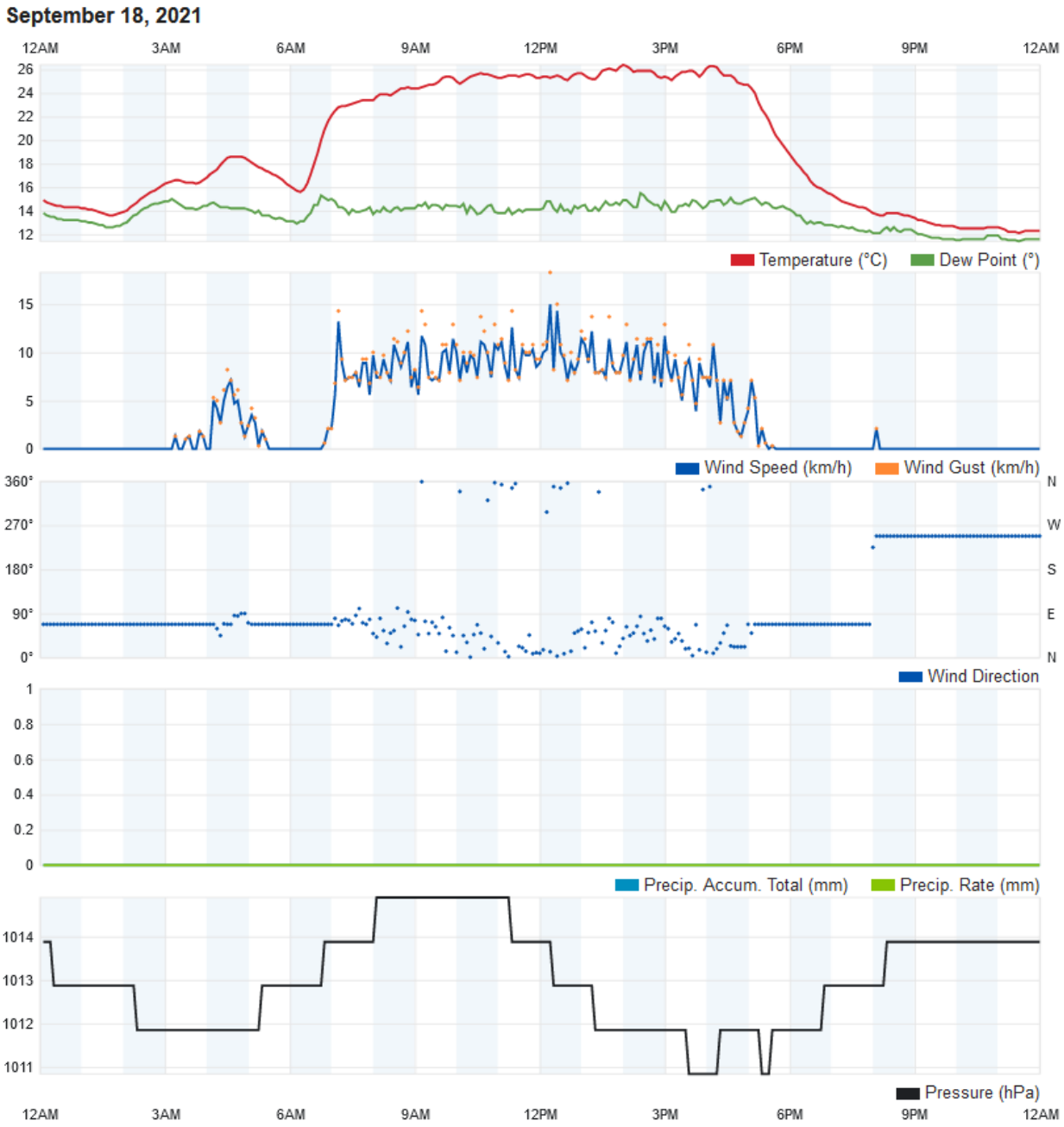


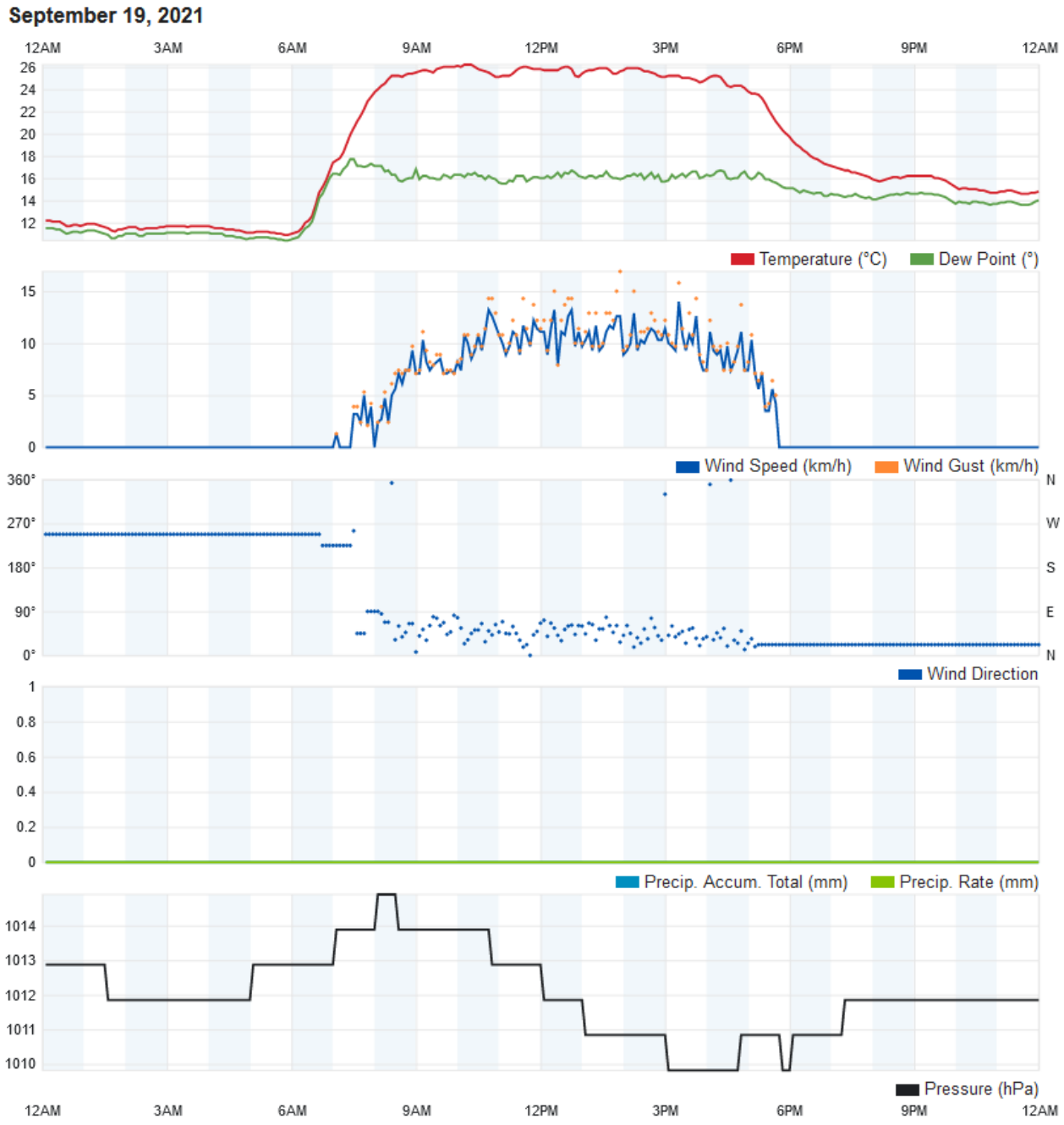


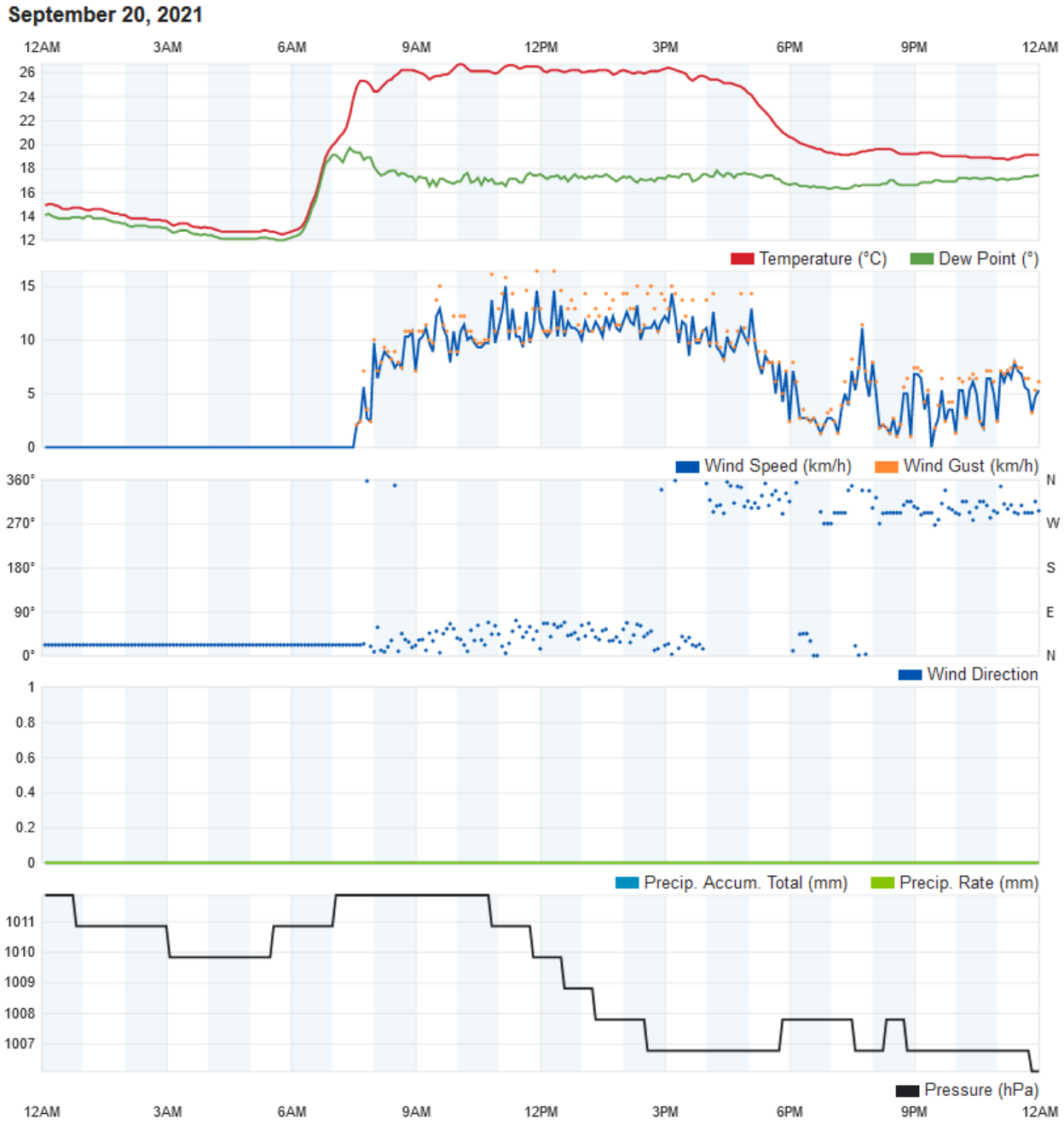


