Government of Western Australia
Development Assessment Panels

Metro Outer Joint Development Assessment Panel Agenda

Meeting Date and Time: Thursday, 5 January 2023; 9:30am
Meeting Number: MOJDAP/221
Meeting Venue: Electronic Means

To connect to the meeting via your computer - https://us06web.zoom.us/j/81311923465

To connect to the meeting via teleconference dial the following phone number - +61 8 6119 3900
Insert Meeting ID followed by the hash (#) key when prompted - 813 1192 3465

This DAP meeting will be conducted by electronic means (Zoom) open to the public rather than requiring attendance in person.

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Attendance

DAP Members

Mr Eugene Koltasz (Presiding Member)
Ms Gabriela Poezyn (A/Deputy Presiding Member)
Mr Jason Hick (Third Specialist Member)

Item 8.1
Cr Lorna Buchan (Local Government Member, City of Rockingham)
Cr Mark Jones (Local Government Member, City of Rockingham)

Item 8.2 & Item 8.3
Cr Rod Henderson (Local Government Member, City of Swan)
Cr Charlie Zannino (Local Government Member, City of Swan)

Officers in attendance

Item 8.1
Mr David Waller (City of Rockingham)
Mr Mike Ross (City of Rockingham)

Item 8.2 & Item 8.3
Mr Phil Russell (City of Swan)
Mr Jonathan Lendich (City of Swan)
Mr Dawie Van Rensburg (City of Swan)

Minute Secretary

Mr Stephen Haimes (DAP Secretariat)

Applicants and Submitters

Item 8.1
Mr Nik Hidding (Hidding Urban Planning)

Item 8.2
Ms Farida Farrag (Taylor Burrell Barnett)
Mr Jarrod Ross (Taylor Burrell Barnett)
Ms Jesse Dunbar (Taylor Burrell Barnett)

Item 8.3
Ms Georgina Richmond (SITE planning + design)

Members of the Public / Media

Nil.

1. Opening of Meeting, Welcome and Acknowledgement

The Presiding Member declares the meeting open and acknowledges the traditional owners and pay respects to Elders past and present of the land on which the meeting is being held.

This meeting is being conducted by electronic means (Zoom) open to the public. Members are reminded to announce their name and title prior to speaking.

2. Apologies

Ms Karen Hyde (Deputy Presiding Member)

3. Members on Leave of Absence

Nil.

4. Noting of Minutes

Signed minutes of previous meetings are available on the DAP website.

5. Declarations of Due Consideration

Any member who is not familiar with the substance of any report or other information provided for consideration at the DAP meeting must declare that fact before the meeting considers the matter.

6. Disclosure of Interests

Member	Item	Nature of Interest
Cr Lorna Buchan	8.1	Impartiality Interest – Under clause 2.4.9 of the DAP Code of Conduct, Cr Buchan participated in the prior Council decision in accordance with her functions as a member of a local government. Cr Buchan undertakes to exercise judgment in relation to any DAP application before her, which she will consider on its planning merits.
Cr Mark Jones	8.1	Impartiality Interest – Under clause 2.4.9 of the DAP Code of Conduct, Cr Jones participated in the prior Council decision in accordance with his functions as a member of a local government. Cr Jones undertakes to exercise judgment in relation to any DAP application before him, which he will consider on its planning merits.
Cr Rod Henderson	8.2	Impartiality Interest – Under clause 2.4.9 of the DAP Code of Conduct, Cr Henderson participated in the prior Council decision in accordance with his functions as a member of a local government. Cr Henderson undertakes to exercise judgment in relation to any DAP application before him, which he will consider on its planning merits.
Cr Charlie Zannino	8.2 & 8.3	Impartiality Interest – Under clause 2.4.9 of the DAP Code of Conduct, Cr Zannino participated in the prior Council decision in accordance with his functions as a member of a local government. Cr Zannino undertakes to exercise judgment in relation to any DAP application before him, which he will consider on its planning merits.
Ms Karen Hyde	8.2	Impartiality Interest – Ms Hyde is an employee of the applicant, Taylor Burrell Barnett and therefore has a conflict and must recuse herself from the meeting

7. Deputations and Presentations

7.1 Mr Nik Hidding (Hidding Urban Planning) presenting in support of the recommendation for the application at Item 8.1. The presentation will address the recommendation for approval and conditions.

7.2 Ms Jesse Dunbar (Taylor Burrell Barnett) presenting in support of the recommendation for the application at Item 8.2. The presentation will address support of the application and requesting minor modifications to conditions.

7.3 Ms Georgina Richmond (Site P+D) presenting in support of the recommendation for the application at Item 8.3. The presentation will address support for the recommendation and request a modification to the wording of Condition 11 relating to landscaping.

The City of Rockingham and City of Swan may be provided with the opportunity to respond to questions of the panel, as invited by the Presiding Member.

8. Form 1 – Responsible Authority Reports – DAP Applications

8.1 1-5 (Lot 1887) Linott Close, Baldivis

Development Description:	Child Care Premises
Applicant:	Hidding Urban Planning
Owner:	Danmar Homes Pty Ltd
Responsible Authority:	City of Rockingham
DAP File No:	DAP/22/02334

8.2 Lot 59 Bushmead Road, Hazelmere

Development Description:	Warehouse and Incidental Office Use
Applicant:	Taylor Burrell Barnett
Owner:	The Trust Company (Australia)
Responsible Authority:	City of Swan
DAP File No:	DAP/22/02305

8.3 Lot 152 & 153 Talbot Road, Hazelmere

Development Description:	Proposed Industrial Warehouse and Ancillary Uses
Applicant:	SITE planning + design
Owner:	Perpetual Corporate Trust Limited
Responsible Authority:	City of Swan
DAP File No:	DAP/22/02332

9. Form 2 – Responsible Authority Reports – DAP Amendment or Cancellation of Approval

Nil.

