SHIRE OF MOORA
LOCAL PLANNING SCHEME NO.4

NOTICE OF PUBLIC ADVERTISEMENT OF PLANNING PROPOSAL

Planning and Development Act 2005
Shire of Moora

The local government has received an application to use and/or develop land for the following purpose and public comments are invited.

Land Details:

Lot 80 (No.18201) Great Northern Highway, Miling

Proposal:

Construction and use of proposed new workforce accommodation on the abovementioned property including various associated improvements to accommodate up to twelve (12) people at any one time.

Details of the proposal are attached.

Comments on the proposal are now invited and can be emailed to shire@moora.wa.gov.au or posted to the Shire's Chief Executive Officer at PO Box 211 MOORA WA 6510 by no later than **Monday 19 February 2024**. All submissions must include the following information:

- Your name, address and contact telephone number;
- How your interests are affected; whether as a private citizen, on behalf of a company or other organisation, or as an owner or occupier of property;
- Address of property affected (if applicable); and
- Whether your submission is in support of, or objecting to the proposal and provide any arguments supporting your comments.

All submissions received may be made public at a Council meeting and included in a Council Agenda, which will be available on the Shire's website, unless a submission specifically requests otherwise.

Gavin Robins
Chief Executive Officer
Shire of Moora

18 January 2024

Co-operative Bulk Handling Ltd
ABN 29 256 604 947

Level 6, 240 St Georges Terrace
Perth WA 6000 Australia

GPO Box L886
Perth WA 6842 Australia

Telephone
+61 8 9237 9600

Grower Service Centre
1800 199 083

cbh.com.au

08 November 2023

Gavin Robins
Shire of Corrigin
Via email: ceo@corrigin.wa.gov.au

Dear Gavin,

CHANGE OF USE TO WORKFORCE ACCOMMODATION AT LOT 80 (NO. 18201) GREAT NORTHERN HIGHWAY, MILING

CBH is seeking development approval from the Shire of Moora for a change of use to workforce accommodation on Lot 80 (No. 18201) Great Northern Highway, Miling. The subject application has been prepared in accordance with Schedule 2 (Deemed Provisions) of the Planning and Development (Local Planning Schemes) Regulations 2015 and the Shire of Moora Town Planning Scheme No. 4.

Proposal

The proposed development incorporates the following elements:

- Accommodation that caters for 12 people;
- Site amenities including kitchen, dining, laundry, and common room area;
- Covered areas, verandas, and associated amenities;
- Car parking bays for 13 people;
- Onsite effluent disposal system appropriate for accommodation of this size;
- The existing deconsecrated church is proposed to be retained.

Site Details

The subject land is located immediately south of the Miling townsite. The site is zoned 'rural townsite' under the Shire of Moora Town Planning Scheme No. 4 (TPS 4). The existing approved land use for this portion of the subject site is unknown but in recent years aerial imagery appears to have been for an 'agriculture-extensive' land use which is an 'X' uses within the rural townsite zone as prescribed by the zoning table of TPS 4. There is also a deconsecrated church in disrepair on the lot and a 'place of worship' which is a "D' use within the 'rural townsite' zone.

Town Planning Considerations

Workforce accommodation is defined under the Planning and Development (Local Planning Schemes) Regulations 2015 as a 'premises which may include modular or relocatable buildings, used primarily for the accommodation of workers engaged in construction, resource, agricultural or other industries on a temporary basis and for an associated catering, sporting and recreation facilities for the occupants and authorised visitors'.

Workforce accommodation is a use not listed within Table 1 of TPS 4. Clause 3.2.4 of LPS 4 states that if the use of the land for a particular purpose is not specifically mentioned in the Zoning Table and cannot reasonable be determined as falling within the interpretation of one of the use categories the local government may:

(a) Determine that the use is consistent with the objectives and purposes of the particular zone and is therefore permitted; or

(b) Determine that the use may be consistent with the objectives and purposed of the zone and thereafter follow the 'A' advertising procedures of clause 64 of the deemed provisions in considering an application for development approval; or

(c) Determine that the use is not consistent with the objectives and purposes of the particular zone and is therefore not permitted.

It is considered that the proposed land use is consistent with the relevant objective of the rural townsite zone below and may therefore be permitted on the subject site for the following reasons:

(i) To allow for a wide range of land uses such as may be found in a small country town, but subject to the preservation of local amenities.

No existing trees are affected by the development or are proposed to be removed. This vegetation retention ensures that the rural character and rural appearance of the rural townsite zone is maintained. Further the stormwater management plan for the development requires installation of a drainage basin. Drainage basins are consistent with the look and feel of the rural zone in which the subject lot is located adjacent to.

Previous correspondence with the Shire requested a landscaping plan be provided. A landscaping plan has been provided in support of this application for development approval. Minimal onsite planting has been proposed to compliment the vast expanse of existing 'agricultural-extensive' land uses (farms) surrounding the CBH facility.This planting will also aid in ensuring that the proposed development is appropriate to its context and that the rural character and appearance of the rural townsite zone is maintained acting as a buffer between the townsite ad surrounding rural zoned lots. The site plan demonstrates that the site has ample vacant land for landscaping purposes.

The accommodation structures themselves are second hand renovated units. The colour of the external walls is proposed to be 'paperback' and the roof and flashing colour is proposed to be 'deep ocean'. This is consistent with the rest of the CBH modular portfolio and is not considered to be out of context with the amenity of the rural townsite zone in which it is proposed to be located. Photos of the units 'as constructed' and a materials and colour palette have been provided as part of this application package.

The workforce accommodation should be considered a necessary incidental component to existing CBH operations on the adjacent lot. The workforce accommodation will solely be used for workers that work at the CBH facility during harvest. The benefit of this location is that the nuisance factor of irregular house noise and potential impact on other residential development is buffered by its location within the expansive rural townsite lot.

Noting this and that the CBH facilities and adjoining land uses are rural in nature, the impact on nearby amenity is considered negligible and the economic viability of the agricultural industry is maintained as this land use is an extension of agricultural activities.

<u>Shire of Moora Town Planning Scheme No. 4</u>

The proposal is subject to the site and development requirements prescribed by TPS4. Clause 3.8 of TPS4 sets out the site requirements for various land uses within the rural townsite zone which are to be 'in accordance with the residential design codes' (R-Codes). Table 1 of TPS4 offers a range of discretionary non-residential land uses within the rural townsite zone whereby the R-Codes should not be the appropriate mechanism to define the scale, nature, design, general appearance, and impact of the land use. It is conceded that the proposed workforce accommodation land use is not able to meet all the requirements of the residential development focussed R-Codes.

Clause 2.5 of the R-Codes allows the local government to exercise discretion to modify the development standards prescribed by the R-Codes in instances such as these. Further, Clause 67 (2c) of the *Planning and Development (Local Planning Schemes) Regulations 2015 – Deemed Provisions for Local Planning Scheme* allows the local government to only have 'due regard' to any approved State planning policy allowing them to apply discretion in their assessment of the workforce accommodation land use against the provisions of the R-Codes.

Part IV of TPS4 sets out development requirements which are the local government's specific requirements to ensure the scale, nature, design, general appearance, and impact of such uses is compatible with the objectives of the zone in which the development is proposed and the general purposes and aims of the Scheme. The proposed development provides generous setbacks and is of a size and scale that maintains and protect the existing amenity, character, and appearance of the rural townsite zone.

Front setback areas from Dookling Drive are confined solely for use as a means of access, the daily parking of vehicles, the loading and unloading of vehicles as well as landscaping. Car parking spaces are to be specified by the local government and have been provided as one space per dwelling with an additional two spaces for the use of laundry and maintenance workers as required.

It is considered that the setbacks, height, plot ratio and number of car parking spaces provided are appropriate to the zone in which the development is located.

<u>DPLH Workforce Accommodation Position Statement</u>

The Department of Planning, Lands and Heritage Position Statement on Workforce Accommodation is designed to assist decision makers in the planning system in understanding the land use planning considerations for workforce accommodation. The position statement identifies that where practical, workforce accommodation should be provided in established towns, in location suitable to its context, to facilitate their ongoing sustainability. It is considered that the proposed location meets the objectives and purpose of this position statement in that it is proposed in a location within proximity to the grain handling storage facility it is designed to service whilst also being locate on the edge of the Miling townsite ensuring easy access to essential services. The proposed location of the workforce accommodation should therefore be supported.

Standard considerations for a development application of this type are traffic generation, on-site effluent disposal, noise and dust management and stormwater management. A drainage report and a Traffic Impact Statement have been included as attachments to this application in support of this application and are summarised below.

<u>On-site Effluent Disposal System</u>

The location, setback and specifications of leach drains is subject to further approval by the Department of Health that falls outside of the development application process. Notwithstanding an area for sub soil irrigation has been shown on the site plan to demonstrate that the site can appropriately accommodate onsite effluent disposal. Early engagement with the Department of Health identified that the level of information provided as part of this application for development approval is sufficient.

As part of the subsequent application to install a wastewater system, the Department of Health will determine whether a site and soil analysis is required once the application is received however given there is an existing septic system onsite this requirement is considered unlikely. Notwithstanding a Geotechnical Report and Site and Soil Evaluation detailing some analysis has been provided as an attachment to this application for development approval.

Stormwater Management

The stormwater management strategy is for all surface runoff on the site to be managed to prevent flooding or damage to critical infrastructure. Paved surfaces are graded to direct stormwater runoff to open drainage conveyance system. Surface water runoff up to the 20-year ARI event is to be conveyed via an open drainage system. Surface water incident to the site from up to the 20-year ARI critical storm event is to be detained onsite with a controlled outflow limited to the predevelopment flow rates.

The stormwater drainage system has been designed in accordance with the requirements of CBH Design Specification TS10A – Civil Earthworks, Roads and Drainage and followed guidelines set out in the Australian Rainfall & Runoff. Open drains and culverts have been designed to convey the 20-year ARI rainfall event. Further detail including a catchment plan is provided as part of Stantec's Stormwater Management Plan attached in support of this application for development approval.

Traffic Management

A Traffic Impact Statement (TIS) has been prepared by Shawmac demonstrating that the site is well connected to the surrounding road network and that the proposed facility will not result in significant changes to traffic movements on the surrounding road network.

As shown on the site plan, vehicular access is to be taken via a proposed crossover from Dookling Drive along the south-eastern boundary of the site. Dookling Drive provides direct access to Great Northern Highway and Miling W Road which accesses the CBH grain handling and storage facility.

During the harvest period from October to December, most staff will stay and work on site. For the remainder of the year, there will be some staff in the accommodation who may travel to and from the site 1 to 2 times per week. This volume of traffic generated by the development will be low and can easily be accommodated within the existing capacity of the road network with no major impact.

Based on the proposed 12 rooms, 13 car parking spaces should be considered sufficient. There may be a small number of staff movements such as laundry and maintenance workers which would utilise the surplus car parking spaces. It is understood that these staff movements are expected to occur during the day when workers are away from the accommodation working at the CBH storage and handling facility. Noting the proximity of the accommodation to the facility it is largely expected workers would leave their car and walk to the facility.

The TIS also demonstrates that the site is provided with the appropriate level of parking, minimum car parking space dimensions, sightlines, and manoeuvring areas. Further detail is provided as part of Shawmac's Transport Impact Statement attached in support of this application for development approval.

Noise & Dust Management

CBH shall ensure that noise from the specification and installation of any mechanical equipment as well as traffic and construction noise does not exceed assigned levels prescribed in the *Environmental Protection (Noise) Regulations 1997*, when it is received at a neighbouring property. Dust Management will comply with *Environmental Protection Act 1986* and the relevant *National Environmental Protection Measures.*

CBH is committed to improving the overall environmental impacts of its business and in achieving the environmental objectives outlined in the CBH Group Health, Safety and Environmental Policy. CBH undertakes frequent noise and dust monitoring across its sites to ensure that dust and noise levels are measured and are mitigated whenever there is an exceedance.

European Heritage

The deconsecrated church on the subject site is listed within the Shire of Moora's Municipal Heritage Inventory (MHI) with an assigned management category 4. As the Shire has not prepared and adopted a Local Heritage List, there are no statutory controls applicable to the proposed development to provide for the long-term protection of the subject land's local heritage values.

As the deconsecrated church is located on private land, CBH has no intention to allow public access onto the lot. CBH intends to retain the church and notes that it is in a state of disrepair but has no plans to restore it. It is likely the church will be fenced off from the rest of the workforce accommodation development however a decision on this has not be finalised.

Conclusion

The proposed land use and associated works are aligned with the planning framework for the area specifically the rural townsite zone in which it is located, and it is not considered to result in any new amenity impacts to the surrounding area. CBH respectfully requests the Application for Development Approval is considered favourably by the Shire of Moora given the straightforward nature of the application and its general compliance with the Shire's planning framework. Should you have any questions in relation to the application, please contact Timothy Roberts on 9216 6061 or timothy.roberts@cbh.com.au.

Yours Sincerely,

Timothy Roberts
Lead – Planning & Approvals

SHIRE OF MOORA LOCAL PLANNING SCHEME NO.4

FORM 1 - APPLICATION FOR DEVELOPMENT APPROVAL

Owner Details		
Name/s: Co-operative Bulk Handling Ltd		
ABN (if applicable): 29 256 604 947		
Postal Address: Level 6 No. 240 St George's Terrace, Perth, WA Postcode:		
Work Phone: 08 9216 6061 Home Phone: Mobile Phone:	Fax:	E-mail: timothy.roberts@cbh.com.au
Contact Person for Correspondence: Timothy Roberts		
Signature:		Date: 08 November 2023
Signature:		Date:

NOTES:

i) Use and attach a separate copy of this page where there are more than two (2) landowners.

ii) The signature/s of all registered owner(s) as listed on the land's Certificate of Title is required. This application cannot proceed without the required signature/s. For the purposes of signing this application an owner includes the persons referred to in the Planning and Development (Local Planning Schemes) Regulations 2015 Schedule 2 clause 62(2). Land owned by an incorporated body (i.e. a company) must be signed by:

- *1 director of the company, accompanied by the company seal; or*
- *2 directors of the company; or*
- *1 director and 1 secretary of the company; or*
- *1 director if a sole proprietorship company.*

Print the full names and positions of company signatories underneath the signatures.

iii) A copy of the Certificate of Title for all land the subject of this application must be provided and can be purchased through Landgate directly if required.

iv) Development Applications relating to Unallocated Crown Land, Unmanaged Crown Reserves, land under management order to the Shire of Moora where the development is not consistent with the reserve's purpose, or is used for commercial purposes, or land which is subject to a lease issued under the Land Administration Act 1997 need to be referred to the Lands Division of the Department of Planning, Lands and Heritage for consideration and signing.

Applicant Details (if different from owner)
Name/s: Co-operative Bulk Handling Ltd
Address: Level 6 No. 240 St George's Terrace, Perth, WA Postcode: 6000

Work Phone: 08 9216 6061 Home Phone: Mobile Phone:	Fax:	E-mail: timothy.roberts@cbh.com.au

Contact Person for Correspondence: Timothy Roberts

Signature:	Date: 08 November 2023

NOTES:

i) Failure to provide a suitably completed development application form, a copy of the relevant Certificate/s of Title, sufficient plans and other supporting information and/or the correct application fee may result in the application being returned or placed on hold.

ii) The application fee payable will be confirmed by the local government following receipt of the application. Processing of the application will not commence until the fee is paid in full.

iii) As per Schedule 2 clause 64 of the Planning and Development (Local Planning Schemes) Regulations 2015 the information and plans provided with this application may be made available by the local government for public viewing in connection with the application.

iv) If public advertising of the application is required by the local government an additional fee in accordance with the local government's adopted schedule of fees and charges will be payable by the applicant. Further processing of the application following completion of public advertising will not proceed until the additional fee is paid in full.

v) The original of this application and supporting information and plans will be retained by the local government for its records and will not be returned to the applicant/landowner following final determination.

Property Details

NOTE: The details provided must match those shown on the relevant Certificate/s of Title.

Lot No: 80		
Survey Diagram or Plan No: 33218	Certificate of Title Volume No: 1165	Certificate of Title Folio No: 343

Title encumbrances (e.g. easements, restrictive covenants):

Except and reserving metals, minerals, gems and mineral oil specified in transfer 5680/1925 & 4309/1944

Street name:	Suburb: Miling

Nearest street intersection:

Dookling Drive & Phelan Street

Proposed Development:

Nature of development:

- ☐ Works (New construction works with no change of land use)
- ☐ Use (Change of use of land with no construction works)
- ☒ Works and Use

NOTE: If the proposal involves advertising signage the Additional Information for Development Approval for Advertisements form (i.e. a Form 2) must be completed and submitted with this application.

Is an exemption from development claimed for part of the development? Yes ☐ No ☒

If yes, is the exemption for:

- ☐ Works
- ☐ Use

Description of Proposed Works and/or land use: 12 x single person quarters; shared site amenities including kitchen, dining, laundry & common area; covered areas & verandas; car parking bays for 14 people and on-site effluent disposal system.
Description of exemption claimed (if relevant): NA
Nature of any existing buildings and/or land use: Place of Worship
Approximate cost of proposed development (excluding GST): $2,200,000
OFFICE USE ONLY Date application received: Received by: Application reference number: Application fee payable: $ Date of receipt of application fee from applicant: Receipt number for application fee:

REGISTER NUMBER	
80/DP33218	
DUPLICATE EDITION **1**	DATE DUPLICATE ISSUED **30/4/2008**

WESTERN AUSTRALIA

VOLUME **1165** FOLIO **343**

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

BGRoberts

REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 80 ON DEPOSITED PLAN 33218

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

GENOCANNA NOMINEES PTY LTD OF POST OFFICE BOX 32, MILING

(T K543833) REGISTERED 25/3/2008

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. EXCEPT AND RESERVING METALS, MINERALS, GEMS AND MINERAL OIL SPECIFIED IN TRANSFER 5680/1925.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
* Any entries preceded by an asterisk may not appear on the current edition of the duplicate certificate of title.
Lot as described in the land description may be a lot or location.

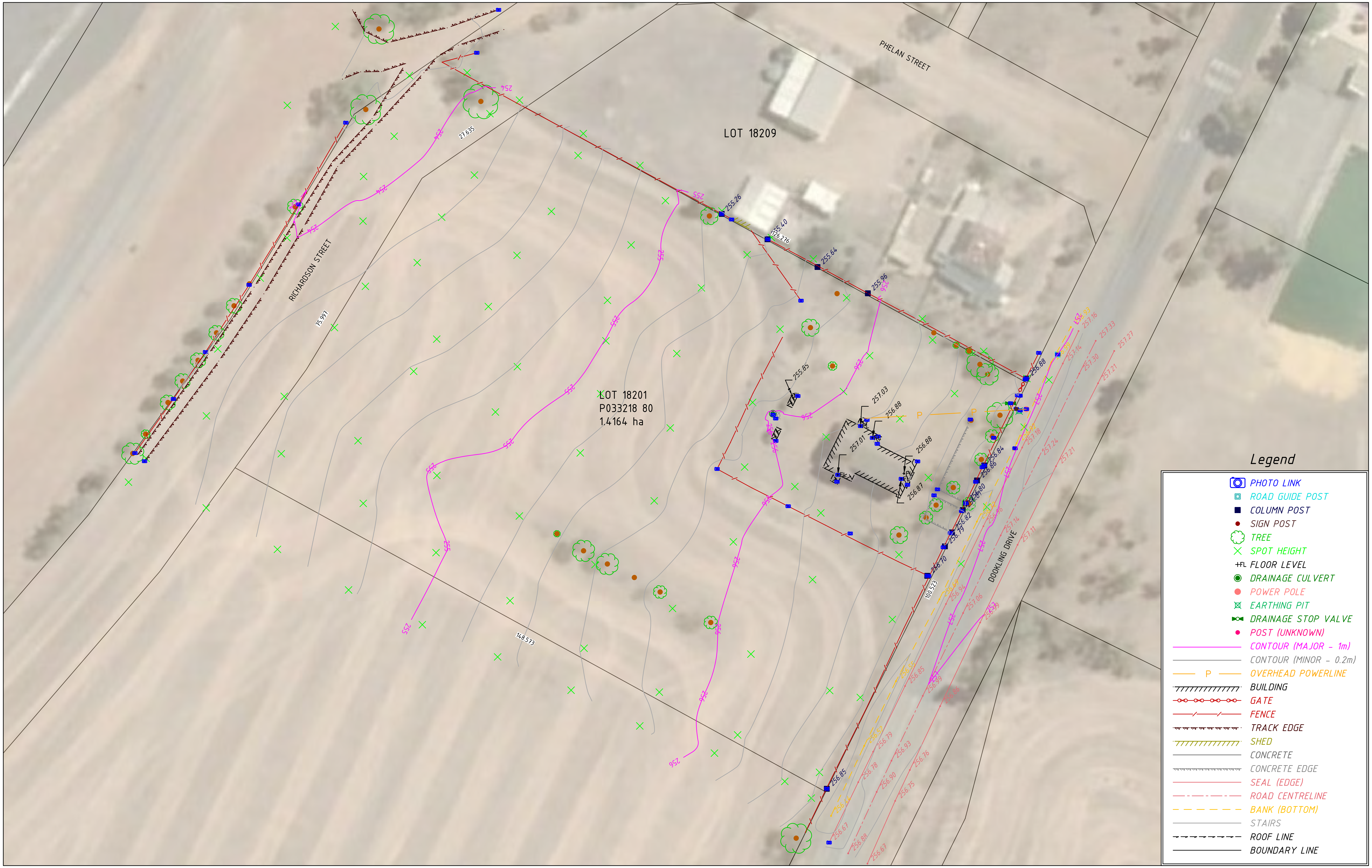
--END OF CERTIFICATE OF TITLE--

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	DP33218
PREVIOUS TITLE:	1076-890
PROPERTY STREET ADDRESS:	18201 GREAT NORTHERN HWY, MILING.
LOCAL GOVERNMENT AUTHORITY:	SHIRE OF MOORA

NOTE 1: A000001A LAND DESCRIPTION AMENDED ON ORIGINAL CERTIFICATE OF TITLE - BUT NOT SHOWN ON CURRENT EDITION OF THE DUPLICATE.
NOTE 2: SKETCH ON ORIGINAL SUPERSEDED PAPER TITLE AMENDED - BUT NOT SHOWN ON CURRENT EDITION OF THE DUPLICATE.



REV	DESCRIPTION	DATE	SURVEYOR	DRN	CHK	APR
1	Report Amendment	18/07/2023	JM	JM	MR	BW
0	Issued To Client For Review	14/07/2023	JM	JM	BW	BW

NOTES:

1) Boundaries shown on this plan were not reinstated or marked at the time of survey. All boundary dimensions shown have been derived from Landgate published digital data and shown for visual reference only. Since the accuracy, reliability and completeness of Landgate published digital data is not guaranteed, Handley Surveys cannot guarantee the reliability, accuracy and completeness of any boundary dimensions shown. See Landgate website for digital data disclaimer.
2) Contour Interval: 0.20m. Contours Labeled: 1.00m
3) Finished floor level was surveyed on the inside of external doors only on the top of floor covering.
4) Aerial overlay is for visual reference only and has not been surveyed. Aerial overlay dated 27/01/2021.
5) Photo link will be removed after 6 months of the plan issuing date.

N

Client: CBH

Date of Survey: 12-13/07/2023
Hz Datum: AGLIME2020
V Datum: AHD71

Handley Surveys verify that all information contained within this plan is accurate at the date of survey. Any consultant or individual wishing to utilise the contents of this document should satisfy themselves of its currency by contacting Handley Surveys.

0 3.75 18.75 37.5
1:750 METRES

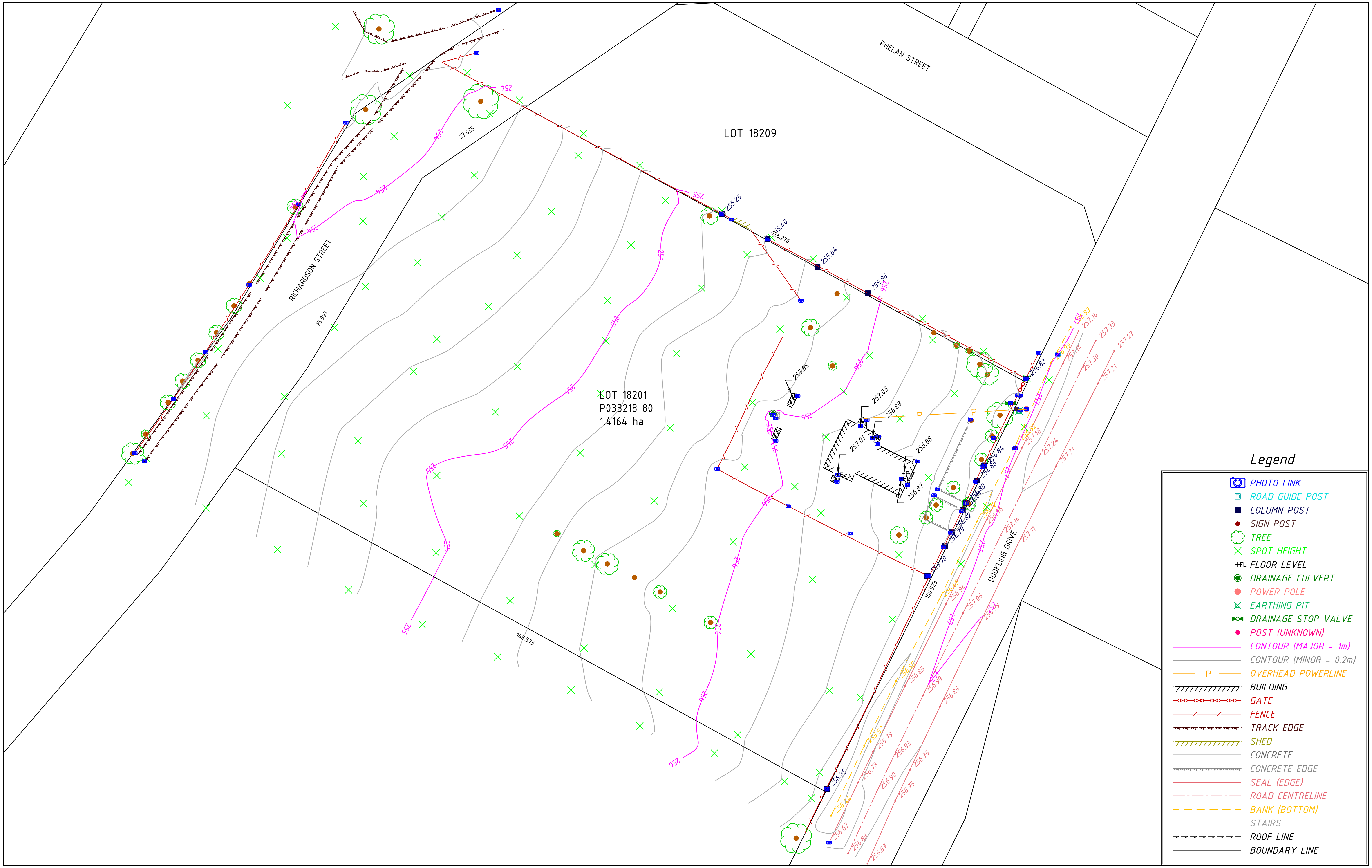
Handley SURVEYS

PERTH (HEAD OFFICE) 3/524 Abernethy Road KEWDALE WA 6105
(08) 9353 2622 | ABN: 59 100 410 384 | admin@handleysurveys.com.au
www.handleysurveys.com.au

18201 GREAT NORTHERN HIGHWAY
MILING, WA
CONTOUR AND FEATURE SURVEY

A3 SHEET: 1/2 6252-0001-SVY-PLN-001-R01

8888-0000-SVY-TMP-004-R00



1	Report Amendment	18/07/2023	JM	JM	MR	BW
0	Issued To Client For Review	14/07/2023	JM	JM	BW	BW
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0 3.75 18.75 37.5
1:750 METRES

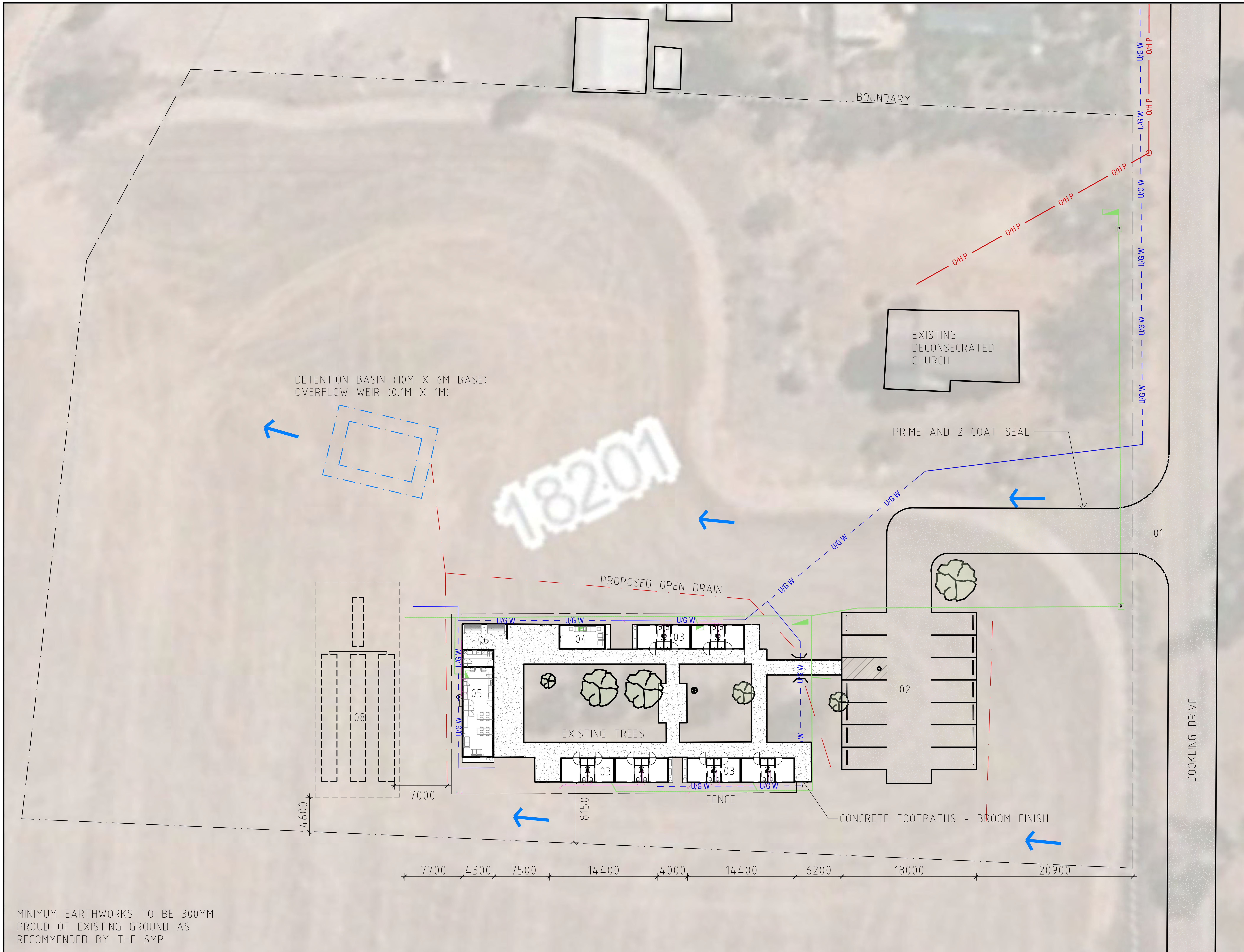
Handley SURVEYS

PERTH (HEAD OFFICE) 3/524 Abernethy Road KEWDALE WA 6105
(08) 9353 2622 | ABN: 59 100 410 384 | admin@handleysurveys.com.au
www.handleysurveys.com.au

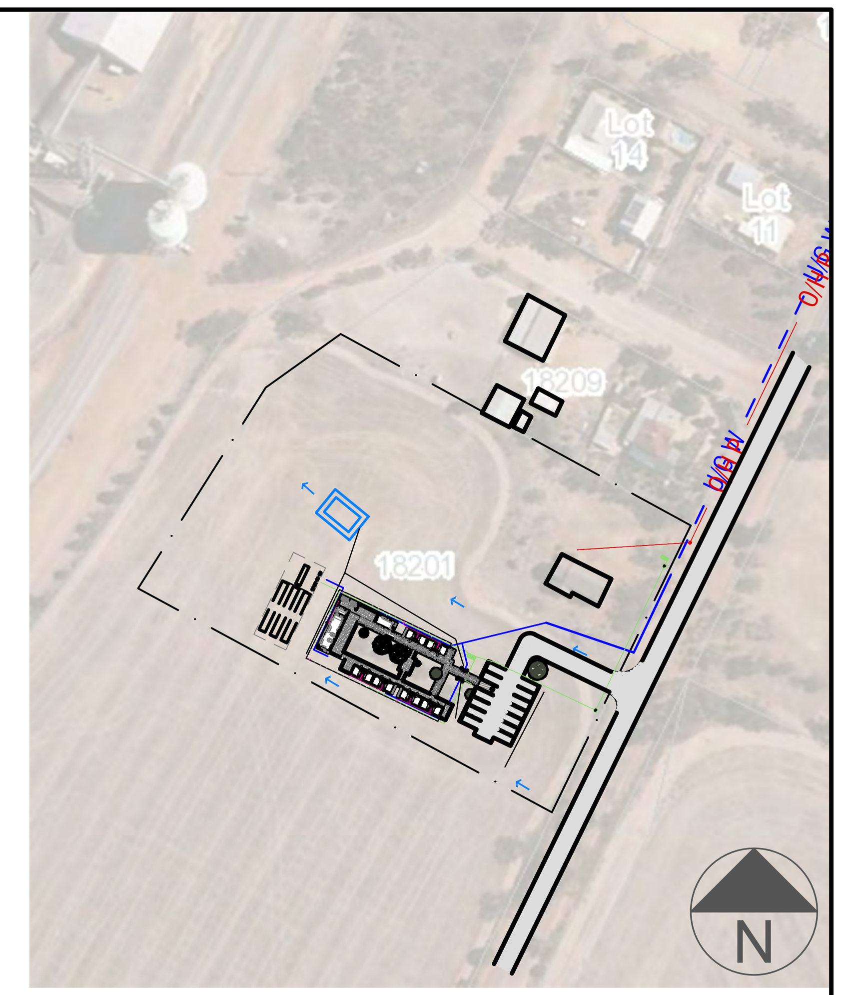
18201 GREAT NORTHERN HIGHWAY
MILING, WA
CONTOUR AND FEATURE SURVEY

A3 SHEET: 2/2

6252-0001-SVY-PLN-001-R01



MINIMUM EARTHWORKS TO BE 300MM PROUD OF EXISTING GROUND AS RECOMMENDED BY THE SMP



SURROUNDING SITE PLAN
NTS

LEGEND

01 ENTRY
02 13 BAY CARPARK
03 SPQ
04 COMMON ROOM
05 KDLU
06 DRYING AREA
07 BASIN (TBC)
08 LEECH DRAIN AREA

U/GW UNDERGROUND WATER
O/HP OVERHEAD POWER LINE
POWER
SEWER
OVERLAND FLOW ARROW

CBH GROUP
ABN 29 256 604 947

REV	DATE	REVISION DESCRIPTION	BY	CHK'D	APP'D
B	22.11.23	ISSUED FOR REVIEW	LY	BL	
A	24.10.23	ISSUED FOR REVIEW	LY	BL	

REF DRAWING No.	REFERENCE DRAWING TITLE

SCALE	1:250
SHEET	A1
PROJECT	
CONTRACT No	
DRAWN	L YAP
CHECKED	B LIM
DESIGNED	
DESIGN APPR	
PROJECT APPR	

TITLE
MILING
INFRASTRUCTURE PLANNING
ACCOMMODATION
SITE PLAN

DRG No	SHEET	REV
342-ENG-AR-DGA-0001	1 OF 4	B

CBH GROUP
ABN 29 256 604 947

REF DRAWING No.	REFERENCE DRAWING TITLE	REV	DATE	REVISION DESCRIPTION	BY	CHK'D	APP'D
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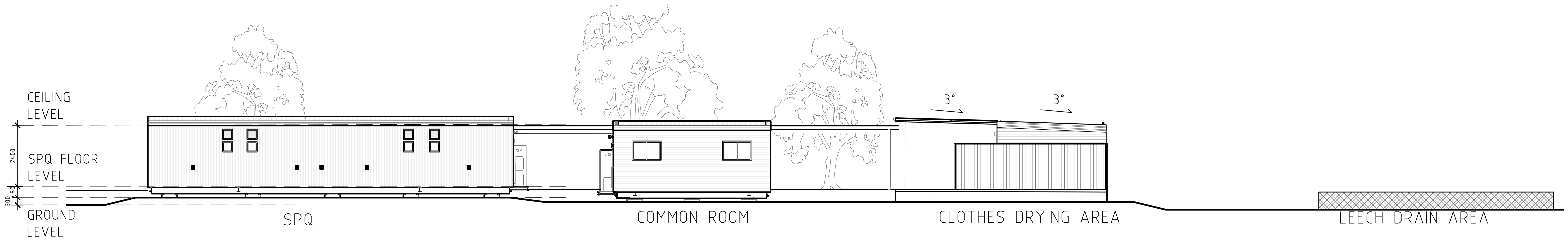
		A	24.10.23	ISSUED FOR REVIEW	LY	BL	

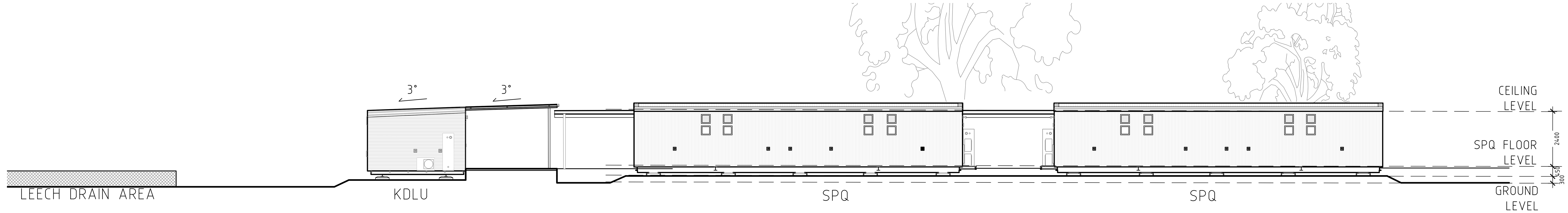
SCALE 1:100	DRAWN L YAP		
SHEET A1	CHECKED B LIM		
PROJECT	DESIGNED		
	DESIGN APPR		
CONTRACT No	PROJECT APPR		

TITLE
MILING
INFRASTRUCTURE PLANNING
ACCOMMODATION
SITE PLAN

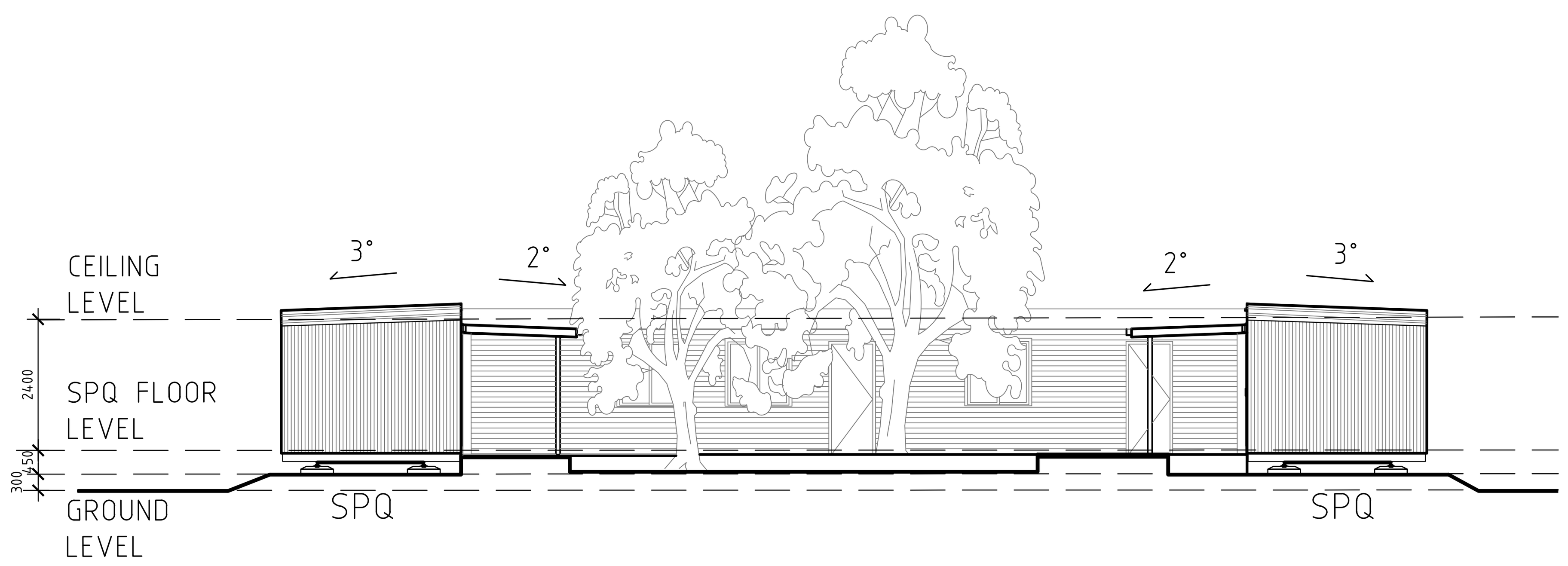
DRG No	SHEET	REV.
342-ENG-AR-DGA-0002	2 OF 4	B



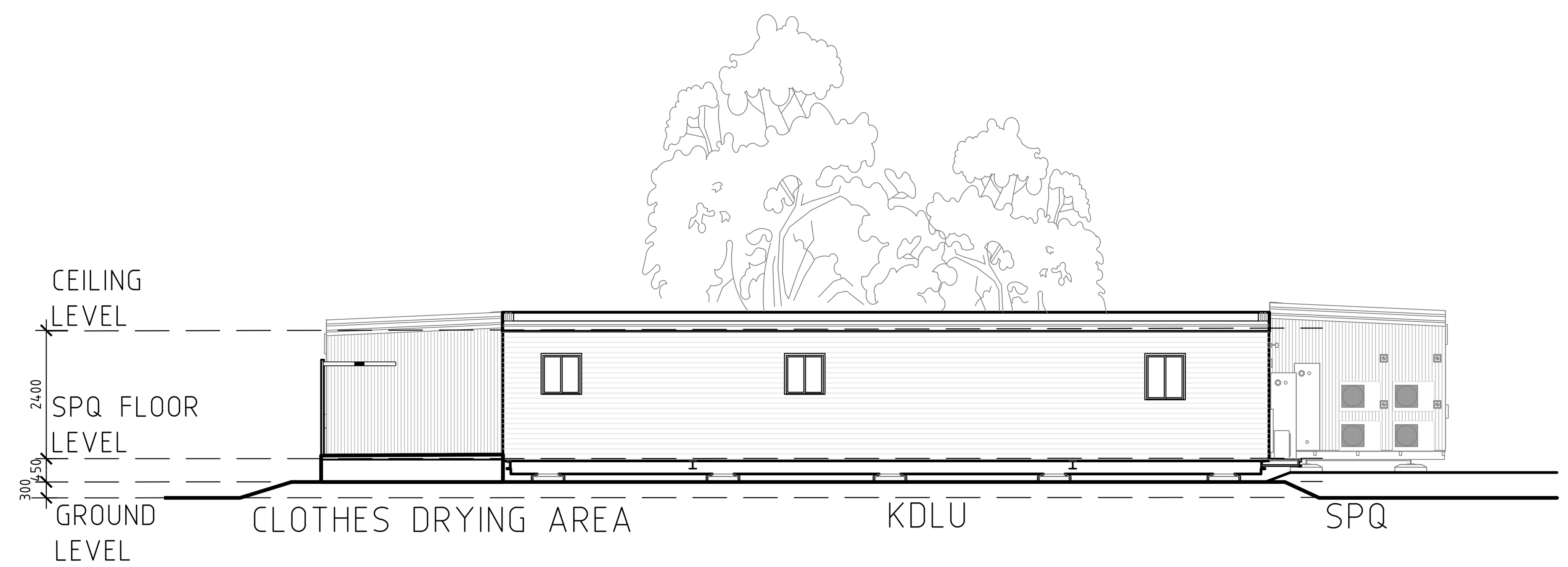
NORTH ELEVATION



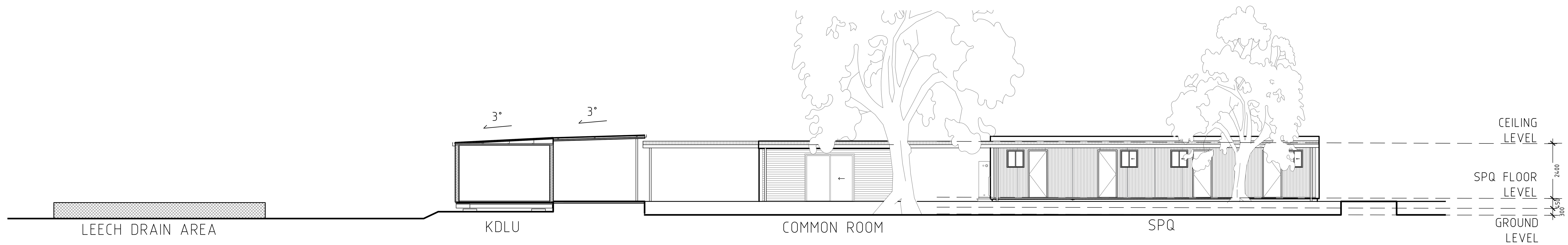
SOUTH ELEVATION



EAST ELEVATION



WEST ELEVATION



SECTION

CBH GROUP
ABN 29 256 604 947

REV	DATE	REVISION DESCRIPTION	BY	CHK'D	APP'D
B	22.11.23	ISSUED FOR REVIEW	LY	BL	
A	24.10.23	ISSUED FOR REVIEW	LY	BL	

REF DRAWING No.	REFERENCE DRAWING TITLE

SCALE	1:100
SHEET	A1
PROJECT	
CONTRACT No	
DRAWN	L YAP
CHECKED	B LIM
DESIGNED	
DESIGN APPR	
PROJECT APPR	

TITLE
MILING
INFRASTRUCTURE PLANNING
ACCOMMODATION
ELEVATIONS

DRG No	SHEET	REV.
342-ENG-AR-DEL-0001	4 OF 4	B

CLIENT APPROVAL

SIGNATURE DATE

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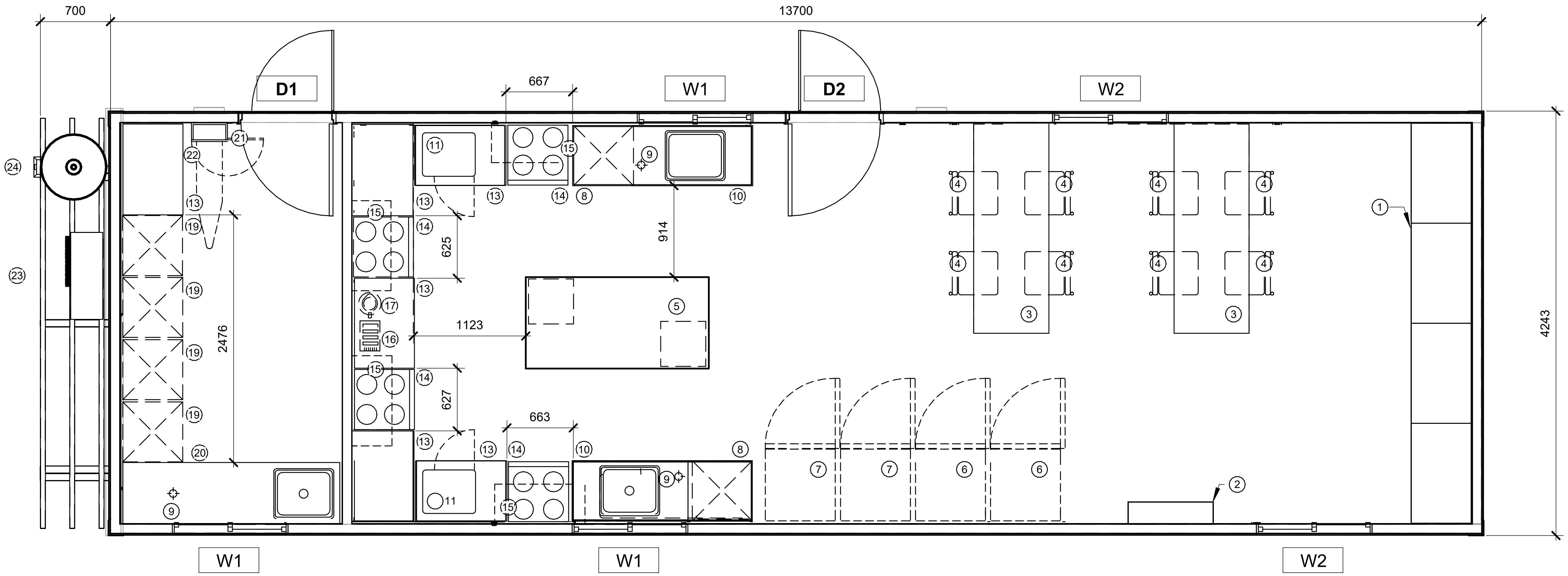
APPROVED FOR STRUCTURAL SUFFICIENCY

A K Pollock FIEAust CPEng NER APEC engineer IntPE(Aust)

....

A K P CONSULTING PTY LTD



General Arrangement

1 : 50

EQUIPMENT LIST
1. 2200mm high white melamine cupboardsw 5 adjustable shelves
2. AC Wall Mounted Unit
3. Table (Supplied by CBH)
4. Chair (Supplied by CBH)
5. Stainless steel bench with 2 sets of 2 lockable drawers on opposing corners as per layout - 1829Lx914Wx900H
6. Nom 500L freezer (Supplied by CBH)
7. Nom 500L fridge (Supplied by CBH)
8. Dishwasher Supply - Cold water (dishwasher supplied by CBH)
9. Floor Waste
10. Stainless steel benchw intergrated sink & splashback-1800Lx610Wx900H
11. Microwave on wall mounted SS shelf (Microwave supplied by CBH)
13. Stainless steel bench - 914Lx610Wx900H
14. 4 Burner SS gas stove & oven (Supplied by CBH)
15. 900mm Cooker hood (supplied by CBH)
16. Toaster (supplied by CBH)
17. Kettle (Supplied by CBH)
19. Washing machine supply 600 wide (Washing machine supplied by CBH)
20. Stainless steel benchw integrated sink & splashback-2170Lx610Wx900H
21. Wall mounted Ironing board
22. 15L rubbish bin (Supplied by CBH)
23. AC condenser
24. 300L hot water unit

BUILDING CONSTRUCTION - SHORT SPECIFICATION
- Chassis: fabricated structural steel beams; LC100 joists (400c)
- Chassis paint spec: Black zinc enamel (75microns)
- Floor substrate: 22mm Durafloor
- Laundry/kitchen floor covering: Accolade Safe vinyl w. coved skirting
- Dining/Lounge floor covering: Accolade Plus vinyl w. coved skirting
- External Walls: 92mm x 1.15bmt steel studwork (600c)
- Internal walls: 92mm x 1.15bmt steel studwok (600c)
- Wall insulation: R2.2 insulation; R0.2 thermal wrap between framing/cladding
- Ceiling insulation: R4.1 ceiling batts
- Floor insulation: R2.2 Rigid insulation board between floor joists
- Roof structure: 92mm x 1.15bmt steel framework (400c)
- External wall cladding: Custom Orb (horizontal)
- Roof cladding: Lysaght trimdek; matching barges, gutters & flashings
- Internal wall cladding: 3.6mm pre-finished Poly Ply
- Ceiling cladding: 3.6mm pre-finished Poly Ply
- Doors: face mounted steel clad door in steel split frames
- Windows: face mounted aluminium sliding windows with 6.52mm laminates glass

BUILDING DESIGN CRITERIA
NCC Class 6 Building
Wind Region A
Climate zone 4

COLOUR SCHEDULE	
Ext. Cladding:	Paperbark
Ext. Cladding (2):	Deep Ocean
Doors:	Deep Ocean
Door frames:	Deep Ocean
Internal Walls:	Embossed White
Ceiling:	Mirage Pearl
Windows:	Deep Ocean
Vinyl:	Blue Bells
Cabinetry:	White
Benches:	Stainless Steel
Blinds:	Charcoal
PVC Skirting:	Black
Cornice Angle:	White Gloss

Trigon PROJECTS

CBH 2024 Accomodation Project

KITCHEN, DINING, LAUNDRY UNIT

GENERAL ARRANGEMENT PLAN

Project number	Project Number
Date	31/05/2023
Drawn by	TB
Drawing number	A100
Revision	2

CLIENT APPROVAL

SIGNATURE DATE

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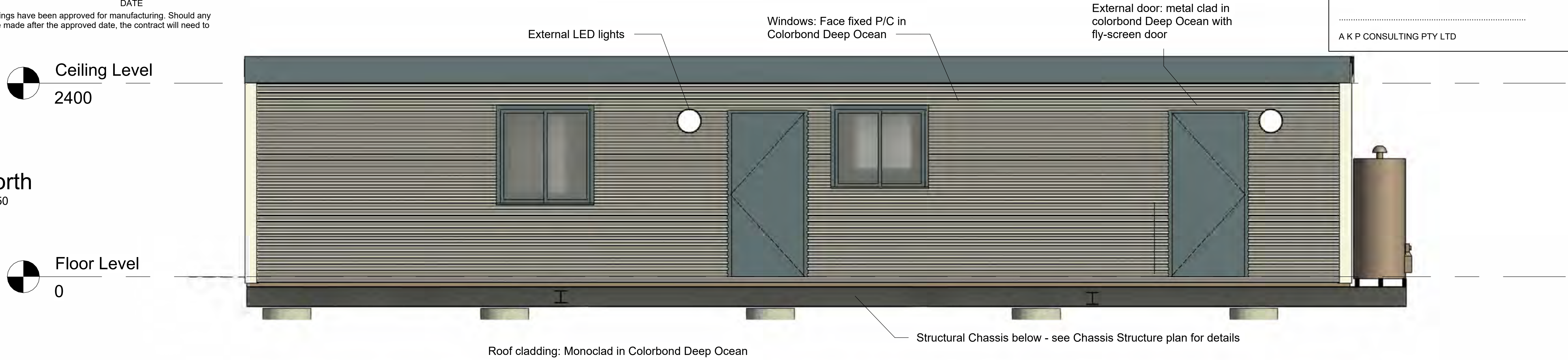
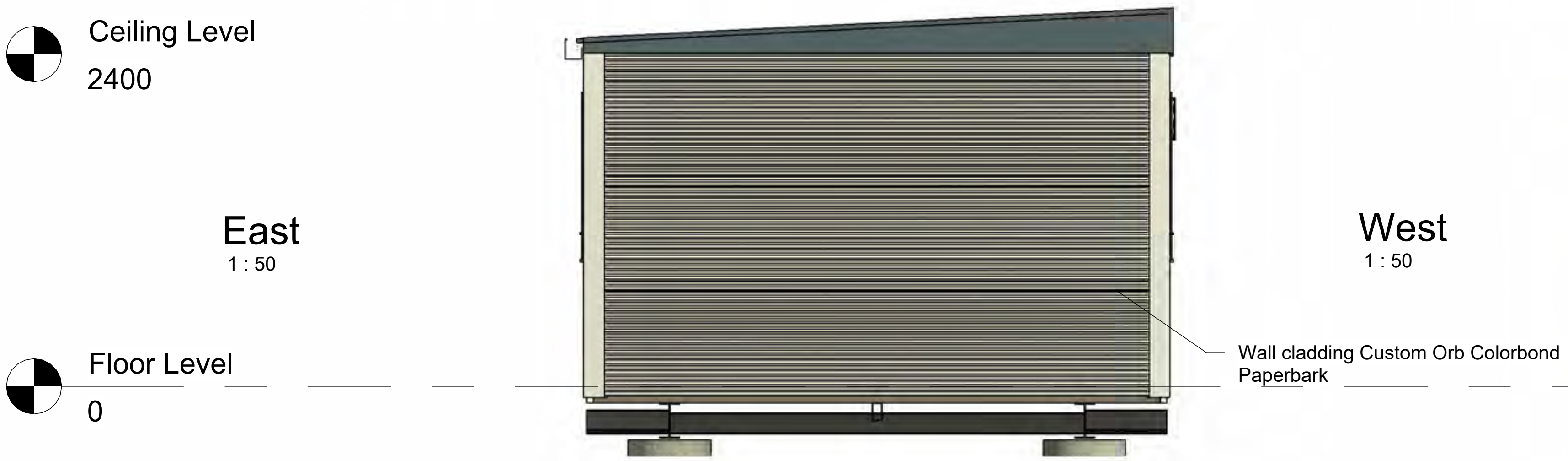
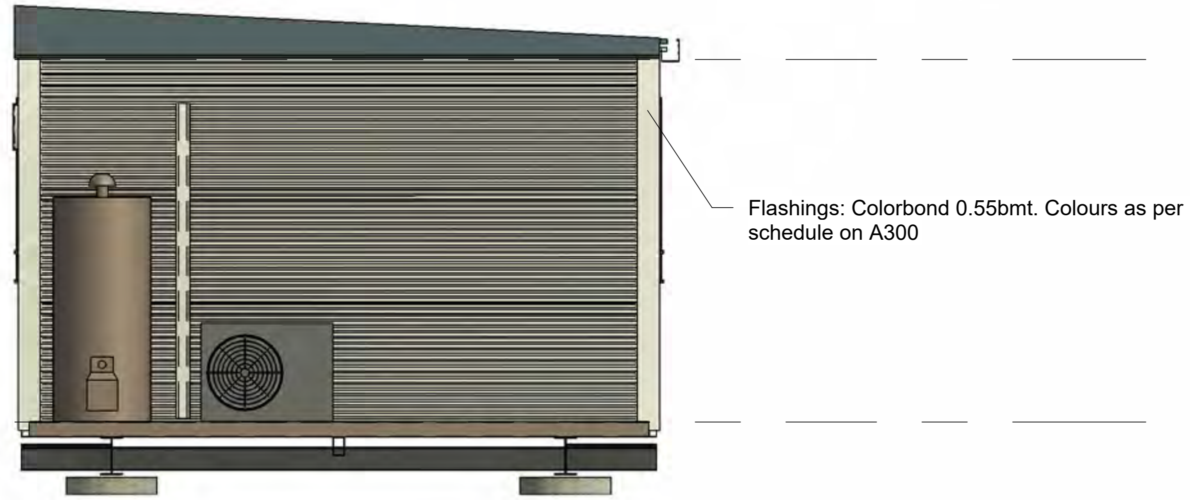


North
1 : 50

South
1 : 50



East
1 : 50



West
1 : 50

Trigon PROJECTS

CBH 2024 Accomodation Project

KITCHEN, DINING, LAUNDRY UNIT

ELEVATIONS

Project number	Project Number
Date	31/05/2023
Drawn by	TB
Drawing number	A101
Revision	2

CLIENT APPROVAL

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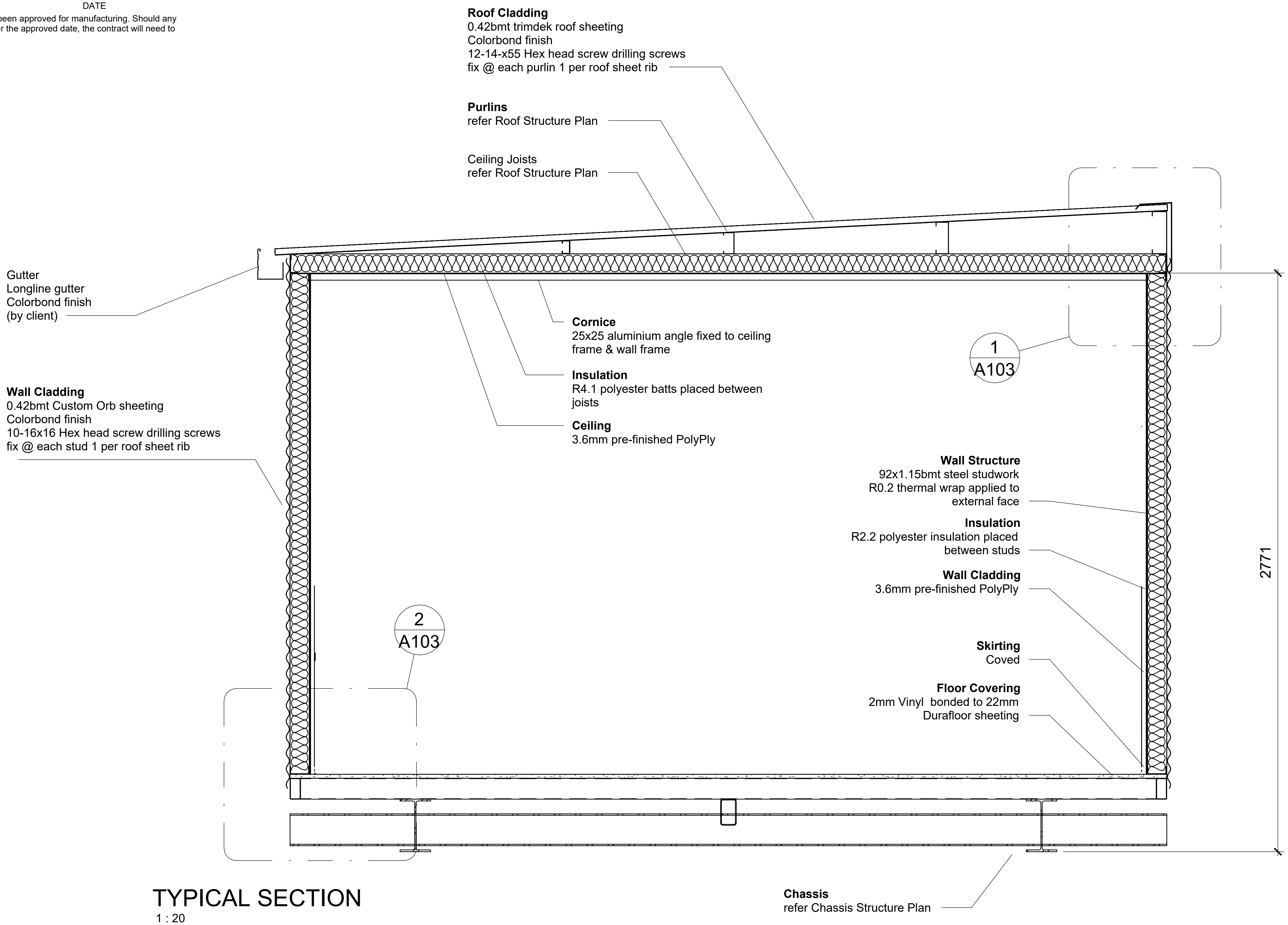

TYPICAL SECTION

1 : 20

Trigon PROJECTS

CBH 2024 Accomodation Project

KITCHEN, DINING, LAUNDRY UNIT

TYPICAL SECTION

Project number	Project Number
Date	31/05/2023
Drawn by	TB
Drawing number	A102
Revision	2

CLIENT APPROVAL

SIGNATURE DATE

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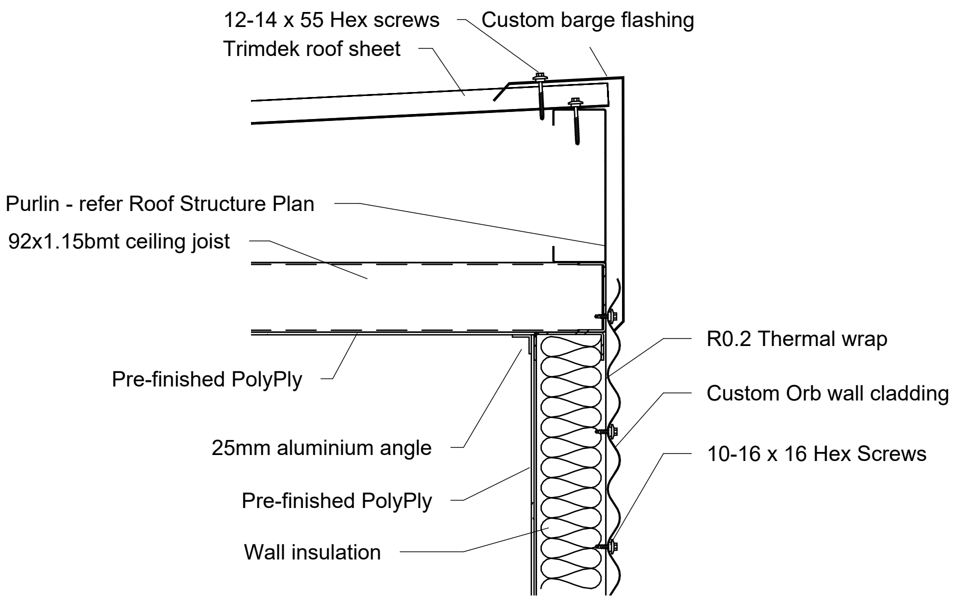
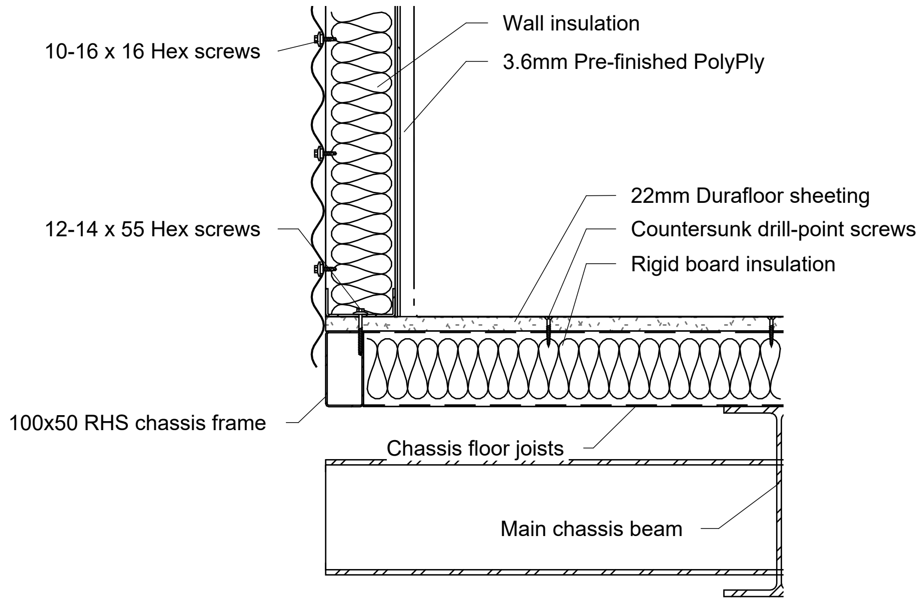