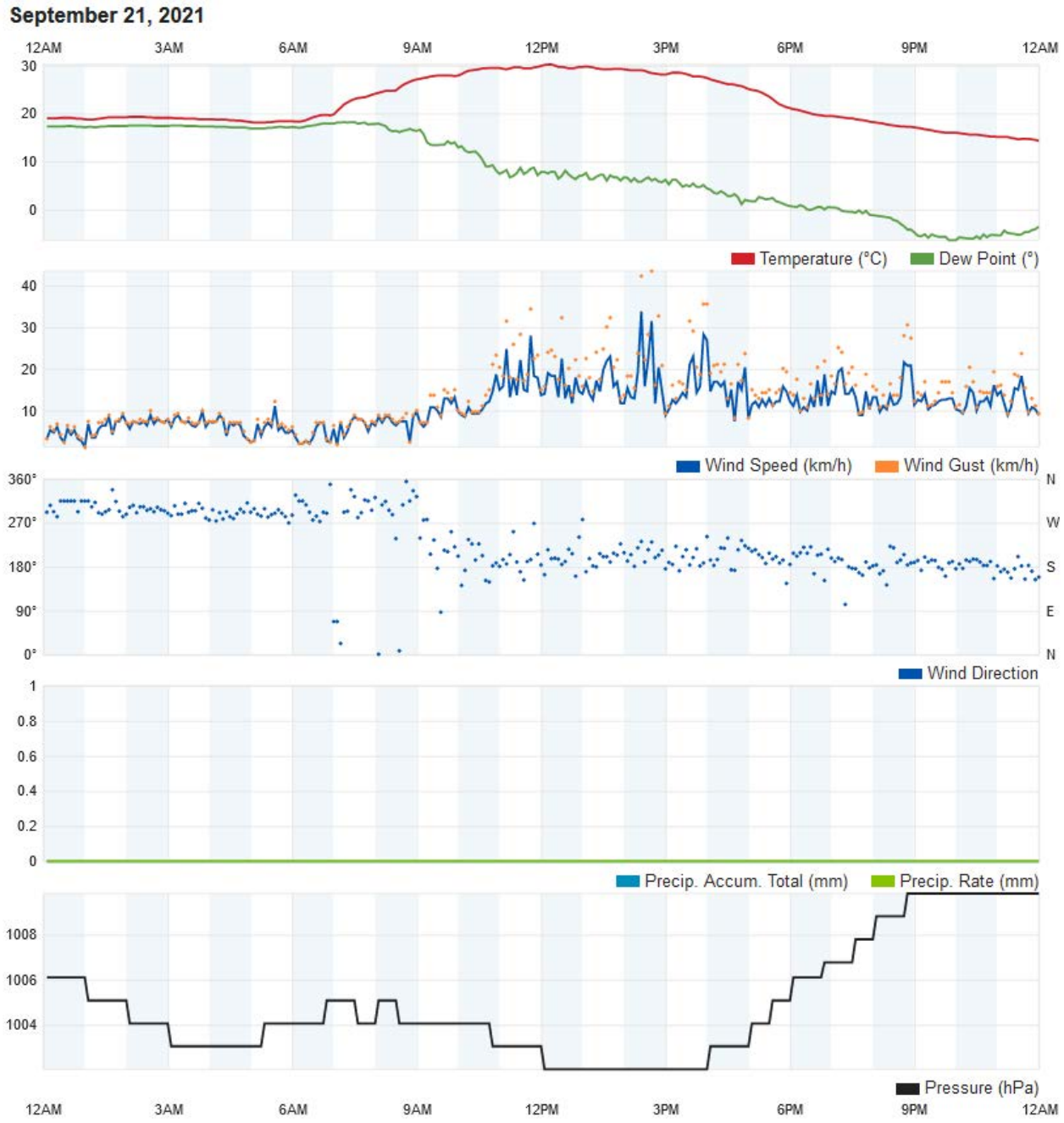
APPENDIX C: WEATHER DATA

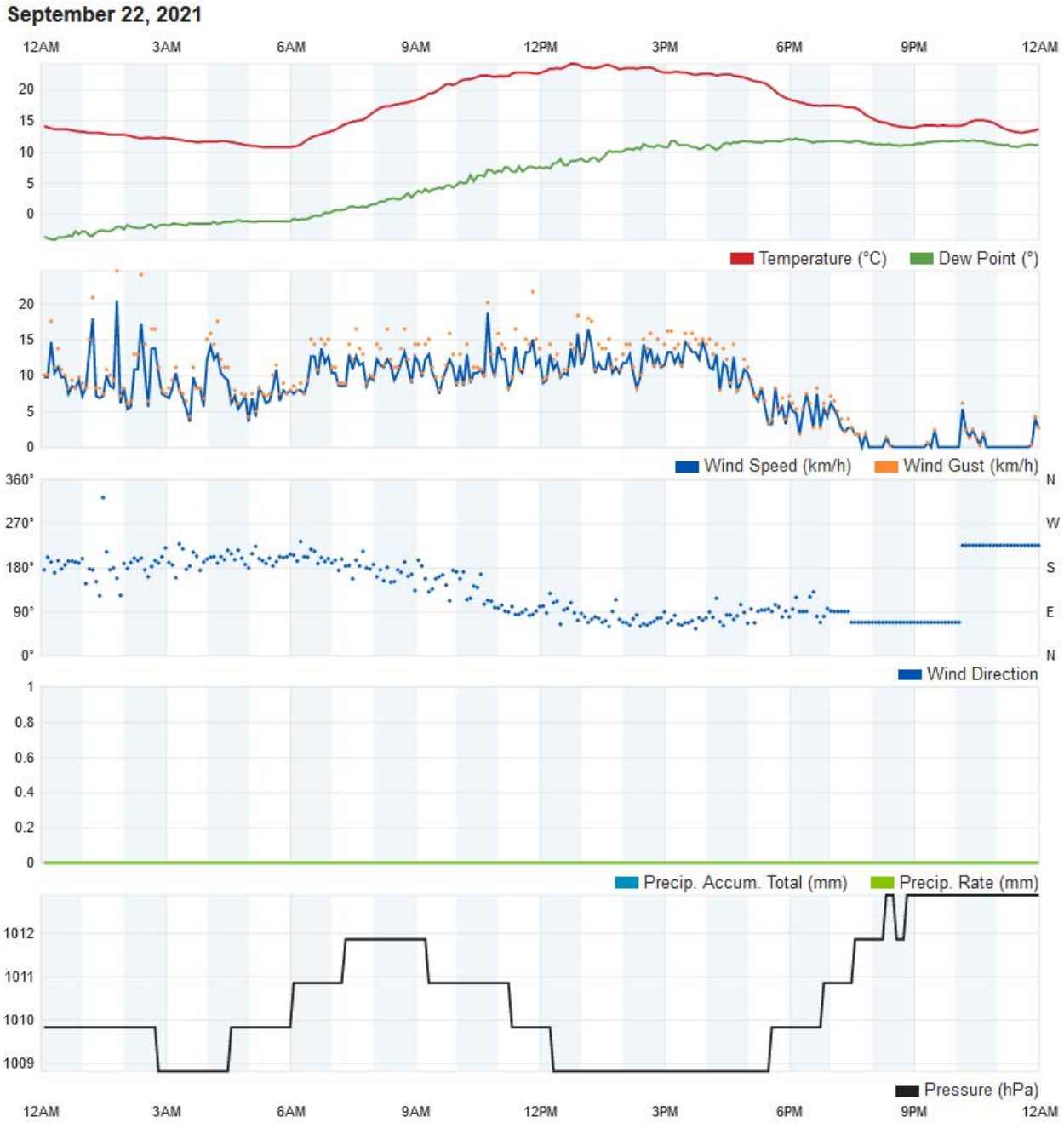


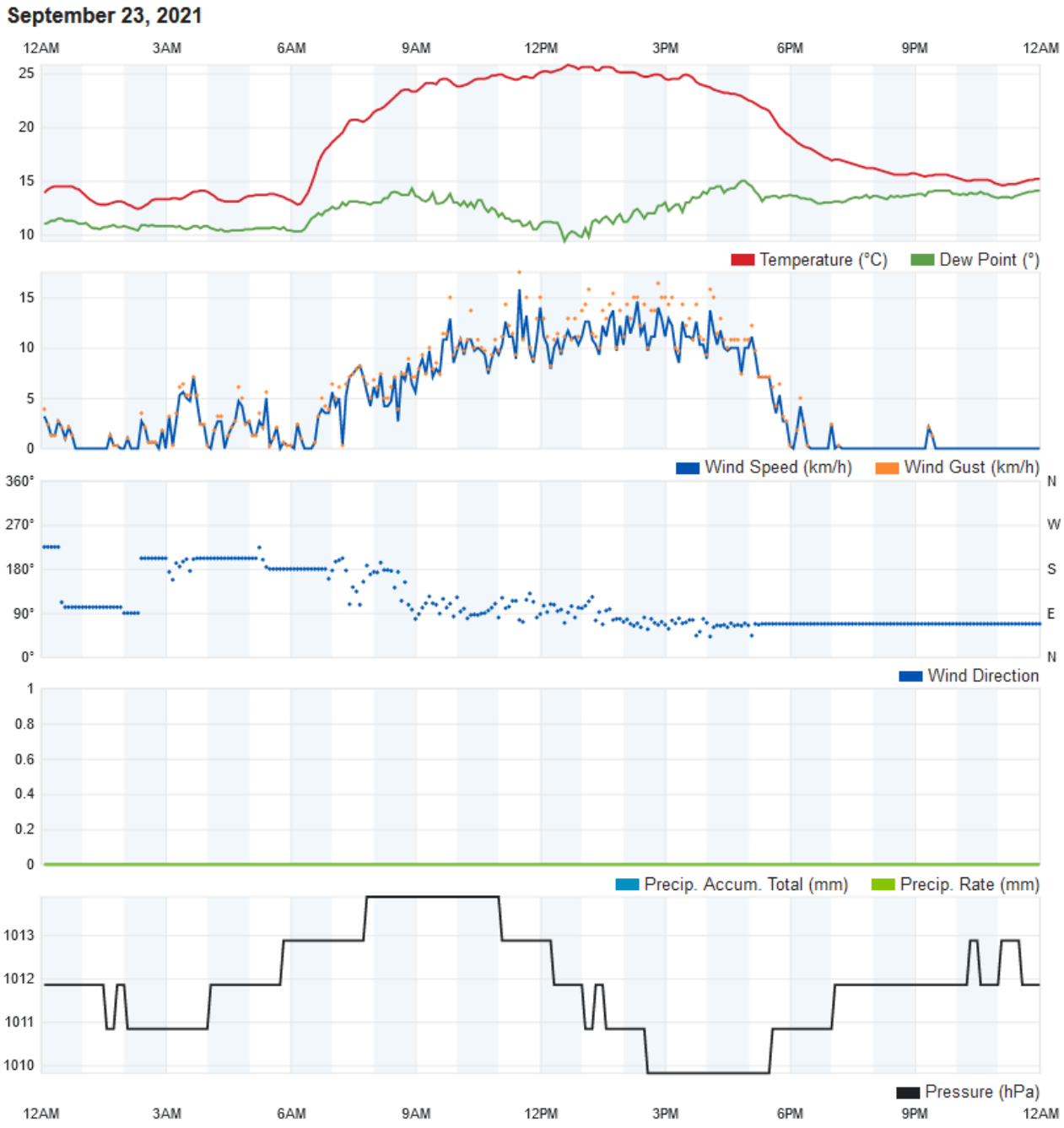


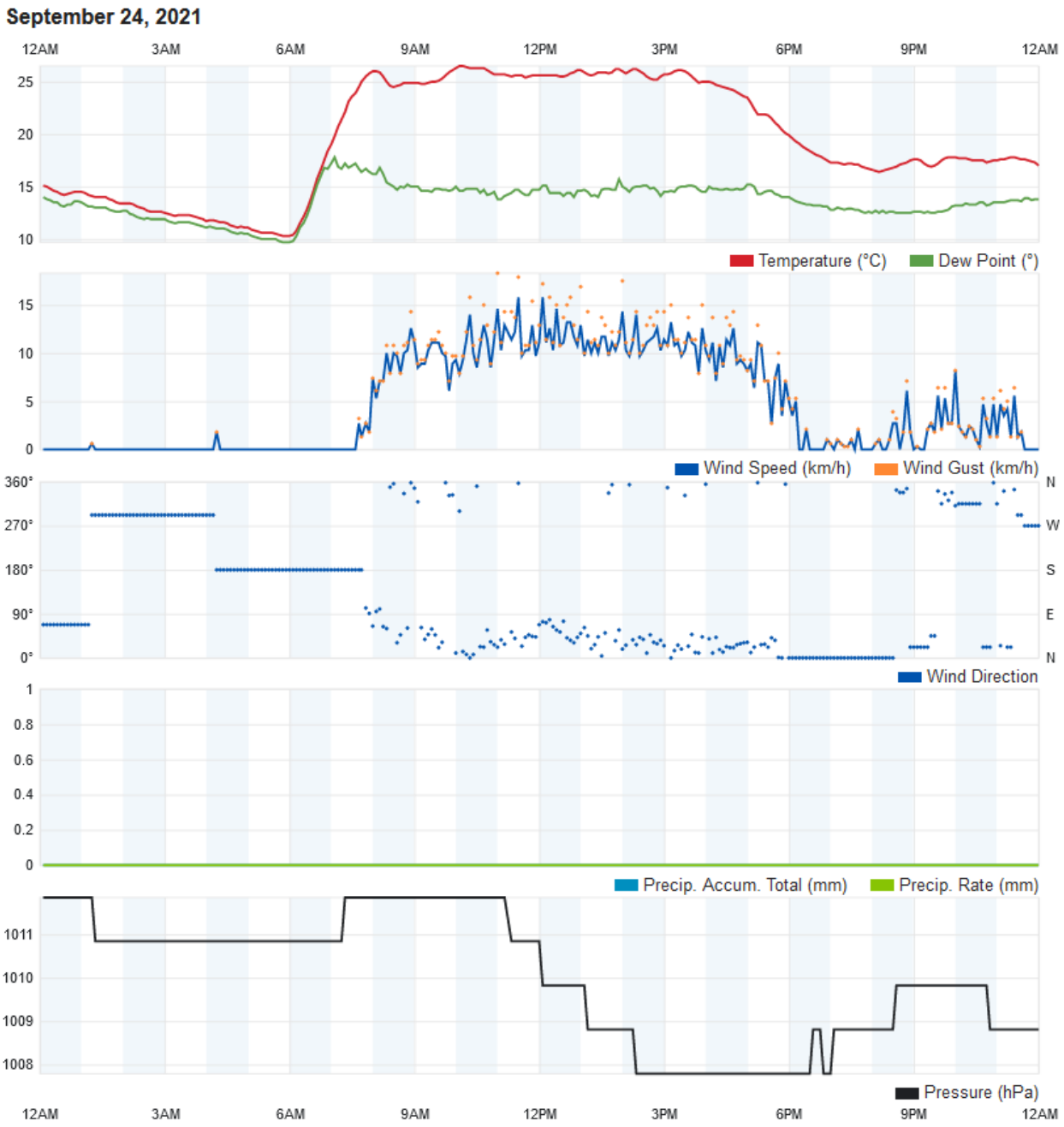












APPENDIX D: SOUNDPLAN RESULTS

Figure 7: L_{A90} noise emissions from the air-conditioning condensers for comparison against background creep limits