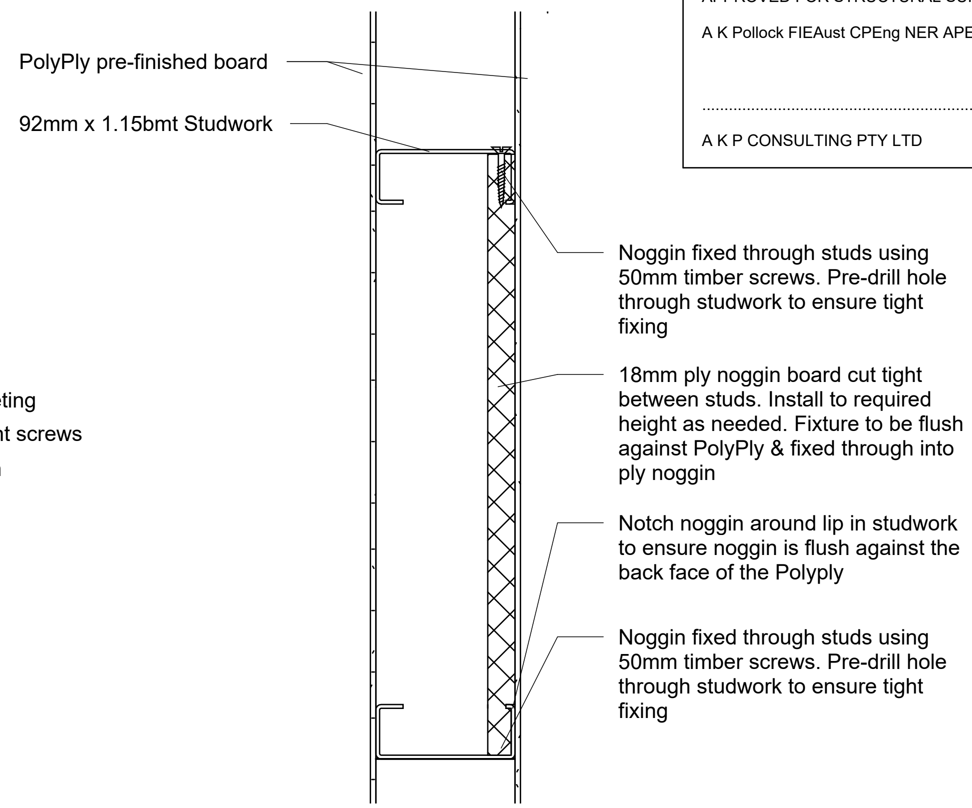
1 A102 BARGE DETAIL

1 : 10



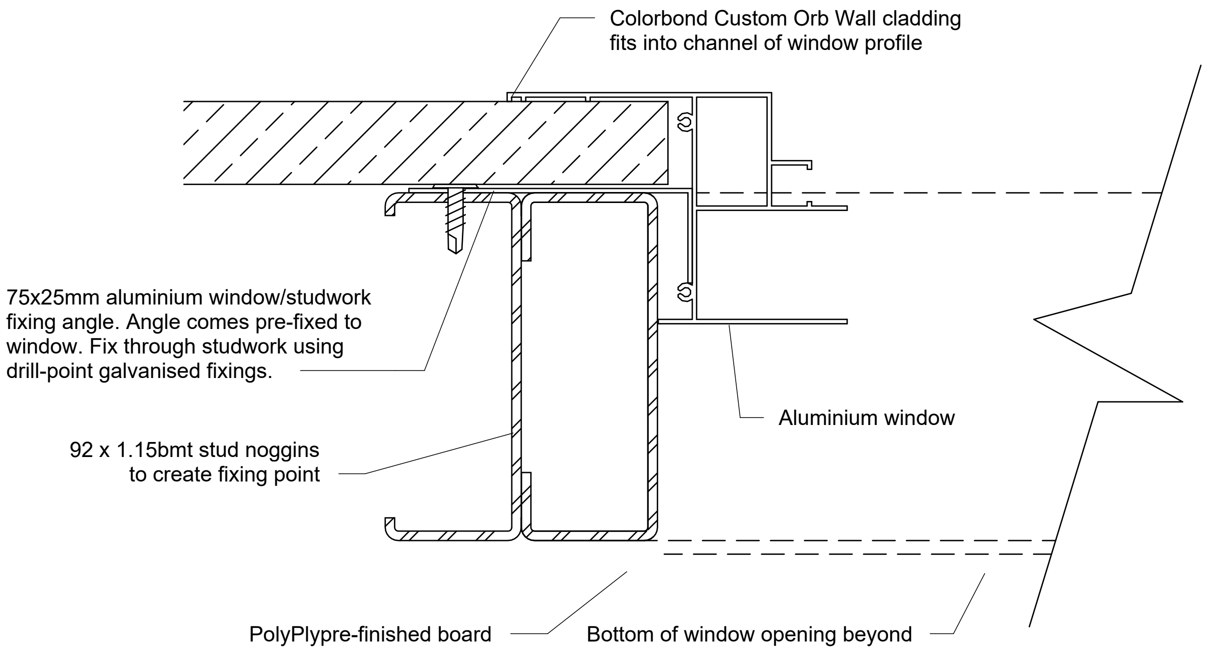
2 A102 FLOOR/WALL DETAIL

1 : 10



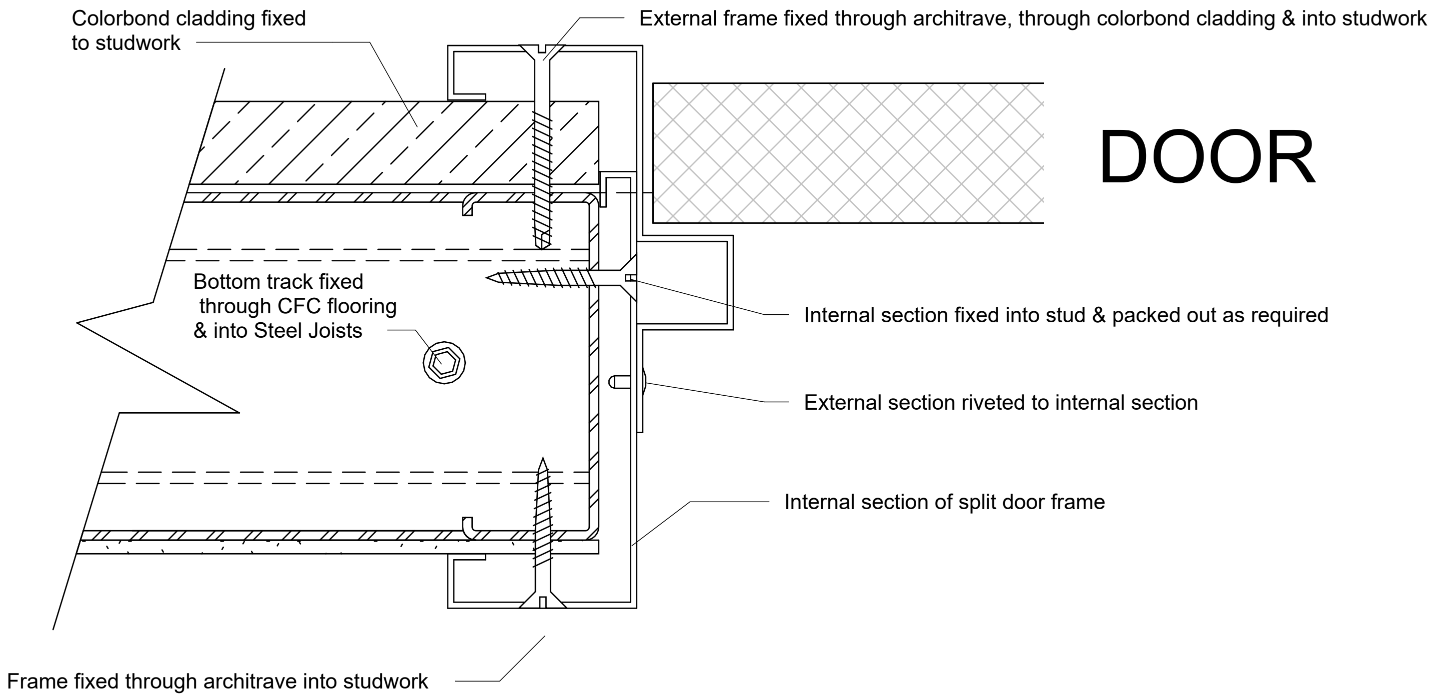
TYPICAL NOGGIN DETAIL

1 : 5



WINDOW SIDE FIXING DETAIL

1 : 2



SPLIT DOOR FRAME FIXING DETAIL

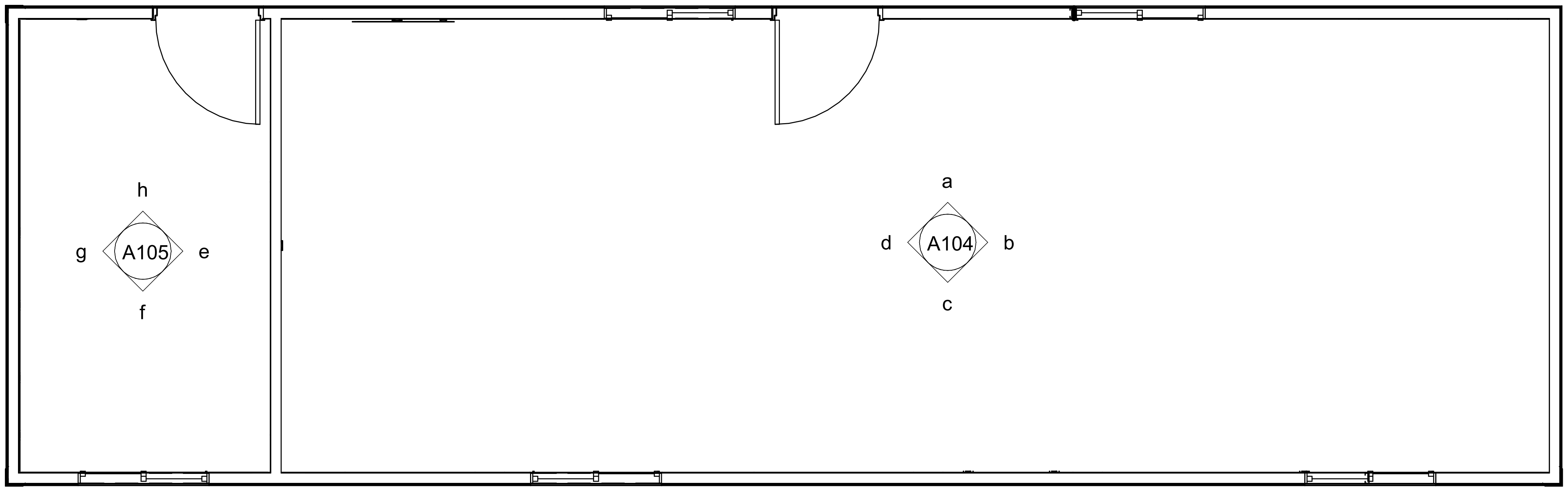
Trigon PROJECTS

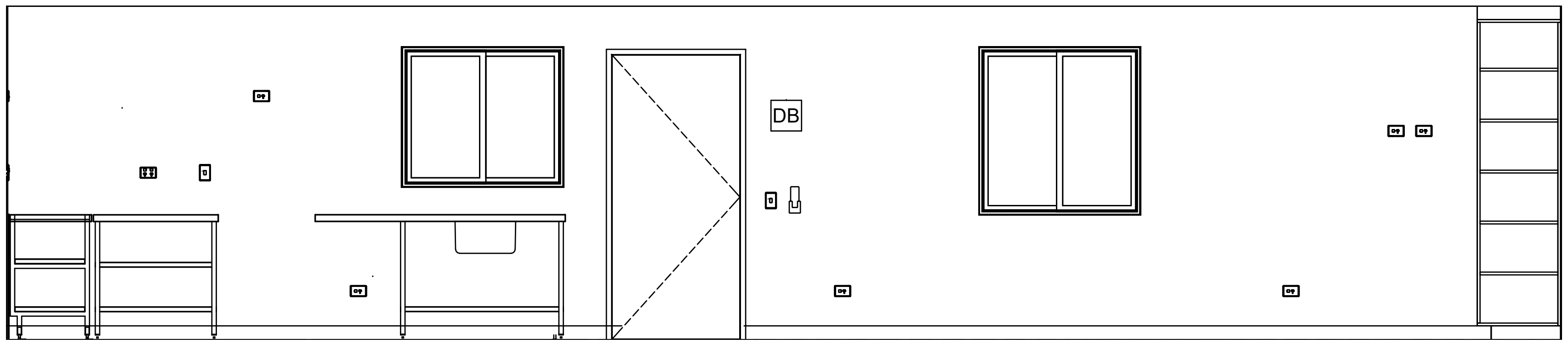
CBH 2024 Accomodation Project

KITCHEN, DINING, LAUNDRY UNIT

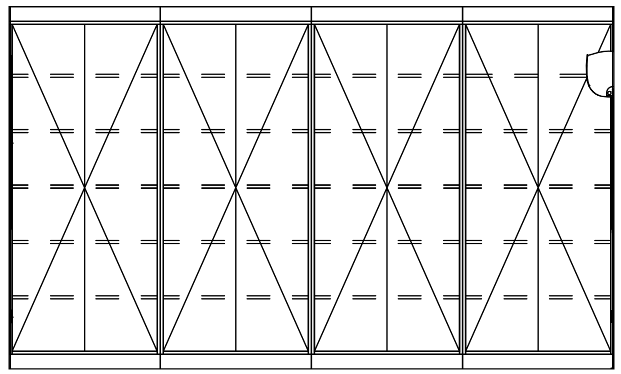
SECTION DETAILS

Project number	Project Number
Date	31/05/2023
Drawn by	TB
Drawing number	A103
Revision	2

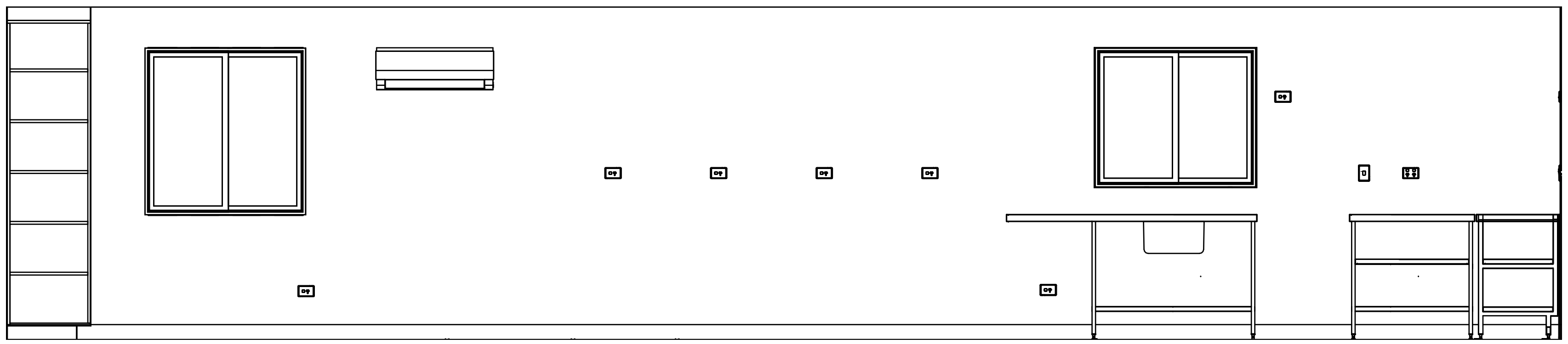




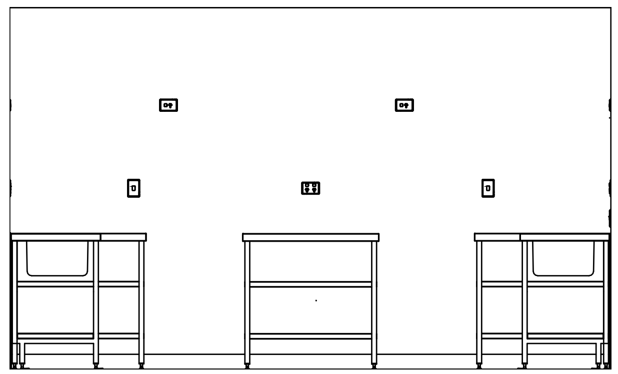
Elevation A
1 : 50



Elevation B
1 : 50



Elevation C
1 : 50



Elevation D
1 : 50

Trigon
PROJECTS

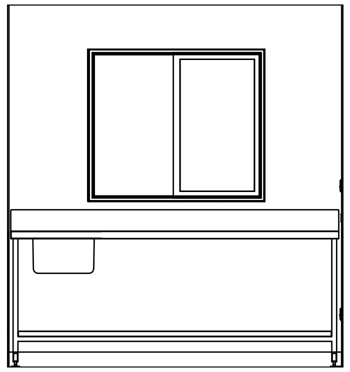
CBH 2024 Accomodation Project

KITCHEN, DINING, LAUNDRY UNIT

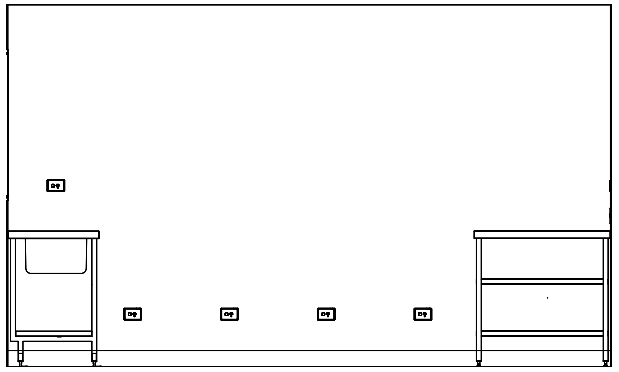
INTERNAL ELEVATIONS

Project number	Project Number
Date	31/05/2023
Drawn by	TB
Drawing number	A104
Revision	2

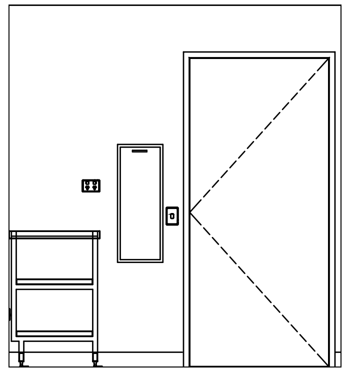
Elevation E
1 : 50



Elevation F
1 : 50



Elevation G
1 : 50



Elevation H
1 : 50

Trigon PROJECTS

CBH 2024 Accomodation Project

KITCHEN, DINING, LAUNDRY UNIT

INTERNAL ELEVATIONS

Project number	Project Number
Date	31/05/2023
Drawn by	TB
Drawing number	A105
Revision	2

Window Schedule

Mark	Height	Width	Operation	Details	Colour	Count
W1	1000	1156	Face-fit sliding	2 light; 5mm Clear Toughened; 610mm Aluminium mesh flywire	Deep Ocean	3
W2	1200	1156	Face-fit sliding	2 light; 5mm Clear Toughened; 610mm Aluminium mesh flywire	Deep Ocean	2

Door Schedule

Mark	Height	Width	Operation	Details	Frame Type	Door Type	Door Colour	Frame/screen Colour	Count
D1	2040	920	Single Swing Right Hand	Carbine PS4000-6000 Series Entrance Set (knob/lever - Escape function); Kilaro fixed door bottom seal; Aluminium mesh fly screen	2 Piece portable building frame	37mm Medium Density Polystyrene Core	Deep Ocean	Deep Ocean	1
D2	2040	920	Single Swing Left Hand	Carbine PS4000-6000 Series Entrance Set (knob/lever - Escape function); Kilaro fixed door bottom seal; Aluminium mesh fly screen	2 Piece portable building frame	37mm Medium Density Polystyrene Core	Deep Ocean	Deep Ocean	1

CLIENT APPROVAL

SIGNATURE

DATE

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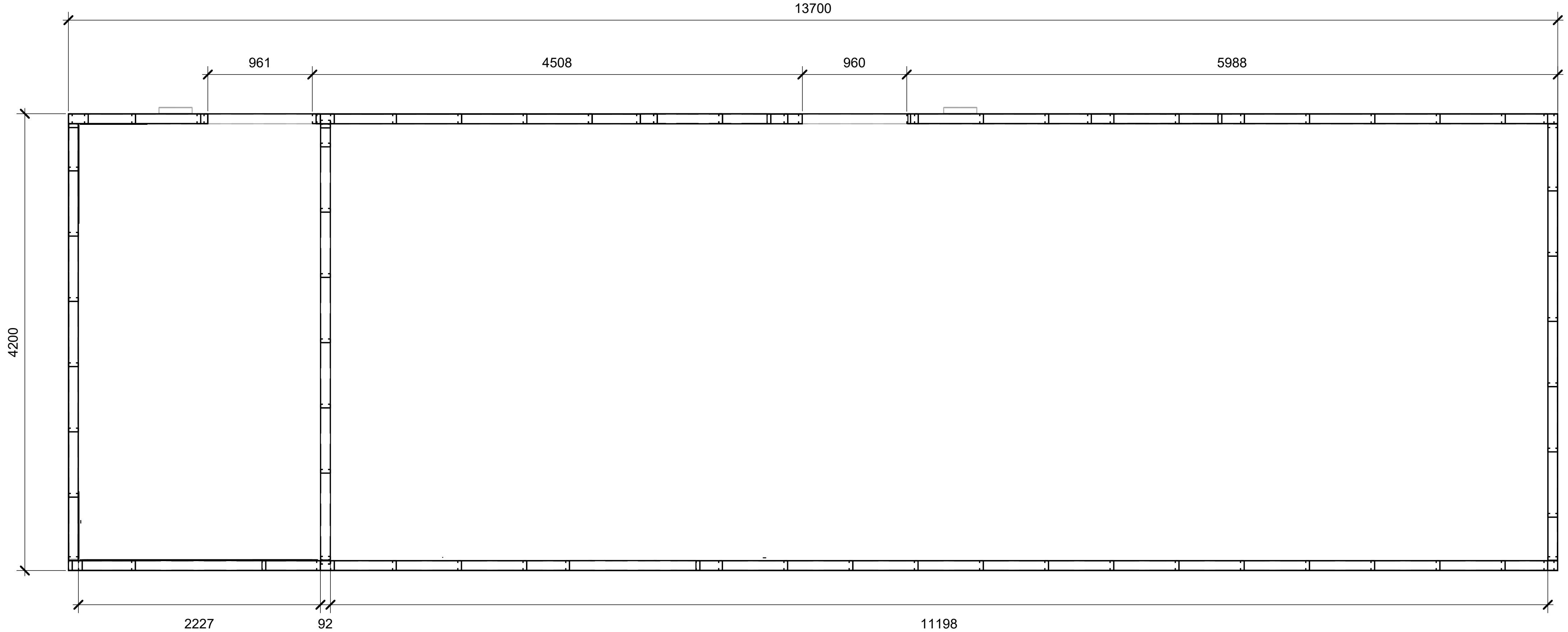
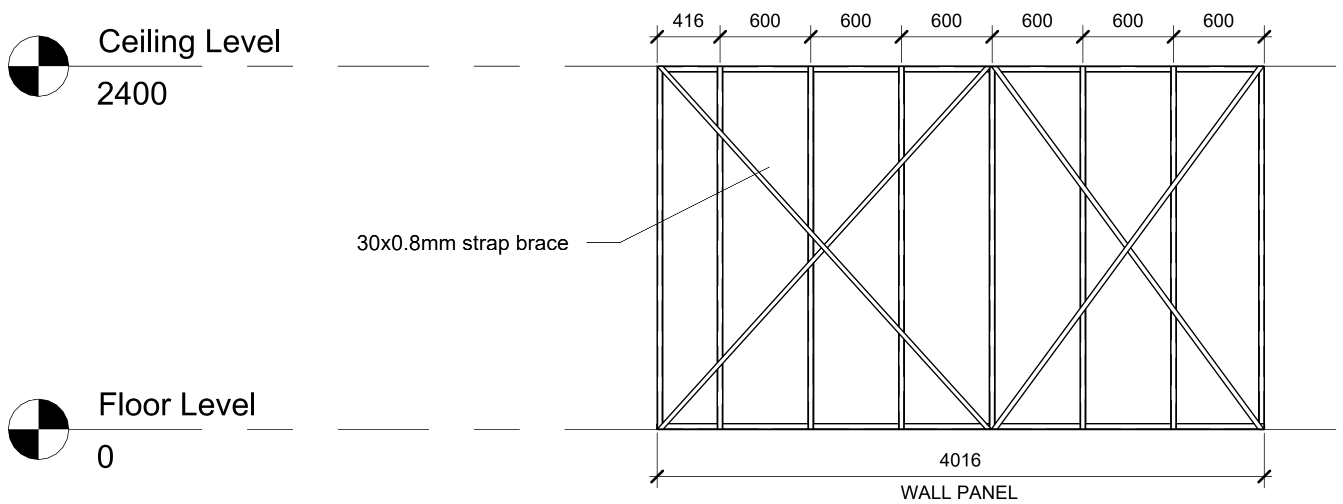


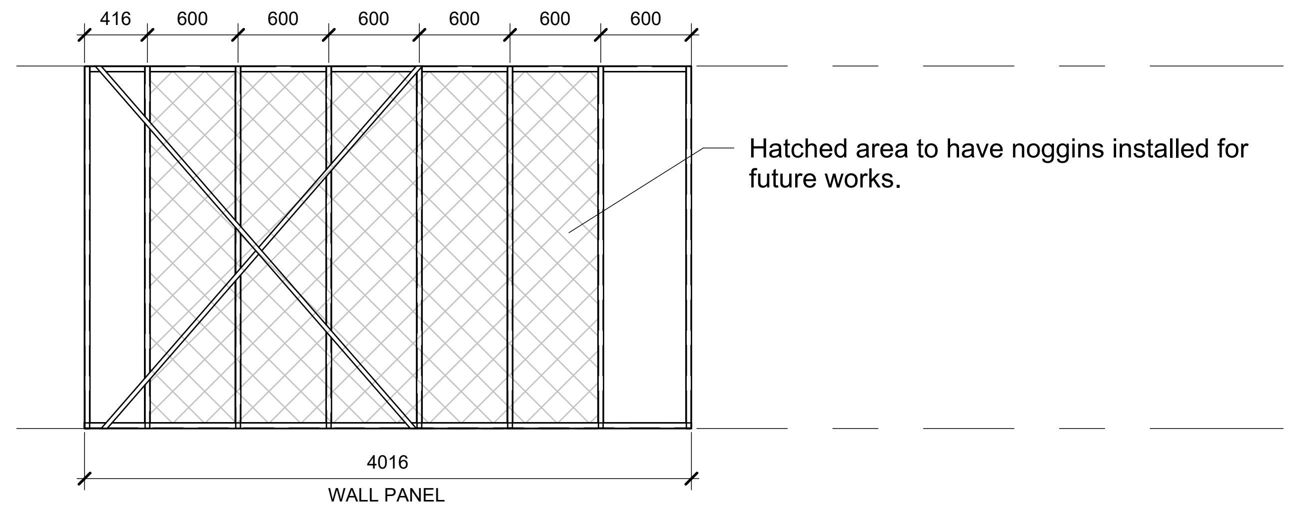
Wall Layout
1 : 50

NOTES

- All stud/track framing components fixed together using drill point metal screws



East Wall Frame
1 : 50



West Wall Frame
1 : 50

Trigon PROJECTS

CBH 2024 Accomodation Project

KITCHEN, DINING, LAUNDRY UNIT

WALL LAYOUT PLAN & ELEVATIONS

Project number	Project Number
Date	31/05/2023
Drawn by	TB
Drawing number	A200
Revision	2

CLIENT APPROVAL

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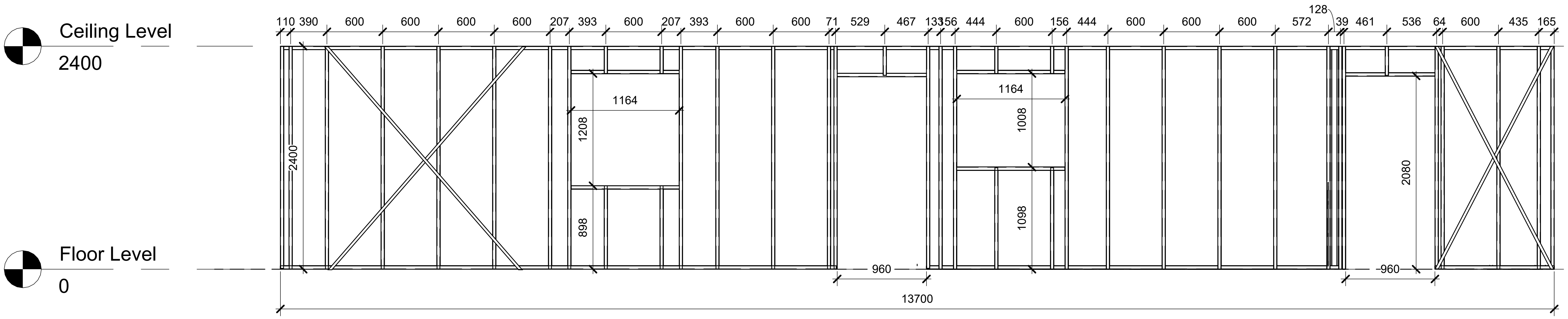
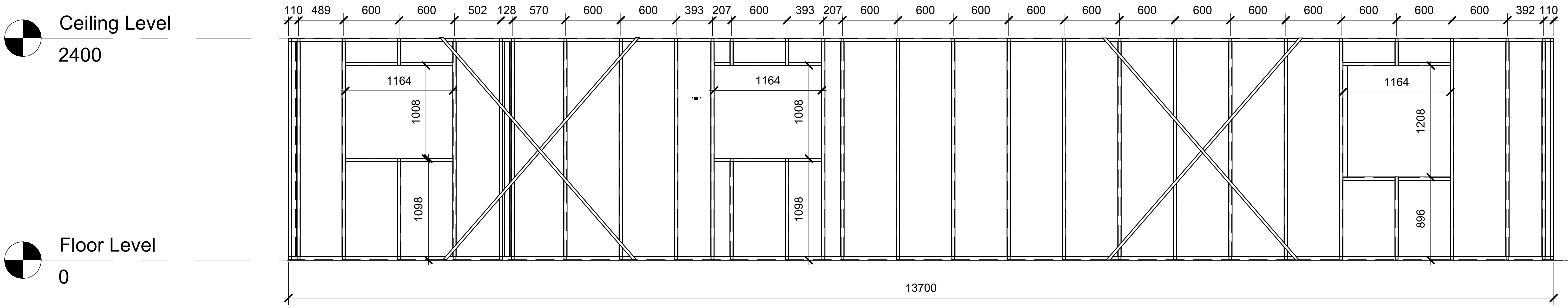


North Wall Frame

1 : 50

NOTES

- All stud/track framing components fixed together using drill point metal screws



South Wall Frame

1 : 50

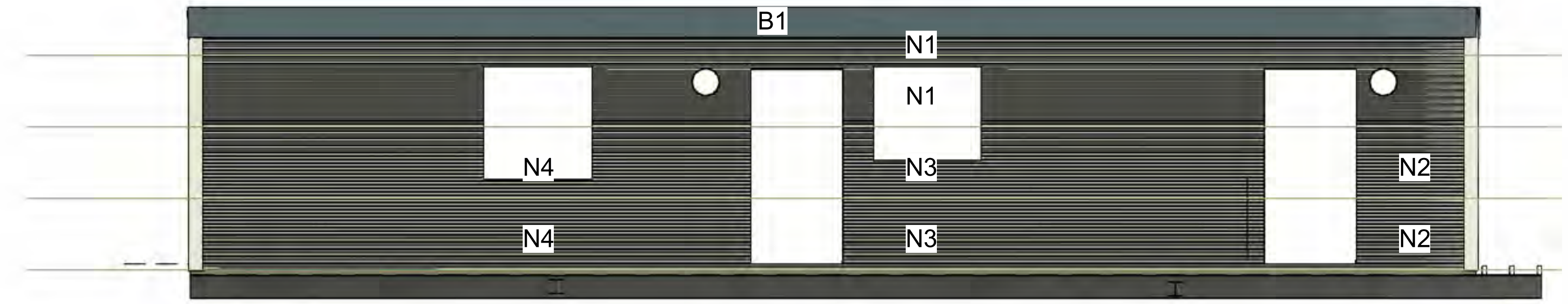
Trigon PROJECTS

CBH 2024 Accomodation Project

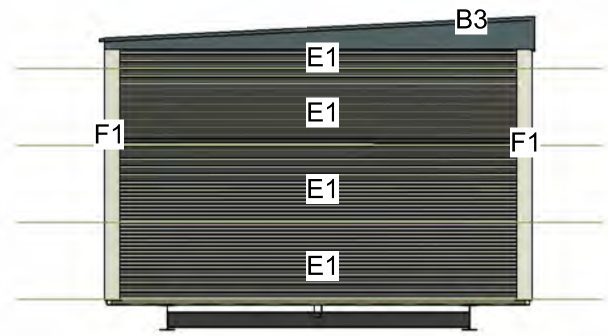
KITCHEN, DINING, LAUNDRY UNIT

WALL LAYOUT ELEVATIONS

Project number	Project Number
Date	31/05/2023
Drawn by	TB
Drawing number	A201
Revision	2

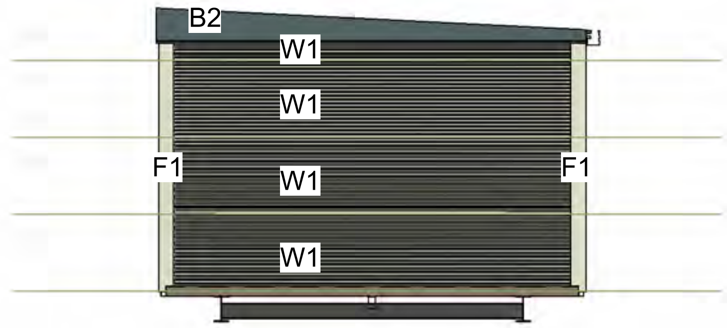


North Sheet Layout
1 : 75

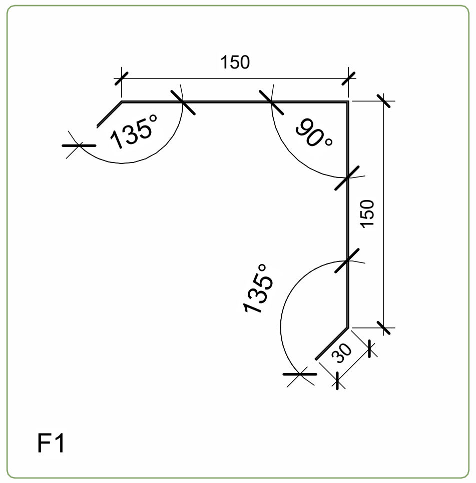


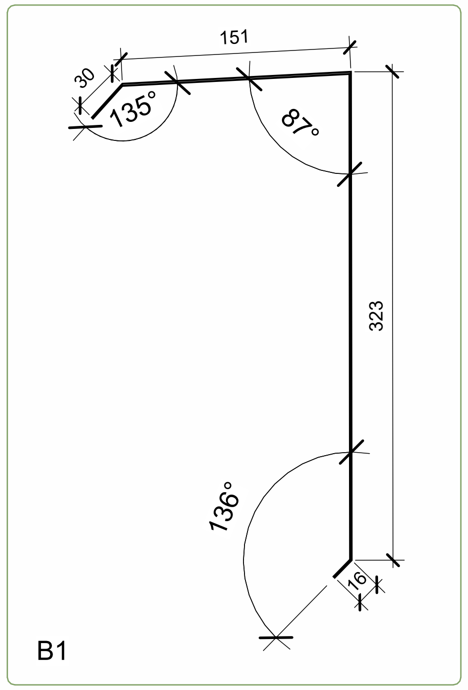
East Sheet Layout
1 : 75

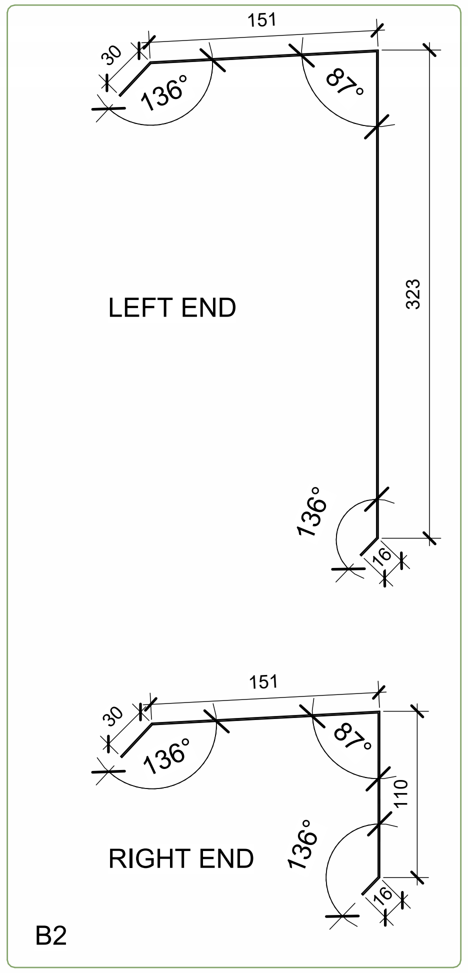
South Sheet Layout
1 : 75

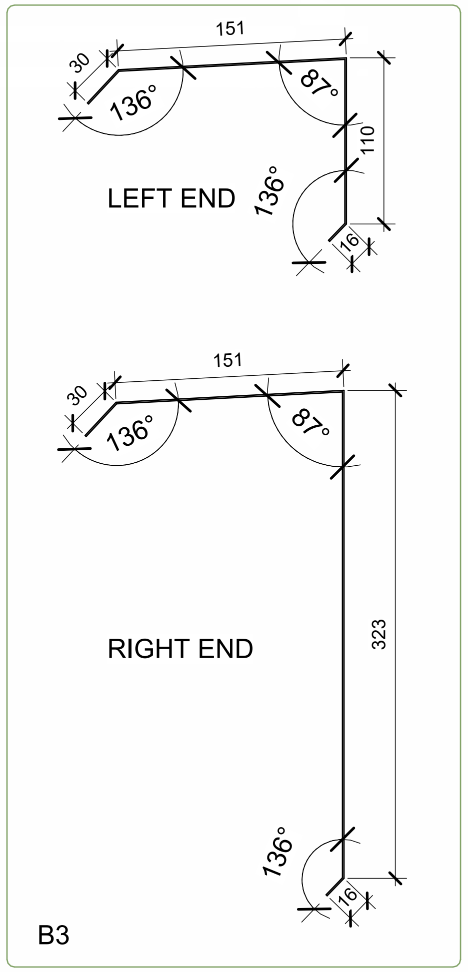


West Sheet Layout
1 : 75









TYPE	MARK	DIM (mm)	CNT
Custom Orb Paperbark	N1	13700	2
Custom Orb Paperbark	N2	1270	2
Custom Orb Paperbark	N3	4508	2
Custom Orb Paperbark	N4	5988	2
Custom Orb Paperbark	E1	4200	4
Custom Orb Paperbark	S1	13700	4
Custom Orb Paperbark	W1	4200	4
Barge Flashing (see detail)	B1	14100	1
Barge Flashing (see detail)	B2	4300	1
Barge Flashing (see detail)	B3	4300	1
Monoclad Deep Ocean	R1	4280	19
Corner Flashing (see detail)	F1	2700	4
Easiline Commercial gutter Deep Ocean	G1	14100	1
D/Pipe 100x50 Paperbark	DP	2400	3
Astragal 100x50 Paperbark			9
Nozzle/Pop 100x50 Zincalume			3
Easiline gen Pur Bracket (gal)			12
Easiline Gutter Stop End (Left)			1
Easiline Gutter Stop End (Left)			1

Trigon
PROJECTS

CBH 2024 Accomodation Project

KITCHEN, DINING, LAUNDRY UNIT

CLADDING LAYOUT PLAN

Project number	Project Number
Date	31/05/2023
Drawn by	TB
Drawing number	A300
Revision	2

SHEET LIST_GENERAL

SHEET NUMBER	SHEET NAME
A00-CS02	CODE LEGEND
A02-FP01	FLOOR PLAN
A03-EL01	EXTERNAL ELEVATION
A03-EL02	EXTERNAL ELEVATION
A04-SC01	SECTIONS
A05-RP01	ROOF PLAN
A05-RP10	REFLECTED CEILING PLAN
A06-IE01	INTERNAL ELEVATIONS
A07-SD02	FLASHING DETAILS
A07-SD20	CONSTRUCTION DETAILS
A08-SH01	DOOR & WINDOW SCHEDULE
A10-ST01	FOOTING LAYOUT
A11-SR01	ELECTRICAL & DATA

4P SPQ

PROJECT NO.:
J004099

PROJECT CLIENT
CBH

PROJECT STATUS
ISSUED FOR REVIEW

PROJECT ADDRESS:
GINGIN

FLEETWOOD AUSTRALIA

1202 Abernethy Rd, Perth Airport WA 6105 | (08) 9281 7500

GENERAL NOTES
1. ALL DIMENSIONS TO BE VERIFIED ON SITE PRIOR TO COMMENCEMENT OF WORKS.
2. USE WRITTEN DIMENSIONS ONLY, DO NOT SCALE DRAWINGS.
3. READ IN CONJUNCTION WITH OTHER DRAWINGS, SPECIFICATIONS & CONSULTANTS DOCUMENTATION.
4. REFER ANY DISCREPANCIES IMMEDIATELY TO THE DESIGNER & AWAIT WRITTEN INSTRUCTION.

SHEET
COVER PAGE

DRAWN	CHECKED	SCALE	SIZE
VL	KP		A3

DRAWING NO.
A00-CS01

REVISION
A

DC SIGN OFF:

Autodesk Docs://J004099 - CBH 4P SPQ/J004099_4P A SPQ.rvt

EXTERNAL CLADDING & FINISHES LEGEND

WMC-01 **CORRIGATED IRON**
EXTERNAL WALL
COLOUR: PAPERBARK
THICKNESS: 16MM

WPP-01 **POLYPLY**
INTERNAL WALL
COLOUR: MIRAGE PEARL
THICKNESS: 3MM

RMS-01 **ROOF SHEETING**
SUPERDECK ROOF SHEETING
COLOUR: DEEP OCEAN
BMT: 0.42MM

RFL-01/0X **FLASHINGS (INCLUDING CORNER TRIMS)**
MATERIAL: COLORBOND
COLOUR: 'DEEP OCEAN'

RBF-01 **BARGE CAPPING**
MATERIAL: COLORBOND
COLOUR: 'DEEP OCEAN'

FLOORING LEGEND

FVI-01 **VINYL**
TYPE: 3.0mm COMMERCIAL GRADE VINYL.
COLOUR: NEUTRAL GREY
TO ALL BEDROOMS
TO INCLUDE WSK-01

FVI-02 **VINYL**
TYPE: NON-SLIP COMMERCIAL GRADE VINYL
COLOUR: NEUTRAL GREY
TO ALL WET AREAS
TO INCLUDE WSK-02

WSK-01 **SKIRTING**
PVC SKIRTING
40MM HIGH.
COLOUR: TO MATCH FVI-01
TO ALL WET AREAS

WSK-02 **SKIRTING**
COVED VINYL SKIRTING
100MM HIGH.
TYPE: TO MATCH FVI-02
COLOUR: TO MATCH FVI-02
TO ALL WET AREAS

INSULATION

CIN-01 **CEILING:**
R2.5 EARTHWOOL BATTS BETWEEN CEILING JOISTS

RIN-01 **ROOF:**
R1.3 ANTI-CONDENSATION BLANKET UNDER ROOF SHEETS

FIN-01 **FLOOR:**
R2.0 ANTI-CONDENSATION BLANKET.

INTERNAL WALL & CEILING FINISHES LEGEND

CPB-01 **POLY PLY CEILING**
COLOUR: MIRAGE PEARL
TO ALL AREAS
TO INCLUDE **CCC-01**

CCC-01 **ALUMINIUM CORNICE**
40MM x 40MM ALUMINIUM ANGLE
TO ALL AREAS

WSK-03 **WALL - SPLASH BACK**
MATERIAL: CERAMIC 200MM X 200MM. .
COLOUR: WHITE

JOINERY LEGEND

JCF-01 **HALF HEIGHT WARDROBE**
TO INCLUDE 2X SHELVES
OVER FRIDGE RECESS
SIZE: 575MM W X 540MM D X 900MM H

JCF-02 **FULL HEIGHT WARDROBE**
TO INCLUDE WARDROBE RAILS AND TOP SHELF
SIZE: 365MM W X 540MM D X 1800MM H

JBE-01 **FIXED LAMINATE BENCH**
STUDY
DEPTH: 450MM
WIDTH: 1000MM
THICKNESS: 25MM MELAMINE
WALL MOUNTED

NOTES:
- ALL JOINERY COLOUR: TBC

LOOSE FURNITURE LEGEND

LBD-01 **BED**
KING SINGLE BED WITH BED HEAD

LCH-01 **CHAIR WITH WHEELS**
COLOUR: WHITE

FIXTURES

TRE-01 **BAR FRIDGE**
115 LITRE BAR FRIDGE

TBN-01 **BASIN**
TYPE: WHITE CERAMIC
TO INCLUDE MIXER

TSB-01 **SHOWER**
900MMx900MM FIBREGLASS UNIT
c/w SHOWER ROSE AND MIXER

TWC-01 **WC**
CERAMIC TOILET
COLOUR: WHITE

XMI-01 **MIRROR**
400MM W x 535MM HIGH
c/w INBUILT SHELF

XSC-01 **SHOWER CURTAIN**

XTR-01 **TOWEL RAIL**
SINGLE TOWEL RAIL

XTR-01 **TOILET ROLL HOLDER**

XCH-01 **COAT HOOK**

NO.	DESCRIPTION	DATE	BY	CHK'D
A	ISSUED FOR REVIEW	14.07.2023	MV	KP

FLEETWOOD AUSTRALIA

1202 Abernethy Rd, Perth Airport WA 6105 | (08) 9281 7500

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PROJECT NO.: **J004099**
PROJECT STATUS: **ISSUED FOR REVIEW**
PROJECT CLIENT: **CBH**

PROJECT: **4P SPQ**
PROJECT ADDRESS: **GINGIN**

SHEET: **CODE LEGEND**

DRAWN: **VL** | CHECKED: **KP** | SCALE: **1 : 100** | SIZE: **A3**

DRAWING NO.: **A00-CS02** | REVISION: **A**

DC SIGN OFF:

ROOMS

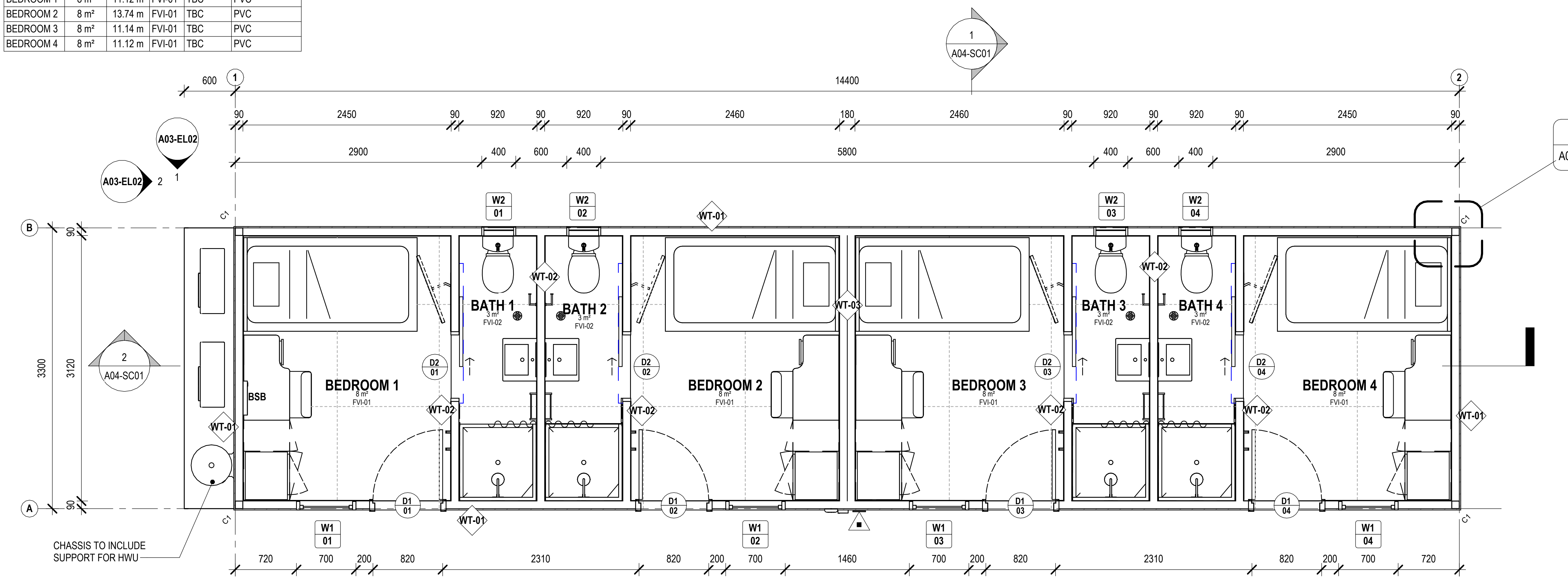
NAME	AREA	PERIM.	FLOOR LINING TYPE	FLOOR LINING COLOUR	SKIRTING
BATH 1	3 m²	8.06 m	FVI-02	TBC	PVC
BATH 2	3 m²	8.06 m	FVI-02	TBC	PVC
BATH 3	3 m²	8.06 m	FVI-02	TBC	PVC
BATH 4	3 m²	8.06 m	FVI-02	TBC	PVC
BEDROOM 1	8 m²	11.12 m	FVI-01	TBC	PVC
BEDROOM 2	8 m²	13.74 m	FVI-01	TBC	PVC
BEDROOM 3	8 m²	11.14 m	FVI-01	TBC	PVC
BEDROOM 4	8 m²	11.12 m	FVI-01	TBC	PVC

WALLS 1

TAG	STRUCTURE	EXTERNAL CLADDING TYPE	EXTERNAL CLADDING COLOUR	INTERNAL LINING TYPE	INTERNAL LINING COLOUR	INSULATION	m
WT-01	STEEL FRAME, 90MM, "LIPPED C" SECTION	CUSTOM ORB VERTICALLY LAID	PAPERBARK	POLY PLY 3mm	MIRAGE PEARL	90mm R2.5 EARTHWOOL	35.09 m
WT-02	STEEL FRAME, 90MM, "LIPPED C" SECTION	POLY PLY 3mm	MIRAGE PEARL	POLY PLY 3mm	MIRAGE PEARL	90mm R2.5 EARTHWOOL	56.89 m
WT-03	STEEL FRAME, 90MM, "LIPPED C" SECTION	POLY PLY 3mm	MIRAGE PEARL	POLY PLY 3mm	MIRAGE PEARL	90mm R2.5 EARTHWOOL	3.22 m

FLOOR

TAG	SUBSTRATE	m²
FVI-01	VINYL TARKETT PRIMO	30.69
FVI-02	VINYL TARKETT NON-SLIP	8.29



1 FLOOR PLAN 1 : 50

GENERAL NOTES:

BUILDING CLASSIFICATION: **NCC CLASS 1b**

BAL LEVEL: **BAL 29**

CLIMATE ZONE: **5**

CYCLONIC REGION CLASSFICIATION: **"A" REGION, TERRAIN CATEGORY = 2.0 Vu = V500 = 88m/s, Vser = 37m/s, Ms = 1.0, Mt = 1.0, Mz cat = 0.91**

WINDOWS DESIGN CRITERIA: **AS2047**

SERVICEABILITY PRESSURE: **GENERAL: 740pa - TABLE 2.1 AS2047 1110pa FOR WINDOWS WITHIN 600mm FROM CORNERS.**

ULTIMATE STRENGTH PRESSURE: **GENERAL: 1095pa - TABLE 2.5 AS2047 1640pa FOR WINDOWS WITHIN 600mm FROM CORNERS.**

WATER PENETRATION RESISTANCE PRESSURE **NON EXPOSED - 150Pa, EXPOSED - 200Pa**

WIND LOAD IN ACCORDANCE WITH: **AS.1170.2-2011**

FLOOR STRUCTURAL STEEL PROTECTION MINIMUM CATEGORY: **ATMOSPHERIC CORROSIVITY CATEGORY "C3"**

DESIGN CRITERIA IN ACCORDANCE WITH: **AS1170.1-2002: IMPOSED FLOOR ACTIONS (TABLE 3.1).**

ALLOWABLE FLOOR LOADS: **B-3.0kPa UNIFORMLY DISTRIBUTED. 4.5kN CONCENTRATED LOAD. (TBC BY ENGINEER)**

THE ENTIRE ROOF AND WALL ASSEMBLIES, THER CONNECTIONS & IMMEDIATE SUPPORTING MEMBERS HAVE BEEN DESIGNED SO AS TO BE CAPABLE OF REMAINING IN POSITION NOTWITHSTANDING ANY PERMANENT DISTORTION, FRACTURE OR DAMAGE THAT MIGHT OCCUR WITH NCC VOLUME 1, SPECIFICATIONS B1.2 OR VOLUME 2, PART 2.1.1 (b) AND 3.10.1 HIGH WIND AREAS (IF APPLICABLE).

ALL REFERENCED STANDARDS TO BE THE CURRENT VERSION AT THE TIME OF CONSTRUCTION.

GENERAL SPECIFICATIONS:

CHASSIS PAINT SPEC.: **425 ZINC PHOSPHATE PRIMER, 2 COATS ALKYD PRIMER ON WET - BLACK - FOR CORROSION INHIBITION.**

WALLS (WT-01): **90mm STEEL FRAMEWORK**

ROOF & CEILING FRAME: **90mm STEEL FRAMEWORK.**

NOTE: BUSHFIRE ATTACK LEVEL 29

NO.	DESCRIPTION	DATE	BY	CHK'D
A	ISSUED FOR REVIEW	14.07.2023	MV	KP

FLEETWOOD AUSTRALIA

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PROJECT NO.: **J004099**

PROJECT STATUS: **ISSUED FOR REVIEW**

PROJECT CLIENT: **CBH**

PROJECT: **4P SPQ**

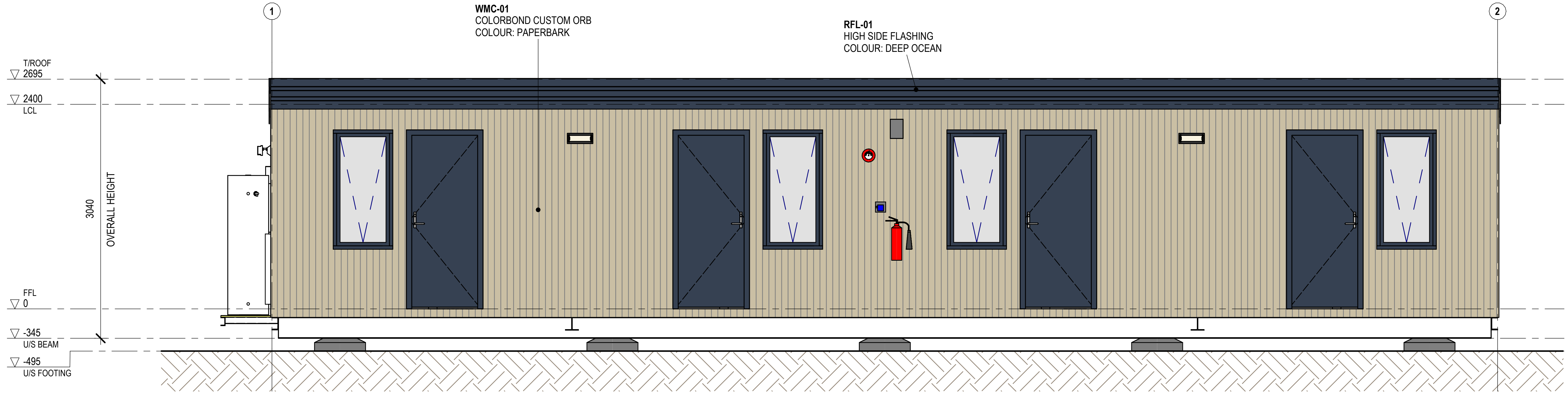
PROJECT ADDRESS: **GINGIN**

SHEET: **FLOOR PLAN**

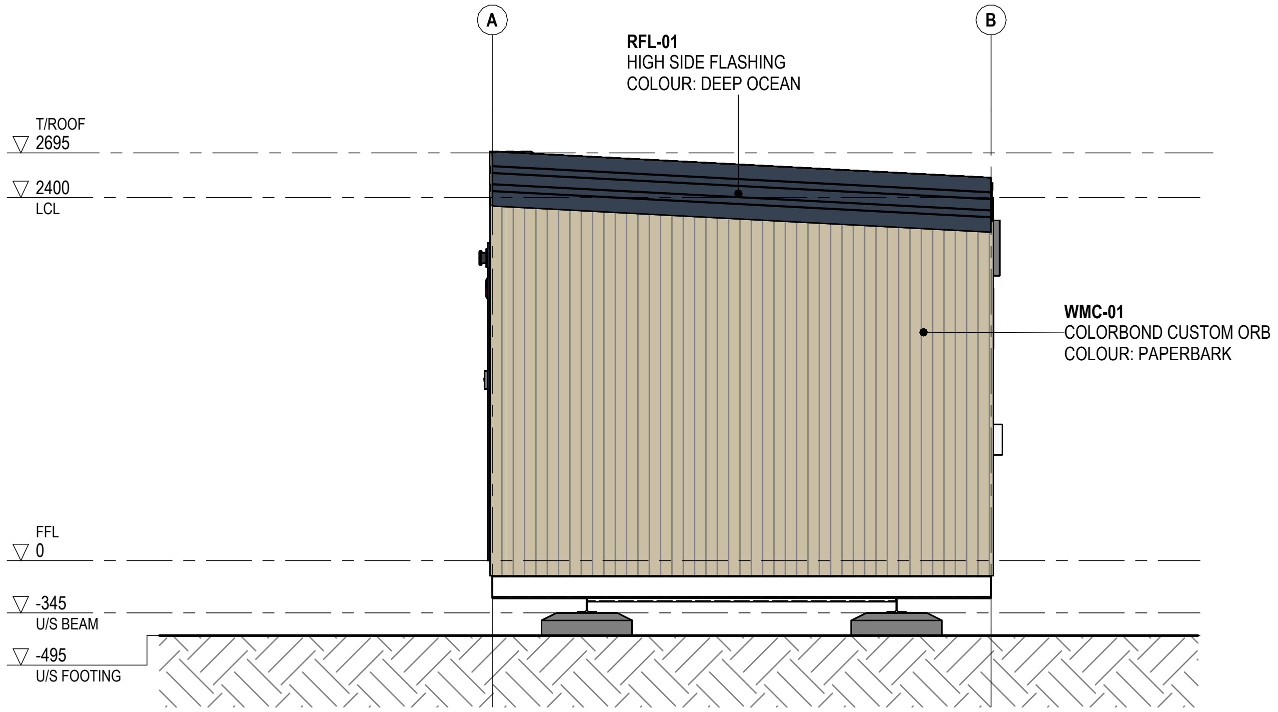
DRAWN: VL | CHECKED: KP | SCALE: 1 : 50 | SIZE: A3

DRAWING NO.: **A02-FP01** | REVISION: **A**

DC SIGN OFF:



1	FRONT ELEVATION
A02-FP01	1 : 50



2	SIDE 1 ELEVATION
A02-FP01	1 : 50

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A	ISSUED FOR REVIEW	14.07.2023	MV	KP

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J004099

PROJECT STATUS
ISSUED FOR REVIEW

PROJECT CLIENT
CBH

PROJECT:
4P SPQ

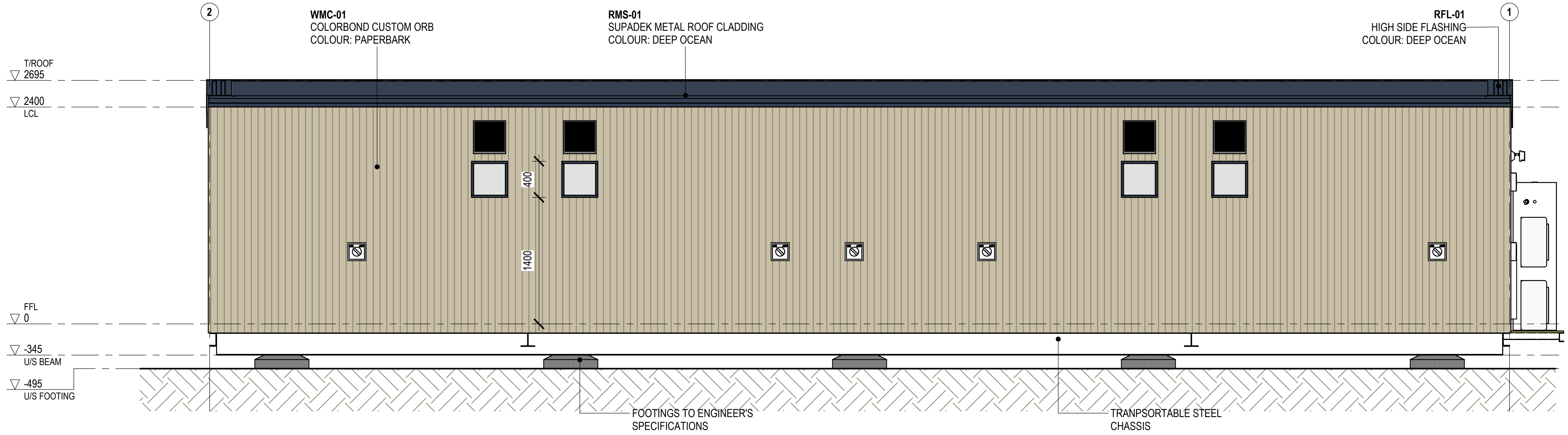
PROJECT ADDRESS
GINGIN

SHEET
EXTERNAL ELEVATION

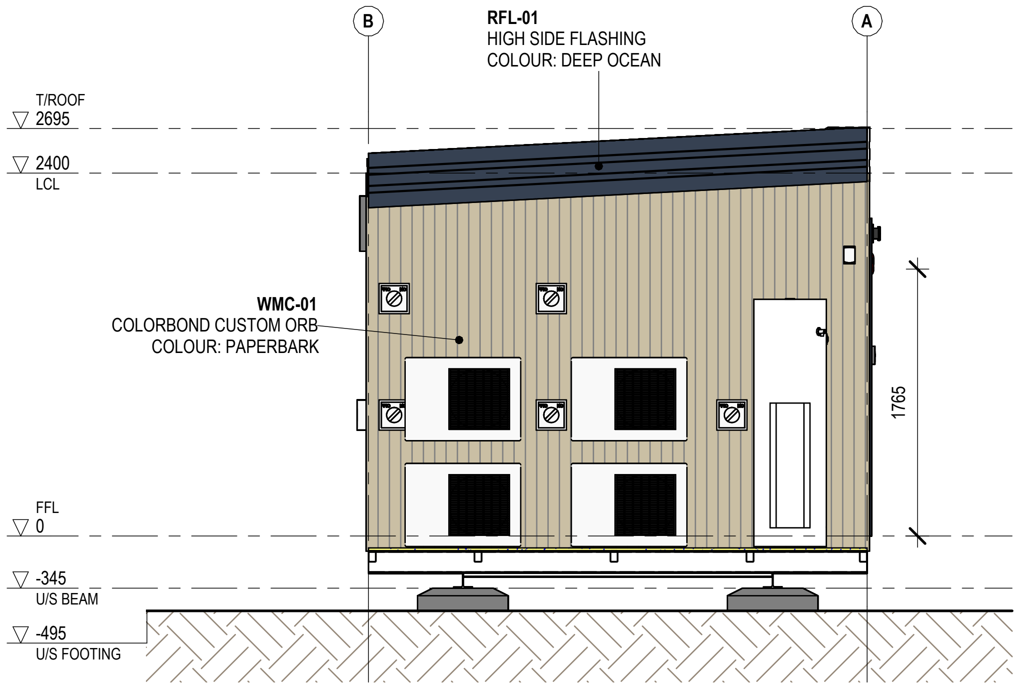
DRAWN	CHECKED	SCALE	SIZE
VL	KP	1 : 50	A3

DRAWING NO. **A03-EL01**
REVISION **A**

DC SIGN OFF:



1	REAR ELEVATION
A02-FP01	1 : 50



2	SIDE 2 ELEVATION
A02-FP01	1 : 50

NO.	DESCRIPTION	DATE	BY	CHK'D
A	ISSUED FOR REVIEW	14.07.2023	MV	KP

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PROJECT CLIENT: **CBH**

PROJECT: **4P SPQ**

PROJECT ADDRESS: **GINGIN**

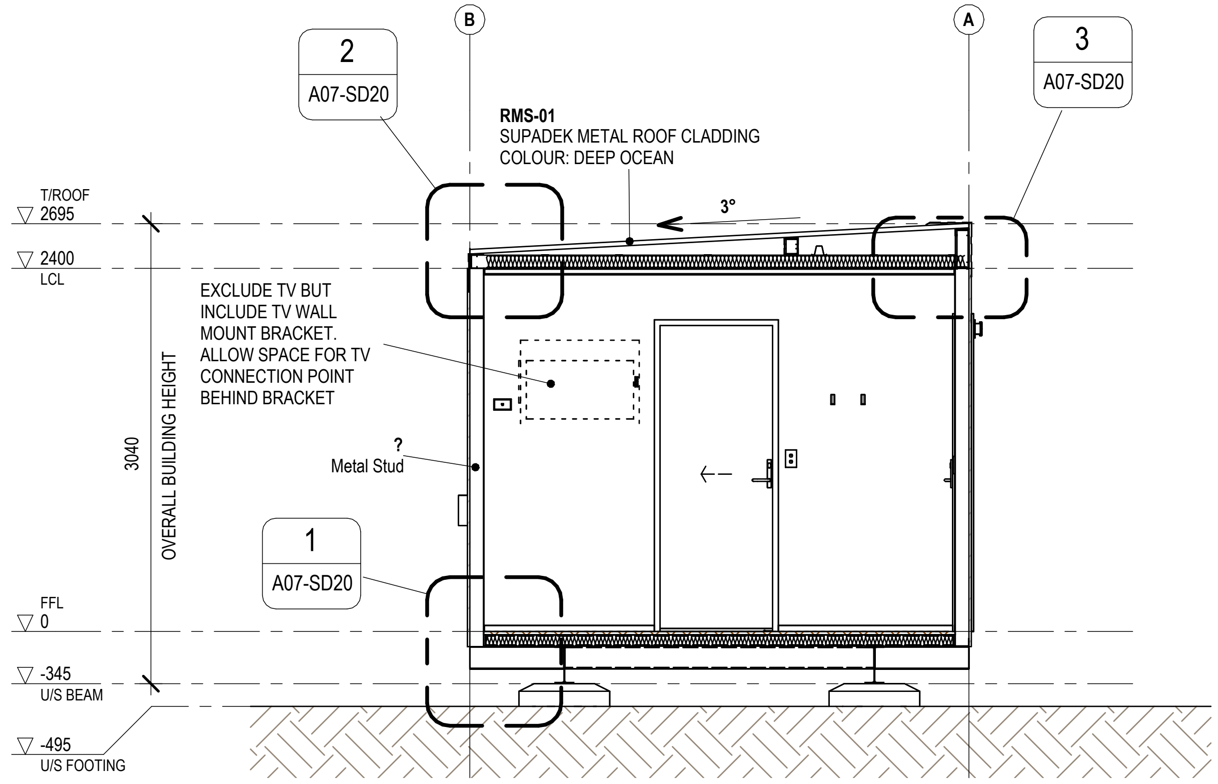
SHEET: **EXTERNAL ELEVATION**

DRAWN	CHECKED	SCALE	SIZE
VL	KP	1 : 50	A3

DRAWING NO.: **A03-EL02**

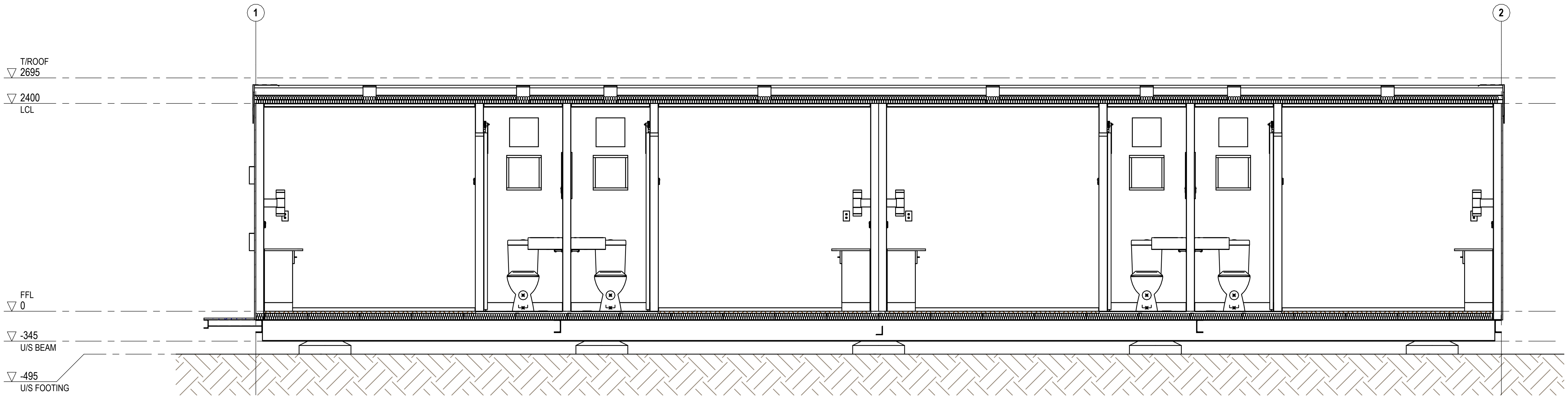
REVISION: A

DC SIGN OFF:



1
A02-FP01

SECTION 1
1 : 50



2
A02-FP01

SECTION 2
1 : 50

NO.	DESCRIPTION	DATE	BY	CHK'D
A	ISSUED FOR REVIEW	14.07.2023	MV	KP

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J004099

PROJECT STATUS
ISSUED FOR REVIEW

PROJECT CLIENT
CBH

PROJECT:
4P SPQ

PROJECT ADDRESS
GINGIN

SHEET
SECTIONS

DRAWN	CHECKED	SCALE	SIZE
VL	KP	1 : 50	A3

DRAWING NO.
A04-SC01

REVISION
A

DC SIGN OFF:

ROOF NOTES

METAL SHEET ROOFING TO BE IN ACCORDANCE WITH AS1562.1-1992.

1 ROOF PLAN
1 : 50

NO.	DESCRIPTION	DATE	BY	CHK'D
A	ISSUED FOR REVIEW	14.07.2023	MV	KP

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PROJECT STATUS: **ISSUED FOR REVIEW**

PROJECT CLIENT: **CBH**

PROJECT: **4P SPQ**

PROJECT ADDRESS: **GINGIN**

SHEET: **ROOF PLAN**

DRAWN	CHECKED	SCALE	SIZE
VL	KP	As indicated	A3

DRAWING NO.: **A05-RP01**

REVISION: A

DC SIGN OFF:

SERVICES FIXTURES

REFER TO SERVICES CONSULTANTS DRAWINGS FOR ALL SERVICES FIXTURES SPECIFICATIONS, REQUIREMENTS AND SCHEDULES.

WIRING SHALL BE IN ACCORDANCE WITH A.S 3000, A.S 3008 & THE RELEVANT LOCAL ELECTRICAL AUTHORITY.

CONTRACTORS SHALL BEFORE COMMENCEMENT OF CONSTRUCTION OF SERVICES, CHECK ALL SETOUTS AND DIMENSIONS.

THE ELECTRICAL INSTALLATION MUST COMPLY WITH REQUIREMENTS OF AS/NZS 3000 & 3008.1

ALL CEILINGS TO BE 2400MM HIGH UNLESS NOTED OTHERWISE

CEILING FIXTURES GENERALLY TO BE CENTRED WITHIN ROOMS UNLESS NOTED OTHERWISE

NOTE SET OUT IS MIRRORED WHERE NO ADDITIONAL DIMENSIONS ARE PROVIDED

CEILING FINISHES

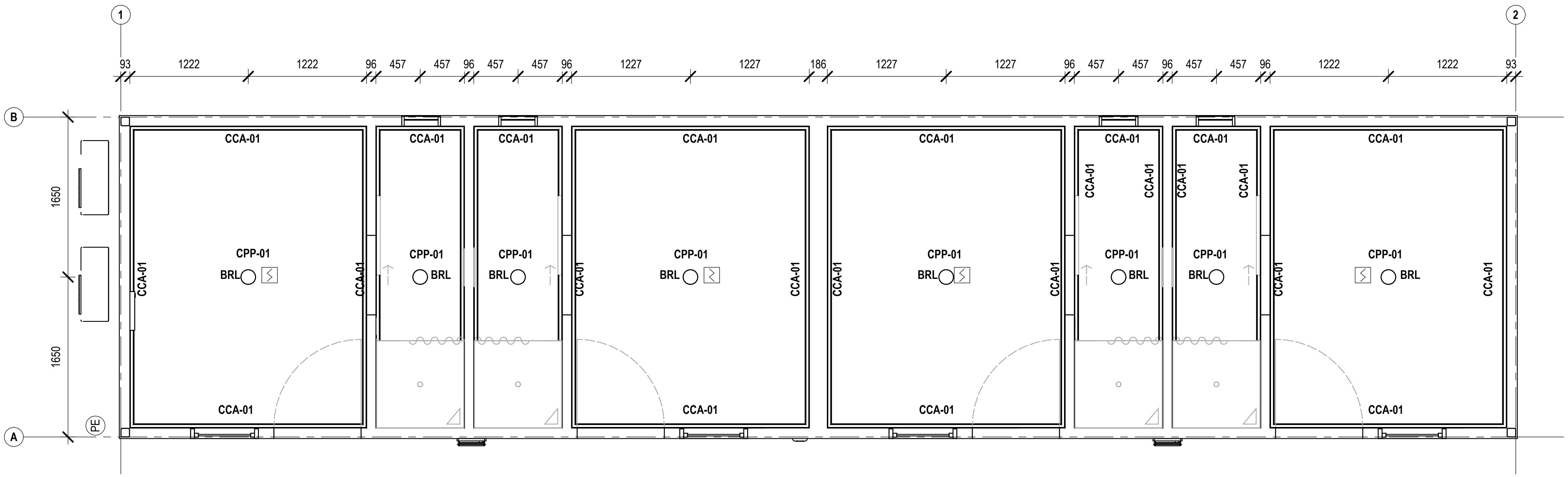
	CPP-01	POLYPLY CEILING
	CCA-01	ALUMINIUM CORNICE

LIGHTING FIXTURES

○	**BRL**	LED LIGHT. TYPE: RECESSED.