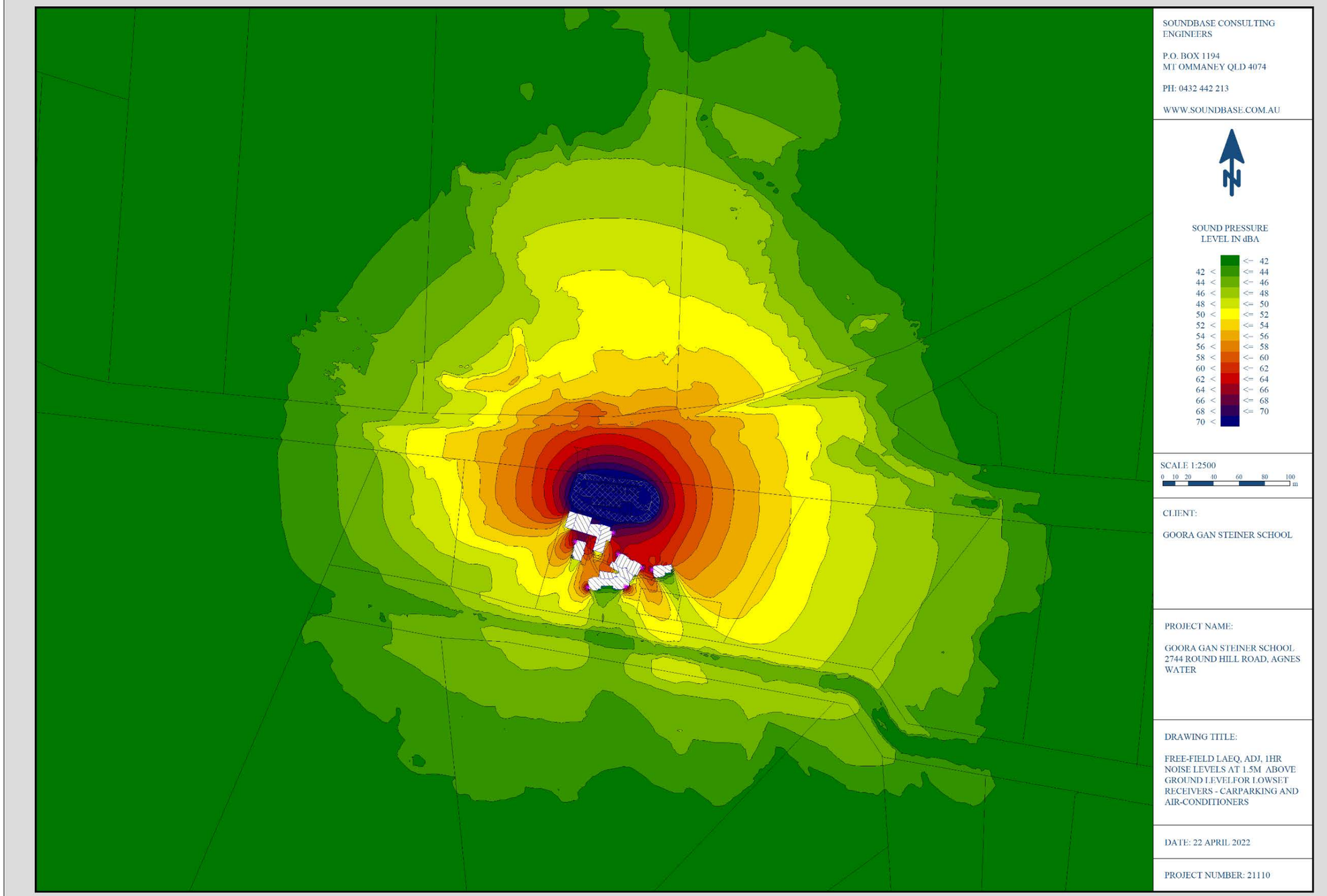


Figure 8: $L_{Aeq, adj, 1hr}$ noise emissions from carpark activities and air-conditioning condensers during the morning drop-off

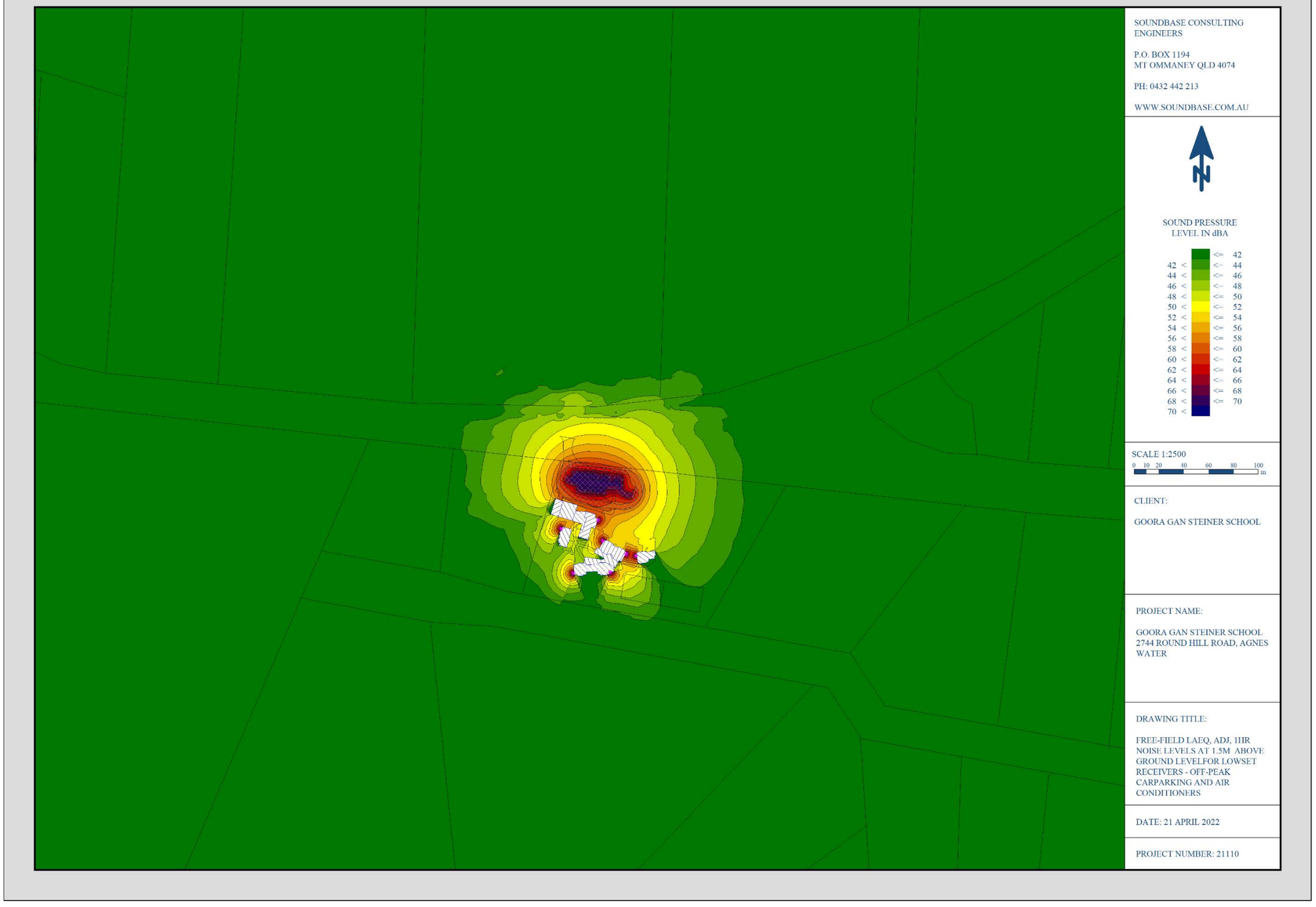


Figure 9: $L_{Aeq,\ adj,\ 1hr}$ noise emissions from off-peak use of the carpark and air-conditioning condensers

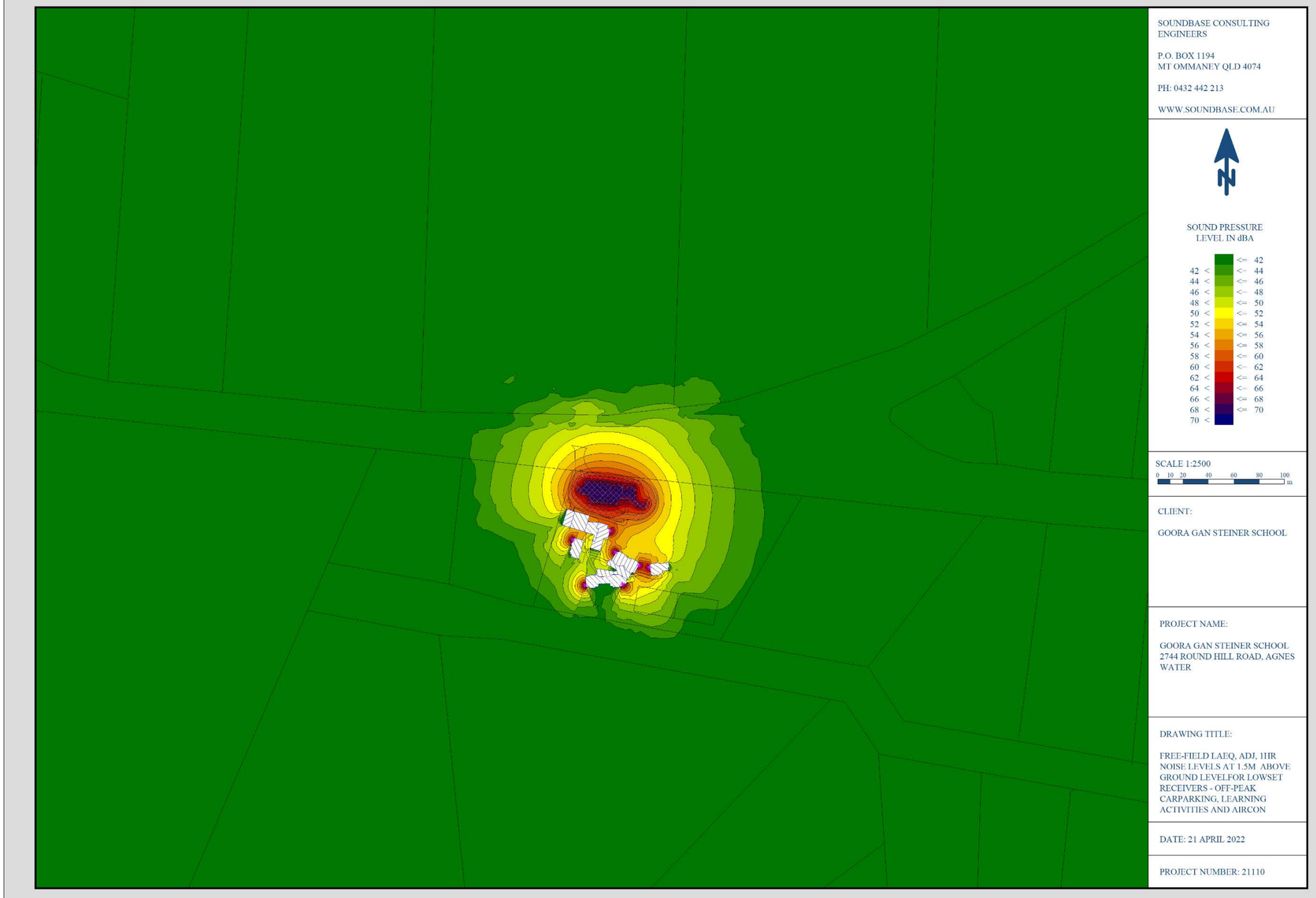


Figure 10: $L_{Aeq,\ adj,\ 1hr}$ noise emissions due to off-peak use of the carpark, learning activities and operation of the air-conditioning condensers