FIRE DETECTION FIXTURES

	BSD	SMOKE DETECTOR



1	REFLECTED CEILING PLAN
	1 : 50

NO.	DESCRIPTION	DATE	BY	CHK'D
A	ISSUED FOR REVIEW	14.07.2023	MV	KP

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PROJECT CLIENT: **CBH**

PROJECT: **4P SPQ**

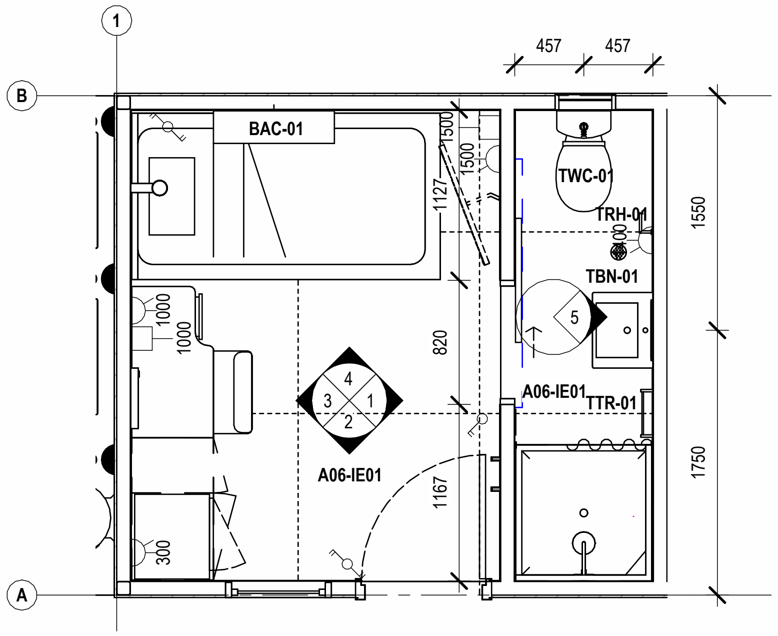
PROJECT ADDRESS: **GINGIN**

SHEET: **REFLECTED CEILING PLAN**

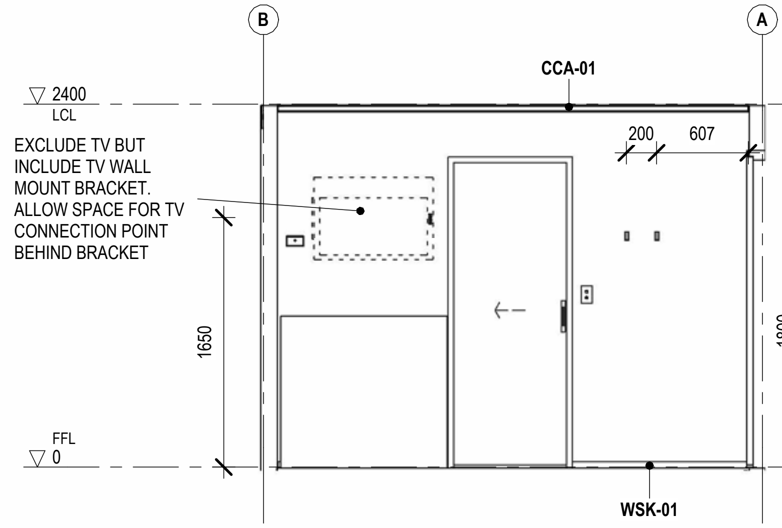
DRAWN	CHECKED	SCALE	SIZE
VL	KP	As indicated	A3

DRAWING NO.: **A05-RP10** REVISION: **A**

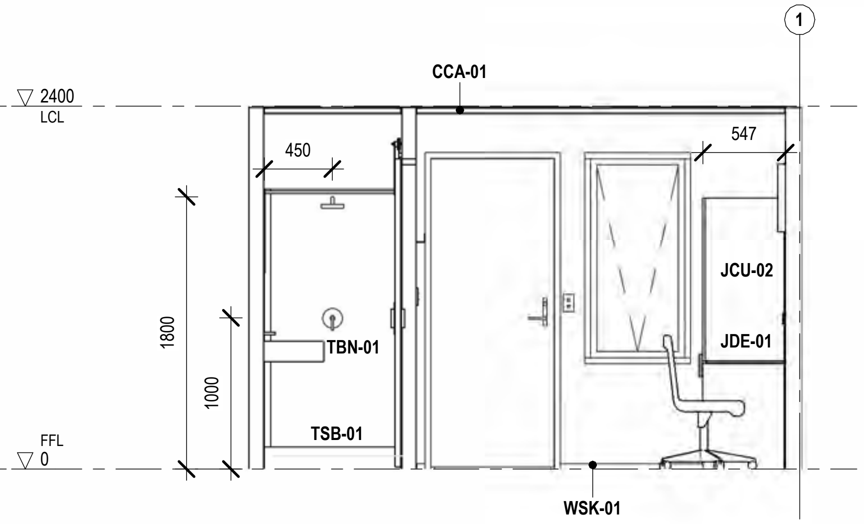
DC SIGN OFF:



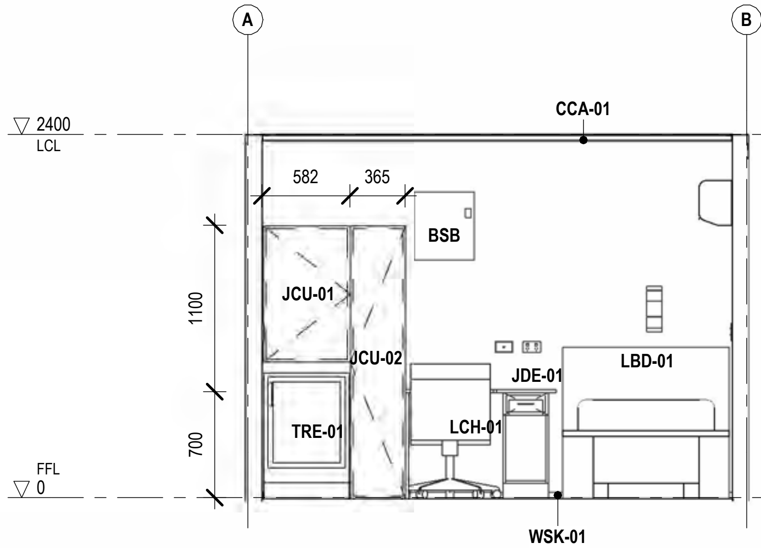
A	TYPICAL ROOM LAYOUT
	1 : 50



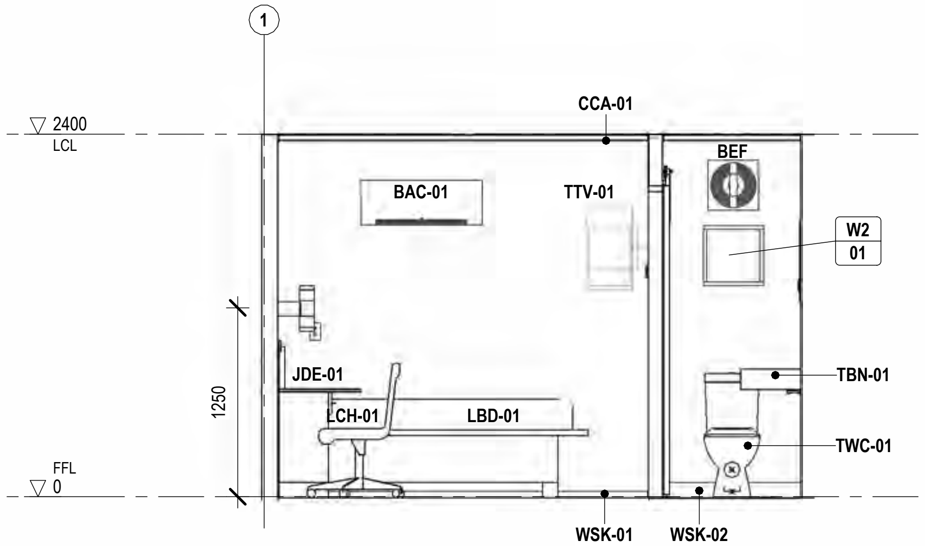
1	INTERNAL ELEVATION 1
A06-IE01	1 : 50



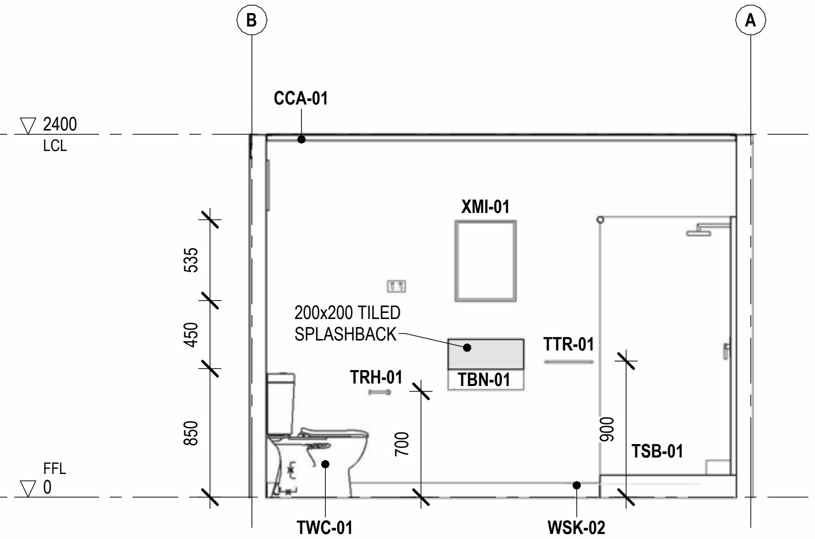
2	INTERNAL ELEVATION 2
A06-IE01	1 : 50



3	INTERNAL ELEVATION 3
A06-IE01	1 : 50



4	INTERNAL ELEVATION 4
A06-IE01	1 : 50



5	INTERNAL ELEVATION 5
A06-IE01	1 : 50

NO.	DESCRIPTION	DATE	BY	CHK'D
A	ISSUED FOR REVIEW	14.07.2023	MV	KP

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PROJECT CLIENT: **CBH**

PROJECT: **4P SPQ**

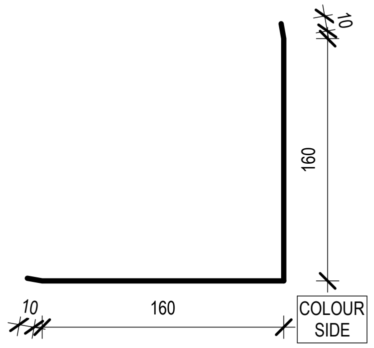
PROJECT ADDRESS: **GINGIN**

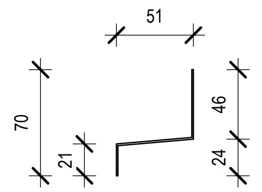
SHEET: **INTERNAL ELEVATIONS**

DRAWN	CHECKED	SCALE	SIZE
MV	SA	1 : 50	A3

DRAWING NO. **A06-IE01** REVISION **A**

DC SIGN OFF:

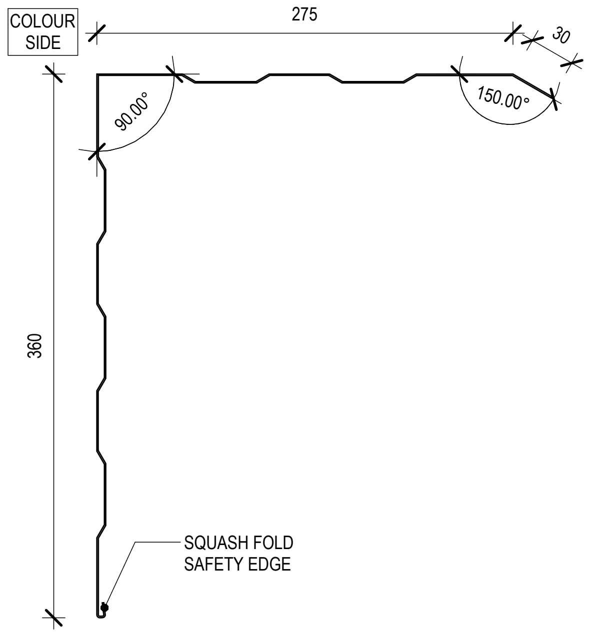




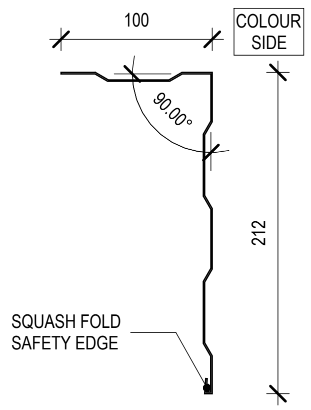
APRON WALL FLASHING
MIN 1.5MM THICKNESS G450

1	WFL-01. CORNER FLASHING
	1 : 5

3	WFL-02. WALL CAPPING
	1 : 5



FLASHING TO BE PROFILED



FLASHING TO BE PROFILED

6	RFL-01. HIGH SIDE/BARGE FLASHING
	1 : 5

7	RFL-02. LOW SIDE FLASHING
	1 : 5

NO.	DESCRIPTION	DATE	BY	CHK'D
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PROJECT: **4P SPQ**

PROJECT ADDRESS: **GINGIN**

SHEET: **FLASHING DETAILS**

DRAWN	CHECKED	SCALE	SIZE
VL	KP	1 : 5	A3

DRAWING NO. **A07-SD02**

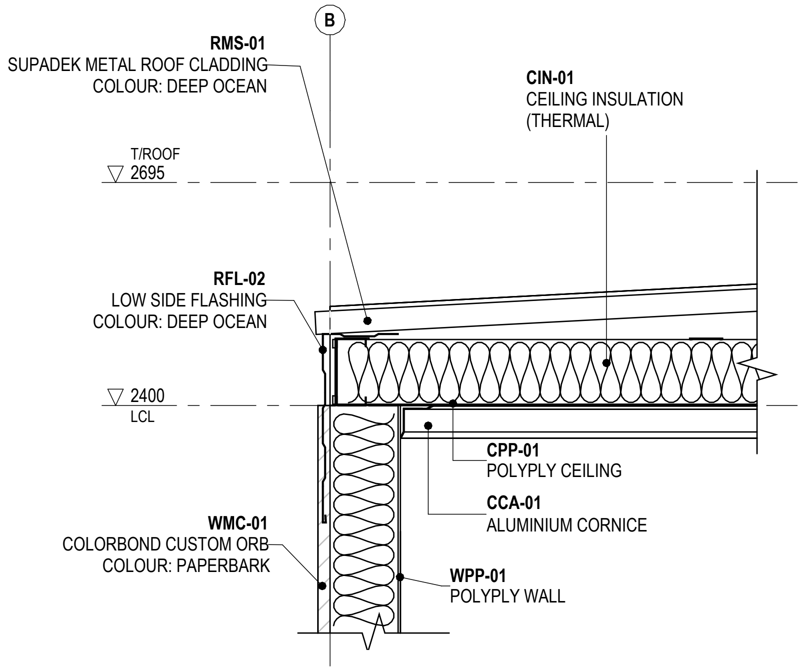
REVISION **A**

DC SIGN OFF:

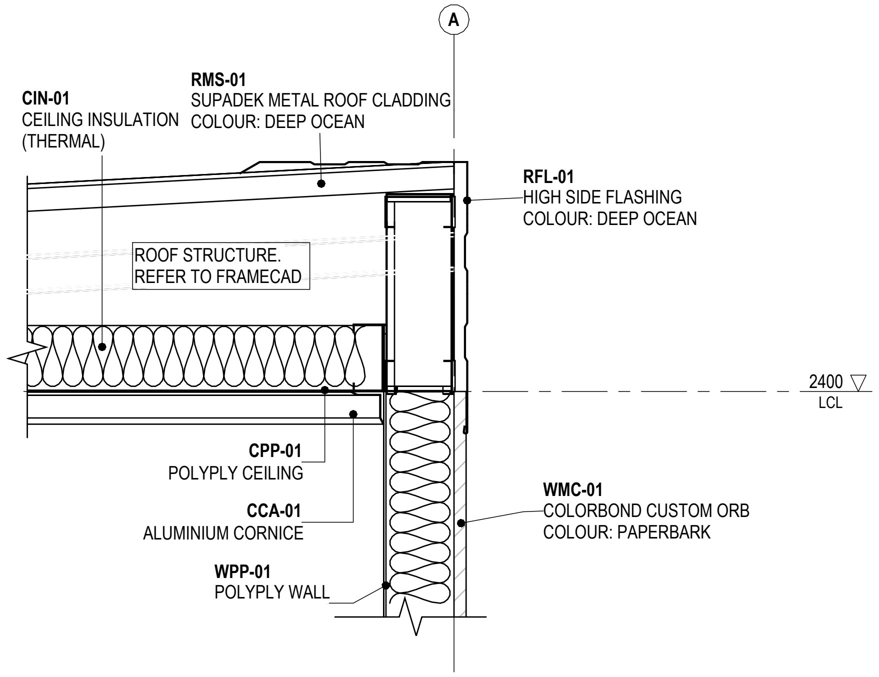
WALL FIXING SPECIFICATION

(TBC WITH ENGINEER)
WALLFRAME TO STEEL CHASSIS
1 x 14G TEKS @ 600 CRS (TYPICAL)

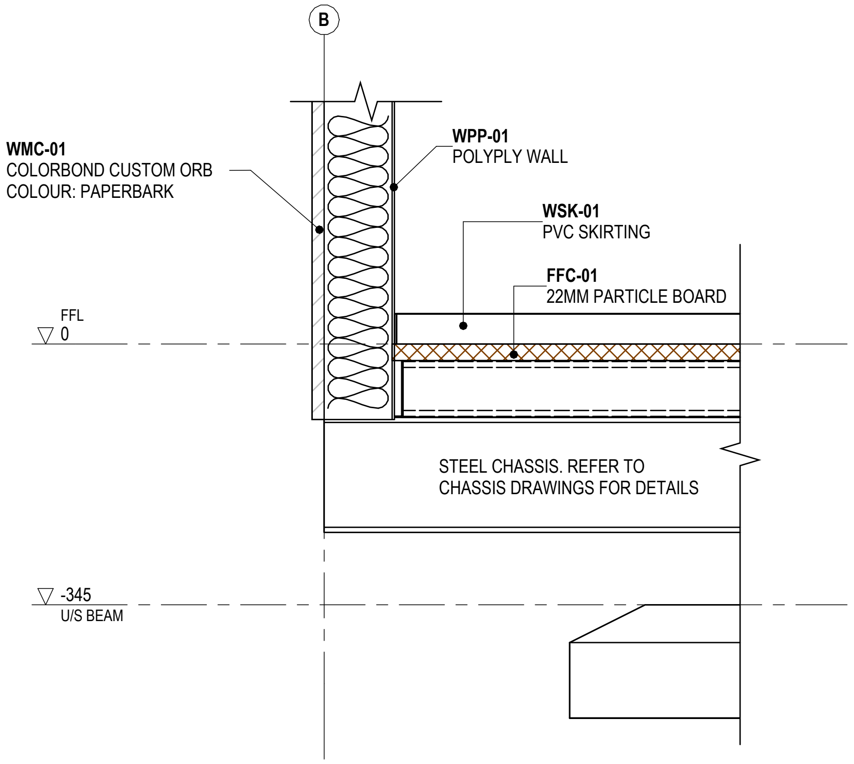
ROOF FRAME TO WALLFRAME
2 x 14G TEKS @ 600 CRS (TYPICAL)



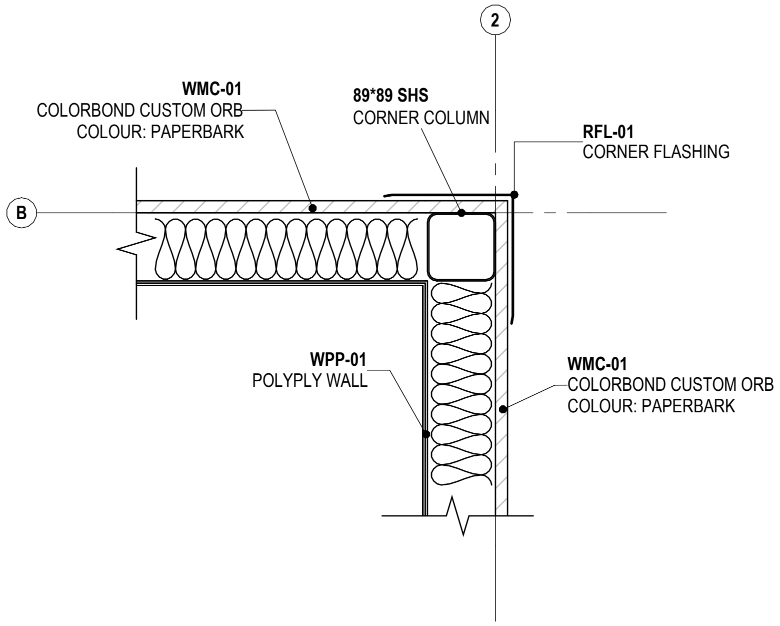
2	HIGH BARGE DETAIL
A04-SC01	1 : 10



3	LOW BARGE DETAIL
A04-SC01	1 : 10



1	CHASSIS DETAIL
A04-SC01	1 : 10



4	CORNER WALL DETAIL
A02-FP01	1 : 10

NO.	DESCRIPTION	DATE	BY	CHK'D
A	ISSUED FOR REVIEW	14.07.2023	MV	KP

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PROJECT CLIENT: **CBH**
PROJECT: **4P SPQ**
PROJECT ADDRESS: **GINGIN**

SHEET: **CONSTRUCTION DETAILS**

DRAWN	CHECKED	SCALE	SIZE
VL	KP	As indicated	A3

DRAWING NO.: **A07-SD20**
REVISION: **A**
DC SIGN OFF:

WINDOW NOTES

W#.# — WINDOW TYPE
— WINDOW NUMBER

W#.# — WINDOW TYPE
MODULE NUMBER — M#.## — WINDOW NUMBER

REVEAL SIZE MUST BE 115MM (PLEASE ALLOW TO CUT DOWN).

WINDOWS TO BE 2200 PA / 300 Water.

WINDOWS SHALL BE ALUMINIUM FRAMED NATURAL ANODISED FINISHED.

ALL GLAZING TO COMPLY WITH AS 2047 & AS 1288 GLAZING CODES

WINDOWS REQUIRE TO BE KEY LOCKABLE AS SCHEDULED.

FLYSCREENS TO ALL OPERABLE WINDOWS.

TYPE W1
FRAME: POWDERCOAT ALUMINIUM DEEP OCEAN
OPERATION: AWNING
GLAZING: 5mm TOUGHEND

TYPE W2
FRAME: POWDERCOAT ALUMINIUM DEEP OCEAN
OPERATION: FIXED
GLAZING: 5mm TOUGHEND OBSCURE

WINDOW SCHEDULE - MARK NUMBERED

TYPE	MARK	LOCATION	WIDTH	HEIGHT	GLAZING	WINDOW TYPE	COMMENTS
W1	01	BEDROOM 1	700	1400	CLEAR	AWNING	SECURITY SCREEN & BLINDS
W1	02	BEDROOM 2	700	1400	CLEAR	AWNING	SECURITY SCREEN & BLINDS
W1	03	BEDROOM 3	700	1400	CLEAR	AWNING	SECURITY SCREEN & BLINDS
W1	04	BEDROOM 4	700	1400	CLEAR	AWNING	SECURITY SCREEN & BLINDS
W2	01	BATH 1	400	400	OBSCURED	FIXED	N/A
W2	02	BATH 2	400	400	OBSCURED	FIXED	N/A
W2	03	BATH 3	400	400	OBSCURED	FIXED	N/A
W2	04	BATH 4	400	400	OBSCURED	FIXED	N/A

WINDOW PROCUREMENT SCHEDULE

TYPE	COUNT
W1	4
W2	4

NOTE: BUSHFIRE ATTACK LEVEL 29

DOOR NOTES

D#.## — DOOR TYPE
MK — DOOR NUMBER

D#.## — DOOR TYPE
MODULE NUMBER — ##.## — DOOR NUMBER

DOORS TO BE NOMINAL HEIGHT OF 2040MM UNLESS SPECIFIED.

DOORS GLAZING TO CONFORM TO A.S 1288.

DOOR HARDWARE AS REFERRED TO IN SPECIFICATION.

DOORS TO BE KEYED AS PER SPECIFICATION. MASTER BUILDER KEYS UNLESS NOTED OTHERWISE IN SPECIFICATION.

ALL DOORS TO BE FITTED WITH APPROVED AIR SEALS AS PER SECTION 'J' OF THE BCA.

ALL EXIT DOORS AND DOORS LEADING TO EXITS TO BE PROVIDED WITH COMPLIANT HARDWARE - ie. READILY OPENABLE WITHOUT A KEY FROM THE SIDE THAT FACES EGRESS BY A SINGLE HAND DOWNWARD ACTION ON A SINGLE DEVICE BETWEEN 900MM AND 1.1M FROM THE FFL.

ALL DOORS WILL BE CONTRASTING TO FRAMES IN ACCORDANCE WITH AS1428.1 - 2009

MIN. 530MM LATCH CLEARANCE FROM THE EXTERNAL SIDE OF BOTH ENTRY DOORS.

NOTE: DIMENSIONS ARE TO OPENING IN FRAME. DOOR LEAF TO BE 100mm WIDER

TYPE D1
FRAME: GALV. PRESSED METAL POWDERCOATED DEEP OCEAN
LEAF: METAL CLAD, SOLID TIMBER PANEL.
FINSH: COLORBOND EXT DEEP OCEAN, INT DEEP OCEAN.
TYPE: HINGED DOOR
HARDWARE: LEVER TYPE ENTRANCE SET

TYPE D2
FRAME: GALV. PRESSED METAL POWDERCOATED DEEP OCEAN
LEAF: HOLLOW CORE TIMBER DOOR
FINISH: PAINTED DEEP OCEAN
TYPE: INTERNAL SLIDING DOOR
HARDWARE: FACE SLIDER HANDLE

DOOR SCHEDULE - MARK NUMBERED

TYPE	MARK	LOCATION	WIDTH	HEIGHT	DOOR TYPE	LEAF	HARDWARE	COMMENTS
D1	01	BEDROOM 1	820	2040	SWING	SOLID CORE	ENTRANCE SET	FLYSCREEN
D1	02	BEDROOM 2	820	2040	SWING	SOLID CORE	ENTRANCE SET	FLYSCREEN
D1	03	BEDROOM 3	820	2040	SWING	SOLID CORE	ENTRANCE SET	FLYSCREEN
D1	04	BEDROOM 4	820	2040	SWING	SOLID CORE	ENTRANCE SET	FLYSCREEN
D2	01	BATH 1	820	2040	SLIDING	HOLLOW CORE	FACE SLIDER HANDLE	
D2	02	BATH 2	820	2040	SLIDING	HOLLOW CORE	FACE SLIDER HANDLE	
D2	03	BATH 3	820	2040	SLIDING	HOLLOW CORE	FACE SLIDER HANDLE	
D2	04	BATH 4	820	2040	SLIDING	HOLLOW CORE	FACE SLIDER HANDLE	

DOOR PROCUREMENT SCHEDULE

TYPE	TOTAL
D1	4
D2	4

NO.	DESCRIPTION	DATE	BY	CHK'D
A	ISSUED FOR REVIEW	14.07.2023	MV	KP

FLEETWOOD AUSTRALIA

1202 Abernethy Rd, Perth Airport WA 6105 | (08) 9281 7500

GENERAL NOTES
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2. USE WRITTEN DIMENSIONS ONLY, DO NOT SCALE DRAWINGS.
3. READ IN CONJUNCTION WITH OTHER DRAWINGS, SPECIFICATIONS & CONSULTANTS DOCUMENTATION.
4. REFER ANY DISCREPANCIES IMMEDIATELY TO THE DESIGNER & AWAIT WRITTEN INSTRUCTION.

PROJECT NO.: **J004099**
PROJECT STATUS: **ISSUED FOR REVIEW**
PROJECT CLIENT: **CBH**
PROJECT: **4P SPQ**
PROJECT ADDRESS: **GINGIN**

SHEET: **DOOR & WINDOW SCHEDULE**
DRAWN: **VL** CHECKED: **KP** SCALE: **1 : 100** SIZE: **A3**
DRAWING NO.: **A08-SH01** REVISION: **A**
DC SIGN OFF:

SFO. CONCRETE DONUT FOOTING
600MM Ø X 150MM HEIGHT

TIE DOWN 1
600 DIA x 1200 DEEP MASS CONCRETE PAD FOOTING
TD1

NOTE
PLEASE INFORM FLEETWOOD IMMEDIATELY IF ANY NEW OR EXISTING BUILDINGS ON SITE ARE WITHIN 3M OF BUILDING OUTLINE

SOIL CLASSIFICATION: TBD

FOUNDATION NOTES:

FOUNDATION SOIL TO BE CLEAN, COMPACT, NATURAL GROUND, FREE OF EXCESSIVE MOISTURE.

THE OVERALL SITE SHOULD BE GRADED TO ENSURE STORM WATER CAN FREELY DRAIN AWAY FROM THE BUILDING FOUNDATIONS AND TO THE SURROUNDING DRAINAGE SYSTEM.

THE SURROUNDING GROUND IS TO BE BUILT UP TO WITHIN 125mm OF THE FLOOR LEVEL OF THE HOUSE WHICH WILL ENSURE THE SURFACE WATER IS DIVERTED WELL BACK FROM THE HOUSE.

STRIP THE SITE TO A MINIMUM OF 100MM OR AS TO REMOVE ALL TOPSOIL.

PREPARE SITE SUCH THAT SURFACE RUNOFF CANNOT DRAIN OVER OR UNDER FOUNDATIONS.

NOTE

TYPICAL FOOTING LAYOUT ONLY DESIGN AND INSTALLATION ON SITE BY OTHERS.

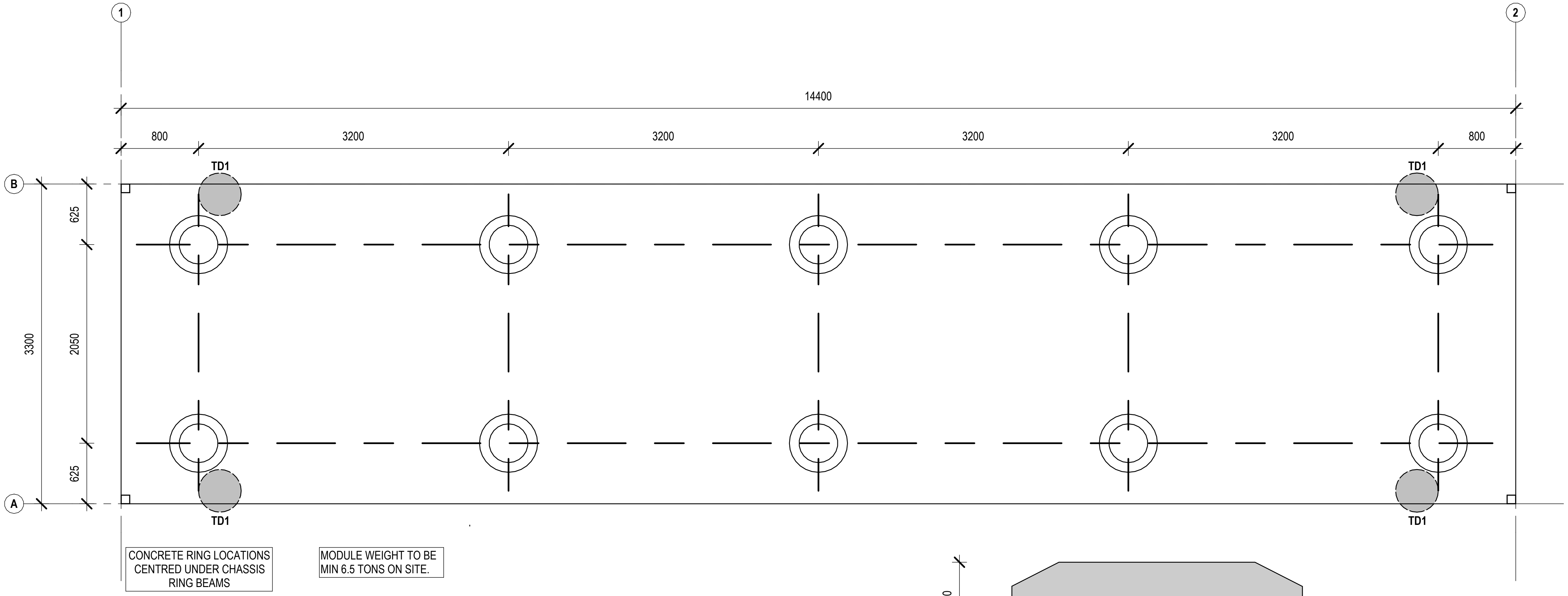
TIE DOWN REQUIREMENTS BY OTHERS.

GROUND SHALL BE COMPACTED TO ACHIEVE:

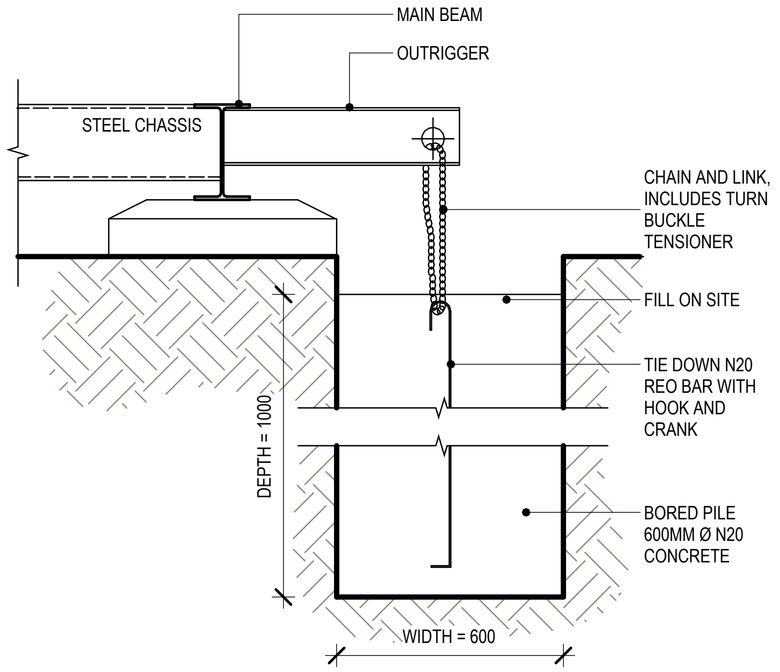
FOR SAND SITES - MINIMUM 6 BLOWS OVER 150-450mm, 7 BLOWS OVER 450-750mm AND 9 BLOWS OVER 750-1050mm WITH A PERTH SAND PENETROMETER (AS1289.6.3.3)
FOR COHESIVE/GRAVEL SITES - MINIMUM 6 BLOWS OVER 150mm USING A DYNAMIC CONE PENETROMETER (DCP) THROUGH ALL FILL OR TO 600mm IN NATURAL GROUND.

FOOTING HAS BEEN DESIGNED FOR CLASS 'A' AND 'S' SOIL TO AS2870

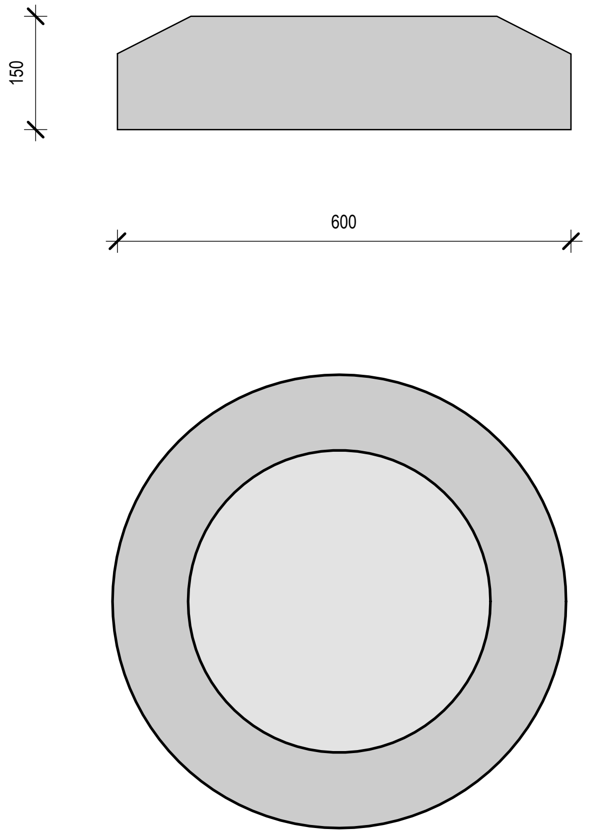
PRECAST CONCRETE SLAB BY TOHERS DESIGNED FOR 3kPA, 4.5kN IMPOSED FLOOR LOAD



1 FOOTING LAYOUT
1 : 50



3 TIE DOWN DETAIL
1 : 20



2 DONUT DETAIL
1 : 10

NO.	DESCRIPTION	DATE	BY	CHK'D
A	ISSUED FOR REVIEW	14.07.2023	MV	KP

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PROJECT NO.:
J004099

PROJECT STATUS
ISSUED FOR REVIEW

PROJECT CLIENT
CBH

PROJECT:
4P SPQ

PROJECT ADDRESS
GINGIN

SHEET
FOOTING LAYOUT

DRAWN **VL** | CHECKED **KP** | SCALE **As indicated** | SIZE **A3**

DRAWING NO. **A10-ST01** | REVISION **A**

DC SIGN OFF:

ELECTRICAL & DATA FIXTURES

300	BGP-01	DOUBLE 10A GENERAL PURPOSE OUTLET WALL MOUNTED 300MM AFFL UNLESS NOTED OTHERWISE
300	BDO-01	SINGLE COMMUNICATIONS OUTLET RJ45 4 PAIR CAT. 6 UTP
TV 300	BDO-02	TV OUTLET
PE	BPE	PHOTOELECTRIC CELL
	BPI	800 AFL ISOLATOR WALL MOUNTED
	BSB	DISTRIBUTION BOARD WALL MOUNTED 1800MM AFFL UNLESS NOTED OTHERWISE
	BDL	RECESSED LED LIGHT.
	BWL-01	LED BUNKER LIGHT, SCREW FIXED LUMINARY. WALL MOUNTED.
	BWL-02	LED LAMP LIGHT. WALL MOUNTED.
	BSW-01	MULTI GANG SWITCH
	BSW-01	TWO-WAY SWITCH
1500		DENOTES MOUNTING HEIGHT
	TRE-01	60 LITRE BAR FRIDGE

FIRE DETECTION FIXTURES

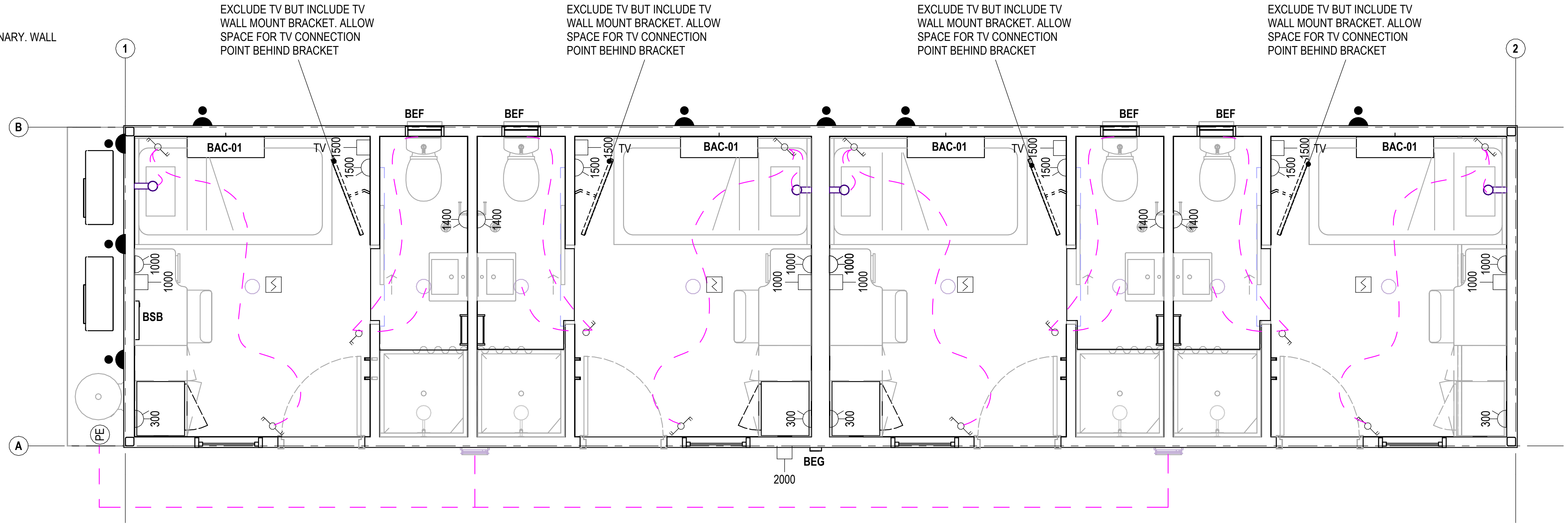
	BSD	SMOKE DETECTOR
	BFE	FIRE EXTINGUISHER
	BAB	FIRE ALARM BELL
	BEG	BREAK GLASS UNIT

MECHANICAL FIXTURES

	BAC-01	SPLIT AIR CONDITIONER UNIT 2.5KW
	BCU-01	AIR CONDITIONER UNIT 2.5KW
	BEF-01	EXHAUST FAN

PLUMBING FIXTURES

	BFW	FLOOR WASTE
	BHS	160L HOT WATER SYSTEM



DRAWING TO BE READ IN CONJUNCTION WITH REFLECTED CEILING PLAN

REFER TO SERVICES CONSULTANTS DRAWINGS FOR ALL SERVICES FIXTURES SPECIFICATIONS, REQUIREMENTS AND SCHEDULES.

WIRING SHALL BE IN ACCORDANCE WITH A.S 3000, A.S 3008 & THE RELEVANT LOCAL ELECTRICAL AUTHORITY.

CONTRACTORS SHALL BEFORE COMMENCEMENT OF CONSTRUCTION OF SERVICES, CHECK ALL SETOUTS AND DIMENSIONS.

THE ELECTRICAL INSTALLATION MUST COMPLY WITH REQUIREMENTS OF AS/NZS 3000 & 3008.1

1 ELECTRICAL & DATA LAYOUT
1 : 50

NO.	DESCRIPTION	DATE	BY	CHK'D
A	ISSUED FOR REVIEW	14.07.2023	MV	KP

FLEETWOOD AUSTRALIA

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PROJECT NO.: J004099
PROJECT STATUS: ISSUED FOR REVIEW
PROJECT CLIENT: CBH
PROJECT: 4P SPQ
PROJECT ADDRESS: GINGIN
SHEET: ELECTRICAL & DATA
DRAWN: VL
CHECKED: KP
SCALE: As indicated
SIZE: A3
DRAWING NO.: A11-SR01
REVISION: A
DC SIGN OFF:

CLIENT APPROVAL

SIGNATURE DATE

NOTE: These drawings have been approved for manufacturing. Should any changes need to be made after the approved date, the contract will need to be reviewed.

APPROVED FOR STRUCTURAL SUFFICIENCY

A K Pollock FIEAust CPEng NER APEC engineer IntPE(Aust)

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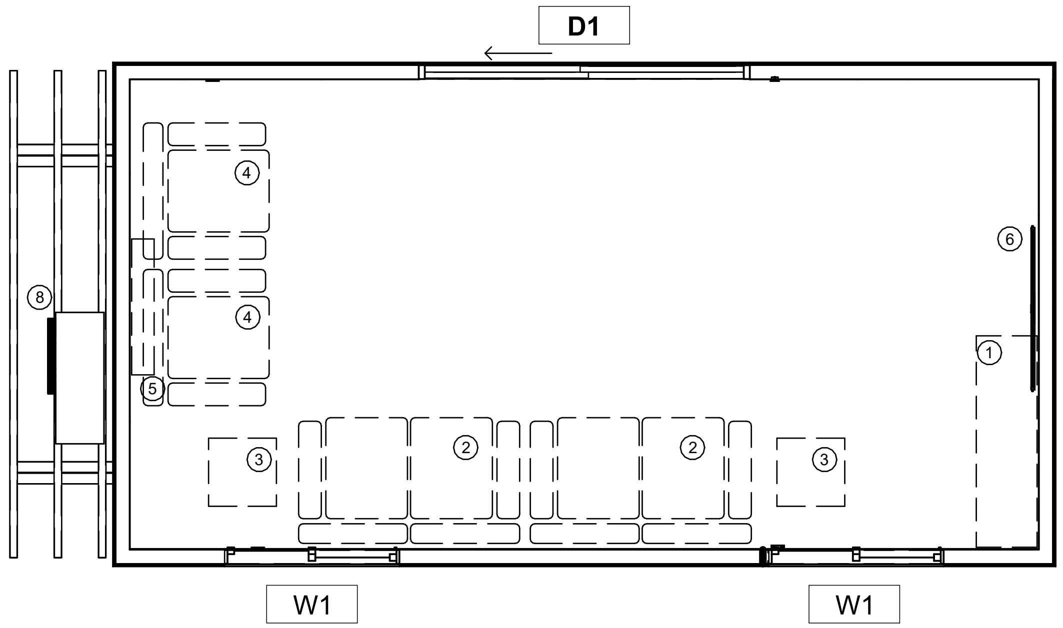
A K P CONSULTING PTY LTD



General Arrangement

1 : 50

EQUIPMENT LIST
1. Table (Supplied by CBH)
2. Chair (Supplied by CBH)
3. Side table (Supplied by CBH)
4. Arm chair (Supplied by CBH)
5. AC Wall mounted unit
6. TV screen (Supplied by CBH)
7. TV cabinet (Supplied by CBH)
8. AC condenser

BUILDING CONSTRUCTION - SHORT SPECIFICATION
- Chassis: fabricated structural steel beams; LC100 joists (400c)
- Chassis paint spec: Black zinc enamel (75microns)
- Floor substrate: 22mm durafloor
- Floor covering: Accolade Plus grade vinyl w. coved skirting
- External Walls: 92mm x 1.15bmt steel studwork (600c)
- Internal walls: 92mm x 1.15bmt steel studwork (600c)
- Wall insulation: R2.2 insulation; R0.2 thermal wrap between framing/cladding
- Ceiling insulation: R4.1 ceiling batts
- Floor insulation: R2.2 Rigid insulation board between floor joists
- Roof structure: 92mm x 1.15bmt steel framework (400c)
- External wall cladding: Custom Orb (horizontal)
- Roof cladding: Lysaght trimdek; matching barges, gutters & flashings
- Internal wall cladding: 3.6mm pre-finished Poly Ply
- Ceiling cladding: 3.6mm pre-finished Poly Ply
- Doors: face mounted steel clad door in steel split frames
- Windows: face mounted aluminium sliding windows with 6.52mm laminates glass

BUILDING DESIGN CRITERIA
NCC Class 6 Building
Wind Region A
Climate zone 4

COLOUR SCHEDULE	
Ext. Cladding:	Paperbark
Ext. Cladding (2):	Deep Ocean
Doors:	Deep Ocean
Door frames:	Deep Ocean
Internal Walls:	Embossed White
Ceiling:	Mirage Pearl
Windows:	Deep Ocean
Vinyl:	Blue Bells
Cabinetry:	White
Benches:	Stainless Steel
Blinds:	Charcoal
PVC Skirting:	Black
Cornice Angle:	White Gloss

Trigon PROJECTS

CBH 2024 Accomodation Project

COMMON ROOM

GENERAL ARRANGEMENT PLAN

Project number	Project Number
Date	15/06/2023
Drawn by	TB
Drawing number	A100
Revision	2

CLIENT APPROVAL

SIGNATURE DATE

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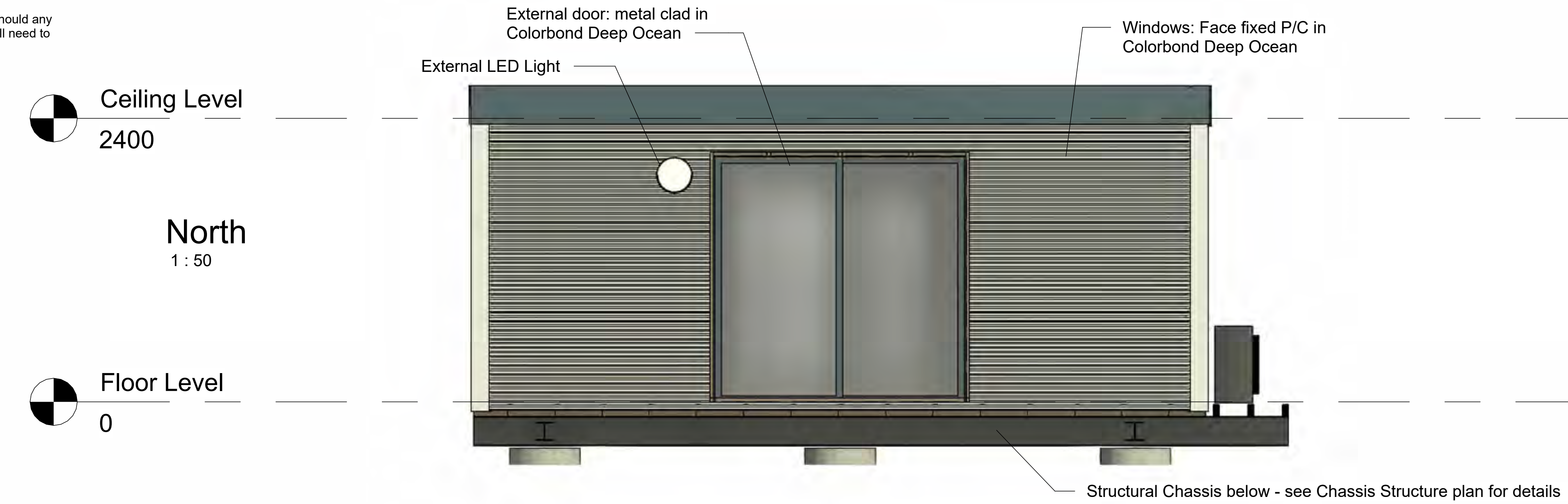
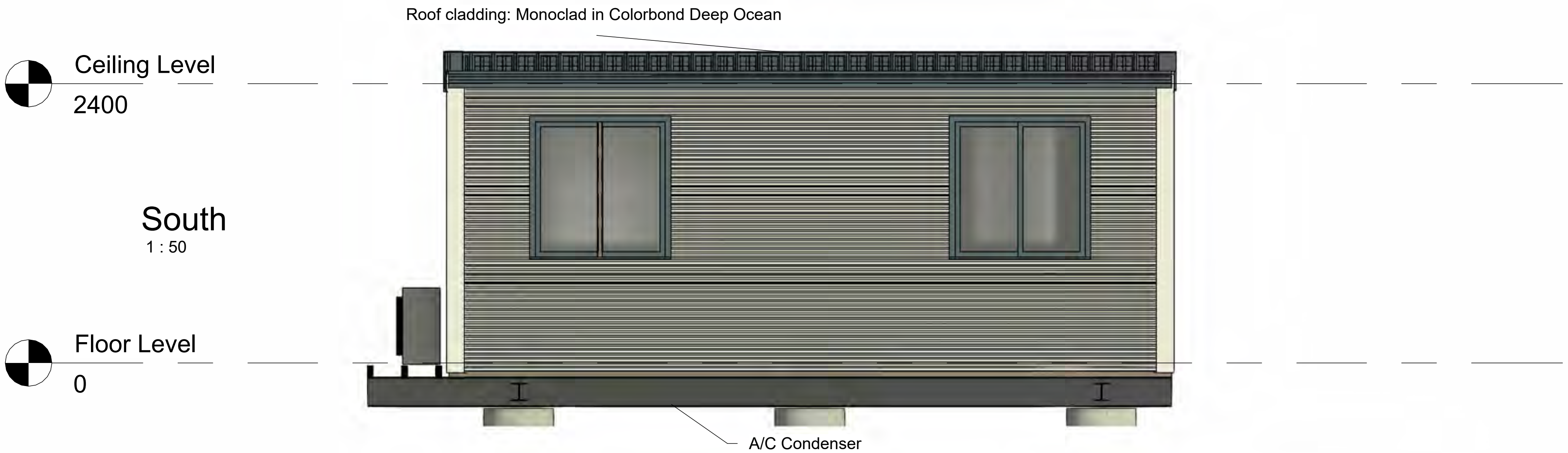
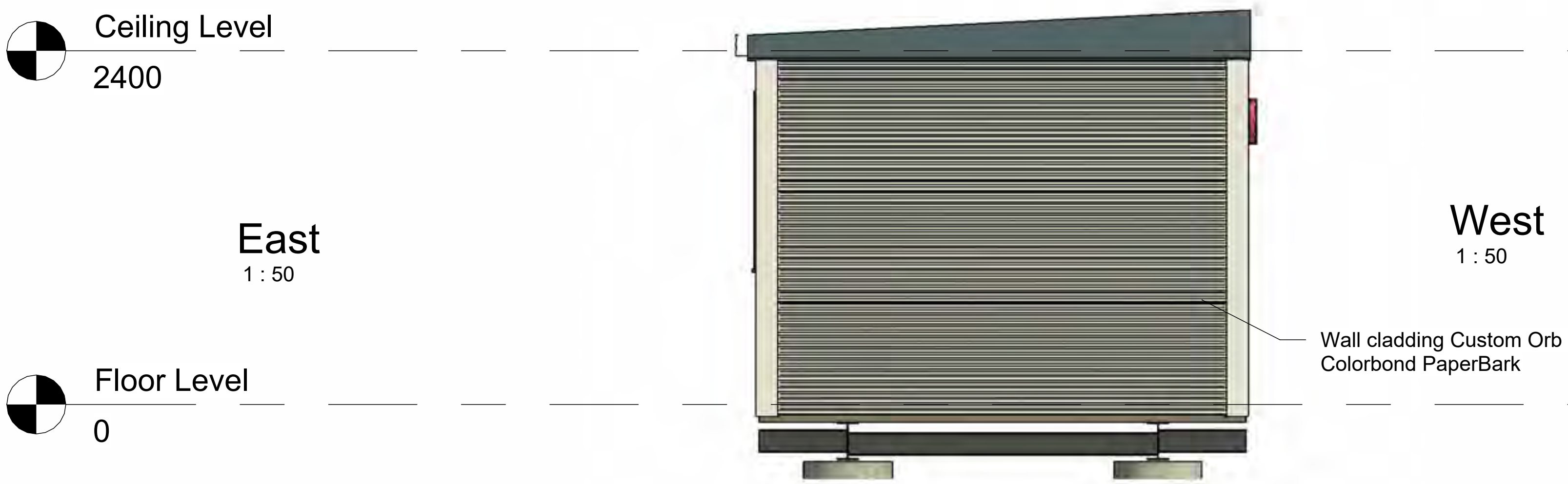


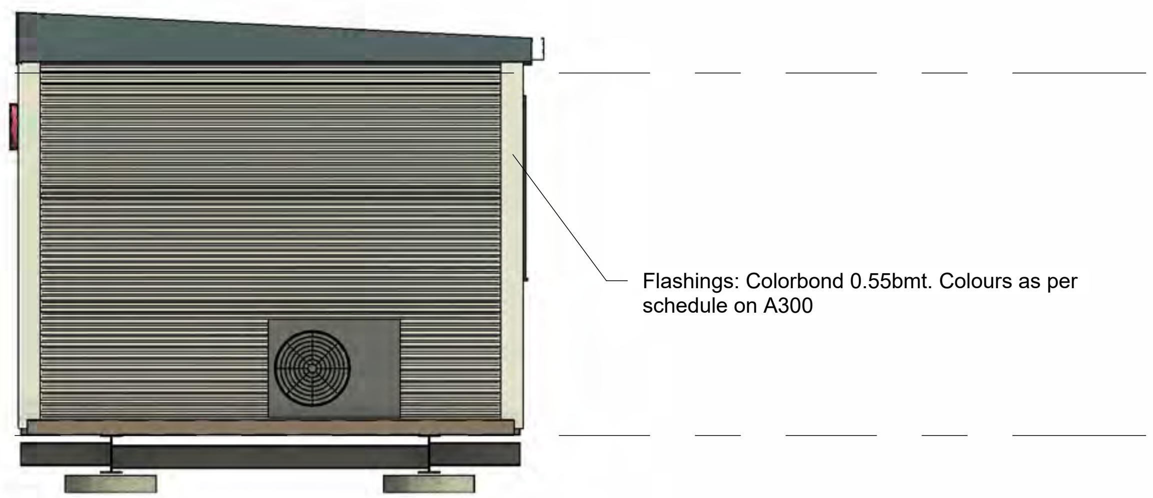
North
1 : 50



South
1 : 50



East
1 : 50



West
1 : 50

Trigon PROJECTS

CBH 2024 Accomodation Project

COMMON ROOM

ELEVATIONS

Project number	Project Number
Date	15/06/2023
Drawn by	TB
Drawing number	A101
Revision	2

CLIENT APPROVAL

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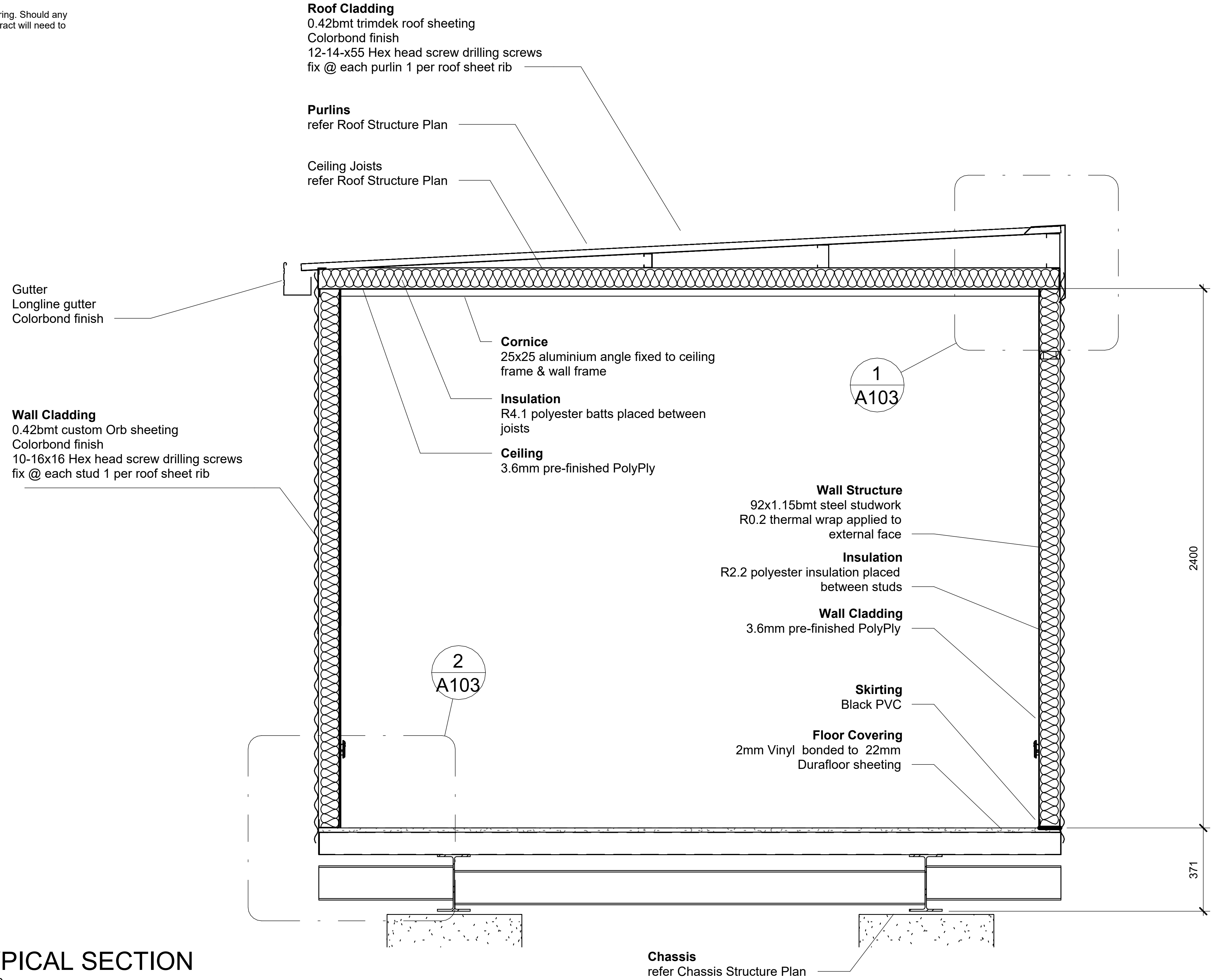

TYPICAL SECTION

1 : 20

Trigon PROJECTS

CBH 2024 Accomodation Project

COMMON ROOM

TYPICAL SECTION

Project number	Project Number
Date	15/06/2023
Drawn by	TB
Drawing number	A102
Revision	2

CLIENT APPROVAL

SIGNATURE DATE

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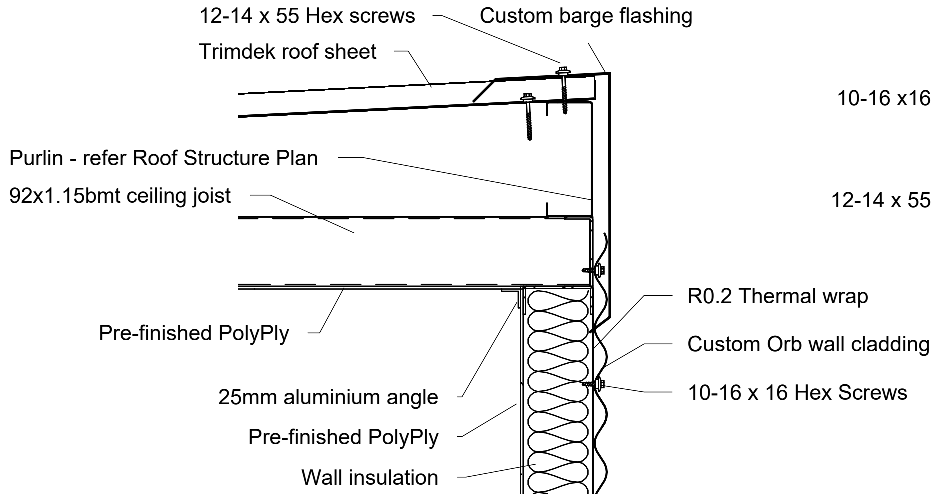
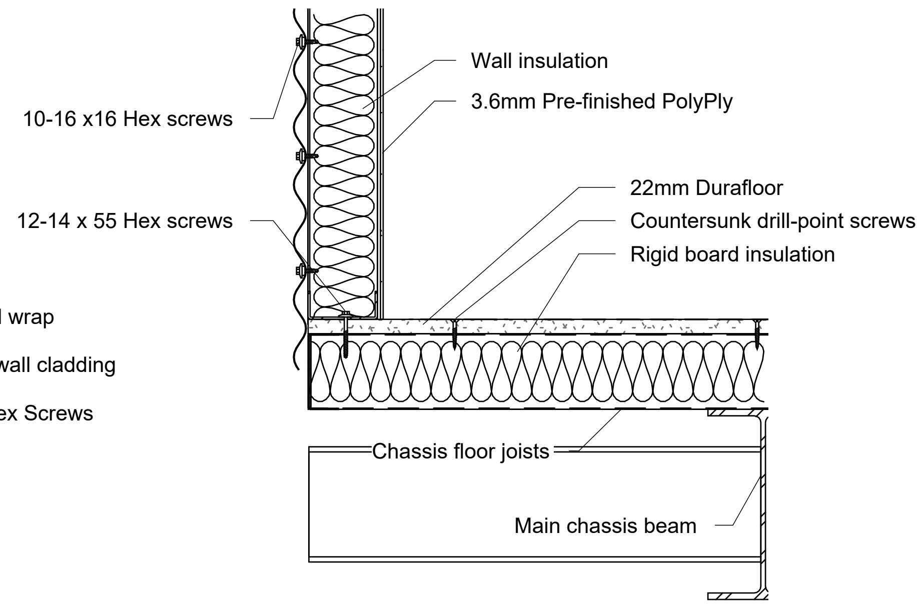


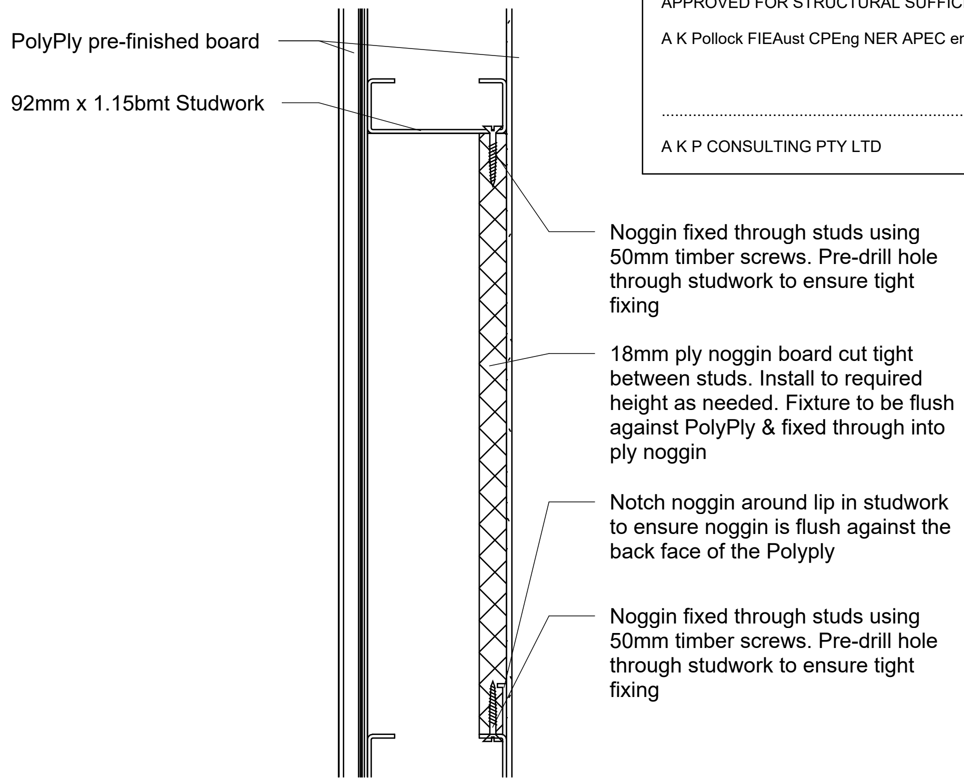
1 / A102 BARGE DETAIL

1 : 10



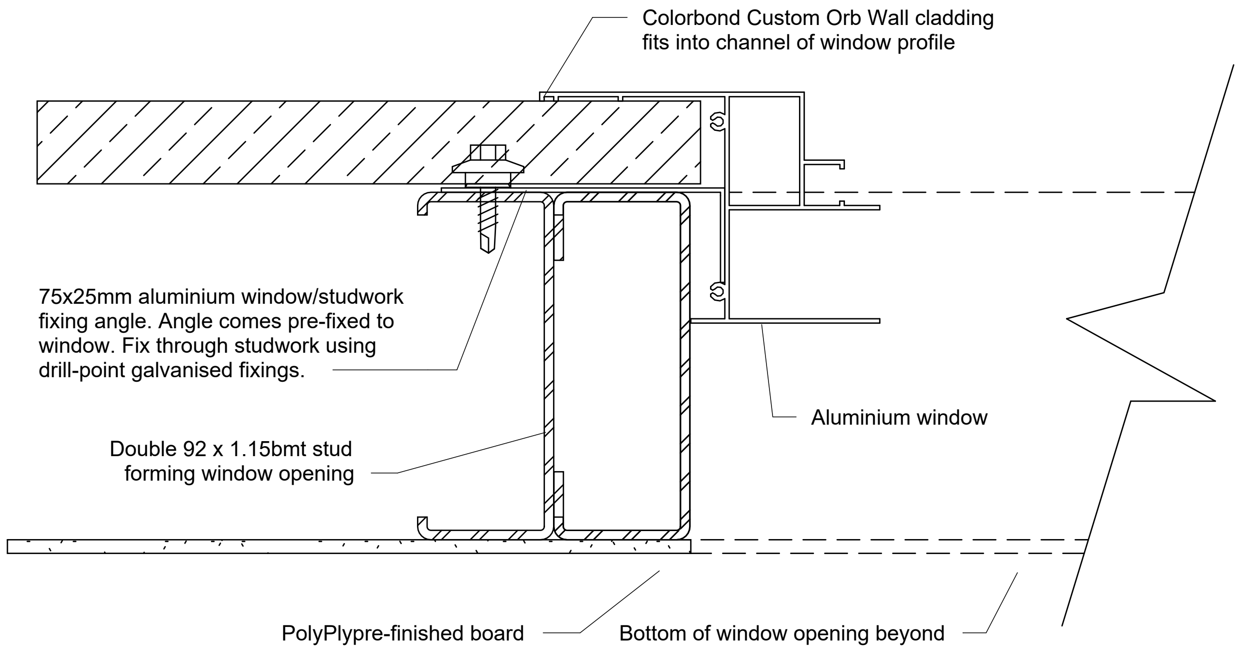
2 / A102 FLOOR/WALL DETAIL

1 : 10



TYPICAL NOGGIN DETAIL

1 : 5



WINDOW SIDE FIXING DETAIL

1 : 2

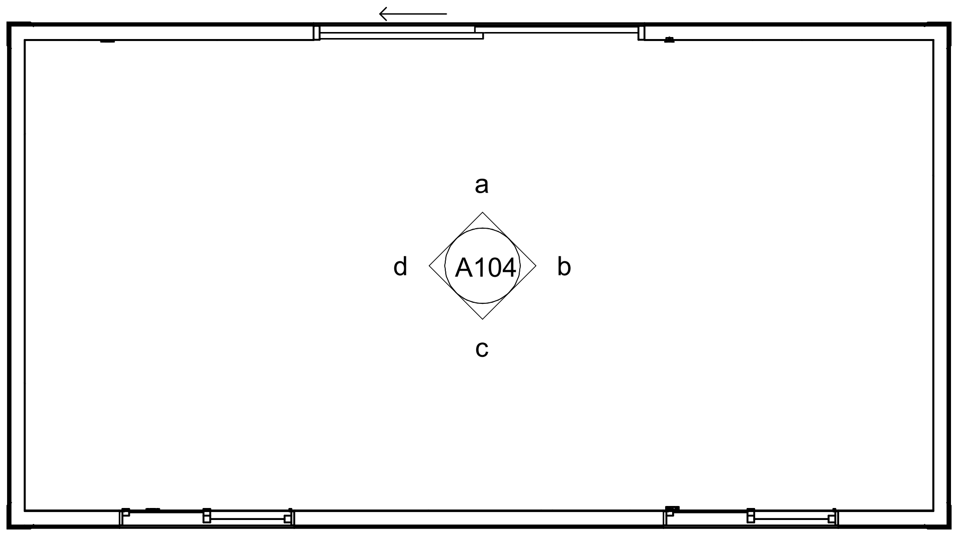
Trigon PROJECTS

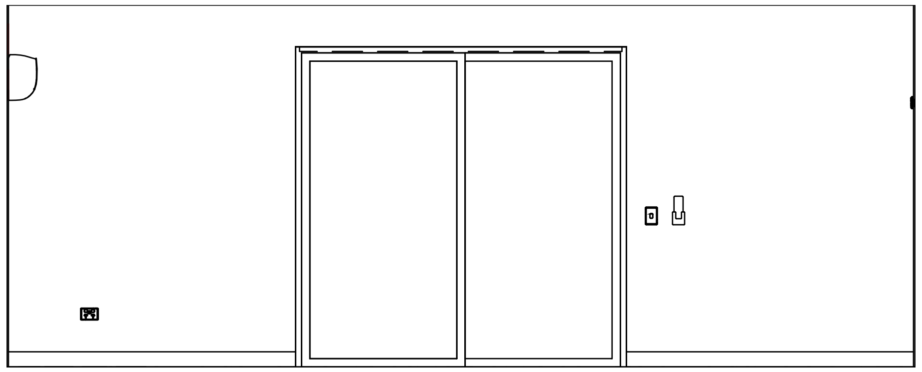
CBH 2024 Accomodation Project

COMMON ROOM

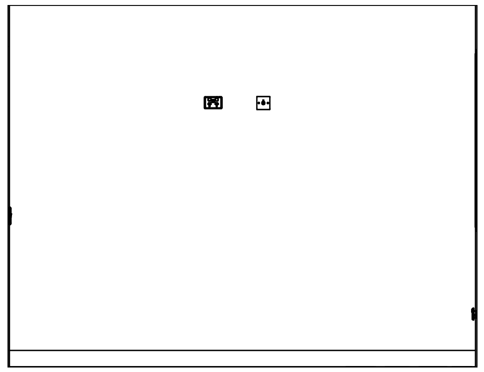
SECTION DETAILS

Project number	Project Number
Date	15/06/2023
Drawn by	TB
Drawing number	A103
Revision	2

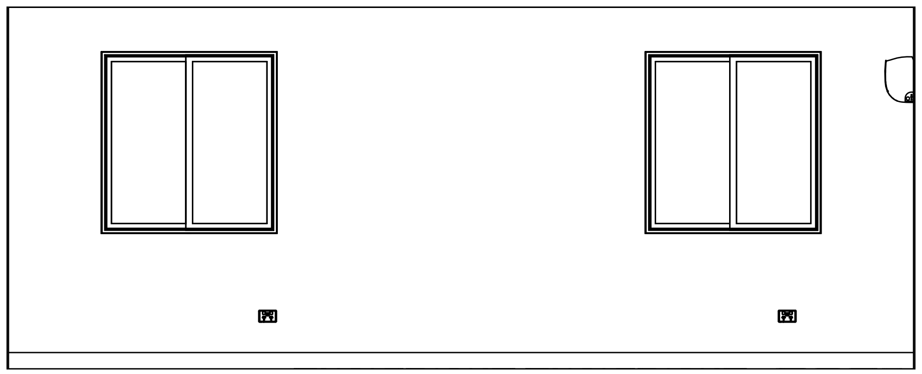




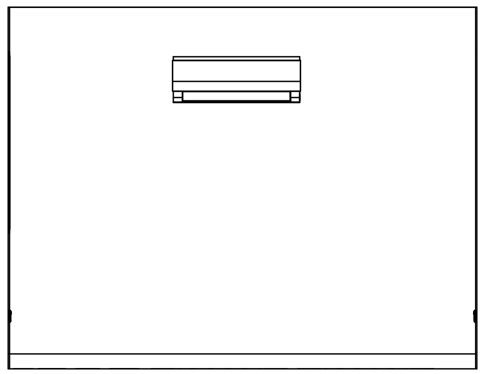
Elevation A
1 : 50



Elevation B
1 : 50



Elevation C
1 : 50



Elevation D
1 : 50

Trigon PROJECTS

CBH 2024 Accomodation Project

COMMON ROOM

INTERNAL ELEVATIONS

Project number	Project Number
Date	15/06/2023
Drawn by	TB
Drawing number	A104
Revision	2

Window Schedule

Mark	Height	Width	Operation	Details	Colour	Count
W1	1200	1156	Face-fit sliding	2 light; 5mm Clear Toughened; 610mm Aluminium mesh flywire	Deep Ocean	2

Door Schedule

Mark	Height	Width	Operation	Details	Colour	Count
D1	2080	2110	Face-fit sliding	2 light; 6mm clear Toughened; vision motif; Aluminium Mesh Flywire; door handle @1055mm; Screen Handle @1200	Deep Ocean	1

CLIENT APPROVAL

SIGNATURE DATE

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APPROVED FOR STRUCTURAL SUFFICIENCY

A K Pollock FIEAust CPEng NER APEC engineer IntPE(Aust)

....

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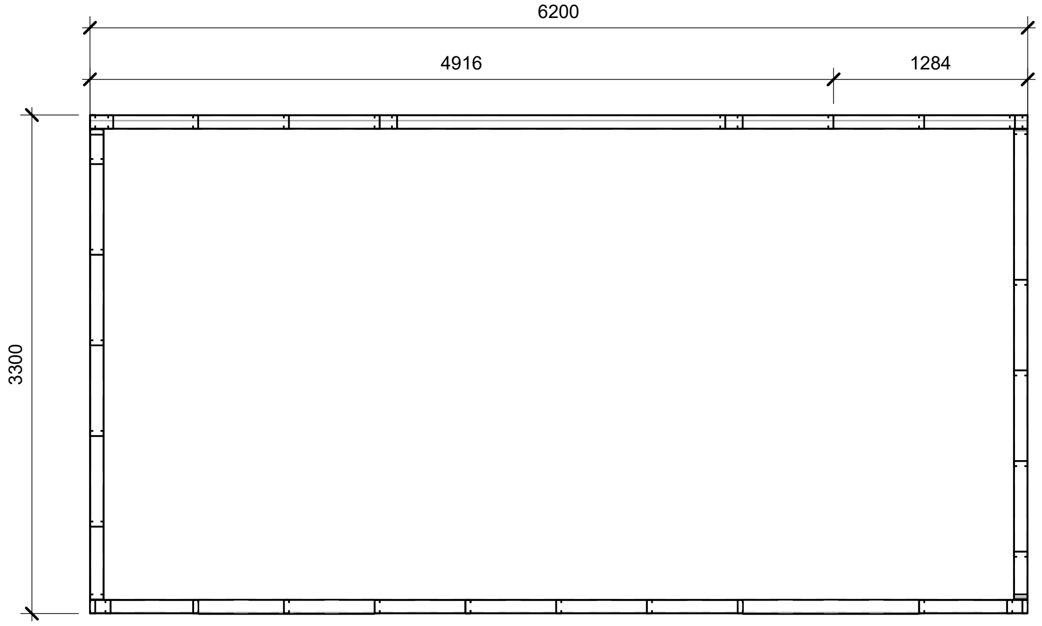
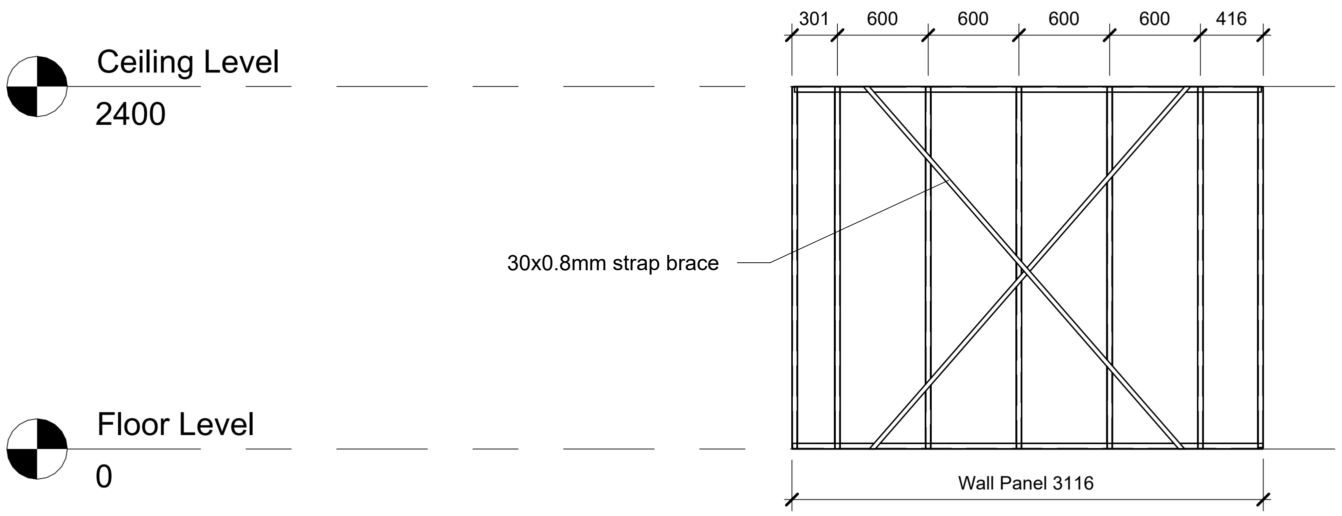


Wall Layout

1 : 50

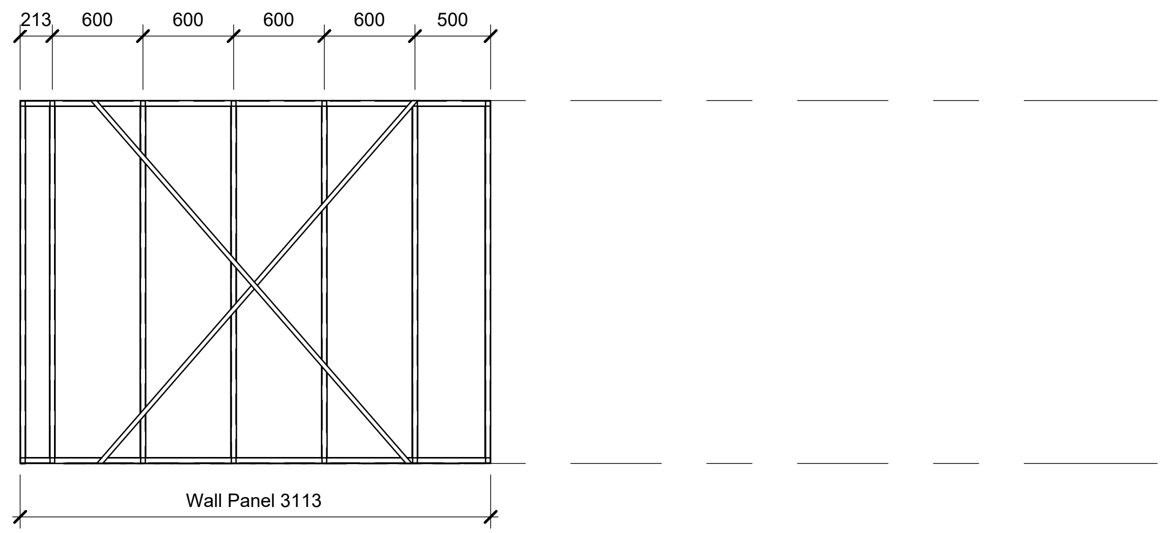
NOTES

- All stud/track framing components fixed together using drill point metal screws



East Wall Frame

1 : 50



West Wall Frame

1 : 50

Trigon PROJECTS

CBH 2024 Accomodation Project

COMMON ROOM

WALL LAYOUT PLAN & ELEVATIONS

Project number	Project Number
Date	15/06/2023
Drawn by	TB
Drawing number	A200
Revision	2

CLIENT APPROVAL

SIGNATURE DATE

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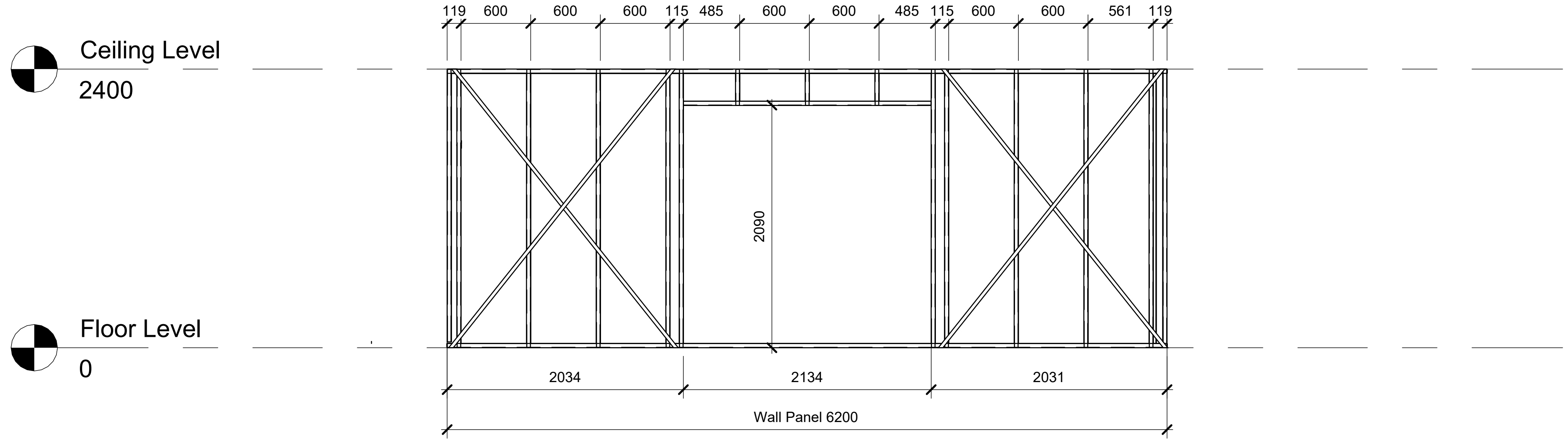
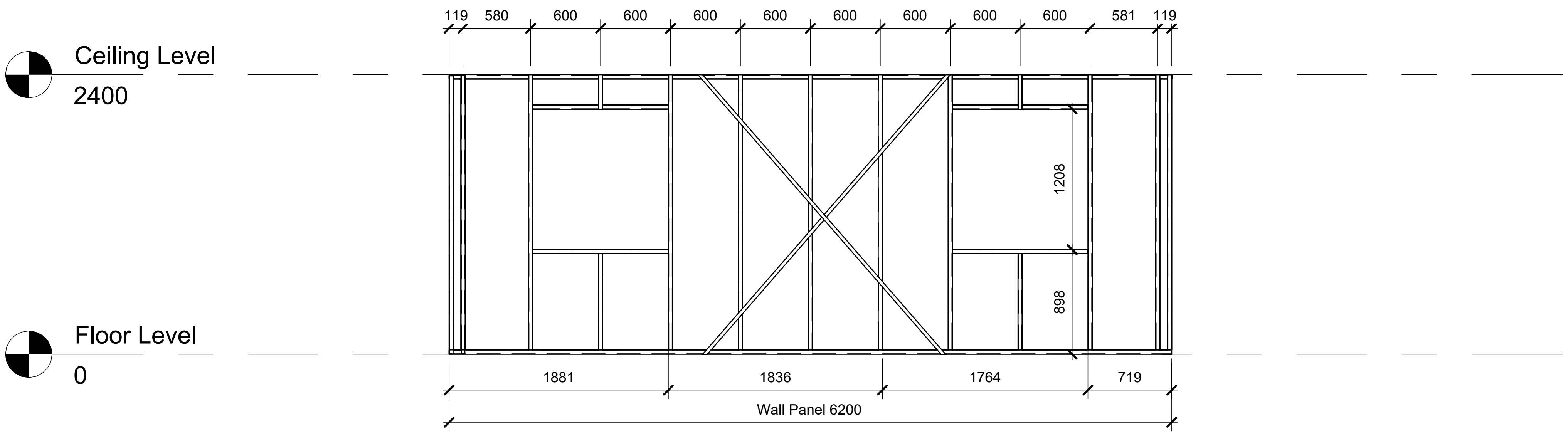




NOTES

- All stud/track framing components fixed together using drill point metal screws

South Wall Frame

1 : 50

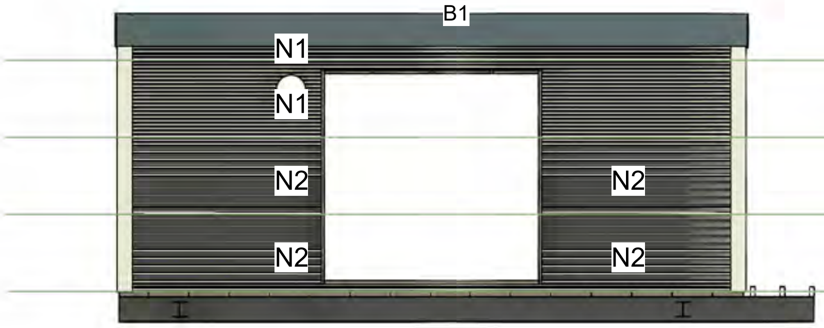
Trigon PROJECTS

CBH 2024 Accomodation Project

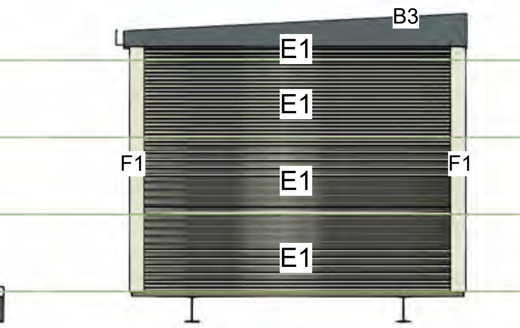
COMMON ROOM

WALL LAYOUT ELEVATIONS

Project number	Project Number
Date	15/06/2023
Drawn by	TB
Drawing number	A201
Revision	2

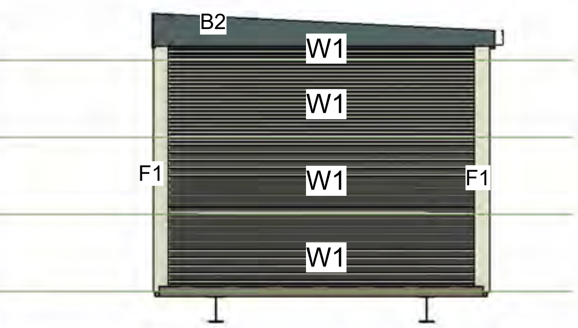


North Cladding Layout
1 : 75

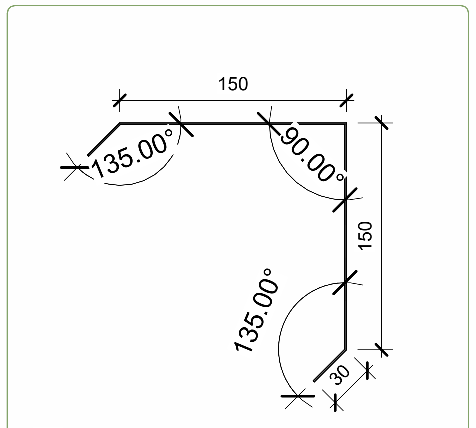


East Cladding Layout
1 : 75

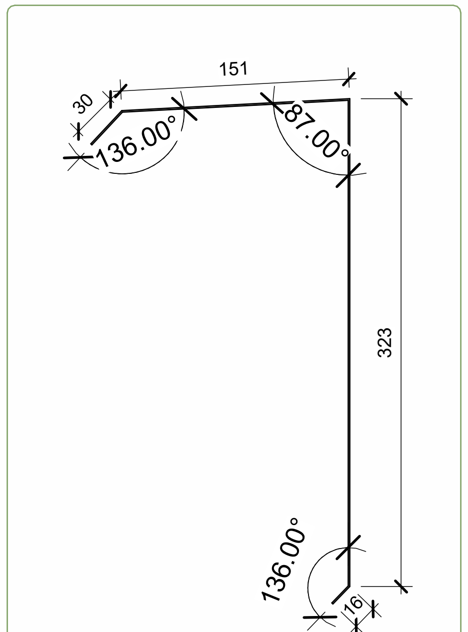
South Cladding Layout
1 : 75



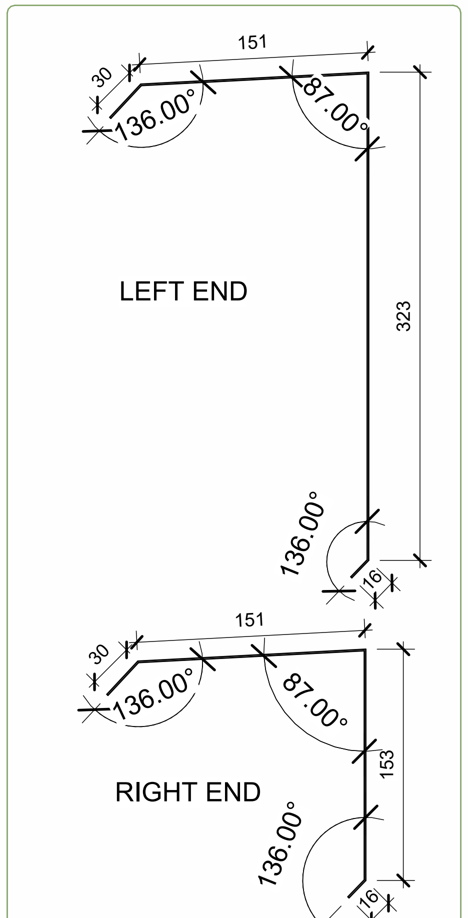
West Cladding Layout
1 : 75



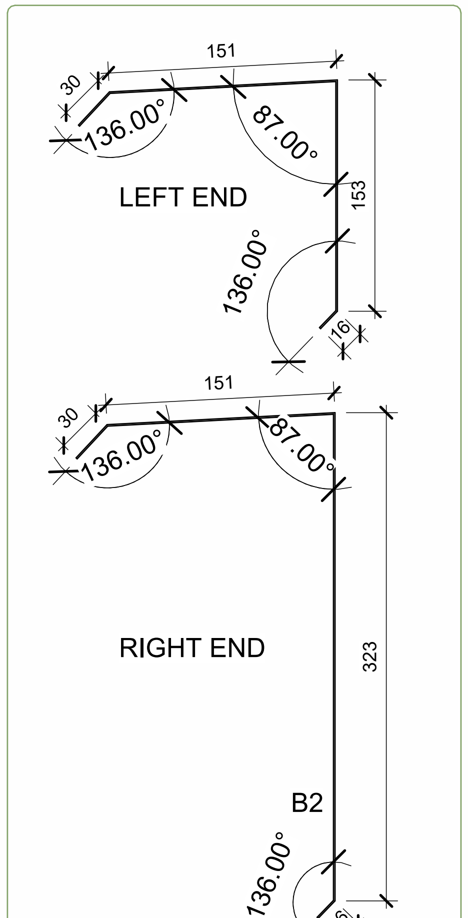
F1



B1



B2



B3

TYPE	MARK	DIM (mm)	CNT
Custom Orb Paperbark	N1	6200	2
Custom Orb Paperbark	N2	2031	4
Custom Orb Paperbark	E1	3300	4
Custom Orb Paperbark	S1	6200	4
Custom Orb Paperbark	W1	3300	4
Barge Flashing (see detail)	B1	6600	1
Barge Flashing (see detail)	B2	3400	1
Barge Flashing (see detail)	B3	3400	1
Easiline Commercial Gutter Deep Ocean	G1	6200	1
D/Pipe 100x50 Paperbark	DP	2400	2
Monoclad Deep Ocean	R1	3380	9
Corner Flashing (see detail)	F1	2700	4
Astragal 100x50 Paperbark			6
Nozzle/Pop 100x50 Zincalume			2
Easiline gen Pur Bracket (gal)			7
Easiline Gutter Stop End (Left)			1
Easiline Gutter Stop End (Right)			1

Trigon
PROJECTS

CBH 2024 Accomodation Project

COMMON ROOM

CLADDING LAYOUT PLAN

Project number	Project Number
Date	15/06/2023
Drawn by	TB
Drawing number	A300
Revision	2

LEGEND

01 ENTRY
02 13 BAY CARPARK
03 SPQ
04 COMMON ROOM
05 KDLU
06 DRYING AREA
07 LEECH DRAIN AREA

CBH GROUP
ABN 29 256 604 947

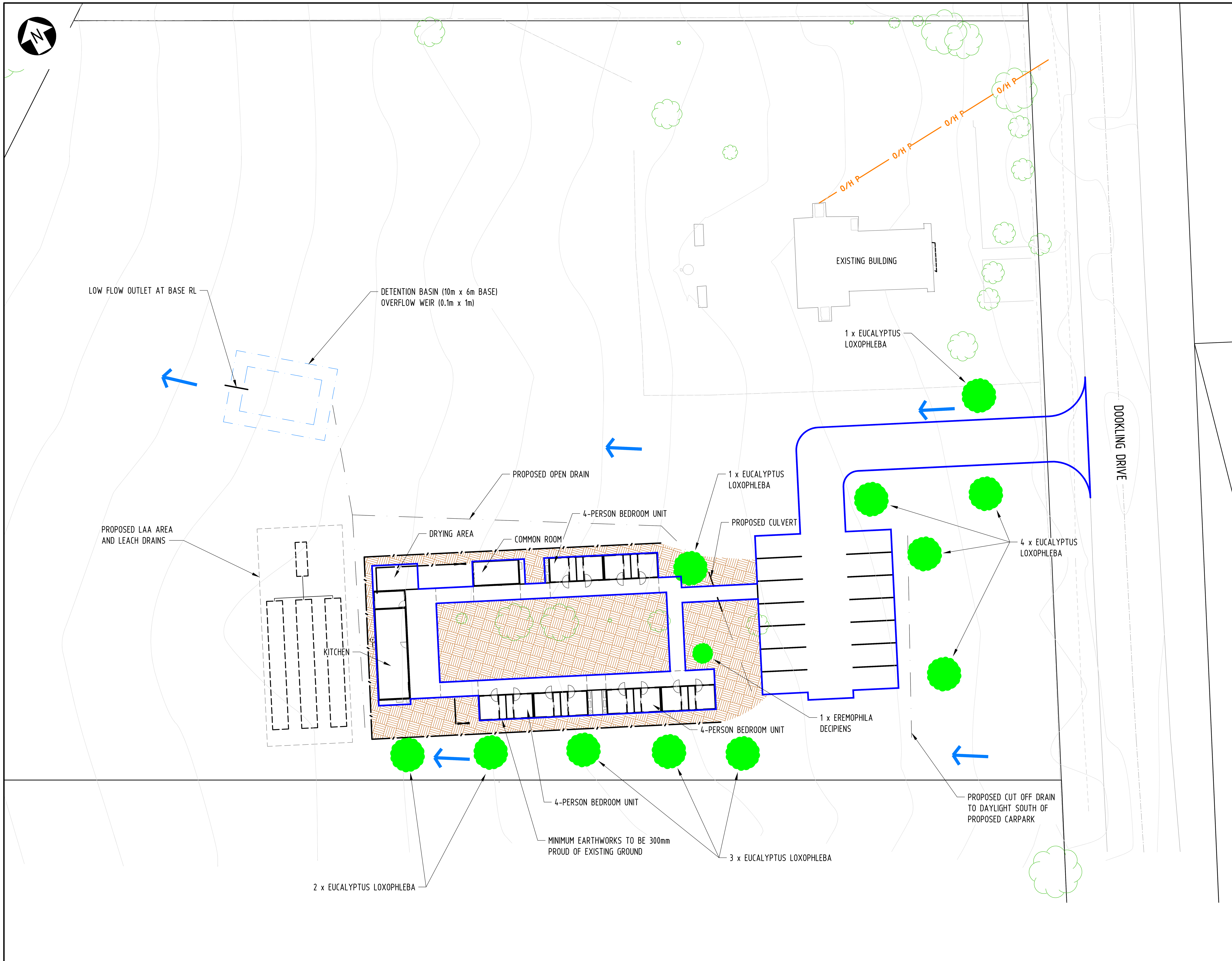
REF DRAWING No.	REFERENCE DRAWING TITLE	REV	DATE	REVISION DESCRIPTION	BY	CHK'D	APP'D
		B	22.11.23	ISSUED FOR REVIEW	LY	BL	
		A	24.10.23	ISSUED FOR REVIEW	LY	BL	

SCALE	1:100
SHEET	A1
PROJECT	
CONTRACT No	
DRAWN	L YAP
CHECKED	B LIM
DESIGNED	
DESIGN APPR	
PROJECT APPR	

TITLE
MILING
INFRASTRUCTURE PLANNING
ACCOMMODATION
ROOF PLAN

DRG No	SHEET	REV.
342-ENG-AR-DGA-0003	3 OF 4	B

COLORBOND® CLASSIC COLOUR CHARTS



NOTES

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE CBH STANDARD SPECIFICATIONS, CONTRACT DRAWINGS AND CBH CIVIL TYPICAL DRAWINGS.
2. PRIOR TO CUTTING OR FILLING, THE SITE AREAS SHALL BE CLEARED WITH 150mm TOPSOIL STRIPPED AND STOCKPILED AS DIRECTED ON SITE.
3. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SHOWN.
4. FINISHED LEVELS DO NOT INCLUDE RESPREAD TOPSOIL.
5. SOIL STABILISATION TO BE AS DIRECTED BY SUPERINTENDENT.
6. DUST CONTROL TO BE THE RESPONSIBILITY OF THE CONTRACTOR.
7. PROPOSED CATCHMENT AREA = $1488.7m^2$
8. DRAWING IS IN MILING LOCAL CO-ORDINATE GRID SYSTEM (AGLIME94

LEGEND

EXISTING TREES

PROPOSED TREES - REFER PLANT SCHEDULE

PROPOSED WOODCHIP GROUND COVER MAX. 100mm THICK

PROPOSED FENCING

CADASTRAL

EXISTING CONTOUR

0/H P — EXISTING OVERHEAD POWER

CATCHMENT BOUNDARY

PROPOSED OPEN DRAIN

PROPOSED CULVERT

OVERLAND FLOW ARROW

INDICATIVE WOODCHIP GROUND COVER

EREMOPHILA DECIPIENS

EUCALYPTUS LOXOPHLEBO

PLANT SCHEDULE:

BOTANICAL NAME	COMMON NAME	INSTALLATION SIZE	QUANTITY
TREES			
EUCALYPTUS LOXOPHLEBA	YORK GUM	30ltr	11
SHRUBS			
EREMOPHILA DECIPIENS	SLENDER FUCHSIA	10ltr	1

DO NOT SCALE FROM THIS DRAWING

CBH GROUP ABN 29 256 604 947

Urbanise wa ENGINEERING SOLUTIONS
207/396 Scarborough Beach Road, Osborne Park, WA 6017
Email : info@urbanise.net.au
Web : www.urbanise.net.au

REF DRAWING No.	REFERENCE DRAWING TITLE	REV	DATE	REVISION DESCRIPTION	BY	CHK'D	APP'D
		B		ISSUED FOR CLIENT REVIEW	ZS	CB	BP
342-ENG-GN-DLP-0001	SITE PLAN	A	18/10/23	ISSUED FOR DEVELOPMENT APPLICATION	ZS	CB	BP

SCALE	1:250	
SHEET	A1	
PROJECT	-	
CONTRACT No	-	
DRAWN	Z.SABATINO	18/10/23
CHECKED	C.BENFIELD	18/10/23
DESIGNED	C.BENFIELD	18/10/23
DESIGN APPR	B.PATON	18/10/23
PROJECT APPR	B.PATON	18/10/23

TITLE
MILING INFRASTRUCTURE PLANNING ACCOMMODATION LANDSCAPING PLAN

DRG No 342-ENG-LA-DLP-0001 | SHEET 1 OF 1 | REV. B

Report on

GEOTECHNICAL STUDY AND PAVEMENT DESIGN, PRELIMINARY ACID SULFATE SOIL AND CONTAMINATION STUDY PROPOSED ACCOMMODATION SITE PART LOT 80, GREAT NORTHERN HIGHWAY MILING

Submitted to:

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T: +61 (8) 6272-0200

WAG230373-01 002 R Rev0

22 August 2023

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TABLES

FIGURES

APPENDICES

1. INTRODUCTION

This report presents the outcomes of Galt Geotechnics' (Galt's) geotechnical study, pavement design and preliminary acid sulfate soils (ASS) and contamination study for the proposed accommodation site on Part of Lot 80 (#18201) Great Northern Highway in Miling ("the site").

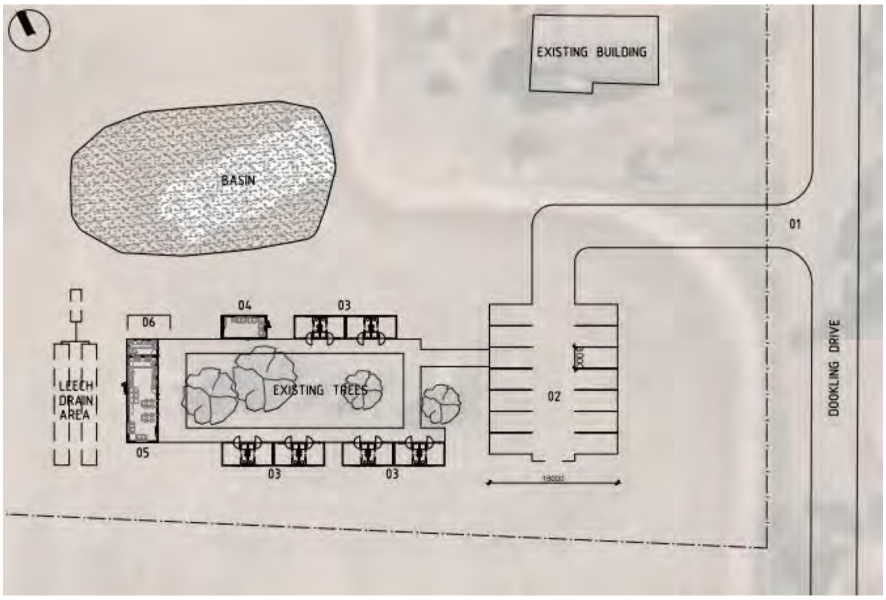
The location of the site relative to the surrounding area is shown on Figure 1.

2. SITE DESCRIPTION AND PROPOSED DEVELOPMENT

Lot 80 is roughly rectangular in shape and covers a plan area of about 1.4 hectares. At the time of investigation, a former church (Holy Rosary Catholic Church) occupied the north-east part of site with relatively open cultivated land across the balance of the Lot. The church building is in a worn condition with significant cracking and chipping evident on the exterior faces, due to its age and possible settlement (refer Appendix A, Site Photographs).

A firebreak (access track) is present along part of the northern boundary and along the eastern boundary of site. Publicly available topographical mapping indicates that the current ground level is around RL 256 m AHD.

The proposed accommodation site is located on the southern part of Lot 80 as shown below.



Inline Image 1: Proposed Accommodation Site

We understand the site is to be developed with proposed accommodation units, a car park, and a drainage basin. We also note that on-site effluent disposal is proposed by way of leach drains.

We assume that no significant cut or fill is proposed and that proposed accommodation structures will be supported on shallow pad/strip footings.

3. PROJECT OBJECTIVES

The objectives of the study were to:

- assess subsurface soil and groundwater conditions across the accommodation site;
- assess the site classification in accordance with AS2870 (2011) “Residential Slabs and Footings”;
- provide site preparation guidelines, including compaction criteria and approved fill reuse taking into account CBH Specifications;
- provide recommendations for excavations and slopes;
- assess the hydraulic conductivity of the soils at the site and advise on on-site drainage; and
- provide pavement, seal and surfacing design for the access road and carpark.

Preliminary Acid Sulfate Soils and Contamination Study

- conduct a preliminary assessment of ASS conditions at the site;
- assess the nature and extent of soil contamination at the site;
- make recommendations for further investigation and/or remediation (if required).

4. FIELDWORK

Fieldwork was carried out on 31 July and 1 August 2023 and comprised:

- a walkover and inspection of the site;
- excavation of test pits (TP) at 9 locations (TP01 to TP09), extending to:
  - a target depth of 1.5 m across the proposed carpark and access road (TP01 to TP03);
  - refusal, at depths ranging from 1.75 m to 2.5 m across the proposed accommodation units (TP04 to TP06);
  - a depth of 1.5 m at the proposed basin (TP07); and
  - depths of 1.75 and 1.5 m respectively at the proposed leach drains (TP08 and TP09).
- Dynamic Cone Penetrometer (DCP) testing adjacent select test pits (TP01-TP07) extending to depths ranging from refusal at 0.6 m to a target depth of 1.0 m;
- constant head permeability testing using a Guelph permeameter at:
- a depth of 0.63 m at the proposed basin location (P03);
- depths of 0.53 m and 0.50 m respectively, at the proposed leach drains (P01 and P02)
- collection of soil samples at 0.5 m intervals until the termination of each borehole.

General

Fieldwork was conducted by a geotechnical engineer from Galt in general accordance with AS1726 (2017) “Geotechnical Site Investigations”.

Our engineer positioned the tests using a handheld GPS accurate to about 5 m in the horizontal plane. The engineer conducted the site walkover, observed the test pitting, logged the materials encountered, performed the field tests and collected representative soil samples for laboratory testing.

The approximate test locations are shown on Figure 1. Photographs of the site taken during the inspection are presented in Appendix A, Site Photographs. Details of the test pits are shown in Table 1: Summary of Tests.

Table 1: Summary of Tests

Test Name	Description of Proposed Development	Test Depth (m)	Reason for Termination	Stratigraphy
TP01	Proposed Carpark and Access Road	1.5	Target depth	FILL: Clayey SAND over Clayey SAND over Sandy CLAY
TP02				FILL: SAND over Clayey SAND over Sandy CLAY
TP03				TOPSOIL: SAND over Clayey SAND over Sandy CLAY
TP04	Proposed Accommodation Units	2.5	Refusal	TOPSOIL: Sandy CLAY over Sandy CLAY
TP05		1.75		TOPSOIL: Clayey SAND over Clayey SAND over Sandy CLAY
TP06		2.5		TOPSOIL: Clayey SAND over Clayey SAND over Sandy CLAY
TP07	Proposed Basin Area	1.5	Target depth	TOPSOIL: Clayey SAND over Clayey SAND over Sandy CLAY over Sandy Gravelly CLAY
TP08	Proposed Leach Drain Area	1.75		TOPSOIL: Sandy CLAY over Sandy CLAY over Sandy Gravelly CLAY over Sandy CLAY
TP09		1.5		TOPSOIL: Clayey SAND over Clayey SAND over Sandy CLAY

Notes:
1. TP – Test Pit
2. Groundwater was not encountered at test locations
3. Refusal occurred on cemented strata

Test Pits

Test pits were excavated using an 8-tonne JCB 3CX tractor-mounted backhoe equipped with a 0.45 m wide toothed bucket. The backhoe was supplied and operated by ANH Contracting. Test pit reports, including a list of notes and abbreviations and the method of soil description used on the reports are included in Appendix C, Test Pit Reports. A photograph of the spoil recovered from each test pit is also included on each report.

Dynamic Cone Penetrometer (DCP) Tests

DCP tests were carried out in accordance with AS 1289.6.3.2, with blow counts recorded in 100 mm intervals. The tests were conducted adjacent test pits TP01 to TP07. The results of the tests are presented in Table 2: Summary of DCP Test Results.

Table 2: Summary of DCP Test Results

Location:	TP01	TP02	TP03	TP04	TP05	TP06	TP07
Depth (mm)	**No of Penetrometer Blows per 100 mm Depth Interval**						
0-100	2	3	2	3	5	2	4
100-200	2	2	3	5	4	6	4
200-300	3	6	5	6	3	5	6
300-400	4	6	6	10	5	4	6
400-500	4	8	5	11	5	6	6
500-600	5	10	7	12+ R	7	6	7
600-700	4	13+ R	7		9	6	11
700-800	4		6		13+ R	6	15+ R
800-900	5		8			8	
900-1000	6		10+ R			12	

Note: R indicates practical refusal of the penetrometer

Constant Head Permeability Tests

Constant head permeability tests were conducted using a Guelph Permeameter at locations where drainage basins / leach drains are likely to be situated. The testing was generally conducted in accordance with Appendix G of AS1547 (2012) "On-site domestic wastewater management". The test results are summarised in Table 3.

Table 3: Constant Head Permeability Test Results

Test Location	Depth of Test (m)	Soil Profile (AS1726-2017)	Head (m)	k^1 (m/day)	Soil Category[3]
P01	0.53	Sandy CLAY	0.31	0.01	5
P02	0.50	Sandy Gravelly CLAY	0.26	0.01	5
P03	0.63	Sandy CLAY	0.35	0.01	5

Notes:
1. k – saturated hydraulic conductivity
2. Groundwater not encountered at test locations
3. Soil category is as per Table L1 of AS1547-2012.

Soil Sampling

Environmental soil samples were collected from the boreholes in accordance with the following Australian Standards (AS) and guidelines:

- AS 4482.1:2005 *Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soil Part I Non-Volatile and Semi Volatile Compounds;*
- AS 4482.2:1999 *Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soil Part 2 Volatile Compounds;*
- Department of Environment Regulation (DER) (2015) *Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes*;
- National Environment Protection Council (NEPC) (2013) *National Environmental Protection (Assessment of Site Contamination) Measure* (herein referred to as NEPM 2013).

Soil samples were collected at 0.25 m intervals from each borehole using a new pair of disposable nitrile gloves. All soil samples were collected in laboratory supplied glass jars or bags and stored on ice during fieldwork and transport to the laboratory to ensure that they arrived intact and at the appropriate temperature to ensure sample preservation.

5. LABORATORY TESTING

5.1 Geotechnical

Geotechnical laboratory testing was conducted by Western Geotechnical and Laboratory Services (WGLS) in their NATA accredited laboratory. The testing comprised determination of:

- particle size distribution on 5 samples;
- Atterberg limits and linear shrinkage on 5 samples;
- dry density-moisture content relationship using Modified compactive effort on 1 sample; and
- soaked California Bearing Ratio (CBR) on 1 remoulded sample.

The laboratory test certificates are presented in Appendix D along with the test methods followed. A summary of the test results is presented in Table 4.

Table 4: Summary of Laboratory Test Results

Test Location	Sample Depth (m)	AS1726 (2017) Soil Class	% Gravel	% Sand	% Fines	LL (%)	PI (%)	LS (%)	MMDD (t/m^3)	OMC (%)	CBR (%)	CBR Swell (%)
TP03	0.4 – 0.7	Sandy CLAY (CI-CH)	16	44	40	50	32	13.5	1.89	14.5	4.5	2.5
TP05	1.0 – 1.3	Sandy CLAY (CI)	10	50	40	44	28	11.0				
TP06	2.2 – 2.5	Sandy CLAY (CI)	6	39	55	47	29	11.5				
TP08	0.45 – 0.65	Sandy Gravelly CLAY (CH)	34	29	37	54	36	15.0				
TP09	0.5 – 0.7	Sandy CLAY (CI)	2	50	48	45	28	10.5				

LL – Liquid Limit **PI** – Plasticity Index **LS** – Linear Shrinkage
MMDD – Modified Maximum Dry Density **OMC** – optimum moisture content
CBR – California Bearing Ratio, remoulded to 92% MMDD and subjected to 6.75 kg surcharge, 4-day soak
Grey Shaded – Not Tested

5.2 Environmental

Selected soil and groundwater samples were analysed by NATA accredited laboratories for a range of contaminants of potential concern (COPC) comprising the following:

- heavy metals;
- total recoverable hydrocarbons (TRH);
- benzene, toluene, ethylbenzene, xylenes and naphthalene (BTEXN);
- polycyclic aromatic hydrocarbons (PAH); and
- asbestos ID (AS 4964).

Acid Sulfate Soils

Laboratory analysis was undertaken on selected soil samples using the chromium reducible sulfur (CRS) method which provides acid base accounting and quantification of potential acid generation. The selection of samples for laboratory analysis was based on soil type and the results of field testing. The field test results are summarised in Table A1 at the end of the text.

All laboratory analysis was undertaken using NATA-accredited methods of analysis. Laboratory certificates of analysis are presented in Appendix E and the results are discussed in Section 10.2.

6. SITE CONDITIONS

6.1 Geology

The Moora sheet of the 1:250,000 scale Geological series map indicates that the area is underlain by Colluvium which is broadly described as rock fragments (presumably gravelly soil). Colluvial sand is also shown close to the site.

Our investigation found the subsurface conditions comprise clayey soils (clayey sand and sandy clay) overlying possible cemented soils/rock at depth.

6.2 Subsurface Profile

The typical soil profiles can be described as follows:

TP01 and TP02 (Access Road)

- FILL: Clayey SAND (SC): fine to coarse grained, brown, approximately 12-20% low plasticity fines, trace organic fines, trace rootlets, trace gravel of building rubble, dry, typically 200 mm thick; overlying
- Sandy CLAY (CI): medium plasticity, brown becoming pale brown mottled white with depth, with fine to coarse grained sand, with fine to coarse grained gravel, dry, extending to a depth of 1.5 m.

TP03 to TP09 (Accommodation Arae, Leach Drains and Basin)

- TOPSOIL: Clayey SAND (SC)/Sandy CLAY (CI-CH): fine to coarse grained, brown, with low to medium plasticity fines, trace fine grained gravel, trace organic fines, trace rootlets, typically dry, extending to depths ranging from 0.1 m to 0.2 m; overlying
- Sandy CLAY (CI / CI-CH): medium and high plasticity, brown becoming brown mottled red with depth, with about 40-50% fine to coarse grained sand, trace to with fine to medium grained gravel, dry, extending to the typical investigated depth of 2.5 m.

Notes:
1. A layer of high plasticity Sandy Gravelly CLAY (CH) was noted at location TP08 (approximately 200 mm thick).
2. Test locations TP05-TP07 presented a thin layer (around 100-200 mm thick) of Clayey SAND (SC) underlying the Topsoil layer.

6.3 Groundwater

We do not have groundwater information for this site.

Groundwater was not encountered in any of the test pits during our investigation (conducted 31 July and 1 August 2023) to the maximum investigated depth of 2.5 m. Notwithstanding this, we expect that storm-water runoff perches on the low permeability clayey soils particularly following periods of significant rainfall particularly during winter.

6.4 Contaminated Sites

The publicly available DWER contaminated sites database was searched for known contaminated sites (within or adjacent the study area) classified as:

- contaminated – restricted use;
- contaminated – remediation required; and
- remediated for restricted use.

A review of the database indicates that the site is not listed as a contaminated site.

6.5 Acid Sulfate Soils

The site is shown on the DWER on-line acid sulfate soils (ASS) risk mapping databases as having a low risk of ASS occurrence. We note that there is an area mapped as having a high risk of ASS approximately 400 m north-west of the site.

7. GEOTECHNICAL ASSESSMENT

7.1 Geotechnical Issues

The key geotechnical issues at the site are:

- the potential for shallow / perched groundwater to develop over the natural soils after periods of prolonged rainfall;
- poor subgrade CBR for pavements;
- relatively poor site class (AS2870); and
- difficulty in achieving suitable compaction in clayey soils without careful moisture conditioning.

7.2 Site Classification

Site classifications in accordance with AS2870-2011 "Residential Slabs and Footings" are summarised in Table 5, Summary of Site Classifications (AS 2870-2011).

Table 5: Summary of Site Classifications (AS 2870-2011)

Class	Description	Characteristic Surface Movement (y_s)
A	Most sand and rock sites with little or no ground movement from moisture change	Not Defined (typically <5 mm)
S	Slightly reactive clay sites with only slight ground movement from moisture changes	0 – 20 mm
M	Moderately reactive clay sites, which may experience moderate ground movements from moisture change	20 – 40 mm
H1	Highly reactive sites, which may experience high ground movements from moisture change	40 – 60 mm
H2	Highly reactive sites, which may experience very high ground movements from moisture change	60 – 75 mm
E	Extremely reactive sites, which may experience extreme ground movements from moisture change	>75 mm
P	Sites which include soft soils, such as soft clay or silt or loose sands; landslip; mine subsidence; collapsing soils; soils subject to erosion; reactive sites subject to abnormal moisture conditions or sites which cannot be classified otherwise	Not Defined

We have assessed the site classification in accordance with AS2870 (2011) "Residential Slabs and Footings". We consider that a site classification of "Class M" would apply for the site. This is due to the presence of shallow medium plasticity Sandy CLAY. Footings and slabs may be designed in accordance with AS2870-2011 for a "Class M" site with a maximum bearing pressure of 100 kPa. If higher bearing pressures are required, we must be consulted.

The above assumes that the preliminary site preparation guidelines in Section 7.3 are followed.

Note: Footing and slab details in AS 2870-2011 are for single or double storey residential structures supported on shallow footings with a maximum bearing pressure of 100 kPa. This must be taken into account by the structural designers.

7.3 Construction Issues

Based on our constant head permeability tests, we note the hydraulic conductivity of the shallow clayey soils is very low and that storm-water run-off may pond on or near the surface after significant rainfall events. This may cause difficulties during construction, including:

- heaving and rutting of saturated clayey soils when trafficked; and
- softening of silty/clayey soils if water ponds at the base of excavations.

We therefore recommend that earthworks are conducted during the drier months (preferably early summer immediately after the harvest season), although mitigating measures will still be required to limit exposure and excessive drying out of the reactive clayey soils.

If earthworking in wet weather is unavoidable, a capping layer of say 150 mm approved gravel fill should be placed in critical areas to provide a working platform and to reduce the risk of subgrade softening and/or rutting.

Any excavated wet clayey soils may require stockpiling and allowing time to dry to a lower moisture content to allow for placement and compaction. Lime stabilisation of clayey soils may also be considered if earthworks in wet clay is unavoidable.

7.4 Site Preparation

The following site preparation measures are required prior to construction of buildings/structures, including on-ground slabs, shallow footings, retaining walls and pavements:

- Remove topsoil and vegetation, including grubbing out of roots. We expect that a 100 mm strip should be generally adequate however the topsoil strip must be deep enough to remove all roots. Holes formed by the removal of trees (present near the southern part of site) will need to be backfilled with suitably compacted approved clayey fill.
- Where required, conduct excavations to the required levels using safely battered slopes in accordance with Section 7.5.
- Scarify, moisture condition and compact exposed soils to a depth of 0.3 m in accordance with Section 7.6.
- If rock (or cemented zones) is encountered, over-excavate to a minimum depth of 0.15 m below the design subgrade level and backfill with approved, compacted granular fill (Section 7.7).
- Any areas that do not respond to compaction must be over-excavated and replaced with approved compacted fill (Section 7.7). Clayey soils that are over-excavated must be replaced with approved clayey fill to prevent stormwater run-off infiltrating, collecting and saturating/softening materials in the base of backfilled excavations.
- Moisture condition, place and compact approved fill (Section 7.7) in layers no greater than 0.3 m loose thickness. Each layer must be placed and compacted to achieve the minimum required densities in Section 7.6

Notes:
1. Clay / clayey soils will be difficult to compact if not moisture conditioned to near its optimum moisture content. As discussed in Section 7.3, earthworks should be considered during the dryer summer months.
2. Any clayey soil horizons must be graded to drain. A minimum grade of 1% is recommended for drainage.

7.5 Excavation and Slopes

Due to cemented ground conditions, test pits at the location of the proposed accommodation units (TP04-TP06) encountered refusal at depths ranging from 1.75 m to 2.5 m. Based on this, we consider that excavation to a nominal depth of up to 2.0 m should be possible with a large excavator (10 tonne or larger equipped with a rock bucket). We recommend allowance for a hydraulic rock breaker to facilitate excavation below 2.0 m.

Excavations in clayey soils above the water table must be battered back to slope angles of 1V:1H for temporary slopes and 1V:2H for permanent slopes.

Surcharges (such as plant and soil stockpiles) must not be placed at or near the crest of excavations. Even at these slope angles erosion and rilling may occur.

A geotechnical engineer must be consulted where there is any doubt regarding the stability or safety of unsupported excavations.

7.6 Compaction

Imported and site derived fill must be moisture conditioned to within 2% of optimum moisture content (OMC) and compacted to a minimum dry density ratio (DDR) as determined in accordance with AS1289.5.2.1 of:

- 92% MMDD (modified maximum dry density) for clayey embankment foundations and/or fill; and
- 95% MMDD for any granular foundations and imported granular fill.

Compaction control must be undertaken with a nuclear density gauge (NDG) in accordance with AS1289.5.8.1 and adopting the test frequencies outlined in CBH TS10B Construction Specification. Below structures (i.e., buildings), we recommend testing to a minimum depth of 0.3 m:

- at each pad footing location;
- at 5 m centres below strip footings;
- at one location below the base slab for the auger pit;
- on a grid of 10 m centres below other on-ground slabs.

Testing below pavements is discussed in Section 9.

Over-excavation and replacement of loose/soft materials must be done where the minimum dry density ratio cannot be achieved.

Granular fill (imported granular fill, silty sand, sandy gravel, silty gravelly sand) must be placed and compacted in layers no greater than 0.3 m loose thickness.

Clayey fill (clayey sand, sandy clay or clay) must be placed and compacted in layers no greater than 0.3 m loose thickness where required, although we recommend against re-use of this material if it can be avoided.

Each layer must be compacted by suitable compaction equipment, and carefully controlled to ensure even compaction over the full area and depth of each layer.

Large compaction equipment (self-propelled vibrating rollers, etc.) must not be used within 2 m behind retaining walls. Hand compaction plant must be used in this instance.

7.7 Approved Fill

The following requirements apply to approved fill materials used in the earthworking of the site for structures and pavements.

Imported granular fill must comply with the CBH TS10B Construction Specification Appendix E, E.1 Requirements. We can review the suitability of proposed fill sources that do not conform to TS10B if required.

Any organic rich materials must not be used.

Re-use of in situ clayey soils is generally not recommended due to issues with saturation, softening and shrink-swell movements from winter construction, particularly in low lying areas with poor drainage. However, we note that some clay backfilling may be required where there are low points or excavations made into the clayey soils.

Notwithstanding the above, we note that:

- Any low points or excavations made into the clayey soils must be backfilled with similar clayey soils (<u>not granular fill</u>) and graded to ensure storm-water run-off drains away from structures/pavements.
- Granular soils must not form the slopes or bases of drains due to risk of erosion unless approved by CBH.

<u>Note that abrupt changes in subgrade support must be avoided to reduce the risk of differential movements. We must therefore review the proposed fill materials and filling profile prior and/or during construction to confirm the suitability of the approach.</u>

Where there is any doubt about the materials, a geotechnical engineer must be engaged to inspect and comment on the suitability of proposed fill materials.

7.8 Drainage and Stormwater Disposal

Our tests at the proposed drainage basin and proposed leach drain areas indicate that the upper in situ clayey soils have a constant head hydraulic conductivity in the range of 0.01 m/day (refer to Table 3).

Based on the above, we the clayey soils below the site surface have a very low permeability. As such, we recommend that the subsurface soils are modelled as effectively impermeable.

We note that stormwater will likely pond on the surface during the wetter parts of the year. This may cause difficulties during construction including:

- heaving and rutting of saturated clayey soils when trafficked; and
- softening of clayey soils when water is allowed to pond at the base of excavations.

We therefore recommend that:

- earthworks are conducted during the summer months;
- clayey horizons and finished pavements are shaped to promote positive water run-off away from pavements and structures; and
- subsoil drains are used to direct subsurface water away from pavement and structures where required.

8. PRELIMINARY PAVEMENT DESIGNS

8.1 General

We have provided a preliminary flexible pavement design for the light duty access roads in general accordance with the following design guides:

- Austroads (2012) Guide to Pavement Technology Part 2 – Pavement Structural Design.
- Main Roads Western Australia (MRWA, 2013), Engineering Road Note 9.

8.2 Subgrade Evaluation

The subgrade typically comprises low and medium plasticity clayey sand/sandy clay.

We consider that a subgrade design CBR of 5% is appropriate where:

- the site preparation guidelines in Section 7.4 followed; and
- appropriate drainage control measures have been implemented.

We highlight that the 4-day soaked CBR (on test) indicates a CBR swell of 2.5%. MRWA Engineering Road Note 9 (ERN9) recommends the following minimum cover of inert material over reactive subgrades:

- Swell >2.5% to ≤5.0%: 600 mm cover
- Swell ≥0.5% to ≤2.5%: 150 mm cover

The preliminary thickness design provided assumes that the swell is not greater than 2.5%. We recommend that additional laboratory testing is undertaken prior to finalising the pavement design to verify that this is the case. Failure to provide sufficient cover over reactive materials may lead to shape loss and shrinkage cracking at the pavement surface. Alternatively, reactive subgrades may be treated with lime to reduce their plasticity and shrink-swell potential.

8.3 Design Traffic

We have not been provided with design traffic information for the pavements. However, based on our experience with similar light duty pavements, we consider that a design traffic of 9×10^4 ESA over a 25 year design period is appropriate for the pavement. This design traffic allows for about 5 heavy vehicle movements per day over 25 years.

We require that this design traffic assumption is reviewed and confirmed as acceptable.

8.4 Summary of Pavement Design

We provide the following pavement design based on the assumptions made:

Table 6: Summary of Pavement Design

Pavement Layer	Minimum CBR (%)	Design Thickness (mm)	Material Description and Specification
Wearing Surface	N/A	30	10 mm dense graded asphalt Class 170 bitumen IPWEA/AAPA (2016)
Seal	N/A	Nominal	Prime and 7 mm CRS170/60 seal MRWA Specifications 503 and 511
Basecourse	80	100	Imported Gravel Fill (CBH TS10B Appendix E3) (Min CBR 80%)
Subbase	50	200	Imported Sub-base Gravel Fill (CBH TS10B Appendix E2) (Min CBR 50%)
Subgrade	5	Semi-infinite	Clayey Sand/Sandy CLAY

8.5 Seal Design and Surfacings

8.5.1 Surface Preparation and Priming

Prior to sealing, the basecourse surface must be compacted and dried back to produce a dense, evenly textured, tightly bound surface and swept with a rotary broom or similar to remove any surface dust or loose particles. The surface must not show evidence of laminations or ravelling before and after brooming.

The surface must be primed to waterproof the granular base and provide a strong bond between the basecourse, seal and surfacing. We recommend priming in accordance with MRWA Specification 503 using a prime comprising 40% Class 170 bitumen/60% Medium curing cutter oil applied at a rate of 0.6 L/m^2.

The prime must be applied in dry and warm conditions, with no rainfall forecast within the following 3 days. The prime must be allowed to cure for 3 to 7 days prior to application of the surfacing (subject to assessment of site conditions).

Notwithstanding the given nominal application rates, the prime must be adjusted:

- to ensure a uniform and even coating;
- to account for the porosity of the pavement surface;
- to account for the pavement moisture content and prevailing conditions; and
- if the seal or surfacing is applied immediately after the primer.

8.5.2 Preliminary Seal Design below Asphalt Surfacing

The following presents a prime and preliminary seal design below the asphalt assuming a 7 mm single/single sprayed seal with a cationic rapid setting Class 170 60% bitumen emulsion (CRS170/60). The design may need to be adjusted to suit the aggregate used and the site conditions.

Table 7: Preliminary Seal Design below Asphalt Surfacing

Seal Type	Aggregate Size (mm)	Binder	Total Binder Rate (@ 15°C) L/m²	Aggregate Spread Rate (m²/m³)
Prime	-	Class 170 Cutback bitumen MRWA Specification 503	0.6	-
Single/single seal	7 mm	CRS170/60 emulsion	1.3	150-200

8.5.3 Surfacing Selection

We recommend that 10 mm dense graded asphalt with Class 170 bitumen is used for the surfacing.

IPWEA/AAPA (2016) Specification must be used for the mix design. The asphalt job mix must be trialled and laboratory tested to ensure it conforms with the specification.

The asphalt must be compacted to a minimum characteristic density ratio of 94% of the 50 blow Marshall Density as outlined in the IPWEA/AAPA (2016) Specification.

9. PAVEMENT SPECIFICATION AND CONSTRUCTION

9.1 Fill Materials

Imported fill materials used for the construction of pavements must meet the requirements of CBH Group Construction Specification TS10B – Civil Earthworks, Roads and Drainage and the design requirements outlined in Section 8.4

9.2 Moisture Conditioning, Compaction and Dryback

All granular pavement layers must be suitably, moisture conditioned compacted and dried back. Inadequate dry-back of pavement materials is often a cause of premature failures. Compaction and dry back requirements are provided in Table 8.

Table 8: Compaction and Dryback Requirements

Pavement Layer	Moisture Content for Compaction	Minimum DDR	Maximum Moisture Content for Dryback
Base-course	90-110% of MOMC	98% MMDD	70% of MOMC
Sub-base		98% MMDD	85% of MOMC
Subgrade (granular)		95% MMDD	85% of MOMC
Subgrade (cohesive)		92% MMDD	Target 80-100% MOMC No not allow dryback below 80% MOMC

Note: MOMC – Modified Optimum Moisture Content

Compaction control of pavement materials and subgrades must be undertaken in accordance with CBH TS10B – Construction Specification - Civil Earthworks, Roads and Drainage.

9.3 Pavement Drainage

The pavement designs assume that suitable drainage control measures have been implemented to prevent moisture ingress into the pavement and subgrade.

<u>It is therefore essential that the pavement surface and subgrade is shaped to drain away from pavements and other structures. Stormwater run-off that infiltrates the pavements and ponds on the clayey subgrade will cause it to soften and will adversely impact pavement performance. Subsoil drainage should be considered in poorly drained areas, particularly in the vicinity of cuttings where groundwater may be intercepted</u>.

10. ENVIRONMENTAL ASSESSMENT

10.1 Regulatory Assessment Criteria

<u>Chemical Contaminants and Asbestos</u>

Regulatory assessment criteria for soil and groundwater analysis were selected taking into account the current land use, proposed use as an accommodation facility, applicable soil beneficial uses and consistency with relevant published guidelines including National Environmental Protection Council (NEPC) (2013) *National Environmental Protection (Assessment of Site Contamination) Measure.*

Soil samples were specifically assessed against the following:

- health investigation levels - residential (HIL A); and
- health screening levels - residential (HSL A).

<u>Acid Sulfate Soils</u>

Typically, field pH values (pH_F) of <3 to 4 indicate the presence of ASS, thus indicating acids in the soil profile have oxidised.

The presence of unoxidized acids or potential acid sulfate soil (PASS) is indicated if:

- A strong reaction with hydrogen peroxide is observed;
- the pH_{FOX} is at least 1 pH unit below pH_F; or
- the pH_{FOX} is <3 to 4 and one or both of the above conditions apply.

The texture based net acidity action criteria presented in the Department of Environment and Regulation (DER) (2015) *Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes* guideline document specifies a value of 0.06 %S based on the anticipated volume of soil to be disturbed being less than 1,000 tonnes. This value has been adopted for the assessment of net acidity in soils across the site.

10.2 Results

Soil analytical results are presented in Table 9 and discussed below. Tabulated results and assessment criteria are shown in Appendix F.

Table 9: Analytical Results Summary

Analyte	Results Range	Exceedances
Metals		
Arsenic	<5 mg/kg	None
Cadmium	<0.1 – 0.2 mg/kg	None
Chromium (III+VI)	13 - 35 mg/kg	None
Copper	4.9 – 9.4 mg/kg	None
Lead	11 - 17 mg/kg	None
Mercury	<0.02 – 0.15 mg/kg	None
Nickel	2.8 - 11 mg/kg	None
Zinc	9.1 - 70 mg/kg	None
Hydrocarbons		
BTEXN	< LOR[1]	None
TRH	< LOR	None
PAH	< LOR	None
Asbestos		
Asbestos	Not identified	None
Acid Sulfate Soil		
Net Acidity	< 0.02 – 0.04 %S	None
pH_f	4.6 – 9.5	N/A
pH_{fox}	4.1 – 9.3	N/A
pH_f - pH_{fox}	0 – 3.2	N/A

Notes: 1. LOR indicates results were below the laboratory limits of reporting.

10.3 Summary

Chemical Contaminants and Asbestos

The results of the analytical testing indicate that the concentrations of all contaminants of potential concern (COPC) were either below the laboratory limit of reporting (LOR) and/or conformed to the adopted assessment criteria.

Acid Sulfate Soils

Net acidity did not exceed the action criterion of 0.06%S in any of the samples tested. As such, we do not consider that ASS treatment is required for any excavated materials.

[1] LOR indicates that all constituent compounds were below the laboratory limit of reporting.

Based on these results, we consider it unlikely that the site presented a risk to human health or the environment in the context of the proposed land use. Furthermore, we consider that the site is suitable for use as an accommodation facility.

11. CLOSURE

We draw your attention to Appendix F of this report, "Understanding Your Report". The information provided within is intended to inform you as to what your realistic expectations of this report should be. Guidance is also provided on how to minimise risks associated with groundworks for this project. This information is provided not to reduce the level of responsibility accepted by Galt, but to ensure that all parties who rely on this report are aware of the responsibilities each assumes in so doing.

GALT GEOTECHNICS PTY LTD

Sean Coffey CPEng
Geotechnical Engineer

https://galtgeo.sharepoint.com/sites/WAG230373/Shared Documents/01 CBH SI Great Northern Hwy Miling/03 Correspondence/WAG230373-01 002 R Rev0.docx

Tables

Table A1: ASS Field Testing Results

Field Observations					
Location	Depth (m)	pH_f (pH units)	pH_{fox} (pH units)	pH_f - pH_{fox} (pH units)	Reaction Rate (LMHXV)
		4	4	1	NV
TP01	0.00	6.0	5.9	0.1	L
	0.25	8.6	8.3	0.3	H
	0.50	9.4	8.6	0.8	X
	0.75	9.3	8.9	0.4	V
	1.00	9.1	9.1	0.0	V
	1.25	8.8	6.8	2.0	L
	1.50	8.8	6.4	2.4	L
TP02	0.00	6.0	6.0	0.0	L
	0.25	6.3	6.3	0.0	X
	0.50	7.0	7.0	0.0	X
	0.75	7.4	7.4	0.0	V
	1.00	8.2	8.2	0.0	H
	1.25	8.6	6.7	1.9	H
	1.50	8.8	6.4	2.4	L
TP03	0.00	8.1	5.6	2.5	L
	0.25	9.1	7.9	1.2	X
	0.50	9.0	8.7	0.3	V
	0.75	8.7	8.6	0.1	X
	1.00	8.5	8.5	0.0	V
	1.25	9.0	8.8	0.2	V
	1.50	8.0	6.2	1.8	X
TP04	0.00	7.6	6.0	1.6	L
	0.25	9.4	7.3	2.1	X
	0.50	9.5	8.0	1.5	X
	0.75	9.3	8.1	1.2	V
	1.00	9.5	9.3	0.2	X
	1.25	8.7	7.9	0.8	M
	1.50	8.9	6.6	2.3	L
	1.75	5.2	4.1	1.1	L
	2.00	8.2	5.0	3.2	X
	2.25	5.0	4.6	0.4	L
	2.50	5.0	4.1	0.9	L

Field Observations					
Location	Depth (m)	pH_f (pH units)	pH_{fox} (pH units)	pH_f - pH_{fox} (pH units)	Reaction Rate (LMHXV)
		4	4	1	NV
TP05	0.00	6.6	5.3	1.3	L
	0.25	7.7	6.3	1.4	M
	0.50	8.9	8.2	0.7	H
	0.75	9.0	7.6	1.4	H
	1.00	9.1	7.8	1.3	H
	1.25	9.4	9.3	0.1	H
	1.50	9.1	7.4	1.7	L
	1.75	9.3	6.9	2.4	L
TP06	0.00	6.3	5.0	1.3	L
	0.25	6.6	5.8	0.8	L
	0.50	7.4	6.4	1.0	L
	0.75	7.9	6.4	1.5	L
	1.00	7.9	6.3	1.6	L
	1.25	8.2	6.6	1.6	L
	1.50	7.9	5.6	2.3	L
	1.75	7.4	5.6	1.8	L
	2.00	5.9	4.8	1.1	L
	2.25	4.9	4.3	0.6	L
	2.50	4.6	4.3	0.3	L
TP07	0.00	5.2	5.1	0.1	L
	0.25	7.9	6.5	1.4	L
	0.50	8.9	6.6	2.3	L
	0.75	8.2	8.2	0.0	X
	1.00	8.6	8.2	0.4	V
	1.25	8.4	8.0	0.4	X
	1.50	8.4	6.3	2.1	L

Figures

www.galtgeo.com.au
50 Edward Street OSBORNE PARK WA 6017

ABN: 64 625 054 729

Legend

- Site Boundary
- Test Pit
- Test Pit / Constant Head Permeameter Test

N

0 8 16 24 32 40
Meters

NOTES

Aerial Imagery and Cadastre sourced from Landgate/SLIP

SCALE	1:500 (A3)
DRAWN	DAC
DATE DRAWN	3/8/2023
CHECKED	_
DATE CHECKED	_
PROJECTION	GDA 1994 MGA Zone 50

Galt GEOTECHNICS

Galt Geotechnics Pty Ltd
ACN : 138 490 865
Tel : +61 (0)8 6272-0200
Address : 50 Edward Street
Osborne Park WA 6017

CLIENT	COOPERATIVE BULK HANDLING (CBH) LTD
PROJECT	PROPOSED ACCOMMODATION SITE
LOCATION	PART OF LOT 80 GREAT NORTHERN HIGHWAY MILING
TITLE	SITE & LOCATION PLAN
Job No	WAG230373-01
Fig No	FIGURE 1
Rev	A

Appendix A: Site Photographs

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50 Edward Street OSBORNE PARK WA 6017

ABN: 64 625 054 729

Photograph 1: Facing southwest from near existing former church

Photograph 2: Note on former church exterior wall

Photograph 3: Note on former church exterior wall

Photograph 4: Facing northwest from near the northeastern corner of site

Photograph 5: Facing south from near the northeastern corner of site

Photograph 6: Facing northeast from near location TP09

Photograph 7: Facing north from near the southwestern corner of existing former church.

Photograph 8: Facing west from near test pit location TP08.

Photograph 9: Facing west from near location TP04

Photograph 10: Facing east from near location TP01.

Photograph 11: Facing south from near location TP04.

Photograph 12: Facing south from near location P03

Photograph 13: Close up of cemented clayey soil interbedded with weathered rock within TP07 (depth 1.5 m)

Photograph 14: Close up of cemented clayey soil interbedded with weathered rock within TP07 (depth 1.5 m)

Appendix B: Test Pit Reports

METHOD OF SOIL DESCRIPTION
BOREHOLE AND TEST PIT REPORTS

GRAPHIC LOG & SOIL CLASSIFICATION SYMBOLS

Graphic	USCS	Soil Name
		FILL (various types)
		COBBLES / BOULDERS
	GP	GRAVEL (poorly graded)
	GW	GRAVEL (well graded)
	GC	Clayey GRAVEL
	GM	Silty GRAVEL
	SP	SAND (poorly graded)
	SW	SAND (well graded)
	SC	Clayey SAND

Graphic	USCS	Soil Name
	SM	Silty SAND
	ML	SILT (low liquid limit)
	MH	SILT (high liquid limit)
	CL	CLAY (low plasticity)
	CI	CLAY (medium plasticity)
	CH	CLAY (high plasticity)
	OL	Organic SILT (low liquid limit)
	OH	Organic SILT (high liquid limit)
	Pt	PEAT

NOTE: Dual classification given for soils with a fines content between 5% and 12%.

SOIL CLASSIFICATION AND INFERRED STRATIGRAPHY

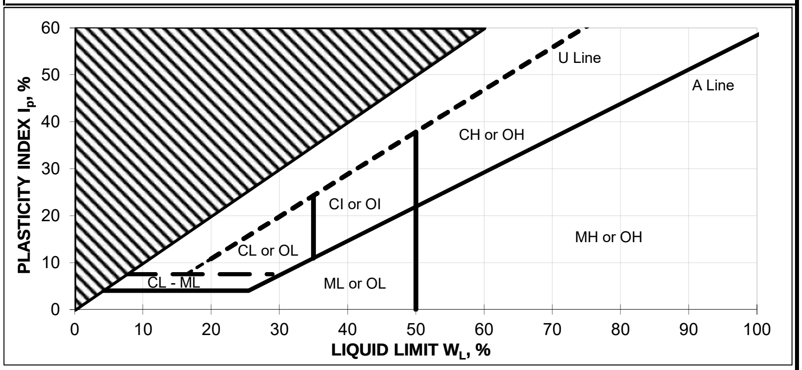
Soil descriptions are based on AS1726-2017. Material properties are assessed in the field by visual/tactile methods in combination with field and laboratory testing techniques (where used).