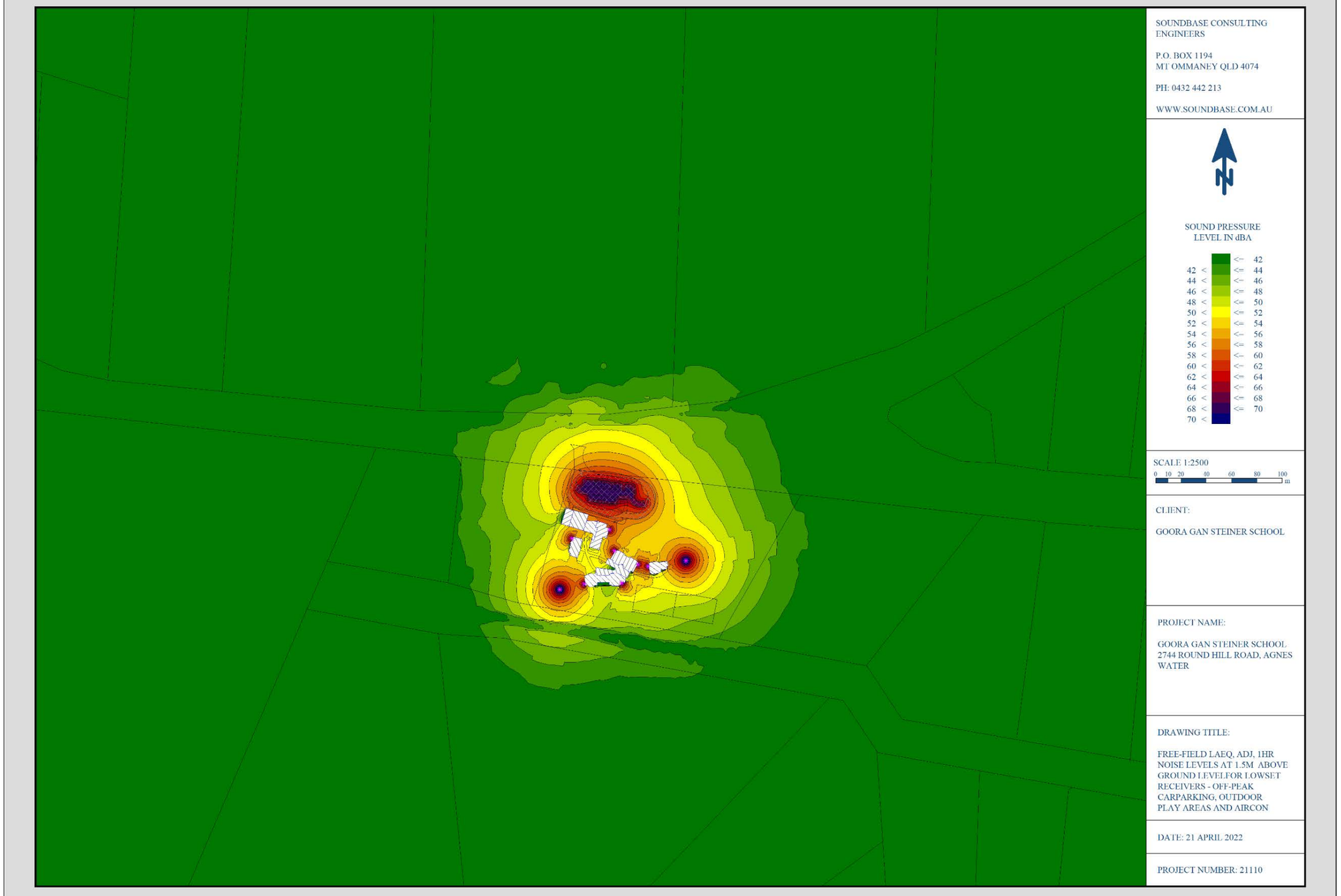


Figure 11: $L_{Aeq,\ adj,\ 1hr}$ noise emissions from off-peak use of the carpark, the designated outdoor play areas and operation of the air-conditioning condensers

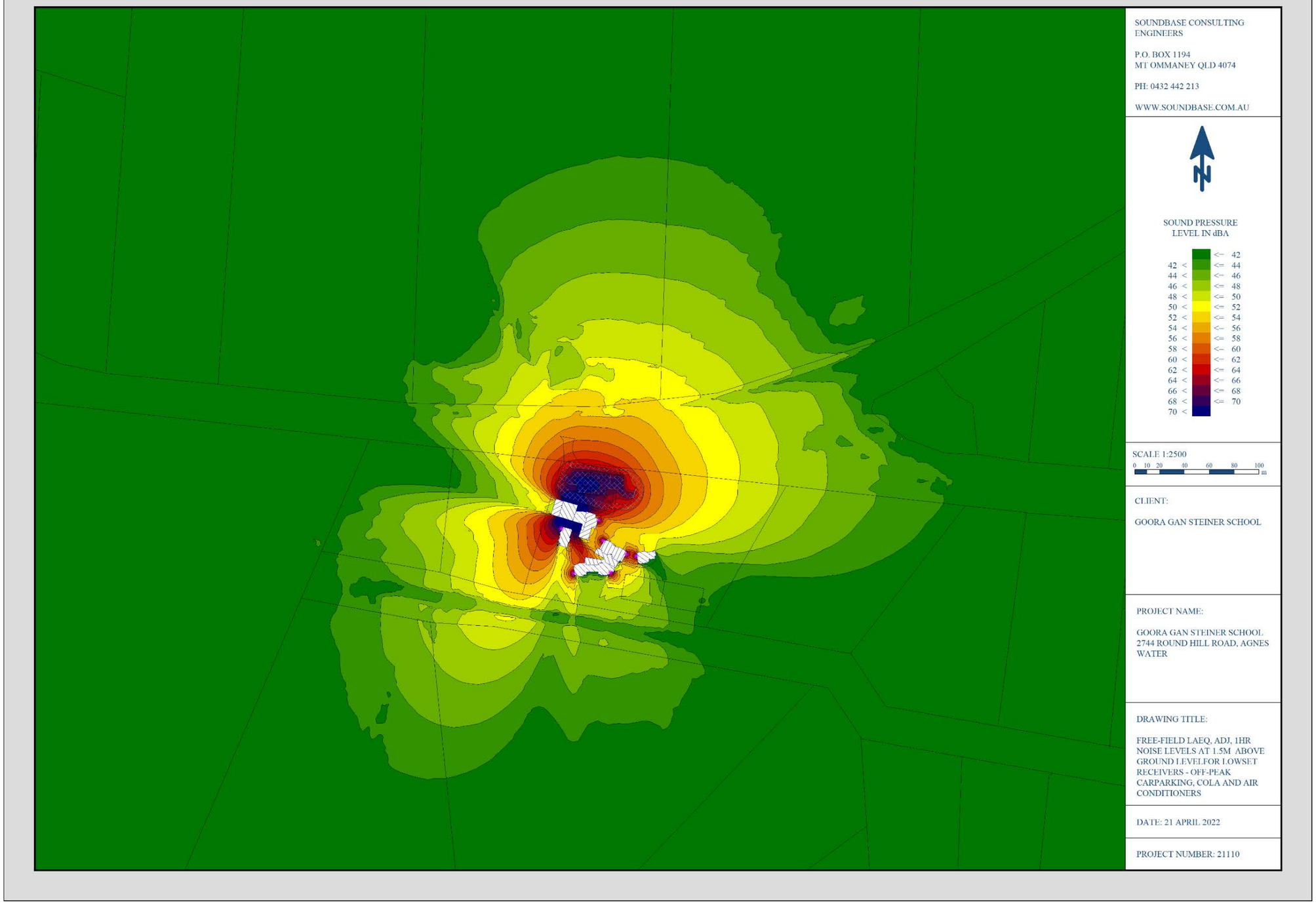


Figure 12: $L_{Aeq,\ adj,\ 1hr}$ noise emissions from off-peak use of the carpark, students and staff talking in the COLA and operation of the air-conditioning condensers