NOTE: AS 1726-2017 defines a fine grained soil where the total dry mass of fine fractions (<0.075 mm particle size) exceeds 35%.

PARTICLE SIZE

Soil Name		Particle Size (mm)
BOULDERS		>200
COBBLES		63 to 200
GRAVEL	Coarse	19 to 63
	Medium	6.7 to 19
	Fine	2.3 to 6.7
SAND	Coarse	0.6 to 2.36
	Medium	0.21 to 0.6
	Fine	0.075 to 0.21
FINES	SILT	0.002 to 0.075
	CLAY	<0.002

PLASTICITY - MODIFIED CASAGRANDE CHART - AS1726-2017



RESISTANCE TO EXCAVATION

Symbol	Term	Description
VE	Very easy	All resistances are relative to the selected method of excavation
E	Easy	
F	Firm	
H	Hard	
VH	Very hard	

MOISTURE CONDITION

Symbol	Term
D	Dry
M	Moist
W	Wet

CEMENTATION

Cementation	Description
Weakly cemented	Soil may be easily disaggregated by hand in air or water
Moderately cemented	Effort is required to disaggregate the soil by hand in air or water

CONSISTENCY

Symbol	Term	Undrained Shear Strength (kPa)
VS	Very Soft	0 to 12
S	Soft	12 to 25
F	Firm	25 to 50
St	Stiff	50 to 100
VSt	Very Stiff	100 to 200
H	Hard	>200

ORGANIC SOILS

Material	Organic Content % of dry mass
Inorganic soil	<2%
Organic soil	2% to 25%
Peat	>25%

DENSITY

Symbol	Term	Density Index (%)
VL	Very Loose	<15
L	Loose	15 to 35
MD	Medium Dense	35 to 65
D	Dense	65 to 85
VD	Very Dense	>85

EXPLANATORY NOTES TO BE READ WITH BOREHOLE AND TEST PIT REPORTS

Galt GEOTECHNICS

METHOD OF DRILLING OR EXCAVATION

AC	Air Core	E	Excavator	PQ3	PQ3 Core Barrel
AD/T	Auger Drilling with TC-Bit	EH	Excavator with Hammer	PT	Push Tube
AD/V	Auger Drilling with V-Bit	HA	Hand Auger	R	Ripper
AT	Air Track	HMLC	HMLC Core Barrel	RR	Rock Roller
B	Bulldozer Blade	HQ3	HQ3 Core Barrel	SON	Sonic Rig
BH	Backhoe Bucket	N	Natural Exposure	SPT	Driven SPT
CT	Cable Tool	NMLC	NMLC Core Barrel	WB	Washbore
DT	Diatube	PP	Push Probe	X	Existing Excavation

SUPPORT

T	Timbering

PENETRATION EFFORT (RELATIVE TO THE EQUIPMENT USED)

VE	Very Easy	E	Easy	F	Firm
H	Hard	VH	Very Hard		

WATER

►	Water Inflow	▼	Water Level
◄	Water Loss (complete)		
◁	Water Loss (partial)		

SAMPLING AND TESTING

B	Bulk Disturbed Sample	P	Piston Sample
BLK	Block Sample	PBT	Plate Bearing Test
C	Core Sample	U	Undisturbed Push-in Sample
CBR	CBR Mould Sample		U50: 50 mm diameter
D	Small Disturbed Sample	SPT	Standard Penetration Test
ES	Environmental Soil Sample		Example: 3, 4, 5 N=9
EW	Environmental Water Sample		3,4,5: Blows per 150 mm
G	Gas Sample		N=9: Blows per 300 mm after
HP	Hand Penetrometer		150 mm seating interval
LB	Large Bulk Disturbed Sample	VS	Vane Shear; P = Peak
M	Mazier Type Sample		R = Remoulded (kPa)
MC	Moisture Content Sample	W	Water Sample

ROCK CORE RECOVERY

TCR = Total Core Recovery (%) $= \frac{CRL}{TCL} \times 100$

RQD = Rock Quality Designation (%) $= \frac{ALC>100}{TCL} \times 100$

TCL	Length of Core Run
CRL	Length of Core Recovered
ALC>100	Total Length of Axial Lengths of Core Greater than 100 mm Long

REPORT OF TESTPIT: TP01

Job No	: WAG230373	Easting	: 438656.7	Sheet	: 1 OF 1
Client	: CBH	Northing	: 6626306.1	Logged	: Alex Mathew
Project	: Proposed Accommodation Site	UTM	: 50J	Logged Date	: 14/08/2023
Location	: 18201 Great Northern Highway, Miling	Drill Rig	:	Checked	: SC
Contractor	: ANH Contracting	Inclination	: -90 deg	Checked Date	: 22/08/2023

Excavator Attachment	Excavation Resistance	DCP graph	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Consistency/Density	Remarks	Sample
450mm toothed bucket		2		Fill		SC	Fill clayey SAND: low plasticity clay, brown, fine to coarse grained, trace fine to coarse sized gravel, (trace organic fines, trace rootlets, approximately 12-20% fines).	D			
		2									
		3	0.2	Natural		CI	Natural sandy CLAY: medium plasticity, brown, fine to coarse grained sand, with fine sized gravel, inorganic, (approximately 45-55% sand).				
		4									
		4									
		5									
		4									
		4									
		5	0.8	Natural		CI	As above, pale brown mottled white.				
		6									
			1								
							TP01 Terminated at 1.5 m (Target Depth. Groundwater not encountered)				

REPORT OF TESTPIT: TP02

Job No	: WAG230373	Easting	: 438636.7	Sheet	: 1 OF 1
Client	: CBH	Northing	: 6626314.8	Logged	: Alex Mathew
Project	: Proposed Accommodation Site	UTM	: 50J	Logged Date	: 14/08/2023
Location	: 18201 Great Northern Highway, Miling	Drill Rig	:	Checked	: SC
Contractor	: ANH Contracting	Inclination	: -90 deg	Checked Date	: 22/08/2023

Excavator Attachment	Excavation Resistance	DCP graph	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Consistency/Density	Remarks	Sample
450mm toothed bucket		3, 2		Fill		SC	Fill clayey SAND: low to medium plasticity clay, brown, fine to coarse grained, with fine sized gravel, (trace organic fines, trace rootlets, trace building rubble (pavers, plastic), approximately 12-20% fines.).	D			
		6, 6, 8, 10, 13+ R	0.2	Natural		CI	Natural sandy CLAY: medium plasticity, brown, fine to coarse grained sand, with fine sized gravel, inorganic, (approximately 45-55% sand).				
			0.9	Natural		CI	As above, pale brown mottled white.				
			1								

TP02 Terminated at 1.5 m (Target Depth. Groundwater not encountered.)

REPORT OF TESTPIT: TP03

Job No	: WAG230373	Easting	: 438624.6	Sheet	: 1 OF 1
Client	: CBH	Northing	: 6626292.6	Logged	: Alex Mathew
Project	: Proposed Accommodation Site	UTM	: 50J	Logged Date	: 14/08/2023
Location	: 18201 Great Northern Highway, Miling	Drill Rig	:	Checked	: SC
Contractor	: ANH Contracting	Inclination	: -90 deg	Checked Date	: 22/08/2023

Excavator Attachment	Excavation Resistance	DCP graph	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Consistency/Density	Remarks	Sample
450mm toothed bucket		2, 3	0.2	Topsoil		SC	Topsoil clayey SAND: low plasticity clay, brown, fine to coarse grained, with fine sized gravel, (trace rootlets, trace organic fines, approximately 12-15% fines.).	D			
		5, 6, 5, 7, 7	0.7	Natural		CI-CH	Natural sandy CLAY: medium to high plasticity, brown, fine to coarse grained sand, with fine sized gravel, inorganic, (approximately 40-50% sand).				
		6, 8, 10+ R	1	Natural		CI-CH	As above, trace fine to coarse sized gravel.				
							TP03 Terminated at 1.5 m (Target Depth. Groundwater not encountered.)				

REPORT OF TESTPIT: TP04

Job No	: WAG230373	Easting	: 438603.5	Sheet	: 1 OF 1
Client	: CBH	Northing	: 6626296.1	Logged	: Alex Mathew
Project	: Proposed Accommodation Site	UTM	: 50J	Logged Date	: 14/08/2023
Location	: 18201 Great Northern Highway, Miling	Drill Rig	:	Checked	: SC
Contractor	: ANH Contracting	Inclination	: -90 deg	Checked Date	: 22/08/2023

Excavator Attachment	Excavation Resistance	DCP graph	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Consistency/Density	Remarks	Sample
450mm toothed bucket		3, 5	0 – 0.15	Topsoil		CI	Topsoil sandy CLAY: medium plasticity, dark brown, fine to coarse grained sand, trace fine sized gravel, (trace organic fines, trace rootlets).	D			
		6, 10, 11, 12+ R	0.15 – 0.7	Natural		CI	Natural sandy CLAY: medium plasticity, brown, fine to coarse grained sand, with fine to coarse sized gravel, (approximately 50-60% sand).				
			0.7 – 1.5	Natural		CI	As above, brown mottled white.				
			1.5 – 2	Natural		CI	As above, with fine to medium sized gravel, (approximately 45-55% sand).				
			2 – 2.5	Natural		CI	As above, (moderately cemented).				

TP04 refusal at 2.5 m (Slow excavation. Groundwater not encountered)

Galt

REPORT OF TESTPIT: TP05

Job No	: WAG230373	Easting	: 438597.7	Sheet	: 1 OF 1
Client	: CBH	Northing	: 6626319.2	Logged	: Alex Mathew
Project	: Proposed Accommodation Site	UTM	: 50J	Logged Date	: 14/08/2023
Location	: 18201 Great Northern Highway, Miling	Drill Rig	:	Checked	: SC
Contractor	: ANH Contracting	Inclination	: -90 deg	Checked Date	: 22/08/2023

Excavator Attachment	Excavation Resistance	DCP graph	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Consistency/Density	Remarks	Sample
450mm toothed bucket		5		Topsoil		SC	Topsoil clayey SAND: low to medium plasticity clay, brown, fine to coarse grained, trace fine sized gravel, (trace organic fines, trace rootlets).	D			
		4	0.1	Natural		SC	Natural clayey SAND: low plasticity clay, brown, fine to coarse grained, trace fine sized gravel.				
		3, 5, 5, 5, 7, 9, 13+ R	0.2	Natural		CI	Natural sandy CLAY: medium plasticity, brown, fine to coarse grained sand, trace fine sized gravel, inorganic, (approximately 45-55% sand).				
			1	Natural		CI	As above, brown mottled white, with fine to coarse sized gravel, (includes moderately cemented zones).				
			1.5	Natural		CI	As above, brown mottled pale red, inorganic, (approximately 40-50% sand).				
							TP05 refusal at 1.75 m (Slow excavation. Groundwater not encountered.)				

REPORT OF TESTPIT: TP06

Job No	: WAG230373	Easting	: 438576.6	Sheet	: 1 OF 1
Client	: CBH	Northing	: 6626319.0	Logged	: Alex Mathew
Project	: Proposed Accommodation Site	UTM	: 50J	Logged Date	: 14/08/2023
Location	: 18201 Great Northern Highway, Miling	Drill Rig	:	Checked	: SC
Contractor	: ANH Contracting	Inclination	: -90 deg	Checked Date	: 22/08/2023

Excavator Attachment	Excavation Resistance	DCP graph	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Consistency/Density	Remarks	Sample
450mm toothed bucket		2	0.1	Topsoil		SC	Topsoil clayey SAND: low to medium plasticity clay, brown, fine to coarse grained, trace fine sized gravel, (trace organic fines, trace rootlets).	D			
		6	0.2	Natural		SC	Natural clayey SAND: low plasticity clay, brown, fine to coarse grained, trace fine to medium sized gravel, (approximately 25-35% fines).				
		5		Natural		CI	Natural sandy CLAY: medium plasticity, brown, fine to coarse grained sand, with fine to coarse sized gravel, (approximately 45-55% sand).				
		4									
		6									
		6									
		6									
		6									
		6									
		8	1								
			2	Natural		CI	As above, brown mottled red, trace fine sized gravel, inorganic, (moderately cemented, approximately 35-45% sand).				

TP06 refusal at 2.5 m (Slow excavation. Groundwater not encountered)

REPORT OF TESTPIT: TP07

Job No : WAG230373	Easting : 438594.7	Sheet : 1 OF 1	
Client : CBH	Northing : 6626342.2	Logged : Alex Mathew	
Project : Proposed Accommodation Site	UTM : 50J	Logged Date : 14/08/2023	
Location : 18201 Great Northern Highway, Miling	Drill Rig :	Checked : SC	
Contractor : ANH Contracting	Inclination : -90 deg	Checked Date : 22/08/2023	

Excavator Attachment	Excavation Resistance	DCP graph	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Consistency/Density	Remarks	Sample
450mm toothed bucket		4	0.1	Topsoil		SC	Topsoil clayey SAND: low plasticity clay, brown, fine to coarse grained, trace fine to medium sized gravel, (trace organic fines, trace rootlets).	D			
		4 6	0.3	Natural		SC	Natural clayey SAND: low plasticity clay, brown, fine to coarse grained, trace fine to medium sized gravel, (approximately 20-30% fines).				
		6 6 7 11 15+ R	1 1.3	Natural		CI	Natural sandy CLAY: medium plasticity, brown, fine to coarse grained sand, with fine to medium sized gravel, (approximately 45-55% sand).				
				Natural		CI	Natural sandy to gravelly CLAY: medium plasticity, brown, fine sized gravel, fine to coarse grained sand, inorganic, (approximately 40-50% sand, trace cobble-sized material).				
							TP07 Terminated at 1.5 m (Target Depth. Groundwater not encountered)				

REPORT OF TESTPIT: TP08

Job No	: WAG230373	Easting	: 438567.1	Sheet	: 1 OF 1
Client	: CBH	Northing	: 6626330.4	Logged	: Alex Mathew
Project	: Proposed Accommodation Site	UTM	: 50J	Logged Date	: 14/08/2023
Location	: 18201 Great Northern Highway, Miling	Drill Rig	:	Checked	: SC
Contractor	: ANH Contracting	Inclination	: -90 deg	Checked Date	: 22/08/2023

Excavator Attachment	Excavation Resistance	DCP graph	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Consistency/Density	Remarks	Sample
450mm toothed bucket				Topsoil		CI	Topsoil sandy CLAY: medium plasticity, brown, fine to coarse grained sand, trace fine sized gravel, (trace organic fines, trace rootlets).	D			
			0.1	Natural		CI	Natural sandy CLAY: medium plasticity, dark brown, fine to coarse grained sand, trace fine to medium sized gravel, inorganic, (approximately 45-55% sand).				
			0.3	Natural		CH	Natural sandy to gravelly CLAY: high plasticity, brown mottled red, fine to medium sized gravel, fine to coarse grained sand, inorganic, (approximately 30-40% gravel, 25-35% sand).				
			0.7	Natural		CI	Natural sandy CLAY: medium plasticity, orange brown mottled white, fine to coarse grained sand, trace fine sized gravel, inorganic, (approximately 45-55% sand).				
			1								
							TP08 Terminated at 1.75 m (Target Depth. Groundwater not encountered.)				

REPORT OF TESTPIT: TP09

Job No	: WAG230373	Easting	: 438565.0	Sheet	: 1 OF 1
Client	: CBH	Northing	: 6626314.7	Logged	: AM
Project	: Proposed Accommodation Site	UTM	:	Logged Date	: 31/07/2023
Location	: 18201 Great Northern Highway, Miling	Drill Rig	:	Checked	: SC
Contractor	: ANH Contracting	Inclination	: -90 deg	Checked Date	: 22/08/2023

Excavator Attachment	Excavation Resistance	DCP graph	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Consistency/Density	Remarks	Sample
				Topsoil		SC	Topsoil clayey SAND: low to medium plasticity clay, brown, fine to medium grained, trace fine to medium sized gravel, (trace organic fines, trace rootlets, approximately 12-20% fines).	D			
			0.2	Natural		CI	Natural sandy CLAY: medium plasticity, brown, fine to coarse grained sand, trace fine sized gravel, inorganic, (approximately 45-55% sand).				
			0.8	Natural		CI	As above, brown mottled red.				
			1								
							TP09 Terminated at 1.5 m (Target Depth. Groundwater not encountered.)				

Appendix C: Constant Head Permeameter Test Results

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50 Edward Street OSBORNE PARK WA 6017

ABN: 64 625 054 729

Hydraulic Conductivity Calculation - Constant Head by Permeameter

Galt Geotechnics

Spreadsheet author:

REFERENCE: AS1547-2012, "On-site domestic wastewater management" - Appendix G

Job No:	WAG230373-01
Client:	CBH
Project:	Proposed Accommodation Site
Location:	18201 Great Northern Hwy, Miling
Test Name	P01

$$K = \frac{4.4Q[0.5\ \sinh^{-1}\left(\frac{H}{2r}\right) - \sqrt{\left(\frac{r}{H}\right)^2 + 0.25} + \frac{r}{H}]}{2\,\pi H^2}$$

Spreadsheet Legend

- Required input
- Calculated field
- Comment field
- Field not used
- Fixed field

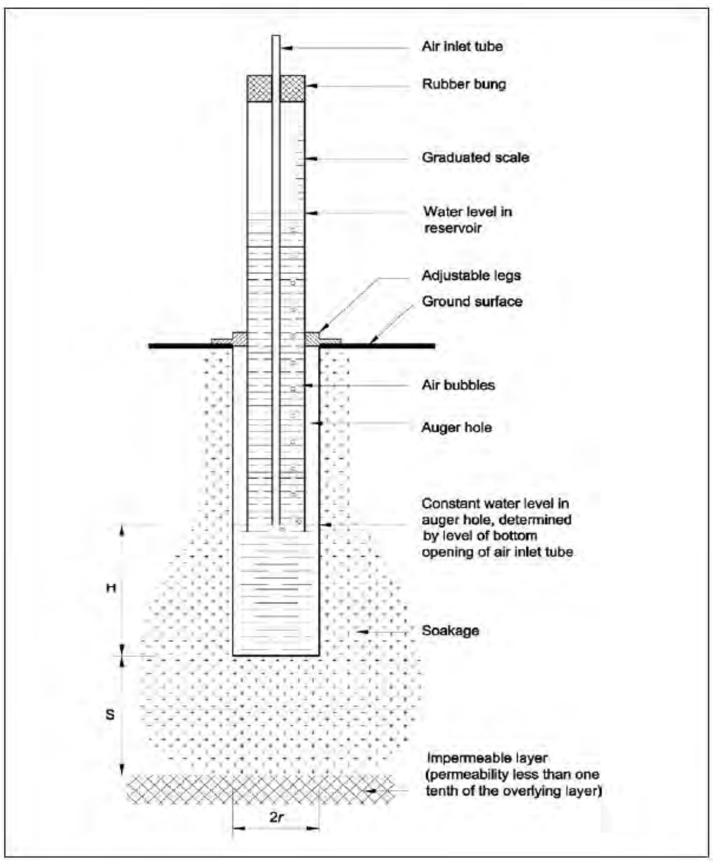
Parameter	Description	Value	Units
K_{sat}	Saturated hydraulic conductivity		cm/min
D	Depth of auger hole	53	cm
H	Head of water above base	31	cm
r	Radius of auger hole	7.6	cm
S	Depth to impermeable stratum		cm
Reservoir	Chosen Guelph reservoir (inner or outer)	**Outer**	
Area	Area of chosen reservoir	36.3	cm^2
F	Reading of water level in reservoir		cm

Test Results

Time (min)	F (cm)	ΔF (cm)	ΔF (cm)/min
0	19		
5.5	18.6	0.40	0.07
6	18.6	0.00	0.00
9	18.4	0.20	0.07
11	18.4	0.00	0.00
12	18.4	0.00	0.00
14	18.2	0.20	0.10
15	18.2	0.00	0.00
16	18.2	0.00	0.00
17	18.2	0.00	0.00
19	18	0.20	0.10
20	18	0.00	0.00
21	17.9	0.10	0.10
AVERAGE - LAST 5 READINGS			0.04

Calculation

Steady State Flow	0.04	cm/min
Flow from reservoir (Q)	1.45	cm^3/min
K_{sat}	0.000	cm/min
K_{sat}	7.387E-08	m/s
K_{sat}	**0.01**	**m/day**



where:
H = depth of water in test hole
S = the depth to an underlying impermeable layer
r = radius of the test hole

Hydraulic Conductivity Calculation - Constant Head by Permeameter

Galt Geotechnics

Spreadsheet author:

REFERENCE: AS1547-2012, "On-site domestic wastewater management" - Appendix G

Job No:	WAG230373-01
Client:	CBH
Project:	Proposed Accommodation Site
Location:	18201 Great Northern Hwy, Miling
Test Name	P02

$$K = \frac{4.4Q[0.5\ \sinh^{-1}\left(\frac{H}{2r}\right) - \sqrt{\left(\frac{r}{H}\right)^2 + 0.25} + \frac{r}{H}]}{2\ \pi H^2}$$

Spreadsheet Legend

	Required input
	Calculated field
	Comment field
	Field not used
	Fixed field

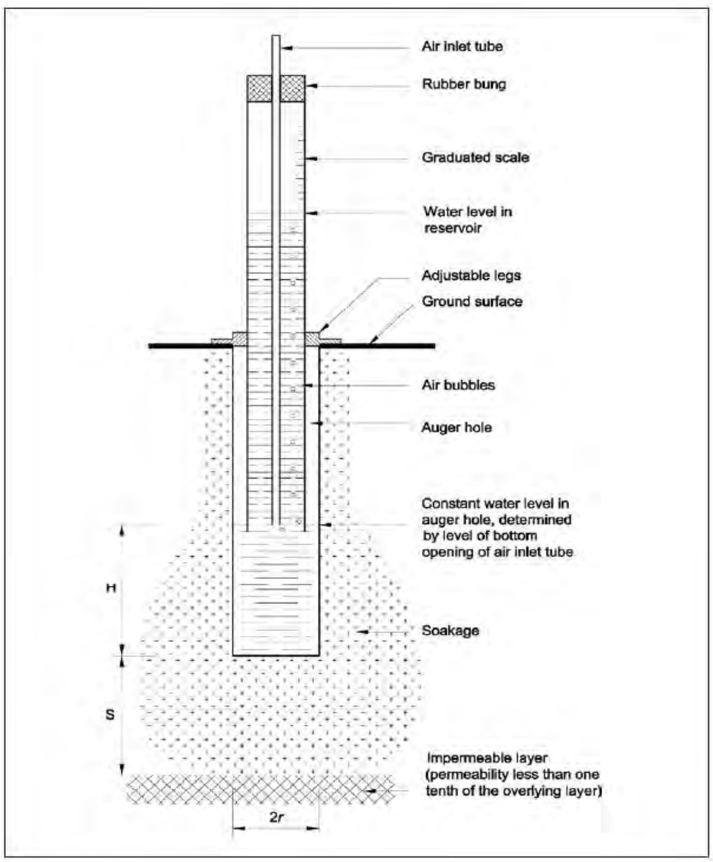
Parameter	Description	Value	Units
K_{sat}	Saturated hydraulic conductivity		cm/min
D	Depth of auger hole	50	cm
H	Head of water above base	26.2	cm
r	Radius of auger hole	4.5	cm
S	Depth to impermeable stratum		cm
Reservoir	Chosen Guelph reservoir (inner or outer)	**Outer**	
Area	Area of chosen reservoir	36.3	cm^2
F	Reading of water level in reservoir		cm

Test Results

Time (min)	F (cm)	ΔF (cm)	ΔF (cm)/min
0	24		
3	23.8	0.20	0.07
4.5	23.8	0.00	0.00
9.5	23.4	0.40	0.08
13	23.2	0.20	0.06
14.5	23.2	0.00	0.00
16	23	0.20	0.13
18.5	23	0.00	0.00
20	22.8	0.20	0.13
21	22.8	0.00	0.00
23	22.8	0.00	0.00
24	22.6	0.20	0.20
25	22.6	0.00	0.00
26	22.6	0.00	0.00
AVERAGE - LAST 5 READINGS			0.04

Calculation

Steady State Flow	0.04	cm/min
Flow from reservoir (Q)	1.45	cm^3/min
K_{sat}	0.001	cm/min
K_{sat}	1.328E-07	m/s
$\mathbf{K_{sat}}$	**0.01**	**m/day**



where:
H = depth of water in test hole
S = the depth to an underlying impermeable layer
r = radius of the test hole

Hydraulic Conductivity Calculation - Constant Head by Permeameter

Galt Geotechnics

Spreadsheet author:

REFERENCE: AS1547-2012, "On-site domestic wastewater management" - Appendix G

Job No:	WAG230373-01
Client:	CBH
Project:	Proposed Accommodation Site
Location:	18201 Great Northern Hwy, Miling
Test Name	P03

$$K = \frac{4.4Q[0.5\ \sinh^{-1}\left(\frac{H}{2r}\right) - \sqrt{\left(\frac{r}{H}\right)^2 + 0.25} + \frac{r}{H}]}{2\,\pi H^2}$$

Spreadsheet Legend

- Required input
- Calculated field
- Comment field
- Field not used
- Fixed field

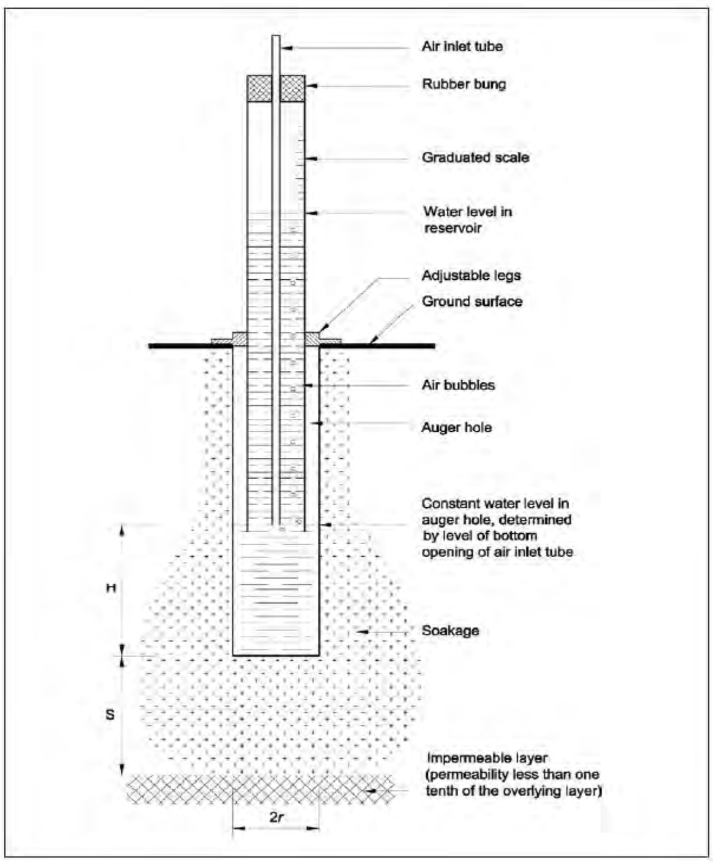
Parameter	Description	Value	Units
K_{sat}	Saturated hydraulic conductivity		cm/min
D	Depth of auger hole	63	cm
H	Head of water above base	35	cm
r	Radius of auger hole	8	cm
S	Depth to impermeable stratum		cm
Reservoir	Chosen Guelph reservoir (inner or outer)	**Outer**	
Area	Area of chosen reservoir	36.3	cm^2
F	Reading of water level in reservoir		cm

Test Results

Time (min)	F (cm)	ΔF (cm)	ΔF (cm)/min
0	28.6		
0.5	28.6	0.00	0.00
1	28.6	0.00	0.00
1.5	28.6	0.00	0.00
2	28.6	0.00	0.00
5	28.4	0.20	0.07
11	28.2	0.20	0.03
14	28.2	0.00	0.00
19	28.1	0.10	0.02
21	28	0.10	0.05
22	27.9	0.10	0.10
23	27.9	0.00	0.00
24	27.8	0.10	0.10
AVERAGE - LAST 5 READINGS			0.05

Calculation

Steady State Flow	0.05	cm/min
Flow from reservoir (Q)	1.96	cm^3/min
K_{sat}	0.000	cm/min
K_{sat}	8.237E-08	m/s
K_{sat}	**0.01**	**m/day**



where:
H = depth of water in test hole
S = the depth to an underlying impermeable layer
r = radius of the test hole

Appendix D: Geotechnical Laboratory Test Results

www.galtgeo.com.au
50 Edward Street OSBORNE PARK WA 6017

ABN: 64 625 054 729

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

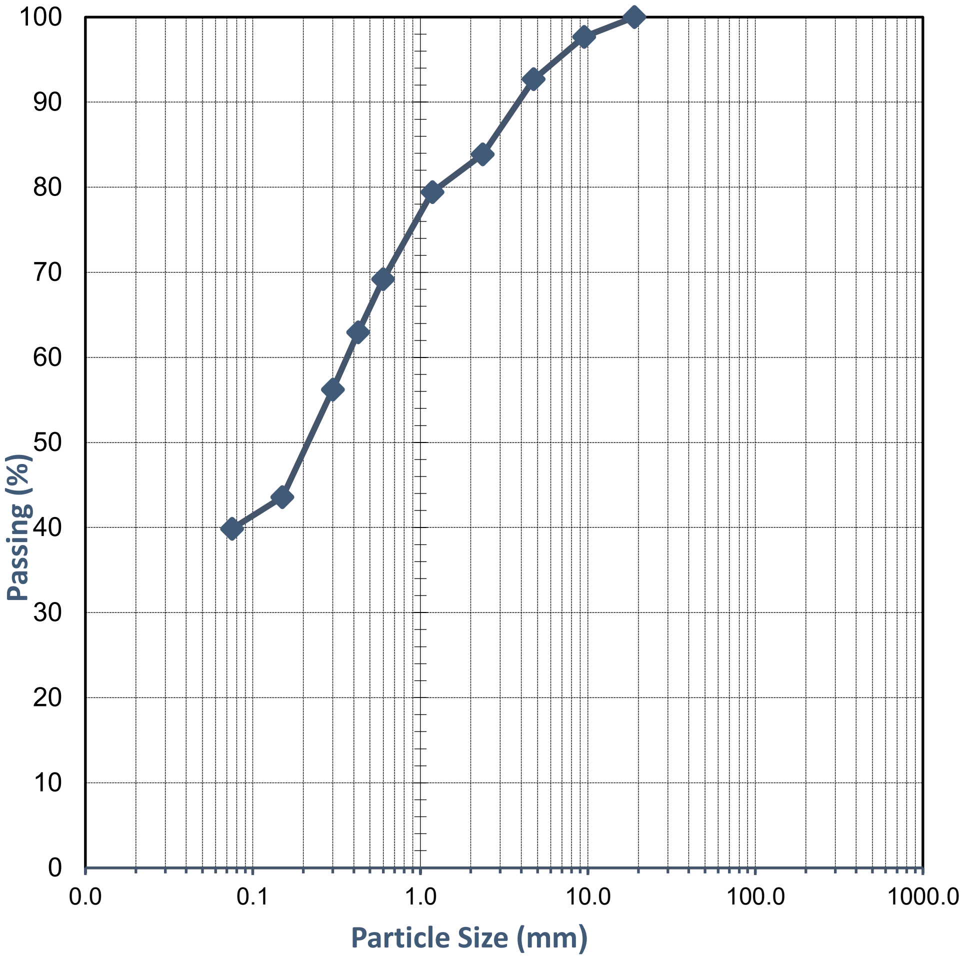
TEST REPORT - AS 1289.3.6.1

Client:	Cooperative Bulk Handling (CBH)	*Ticket No.*	S10545
Client Address:	-	*Report No.*	WG23.12011_1_PSD
Project:	Proposed Accomodation Site	*Sample No.*	WG23.12011
Location:	Part Lot 80, Great Northern Highway, Miling	*Date Sampled:*	Not Specified
Sample Identification:	TP03 0.4-0.7m	*Date Tested:*	07/08 - 08/08/2023

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	100
9.5	98
4.75	93
2.36	84
1.18	79
0.600	69
0.425	63
0.300	56
0.150	44
0.075	40



Comments:

Approved Signatory:

Name: Cody O'Neill

Date: 08/August/2023

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TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Cooperative Bulk Handling (CBH)	*Ticket No.*	S10545
Client Address:	-	*Report No.*	WG23.12011_1_PI
Project:	Proposed Accomodation Site	*Sample No.*	WG23.12011
Location:	Part Lot 80, Great Northern Highway, Miling	*Date Sampled:*	Not Specified
Sample Identification:	TP03 0.4-0.7m	*Date Tested:*	8/08/2023

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50^{o}C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**50**
AS 1289.3.2.1	**Plastic Limit (%)**	**18**
AS 1289.3.3.1	**Plasticity Index (%)**	**32**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**13.5**

AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**Cracked, Curled**

Comments:

Approved Signatory:

Name: Cody O'Neill

Date: 09/August/2023

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.5.2.1

Client:	Cooperative Bulk Handling (CBH)	*Ticket No.*	S10545
Client Address:	-	*Report No.*	WG23.12011_1_MMDD
Project:	Proposed Accomodation Site	*Sample No.*	WG23.12011
Location:	Part Lot 80, Great Northern Highway, Miling	*Date Sampled:*	Not Specified
Sample Identification:	TP03 0.4-0.7m	*Date Tested:*	7/08/2023

TEST RESULTS - Modified Maximum Dry Density

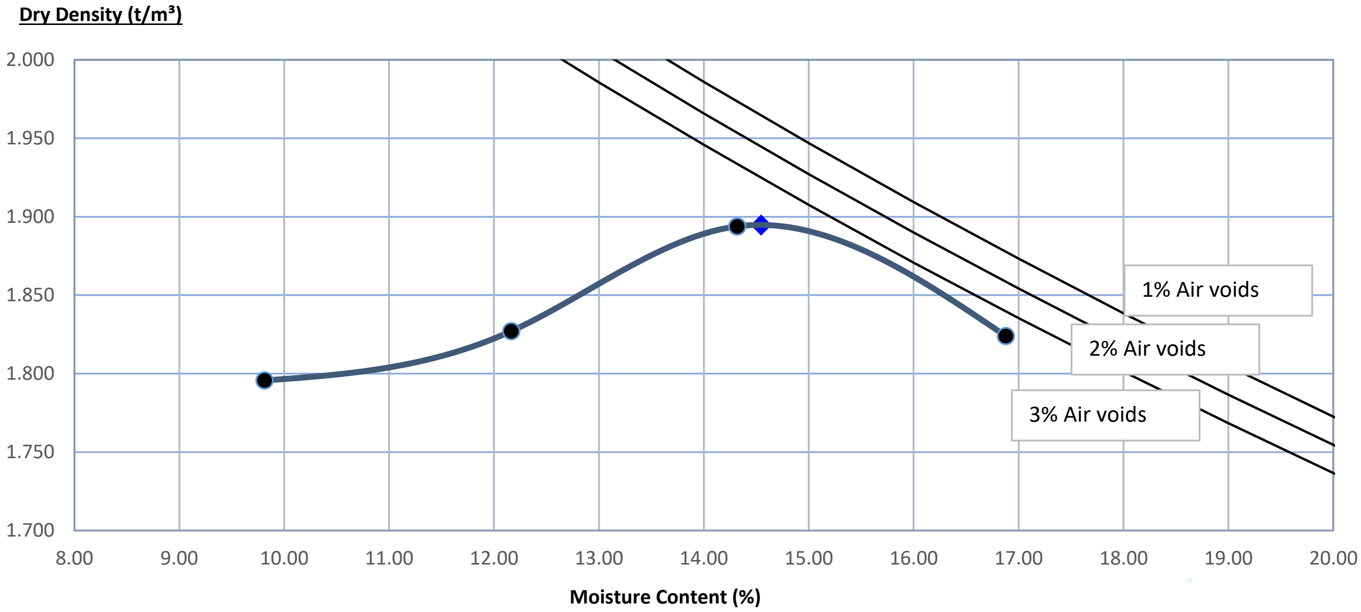
Sampling Method: Sampled by Client, Tested as Received

Sample Curing Time (Hours): 48

Method used to Determine Liquid Limit: Visual / Tactile Assessment by Competent Technician

Material + 19.0mm (%): 0 **Material + 37.5mm (%)** -

Moisture Content (%)	**9.8**	**12.2**	**14.3**	**16.9**	
Dry Density (t/m³)	**1.796**	**1.827**	**1.894**	**1.824**	



Modified Maximum Dry Density (t/m³) **1.89**

Optimum Moisture Content (%) **14.5**

Comments: *The above air void lines are derived from a calculated apparent particle density of 2.789 t/m³*

Approved Signatory:

Name: Cody O'Neill

Date: 08/August/2023

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TEST REPORT - AS 1289.6.1.1

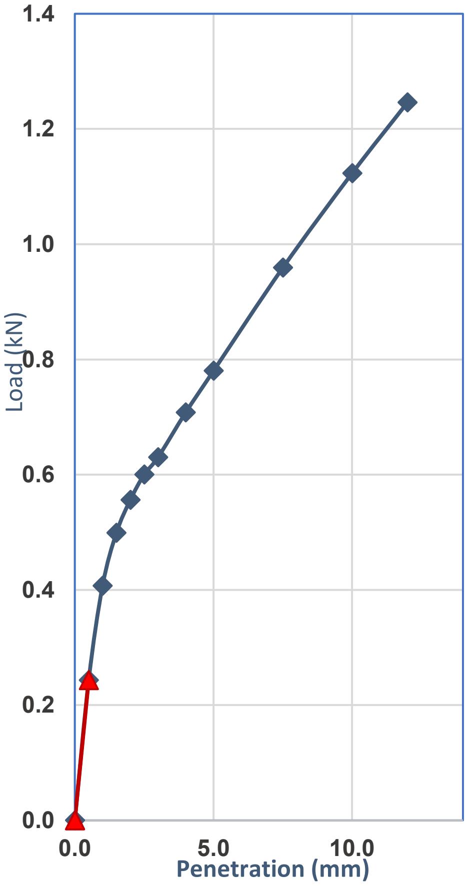
Client:	Cooperative Bulk Handling (CBH)	*Ticket No.*	S10545
Client Address:	-	*Report No.*	WG23.12011_1_SCBR
Project:	Proposed Accomodation Site	*Sample No.*	WG23.12011
Location:	Part Lot 80, Great Northern Highway, Miling	*Date Sampled:*	Not Specified
Sample Identification:	TP03 0.4-0.7m	*Date Tested:*	07/08 - 14/08/2023

TEST RESULTS - CALIFORNIA BEARING RATIO

Sample Description: Sandy Clay with Gravel

Sampling Method: Sampled by Client, Tested as Received

Load Penetration Curve



Compaction Details			
Compaction Method	AS 1289.5.2.1	Hammer Type	Modified
Plasticity Determined by	Estimated	Curing Time (Hours)	72.0
% Retained 19.0mm	0	Excluded/Replaced	Excluded
Maximum Dry Density (t/m^3)	1.90	Optimum Moisture (%)	14.5
Target Dry Density Ratio (%)	92	Target Moisture Ratio (%)	100

Specimen Conditions At Compaction			
Dry Density (t/m3)	1.75	Moisture Content (%)	14.1
Density Ratio (%)	92.5	Moisture Ratio (%)	97.0

Specimen Conditions After Soak			
Soaked or Unsoaked	Soaked	Soaking Period (days)	4
Surcharges Applied (kg)	6.75	Measured Swell (%)	2.5
Dry Density (t/m^3)	1.71	Dry Density Ratio (%)	90.0
Moisture Content (%)	22.5	Moisture Ratio (%)	155.0

Specimen Conditions After Test			
Top 30mm Moisture (%)	23.6	Remaining Depth (%)	21.1

Correction applied to Penetration: 0mm

Determined at a Penetration of: 2.5mm

California Bearing Ratio (CBR): 4.5%

Comments:

Approved Signatory:

Name: Cody O'Neill

Date: 15/August/2023

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

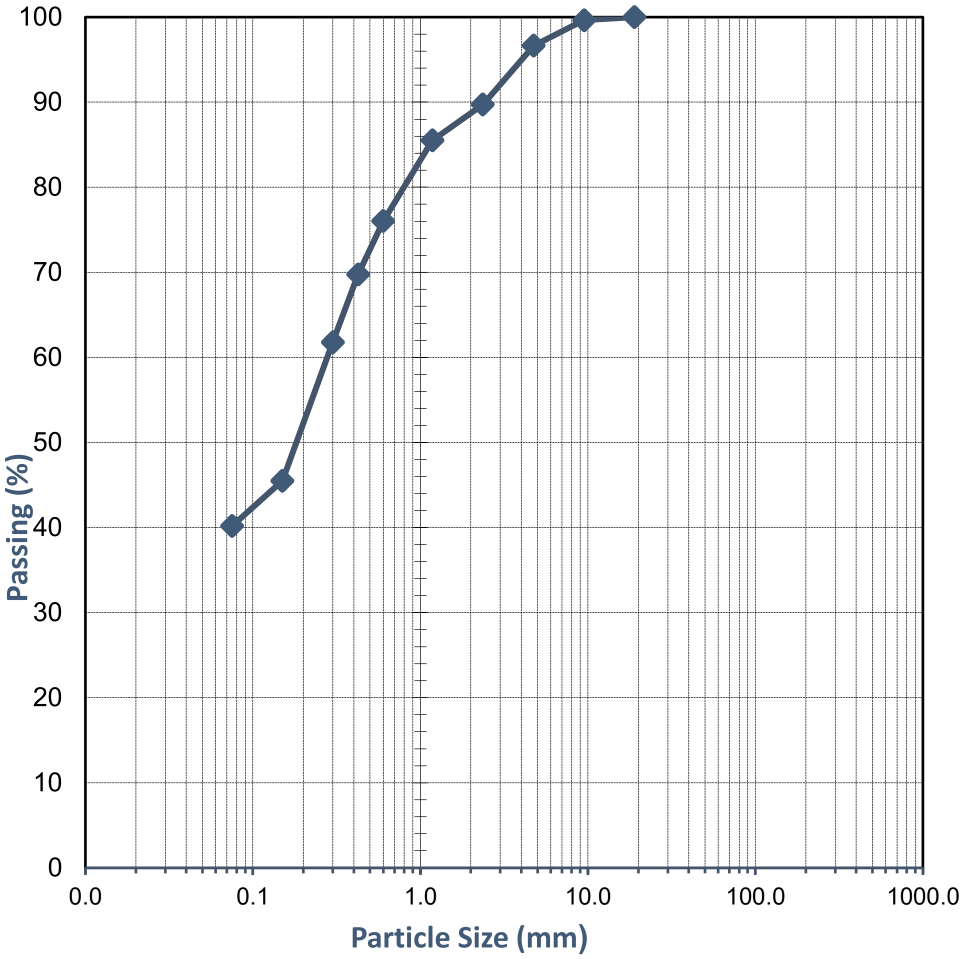
TEST REPORT - AS 1289.3.6.1

Client:	Cooperative Bulk Handling (CBH)	*Ticket No.*	S10545
Client Address:	-	*Report No.*	WG23.12012_1_PSD
Project:	Proposed Accomodation Site	*Sample No.*	WG23.12012
Location:	Part Lot 80, Great Northern Highway, Miling	*Date Sampled:*	Not Specified
Sample Identification:	TP05 1.0-1.3m	*Date Tested:*	07/08 - 08/08/2023

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	100
9.5	100
4.75	97
2.36	90
1.18	86
0.600	76
0.425	70
0.300	62
0.150	46
0.075	40



Comments:

Approved Signatory:

Name: Cody O'Neill

Date: 08/August/2023

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TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Cooperative Bulk Handling (CBH)	*Ticket No.*	S10545
Client Address:	-	*Report No.*	WG23.12012_1_PI
Project:	Proposed Accomodation Site	*Sample No.*	WG23.12012
Location:	Part Lot 80, Great Northern Highway, Miling	*Date Sampled:*	Not Specified
Sample Identification:	TP05 1.0-1.3m	*Date Tested:*	8/08/2023

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50^{o}C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**44**
AS 1289.3.2.1	**Plastic Limit (%)**	**16**
AS 1289.3.3.1	**Plasticity Index (%)**	**28**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**11.0**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**Cracked, Curled**

Comments:

Approved Signatory:

Name: Cody O'Neill

Date: 09/August/2023

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

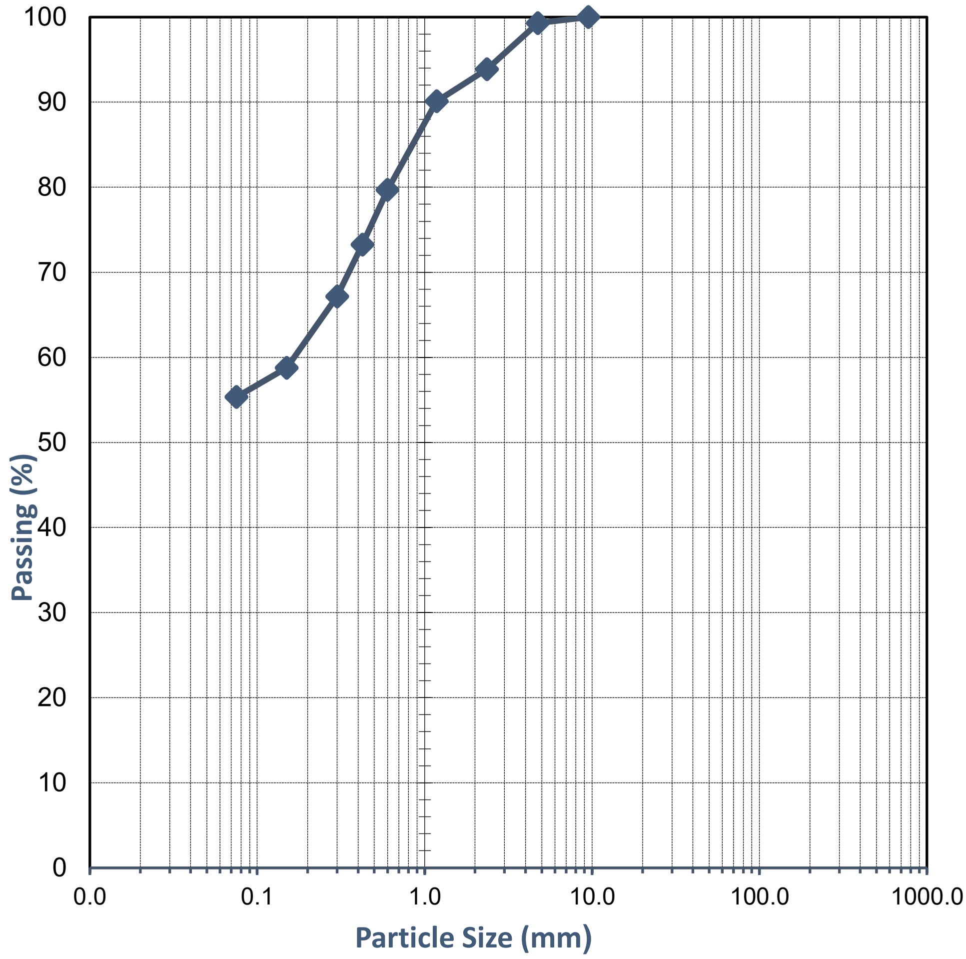
TEST REPORT - AS 1289.3.6.1

Client:	Cooperative Bulk Handling (CBH)	*Ticket No.*	S10545
Client Address:	-	*Report No.*	WG23.12013_1_PSD
Project:	Proposed Accomodation Site	*Sample No.*	WG23.12013
Location:	Part Lot 80, Great Northern Highway, Miling	*Date Sampled:*	Not Specified
Sample Identification:	TP06 2.2-2.5m	*Date Tested:*	07/08 - 08/08/2023

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: **Sampled by Client, Tested as Received**

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	
9.5	100
4.75	99
2.36	94
1.18	90
0.600	80
0.425	73
0.300	67
0.150	59
0.075	55



Comments:

Approved Signatory:

Name: Cody O'Neill

Date: 08/August/2023

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TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Cooperative Bulk Handling (CBH)	*Ticket No.*	S10545
Client Address:	-	*Report No.*	WG23.12013_1_PI
Project:	Proposed Accomodation Site	*Sample No.*	WG23.12013
Location:	Part Lot 80, Great Northern Highway, Miling	*Date Sampled:*	Not Specified
Sample Identification:	TP06 2.2-2.5m	*Date Tested:*	8/08/2023

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50°C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**47**
AS 1289.3.2.1	**Plastic Limit (%)**	**18**
AS 1289.3.3.1	**Plasticity Index (%)**	**29**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**11.5**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**Curled**

Comments:

Approved Signatory:

Name: Cody O'Neill

Date: 09/August/2023

NATA WORLD RECOGNISED ACCREDITATION

Accreditation No. 20599

Accredited for compliance with ISO/IEC 17025 - Testing

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

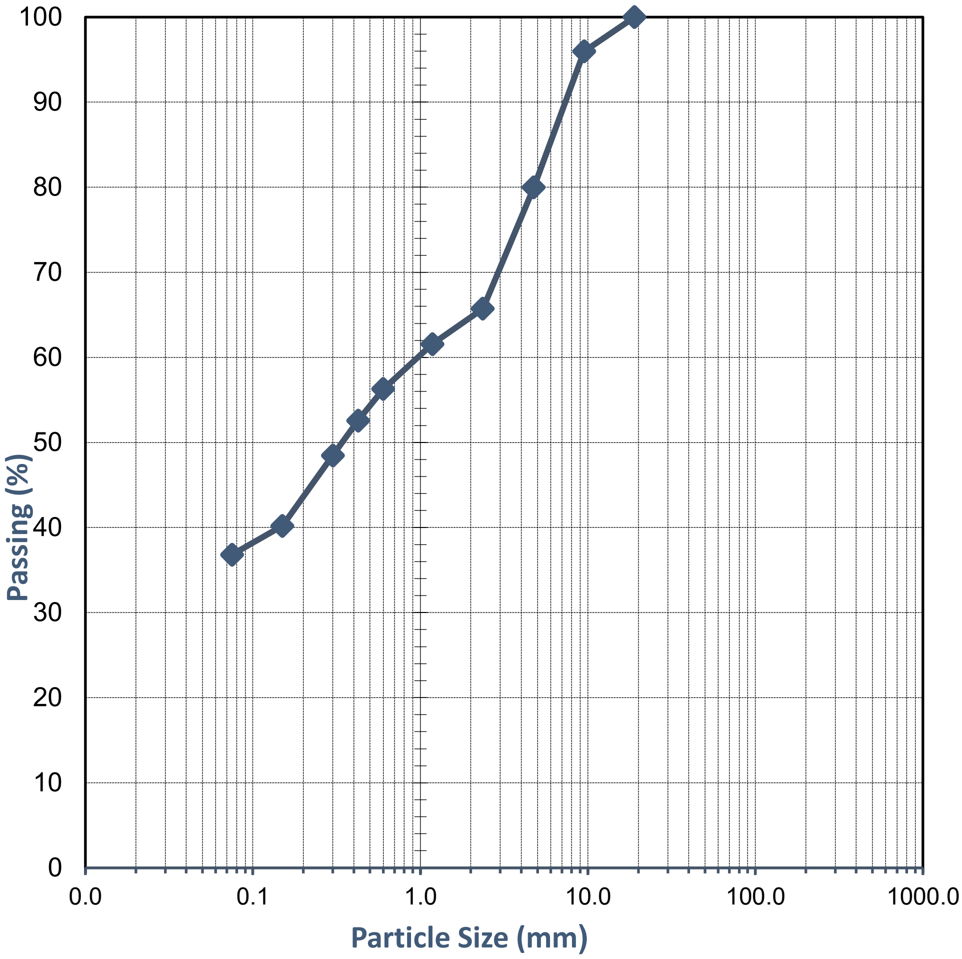
TEST REPORT - AS 1289.3.6.1

Client:	Cooperative Bulk Handling (CBH)	*Ticket No.*	S10545
Client Address:	-	*Report No.*	WG23.12014_1_PSD
Project:	Proposed Accomodation Site	*Sample No.*	WG23.12014
Location:	Part Lot 80, Great Northern Highway, Miling	*Date Sampled:*	Not Specified
Sample Identification:	TP08 0.45-0.65m	*Date Tested:*	07/08 - 08/08/2023

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: **Sampled by Client, Tested as Received**

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	100
9.5	96
4.75	80
2.36	66
1.18	62
0.600	56
0.425	53
0.300	48
0.150	40
0.075	37



Comments:

Approved Signatory:

Name: Cody O'Neill

Date: 08/August/2023

NATA Accreditation No. 20599
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SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Cooperative Bulk Handling (CBH)	*Ticket No.*	S10545
Client Address:	-	*Report No.*	WG23.12014_1_PI
Project:	Proposed Accomodation Site	*Sample No.*	WG23.12014
Location:	Part Lot 80, Great Northern Highway, Miling	*Date Sampled:*	Not Specified
Sample Identification:	TP08 0.45-0.65m	*Date Tested:*	8/08/2023

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50°C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**54**
AS 1289.3.2.1	**Plastic Limit (%)**	**18**
AS 1289.3.3.1	**Plasticity Index (%)**	**36**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**15.0**

AS 1289.3.4.1	**Length of Mould (mm)**	**125**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**Curled**

Comments:

Approved Signatory:

Name: Cody O'Neill

Date: 09/August/2023

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

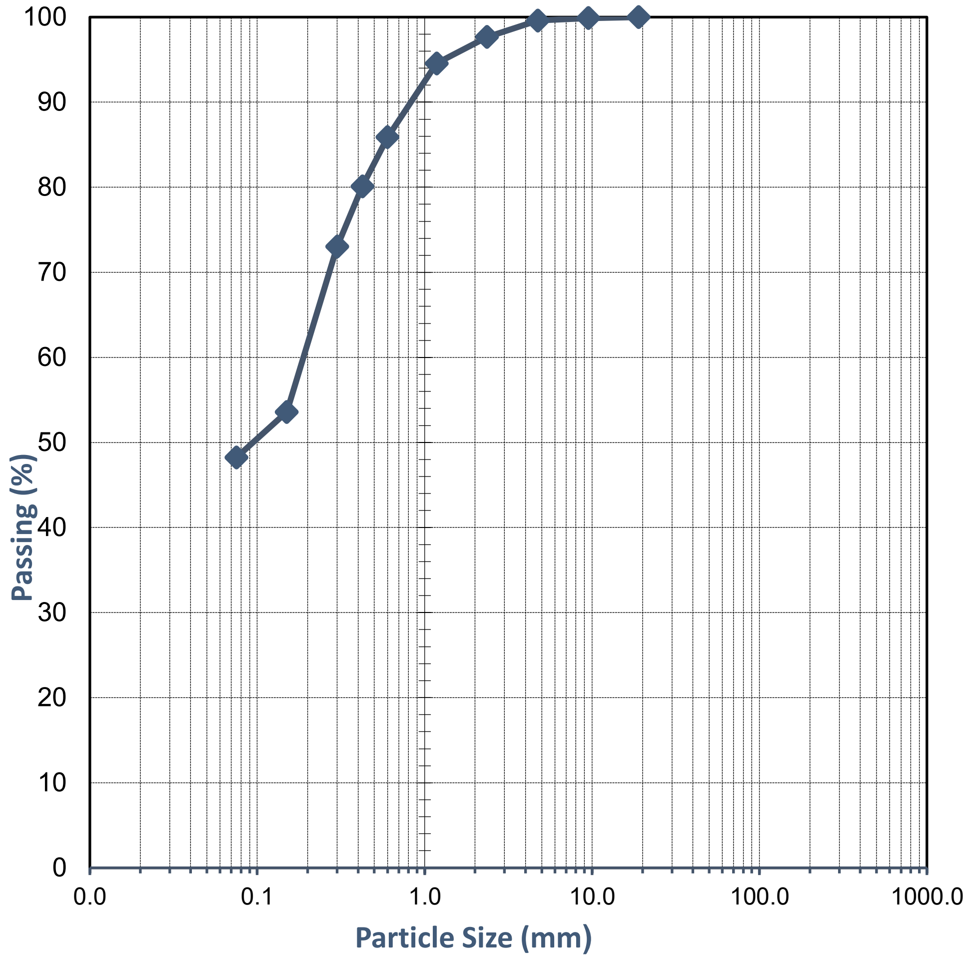
TEST REPORT - AS 1289.3.6.1

Client:	Cooperative Bulk Handling (CBH)	*Ticket No.*	S10545
Client Address:	-	*Report No.*	WG23.12015_1_PSD
Project:	Proposed Accomodation Site	*Sample No.*	WG23.12015
Location:	Part Lot 80, Great Northern Highway, Miling	*Date Sampled:*	Not Specified
Sample Identification:	TP09 0.5-0.7m	*Date Tested:*	07/08 - 08/08/2023

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: **Sampled by Client, Tested as Received**

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	100
9.5	100
4.75	100
2.36	98
1.18	95
0.600	86
0.425	80
0.300	73
0.150	54
0.075	48



Comments:

Approved Signatory:

Name: Cody O'Neill
Date: 08/August/2023

NATA WORLD RECOGNISED ACCREDITATION

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Cooperative Bulk Handling (CBH)	*Ticket No.*	S10545
Client Address:	-	*Report No.*	WG23.12015_2_PI
Project:	Proposed Accomodation Site	*Sample No.*	WG23.12015
Location:	Part Lot 80, Great Northern Highway, Miling	*Date Sampled:*	Not Specified
Sample Identification:	TP09 0.5-0.7m	*Date Tested:*	9-08-2023

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50^{o}C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**45**
AS 1289.3.2.1	**Plastic Limit (%)**	**17**
AS 1289.3.3.1	**Plasticity Index (%)**	**28**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**10.5**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**Cracked, Curled**

Comments: Report replaces WG23.12015_1_PI. Report reissued due to updated Sampling Method.

Approved Signatory:

Name: Cody O'Neill

Date: 16-August-2023

NATA WORLD RECOGNISED ACCREDITATION

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Appendix E: Environmental Laboratory Test Results

eurofins ARL

Certificate of Analysis

NATA Accredited
Accreditation Number 2377
Site Number 2370

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Galt Environment P/L
50 Edward Street
Osborne Park
WA 6017

Attention: - ALL SRA/Results

Report	**1014072-S**
Project name	MILLING
Project ID	WAG230373
Received Date	Aug 04, 2023

Client Sample ID			**TP01 0.75**	**TP02 0.25**	**TP02 1.25**	**TP03 0.5**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**L23-Au0012779**	**L23-Au0012780**	**L23-Au0012781**	**L23-Au0012782**
Date Sampled			**Jul 31, 2023**	**Jul 31, 2023**	**Jul 31, 2023**	**Jul 31, 2023**
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	78	56	96	90
>2mm Fraction	0.005	g	< 0.005	< 0.005	60	21
Analysed Material	0.1	%	100	100	62	81
Extraneous Material	0.1	%	< 0.1	< 0.1	38	19
Net Acidity (Excluding ANC)						
CRS Suite - Net Acidity - NASSG (Excluding ANC)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS Suite - Net Acidity - NASSG (Excluding ANC)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite - Liming Rate - NASSG (Excluding ANC)	1	kg CaCO3/t	< 1	< 1	< 1	< 1
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	9.1	7.0	8.9	9.0
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	< 2	< 2	< 2	< 2
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	< 0.003
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCr) (NLM-2.1)[S04]	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur (a-SCr) (NLM-2.1)	3	mol H+/t	< 3	< 3	< 3	< 3
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	N/A	N/A	N/A	N/A
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	6.9	1.00	1.3	2.9
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2)[S03]	0.02	% S	2.2	0.32	0.43	0.93
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	1400	200	270	580
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
CRS Suite - Net Acidity - NASSG (Including ANC)	0.02	% S	< 0.02	< 0.02	< 0.02	< 0.02
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	< 10	< 10	< 10	< 10
CRS Suite - Liming Rate - NASSG (Including ANC)[S01]	1	kg CaCO3/t	< 1	< 1	< 1	< 1
Sample Properties						
% Moisture	1	%	11	9.0	8.4	12

Client Sample ID			TP04 0.75	TP04 1.75	TP05 0.75	TP06 2.25
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L23-Au0012783	L23-Au0012784	L23-Au0012785	L23-Au0012786
Date Sampled			Jul 31, 2023	Jul 31, 2023	Jul 31, 2023	Jul 31, 2023
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	88	92	110	100
>2mm Fraction	0.005	g	< 0.005	< 0.005	< 0.005	< 0.005
Analysed Material	0.1	%	100	100	100	100
Extraneous Material	0.1	%	< 0.1	< 0.1	< 0.1	< 0.1
Net Acidity (Excluding ANC)						
CRS Suite - Net Acidity - NASSG (Excluding ANC)	0.02	% S	< 0.02	< 0.02	< 0.02	0.04
CRS Suite - Net Acidity - NASSG (Excluding ANC)	10	mol H+/t	< 10	< 10	< 10	26
CRS Suite - Liming Rate - NASSG (Excluding ANC)	1	kg CaCO3/t	< 1	< 1	< 1	1.9
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	9.1	7.9	8.9	4.6
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	< 2	< 2	< 2	26
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	< 0.003	< 0.003	< 0.003	0.041
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCr) (NLM-2.1)[S04]	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur (a-SCr) (NLM-2.1)	3	mol H+/t	< 3	< 3	< 3	< 3
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	N/A	N/A	N/A	N/A
HCl Extractable Sulfur	0.005	% S	N/A	N/A	N/A	N/A
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	8.0	0.71	1.8	N/A
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2)[S03]	0.02	% S	2.5	0.23	0.57	N/A
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	1600	140	360	N/A
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
Net Acidity (Including ANC)						
CRS Suite - Net Acidity - NASSG (Including ANC)	0.02	% S	< 0.02	< 0.02	< 0.02	0.04
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	< 10	< 10	< 10	26
CRS Suite - Liming Rate - NASSG (Including ANC)[S01]	1	kg CaCO3/t	< 1	< 1	< 1	1.9
Sample Properties						
% Moisture	1	%	8.7	8.8	9.6	8.9

Client Sample ID			TP07 1.0	QC01	TP01 0.0	TP02 0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L23-Au0012787	L23-Au0012788	L23-Au0012789	L23-Au0012790
Date Sampled			Jul 31, 2023	Jul 31, 2023	Jul 31, 2023	Jul 31, 2023
Test/Reference	LOR	Unit				
Extraneous Material						
<2mm Fraction	0.005	g	120	64	-	-
>2mm Fraction	0.005	g	< 0.005	< 0.005	-	-
Analysed Material	0.1	%	100	100	-	-
Extraneous Material	0.1	%	< 0.1	< 0.1	-	-

Client Sample ID			TP07 1.0	QC01	TP01 0.0	TP02 0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L23-Au0012787	L23-Au0012788	L23-Au0012789	L23-Au0012790
Date Sampled			Jul 31, 2023	Jul 31, 2023	Jul 31, 2023	Jul 31, 2023
Test/Reference	LOR	Unit				
Net Acidity (Excluding ANC)						
CRS Suite - Net Acidity - NASSG (Excluding ANC)	0.02	% S	< 0.02	< 0.02	-	-
CRS Suite - Net Acidity - NASSG (Excluding ANC)	10	mol H+/t	< 10	< 10	-	-
CRS Suite - Liming Rate - NASSG (Excluding ANC)	1	kg CaCO3/t	< 1	< 1	-	-
Actual Acidity (NLM-3.2)						
pH-KCL (NLM-3.1)	0.1	pH Units	8.5	9.0	-	-
Titratable Actual Acidity (NLM-3.2)	2	mol H+/t	< 2	< 2	-	-
Titratable Actual Acidity (NLM-3.2)	0.003	% pyrite S	< 0.003	< 0.003	-	-
Potential Acidity - Chromium Reducible Sulfur						
Chromium Reducible Sulfur (s-SCr) (NLM-2.1)[S04]	0.005	% S	< 0.005	< 0.005	-	-
Chromium Reducible Sulfur (a-SCr) (NLM-2.1)	3	mol H+/t	< 3	< 3	-	-
Extractable Sulfur						
Sulfur - KCl Extractable	0.005	% S	N/A	N/A	-	-
HCl Extractable Sulfur	0.005	% S	N/A	N/A	-	-
Retained Acidity (S-NAS)						
Net Acid soluble sulfur (SNAS) NLM-4.1	0.005	% S	N/A	N/A	-	-
Net Acid soluble sulfur (s-SNAS) NLM-4.1[S02]	0.005	% S	N/A	N/A	-	-
Net Acid soluble sulfur (a-SNAS) NLM-4.1	2	mol H+/t	N/A	N/A	-	-
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	-	-
Acid Neutralising Capacity (ANCbt)						
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	0.01	% CaCO3	0.81	4.7	-	-
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2)[S03]	0.02	% S	0.26	1.5	-	-
Acid Neutralising Capacity - (a-ANCbt) (NLM-5.2)	2	mol H+/t	160	940	-	-
ANC Fineness Factor		factor	1.5	1.5	-	-
Net Acidity (Including ANC)						
CRS Suite - Net Acidity - NASSG (Including ANC)	0.02	% S	< 0.02	< 0.02	-	-
CRS Suite - Net Acidity - NASSG (Including ANC)	10	mol H+/t	< 10	< 10	-	-
CRS Suite - Liming Rate - NASSG (Including ANC)[S01]	1	kg CaCO3/t	< 1	< 1	-	-
Sample Properties						
% Moisture	1	%	11	11	6.5	8.1
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	-	-	< 20	< 20
TRH C10-C14	20	mg/kg	-	-	< 20	< 20
TRH C15-C28	50	mg/kg	-	-	< 50	< 50
TRH C29-C36	50	mg/kg	-	-	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	-	-	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	-	-	< 0.1	< 0.1
Toluene	0.1	mg/kg	-	-	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	-	-	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	-	-	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	-	-	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	-	-	< 0.3	< 0.3
BTEX						
4-Bromofluorobenzene (surr.)	1	%	-	-	113	93
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	-	-	< 0.5	< 0.5
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	-	-	< 50	< 50
TRH C6-C10	20	mg/kg	-	-	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	-	-	< 20	< 20

Client Sample ID			TP07 1.0	QC01	TP01 0.0	TP02 0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L23-Au0012787	L23-Au0012788	L23-Au0012789	L23-Au0012790
Date Sampled			Jul 31, 2023	Jul 31, 2023	Jul 31, 2023	Jul 31, 2023
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	-	-	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	-	-	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	-	-	1.2	1.2
Acenaphthene	0.5	mg/kg	-	-	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	-	-	< 0.5	< 0.5
Anthracene	0.5	mg/kg	-	-	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	-	-	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	-	-	< 0.5	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	-	-	< 0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	-	-	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	-	-	< 0.5	< 0.5
Chrysene	0.5	mg/kg	-	-	< 0.5	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	-	-	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	-	-	< 0.5	< 0.5
Fluorene	0.5	mg/kg	-	-	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	-	-	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	-	-	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	-	-	< 0.5	< 0.5
Pyrene	0.5	mg/kg	-	-	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	-	-	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	-	-	122	100
p-Terphenyl-d14 (surr.)	1	%	-	-	140	97
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	-	-	< 50	< 50
TRH >C16-C34	100	mg/kg	-	-	< 100	< 100
TRH >C34-C40	100	mg/kg	-	-	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	-	-	< 100	< 100
Arsenic	5	mg/kg	-	-	< 5	< 5
Cadmium	0.1	mg/kg	-	-	0.1	0.1
Chromium	1	mg/kg	-	-	13	15
Copper	1	mg/kg	-	-	4.9	9.2
Lead	1	mg/kg	-	-	13	14
Mercury	0.02	mg/kg	-	-	< 0.02	< 0.02
Nickel	1	mg/kg	-	-	3.0	4.2
Zinc	1	mg/kg	-	-	14	70

Client Sample ID			TP03 0.0	TP04 0.0	TP05 0.0	TP06 0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L23-Au0012791	L23-Au0012792	L23-Au0012793	L23-Au0012794
Date Sampled			Jul 31, 2023	Jul 31, 2023	Jul 31, 2023	Jul 31, 2023
Test/Reference	LOR	Unit				
Sample Properties						
% Moisture	1	%	6.0	9.9	4.4	7.7

Client Sample ID			TP03 0.0	TP04 0.0	TP05 0.0	TP06 0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L23-Au0012791	L23-Au0012792	L23-Au0012793	L23-Au0012794
Date Sampled			Jul 31, 2023	Jul 31, 2023	Jul 31, 2023	Jul 31, 2023
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
BTEX						
4-Bromofluorobenzene (surr.)	1	%	99	93	98	97
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	0.6	0.6	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	1.2	1.2	1.2
Acenaphthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chrysene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Fluorene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Naphthalene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Pyrene	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	136	106	90	94
p-Terphenyl-d14 (surr.)	1	%	141	120	101	105
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100

Client Sample ID			TP03 0.0	TP04 0.0	TP05 0.0	TP06 0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L23-Au0012791	L23-Au0012792	L23-Au0012793	L23-Au0012794
Date Sampled			Jul 31, 2023	Jul 31, 2023	Jul 31, 2023	Jul 31, 2023
Test/Reference	LOR	Unit				
Arsenic	5	mg/kg	< 5	< 5	< 5	< 5
Cadmium	0.1	mg/kg	0.1	0.2	< 0.1	< 0.1
Chromium	1	mg/kg	13	17	19	35
Copper	1	mg/kg	5.3	6.5	6.2	9.4
Lead	1	mg/kg	11	14	11	17
Mercury	0.02	mg/kg	< 0.02	< 0.02	< 0.02	0.15
Nickel	1	mg/kg	3.4	5.8	3.9	11
Zinc	1	mg/kg	10	12	9.1	6.8

Client Sample ID			TP07 0.0
Sample Matrix			Soil
Eurofins Sample No.			L23-Au0012795
Date Sampled			Jul 31, 2023
Test/Reference	LOR	Unit	
Sample Properties			
% Moisture	1	%	14
Total Recoverable Hydrocarbons - 1999 NEPM Fractions			
TRH C6-C9	20	mg/kg	< 20
TRH C10-C14	20	mg/kg	< 20
TRH C15-C28	50	mg/kg	< 50
TRH C29-C36	50	mg/kg	< 50
TRH C10-C36 (Total)	50	mg/kg	< 50
BTEX			
Benzene	0.1	mg/kg	< 0.1
Toluene	0.1	mg/kg	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2
o-Xylene	0.1	mg/kg	< 0.1
Xylenes - Total*	0.3	mg/kg	< 0.3
BTEX			
4-Bromofluorobenzene (surr.)	1	%	95
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
Naphthalene[N02]	0.5	mg/kg	< 0.5
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50
TRH C6-C10	20	mg/kg	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20
Polycyclic Aromatic Hydrocarbons			
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2
Acenaphthene	0.5	mg/kg	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5
Anthracene	0.5	mg/kg	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5

Client Sample ID			TP07 0.0
Sample Matrix			Soil
Eurofins Sample No.			L23-Au0012795
Date Sampled			Jul 31, 2023
Test/Reference	LOR	Unit	
Polycyclic Aromatic Hydrocarbons			
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5
Chrysene	0.5	mg/kg	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5
Fluorene	0.5	mg/kg	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5
Naphthalene	0.5	mg/kg	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5
Pyrene	0.5	mg/kg	< 0.5
Total PAH*	0.5	mg/kg	< 0.5
2-Fluorobiphenyl (surr.)	1	%	86
p-Terphenyl-d14 (surr.)	1	%	107
Total Recoverable Hydrocarbons - 2013 NEPM Fractions			
TRH >C10-C16	50	mg/kg	< 50
TRH >C16-C34	100	mg/kg	< 100
TRH >C34-C40	100	mg/kg	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100
Arsenic	5	mg/kg	< 5
Cadmium	0.1	mg/kg	< 0.1
Chromium	1	mg/kg	19
Copper	1	mg/kg	7.3
Lead	1	mg/kg	11
Mercury	0.02	mg/kg	< 0.02
Nickel	1	mg/kg	2.8
Zinc	1	mg/kg	17

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Extraneous Material	Brisbane	Aug 10, 2023	6 Week
- Method: LTM-GEN-7050/7070			
Chromium Suite - NASSG (Excluding ANC)	Brisbane	Aug 10, 2023	6 Week
- Method: LTM-GEN-7070 Chromium Reducible Sulfur Suite			
% Moisture	Welshpool	Aug 04, 2023	14 Days
- Method: LTM-GEN-7080 Moisture			
- Method: ARL135 Moisture in Solids			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Welshpool	Aug 08, 2023	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Welshpool	Aug 08, 2023	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Welshpool	Aug 08, 2023	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Polycyclic Aromatic Hydrocarbons	Welshpool	Aug 08, 2023	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Welshpool	Aug 08, 2023	14 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Arsenic	Welshpool	Aug 08, 2023	180 Days
- Method: ARL401/403 - Metals in Soil and Sediment by ICPOES/MS			
Cadmium	Welshpool	Aug 08, 2023	180 Days
- Method: ARL401/403 - Metals in Soil and Sediment by ICPOES/MS			
Chromium	Welshpool	Aug 08, 2023	180 Days
- Method: ARL401/403 - Metals in Soil and Sediment by ICPOES/MS			
Copper	Welshpool	Aug 08, 2023	180 Days
- Method: ARL401/403 - Metals in Soil and Sediment by ICPOES/MS			
Lead	Welshpool	Aug 08, 2023	180 Days
- Method: ARL401/403 - Metals in Soil and Sediment by ICPOES/MS			
Mercury	Welshpool	Aug 08, 2023	28 Days
- Method: ARL No. 406 - Mercury by Cold Vapour Atomic Absorption Spectrophotometry			
Nickel	Welshpool	Aug 08, 2023	180 Days
- Method: ARL401/403 - Metals in Soil and Sediment by ICPOES/MS			
Zinc	Welshpool	Aug 08, 2023	180 Days
- Method: ARL401/403 - Metals in Soil and Sediment by ICPOES/MS			

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Company Name:	Galt Environment P/L	**Order No.:**	WAG230373	**Received:**	Aug 4, 2023 12:17 PM
Address:	50 Edward Street Osborne Park WA 6017	**Report #:**	1014072	**Due:**	Aug 11, 2023
		Phone:	08 6272 0200	**Priority:**	5 Day
		Fax:	08 9285 8444	**Contact Name:**	- ALL SRA/Results
Project Name:	MILLING				
Project ID:	WAG230373				

Eurofins Analytical Services Manager : Andrew Harvey

Sample Detail						Asbestos in Soils (AS 4964-2004)	Moisture Set	Moisture Set	Chromium Suite - NASSG (Excluding ANC)	Eurofins Suite B4	Metals M8 Soil
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X		X	X
Brisbane Laboratory - NATA # 1261 Site # 20794							X	X	X		
External Laboratory											
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**						
1	TP01 0.75	Jul 31, 2023		Soil	L23-Au0012779		X		X		
2	TP02 0.25	Jul 31, 2023		Soil	L23-Au0012780		X		X		
3	TP02 1.25	Jul 31, 2023		Soil	L23-Au0012781		X		X		
4	TP03 0.5	Jul 31, 2023		Soil	L23-Au0012782		X		X		
5	TP04 0.75	Jul 31, 2023		Soil	L23-Au0012783		X		X		
6	TP04 1.75	Jul 31, 2023		Soil	L23-Au0012784		X		X		
7	TP05 0.75	Jul 31, 2023		Soil	L23-Au0012785		X		X		
8	TP06 2.25	Jul 31, 2023		Soil	L23-Au0012786		X		X		
9	TP07 1.0	Jul 31, 2023		Soil	L23-Au0012787		X		X		
10	QC01	Jul 31, 2023		Soil	L23-Au0012788		X		X		
11	TP01 0.0	Jul 31, 2023		Soil	L23-Au0012789	X		X		X	X
12	TP02 0.0	Jul 31, 2023		Soil	L23-Au0012790	X		X		X	X

Company Name:	Galt Environment P/L	**Order No.:**	WAG230373	**Received:**	Aug 4, 2023 12:17 PM
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		Fax:	08 9285 8444	**Contact Name:**	- ALL SRA/Results
Project Name:	MILLING				
Project ID:	WAG230373				

Eurofins Analytical Services Manager : Andrew Harvey

Sample Detail						Asbestos in Soils (AS 4964-2004)	Moisture Set	Moisture Set	Chromium Suite - NASSG (Excluding ANC)	Eurofins Suite B4	Metals M8 Soil
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X		X	X
Brisbane Laboratory - NATA # 1261 Site # 20794							X	X	X		
External Laboratory											
13	TP03 0.0	Jul 31, 2023		Soil	L23-Au0012791	X		X		X	X
14	TP04 0.0	Jul 31, 2023		Soil	L23-Au0012792	X		X		X	X
15	TP05 0.0	Jul 31, 2023		Soil	L23-Au0012793	X		X		X	X
16	TP06 0.0	Jul 31, 2023		Soil	L23-Au0012794	X		X		X	X
17	TP07 0.0	Jul 31, 2023		Soil	L23-Au0012795	X		X		X	X
Test Counts						7	17	17	10	7	7

Environment Testing

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**µg/L:** micrograms per litre
ppm: parts per million	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit		

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR: No Limit

Results between 10-20 times the LOR: RPD must lie between 0-50%

Results >20 times the LOR: RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total*	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
Arsenic	mg/kg	< 5			5	Pass	
Cadmium	mg/kg	< 0.1			0.1	Pass	
Chromium	mg/kg	< 1			1	Pass	
Copper	mg/kg	< 1			1	Pass	
Lead	mg/kg	< 1			1	Pass	
Mercury	mg/kg	< 0.02			0.02	Pass	
Nickel	mg/kg	< 1			1	Pass	
Zinc	mg/kg	< 1			1	Pass	
LCS - % Recovery							
Actual Acidity (NLM-3.2)							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
pH-KCL (NLM-3.1)	%	91			80-120	Pass	
Titratable Actual Acidity (NLM-3.2)	%	103			80-120	Pass	
LCS - % Recovery							
Potential Acidity - Chromium Reducible Sulfur							
Chromium Reducible Sulfur (s-SCr) (NLM-2.1)	%	97			80-120	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	105			70-130	Pass	
TRH C10-C14	%	98			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	87			70-130	Pass	
Toluene	%	111			70-130	Pass	
Ethylbenzene	%	111			70-130	Pass	
m&p-Xylenes	%	103			70-130	Pass	
o-Xylene	%	120			70-130	Pass	
Xylenes - Total*	%	109			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	104			70-130	Pass	
TRH C6-C10	%	109			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	105			70-130	Pass	
Acenaphthylene	%	95			70-130	Pass	
Anthracene	%	96			70-130	Pass	
Benz(a)anthracene	%	85			70-130	Pass	
Benzo(a)pyrene	%	81			70-130	Pass	
Benzo(b&j)fluoranthene	%	82			70-130	Pass	
Benzo(g.h.i)perylene	%	97			70-130	Pass	
Benzo(k)fluoranthene	%	87			70-130	Pass	
Chrysene	%	93			70-130	Pass	
Dibenz(a.h)anthracene	%	86			70-130	Pass	
Fluoranthene	%	87			70-130	Pass	
Fluorene	%	93			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	84			70-130	Pass	
Naphthalene	%	94			70-130	Pass	
Phenanthrene	%	97			70-130	Pass	
Pyrene	%	87			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	%	94			70-130	Pass	
LCS - % Recovery							
Arsenic	%	107			80-120	Pass	
Cadmium	%	101			80-120	Pass	
Chromium	%	80			80-120	Pass	
Copper	%	82			80-120	Pass	
Lead	%	83			80-120	Pass	
Mercury	%	81			60-120	Pass	
Nickel	%	82			80-120	Pass	
Zinc	%	107			80-120	Pass	
CRM - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	%	100			70-130	Pass	
TRH >C34-C40	%	92			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	L23-Au0009313	NCP	%	100			70-130	Pass	
TRH C10-C14	L23-Au0009310	NCP	%	114			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	L23-Au0009313	NCP	%	93			70-130	Pass	
Toluene	L23-Au0009313	NCP	%	116			70-130	Pass	
Ethylbenzene	L23-Au0009313	NCP	%	109			70-130	Pass	
m&p-Xylenes	L23-Au0009313	NCP	%	108			70-130	Pass	
o-Xylene	L23-Au0009313	NCP	%	123			70-130	Pass	
Xylenes - Total*	L23-Au0009313	NCP	%	113			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	L23-Au0009313	NCP	%	112			70-130	Pass	
TRH C6-C10	L23-Au0009313	NCP	%	99			70-130	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	L23-Au0009286	NCP	%	96			70-130	Pass	
Acenaphthylene	L23-Au0009286	NCP	%	94			70-130	Pass	
Anthracene	L23-Au0009286	NCP	%	96			70-130	Pass	
Benz(a)anthracene	L23-Au0009286	NCP	%	92			70-130	Pass	
Benzo(a)pyrene	L23-Au0009286	NCP	%	90			70-130	Pass	
Benzo(b&j)fluoranthene	L23-Au0009286	NCP	%	86			70-130	Pass	
Benzo(g.h.i)perylene	L23-Au0009286	NCP	%	103			70-130	Pass	
Benzo(k)fluoranthene	L23-Au0009286	NCP	%	96			70-130	Pass	
Chrysene	L23-Au0009286	NCP	%	100			70-130	Pass	
Dibenz(a.h)anthracene	L23-Au0009286	NCP	%	84			70-130	Pass	
Fluoranthene	L23-Au0009286	NCP	%	85			70-130	Pass	
Fluorene	L23-Au0009286	NCP	%	91			70-130	Pass	
Indeno(1.2.3-cd)pyrene	L23-Au0009286	NCP	%	94			70-130	Pass	
Naphthalene	L23-Au0009286	NCP	%	92			70-130	Pass	
Phenanthrene	L23-Au0009286	NCP	%	95			70-130	Pass	
Pyrene	L23-Au0009286	NCP	%	80			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	L23-Au0009310	NCP	%	102			70-130	Pass	
Spike - % Recovery									
				Result 1					
Arsenic	L23-Au0009307	NCP	%	102			80-120	Pass	
Cadmium	L23-Au0009307	NCP	%	75			80-120	Fail	Q08
Chromium	L23-Au0009307	NCP	%	117			80-120	Pass	
Copper	L23-Au0009307	NCP	%	75			80-120	Fail	Q08
Lead	L23-Au0009307	NCP	%	77			80-120	Fail	Q08
Mercury	L23-Au0009307	NCP	%	86			80-120	Pass	
Zinc	L23-Au0009307	NCP	%	67			80-120	Fail	Q08
Spike - % Recovery									
				Result 1					
Nickel	L23-Au0012172	NCP	%	89			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Net Acidity (Excluding ANC)				Result 1	Result 2	RPD			
CRS Suite - Net Acidity - NASSG (Excluding ANC)	L23-Au0012779	CP	% S	< 0.02	N/A	N/A	30%	Pass	
CRS Suite - Net Acidity - NASSG (Excluding ANC)	L23-Au0012779	CP	mol H+/t	< 10	N/A	N/A	20%	Pass	
CRS Suite - Liming Rate - NASSG (Excluding ANC)	L23-Au0012779	CP	kg CaCO3/t	< 1	N/A	N/A	30%	Pass	
Duplicate									
Actual Acidity (NLM-3.2)				Result 1	Result 2	RPD			
pH-KCL (NLM-3.1)	L23-Au0012779	CP	pH Units	9.1	9.2	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L23-Au0012779	CP	mol H+/t	< 2	< 2	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L23-Au0012779	CP	% pyrite S	< 0.003	< 0.003	<1	30%	Pass	
Duplicate									
Potential Acidity - Chromium Reducible Sulfur				Result 1	Result 2	RPD			
Chromium Reducible Sulfur (s-SCr) (NLM-2.1)	L23-Au0012779	CP	% S	< 0.005	< 0.005	<1	20%	Pass	
Chromium Reducible Sulfur (a-SCr) (NLM-2.1)	L23-Au0012779	CP	mol H+/t	< 3	< 3	<1	30%	Pass	
Duplicate									
Extractable Sulfur				Result 1	Result 2	RPD			
Sulfur - KCl Extractable	L23-Au0012779	CP	% S	N/A	N/A	N/A	30%	Pass	
HCl Extractable Sulfur	L23-Au0012779	CP	% S	N/A	N/A	N/A	20%	Pass	
Duplicate									
Retained Acidity (S-NAS)				Result 1	Result 2	RPD			
Net Acid soluble sulfur (SNAS) NLM-4.1	L23-Au0012779	CP	% S	N/A	N/A	N/A	30%	Pass	
Net Acid soluble sulfur (s-SNAS) NLM-4.1	L23-Au0012779	CP	% S	N/A	N/A	N/A	30%	Pass	
Net Acid soluble sulfur (a-SNAS) NLM-4.1	L23-Au0012779	CP	mol H+/t	N/A	N/A	N/A	30%	Pass	
Duplicate									
Acid Neutralising Capacity (ANCbt)				Result 1	Result 2	RPD			
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	L23-Au0012779	CP	% CaCO3	6.9	7.1	2.4	20%	Pass	
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2)	L23-Au0012779	CP	% S	2.2	2.3	2.4	30%	Pass	
ANC Fineness Factor	L23-Au0012779	CP	factor	1.5	1.5	<1	30%	Pass	
Duplicate									
Net Acidity (Including ANC)				Result 1	Result 2	RPD			
CRS Suite - Net Acidity - NASSG (Including ANC)	L23-Au0012779	CP	% S	< 0.02	< 0.02	<1	30%	Pass	
CRS Suite - Net Acidity - NASSG (Including ANC)	L23-Au0012779	CP	mol H+/t	< 10	< 10	<1	30%	Pass	
CRS Suite - Liming Rate - NASSG (Including ANC)	L23-Au0012779	CP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Duplicate									
Net Acidity (Excluding ANC)				Result 1	Result 2	RPD			
CRS Suite - Net Acidity - NASSG (Excluding ANC)	L23-Au0012788	CP	% S	< 0.02	N/A	N/A	30%	Pass	
CRS Suite - Net Acidity - NASSG (Excluding ANC)	L23-Au0012788	CP	mol H+/t	< 10	N/A	N/A	20%	Pass	
CRS Suite - Liming Rate - NASSG (Excluding ANC)	L23-Au0012788	CP	kg CaCO3/t	< 1	N/A	N/A	30%	Pass	
Duplicate									
Actual Acidity (NLM-3.2)				Result 1	Result 2	RPD			
pH-KCL (NLM-3.1)	L23-Au0012788	CP	pH Units	9.0	8.8	2.3	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L23-Au0012788	CP	mol H+/t	< 2	< 2	<1	20%	Pass	
Titratable Actual Acidity (NLM-3.2)	L23-Au0012788	CP	% pyrite S	< 0.003	< 0.003	<1	30%	Pass	

Duplicate									
Potential Acidity - Chromium Reducible Sulfur				Result 1	Result 2	RPD			
Chromium Reducible Sulfur (s-SCr) (NLM-2.1)	L23-Au0012788	CP	% S	< 0.005	< 0.005	<1	20%	Pass	
Chromium Reducible Sulfur (a-SCr) (NLM-2.1)	L23-Au0012788	CP	mol H+/t	< 3	< 3	<1	30%	Pass	
Duplicate									
Extractable Sulfur				Result 1	Result 2	RPD			
Sulfur - KCl Extractable	L23-Au0012788	CP	% S	N/A	N/A	N/A	30%	Pass	
HCl Extractable Sulfur	L23-Au0012788	CP	% S	N/A	N/A	N/A	20%	Pass	
Duplicate									
Retained Acidity (S-NAS)				Result 1	Result 2	RPD			
Net Acid soluble sulfur (SNAS) NLM-4.1	L23-Au0012788	CP	% S	N/A	N/A	N/A	30%	Pass	
Net Acid soluble sulfur (s-SNAS) NLM-4.1	L23-Au0012788	CP	% S	N/A	N/A	N/A	30%	Pass	
Net Acid soluble sulfur (a-SNAS) NLM-4.1	L23-Au0012788	CP	mol H+/t	N/A	N/A	N/A	30%	Pass	
Duplicate									
Acid Neutralising Capacity (ANCbt)				Result 1	Result 2	RPD			
Acid Neutralising Capacity - (ANCbt) (NLM-5.2)	L23-Au0012788	CP	% CaCO3	4.7	4.7	<1	20%	Pass	
Acid Neutralising Capacity - (s-ANCbt) (NLM-5.2)	L23-Au0012788	CP	% S	1.5	1.5	<1	30%	Pass	
ANC Fineness Factor	L23-Au0012788	CP	factor	1.5	1.5	<1	30%	Pass	
Duplicate									
Net Acidity (Including ANC)				Result 1	Result 2	RPD			
CRS Suite - Net Acidity - NASSG (Including ANC)	L23-Au0012788	CP	% S	< 0.02	N/A	N/A	30%	Pass	
CRS Suite - Net Acidity - NASSG (Including ANC)	L23-Au0012788	CP	mol H+/t	< 10	N/A	N/A	30%	Pass	
CRS Suite - Liming Rate - NASSG (Including ANC)	L23-Au0012788	CP	kg CaCO3/t	< 1	N/A	N/A	30%	Pass	
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	L23-Au0012788	CP	%	11	10	6.9	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Arsenic	L23-Au0009521	NCP	mg/kg	< 5	< 5	<1	20%	Pass	
Cadmium	L23-Au0009521	NCP	mg/kg	0.1	0.1	4.1	20%	Pass	
Chromium	L23-Au0009521	NCP	mg/kg	< 1	< 1	<1	20%	Pass	
Copper	L23-Au0009521	NCP	mg/kg	< 1	< 1	<1	20%	Pass	
Lead	L23-Au0009521	NCP	mg/kg	< 1	< 1	<1	20%	Pass	
Mercury	L23-Au0009521	NCP	mg/kg	< 0.02	< 0.02	<1	30%	Pass	
Nickel	L23-Au0009521	NCP	mg/kg	< 1	1.0	49	20%	Fail	Q15
Zinc	L23-Au0009521	NCP	mg/kg	2.0	3.6	58	20%	Fail	Q15
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	L23-Au0012794	CP	%	7.7	7.6	1.1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	L23-Au0012795	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	L23-Au0012795	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	L23-Au0012795	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	L23-Au0012795	CP	mg/kg	< 50	< 50	<1	30%	Pass	

Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	L23-Au0012795	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	L23-Au0012795	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	L23-Au0012795	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	L23-Au0012795	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	L23-Au0012795	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total*	L23-Au0012795	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	L23-Au0012795	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	L23-Au0012795	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	L23-Au0012795	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	L23-Au0012795	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	L23-Au0012795	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	L23-Au0012795	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	L23-Au0012795	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	L23-Au0012795	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	L23-Au0012795	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	L23-Au0012795	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	L23-Au0012795	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	L23-Au0012795	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	L23-Au0012795	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	L23-Au0012795	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	L23-Au0012795	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	L23-Au0012795	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	L23-Au0012795	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	L23-Au0012795	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	L23-Au0012795	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	L23-Au0012795	CP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	L23-Au0012795	CP	mg/kg	< 100	< 100	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference.
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.
S01	Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m3'
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCl if greater than or equal to pH 6.5
S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period

Authorised by:

Andrew Harvey	Analytical Services Manager
Douglas Todd	Senior Analyst-Sample Properties
Jonathon Angell	Senior Analyst-Sample Properties
Jonathon Angell	Senior Analyst-SPOCAS
Patrick Patfield	Senior Analyst-Organic
Patrick Patfield	Senior Analyst-Volatile
Rhys Thomas	Senior Analyst-Asbestos
Sean Sangster	Senior Analyst-Metal

Kim Rodgers
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request

Certificate of Analysis

NATA Accredited
Accreditation Number 2377
Site Number 2370

Accredited for compliance with ISO/IEC 17025–Testing
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.

Galt Environment P/L
50 Edward Street
Osborne Park
WA 6017

Attention:	- ALL SRA/Results
Report	1014072-AIS
Project Name	MILLING
Project ID	WAG230373
Received Date	Aug 04, 2023
Date Reported	Aug 14, 2023

Methodology:

Asbestos Fibre Identification	Conducted in accordance with the Australian Standard AS 4964 – 2004: Method for the Qualitative Identification of Asbestos in Bulk Samples (AS 4964-2004) and in-house Method LTM-ASB-8020 by polarised light microscopy (PLM) and dispersion staining (DS) techniques. *NOTE: Positive Trace Analysis results indicate the sample contains detectable respirable fibres.*
Unknown Mineral Fibres	Mineral fibres of unknown type, as determined by PLM with DS, may require another analytical technique, such as Electron Microscopy, to confirm unequivocal identity. *NOTE: While Actinolite, Anthophyllite and Tremolite asbestos may be detected by PLM with DS, due to variability in the optical properties of these materials, AS 4964-2004 requires that these are reported as UMF unless confirmed by an independent technique.*
Subsampling Soil Samples	The whole sample submitted is first dried and then passed through a 10 mm sieve followed by a 2 mm sieve. All fibrous matter greater than 10mm, greater than 2 mm as well as the material passing through the 2 mm sieve are retained and analysed for the presence of asbestos. If the sub 2 mm fraction is greater than approximately 30 to 60 g then a sub-sampling routine based on ISO 3082:2009(E) is employed. *NOTE: Depending on the nature and size of the soil sample, the sub-2 mm residue material may need to be sub-sampled for trace analysis, in accordance with AS 4964-2004.*
Bonded asbestos-containing material (ACM)	The material is first examined and any fibres isolated for identification by PLM and DS. Where required, interfering matrices may be removed by disintegration using a range of heat, chemical or physical treatments, possibly in combination.The resultant material is then further examined in accordance with AS 4964-2004. *NOTE: Even after disintegration it may be difficult to detect the presence of asbestos in some asbestos-containing bulk materials using PLM and DS. This is due to the low grade or small length or diameter of the asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials. Vinyl/asbestos floor tiles, some asbestos-containing sealants and mastics, asbestos-containing epoxy resins and some ore samples are examples of these types of material, which are difficult to analyse.*
Limit of Reporting	The performance limitation of the AS 4964-2004 method for non-homogeneous samples is around 0.1 g/kg (equivalent to 0.01% (w/w)). Where no asbestos is found by PLM and DS, including Trace Analysis, this is considered to be at the nominal reporting limit of 0.01% (w/w). The NEPM screening level of 0.001% (w/w) is intended as an on-site determination, not a laboratory Limit of Reporting (LOR), per se. Examination of a large sample size (e.g. 500 mL) may improve the likelihood of detecting asbestos, particularly AF, to aid assessment against the NEPM criteria. Gravimetric determinations to this level of accuracy are outside of AS 4964-2004 and hence NATA Accreditation does not cover the performance of this service. *NOTE: NATA News March 2014, p.7, states in relation to AS 4964-2004: "This is a qualitative method with a nominal reporting limit of 0.01 % " and that currently in Australia "there is no validated method available for the quantification of asbestos".* *Reference is made to the NATA Specific Accreditation Criteria: ISO/IEC 17025 Application Document, Life Sciences - Annex, Asbestos sampling and testing This report is consistent with the analytical procedures and reporting recommendations in the NEPM and the Government of Western Australia Department of Health Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia(WA DoH).*

Client Sample ID			TP01 0.0	TP02 0.0	TP03 0.0	TP04 0.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			23-Au0012789	23-Au0012790	23-Au0012791	23-Au0012792
Date Sampled			Jul 31, 2023	Jul 31, 2023	Jul 31, 2023	Jul 31, 2023
	LOR	Unit				
Asbestos in Soils (AS 4964-2004)						
Sample Description	-	Comment	Brown coarse grain soil and rocks	Brown coarse grain soil and rocks	Brown coarse grain soil and rocks	Brown coarse grain soil and rocks
Total Dry Mass	0.1	g	643	535	681	535
Total Analytical Fraction	0.1	g	643	535	681	535
Asbestos Detected	-	Yes/No	No	No	No	No
Materials Identified	-	Comment	N/A	N/A	N/A	N/A
Fibres Identified	-	Comment	Organic	Organic	Organic	Organic
Asbestos Content (as asbestos)	0.01	% w/w	< 0.01	< 0.01	< 0.01	< 0.01
Trace Analysis	0.1	g/kg	No trace asbestos detected	No trace asbestos detected	No trace asbestos detected	No trace asbestos detected

Client Sample ID			TP05 0.0	TP06 0.0	TP07 0.0
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			23-Au0012793	23-Au0012794	23-Au0012795
Date Sampled			Jul 31, 2023	Jul 31, 2023	Jul 31, 2023
	LOR	Unit			
Asbestos in Soils (AS 4964-2004)					
Sample Description	-	Comment	Brown coarse grain soil and rocks	Brown coarse grain soil and rocks	Brown coarse grain soil and rocks
Total Dry Mass	0.1	g	740	246	762
Total Analytical Fraction	0.1	g	740	246	762
Asbestos Detected	-	Yes/No	No	No	No
Materials Identified	-	Comment	N/A	N/A	N/A
Fibres Identified	-	Comment	Organic	Organic	Organic
Asbestos Content (as asbestos)	0.01	% w/w	< 0.01	< 0.01	< 0.01
Trace Analysis	0.1	g/kg	No trace asbestos detected	No trace asbestos detected	No trace asbestos detected

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
LTM-ASB-8020 Method for the Qualitative Identification of Asbestos in Bulk Samples (AS 4964-2004)	Welshpool	Aug 04, 2023	Indefinite

eurofins

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Eurofins ARL Pty Ltd
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NATA# 2377
Site# 2370

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NATA# 1261
Site# 25403

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Tel: +61 2 9900 8400
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Site# 18217

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NATA# 1261
Site# 25466

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Tauranga 3112
Tel: +64 9 525 0568
IANZ# 1402

Company Name:	Galt Environment P/L	**Order No.:**	WAG230373	**Received:**	Aug 4, 2023 12:17 PM
Address:	50 Edward Street	**Report #:**	1014072	**Due:**	Aug 11, 2023
	Osborne Park	**Phone:**	08 6272 0200	**Priority:**	5 Day
	WA 6017	**Fax:**	08 9285 8444	**Contact Name:**	- ALL SRA/Results
Project Name:	MILLING				
Project ID:	WAG230373				

Eurofins Analytical Services Manager : Andrew Harvey

Sample Detail						Asbestos in Soils (AS 4964-2004)	Moisture Set	Moisture Set	Chromium Suite - NASSG (Excluding ANC)	Eurofins Suite B4	Metals M8 Soil
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X		X	X
Brisbane Laboratory - NATA # 1261 Site # 20794							X	X	X		
External Laboratory											
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**						
1	TP01 0.75	Jul 31, 2023		Soil	L23-Au0012779		X		X		
2	TP02 0.25	Jul 31, 2023		Soil	L23-Au0012780		X		X		
3	TP02 1.25	Jul 31, 2023		Soil	L23-Au0012781		X		X		
4	TP03 0.5	Jul 31, 2023		Soil	L23-Au0012782		X		X		
5	TP04 0.75	Jul 31, 2023		Soil	L23-Au0012783		X		X		
6	TP04 1.75	Jul 31, 2023		Soil	L23-Au0012784		X		X		
7	TP05 0.75	Jul 31, 2023		Soil	L23-Au0012785		X		X		
8	TP06 2.25	Jul 31, 2023		Soil	L23-Au0012786		X		X		
9	TP07 1.0	Jul 31, 2023		Soil	L23-Au0012787		X		X		
10	QC01	Jul 31, 2023		Soil	L23-Au0012788		X		X		
11	TP01 0.0	Jul 31, 2023		Soil	L23-Au0012789	X		X		X	X
12	TP02 0.0	Jul 31, 2023		Soil	L23-Au0012790	X		X		X	X

Company Name: Galt Environment P/L
Address: 50 Edward Street
Osborne Park
WA 6017

Project Name: MILLING
Project ID: WAG230373

Order No.: WAG230373
Report #: 1014072
Phone: 08 6272 0200
Fax: 08 9285 8444

Received: Aug 4, 2023 12:17 PM
Due: Aug 11, 2023
Priority: 5 Day
Contact Name: - ALL SRA/Results

Eurofins Analytical Services Manager : Andrew Harvey

Sample Detail						Asbestos in Soils (AS 4964-2004)	Moisture Set	Moisture Set	Chromium Suite - NASSG (Excluding ANC)	Eurofins Suite B4	Metals M8 Soil
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X		X	X
Brisbane Laboratory - NATA # 1261 Site # 20794							X	X	X		
External Laboratory											
13	TP03 0.0	Jul 31, 2023		Soil	L23-Au0012791	X		X		X	X
14	TP04 0.0	Jul 31, 2023		Soil	L23-Au0012792	X		X		X	X
15	TP05 0.0	Jul 31, 2023		Soil	L23-Au0012793	X		X		X	X
16	TP06 0.0	Jul 31, 2023		Soil	L23-Au0012794	X		X		X	X
17	TP07 0.0	Jul 31, 2023		Soil	L23-Au0012795	X		X		X	X
Test Counts						7	17	17	10	7	7

Internal Quality Control Review and Glossary General

1. QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Samples were analysed on an 'as received' basis.
4. Information identified on this report with the colour **blue** indicates data provided by customer that may have an impact on the results.
5. This report replaces any interim results previously issued.

Holding Times

Please refer to the most recent version of the 'Sample Preservation and Container Guide' for holding times (QS3001).
If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported. Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

Units

% w/w:	Percentage weight-for-weight basis, e.g. of asbestos in asbestos-containing finds in soil samples (**% w/w**)
F/fld	Airborne fibre filter loading as Fibres (**N**) per Fields counted (**n**)
F/mL	Airborne fibre reported concentration as Fibres per millilitre of air drawn over the sampler membrane (**C**)
g, kg	Mass, e.g. of whole sample (**M**) or asbestos-containing find within the sample (**m**)
g/kg	Concentration in grams per kilogram
L, mL	Volume, e.g. of air as measured in AFM (**V** = **r** x **t**)
L/min	Airborne fibre sampling Flowrate as litres per minute of air drawn over the sampler membrane (**r**)
min	Time (**t**), e.g. of air sample collection period

Calculations

Airborne Fibre Concentration: $C = \left(\frac{A}{a}\right) \times \left(\frac{N}{n}\right) \times \left(\frac{1}{r}\right) \times \left(\frac{1}{t}\right) = K \times \left(\frac{N}{n}\right) \times \left(\frac{1}{V}\right)$

Asbestos Content (as asbestos): $\% \, w/w = \frac{(m \times P_A)}{M}$

Weighted Average (of asbestos): $\%_{WA} = \sum \frac{(m \times P_A)_x}{x}$

Terms

%asbestos	Estimated percentage of asbestos in a given matrix. May be derived from knowledge or experience of the material, informed by HSG264 *Appendix 2*, else assumed to be 15% in accordance with WA DOH *Appendix 2* (**P_A**).
ACM	Asbestos Containing Materials. Asbestos contained within a non-asbestos matrix, typically presented in bonded (non-friable) condition. For the purposes of the NEPM and WA DOH, ACM corresponds to material larger than 7 mm x 7 mm.
AF	Asbestos Fines. Asbestos contamination within a soil sample, as defined by WA DOH. Includes loose fibre bundles and small pieces of friable and non-friable material such as asbestos cement fragments mixed with soil. Considered under the NEPM as equivalent to “non-bonded / friable”.
AFM	Airborne Fibre Monitoring, e.g. by the MFM.
Amosite	Amosite Asbestos Detected. Amosite may also refer to Fibrous Grunerite or Brown Asbestos. Identified in accordance with AS 4964-2004.
AS	Australian Standard.
Asbestos Content (as asbestos)	Total % w/w asbestos content in asbestos-containing finds in a soil sample (**% w/w**).
Chrysotile	Chrysotile Asbestos Detected. Chrysotile may also refer to Fibrous Serpentine or White Asbestos. Identified in accordance with AS 4964-2004.
COC	Chain of Custody.
Crocidolite	Crocidolite Asbestos Detected. Crocidolite may also refer to Fibrous Riebeckite or Blue Asbestos. Identified in accordance with AS 4964-2004.
Dry	Sample is dried by heating prior to analysis.
DS	Dispersion Staining. Technique required for Unequivocal Identification of asbestos fibres by PLM.
FA	Fibrous Asbestos. Asbestos containing material that is wholly or in part friable, including materials with higher asbestos content with a propensity to become friable with handling, and any material that was previously non-friable and in a severely degraded condition. For the purposes of the NEPM and WA DOH, FA generally corresponds to material larger than 7 mm x 7 mm, although FA may be more difficult to visibly distinguish and may be assessed as AF.
Fibre Count	Total of all fibres (whether asbestos or not) meeting the counting criteria set out in the NOHSC:3003
Fibre ID	Fibre Identification. Unequivocal identification of asbestos fibres according to AS 4964-2004. Includes Chrysotile, Amosite (Grunerite) or Crocidolite asbestos.
Friable	Asbestos-containing materials of any size that may be broken or crumbled by hand pressure. For the purposes of the NEPM, this includes both AF and FA. It is outside of the laboratory’s remit to assess degree of friability.
HSG248	UK HSE HSG248, *Asbestos: The Analysts Guide*, 2nd Edition (2021).
HSG264	UK HSE HSG264, *Asbestos: The Survey Guide* (2012).
ISO (also ISO/IEC)	International Organization for Standardization / International Electrotechnical Commission.
K Factor	Microscope constant (**K**) as derived from the effective filter area of the given AFM membrane used for collecting the sample (**A**) and the projected eyepiece graticule area of the specific microscope used for the analysis (**a**).
LOR	Limit of Reporting.
MFM (also NOHSC:3003)	Membrane Filter Method. As described by the Australian Government National Occupational Health and Safety Commission, *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres*, 2nd Edition [NOHSC:3003(2005)].
NEPM (also ASC NEPM)	National Environment Protection (Assessment of Site Contamination) Measure, (2013, as amended).
Organic	Organic Fibres Detected. Organic may refer to Natural or Man-Made Polymeric Fibres. Identified in accordance with AS 4964-2004.
PCM	Phase Contrast Microscopy. As used for Fibre Counting according to the MFM.
PLM	Polarised Light Microscopy. As used for Fibre Identification and Trace Analysis according to AS 4964-2004.
Sampling	Unless otherwise stated Eurofins are not responsible for sampling equipment or the sampling process.
SMF	Synthetic Mineral Fibre Detected. SMF may also refer to Man Made Vitreous Fibres. Identified in accordance with AS 4964-2004.
SRA	Sample Receipt Advice.
Trace Analysis	Analytical procedure used to detect the presence of respirable fibres (particularly asbestos) in a given sample matrix.
UK HSE HSG	United Kingdom, Health and Safety Executive, Health and Safety Guidance, publication.
UMF	Unidentified Mineral Fibre Detected. Fibrous minerals that are detected but have not been unequivocally identified by PLM with DS according the AS 4964-2004. May include (but not limited to) Actinolite, Anthophyllite or Tremolite asbestos.
WA DOH	Reference document for the NEPM. Government of Western Australia, *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia* (updated 2021), including Appendix Four: *Laboratory analysis*
Weighted Average	Combined average % w/w asbestos content of all asbestos-containing finds in the given aliquot or total soil sample (**$\%_{WA}$**).

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Asbestos Counter/Identifier:

Angela Tan	Senior Analyst-Asbestos

Authorised by:

Rhys Thomas	Senior Analyst-Asbestos

Kim Rodgers
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request

Appendix F: Analytical Test Results

Analytical Test Results

Field ID	Unit	EQL	NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Clay	NEPM 2013 Table 1A(1) HILs Res A Soil	TP01 0.0	TP02 0.0	TP03 0.0	TP04 0.0	TP05 0.0	TP06 0.0	TP07 0.0
Date					31 Jul 2023	31 Jul 2023	31 Jul 2023	31 Jul 2023	31 Jul 2023	31 Jul 2023	31 Jul 2023
BTEX											
Naphthalene (VOC)	**mg/kg**	0.5	5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzene	**mg/kg**	0.1	0.7 | 1 | 2 | 3		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	**mg/kg**	0.1	480		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ethylbenzene	**mg/kg**	0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Xylene (m & p)	**mg/kg**	0.2			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Xylene (o)	**mg/kg**	0.1			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Xylene Total	**mg/kg**	0.3	110 | 310		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
TRH											
C6-C10 Fraction (F1)	**mg/kg**	20			<20	<20	<20	<20	<20	<20	<20
C6-C10 (F1 minus BTEX)	**mg/kg**	20	50 | 90 | 150 | 290		<20	<20	<20	<20	<20	<20	<20
>C10-C16 Fraction (F2)	**mg/kg**	50			<50	<50	<50	<50	<50	<50	<50
>C10-C16 Fraction (F2 minus Naphthalene)	**mg/kg**	50	280		<50	<50	<50	<50	<50	<50	<50
>C16-C34 Fraction (F3)	**mg/kg**	100			<100	<100	<100	<100	<100	<100	<100
>C34-C40 Fraction (F4)	**mg/kg**	100			<100	<100	<100	<100	<100	<100	<100
>C10-C40 Fraction (Sum)	**mg/kg**	100			<100	<100	<100	<100	<100	<100	<100
Inorganics											
Moisture Content (dried @ 103°C)	**%**	1			6.5	8.1	6.0	9.9	4.4	7.7	14
Metals											
Arsenic	**mg/kg**	5		100	<5	<5	<5	<5	<5	<5	<5
Cadmium	**mg/kg**	0.1		20	0.1	0.1	0.1	0.2	<0.1	<0.1	<0.1
Chromium (III+VI)	**mg/kg**	1			13	15	13	17	19	35	19
Copper	**mg/kg**	1		6,000	4.9	9.2	5.3	6.5	6.2	9.4	7.3
Lead	**mg/kg**	1		300	13	14	11	14	11	17	11
Mercury	**mg/kg**	0.02		40	<0.02	<0.02	<0.02	<0.02	<0.02	0.15	<0.02
Nickel	**mg/kg**	1		400	3.0	4.2	3.4	5.8	3.9	11	2.8
Zinc	**mg/kg**	1		7,400	14	70	10	12	9.1	6.8	17
PAH											
Acenaphthene	**mg/kg**	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene	**mg/kg**	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene	**mg/kg**	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a)anthracene	**mg/kg**	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a) pyrene	**mg/kg**	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b+j)fluoranthene	**mg/kg**	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(g,h,i)perylene	**mg/kg**	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(k)fluoranthene	**mg/kg**	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	**mg/kg**	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a,h)anthracene	**mg/kg**	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	**mg/kg**	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	**mg/kg**	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene	**mg/kg**	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	**mg/kg**	0.5	5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	**mg/kg**	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene	**mg/kg**	0.5			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PAHs (Sum of total)	**mg/kg**	0.5		300	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TPH											
C6-C9 Fraction	**mg/kg**	20			<20	<20	<20	<20	<20	<20	<20
C10-C14 Fraction	**mg/kg**	20			<20	<20	<20	<20	<20	<20	<20
C15-C28 Fraction	**mg/kg**	50			<50	<50	<50	<50	<50	<50	<50
C29-C36 Fraction	**mg/kg**	50			<50	<50	<50	<50	<50	<50	<50
C10-C36 Fraction (Sum)	**mg/kg**	50			<50	<50	<50	<50	<50	<50	<50

Appendix G: Understanding Your Report

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50 Edward Street OSBORNE PARK WA 6017

ABN: 64 625 054 729

UNDERSTANDING YOUR REPORT

GALT FORM PMP11 Rev4

1. EXPECTATIONS OF THE REPORT

This document has been prepared to clarify what is and is not provided in your report. It is intended to inform you of what your realistic expectations of this report should be and how to manage your risks associated with the conditions on site.

Geotechnical engineering and environmental science are less exact than other engineering and scientific disciplines. We include this information to help you understand where our responsibilities begin and end. You should read and understand this information. Please contact us if you do not understand the report or this explanation. We have extensive experience in a wide variety of projects and we can help you to manage your risk.

2. THIS REPORT RELATES TO PROJECT-SPECIFIC CONDITIONS

This report was developed for a unique set of project-specific conditions to meet the needs of the nominated client. It took into account the following:

- the project objectives as we understood them and as described in this report;
- the specific site mentioned in this report; and
- the current and proposed development at the site.

It should not be used for any purpose other than that indicated in the report. You should not rely on this report if any of the following conditions apply:

- the report was not written for you;
- the report was not written for the site specific to your development;
- the report was not written for your project (including a development at the correct site but other than that listed in the report); or
- the report was written before significant changes occurred at the site (such as a development or a change in ground conditions).

You should always inform us of changes in the proposed project (including minor changes) and request an assessment of their impact.

Where we are not informed of developments relevant to your report, we cannot be held responsible or liable for problems that may arise as a consequence.

Where design is to be carried out by others using information provided by us, we recommend that we be involved in the design process by being engaged for consultation with other members of the project team. Furthermore, we recommend that we be able to review work produced by other members of the project team that relies on information provided in our report.

3. DATA PROVIDED BY THIRD PARTIES

Where data is provided by third parties, it will be identified as such in our reports. We necessarily rely on the completeness and accuracy of data provided by third parties in order to draw conclusions presented in our reports. We are not responsible for omissions, incomplete or inaccurate data associated with third party data, including where we have been requested to provide advice in relation to field investigation data provided by third parties.

4. SOIL LOGS

Our reports often include logs of intrusive and non-intrusive investigation techniques prepared by Galt. These logs are based on our interpretation of field data and laboratory results. The logs should only be read in conjunction with the report they were issued with and should not be re-drawn for inclusion in other documents not prepared by us.

5. THIRD PARTY RELIANCE

We have prepared this report for use by the client. This report must be regarded as confidential to the client and the client's professional advisors. We do not accept any responsibility for contents of this document from any party other than the nominated client. We take no responsibility for any damages suffered by a third party because of any decisions or actions they may make based on this report. Any reliance or decisions made by a third party based on this report are the responsibility of the third party and not of us.

6. CHANGE IN SUBSURFACE CONDITIONS

The recommendations in this report are based on the ground conditions that existed at the time when the study was undertaken. Changes in ground conditions can occur in numerous ways including anthropogenic events (such as construction or contaminating activities on or adjacent to the site) or natural events (such as floods, groundwater fluctuations or earthquakes). We should be consulted prior to use of this report so that we can comment on its reliability. It is important to note that where ground conditions have changed, additional sampling, testing or analysis may be required to fully assess the changed conditions.

7. SUBSURFACE CONDITIONS DURING CONSTRUCTION

Practical constraints mean that we cannot know every minute detail about the subsurface conditions at a particular site. We use professional judgement to form an opinion about the subsurface conditions at the site. Some variation to our evaluated conditions is likely and significant variation is possible. Accordingly, our report should not be considered as final as it is developed from professional judgement and opinion.

The most effective means of dealing with unanticipated ground conditions is to engage us for construction support. We can only finalise our recommendations by observing actual subsurface conditions encountered during construction. We cannot accept liability for a report's recommendations if we cannot observe construction.

8. ENVIRONMENTAL AND GEOTECHNICAL ISSUES

Unless specifically mentioned otherwise in our report, environmental considerations are not addressed in geotechnical reports. Similarly, geotechnical issues are not addressed in environmental reports. The investigation techniques used for geotechnical investigations can differ from those used for environmental investigations. It is the client's responsibility to satisfy themselves that geotechnical and environmental considerations have been taken into account for the site.

Geotechnical advice presented in a Galt Environmental report has been provided by Galt Geotechnics under a sub-contract agreement. Similarly, environmental advice presented in a Galt Geotechnics report has been provided by Galt Environmental under a sub-contract agreement.

Unless specifically noted otherwise, no parties shall draw any inferences about the applicability of the Western Australian state government landfill levy from the contents of this document.

O:\Administration\Standard Forms and Documents\PMP11-Rev3 Understanding your Report.docx

Report on

SITE AND SOIL EVALUATION
PROPOSED ACCOMMODATION SITE
PART LOT 80, GREAT NORTHERN HIGHWAY
MILING

Submitted to:

Cooperative Bulk Handling (CBH) Ltd
Level 6, 240 St Georges Terrace
PERTH WA 6000

www.galtgeo.com.au
50 Edward Street
OSBORNE PARK WA 6017
T: +61 (8) 6272-0200

WAG230373-01 003 R Rev0

23 August 2023

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TABLES

FIGURES

APPENDICES

1. INTRODUCTION

This report presents the outcomes of Galt Geotechnics' (Galt's) general site and soil evaluation (SSE) for the proposed accommodation site on Part of Lot 80 (#18201) Great Northern Highway in Miling ("the site").

The location of the site relative to the surrounding area is shown on Figure 1.

2. DEFINITIONS

Site and Soil Evaluation (SSE) – an assessment of all relevant constraints and the risks to public health and the environment in accordance with AS1547-2012 "On-site domestic wastewater management". This SSE is a general assessment SSE, with the purpose being to undertake a site suitability assessment for onsite wastewater management and to recommend the type of onsite wastewater system for the proposed development. A specific assessment is required to support an "application to install" an onsite wastewater system. This is for when a particular type of system/model is proposed, and a detailed design, including management recommendations and operation requirements. This document is not a specific assessment.

Land Application Area (LAA) – The unencumbered plan area to which treated sewage from an on-site sewage system is distributed for further in-soil treatment and absorption or evaporation. This area is restricted to the distribution of treated sewage and may not be developed for other purposes.

Land Application System (LAS) - The system used to apply effluent from a wastewater treatment unit into or onto the soil for further in-soil treatment and absorption or evaporation.

Effluent – The liquid discharged from a wastewater treatment unit.

Primary Treatment – The separation of suspended material from sewage in septic tanks, primary settling chambers or other structures before discharge to either an LAS or secondary treatment process.

Secondary Treatment – Microbiological digestions and physical settling and filtering processes and decomposition of sewage constituents following primary treatment.

Sewage – Any kind of sewage, faecal matter or urine, and any waste composed wholly or in part of liquid.

Infiltrative Area – Is the area within an LAA that has treated effluent directly discharged onto and does not include setback areas. I.e., the base of leach drains, evapotranspiration beds etc.

3. GOVERNING STANDARDS, REGULATIONS AND POLICIES

SSEs are governed by various National and State Standards, Regulations and Policies, including:

- AS/NZS 1547:2012, *On-site domestic wastewater management.*
- Western Australia Government Sewerage Policy (2019)
- Western Australia Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations (1974)
- Western Australia State Planning Policy 2.9, Water Resources (2005)

Other regulatory requirements may become relevant depending on the outcomes of any SSE.

4. PROJECT OBJECTIVES

The objective of the study was to undertake an SSE and:

- provide a general site and soil evaluation in accordance with:
    - AS1547-2012, On-site domestic wastewater management.
    - The Western Australia Government Sewerage Policy (2019).
- Assess the capacity of the site to sustainably manage sewage within lot boundaries;
- Identify public and environmental health risks of on-site sewage management, especially the effect on groundwater and surface water on site; and
- Identify the most appropriate on-site system in consideration of site conditions and the nature of the proposed development.

The Department of Health guidelines "Guidance on Site-and-soil evaluation for on-site sewage management"[1] notes:

The overall objectives of the SSE process are to:

- *assess the capacity of the site to sustainably manage sewage within lot boundaries;*
- *identify public and environmental health risks of on-site sewage management, especially the effect on groundwater and surface water on the site;*
- *identify the most appropriate on-site system in consideration of site conditions and the nature of the proposed development; and*
- *identify and implement a management program to minimise these risks if required.*

This report addresses the first 3 items. The last item should be addressed by individual lot owners depending on their specific requirements, sewage loading, etc.

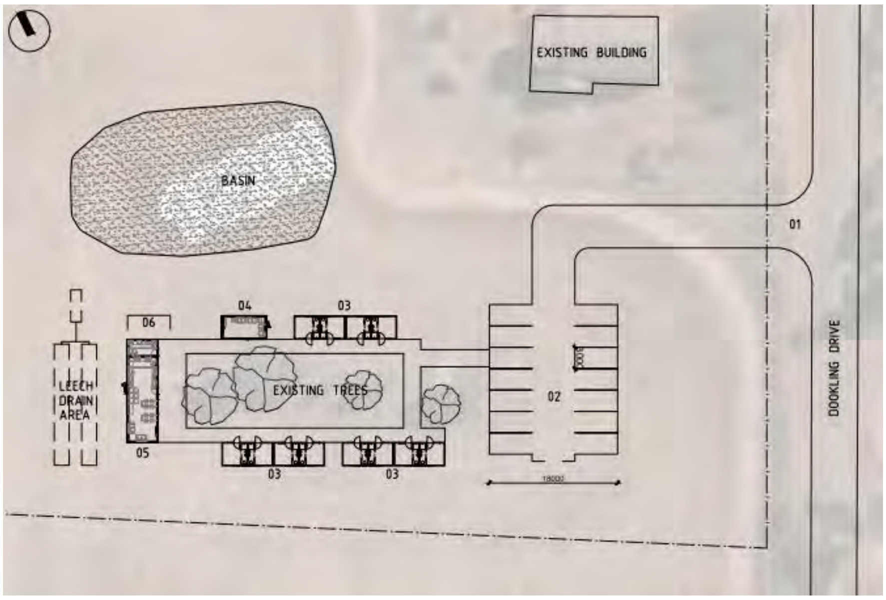
5. SITE DESCRIPTION AND PROPOSED DEVELOPMENT

5.1 General

Lot 80 is roughly rectangular in shape and covers a plan area of about 1.4 hectares. At the time of investigation, a former church (Holy Rosary Catholic Church) occupied the northeast part of site with relatively open cultivated land across the balance of the Lot. Based on publicly available information, the current ground level is around RL 256 m AHD.

The proposed accommodation site is located on the southern part of Lot 80 as shown below.

[1] (https://ww2.health.wa.gov.au/~/media/Files/Corporate/general%20documents/water/Wastewater/Site-Soil-Evaluation.pdf)



Inline Image 1: Proposed Accommodation Site

We understand the site is to be developed with proposed accommodation units, a car park, a drainage basin. We also note that on-site effluent disposal is proposed by way of leach drains.

5.2 Hydraulic Loading of Proposed Development

An estimated design hydraulic loading has been determined in accordance with the WA Department of Health Regulations 28, 29 and Schedule 9 of the Health Regulations (1974). Based on Table 2 of the schedule, for human waste, a design loading rate of 180 L/person/day is considered appropriate (equivalent minesite accommodation camp unit). We have assumed a maximum of around 12 simultaneous persons (based on the number of units shown on the supplied plans), which equates to a design hydraulic loading of 2,160 L/day.

6. FIELDWORK

Fieldwork was carried out on 31 July and 1 August 2023 and comprised:

- a site walkover including inspection of the site features relevant to AS1547-2012;
- excavation of test pits (TP) at 9 locations (TP01 to TP09), extending to:
  - a target depth of 1.5 m across the proposed carpark and access road (TP01 to TP03);
  - refusal, at depths ranging from 1.75 m to 2.5 m across the proposed accommodation units (TP04 to TP06);
  - a depth of 1.5 m at the proposed basin (TP07); and
  - depths of 1.75 and 1.5 m respectively at the proposed leach drains (TP08 and TP09).
- constant head permeability testing at 3 locations using a Guelph permeameter at:
  - a depth of 0.63 m at the proposed basin location (P03);
  - depths of 0.53 m and 0.50 m respectively, at the proposed leach drains (P01 and P02)

<u>General</u>

Fieldwork was conducted by a geotechnical engineer from Galt in general accordance with AS1726 (2017) "Geotechnical Site Investigations".

Our engineer positioned the tests using a handheld GPS accurate to about 5 m in the horizontal plane. The engineer conducted the walkover survey, observed the test pitting, logged the materials encountered, performed the field tests and collected representative soil samples for laboratory testing.

The approximate test locations are shown on Figure 1. Photographs of the site taken during the inspection are presented in Appendix A, Site Photographs. Details of the test pits are shown in Table 1: Summary of Tests.

Table 1: Summary of Tests

Test Name	Description of Proposed Development	Test Depth (m)	Reason for Termination	Stratigraphy
TP01	Proposed Carpark and Access Road	1.5	Target depth	FILL: Clayey SAND over Clayey SAND over Sandy CLAY
TP02				FILL: SAND over Clayey SAND over Sandy CLAY
TP03				TOPSOIL: SAND over Clayey SAND over Sandy CLAY
TP04	Proposed Accommodation Units	2.5	Refusal	TOPSOIL: Sandy CLAY over Sandy CLAY
TP05		1.75		TOPSOIL: Clayey SAND over Clayey SAND over Sandy CLAY
TP06		2.5		TOPSOIL: Clayey SAND over Clayey SAND over Sandy CLAY
TP07	Proposed Basin Area	1.5	Target depth	TOPSOIL: Clayey SAND over Clayey SAND over Sandy CLAY over Sandy Gravelly CLAY
TP08	Proposed Leach Drain Area	1.75		TOPSOIL: Sandy CLAY over Sandy CLAY over Sandy Gravelly CLAY over Sandy CLAY
TP09		1.5		TOPSOIL: Clayey SAND over Clayey SAND over Sandy CLAY

Notes:
1. TP – Test Pit
2. Groundwater was not encountered at test locations
3. Refusal occurred on inferred cemented strata

Test Pits

Test pits were excavated using an 8-tonne JCB 3CX tractor-mounted backhoe equipped with a 0.45 m wide toothed bucket. The backhoe was supplied and operated by ANH Contracting. Test pit reports, including a list of notes and abbreviations and the method of soil description used on the reports are included in Appendix B, Test Pit Reports. A photograph of the spoil recovered from each test pit is also included on each report.

Constant Head Permeability Tests

Constant head permeability tests were conducted using a Guelph Permeameter at locations where drainage basins / leach drains are likely to be situated. The testing was generally conducted in accordance with Appendix G of AS1547 (2012) "On-site domestic wastewater management". The results of the testing are presented in Appendix C: Constant Head Permeameter Test Results and summarised below.

Table 2: Constant Head Permeameter Test Results

Test Location	Depth of Test (m)	Soil Profile (AS1726-2017)	k[1] (m/day)	Soil Category[2]
P01	0.53	Sandy CLAY	0.01	5
P02	0.50	Sandy Gravelly CLAY	0.01	5
P03	0.63	Sandy CLAY	0.01	5

Notes: 1. k – saturated hydraulic conductivity
2. Soil category is as per Table L1 of AS1547-2012.

7. LABORATORY TESTING

7.1 Geotechnical

Geotechnical laboratory testing was conducted by Western Geotechnical and Laboratory Services (WGLS) in their NATA accredited laboratory. The testing comprised determination of:

- particle size distribution on 5 samples;
- Atterberg limits and linear shrinkage on 5 samples and
- Emerson Class tests on 2 samples.

The results of the testing are presented in Appendix D: Laboratory Test Results - Geotechnical and a summary of the test results is presented in Table 3.

Table 3: Summary of Laboratory Test Results

Test Location	Sample Depth (m)	AS1726 (2017) Soil Class	% Gravel	% Sand	% Fines	LL (%)	PI (%)	LS (%)	Emerson Class
TP03	0.4 – 0.7	Sandy CLAY (CI-CH)	16	44	40	50	32	13.5	
TP05	1.0 – 1.3	Sandy CLAY (CI)	10	50	40	44	28	11.0	
TP06	2.2 – 2.5	Sandy CLAY (CI)	6	39	55	47	29	11.5	
TP08	0.45 – 0.65	Sandy Gravelly CLAY (CH)	34	29	37	54	36	15.0	2
TP09	0.5 – 0.7	Sandy CLAY (CI)	2	50	48	45	28	10.5	2

LL – Liquid Limit **PI** – Plasticity Index **LS** – Linear Shrinkage
Grey Shaded – Not Tested

7.2 Chemical

Chemical laboratory testing was undertaken by Envirolab Services (WA) in their NATA accredited laboratory. The testing comprised determination of:

- phosphorus retention index (PRI) testing on 2 samples;
- pH on 2 samples; and
- electrical conductivity on 2 samples.

The results of the testing are presented in Laboratory Test Results - Chemical Appendix E: Laboratory Test Results – Chemical and a summary of the test results is presented in Table 4.

Table 4: Summary of Chemical Laboratory Test Results

Test Location	Depth (m)	Phosphorous Retention Index (PRI)	pH	Electrical Conductivity (µS/cm)
TP08	0.45 – 0.65	19	9.6	460
TP09	0.5 – 0.7	11	9.7	580

8. SITE ASSESSMENT

8.1 Geology and Surface Geology

The Moora sheet of the 1:250,000 scale Geological series map indicates that the area is underlain by Colluvium which is broadly described as rock fragments (presumably gravelly soil). Colluvial sand is also shown close to the site.

Our investigation found the subsurface conditions comprise clayey soils (clayey sand and sandy clay) overlying possible cemented soils/rock at depth.

8.2 Groundwater

We did not encounter groundwater during our investigation (maximum 2.5 m depth). However, we expect that storm-water runoff perches on the low permeability clayey soils particularly following periods of significant rainfall particularly during winter.

8.3 Climate

8.3.1 Rainfall

The nearest Bureau of Meteorology (BoM) weather station to the site is presented below.

Table 5: Bureau of Meteorology Weather Station Details

Location	BoM Station Number	Latitude	Longitude	Elevation
Miling	8085	30.49°	116.36°	250 m

Monthly rainfall data was sourced for this station on 8 June 2023 and is presented in Table 6.

Table 6: Weather Station (8085) Monthly Rainfall Data for All Years (1925-2023)

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	15.2	16.4	19.1	21.4	47.4	62.8	63.0	49.4	26.6	18.1	9.8	9.8	366.6

8.3.2 Evaporation

Evaporation data is estimated from The Department of Agriculture and Food (1987)[2] data. The nearest referenced location in the document is Berkshire Valley.

Table 7: Evaporation Data Estimates - Monthly

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	381	343	304	183	117	74	73	96	127	200	276	373	2547

2 Luke, G J, Burke, K L, and O'Brien T M. (1987), *Evaporation data for Western Australia.* Department of Agriculture and Food, Western Australia, Perth. Report 65.

The evaporation generally exceeds the rainfall annually at the site. On average, there are no months of the year where the rainfall exceeds the evaporation at the site.

8.3.3 Water Balance

A water balance calculation is presented in Appendix F.

The results indicate that a minimum land application area of 276 m^2 is required for zero storage of wastewater (when disposed via beds and trenches).

8.4 Exposure

The proposed LAA area is clear of tree cover and generally well exposed to sunlight.

At the time of investigation, a row of five medium-sized trees were present near the southern part of site (near proposed accommodation units). We expect these trees to be cleared during the proposed development.

As the site is gently sloping, it has no significant aspect.

8.5 Vegetation

No significant or native vegetation is present on the proposed LAA. Most of the proposed LAA is currently open paddock with grass present at surface.

We anticipate that this light vegetation will be removed as part of the development.

8.6 Landform and Drainage

The site is in a flat area with no significant slopes or otherwise. Some low-lying overland flow paths appear to exist between 0.5 km and 1 km from the site, with presumably a very gentle grade from the site to these flow paths.

8.7 Slope

The site has no significant slope.

8.8 Fill (Imported)

No fill is proposed, and no imported fill was noted during our investigation.

8.9 Surface Gravel and Rock Outcrops

No natural rock or gravel outcrops were noted.

8.10 Erosion Potential

The site is flat with no significant slope. Overland flow is minimal, so erosion is considered unlikely.

8.11 PDWSAs and SSAs

The site is not mapped as being in a PDWSA.

The Department of Planning, Lands and Heritage (DPLH) maps the site as not being a sewage sensitive area (SSA).

8.12 Groundwater Separation

Groundwater was not encountered during our field investigation in winter 2023, to the maximum investigated depth of 2.5 m. However, water is likely to pond on the surface of clayey soils (i.e., the site surface) following rainfall events.

The site must be graded to drain away from the LAA and to prevent ponding of any stormwater. We also recommend inverting of leach drains.

8.13 Surface Waters and Separation from Water Resources

There are no existing surface waters within 100 m of the site.

A stormwater detention basin is proposed north of the proposed leach drain area. This will require a setback of 6 m (refer Section 8.16). A setback of ~6 m is currently shown on the information that has been supplied to us.

The LAA will have sufficient separation from water resources.

8.14 Rainfall Run-on and Seepage

The natural clayey soils have a low permeability. Stormwater will follow the natural grade of the site.

The site must be graded to prevent stormwater run-on to the LAA. This can be achieved in the civil design by grading the site away from the LAA and using interception bunds as required.

8.15 Flood Potential

The site is not mapped as being within a flood risk area by the Department of Water (DoW).

8.16 Setbacks

The following horizontal setbacks are applicable.

Table 8: Required Horizontal Setback Distances (AS1547)

Feature	Sub-Type	Horizontal Setback Distance (m)
Treatment tanks to buildings, property boundaries, driveways, paths and other tanks	-	1.2
Trenches, beds and soak wells to boundary, building, tanks and other land application systems	-	1.8
Trenches, beds and soak wells to trafficable areas	-	1.2
Any land application system to wells, streams, private bores or underground source of water intended for human consumption	-	30
Trenches, beds and soak wells to subsoil drains or open drainage channels	-	6.0
Spray irrigation	Boundaries, buildings, driveways etc.	1.8
	Subsoil and open drains	6.0
	Swimming pools	3.0
	Treatment tanks	1.2
Subsurface Drippers	Boundaries, buildings, driveways etc.	0.5
	Subsoil and open drains	3.0
	Swimming pools	2.0
	Garden bore	10.0
On-site waste system to water resources (river, stream etc.)	-	100

All setbacks can be met on the site.

8.17 Land Application Area (LAA)

8.17.1 Government Sewerage Policy

The required minimum Land Application Area (LAA) has been determined in accordance with Schedule 2 of the GSP (2019) using the conversion factors as follows:

Table 9: Conversion Factors used to calculate minimum required LAA (GSP 2019)

Soil Category	Soil Texture	Conversion Factors	
		Primary Treatment	Secondary Treatment
5	Light clays	1.284	0.333

Based on the soil results and other site constraints (very low permeability soils etc.) we recommend secondary treatment (i.e., via ATUs) to minimise the LAA and to control on site risk.

For the estimated hydraulic load of 2,160 L/day, the calculated minimum land application area is 720 m^2 for secondary treatment. Secondary treatment is required on this site due to Category 5 soils being present.

8.17.2 Summary

The below presents a summary of the available and required LAA:

Table 10: Summary of the available and minimum LAA

Item	Section of SSE	Land Application Area (m^2)
GSP (2019) Minimum	Section 8.17.1	720
Area required to meet water balance	Section 8.3.3	276
MINIMUM REQUIRED LAA		720
LAA AS SHOWN ON PLAN		Not defined

Note: The LAA shown above is based on upon hydraulic loading assumptions made in Section 5.2.

9. SOIL ASSESSMENT

9.1 Subsurface Conditions

The typical soil profiles can be described as follows:

TP01 and TP02

- FILL: Clayey SAND (SC): fine to coarse grained, brown, approximately 12-20% low plasticity fines, trace organic fines, trace rootlets, trace gravel of building rubble, dry, typically 200 mm thick; overlying
- Sandy CLAY (CI): medium plasticity, brown becoming pale brown mottled white with depth, with fine to coarse grained sand, with fine to coarse grained gravel, dry, extending to a depth of 1.5 m.

TP03 to TP09 (Including LAA)

- TOPSOIL: Clayey SAND (SC)/Sandy CLAY (CI-CH): fine to coarse grained, brown, with low to medium plasticity fines, trace fine grained gravel, trace organic fines, trace rootlets, typically dry, extending to depths ranging from 0.1 m to 0.2 m; overlying
- Sandy CLAY (CI / CI-CH): medium and high plasticity, brown becoming brown mottled red with depth, with about 40-50% fine to coarse grained sand, trace to with fine to medium grained gravel, dry, extending to the typical investigated depth of 2.5 m.

Notes:
1. A layer of high plasticity Sandy Gravelly CLAY (CH) was noted at location TP08 (approximately 200 mm thick).
2. Test locations TP05-TP07 presented a thin layer (around 100-200 mm thick) of Clayey SAND (SC) underlying the Topsoil layer.

9.2 Soil Category

We have assessed the soil types based on our visual-tactile assessment, laboratory and infiltration testing, in accordance with Table L1 of AS1547. A soil type of Category 5 with a saturated hydraulic conductivity of <0.06 m/day is considered applicable.

9.3 Design Loading Rates

Based on Table L1 of AS1547-2012, the following design loading rates (DLRs) are considered applicable.

Table 11: Design Loading/Irrigation Rates (mm/day)

Soil Category	Indicative permeability (k_{sat}) (m/d)	Trenches and Beds		
		Primary Treated Effluent (Conservative Rate)	Primary Treated Effluent (Maximum Rate)	Secondary Treated Effluent (ATUs/WWTUs)
5	<0.06	-	-	8

Secondary treatment of effluent must be done on this site.

9.4 Soil Chemistry

The results of the soil chemistry testing and the values associated with level of constraint (as outlined in AS1547-2012) are presented in Table 12.

Table 12: Soil Chemistry Summary

Chemical Feature	Test Result	Level of Constraint/Risk (AS1547)		
		Low	Medium	High
pH	9.6-9.7	6-8	4.5-6	<4.5, >8
Electrical Conductivity (dS/m)	0.46-0.58	<0.3	0.3-2	>2
Phosphorus retention index (PRI)[1]	11-19	>20	5-20	<5

Notes: 1. Phosphorus retention index requirements are based on our interpretation of The Department of Primary Industries and Regional Development Standards for Land Resource Mapping (2005), as this is not specified in AS1547.

The results indicate a medium to high risk on the basis of pH, and phosphorus retention. Elevated pH and electrical conductivities are seen to increase the risk of a soil being erodible or dispersive. This is supported by the Emerson class testing which indicated an emerson class test of 2 (somewhat dispersive).

We consider that this risk is mitigated where the LAA:

- is relatively flat;
- has no embankments/batters etc; and
- is bunded or otherwise designed to prevent rainfall run-on and run-off.

We do not consider that any modification to the site soils will be required to mitigate the risks presented by the soil chemistry.

10. SITE AND SOIL ASSESSMENT RESULTS

A risk-based assessment has been carried out in accordance with AS1547-2012 and is presented below. This assessment is based on the information presented in Sections 8 and 9.

Table 13: Site and Soil Risk Based Assessment (AS1547)

Characteristic	Level of Constraint	Mitigation Measures
Climate	High	System must be designed to consider water balance. Refer to Section 8.3.3.
Exposure	Low	-
Vegetation	Low	Encourage other plant growth to promote nutrient uptake.
Landform & Drainage	Low	-
Slope	Low	Site is flat.
Fill (Imported)	Low	-
Surface Gravel and Rock Outcrops	Low	-
Erosion Potential	Low	-
Separation from Groundwater	Low	No groundwater encountered. Surface water (stormwater) must be diverted away from LAA.
PDWSAs and SSAs	Nil	-
Surface Water	Low	Site must grade to drainage areas away from LAA. LAA must be 6 m from proposed drainage basin.

Characteristic	Level of Constraint	Mitigation Measures
Rainfall Run-on	Low to Moderate	Need for diversion of stormwater from LAA
Flood Potential	Low	The site is not identified as being within a recognised floodplain
Setbacks	Low	Refer Section 8.16
Available LAA	Low	Site is large rural area
Sufficient Profile Depth	Low	-
Depth to water table	Low	Groundwater not encountered within 2.5 at end of winter 2023.
Coarse Fragments	Low	n/a
Soil Colour & Mottling	Low	-
Soil Permeability and Design Loading Rates	High	Soil has very low permeability (0.01 m/day). An ATU should be used.
pH	Moderate-High	pH is high, see Section 9.4 Site has overall low erosion/dispersion risk.
Electrical Conductivity	Moderate	EC is moderate, see Section 9.4.
Phosphorus Adsorption	Moderate	Phosphorus adsorption is moderate, see Section 9.4.

We consider that all of the constraints at the site can be appropriately mitigated at the site using the risk-based approach outlined in AS1547-2012.

11. SITE SUITABILITY AND RECOMMENDATIONS

We consider that the site is suitable for disposal of wastewater. Disposal via beds/trenches (i.e., leach drains) is appropriate provided that:

- An aerobic treatment unit (ATU) is mitigated to reduce the risks associated with very low permeability soils.
- We recommend inverting of leach drains to reduce the depth of disposal.
- The required setbacks are met on site for the proposed LAA.
- Stormwater run-on and run-off are controlled in the civil design using grading and interception bunds.
- The LAA must be 6 m from the proposed drainage basin.

Land Application Area

A minimum land application area (LAA) of 720 m^2 is required. Some reconfiguration of the site will be required to facilitate this LAA with the additional infrastructure proposed, but this area appears to be available.

Treatment System

The treatment systems must be designed and installed in accordance with AS1547-2012 and the Department of Health Regulations. Department of Health approved disposal and treatment systems must be used.

The location of the treatment and disposal systems must meet the setback requirements as outlined in Section 8.16.

12. CLOSURE

We draw your attention to Appendix G of this report, "Understanding your Report". The information provided within is intended to inform you as to what your realistic expectations of this report should be. This information is provided not to reduce the level of responsibility accepted by Galt, but to ensure that all parties who rely on this report are aware of the responsibilities each assumes in so doing.

GALT GEOTECHNICS PTY LTD

Sean Coffey CPEng
Geotechnical Engineer

https://galtgeo.sharepoint.com/sites/WAG230373/Shared Documents/01 CBH SI Great Northern Hwy Miling/03 Correspondence/WAG230373-01 003 R Rev0.docx

Figures

Legend

Site Boundary

Test Pit

Test Pit / Constant Head Permeameter Test

N

0 8 16 24 32 40

Meters

NOTES

Aerial Imagery and Cadastre sourced from Landgate/SLIP

SCALE	1:500	(A3)
DRAWN	DAC	
DATE DRAWN	3/8/2023	
CHECKED	_	
DATE CHECKED	_	
PROJECTION	GDA 1994 MGA Zone 50	

Galt GEOTECHNICS

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Address : 50 Edward Street
Osborne Park WA 6017

CLIENT	COOPERATIVE BULK HANDLING (CBH) LTD
PROJECT	PROPOSED ACCOMMODATION SITE
LOCATION	PART OF LOT 80 GREAT NORTHERN HIGHWAY MILING
TITLE	SITE & LOCATION PLAN
Job No	WAG230373-01
Fig No	FIGURE 1
Rev	A

Appendix A: Site Photographs

www.galtgeo.com.au
50 Edward Street OSBORNE PARK WA 6017

ABN: 64 625 054 729

Photograph 1: Facing west from near test pit location TP08.