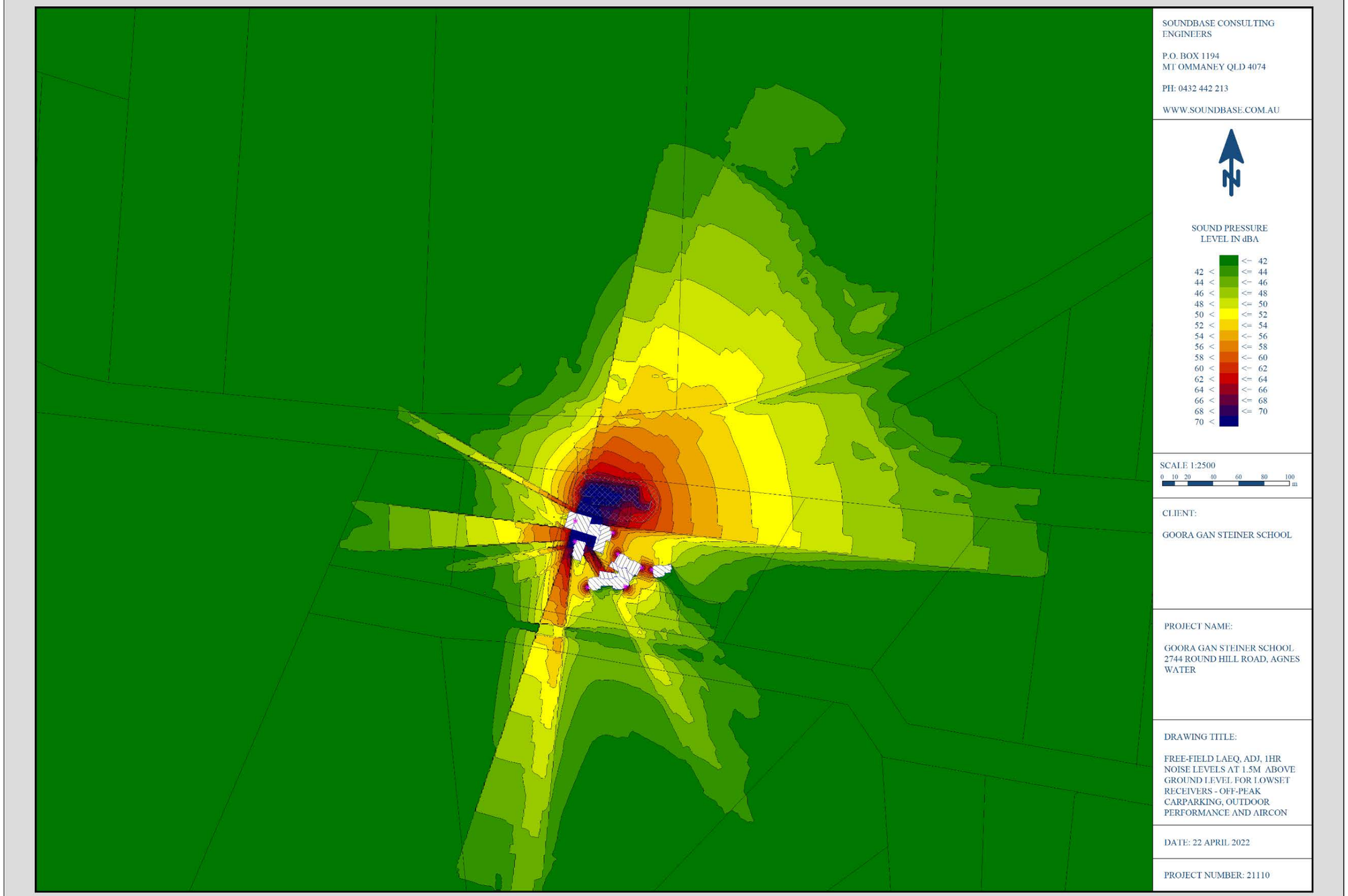


Figure 13: $L_{Aeq,\ adj,\ 1hr}$ noise emissions from off-peak use of the carpark, musical performance in the COLA and operation of the air-conditioning condensers

APPENDIX E: NOISE MANAGEMENT PLAN

Noise Management Plan for the Control of Noise from the COLA	
Activity:	Noise emissions associated with activities in the COLA do not impact upon the amenity of nearby noise-sensitive premises
Element:	Noise from activities in the COLA
Operating Hours:	7:30am to 3:30pm
Aim:	To minimise noise impacts from activities conducted in the COLA
Legislation:	*Gladstone Regional Council Planning Scheme* *Environmental Protection Act 1994* *Environmental Protection (Noise) Policy 2008*
Performance Indicator:	Noise generated from activities in the COLA does not cause a nuisance
Action:	**Planning Stage:** • The COLA is constructed with a solid eastern wall and an acoustically absorptive finish to the underside of the roof that achieves minimum NRC 0.9. • Use of the COLA is limited to daytime hours only, i.e.: between 7:00am and 6:00pm weekdays. • No third party use of the COLA is allowed. • Surrounding residents within 500m of the school are provided with the contact details of a Goora Gan Steiner School representative in case of any complaints/queries. • If permanently mounted speakers are to be used, the optimal configuration would be to use a distributed array of ceiling-mounted speakers that point directly downwards. • The school is to purchase a cheap sound level meter to check the source levels during the operational phase. When conducting the measurements, the sound level meter is to be set to fast response and a C-weighting. **Operational Stage:** • Stand-alone speakers used to amplify voice and music are orientated so that they point towards the southeast. • The source level of any speaker is to be limited to 80dBC @ 3m (measured from the face of the speaker). • Unamplified music that exceeds a source level of 80dBC is prohibited. • Upon receipt of a noise complaint, the following must be recorded in a dedicated log book which must be made available to Council for review: o Time and date; o Name of person receiving the complaint; o Complainant's name, address and telephone number (if provided); o Name of person given the responsibility to resolve the cause(s) of the complaint; o Description of the noise generating the complaint, including: ▪ Whether the noise is continuous or intermittent; ▪ Duration of occurrence; ▪ Whether the source of the noise is easily identifiable to the complainant;

Noise Management Plan for the Control of Noise from the COLA	
	o Timeframe of verbal and/or written response; o All documents relating to the investigation including test reports, instructions to staff, correspondence to complainant etc; o The resulting outcome (i.e.: complaint resolved; additional complaints received etc). • When responding to a complaint, a timeframe of three days is considered to be good practice.
Responsible Person:	Goora Gan Steiner School's delegated representative and any third party's delegated representative.
Review:	Whenever a complaint is received by Goora Gan Steiner School or Gladstone Regional Council.