Photograph 2: Facing west from near location TP04

Photograph 3: Facing east from near location TP01.

Photograph 4: Facing south from near location TP04.

Photograph 5: Facing south from near location P03

Appendix B: Test Pit Reports

METHOD OF SOIL DESCRIPTION
BOREHOLE AND TEST PIT REPORTS

GRAPHIC LOG & SOIL CLASSIFICATION SYMBOLS

Graphic	USCS	Soil Name
		FILL (various types)
		COBBLES / BOULDERS
	GP	GRAVEL (poorly graded)
	GW	GRAVEL (well graded)
	GC	Clayey GRAVEL
	GM	Silty GRAVEL
	SP	SAND (poorly graded)
	SW	SAND (well graded)
	SC	Clayey SAND

Graphic	USCS	Soil Name
	SM	Silty SAND
	ML	SILT (low liquid limit)
	MH	SILT (high liquid limit)
	CL	CLAY (low plasticity)
	CI	CLAY (medium plasticity)
	CH	CLAY (high plasticity)
	OL	Organic SILT (low liquid limit)
	OH	Organic SILT (high liquid limit)
	Pt	PEAT

NOTE: Dual classification given for soils with a fines content between 5% and 12%.

SOIL CLASSIFICATION AND INFERRED STRATIGRAPHY

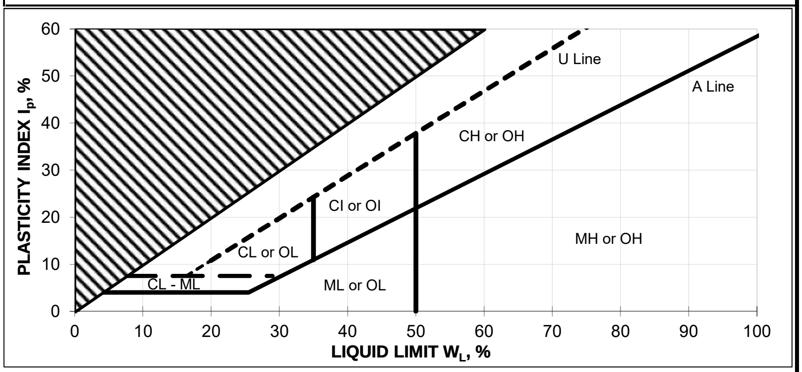
Soil descriptions are based on AS1726-2017. Material properties are assessed in the field by visual/tactile methods in combination with field and laboratory testing techniques (where used).

NOTE: AS 1726-2017 defines a fine grained soil where the total dry mass of fine fractions (<0.075 mm particle size) exceeds 35%.

PARTICLE SIZE

Soil Name		Particle Size (mm)
BOULDERS		>200
COBBLES		63 to 200
GRAVEL	Coarse	19 to 63
	Medium	6.7 to 19
	Fine	2.3 to 6.7
SAND	Coarse	0.6 to 2.36
	Medium	0.21 to 0.6
	Fine	0.075 to 0.21
FINES	SILT	0.002 to 0.075
	CLAY	<0.002

PLASTICITY - MODIFIED CASAGRANDE CHART - AS1726-2017



RESISTANCE TO EXCAVATION

Symbol	Term	Description
VE	Very easy	All resistances are relative to the selected method of excavation
E	Easy	
F	Firm	
H	Hard	
VH	Very hard	

MOISTURE CONDITION

Symbol	Term
D	Dry
M	Moist
W	Wet

CEMENTATION

Cementation	Description
Weakly cemented	Soil may be easily disaggregated by hand in air or water
Moderately cemented	Effort is required to disaggregate the soil by hand in air or water

CONSISTENCY

Symbol	Term	Undrained Shear Strength (kPa)
VS	Very Soft	0 to 12
S	Soft	12 to 25
F	Firm	25 to 50
St	Stiff	50 to 100
VSt	Very Stiff	100 to 200
H	Hard	>200

ORGANIC SOILS

Material	Organic Content % of dry mass
Inorganic soil	<2%
Organic soil	2% to 25%
Peat	>25%

DENSITY

Symbol	Term	Density Index (%)
VL	Very Loose	<15
L	Loose	15 to 35
MD	Medium Dense	35 to 65
D	Dense	65 to 85
VD	Very Dense	>85

EXPLANATORY NOTES TO BE READ WITH BOREHOLE AND TEST PIT REPORTS

METHOD OF DRILLING OR EXCAVATION

AC	Air Core	E	Excavator	PQ3	PQ3 Core Barrel
AD/T	Auger Drilling with TC-Bit	EH	Excavator with Hammer	PT	Push Tube
AD/V	Auger Drilling with V-Bit	HA	Hand Auger	R	Ripper
AT	Air Track	HMLC	HMLC Core Barrel	RR	Rock Roller
B	Bulldozer Blade	HQ3	HQ3 Core Barrel	SON	Sonic Rig
BH	Backhoe Bucket	N	Natural Exposure	SPT	Driven SPT
CT	Cable Tool	NMLC	NMLC Core Barrel	WB	Washbore
DT	Diatube	PP	Push Probe	X	Existing Excavation

SUPPORT

T	Timbering

PENETRATION EFFORT (RELATIVE TO THE EQUIPMENT USED)

VE	Very Easy	E	Easy	F	Firm
H	Hard	VH	Very Hard		

WATER

►	Water Inflow	▼	Water Level
◄	Water Loss (complete)		
◁	Water Loss (partial)		

SAMPLING AND TESTING

B	Bulk Disturbed Sample	P	Piston Sample
BLK	Block Sample	PBT	Plate Bearing Test
C	Core Sample	U	Undisturbed Push-in Sample
CBR	CBR Mould Sample		U50: 50 mm diameter
D	Small Disturbed Sample	SPT	Standard Penetration Test
ES	Environmental Soil Sample		Example: 3, 4, 5 N=9
EW	Environmental Water Sample		3,4,5: Blows per 150 mm
G	Gas Sample		N=9: Blows per 300 mm after
HP	Hand Penetrometer		150 mm seating interval
LB	Large Bulk Disturbed Sample	VS	Vane Shear; P = Peak
M	Mazier Type Sample		R = Remoulded (kPa)
MC	Moisture Content Sample	W	Water Sample

ROCK CORE RECOVERY

TCR = Total Core Recovery (%) $= \frac{CRL}{TCL} \times 100$

RQD = Rock Quality Designation (%) $= \frac{ALC>100}{TCL} \times 100$

TCL	Length of Core Run
CRL	Length of Core Recovered
ALC>100	Total Length of Axial Lengths of Core Greater than 100 mm Long

REPORT OF TESTPIT: TP01

Job No	: WAG230373	Easting	: 438656.7	Sheet	: 1 OF 1
Client	: CBH	Northing	: 6626306.1	Logged	: Alex Mathew
Project	: Proposed Accommodation Site	UTM	: 50J	Logged Date	: 14/08/2023
Location	: 18201 Great Northern Highway, Miling	Drill Rig	:	Checked	: SC
Contractor	: ANH Contracting	Inclination	: -90 deg	Checked Date	: 22/08/2023

Excavator Attachment	Excavation Resistance	DCP graph	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Consistency/Density	Remarks	Sample
450mm toothed bucket		2, 2		Fill		SC	Fill clayey SAND: low plasticity clay, brown, fine to coarse grained, trace fine to coarse sized gravel, (trace organic fines, trace rootlets, approximately 12-20% fines).	D			
		3, 4, 4, 5, 4, 4	0.2	Natural		CI	Natural sandy CLAY: medium plasticity, brown, fine to coarse grained sand, with fine sized gravel, inorganic, (approximately 45-55% sand).				
		5, 6	0.8	Natural		CI	As above, pale brown mottled white.				
			1								
							TP01 Terminated at 1.5 m (Target Depth. Groundwater not encountered)				

REPORT OF TESTPIT: TP02

Job No	: WAG230373	Easting	: 438636.7
Client	: CBH	Northing	: 6626314.8
Project	: Proposed Accommodation Site	UTM	: 50J
Location	: 18201 Great Northern Highway, Miling	Drill Rig	:
Contractor	: ANH Contracting	Inclination	: -90 deg

Sheet	: 1 OF 1
Logged	: Alex Mathew
Logged Date	: 14/08/2023
Checked	: SC
Checked Date	: 22/08/2023

Excavator Attachment	Excavation Resistance	DCP graph	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Consistency/Density	Remarks	Sample
450mm toothed bucket		3, 2		Fill		SC	Fill clayey SAND: low to medium plasticity clay, brown, fine to coarse grained, with fine sized gravel, (trace organic fines, trace rootlets, trace building rubble (pavers, plastic), approximately 12-20% fines.).	D			
		6, 6, 8, 10, 13+ R	0.2	Natural		CI	Natural sandy CLAY: medium plasticity, brown, fine to coarse grained sand, with fine sized gravel, inorganic, (approximately 45-55% sand).				
			0.9	Natural		CI	As above, pale brown mottled white.				
			1								

TP02 Terminated at 1.5 m (Target Depth. Groundwater not encountered.)

REPORT OF TESTPIT: TP03

Job No	: WAG230373	Easting	: 438624.6	Sheet	: 1 OF 1
Client	: CBH	Northing	: 6626292.6	Logged	: Alex Mathew
Project	: Proposed Accommodation Site	UTM	: 50J	Logged Date	: 14/08/2023
Location	: 18201 Great Northern Highway, Miling	Drill Rig	:	Checked	: SC
Contractor	: ANH Contracting	Inclination	: -90 deg	Checked Date	: 22/08/2023

Excavator Attachment	Excavation Resistance	DCP graph	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Consistency/Density	Remarks	Sample
450mm toothed bucket		2, 3	0.0–0.2	Topsoil		SC	Topsoil clayey SAND: low plasticity clay, brown, fine to coarse grained, with fine sized gravel, (trace rootlets, trace organic fines, approximately 12-15% fines.).	D			
		5, 6, 5, 7, 7	0.2–0.7	Natural		CI-CH	Natural sandy CLAY: medium to high plasticity, brown, fine to coarse grained sand, with fine sized gravel, inorganic, (approximately 40-50% sand).				
		6, 8, 10+ R	0.7–1.5	Natural		CI-CH	As above, trace fine to coarse sized gravel.				
			1.5				**TP03 Terminated at 1.5 m (Target Depth. Groundwater not encountered.)**				

REPORT OF TESTPIT: TP04

Job No	: WAG230373	Easting	: 438603.5	Sheet	: 1 OF 1
Client	: CBH	Northing	: 6626296.1	Logged	: Alex Mathew
Project	: Proposed Accommodation Site	UTM	: 50J	Logged Date	: 14/08/2023
Location	: 18201 Great Northern Highway, Miling	Drill Rig	:	Checked	: SC
Contractor	: ANH Contracting	Inclination	: -90 deg	Checked Date	: 22/08/2023

Excavator Attachment	Excavation Resistance	DCP graph	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Consistency/Density	Remarks	Sample
450mm toothed bucket		3, 5	0 – 0.15	Topsoil		CI	Topsoil sandy CLAY: medium plasticity, dark brown, fine to coarse grained sand, trace fine sized gravel, (trace organic fines, trace rootlets).	D			
		6, 10, 11, 12+ R	0.15 – 0.7	Natural		CI	Natural sandy CLAY: medium plasticity, brown, fine to coarse grained sand, with fine to coarse sized gravel, (approximately 50-60% sand).				
			0.7 – 1.5	Natural		CI	As above, brown mottled white.				
			1.5 – 2	Natural		CI	As above, with fine to medium sized gravel, (approximately 45-55% sand).				
			2 – 2.5	Natural		CI	As above, (moderately cemented).				
							TP04 refusal at 2.5 m (Slow excavation. Groundwater not encountered)				

REPORT OF TESTPIT: TP05

Job No	: WAG230373	Easting	: 438597.7	Sheet	: 1 OF 1
Client	: CBH	Northing	: 6626319.2	Logged	: Alex Mathew
Project	: Proposed Accommodation Site	UTM	: 50J	Logged Date	: 14/08/2023
Location	: 18201 Great Northern Highway, Miling	Drill Rig	:	Checked	: SC
Contractor	: ANH Contracting	Inclination	: -90 deg	Checked Date	: 22/08/2023

Excavator Attachment	Excavation Resistance	DCP graph	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Consistency/Density	Remarks	Sample
450mm toothed bucket		5	0.1	Topsoil		SC	Topsoil clayey SAND: low to medium plasticity clay, brown, fine to coarse grained, trace fine sized gravel, (trace organic fines, trace rootlets).	D			
		4	0.2	Natural		SC	Natural clayey SAND: low plasticity clay, brown, fine to coarse grained, trace fine sized gravel.				
		3, 5, 5, 5, 7, 9, 13+ R	1	Natural		CI	Natural sandy CLAY: medium plasticity, brown, fine to coarse grained sand, trace fine sized gravel, inorganic, (approximately 45-55% sand).				
			1.5	Natural		CI	As above, brown mottled white, with fine to coarse sized gravel, (includes moderately cemented zones).				
				Natural		CI	As above, brown mottled pale red, inorganic, (approximately 40-50% sand).				
							TP05 refusal at 1.75 m (Slow excavation. Groundwater not encountered.)				

REPORT OF TESTPIT: TP06

Job No : WAG230373	Easting : 438576.6	Sheet : 1 OF 1	
Client : CBH	Northing : 6626319.0	Logged : Alex Mathew	
Project : Proposed Accommodation Site	UTM : 50J	Logged Date : 14/08/2023	
Location : 18201 Great Northern Highway, Miling	Drill Rig :	Checked : SC	
Contractor : ANH Contracting	Inclination : -90 deg	Checked Date : 22/08/2023	

Excavator Attachment	Excavation Resistance	DCP graph	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Consistency/Density	Remarks	Sample
450mm toothed bucket		2	0.1	Topsoil		SC	Topsoil clayey SAND: low to medium plasticity clay, brown, fine to coarse grained, trace fine sized gravel, (trace organic fines, trace rootlets).	D			
		6	0.2	Natural		SC	Natural clayey SAND: low plasticity clay, brown, fine to coarse grained, trace fine to medium sized gravel, (approximately 25-35% fines).				
		5, 4, 6, 6, 6, 6, 6, 8	1	Natural		CI	Natural sandy CLAY: medium plasticity, brown, fine to coarse grained sand, with fine to coarse sized gravel, (approximately 45-55% sand).				
			2	Natural		CI	As above, brown mottled red, trace fine sized gravel, inorganic, (moderately cemented, approximately 35-45% sand).				
							TP06 refusal at 2.5 m (Slow excavation. Groundwater not encountered)				

REPORT OF TESTPIT: TP07

Job No	: WAG230373	Easting	: 438594.7	Sheet	: 1 OF 1
Client	: CBH	Northing	: 6626342.2	Logged	: Alex Mathew
Project	: Proposed Accommodation Site	UTM	: 50J	Logged Date	: 14/08/2023
Location	: 18201 Great Northern Highway, Miling	Drill Rig	:	Checked	: SC
Contractor	: ANH Contracting	Inclination	: -90 deg	Checked Date	: 22/08/2023

Excavator Attachment	Excavation Resistance	DCP graph	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Consistency/Density	Remarks	Sample
450mm toothed bucket		4		Topsoil		SC	Topsoil clayey SAND: low plasticity clay, brown, fine to coarse grained, trace fine to medium sized gravel, (trace organic fines, trace rootlets).	D			
		4, 6	0.1	Natural		SC	Natural clayey SAND: low plasticity clay, brown, fine to coarse grained, trace fine to medium sized gravel, (approximately 20-30% fines).				
		6, 6, 7, 11, 15+ R	0.3	Natural		CI	Natural sandy CLAY: medium plasticity, brown, fine to coarse grained sand, with fine to medium sized gravel, (approximately 45-55% sand).				
			1.3	Natural		CI	Natural sandy to gravelly CLAY: medium plasticity, brown, fine sized gravel, fine to coarse grained sand, inorganic, (approximately 40-50% sand, trace cobble-sized material).				
							TP07 Terminated at 1.5 m (Target Depth. Groundwater not encountered)				

REPORT OF TESTPIT: TP08

Job No	: WAG230373	Easting	: 438567.1	Sheet	: 1 OF 1
Client	: CBH	Northing	: 6626330.4	Logged	: Alex Mathew
Project	: Proposed Accommodation Site	UTM	: 50J	Logged Date	: 14/08/2023
Location	: 18201 Great Northern Highway, Miling	Drill Rig	:	Checked	: SC
Contractor	: ANH Contracting	Inclination	: -90 deg	Checked Date	: 22/08/2023

Excavator Attachment	Excavation Resistance	DCP graph	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Consistency/Density	Remarks	Sample
450mm toothed bucket				Topsoil		CI	Topsoil sandy CLAY: medium plasticity, brown, fine to coarse grained sand, trace fine sized gravel, (trace organic fines, trace rootlets).	D			
			0.1	Natural		CI	Natural sandy CLAY: medium plasticity, dark brown, fine to coarse grained sand, trace fine to medium sized gravel, inorganic, (approximately 45-55% sand).				
			0.3	Natural		CH	Natural sandy to gravelly CLAY: high plasticity, brown mottled red, fine to medium sized gravel, fine to coarse grained sand, inorganic, (approximately 30-40% gravel, 25-35% sand).				
			0.7	Natural		CI	Natural sandy CLAY: medium plasticity, orange brown mottled white, fine to coarse grained sand, trace fine sized gravel, inorganic, (approximately 45-55% sand).				
			1								

TP08 Terminated at 1.75 m (Target Depth. Groundwater not encountered.)

REPORT OF TESTPIT: TP09

Job No	: WAG230373	Easting	: 438565.0	Sheet	: 1 OF 1
Client	: CBH	Northing	: 6626314.7	Logged	: AM
Project	: Proposed Accommodation Site	UTM	:	Logged Date	: 31/07/2023
Location	: 18201 Great Northern Highway, Miling	Drill Rig	:	Checked	: SC
Contractor	: ANH Contracting	Inclination	: -90 deg	Checked Date	: 22/08/2023

Excavator Attachment	Excavation Resistance	DCP graph	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Consistency/Density	Remarks	Sample
				Topsoil		SC	Topsoil clayey SAND: low to medium plasticity clay, brown, fine to medium grained, trace fine to medium sized gravel, (trace organic fines, trace rootlets, approximately 12-20% fines).	D			
			0.2	Natural		CI	Natural sandy CLAY: medium plasticity, brown, fine to coarse grained sand, trace fine sized gravel, inorganic, (approximately 45-55% sand).				
			0.8	Natural		CI	As above, brown mottled red.				
			1								
							TP09 Terminated at 1.5 m (Target Depth. Groundwater not encountered.)				

Appendix C: Constant Head Permeameter Test Results

Hydraulic Conductivity Calculation - Constant Head by Permeameter

Galt Geotechnics

Spreadsheet author:		

REFERENCE: AS1547-2012, "On-site domestic wastewater management" - Appendix G

Job No:	WAG230373-01
Client:	CBH
Project:	Proposed Accommodation Site
Location:	18201 Great Northern Hwy, Miling
Test Name	P01

$$K = \frac{4.4Q[0.5\ \sinh^{-1}\left(\frac{H}{2r}\right) - \sqrt{\left(\frac{r}{H}\right)^2 + 0.25} + \frac{r}{H}]}{2\,\pi H^2}$$

Spreadsheet Legend

	Required input
	Calculated field
	Comment field
	Field not used
	Fixed field

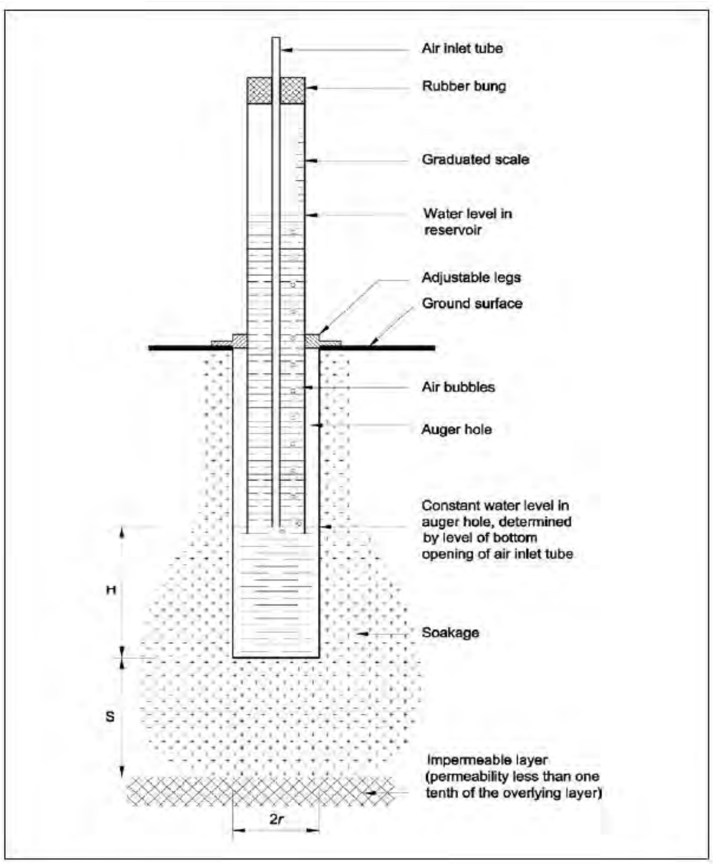
Parameter	Description	Value	Units
K_{sat}	Saturated hydraulic conductivity		cm/min
D	Depth of auger hole	53	cm
H	Head of water above base	31	cm
r	Radius of auger hole	7.6	cm
S	Depth to impermeable stratum		cm
Reservoir	Chosen Guelph reservoir (inner or outer)	**Outer**	
Area	Area of chosen reservoir	36.3	cm^2
F	Reading of water level in reservoir		cm

Test Results

Time (min)	F (cm)	ΔF (cm)	ΔF (cm)/min
0	19		
5.5	18.6	0.40	0.07
6	18.6	0.00	0.00
9	18.4	0.20	0.07
11	18.4	0.00	0.00
12	18.4	0.00	0.00
14	18.2	0.20	0.10
15	18.2	0.00	0.00
16	18.2	0.00	0.00
17	18.2	0.00	0.00
19	18	0.20	0.10
20	18	0.00	0.00
21	17.9	0.10	0.10
AVERAGE - LAST 5 READINGS			0.04

Calculation

Steady State Flow	0.04	cm/min
Flow from reservoir (Q)	1.45	cm^3/min
K_{sat}	0.000	cm/min
K_{sat}	7.387E-08	m/s
K_{sat}	**0.01**	**m/day**



where:
H = depth of water in test hole
S = the depth to an underlying impermeable layer
r = radius of the test hole

Hydraulic Conductivity Calculation - Constant Head by Permeameter

Galt Geotechnics

Spreadsheet author:

REFERENCE: AS1547-2012, "On-site domestic wastewater management" - Appendix G

Job No:	WAG230373-01
Client:	CBH
Project:	Proposed Accommodation Site
Location:	18201 Great Northern Hwy, Miling
Test Name	P02

$$K = \frac{4.4Q\left[0.5\ \sinh^{-1}\left(\frac{H}{2r}\right) - \sqrt{\left(\frac{r}{H}\right)^2 + 0.25} + \frac{r}{H}\right]}{2\,\pi H^2}$$

Spreadsheet Legend

	Required input
	Calculated field
	Comment field
	Field not used
	Fixed field

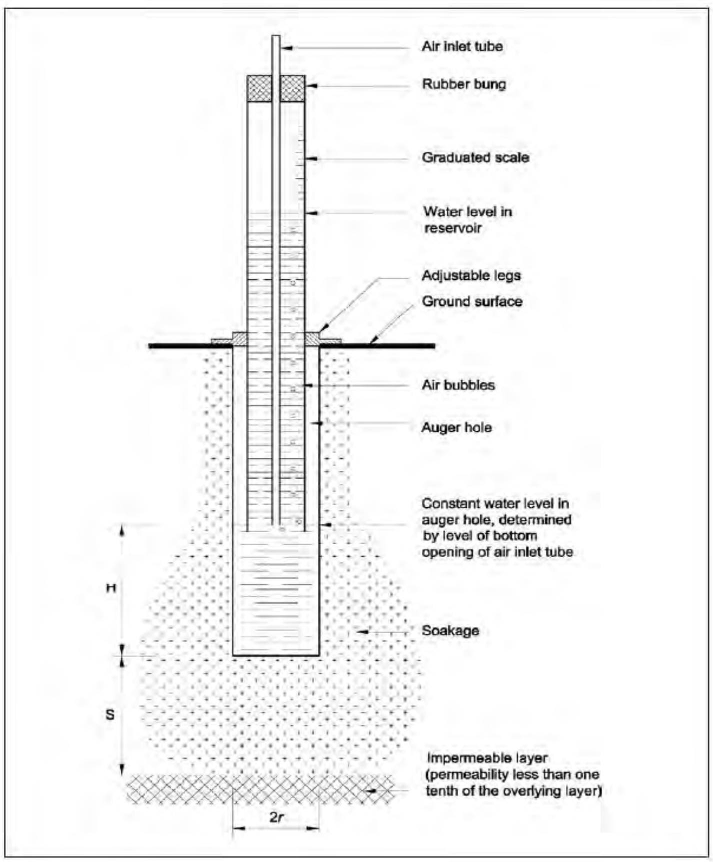
Parameter	Description	Value	Units
K_{sat}	Saturated hydraulic conductivity		cm/min
D	Depth of auger hole	50	cm
H	Head of water above base	26.2	cm
r	Radius of auger hole	4.5	cm
S	Depth to impermeable stratum		cm
Reservoir	Chosen Guelph reservoir (inner or outer)	**Outer**	
Area	Area of chosen reservoir	36.3	cm^2
F	Reading of water level in reservoir		cm

Test Results

Time (min)	F (cm)	ΔF (cm)	ΔF (cm)/min
0	24		
3	23.8	0.20	0.07
4.5	23.8	0.00	0.00
9.5	23.4	0.40	0.08
13	23.2	0.20	0.06
14.5	23.2	0.00	0.00
16	23	0.20	0.13
18.5	23	0.00	0.00
20	22.8	0.20	0.13
21	22.8	0.00	0.00
23	22.8	0.00	0.00
24	22.6	0.20	0.20
25	22.6	0.00	0.00
26	22.6	0.00	0.00
AVERAGE - LAST 5 READINGS			0.04

Calculation

Steady State Flow	0.04	cm/min
Flow from reservoir (Q)	1.45	cm^3/min
K_{sat}	0.001	cm/min
K_{sat}	1.328E-07	m/s
K_{sat}	**0.01**	**m/day**



where:
H = depth of water in test hole
S = the depth to an underlying impermeable layer
r = radius of the test hole

Hydraulic Conductivity Calculation - Constant Head by Permeameter

Galt Geotechnics

Spreadsheet author:

REFERENCE: AS1547-2012, "On-site domestic wastewater management" - Appendix G

Job No:	WAG230373-01
Client:	CBH
Project:	Proposed Accommodation Site
Location:	18201 Great Northern Hwy, Miling
Test Name	P03

$$K = \frac{4.4Q[0.5\ \sinh^{-1}\left(\frac{H}{2r}\right) - \sqrt{\left(\frac{r}{H}\right)^2 + 0.25} + \frac{r}{H}]}{2\,\pi H^2}$$

Spreadsheet Legend

	Required input
	Calculated field
	Comment field
	Field not used
	Fixed field

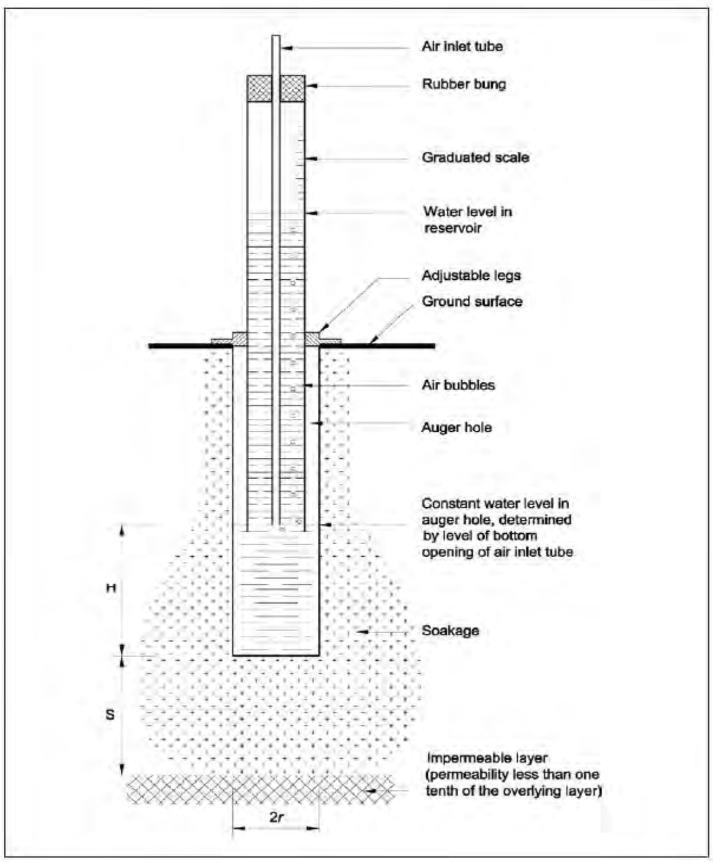
Parameter	Description	Value	Units
K_{sat}	Saturated hydraulic conductivity		cm/min
D	Depth of auger hole	63	cm
H	Head of water above base	35	cm
r	Radius of auger hole	8	cm
S	Depth to impermeable stratum		cm
Reservoir	Chosen Guelph reservoir (inner or outer)	**Outer**	
Area	Area of chosen reservoir	36.3	cm^2
F	Reading of water level in reservoir		cm

Test Results

Time (min)	F (cm)	ΔF (cm)	ΔF (cm)/min
0	28.6		
0.5	28.6	0.00	0.00
1	28.6	0.00	0.00
1.5	28.6	0.00	0.00
2	28.6	0.00	0.00
5	28.4	0.20	0.07
11	28.2	0.20	0.03
14	28.2	0.00	0.00
19	28.1	0.10	0.02
21	28	0.10	0.05
22	27.9	0.10	0.10
23	27.9	0.00	0.00
24	27.8	0.10	0.10
AVERAGE - LAST 5 READINGS			0.05

Calculation

Steady State Flow	0.05	cm/min
Flow from reservoir (Q)	1.96	cm^3/min
K_{sat}	0.000	cm/min
K_{sat}	8.237E-08	m/s
K_{sat}	**0.01**	**m/day**



where:
H = depth of water in test hole
S = the depth to an underlying impermeable layer
r = radius of the test hole

Appendix D: Laboratory Test Results - Geotechnical

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50 Edward Street OSBORNE PARK WA 6017
ABN: 64 625 054 729

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

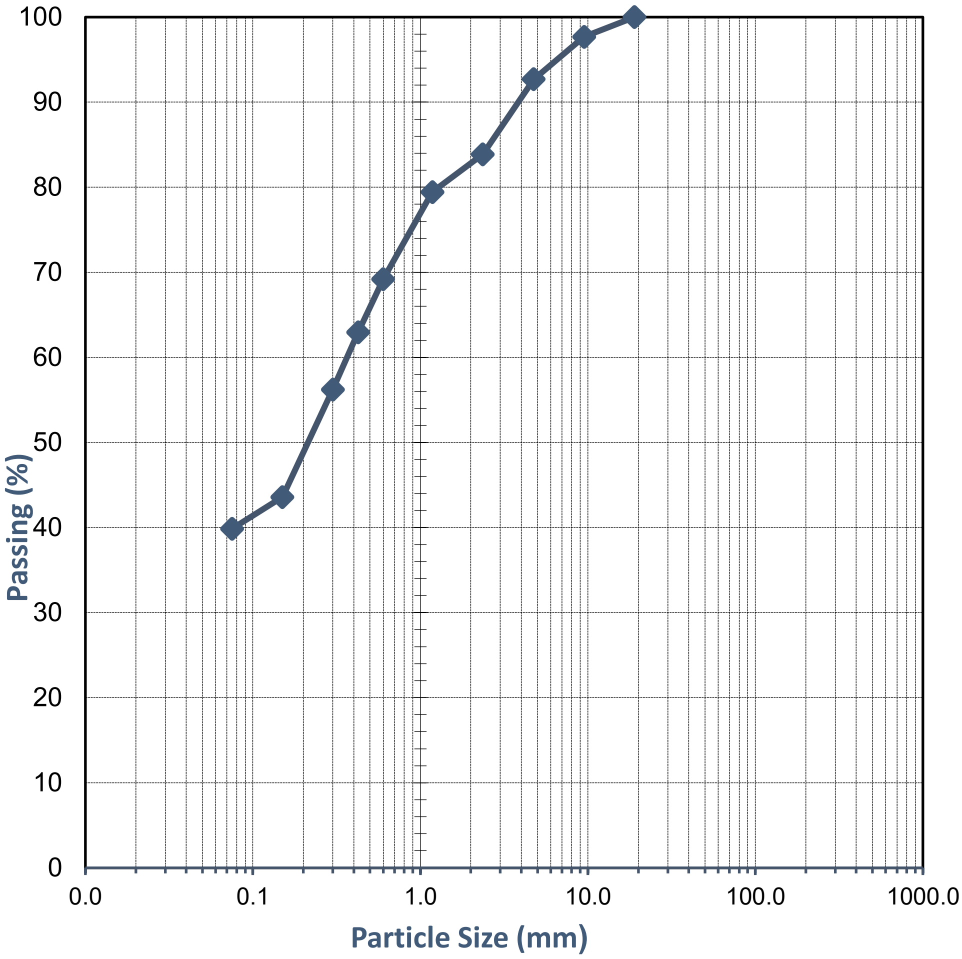
TEST REPORT - AS 1289.3.6.1

Client:	Cooperative Bulk Handling (CBH)	*Ticket No.*	S10545
Client Address:	-	*Report No.*	WG23.12011_1_PSD
Project:	Proposed Accomodation Site	*Sample No.*	WG23.12011
Location:	Part Lot 80, Great Northern Highway, Miling	*Date Sampled:*	Not Specified
Sample Identification:	TP03 0.4-0.7m	*Date Tested:*	07/08 - 08/08/2023

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	100
9.5	98
4.75	93
2.36	84
1.18	79
0.600	69
0.425	63
0.300	56
0.150	44
0.075	40



Comments:

Approved Signatory:

Name: Cody O'Neill

Date: 08/August/2023

NATA WORLD RECOGNISED ACCREDITATION

Accreditation No. 20599

Accredited for compliance with ISO/IEC 17025 - Testing

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Cooperative Bulk Handling (CBH)	*Ticket No.*	S10545
Client Address:	-	*Report No.*	WG23.12011_1_PI
Project:	Proposed Accomodation Site	*Sample No.*	WG23.12011
Location:	Part Lot 80, Great Northern Highway, Miling	*Date Sampled:*	Not Specified
Sample Identification:	TP03 0.4-0.7m	*Date Tested:*	8/08/2023

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50^{o}C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**50**
AS 1289.3.2.1	**Plastic Limit (%)**	**18**
AS 1289.3.3.1	**Plasticity Index (%)**	**32**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**13.5**

AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**Cracked, Curled**

Comments:

Approved Signatory:

Name: Cody O'Neill

Date: 09/August/2023

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Accreditation No. 20599

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SOIL | AGGREGATE | CONCRETE | CRUSHING

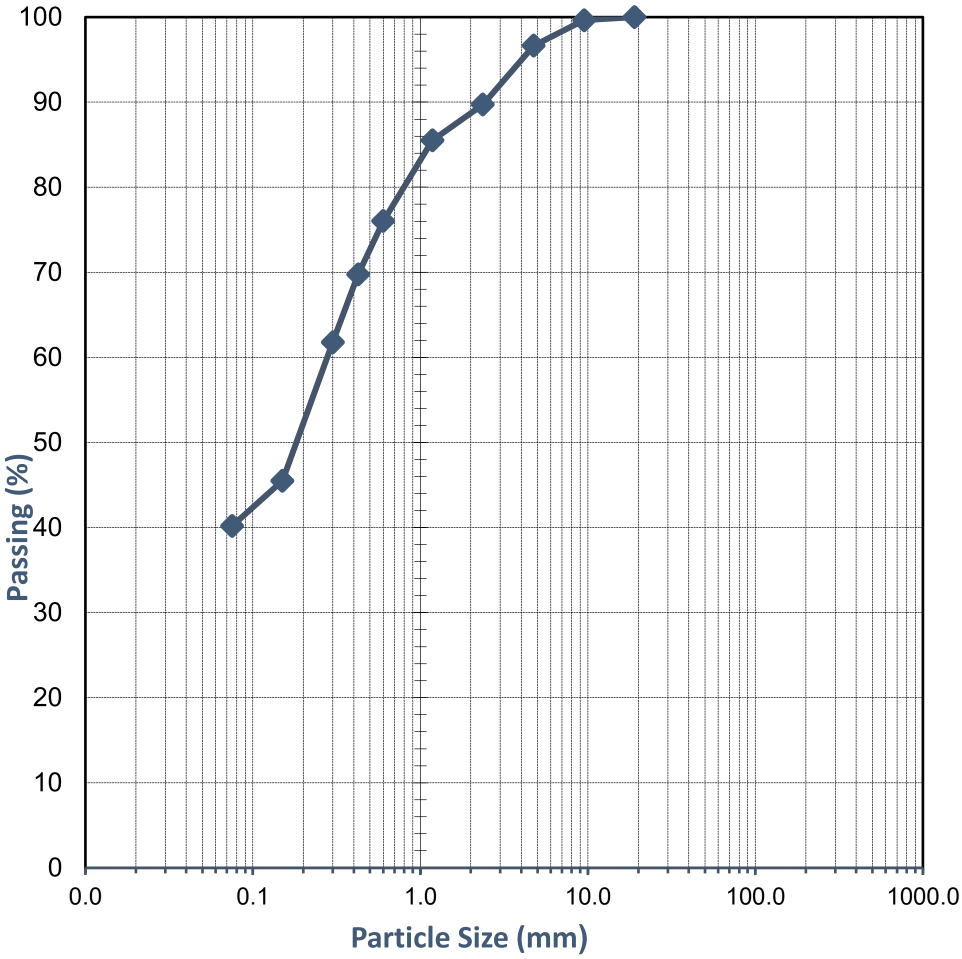
TEST REPORT - AS 1289.3.6.1

Client:	Cooperative Bulk Handling (CBH)	*Ticket No.*	S10545
Client Address:	-	*Report No.*	WG23.12012_1_PSD
Project:	Proposed Accomodation Site	*Sample No.*	WG23.12012
Location:	Part Lot 80, Great Northern Highway, Miling	*Date Sampled:*	Not Specified
Sample Identification:	TP05 1.0-1.3m	*Date Tested:*	07/08 - 08/08/2023

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	100
9.5	100
4.75	97
2.36	90
1.18	86
0.600	76
0.425	70
0.300	62
0.150	46
0.075	40



Comments:

Approved Signatory:

Name: Cody O'Neill

Date: 08/August/2023

NATA

Accreditation No. 20599

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TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Cooperative Bulk Handling (CBH)	*Ticket No.*	S10545
Client Address:	-	*Report No.*	WG23.12012_1_PI
Project:	Proposed Accomodation Site	*Sample No.*	WG23.12012
Location:	Part Lot 80, Great Northern Highway, Miling	*Date Sampled:*	Not Specified
Sample Identification:	TP05 1.0-1.3m	*Date Tested:*	8/08/2023

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50°C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**44**
AS 1289.3.2.1	**Plastic Limit (%)**	**16**
AS 1289.3.3.1	**Plasticity Index (%)**	**28**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**11.0**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**Cracked, Curled**

Comments:

Approved Signatory:

Name: Cody O'Neill

Date: 09/August/2023

Accreditation No. 20599
Accredited for compliance
with ISO/IEC 17025 - Testing

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

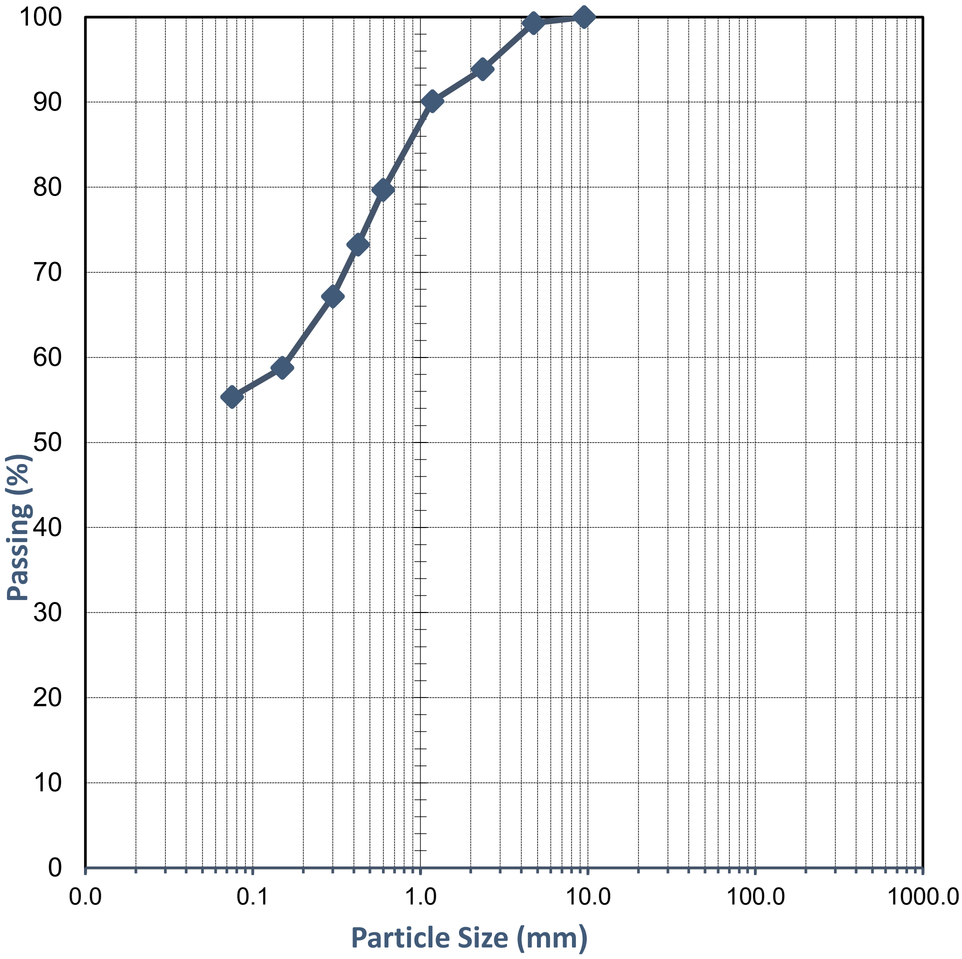
TEST REPORT - AS 1289.3.6.1

Client:	Cooperative Bulk Handling (CBH)	*Ticket No.*	S10545
Client Address:	-	*Report No.*	WG23.12013_1_PSD
Project:	Proposed Accomodation Site	*Sample No.*	WG23.12013
Location:	Part Lot 80, Great Northern Highway, Miling	*Date Sampled:*	Not Specified
Sample Identification:	TP06 2.2-2.5m	*Date Tested:*	07/08 - 08/08/2023

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	
9.5	100
4.75	99
2.36	94
1.18	90
0.600	80
0.425	73
0.300	67
0.150	59
0.075	55



Comments:

Approved Signatory:

Name: Cody O'Neill

Date: 08/August/2023

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Cooperative Bulk Handling (CBH)	*Ticket No.*	S10545
Client Address:	-	*Report No.*	WG23.12013_1_PI
Project:	Proposed Accomodation Site	*Sample No.*	WG23.12013
Location:	Part Lot 80, Great Northern Highway, Miling	*Date Sampled:*	Not Specified
Sample Identification:	TP06 2.2-2.5m	*Date Tested:*	8/08/2023

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50^{o}C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**47**
AS 1289.3.2.1	**Plastic Limit (%)**	**18**
AS 1289.3.3.1	**Plasticity Index (%)**	**29**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**11.5**

AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**Curled**

Comments:

Approved Signatory:

Name: Cody O'Neill
Date: 09/August/2023

NATA WORLD RECOGNISED ACCREDITATION

Accreditation No. 20599
Accredited for compliance with ISO/IEC 17025 - Testing

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

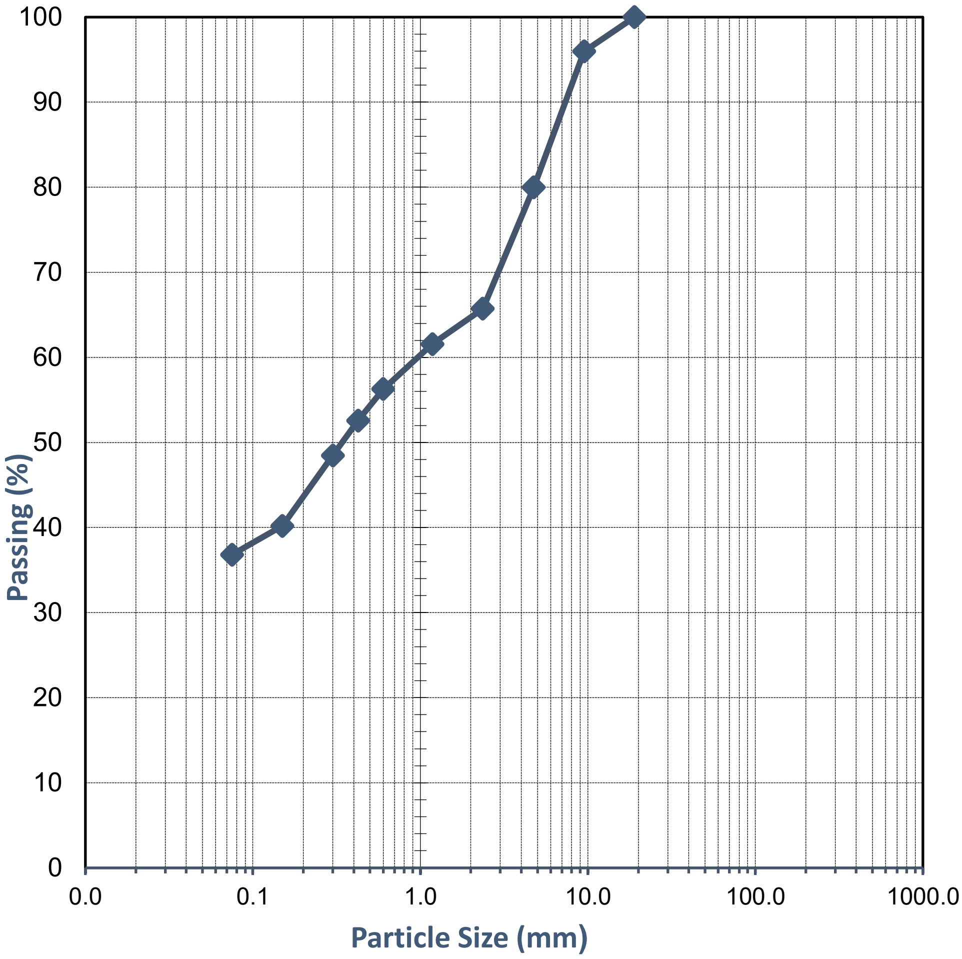
TEST REPORT - AS 1289.3.6.1

Client:	Cooperative Bulk Handling (CBH)	*Ticket No.*	S10545
Client Address:	-	*Report No.*	WG23.12014_1_PSD
Project:	Proposed Accomodation Site	*Sample No.*	WG23.12014
Location:	Part Lot 80, Great Northern Highway, Miling	*Date Sampled:*	Not Specified
Sample Identification:	TP08 0.45-0.65m	*Date Tested:*	07/08 - 08/08/2023

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	100
9.5	96
4.75	80
2.36	66
1.18	62
0.600	56
0.425	53
0.300	48
0.150	40
0.075	37



Comments:

Approved Signatory:

Name: Cody O'Neill

Date: 08/August/2023

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Cooperative Bulk Handling (CBH)	*Ticket No.*	S10545
Client Address:	-	*Report No.*	WG23.12014_1_PI
Project:	Proposed Accomodation Site	*Sample No.*	WG23.12014
Location:	Part Lot 80, Great Northern Highway, Miling	*Date Sampled:*	Not Specified
Sample Identification:	TP08 0.45-0.65m	*Date Tested:*	8/08/2023

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50°C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**54**
AS 1289.3.2.1	**Plastic Limit (%)**	**18**
AS 1289.3.3.1	**Plasticity Index (%)**	**36**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**15.0**
AS 1289.3.4.1	**Length of Mould (mm)**	**125**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**Curled**

Comments:

Approved Signatory:

Name: Cody O'Neill

Date: 09/August/2023

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.8.1

Client:	Cooperative Bulk Handling (CBH)	*Ticket No.*	S10545
Client Address:	-	*Report No.*	WG23.12014_1_ECN
Project:	Proposed Accomodation Site	*Sample No.*	WG23.12014
Location:	Part Lot 80, Great Northern Highway, Miling	*Date Sampled:*	Not Specified
Sample Identification:	TP08 0.45-0.65m	*Date Tested:*	8/08/2023

TEST RESULTS - Emerson Class Number

Sampling Method:	**Sampled by Client, Tested as Received**
Source of Material:	**Not Specified**
Soil Description:	**Sandy Clay with Gravel**
Water Used:	**Distilled**

EMERSON CLASS NUMBER	**2**

Comments: Calcite present in sample.

Approved Signatory:

Name: Cody O'Neill

Date: 11/August/2023

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SOIL | AGGREGATE | CONCRETE | CRUSHING

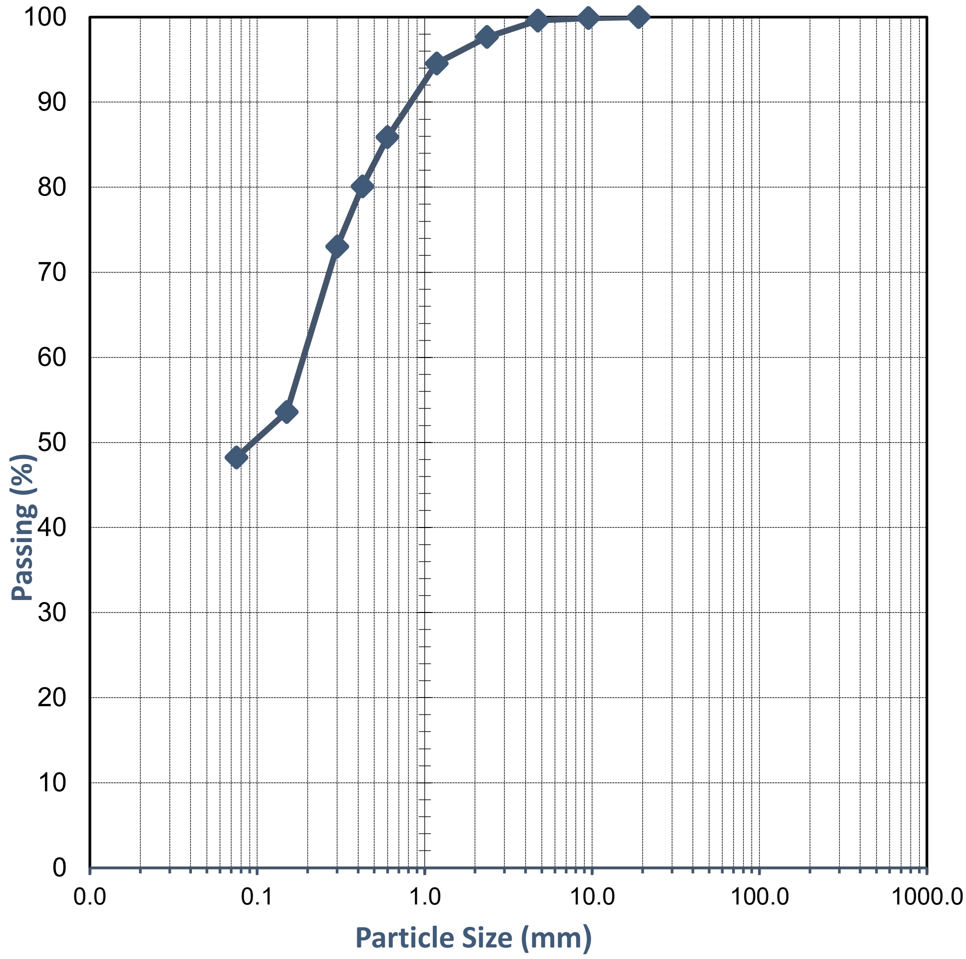
TEST REPORT - AS 1289.3.6.1

Client:	Cooperative Bulk Handling (CBH)	*Ticket No.*	S10545
Client Address:	-	*Report No.*	WG23.12015_1_PSD
Project:	Proposed Accomodation Site	*Sample No.*	WG23.12015
Location:	Part Lot 80, Great Northern Highway, Miling	*Date Sampled:*	Not Specified
Sample Identification:	TP09 0.5-0.7m	*Date Tested:*	07/08 - 08/08/2023

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: **Sampled by Client, Tested as Received**

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	100
9.5	100
4.75	100
2.36	98
1.18	95
0.600	86
0.425	80
0.300	73
0.150	54
0.075	48



Comments:

Approved Signatory:

Name: Cody O'Neill

Date: 08/August/2023

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TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Cooperative Bulk Handling (CBH)	*Ticket No.*	S10545
Client Address:	-	*Report No.*	WG23.12015_2_PI
Project:	Proposed Accomodation Site	*Sample No.*	WG23.12015
Location:	Part Lot 80, Great Northern Highway, Miling	*Date Sampled:*	Not Specified
Sample Identification:	TP09 0.5-0.7m	*Date Tested:*	9-08-2023

TEST RESULTS - Consistency Limits (Casagrande)

Sampling Method:	**Sampled by Client, Tested as Received**
History of Sample:	**Oven Dried <50^{o}C**
Method of Preparation:	**Dry Sieved**

AS 1289.3.1.1	**Liquid Limit (%)**	**45**
AS 1289.3.2.1	**Plastic Limit (%)**	**17**
AS 1289.3.3.1	**Plasticity Index (%)**	**28**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**10.5**

AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**Cracked, Curled**

Comments: Report replaces WG23.12015_1_PI. Report reissued due to updated Sampling Method.

Approved Signatory:

Name: Cody O'Neill

Date: 16-August-2023

Accreditation No. 20599
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WESTERN GEOTECHNICAL
& Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.8.1

Client:	Cooperative Bulk Handling (CBH)	*Ticket No.*	S10545
Client Address:	-	*Report No.*	WG23.12015_1_ECN
Project:	Proposed Accomodation Site	*Sample No.*	WG23.12015
Location:	Part Lot 80, Great Northern Highway, Miling	*Date Sampled:*	Not Specified
Sample Identification:	TP09 0.5-0.7m	*Date Tested:*	8/08/2023

TEST RESULTS - Emerson Class Number

Sampling Method:	**Sampled by Client, Tested as Received**
Source of Material:	**Not Specified**
Soil Description:	**Sandy Clay**
Water Used:	**Distilled**

EMERSON CLASS NUMBER	**2**

Comments: Calcite present in sample.

Approved Signatory:

Name: Cody O'Neill
Date: 11/August/2023

NATA WORLD RECOGNISED ACCREDITATION
Accreditation No. 20599
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235 Bank Street, Welshpool WA 6106 | 08 9472 3465 | www.wgls.com.au

Appendix E: Laboratory Test Results - Chemical

www.galtgeo.com.au
50 Edward Street OSBORNE PARK WA 6017
ABN: 64 625 054 729

Envirolab Services (WA) Pty Ltd trading as MPL Laboratories
ABN 53 140 099 207
16-18 Hayden Court Myaree WA 6154
ph +61 8 9317 2505 fax +61 8 9317 4163
lab@mpl.com.au
www.mpl.com.au

Certificate of Analysis PEH0322

Client Details

Client	Western Geotechnical & Laboratory Services
Contact	Brooke Elliot
Address	235 Bank Street, WELSHPOOL, WA, 6101

Sample Details

Your Reference	S10545 - Proposed Accomodation Site - Part Lot 80, Great Northern Highway, Miling
Number of Samples	2 Soil
Date Samples Received	04/08/2023
Date Samples Registered	04/08/2023

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date Results Requested by	15/08/2023
Date of Issue	10/08/2023

NATA Accreditation Number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025. Tests not covered by NATA are denoted with *.

Authorisation Details

Results Approved By	Heram Halim, Operations Manager Lien Tang, Assistant Operations Manager
Laboratory Manager	Michael Kubiak

Certificate of Analysis PEH0322

Samples in this Report

Envirolab ID	Sample ID	Matrix	Date Sampled	Date Received
PEH0322-01	WG23.12014 - TP08 0.45-0.65m	Soil	04/08/2023	04/08/2023
PEH0322-02	WG23.12015 - TP09 0.5-0.7m	Soil	04/08/2023	04/08/2023

Inorganics - General Physical Parameters (Soil)

Envirolab ID	Units	PQL	PEH0322-01	PEH0322-02
Your Reference			WG23.12014 - TP08 0.45-0.65m	WG23.12015 - TP09 0.5-0.7m
Date Sampled			04/08/2023	04/08/2023
pH	pH units		9.6	9.7
Electrical Conductivity	µS/cm	2.0	460	580

Certificate of Analysis PEH0322

PBI/PRI (Soil)

Envirolab ID	Units	PQL	PEH0322-01	PEH0322-02
Your Reference			WG23.12014 - TP08 0.45-0.65m	WG23.12015 - TP09 0.5-0.7m
Date Sampled			04/08/2023	04/08/2023
Phosphorus Retention Index	-		19	11

Method Summary

Method ID	Methodology Summary
AGRI-003_PRI	Phosphorous Retention index (PRI) is the ratio of adsorbed phosphorus to the equilibrium concentration. Phosphorus is extracted using KCl and determined colourimetrically. Result value is used to calculate PRI as per Allen and Jefferey.
INORG-001	pH - Measured using pH meter and electrode based on APHA latest edition, Method 4500-H+. Please note that the results for water analyses are indicative only, as analysis can be completed outside of the APHA recommended holding times. Solids are reported from a 1:5 water extract unless otherwise specified. Alternatively, pH is determined in a 1:5 extract using 0.01M calcium chloride or a solid is extracted at a ratio of 1:2.5 (AS1289.4.3.1), pH is measured in the extract.
INORG-002	Conductivity and Salinity - measured using a conductivity cell at 25°C based on APHA latest edition Method 2510. Soil results reported from a 1:5 Soil:Water extract unless otherwise specified. Please note Resistivity is estimated by calculation and may not correlate with results otherwise obtained using the Resistivity current method (based on AS 1289.4.4.1), depending on the nature of the soil being analysed.

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was typically insufficient in order to satisfy laboratory QA/QC protocols.

Miscellaneous Information

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, Total Recoverable metals and PFAS where sediment/solids are included by default.

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from the latest "Australian Drinking Water Guidelines", published by NHMRC. No guideline values have been set for Total Coliforms in drinking water. Increased concentrations should be investigated. Total Coliforms are not considered useful as indicators of the presence of faecal contamination.

Where we have provided guideline values eg. ADWG Health Value, it is the responsiblity of the reader to decide if the water is fit for consumption. Please note that the tests we have conducted are just a selection of common tests to give you a general idea of drinking water quality. There are many other tests included in the ADWG that we have not tested for.

Data Quality Assessment Summary PEH0322

Client Details

Client	Western Geotechnical & Laboratory Services
Your Reference	S10545 - Proposed Accomodation Site - Part Lot 80, Great Northern Highway, Miling
Date Issued	10/08/2023

Recommended Holding Time Compliance

No recommended holding time exceedances

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	Yes	No Outliers
Duplicates	Yes	No Outliers
Matrix Spike	Yes	No Outliers
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	Yes	No Outliers

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PEH0322

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
EC | Soil	1-2	04/08/2023	07/08/2023	08/08/2023	Yes
pH | Soil	1-2	04/08/2023	07/08/2023	08/08/2023	Yes
PRI | Soil	1-2	04/08/2023	07/08/2023	08/08/2023	Yes

Quality Control PEH0322

INORG-001 | Inorganics - General Physical Parameters (Soil) | Batch BEH0745

Analyte	Units	PQL	Blank	DUP1 BEH0745-DUP1# Samp | QC | RPD %	DUP2 BEH0745-DUP2# Samp | QC | RPD %	LCS %
pH	pH units		8.2	9.0 | 8.9 | 0.224	8.7 | 8.7 | 0.345	101
Electrical Conductivity	µS/cm	2.0	2.00	71.0 | 71.3 | 0.422	65.3 | 61.3 | 6.32	104

The QC reported was not specifically part of this workorder but formed part of the QC process batch.

AGRI-003_PRI | PBI/PRI (Soil) | Batch BEH0613

Analyte	Units	PQL	Blank	DUP1 PEH0322-01 Samp | QC | RPD %	LCS %
Phosphorus Retention Index	-		0.00	19.1 | 16.9 | 12.3	97.2

Appendix F: Water Balance Calculation

WA Site & Soil Evaluation
Irrigation area sizing

Please read the attached notes before using this spreadsheet

Water Balance for Zero Storage

Site Address:	**Part Lot 80, Great Northern Highway, Miling**		
Date:	Tuesday, 22 August 2023	**Assessor:**	Sean Coffey

INPUT DATA

Design Wastewater Flow	Q	2,160	L/day	Based on maximum potential occupancy and derived from the Supplement to Regulation 29 and Schedule 9 - Wastewater system loading rates
Design Irrigation Rate	DIR	8.0	mm/day	Based on soil texture class/permeability and derived from Table M1 of AS/NZS 1547:2012
Nominated Land Application Area	L	250	m^2	[1]
Crop Factor	C	0.8-1.0	unitless	Estimates evapotranspiration as a fraction of pan evaporation; varies with season and crop type[2]
Rainfall Runoff Factor	RF	1.0	unitless	Proportion of rainfall that remains onsite and infiltrates, allowing for any runoff
Mean Monthly Rainfall Data	Miling			BoM Station and number
Mean Monthly Pan Evaporation Data	Berkshire Valley			BoM Station and number or data from the Evaporation Data for Western Australia Report (https://researchlibrary.agric.wa.gov.au/cgi/viewcontent.cgi?article=1058&context=rmtr)

Parameter	Symbol	Formula	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Days in month	D		days	31	28	31	30	31	30	31	31	30	31	30	31	**365**
Rainfall	R		mm/month	15.2	16.4	19.1	21.4	47.4	62.8	63	49.4	26.6	18.1	9.8	9.8	**359**
Evaporation	E		mm/month	381	343	304	183	117	74	73	96	127	200	276	373	**2547**
Crop Factor	C		unitless	1.00	1.00	0.90	0.90	0.80	0.80	0.80	0.80	0.90	1.00	1.00	1.00	
OUTPUTS																
Evapotranspiration	ET	ExC	mm/month	381	343	274	165	94	59	58	77	114	200	276	373	**2413.6**
Percolation	B	DIRxD	mm/month	248.0	224	248.0	240.0	248.0	240.0	248.0	248.0	240.0	248.0	240.0	248.0	**2920.0**
Outputs		ET+B	mm/month	629.0	567	521.6	404.7	341.6	299.2	306.4	324.8	354.3	448.0	516.0	621.0	**5333.6**
INPUTS																
Retained Rainfall	RR	RxRF	mm/month	15.2	16.4	19.1	21.4	47.4	62.8	63	49.4	26.6	18.1	9.8	9.8	**359**
Applied Effluent	W	(QxD)/L	mm/month	267.8	241.9	267.8	259.2	267.8	259.2	267.8	267.8	259.2	267.8	259.2	267.8	**3153.6**
Inputs		RR+W	mm/month	283.0	258.3	286.9	280.6	315.2	322.0	330.8	317.2	285.8	285.9	269.0	277.6	**3512.6**
STORAGE CALCULATION																
Storage remaining from previous month			mm/month	0.0	0.0	0.0	0.0	0.0	0.0	22.8	47.2	39.7	0.0	0.0	0.0	
Storage for the month	S	(RR+W)-(ET+B)	mm/month	-346.0	-308.7	-234.7	-124.1	-26.4	22.8	24.4	-7.6	-68.5	-162.1	-247.0	-343.4	
Cumulative Storage	M		mm	0.0	0.0	0.0	0.0	0.0	22.8	47.2	39.7	0.0	0.0	0.0	0.0	
Maximum Storage for Nominated Area	N		mm	47.24												
	V	NxL	L	11810												
LAND AREA REQUIRED FOR ZERO STORAGE			m^2	109	110	133	169	228	274	275	243	198	156	128	110	

MINIMUM AREA REQUIRED FOR ZERO STORAGE: 276 m^2

CELLS

	Please enter data in blue cells
XX	Enter available Land Application Area
XX	Data in yellow cells is calculated by the spreadsheet, DO NOT ALTER THESE CELLS

NOTES

[1] This value should be the largest of the following: land application area required based on the most limiting nutrient balance or minimum area required for zero storage

[2] Values selected are suitable for grass in WA

Appendix G: Understanding Your Report

UNDERSTANDING YOUR REPORT

GALT FORM PMP11 Rev4

1. EXPECTATIONS OF THE REPORT

This document has been prepared to clarify what is and is not provided in your report. It is intended to inform you of what your realistic expectations of this report should be and how to manage your risks associated with the conditions on site.

Geotechnical engineering and environmental science are less exact than other engineering and scientific disciplines. We include this information to help you understand where our responsibilities begin and end. You should read and understand this information. Please contact us if you do not understand the report or this explanation. We have extensive experience in a wide variety of projects and we can help you to manage your risk.

2. THIS REPORT RELATES TO PROJECT-SPECIFIC CONDITIONS

This report was developed for a unique set of project-specific conditions to meet the needs of the nominated client. It took into account the following:

- the project objectives as we understood them and as described in this report;
- the specific site mentioned in this report; and
- the current and proposed development at the site.

It should not be used for any purpose other than that indicated in the report. You should not rely on this report if any of the following conditions apply:

- the report was not written for you;
- the report was not written for the site specific to your development;
- the report was not written for your project (including a development at the correct site but other than that listed in the report); or
- the report was written before significant changes occurred at the site (such as a development or a change in ground conditions).

You should always inform us of changes in the proposed project (including minor changes) and request an assessment of their impact.

Where we are not informed of developments relevant to your report, we cannot be held responsible or liable for problems that may arise as a consequence.

Where design is to be carried out by others using information provided by us, we recommend that we be involved in the design process by being engaged for consultation with other members of the project team. Furthermore, we recommend that we be able to review work produced by other members of the project team that relies on information provided in our report.

3. DATA PROVIDED BY THIRD PARTIES

Where data is provided by third parties, it will be identified as such in our reports. We necessarily rely on the completeness and accuracy of data provided by third parties in order to draw conclusions presented in our reports. We are not responsible for omissions, incomplete or inaccurate data associated with third party data, including where we have been requested to provide advice in relation to field investigation data provided by third parties.

4. SOIL LOGS

Our reports often include logs of intrusive and non-intrusive investigation techniques prepared by Galt. These logs are based on our interpretation of field data and laboratory results. The logs should only be read in conjunction with the report they were issued with and should not be re-drawn for inclusion in other documents not prepared by us.

5. THIRD PARTY RELIANCE

We have prepared this report for use by the client. This report must be regarded as confidential to the client and the client's professional advisors. We do not accept any responsibility for contents of this document from any party other than the nominated client. We take no responsibility for any damages suffered by a third party because of any decisions or actions they may make based on this report. Any reliance or decisions made by a third party based on this report are the responsibility of the third party and not of us.

6. CHANGE IN SUBSURFACE CONDITIONS

The recommendations in this report are based on the ground conditions that existed at the time when the study was undertaken. Changes in ground conditions can occur in numerous ways including anthropogenic events (such as construction or contaminating activities on or adjacent to the site) or natural events (such as floods, groundwater fluctuations or earthquakes). We should be consulted prior to use of this report so that we can comment on its reliability. It is important to note that where ground conditions have changed, additional sampling, testing or analysis may be required to fully assess the changed conditions.

7. SUBSURFACE CONDITIONS DURING CONSTRUCTION

Practical constraints mean that we cannot know every minute detail about the subsurface conditions at a particular site. We use professional judgement to form an opinion about the subsurface conditions at the site. Some variation to our evaluated conditions is likely and significant variation is possible. Accordingly, our report should not be considered as final as it is developed from professional judgement and opinion.

The most effective means of dealing with unanticipated ground conditions is to engage us for construction support. We can only finalise our recommendations by observing actual subsurface conditions encountered during construction. We cannot accept liability for a report's recommendations if we cannot observe construction.

8. ENVIRONMENTAL AND GEOTECHNICAL ISSUES

Unless specifically mentioned otherwise in our report, environmental considerations are not addressed in geotechnical reports. Similarly, geotechnical issues are not addressed in environmental reports. The investigation techniques used for geotechnical investigations can differ from those used for environmental investigations. It is the client's responsibility to satisfy themselves that geotechnical and environmental considerations have been taken into account for the site.

Geotechnical advice presented in a Galt Environmental report has been provided by Galt Geotechnics under a sub-contract agreement. Similarly, environmental advice presented in a Galt Geotechnics report has been provided by Galt Environmental under a sub-contract agreement.

Unless specifically noted otherwise, no parties shall draw any inferences about the applicability of the Western Australian state government landfill levy from the contents of this document.

O:\Administration\Standard Forms and Documents\PMP11-Rev3 Understanding your Report.docx

Project Number & Title:	M-3288 2023 Miling Accommodation
Contractor:	Stantec

Document Information

CBH Document Number	**Contractor Document Number**	**Document Title:**
342-3288-CI-RPT-0001	-	2023 Miling Accommodation Drainage Report

Revision History

CBH Rev No	Contractor Rev No.	Description	Date	Approved By (Contractor)	Approved By (CBH)
A	A	Issued for Review	27/09/2023	M. Johnston	C. Pan
0	0	Issued for Use	06/10/2023	M. Johnston	C. Pan

CBHGROUP

- ☐ 1 - APPROVED
- ☐ 2 - APPROVED WORK MAY PROCEED - Submit IFT / IFD / IFU / IFC Documentation
- ☐ 3 - APPROVED EXCEPT AS NOTED - Revise and Resubmit
- ☐ 4 - NOT APPROVED, WORK MAY NOT PROCEED - Revise and Resubmit
- ☐ 5 - INFORMATION ONLY

Signature Date

No review, approval, deemed approval, acceptance or rejection by Co-operative Bulk Handling Limited of, nor any comment or Direction in relation to this document will:
a. relieve the Contractor from any of its Contract obligations and/or liabilities, especially the obligation to achieve Practical Completion by the Date for Practical Completion;
b. evidence or constitute a Direction by Co-operative Bulk Handling Limited; or
c. affect the time for performance of the Contractors or the Contractors Representative's obligations.

Rev	Date	Description	Author	Independent Review	Approved
A	27/09/2023	Issued for Review	M. Johnston	I. Castle	I. Castle
0	06/10/2023	Issued for Use	M. Johnston	I. Castle	I. Castle

The conclusions in the Report titled 2023 Miling Accommodation Drainage Report are Stantec's professional opinion, as of the time of the Report, and concerning the scope described in the Report. The opinions in the document are based on conditions and information existing at the time the scope of work was conducted and do not take into account any subsequent changes. The Report relates solely to the specific project for which Stantec was retained and the stated purpose for which the Report was prepared. The Report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient's own risk.

Stantec has assumed all information received from CBH (the "Client") and third parties in the preparation of the Report to be correct. While Stantec has exercised a customary level of judgment or due diligence in the use of such information, Stantec assumes no responsibility for the consequences of any error or omission contained therein.

This Report is intended solely for use by the Client in accordance with Stantec's contract with the Client. While the Report may be provided by the Client to applicable authorities having jurisdiction and to other third parties in connection with the project, Stantec disclaims any legal duty based upon warranty, reliance or any other theory to any third party, and will not be liable to such third party for any damages or losses of any kind that may result.

Prepared by: ______________________________
Signature

Matthew Johnston
Printed Name

Reviewed by: ______________________________
Signature

Iain Castle
Printed Name

Approved by: ______________________________
Signature

Iain Castle
Printed Name

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1 Introduction

Stantec have been engaged by CBH Group (CBH) as Engineering Consultants for the 2023 accommodation expansion (M-3288) at the 342 Miling Receival Site.

The proposed expansion will provide accommodation for up to 12 workers during peak harvest seasons. The development will be separate from the existing site, located off Dookling Drive.

1.1 Objectives

This drainage design report provides details on the stormwater management strategy and drainage design for the site.

The objectives for this report are:

- Limit the outflow of the proposed expansion back to predevelopment flow rates.

1.2 Technical Guidance

The design has aimed to follow guidelines set out by CBH Design Specification TS10A – Civil Earthworks, Roads and Drainage; and Australian Rainfall & Runoff.

1.3 Data

The design has been carried out using geospatial data from online resources and information supplied by CBH. The geospatial data utilised is listed below in increasing order of accuracy and preference:

- 2m Landgate contours
- Feature Survey undertaken by Handley Surveys in July 2023.

Other data utilised includes:

- Aerial photography from Landgate and Google Maps.

1.4 Climate Change

At the date this assessment has been undertaken, no allowance has been made for changes in rainfall intensity due to climate change.

1.5 Terminology

Annual Exceedance Probability (AEP) terminology has been adopted for consistency with the recommended probability terminology in Australian Rainfall & Rainfall 2019. The use of Average Recurrence Interval (ARI) is no longer recommended and has changed to Annual Exceedance Probability (AEP), which is the probability or likelihood of an event occurring or being exceeded within any given year for flood risk. This preferred terminology is presented in Table 1.

Table 1: AR&R Probability Terminology

Frequency Descriptor	AEP (%)	AEP (1 in X)	ARI
Very Frequent	98.17	1.02	.25
	95.02	4.05	.33
	86.47	1.16	.5
Frequent	63.21	1.58	1
	50	2	1.44
	39.35	2.54	2
	20	55	4.48
	18.13	5.52	5
Rare	10	10	9.49
	5	20	20
	2	50	50
Very Rare	1	100	100
	.5	200	200
	.2	500	500
	.1	1000	1000
Extreme	.05	2000	2000
	.02	5000	5000

2 Site Description and Proposed Development

The town of Miling is located approximately 170 km north-northeast of Perth, Western Australia (refer Figure 1). CBH's Miling receival site is located on the western side of town and the proposed development is located in the southwest of the town, refer to figure 2.

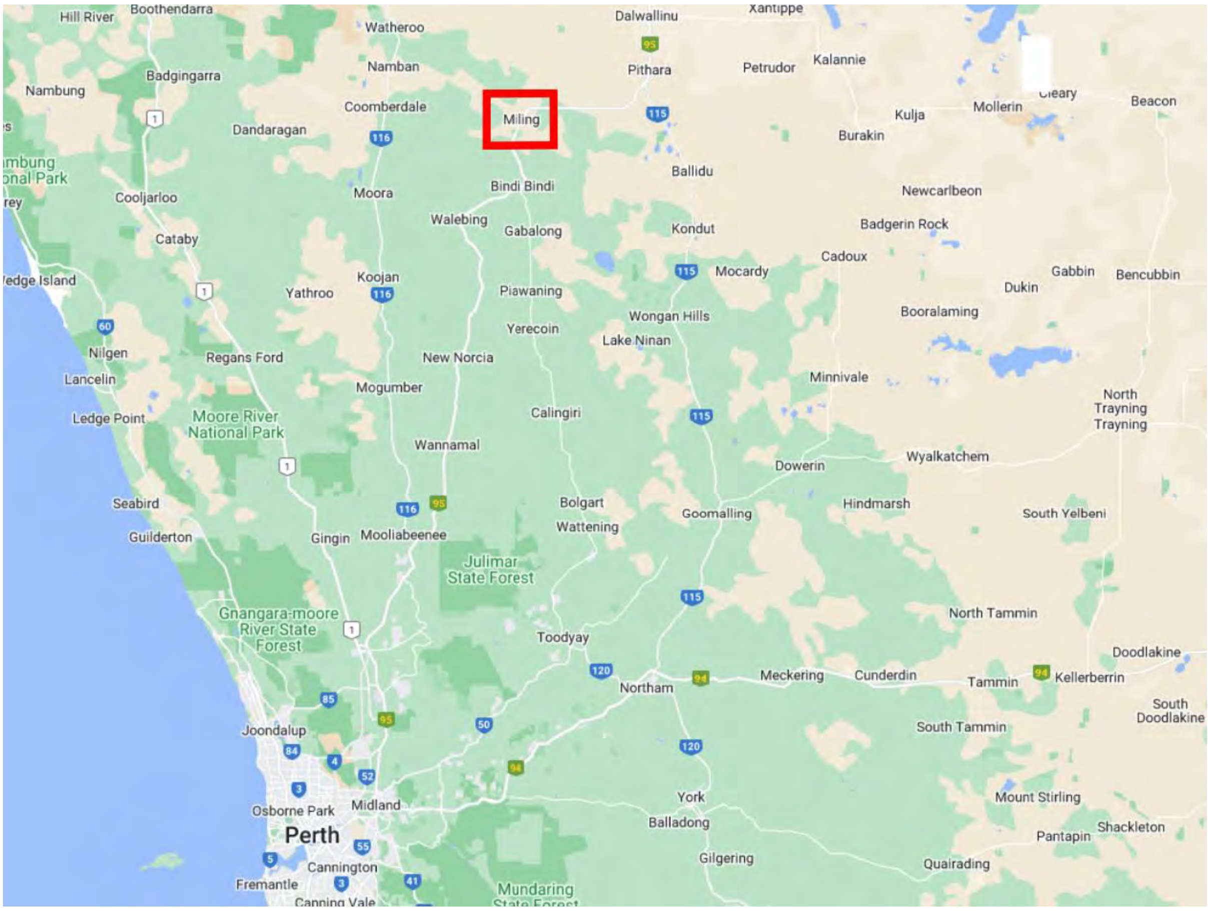


Figure 1: Project Site Location (Source: Google Maps)

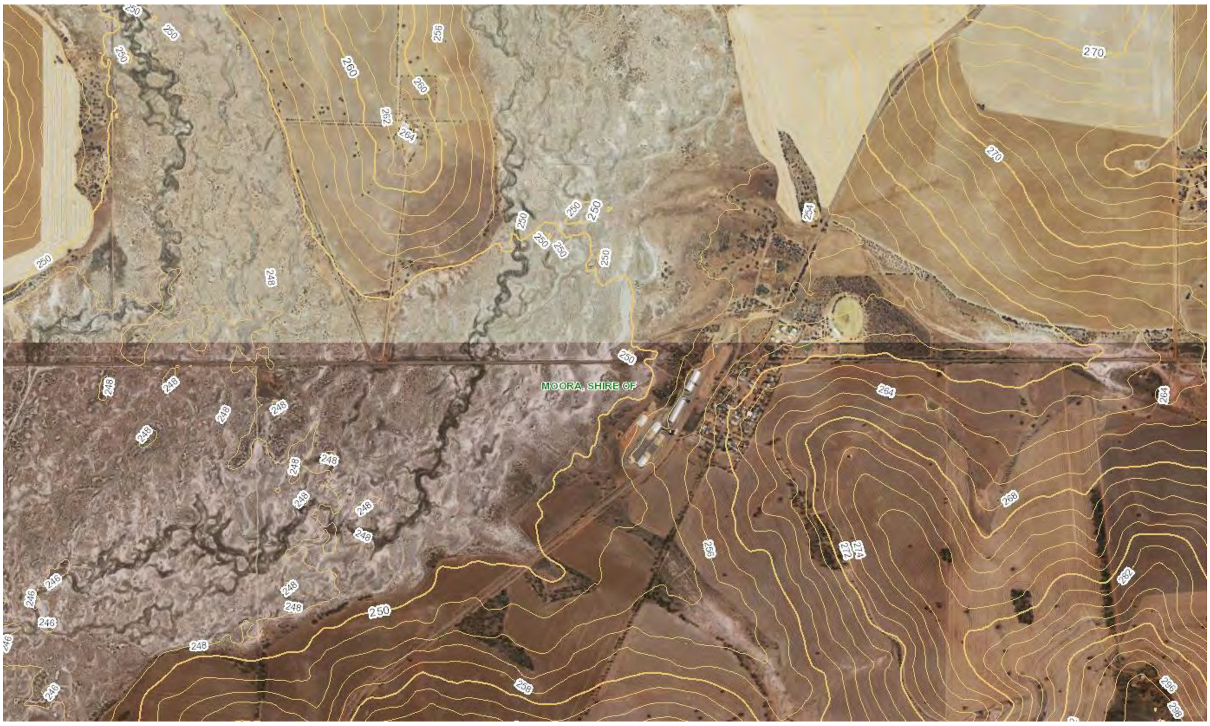


Figure 2: Town of Miling and Moore River with Contours (Source: Landgate Locate)

2.1 Geotechnical Conditions

The published Geological Series Map (1:250,000 Moora Sheet) indicates that the area is underlain by Colluvium (Lithic Sand) and Alluvium (Clay, Silt and Sand).

A Geotechnical investigation was undertaken by Galt Geotechnics for the proposed expansion with fieldwork conducted on the 31st July and 1st August 2023. Refer to report WAG230373-01 002 R Rev0 for further details and for the full scope of works.

The investigations found that the soil profile of the site generally comprises of Sand overlying Clayey Sand over Sandy Clay.

No groundwater information for the site has been provided but it was noted within the geotech report that while groundwater was not encountered in test pits to a depth of 2.5m due to low permeability clayey soils, perched groundwater is likely after significant rainfall.

Permeability testing was conducted in three test pits on the site, with a saturated hydraulic conductivity of 0.01 m/day found. Based on the results of the permeability testing on the soils encountered, for the purpose of stormwater management, the soil will be taken as impermeable for infiltration of runoff.

2.2 Existing Infrastructure

The CBH Miling site is located on the western side of the Miling Town. The existing site currently has 105,000 tonnes of storage capacity split between three open bulkheads and two horizontal storage facilities and infrastructure for marshalling, sampling, and weighing, Refer to Figure 3.

Figure 3: Aerial of Existing Infrastructure (Source: Landgate Locate)

2.3 Proposed Development

The proposed development to the existing Miling facility will add 12 accommodation units, a mess, a common area and parking. The proposed development will primarily take place to the south of the existing site on the eastern side of the rail siding.

3 Stormwater Management

The stormwater management strategy for the site is for all surface runoff on the site to be managed to prevent flooding or damage to critical infrastructure, based on the following philosophy:

- Paved surfaces are graded to direct stormwater runoff to open drainage conveyance system;
- Open drain and culverts have been sized to convey 5% AEP events;
- Detention basins to be provided to limit the post development flows to 20% AEP predevelopment flow rates.

3.1 Design Rainfall

Rainfall data for the Site has been obtained from the Bureau of Meteorology's Design Rainfall Data System (2016). A summary of the Intensity-Frequency-Duration data is shown in Table 2.

Table 2: Rainfall intensity (mm/h) for CBH Miling Site

Duration		Annual Exceedance Probability (AEP)						
Min	Hr	63.20%	50%	20%	10%	5%	2%	1%
5	0.083	47.8	54.4	76.7	93.2	111	136	156
10	0.167	36.2	41.3	58.5	70.8	84.0	102	117
20	0.333	25.0	28.6	40.5	49.2	58.2	70.8	81.3
30	0.5	19.6	22.4	31.6	38.4	45.4	55.6	63.8
60	**1**	12.5	14.2	20	24.3	28.9	35.5	40.9
120	**2**	7.90	8.90	12.5	15.2	18.1	22.3	25.9
180	**3**	6.03	6.80	9.47	11.5	13.7	17.0	19.8
360	**6**	3.82	4.30	5.93	7.22	8.60	10.7	12.5
720	**12**	2.38	2.68	3.71	4.51	5.38	6.70	7.83
1440	**24**	1.44	1.62	2.25	2.74	3.28	4.09	4.79
2880	**48**	0.827	0.933	1.30	1.59	1.90	2.38	2.79
4320	**72**	0.592	0.668	0.928	1.13	1.34	1.67	1.97

3.2 Design Criteria

The stormwater drainage system has been designed in accordance with the requirements of CBH Design Specification TS10A – Civil Earthworks, Roads and Drainage (CBH-ENG-CI-SST-0001_rev3) and followed guidelines set out in the Australian Rainfall & Runoff (ARR).

A summary of the stormwater design criteria adopted for the project is provided in Table 3.

Table 3: Stormwater Design Criteria

Parameter	Value
Design AEP for Conveyance	5%
Design AEP for On-site Detention	5%
Design AEP for Pre-Development Outflow	20%
Minimum Grade for Open Drains	0.3%
Freeboard to top of subgrade	300mm for basins and conveyance drainage
Maximum Outlet Velocity	2m/s (without scour protection)
Maximum Side Slopes	1V:3H
Minimum Drain Depth	400mm
Runoff Co-efficient	Vegetated Ground: 0.19 Paved Areas: 0.9

3.3 Predevelopment Outflow

The undeveloped site currently drains west towards the rail siding. The flow is captured in an open drain besides the rail siding and conveyed towards under the rail before ultimately ending up at the Moore River. To not disadvantage the downstream infrastructure the outflow of the site will be limited to the 20% AEP predevelopment flow rates.

The predevelopment flow was calculated using a runoff coefficient of C = 0.20, assuming the site was 100% pervious in its undeveloped vegetated state.

The Time of Concentration for the pre-development flow rate was found using the Kinematic Wave Equation as recommended by ARR.

A pre-development flow rate of 0.005 m3/s was estimated for the site. Refer Appendix C for pre-development flow rate calculation and site information used.

4 Stormwater Design

The design for the internal stormwater management for the M-2836 Miling Site Expansion includes the following components:

• Detention Basin

• Culvert installations; and

• Open drains.

4.1 Detention Basins

Stormwater detention basins have been sized to attenuate outflow from the site back to predevelopment rates for up to and including the critical 5% AEP event. The Catchment Plan is presented in Appendix B.

Stormwater basins are designed with a low flow outlet to limit flows to 20% AEP pre-development flow rates. An overflow weir is provided for each basin to convey storm events more than 5% AEP.

Refer to Appendix C for basin storage and outlet flow calculations and parameters utilised.

A summary of the design parameters for Drainage Basin 01 is provided in Table 10.

Table 4: Stormwater Detention Basin 01 Design Parameters

Parameter	Basin 01
Pre-development Catchment	1,489 m2 @ C = 0.2
Pre-development Equivalent Impervious Area	298 m2
Predevelopment Outflow Q	0.005 m3/s
Post-development Catchment	318.5 m2 @ C = 0.2 1,170 m2 @ C = 0.9
Post-development Equivalent Impervious Area	1,117 m2
Design AEP Event Detained	5% AEP minus 20% Predevelopment outflow
Basin Volume Required	20 m^3 (Critical 60min duration)
Basin Volume Provided	22 m^3
Low Flow Outlet	DN150mm SN8 uPVC with 80mm orifice (screw cap)
Out Flow Wier	1m long x 0.1m high

4.2 Culverts

Culverts shall be used to convey the stormwater to the proposed basins. To convey a peak flow of 0.04 m3/s for the open drains the following minimum dimensions are recommended:

- 1% longitudinal fall
- 225mm diameter

- 600mm cover

4.3 Open Drains

Open drains shall be used to convey the stormwater to the proposed basins. To convey a peak flow of 0.04 m3/s for the open drains the following minimum dimensions are recommended:

• 1% longitudinal fall

• 1m wide base

• 0.2m depth (exclusive of freeboard)

• Freeboard to top of subgrade: 300 mm.

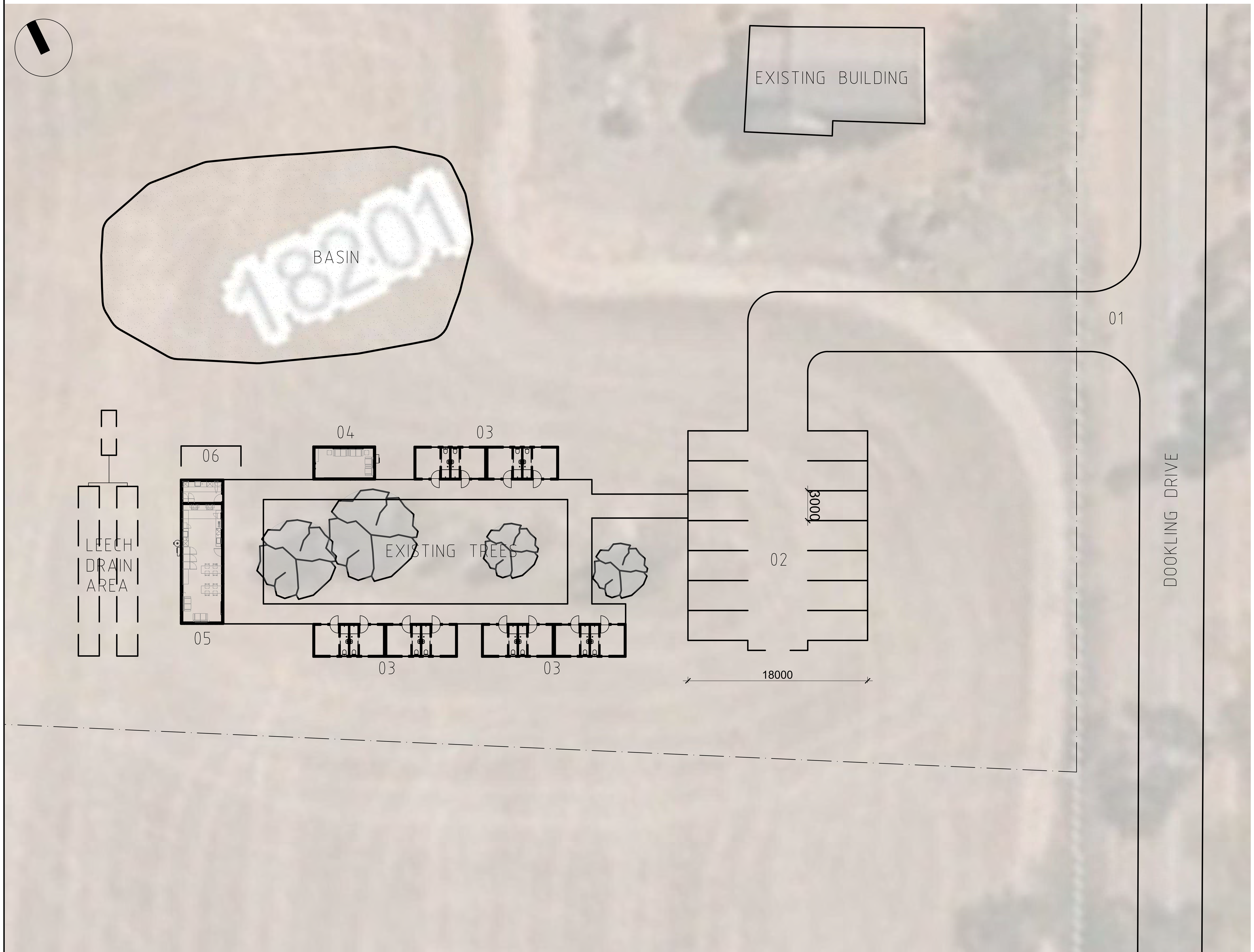
• 1H: 3V side slopes

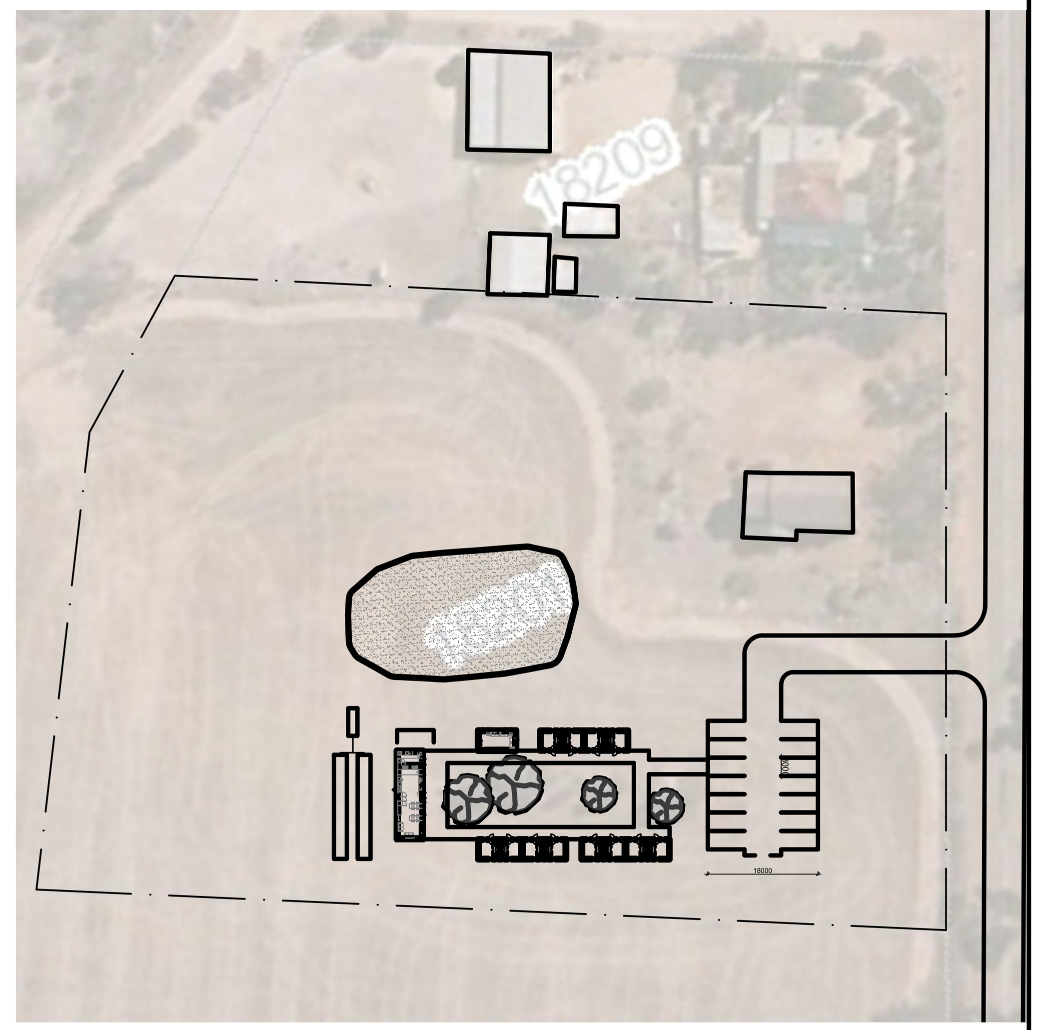
5 Conclusion

As per CBH specifications the stormwater detention basins have been sized to limit outflow from the site in a 5% AEP rainfall event to pre-development flow rates.

The proposed Basins 01 has a capacity of 22 m^3 (20 m^3 required) to detain runoff from the site. The basin will have a low flow outlet sized to discharge the 20% AEP predevelopment event and an overflow weir designed to discharge storm events greater than 5% AEP. Basins, open drains, bunds and culverts should be inspected, maintained and cleaned periodically to achieve continuous functionality.

Appendix A Concept Plan





LEGEND

01 ENTRY
02 14 BAY CARPARK
03 SPQ
04 COMMON ROOM
05 KDLU
06 DRYING AREA
07 BASIN
08 LEECH DRAIN AREA

CBH GROUP
ABN 29 256 604 947

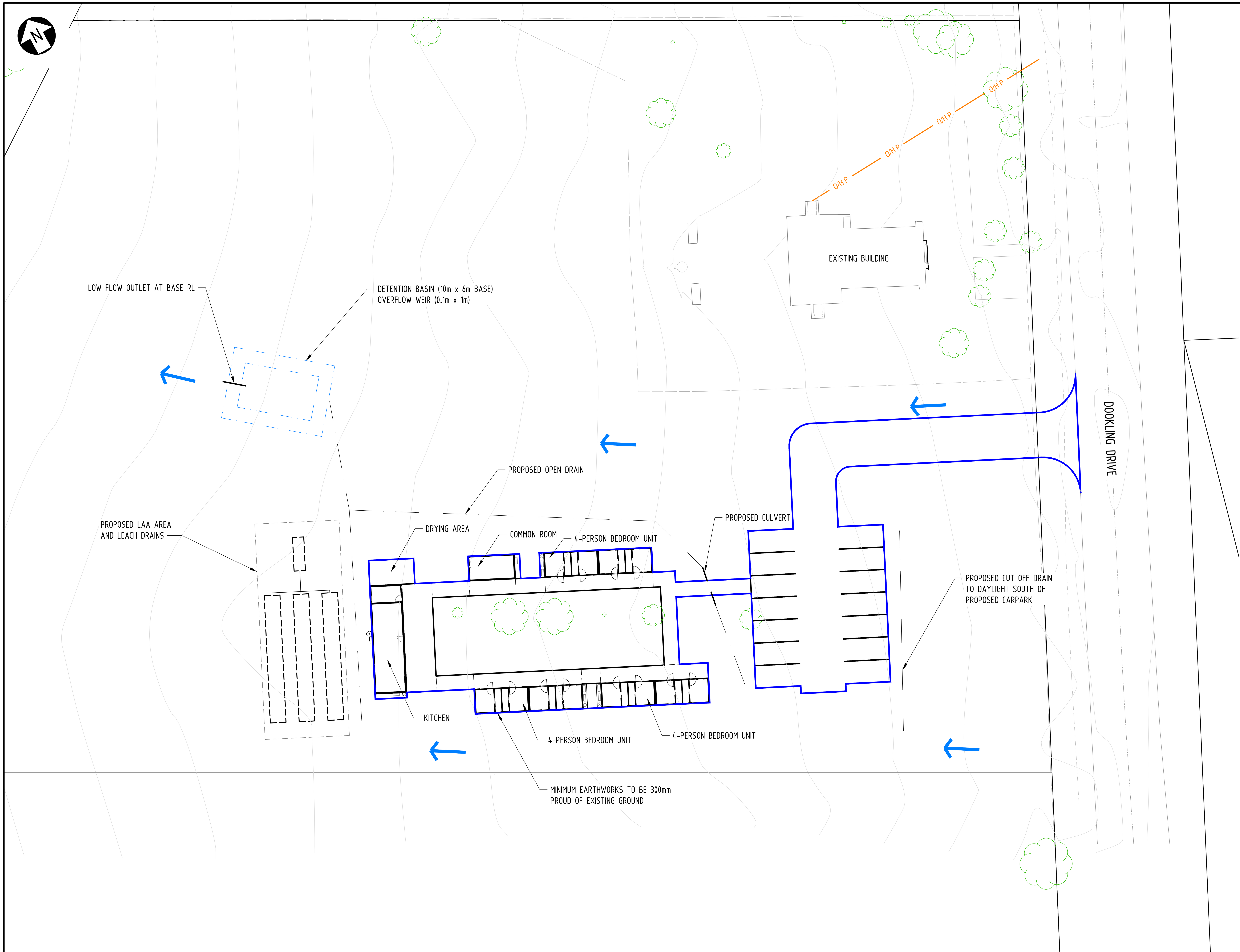
REF DRAWING No.	REFERENCE DRAWING TITLE	REV	DATE	REVISION DESCRIPTION	BY	CHK'D	APP'D

SCALE 1:200	DRAWN	A JONES	
SHEET A1	CHECKED	B LIM	
PROJECT	DESIGNED		
	DESIGN APPR		
CONTRACT No	PROJECT APPR		

TITLE
MILING
INFRASTRUCTURE PLANNING
ACCOMMODATION
TEST FIT

DRG No | SHEET 1 OF 1 | REV. A

Appendix B Catchment Plan



NOTES:

1. ALL DIMENSIONS ARE IN METERS UNLESS NOTED OTHERWISE.
2. DRAWING IS IN MILING LOCAL CO-ORDINATE GRID SYSTEM (AGLIME94)
3. PROPOSED CATCHMENT AREA = 1488.7m^2

LEGEND:

- CADASTRAL
- EXISTING CONTOUR
- O/H P — EXISTING OVERHEAD POWER
- EXISTING TREES
- CATCHMENT BOUNDARY
- PROPOSED OPEN DRAIN
- PROPOSED CULVERT
- OVERLAND FLOW ARROW

1:250 @ A1
1:500 @ A3
0 4 8 12 16 20 24 m

CBH GROUP
ABN 29 256 604 947

REV	DATE	REVISION DESCRIPTION	BY	CHK'D	APP'D
0	06.10.23	ISSUED FOR USE	PF	MJ	IC
A	29.09.23	ISSUED FOR REVIEW	PF	MJ	IC

REF DRAWING No.	REFERENCE DRAWING TITLE
-	-

SCALE 1:250
SHEET A1
PROJECT M-3288
CONTRACT No

DRAWN	P. FORREST	06.10.23
CHECKED	I. CASTLE	06.10.23
DESIGNED	M.JOHNSTON	06.10.23
DESIGN APPR	I.CASTLE	06.10.23
PROJECT APPR		

TITLE
MILING
2023 ACCOMMODATION
SITE DRAINAGE
CATCHMENT PLAN

DRG No 342-ENG-CI-SKT-0010
SHEET 1 OF 1
REV. 0

Appendix C Calculations

Coordinates: Latitude: -30.493975, Longitude: 116.360209
Nearest Grid: Latitude: 30.4875 (S), Longitude: 116.3625 (E)

Duration		Annual Exceedance Probability (AEP)						
Min	Hr	63.20%	50%	20%	10%	5%	2%	1%
5	0.083	47.8	54.4	76.7	93.2	111	136	156
10	0.167	36.2	41.3	58.5	70.8	84.0	102	117
20	0.333	25.0	28.6	40.5	49.2	58.2	70.8	81.3
30	0.5	19.6	22.4	31.6	38.4	45.4	55.6	63.8
60	**1**	12.5	14.2	20	24.3	28.9	35.5	40.9
120	**2**	7.90	8.90	12.5	15.2	18.1	22.3	25.9
180	**3**	6.03	6.80	9.47	11.5	13.7	17.0	19.8
360	**6**	3.82	4.30	5.93	7.22	8.60	10.7	12.5
720	**12**	2.38	2.68	3.71	4.51	5.38	6.70	7.83
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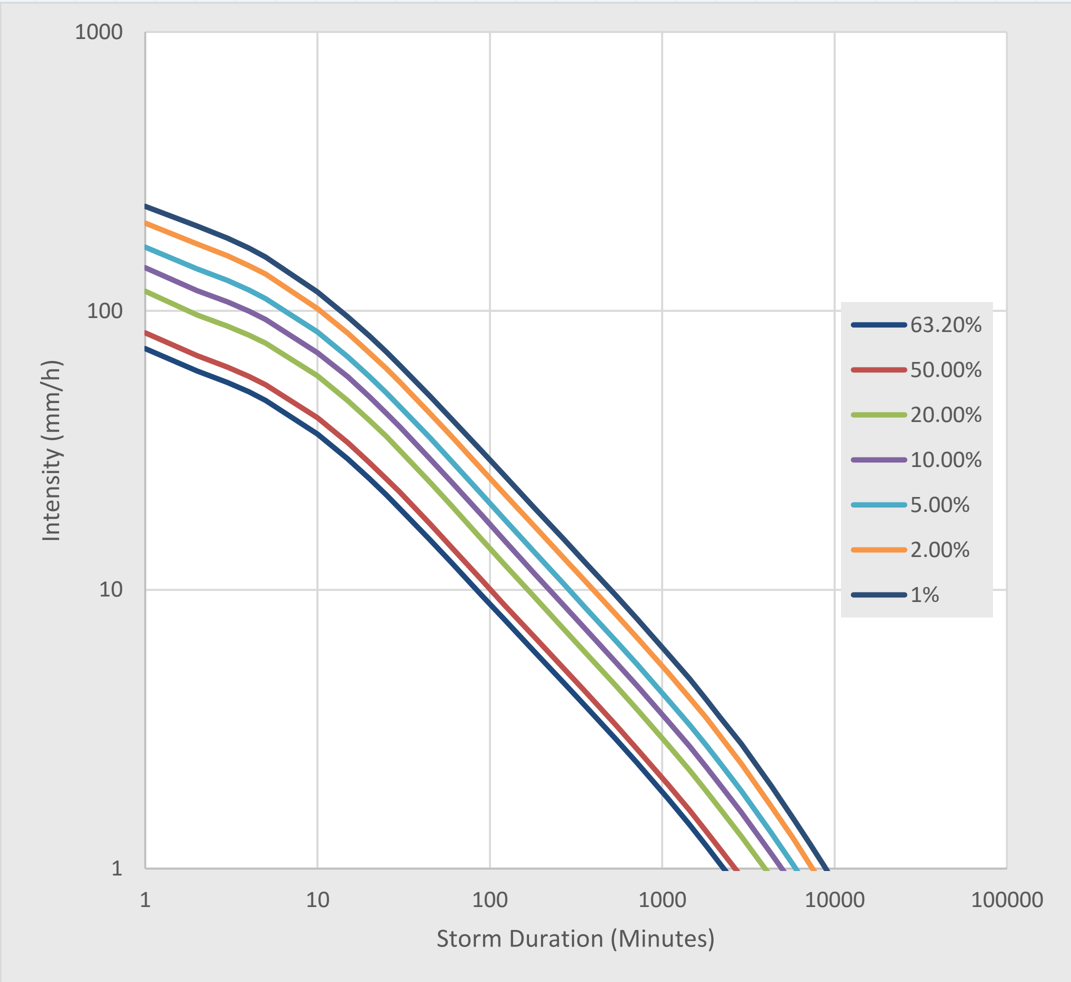
2880	**48**	0.827	0.933	1.30	1.59	1.90	2.38	2.79
4320	**72**	0.592	0.668	0.928	1.13	1.34	1.67	1.97



Parameters

Design AEP for Predevelopment Outflow	20%
Design AEP for On-site Detention	5%
Infiltration	No
Infiltration Rate (m/ day)	0

Pre-development Catchment

Area	m^2	C	C*A
Permeable	1488.7	0.2	297.74
Impermeable	0	0.9	0
Total	**1488.7**		**297.74**

Post-development Catchment

Area	m^2	C	C*A
Permeable	318.5	0.2	63.7
Impermeable	1,170.2	0.9	1,053.2
Total	**1,488.7**		**1,116.9**

Pre-Development

Length	95	m
Slope	0.02	m/m
Manning's n	0.035	
Critical Tc	8.87	min
Intensity	61.72	mm/h
Peak Discharge	0.0051	m^3/s

Basin Data

Basin Characteristics			**Base Dimensions**			**Top Dimensions**		
Free Board	0.3	m	Width	10	m	Width	13.6	m
Side Slope	3	(1:X)	Length	6	m	Length	9.6	m
Depth	0.3	m						

Basin Storage			**Low Flow Outlet**			**Overflow Weir**		
Volume	22.6	m^3	Material	uPVC		Discharge	0.0484	m^3/s
Infiltration	93.8	m^2	Diameter	80	mm	Weir Coeff	1.69	
			Manning ı	0.011	Metric	Weir Height	0.1	m
			Slope	100	1 in x	Weir Width	0.91	m
			Pipe	0.003	m^3/s			

Storm Discharge and Volumes

Duration (Min)	5	10	20	30	60	120	360	720
Intensity (mm/hr)	110.64	84	58.2	45.4	28.9	18.05	8.6	5.375
Area (m^2)	1116.88	1116.88	1116.88	1116.88	1116.88	1116.88	1116.88	1116.88
Ave Storm Q (m^3/s)	0.03	0.03	0.02	0.01	0.01	0.01	0.00	0.00
Storm Volume (m^3)	10.30	15.64	21.67	25.35	32.28	40.32	57.63	72.04
Infiltration (m^3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Outflow (m^3)	1.0	2.0	4.0	6.1	12.1	24.2	72.7	145.5
Max Retention (m^3)	9.3	13.6	17.6	19.3	20.2	16.1	-15.1	-73.4
Storage Volume (m^3)	22.64	22.64	22.64	22.64	22.64	22.64	22.64	22.64
Additional Volume (m^3)	-13.36	-9.03	-5.02	-3.35	-2.49	-6.57	-37.74	-96.06

Drain Capacity Calculations

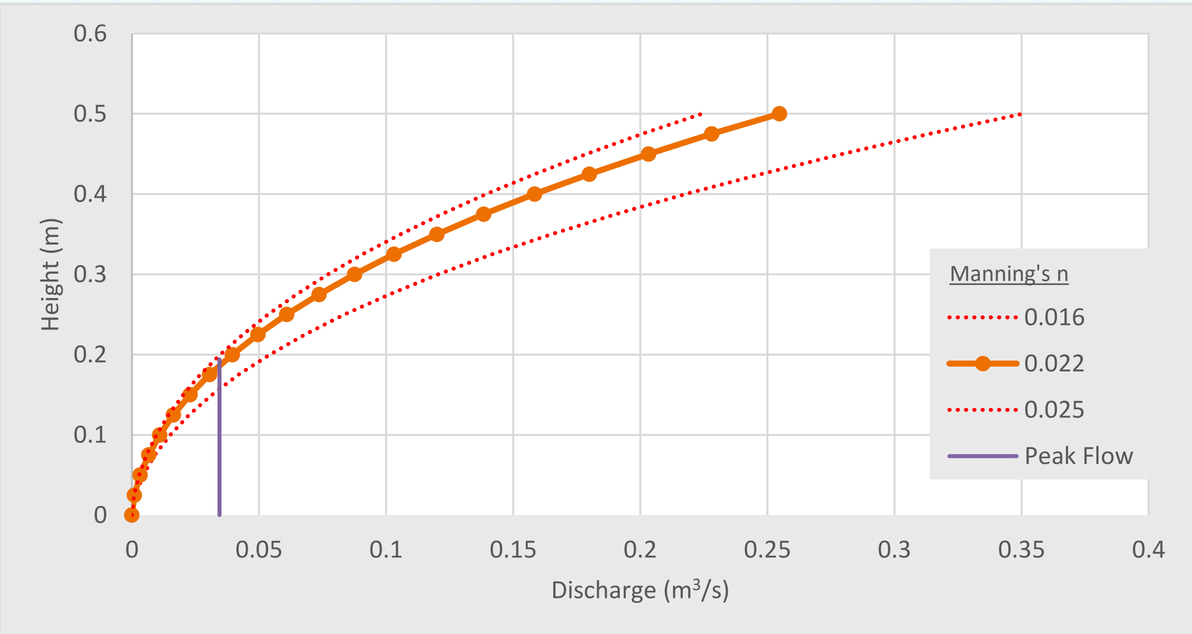
Drain Details

Drain ID

Drain Geometry			**CBH Group**
Depth	0.5	m	TS10A Design Specification Civil Earthworks, Roads and Drainage
Manning's n	0.022		
Slope of Drain (S)	1%		
Base Width	1	m	Table 6.2: Runoff Coefficients and Manning 'n'
Side Slopes	3	1:x	

Drain Hydraulics			**Austroads**	
Area (A)	1.25	m^2	AGRD05B - Guide to Road Design Part 5B	
Top Width	4	m		
Wetted Perimeter (P)	4.1623	m	$R = \frac{A}{P}$	Eq 4
Hydraulic Radius (R)	0.30			
Hydraulic Depth	0.31			

Manning's				
Velocity (V)	0.204	ms^{-1}	$V = \frac{1}{n} \times R^{2/3} \times S^{1/2}$	Eq 3
Discharge (Q)	0.3	m^3s^{-1}	$Q = A \times V$	Eq 1



Transport Impact Statement

Project:	Proposed Accommodation Development 18201 Great Northern Highway, Miling
Client:	CBH Group
Author:	Paul Nguyen
Date:	22nd September 2023
Shawmac Document #:	2309002-TIS-001

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Contents

Figures

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1. Introduction

1.1. Proponent

Shawmac has been engaged by CBH Group to prepare a Transport Impact Statement (TIS) for a proposed accommodation development in Miling.

This TIS has been prepared in accordance with the Western Australian Planning Commission (WAPC) *Transport Impact Assessment Guidelines Volume 4 – Individual Developments*. The assessment considers the following key matters:

- Details of the proposed development.
- Vehicle access and parking.
- Provision for service vehicles.
- Daily traffic volumes and vehicle types.
- Traffic management on frontage streets.
- Public transport access.
- Pedestrian access.
- Cycle access
- Site specific and safety issues.

1.2. Site Location

The site address is 18201 Great Northern Highway in Miling but it is noted that the site does not have direct frontage to Great Northern Highway. The local authority is the Shire of Moora.

The general site location is shown in Figure 1 and an aerial view of the site is shown in Figure 2.

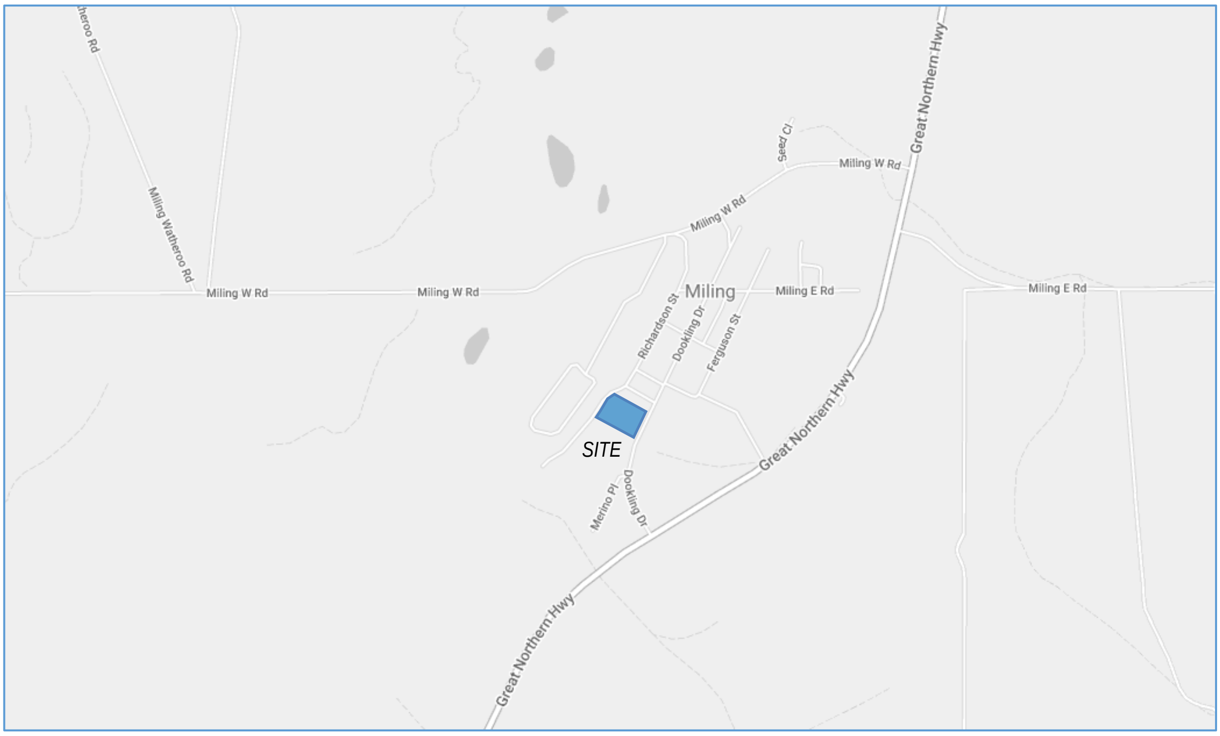

Figure 1: Site Location

Figure 2: Aerial View

2. Proposed Development

CBH are proposing to construct an accommodation development on the site comprising 12 rooms, a common room, a kitchen / laundry building and parking for 13 cars. The development will be occupied by CBH workers who will travel to and from the nearby CBH site.

The proposed site plan is shown in Figure 3.

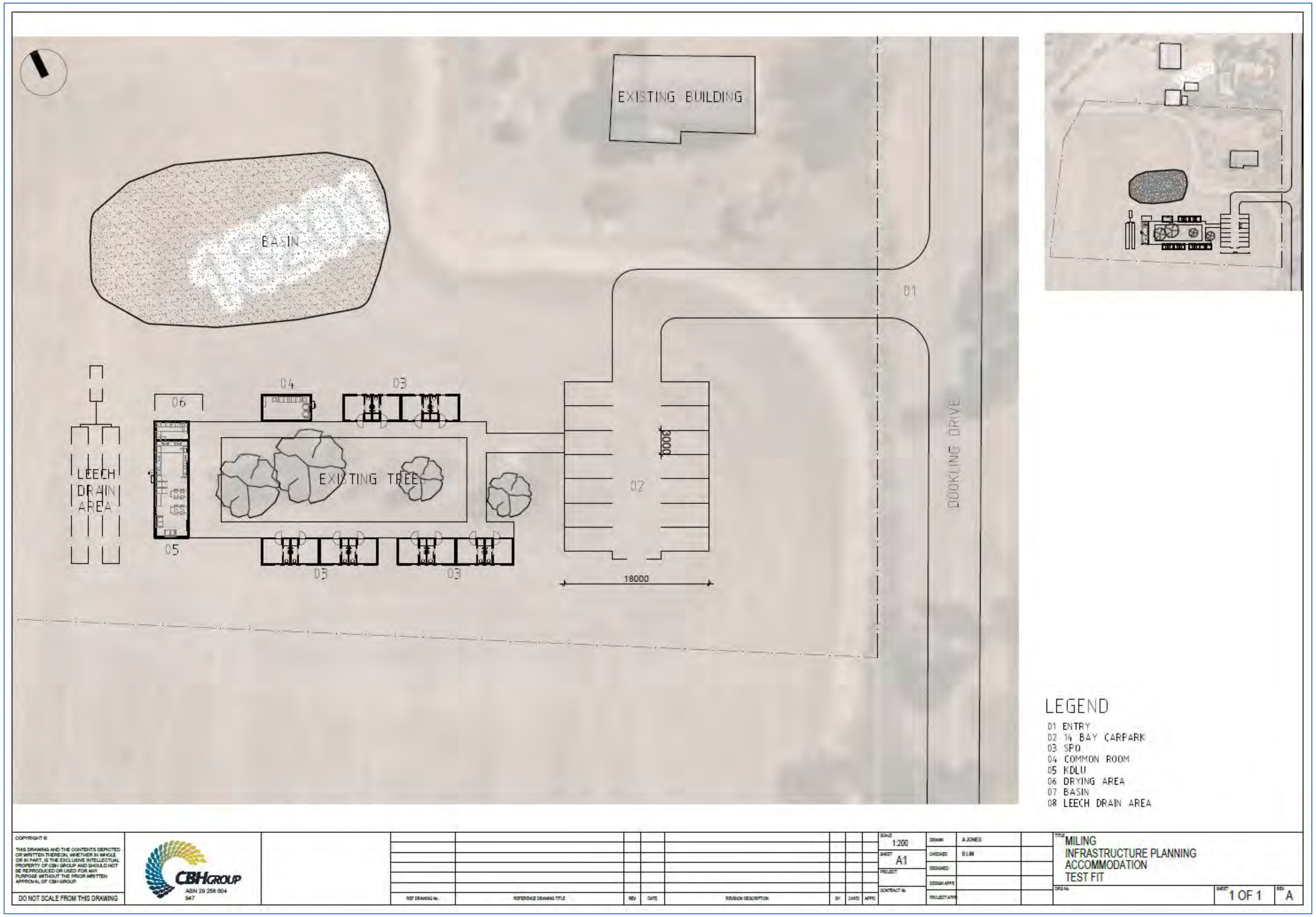

Figure 3: Site Layout

3. Traffic Management on Frontage Streets

3.1. Road Network Layout and Hierarchy

The layout and hierarchy of the existing local road network according to the Main Roads WA *Road Information Mapping System* is shown in Figure 4.

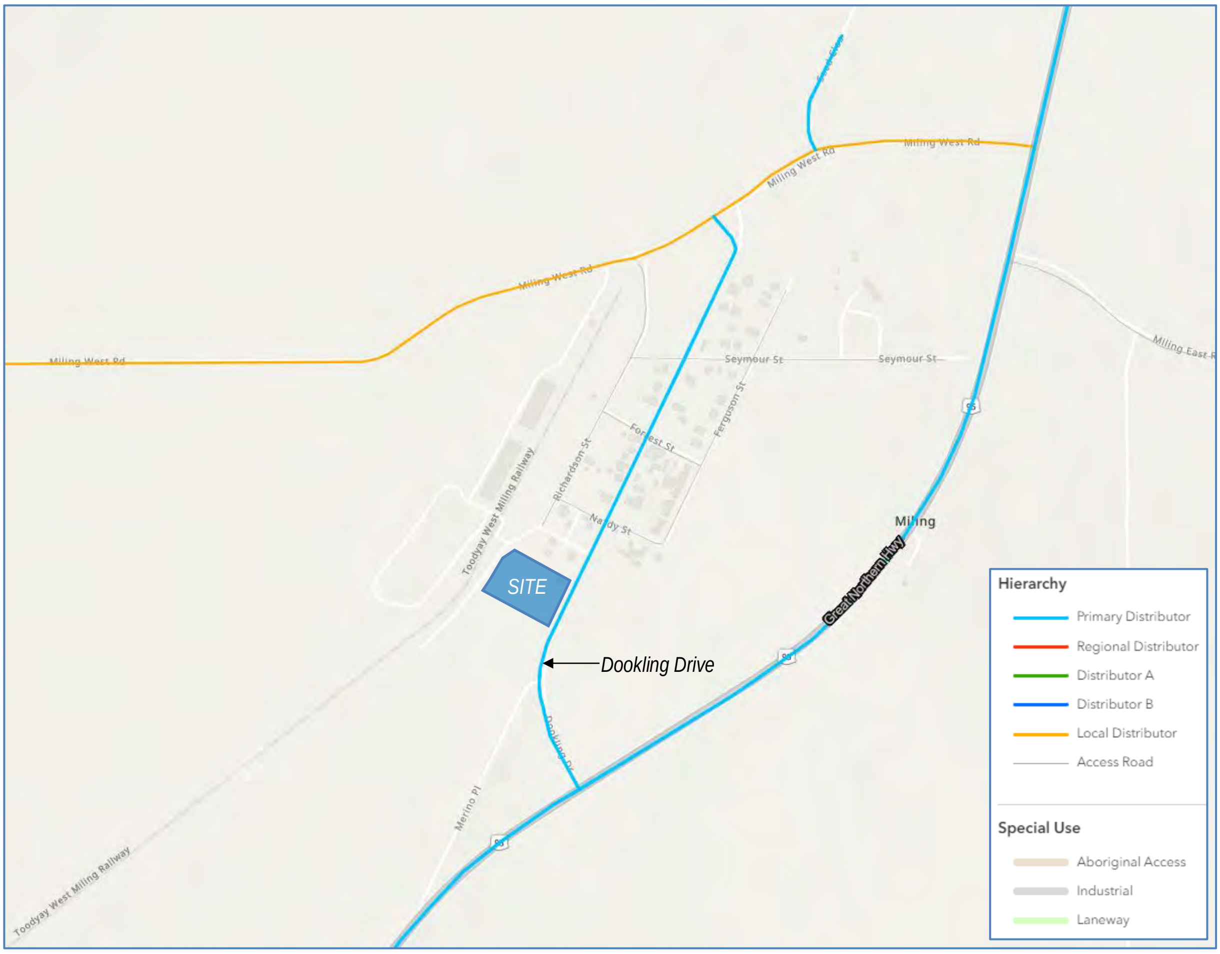

Figure 4: Existing Road Network Hierarchy

As shown, both Great Northern Highway and Dookling Drive are Primary Distributor roads which are under the jurisdiction of Main Roads WA. It is understood that Dookling Drive was the former alignment of Great Northern Highway and currently functions as a lower order road similar to a Local Distributor.

3.2. Speed Limits

The speed limits are shown in Figure 5. As shown, there are some gaps in the speed data. Based on Google Street View, the speed limit on the southern section of Dookling Drive is 50km/h and the speed limit on Miling West Road west of Great Northern Highway is 60km/h.

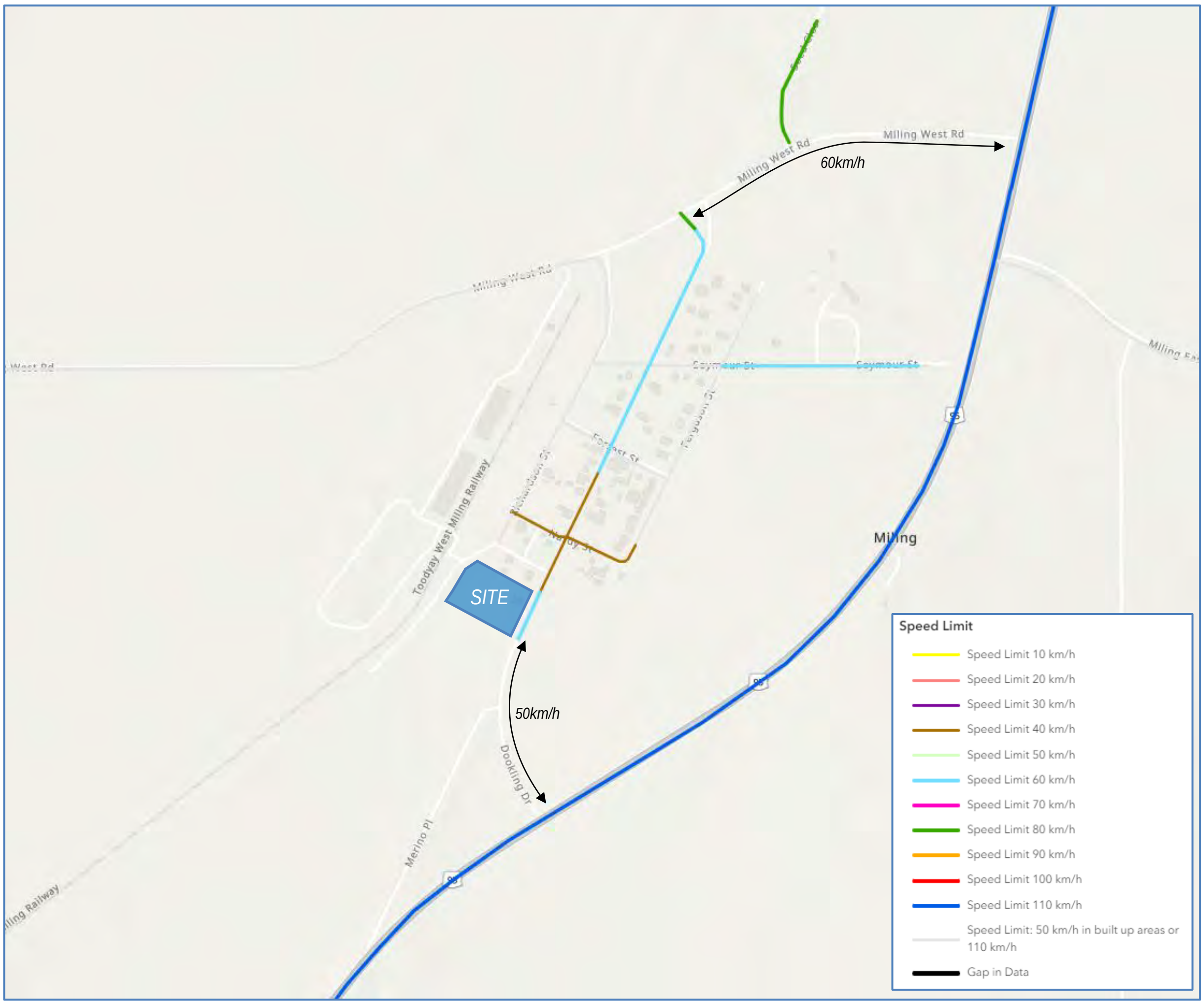

Figure 5: Existing Speed Limits

3.3. Traffic Volumes

The latest traffic volumes along Great Northern Highway were obtained from Main Roads WA *Traffic Map* as summarised in Figure 6 to Figure 9. There was no traffic data in the immediate vicinity of Miling and so the data shown are from Network Performance Sites (NPS) on Great Northern Highway on either side of Miling as a general indication of traffic.

mainroads WESTERN AUSTRALIA

SITE 52768

Hourly Volume

2023/24
Monday to Friday

Great Northern Hwy (H006)

South of Midlands Rd (SLK 146.61)

	All Vehicles			Heavy Vehicles			
	NB	SB	Both	NB	SB	Both	%
00:00	5	4	9	4	3	7	77.8
01:00	1	3	4	1	2	3	75.0
02:00	2	2	4	1	1	2	50.0
03:00	3	6	9	2	5	7	77.8
04:00	5	6	11	2	5	7	63.6
05:00	12	9	21	5	7	12	57.1
06:00	29	24	53	14	14	28	52.8
07:00	43	33	76	23	22	45	59.2
08:00	51	39	90	26	22	48	53.3
09:00	46	45	91	22	24	46	50.5
10:00	45	49	94	23	27	50	53.2
11:00	56	52	108	30	28	58	53.7
12:00	55	50	105	33	24	57	54.3
13:00	46	53	99	27	27	54	54.5
14:00	45	53	98	27	27	54	55.1
15:00	47	51	98	29	27	56	57.1
16:00	39	46	85	24	24	48	56.5
17:00	36	39	75	21	22	43	57.3
18:00	29	26	55	19	16	35	63.6
19:00	31	20	51	25	13	38	74.5
20:00	26	15	41	21	11	32	78.0
21:00	23	13	36	20	11	31	86.1
22:00	14	10	24	12	8	20	83.3
23:00	8	8	16	7	7	14	87.5
TOTAL	697	656	1353	418	377	795	58.8

Peak Statistics

AM TIME	11:30	11:00	11:15	11:45	11:00	11:45	
AM VOL	61	52	110	36	28	61	
PM TIME	12:00	12:45	13:30	12:00	14:45	14:45	
PM VOL	55	57	105	33	31	60	

Figure 6: Traffic Volumes – Great Northern Highway south of Midlands Road – Average Weekday

mainroads WESTERN AUSTRALIA

SITE 52768

Hourly Volume

2023/24
Weekend

Great Northern Hwy (H006)

South of Midlands Rd (SLK 146.61)

	All Vehicles			Heavy Vehicles			
	NB	SB	Both	NB	SB	Both	%
00:00	4	7	11	3	5	8	72.7
01:00	2	5	7	2	4	6	85.7
02:00	4	4	8	3	4	7	87.5
03:00	2	3	5	1	3	4	80.0
04:00	3	5	8	1	4	5	62.5
05:00	9	10	19	3	8	11	57.9
06:00	22	12	34	11	6	17	50.0
07:00	29	27	56	14	16	30	53.6
08:00	36	33	69	17	16	33	47.8
09:00	39	40	79	18	17	35	44.3
10:00	43	47	90	20	21	41	45.6
11:00	40	45	85	17	19	36	42.4
12:00	36	48	84	14	19	33	39.3
13:00	33	45	78	14	19	33	42.3
14:00	33	45	78	12	18	30	38.5
15:00	32	42	74	12	19	31	41.9
16:00	30	38	68	12	18	30	44.1
17:00	23	25	48	7	13	20	41.7
18:00	22	23	45	8	12	20	44.4
19:00	15	17	32	5	10	15	46.9
20:00	8	13	21	4	8	12	57.1
21:00	5	9	14	3	6	9	64.3
22:00	5	8	13	2	6	8	61.5
23:00	3	4	7	2	3	5	71.4
TOTAL	478	555	1033	205	274	479	46.4

Peak Statistics

		NB	SB	Both	NB	SB	Both
AM	TIME	09:30	10:30	10:15	09:30	10:30	10:15
	VOL	44	52	95	21	24	43
PM	TIME	12:00	12:15	12:15	13:15	14:45	12:45
	VOL	36	50	85	15	20	34

Figure 7: Traffic Volumes – Great Northern Highway south of Midlands Road – Average Weekend

mainroads WESTERN AUSTRALIA

SITE 5099

Hourly Volume

2023/24
Monday to Friday

Great Northern Hwy (H006)

South of Northam Pithara Rd (SLK 216.40)

	All Vehicles			Heavy Vehicles			
	NB	SB	Both	NB	SB	Both	%
00:00	4	4	8	3	3	6	75.0
01:00	3	3	6	3	2	5	83.3
02:00	3	4	7	2	3	5	71.4
03:00	2	4	6	1	3	4	66.7
04:00	2	5	7	1	4	5	71.4
05:00	7	8	15	3	6	9	60.0
06:00	18	15	33	7	11	18	54.5
07:00	31	25	56	15	15	30	53.6
08:00	37	25	62	18	13	31	50.0
09:00	35	37	72	16	21	37	51.4
10:00	32	38	70	15	21	36	51.4
11:00	36	39	75	18	20	38	50.7
12:00	40	41	81	21	21	42	51.9
13:00	38	38	76	22	19	41	53.9
14:00	35	42	77	20	24	44	57.1
15:00	33	34	67	21	18	39	58.2
16:00	32	29	61	21	17	38	62.3
17:00	27	27	54	18	17	35	64.8
18:00	23	20	43	15	14	29	67.4
19:00	22	18	40	16	13	29	72.5
20:00	29	14	43	24	11	35	81.4
21:00	21	11	32	18	9	27	84.4
22:00	16	10	26	14	9	23	88.5
23:00	9	8	17	8	7	15	88.2
TOTAL	535	499	1034	320	301	621	60.1

Peak Statistics

		NB	SB	Both	NB	SB	Both
AM	TIME	11:15	11:45	11:45	11:15	09:15	11:15
	VOL	40	43	81	21	23	41
PM	TIME	12:45	14:00	12:30	12:45	14:00	12:45
	VOL	44	42	83	27	24	45

Figure 8: Traffic Volumes – Great Northern Highway south of Northam Pithara Road – Average Weekend

mainroads WESTERN AUSTRALIA

SITE 5099

Hourly Volume

2023/24
Weekend

Great Northern Hwy (H006)

South of Northam Pithara Rd (SLK 216.40)

	All Vehicles NB	All Vehicles SB	All Vehicles Both	Heavy Vehicles NB	Heavy Vehicles SB	Heavy Vehicles Both	Heavy Vehicles %
00:00	5	5	10	4	4	8	80.0
01:00	2	4	6	2	4	6	100.0
02:00	2	5	7	2	4	6	85.7
03:00	3	4	7	2	3	5	71.4
04:00	3	6	9	2	4	6	66.7
05:00	6	7	13	3	5	8	61.5
06:00	14	15	29	5	10	15	51.7
07:00	23	26	49	12	15	27	55.1
08:00	31	29	60	15	15	30	50.0
09:00	31	34	65	14	17	31	47.7
10:00	32	35	67	15	18	33	49.3
11:00	35	37	72	15	18	33	45.8
12:00	33	35	68	15	16	31	45.6
13:00	27	39	66	11	19	30	45.5
14:00	23	36	59	10	18	28	47.5
15:00	22	30	52	11	14	25	48.1
16:00	21	23	44	10	13	23	52.3
17:00	19	23	42	9	13	22	52.4
18:00	16	15	31	6	9	15	48.4
19:00	13	15	28	6	10	16	57.1
20:00	12	10	22	6	7	13	59.1
21:00	4	9	13	2	8	10	76.9
22:00	5	5	10	3	4	7	70.0
23:00	3	3	6	1	2	3	50.0
TOTAL	385	450	835	181	250	431	51.6

Peak Statistics

		All Vehicles NB	All Vehicles SB	All Vehicles Both	Heavy Vehicles NB	Heavy Vehicles SB	Heavy Vehicles Both
AM	TIME	10:15	09:45	11:00	09:15	09:45	09:45
	VOL	36	39	72	17	20	35
PM	TIME	12:15	13:30	12:30	12:30	13:30	12:30
	VOL	33	40	68	15	21	33

Figure 9: Traffic Volumes – Great Northern Highway south of Northam Pithara Road – Average Weekend

According to Austroads *Guide to Traffic Management Part 3: Transport Study and Analysis Methods*, the capacity of a two-lane highway is 1,700 passenger cars per hour for each direction of travel. The current hourly volumes are well within the capacity of the road.

Traffic volumes for Dookling Drive were not available. As this is a relatively short local road, traffic volumes are estimated to be low and less than 1,000 vehicles per day (vpd) which would be well below the target daily traffic volume of 3,000vpd for a Local Distributor Road.

4. Vehicle Access and Parking

4.1. Access

Vehicle access to the site is proposed via a new driveway and crossover on Dookling Drive as shown in Figure 10.

Figure 10: Vehicle Access Arrangement

Sight distance requirements from vehicle exit points are defined in Figure 3.2 of AS2890.1 which are based on the Austroads Stopping Sight Distance (SSD). Based on the 60km/h speed limit along Dookling Drive, the minimum SSD requirement is 73m.

The sight distance check is shown in Figure 11. As shown, the required SSD is achieved in both directions. It is noted that the speed limit reduces to 50km/h to the south of the site and 40km/h to the north of the site and so the actual sight distance requirement will be less.

Vertically, the alignment of Dookling Drive is relatively flat with no major crests or sags that impact sight distance.

Figure 11: Sight Distance Check – Dookling Drive

4.2. Car Parking

It is proposed to provide 14 car parking bays on the site.

4.2.1. Planning Scheme Requirements

The car parking requirements for developments in the Shire of Moora are not specified in the Shire's Town Planning Scheme No. 4 (TPS4). The TPS4 only states that "a person shall not develop or use any land or erect or adapt any building unless car parking spaces specified by the local government are provided and such spaces are constructed and maintained in accordance with the requirements of the local government".

Standard practice and rates in other local government are require the provision of 1 car bay per room or accommodation unit plus visitor parking. Workers accommodation sites are unlikely generate or allow visitors and so it is assumed that the parking requirement would be 1 car bay per room.

Based on the proposed 12 rooms, 12 bays would be considered to be sufficient for the workers. There may be a small number of staff movements (laundry, maintenance etc.). It is understood that staff movements are expected to occur only during the day when workers are away from the site.

Overall, the proposed 13 bays is assessed as being sufficient.

4.2.2. Parking Design

Car parking areas are typically required to comply with the requirements of Australian Standard AS2890.1. The user class will depend on the purpose of the bay as detailed in Figure 12.

9 AS/NZS 2890.1:2004

TABLE 1.1

CLASSIFICATION OF OFF-STREET CAR PARKING FACILITIES

User class	Required door opening	Required aisle width	Examples of uses (Note 1)
1	Front door, first stop	Minimum for single manoeuvre entry and exit	Employee and commuter parking (generally, all-day parking)
1A	Front door, first stop	Three-point turn entry and exit into 90° parking spaces only, otherwise as for User Class 1	Residential, domestic and employee parking
2	Full opening, all doors	Minimum for single manoeuvre entry and exit	Long-term city and town centre parking, sports facilities, entertainment centres, hotels, motels, airport visitors (generally medium-term parking)
3	Full opening, all doors	Minimum for single manoeuvre entry and exit	Short-term city and town centre parking, parking stations, hospital and medical centres
3A	Full opening, all doors	Additional allowance above minimum single manoeuvre width to facilitate entry and exit	Short term, high turnover parking at shopping centres
4	Size requirements are specified in AS/NZS 2890.6 (Note 2)		Parking for people with disabilities

Figure 12: Classification of Parking Facilities

Resident parking (long-term parking) would be classified as User Class 1A. A summary of the AS2890.1 parking requirements is detailed in Table 1.

Table 1: AS2890.1 Car Parking Compliance

Dimension	Requirement	Provided
90 degree parking – Class 1 – Long Term Parking (Residents)		
Car Bay Width	2.4m	3.0m
Car Bay Length	5.4m	6.0m
Parking Aisle Width	5.8m	6.0m

As shown, the key parking dimensions are compliant with AS2890.1.

4.3. Bicycle Parking

The proposed use is unlikely to generate any demand for cycling and so the provision of bicycle parking or end of trip facilities is not considered to be warranted.

4.4. Provision for Service Vehicles

It is assumed that waste will be collected from the verge via the council waste collection service and so there is no requirement to accommodate waste vehicles on the site.

5. Traffic Generation

The proposed development will accommodate CBH workers who will be working at the nearby CBH facility.

Assuming all workers drive individually, it is estimated that the development will generate approximately 12 vehicle movements during each peak hour, including 12 outbound vehicle movements during the morning peak hour and 12 inbound vehicle movements during the afternoon peak hour. This estimate is considered to be a worst-case scenario as some workers may travel together and some may potentially be transported by bus.

According to the WAPC TIA guidelines, an increase of between 10 to 100 peak hour vehicles is considered to have a low to moderate impact and is generally deemed acceptable without requiring detailed capacity analysis. The estimated 12 vehicles per hour is at the lower end of this range and so the development traffic is considered to have a low impact and can be accommodated within the existing capacity of the road network.

6. Pedestrian and Cyclist Access

There are no paths along Dookling Drive or along the adjacent roads. There are some sections of path towards the north-east. Based on the location of the site and the proposed use, the demand for walking and cycling to and from the site would be minimal and so the provision of new paths or cycle lanes is not warranted by the proposed development.

7. Public Transport Access

There are no existing public transport services within reasonable walking distance of the site. All residents are expected to travel via private vehicle and so there is no demand for public transport.

8. Site Specific Issues and Safety Issues

8.1. Crash History

The crash history of the adjacent road network was obtained from the MRWA Reporting Centre.

No crashes have been recorded along Dookling Drive between Great Northern Highway and Miling West Road over the five-year period from January 2018 to December 2022. The crash history does not appear to indicate any major safety issues on the adjacent road network.

The proposed development itself will generate a low volume of additional traffic and there is no indication that the development would increase the risk of crashes unacceptably.

9. Conclusion

This Transport Impact Statement for the proposed accommodation development at 18201 Great Northern Highway in Miling concluded the following:

- It is estimated that the development would generate approximately 12 vehicle movements during each peak hour, including 12 outbound vehicle movements during the morning peak hour and 12 inbound vehicle movements during the afternoon peak hour. This volume of traffic is low and can be accommodated within the existing capacity of the road network with no major impact. This estimate is considered to be a worst-case scenario as some workers may travel together and some may potentially be transported by bus.
- The provision of 13 car bays is considered to be sufficient for the proposed development.
- The key parking dimensions are compliant with AS2890.1.
- The crash history of the adjacent road network did not indicate any safety issue on the adjacent road network and there is no indication that the development would increase the risk of crashes unacceptably.
- It is expected that all residents and visitors will be accessing the site via a motor vehicle and so there is no demand for additional path infrastructure or public transport services.