10. State Administrative Tribunal Applications and Supreme Court Appeals

Current SAT Applications				
File No. & SAT DR No.	**LG Name**	**Property Location**	**Application Description**	**Date Lodged**
DAP/18/01543 DR 75/2022	City of Joondalup	Lot 649 (98) O'Mara Boulevard, Iluka	Commercial development	02/05/2022

Current SAT Applications				
File No. & SAT DR No.	**LG Name**	**Property Location**	**Application Description**	**Date Lodged**
DAP/22/02148 DR146/2022	City of Rockingham	Lot 53 (No 67) Folly Road, Baldivis	Proposed place of worship (Hindu Temple)	26/08/2022
DAP/22/02220 DR162/2022	City of Kwinana	Lot 9507 Berthold Street, Orelia	Proposed Child Care Centre	28/09/2022
DAP/22/02159 DR163/2022	Shire of Murray	No. 630 (Lot 137) Pinjarra Road, Furnissdale	Proposed Petrol Filling Station	28/09/2022

11. General Business

In accordance with Section 7.3 of the DAP Standing Orders 2020 only the Presiding Member may publicly comment on the operations or determinations of a DAP and other DAP members should not be approached to make comment.

12. Meeting Closure

Government of **Western Australia**
Development Assessment Panels

Presentation Request Form

Regulation 40(3) and DAP Standing Orders 2020 cl. 3.5

Must be submitted at least 72 hours (3 ordinary days) before the meeting

Presentation Request Guidelines

Persons interested in presenting to a DAP must first consider whether their concern has been adequately addressed in the responsible authority report or other submissions. Your request will be determined by the Presiding Member based on individual merit and likely contribution to assist the DAP's consideration and determination of the application.

Presentations are not to exceed **5 minutes**. It is important to note that the presentation content will be **published on the DAP website** as part of the meeting agenda.

Please complete a separate form for each presenter and submit to daps@dplh.wa.gov.au

Presenter Details

Name	Nik Hidding
Company (if applicable)	Hidding Urban Planning
Please identify if you have any special requirements:	**YES ☐** **NO ☒** If yes, please state any accessibility or special requirements: Click or tap here to enter text.

Meeting Details

DAP Name	MOJDAP/221
Meeting Date	5th January 2023
DAP Application Number	DAP/22/02334
Property Location	Lot 1887 (#1-5) Linott Close, Baldivis
Agenda Item Number	8.1

Presentation Details

I have read the contents of the report contained in the Agenda and note that my presentation content will be published as part of the Agenda:	**YES ☒**
Is the presentation in support of or against the report recommendation)? *(contained within the Agenda)*	**SUPPORT ☒** **AGAINST ☐**
Is the presentation in support of or against the proposed development?	**SUPPORT ☒** **AGAINST ☐**
Will the presentation require power-point facilities?	**YES ☐** **NO ☒** **If yes, please attach**

Government of **Western Australia**
Development Assessment Panels

Presentation Content*

These details may be circulated to the local government and applicant if deemed necessary by the Presiding Member. Handouts or power points will not be accepted on the day.

Brief sentence summary for inclusion on the Agenda	*The presentation will address:* The recommendation for approval and conditions.

In accordance with Clause 3.5.2 of the *DAP Standing Orders*, your presentation request must also be accompanied with a written document detailing the content of your presentation.

Please attach detailed content of presentation or provide below:

Hidding Urban Planning acts for GAMA Capital Pty Ltd in the proposed Child Care Premises at Lot 1887 (#1-5) Linott Close, Baldivis.

The proposed Child Care Premises is planned for a well-located site adjacent to and part of an existing Community Node (Settlers Hill Village Centre) in the suburb of Baldivis. The proposed Child Care Premises will be a perfect fit for the area and is zoned appropriately (zoned “Commercial”) for the development and use intended.

All relevant considerations have been addressed, including car parking (both on-site and on-street, including having a local parking survey conducted), traffic/access, waste management and landscaping design. (We do note however, that some of the submitted material has not been attached to the RAR including the Planning Report, Transport Impact Statement, Acoustic Report, Waste Management Plan, Landscaping Plan and the architect’s Built Form Environment Design Report. It may be of benefit for the City to provide these documents to the DAP to provide the ‘full picture’ of what has been proposed and assessed. I have **attached** the Design Report for quick reference, as it provides the DAP with some important design considerations.)

We have reviewed the City of Rockingham Responsible Authority Report (RAR) and note the **Recommendation for Approval** with conditions which we support. We take this opportunity to thank the City for its assessment and recommendation for this project. We also note that the RAR was presented to the City of Rockingham Council in December 2022 prior to the RAR being submitted to the DAP, and that the Council also fully supported the proposal and endorsed the RAR as recommended by Officers.

We have no issue with any of the recommended Conditions and believe they are reasonable and can be implemented.

Accordingly, we respectfully seek for the proposed Child Care Premises to be approved by the DAP consistent with the recommendation from the City of Rockingham.

I would be happy to take any questions.

Nik Hidding
Director
Hidding.
URBAN PLANNING

BALDIVIS
ELC

01 CONTEX


OSGOOD WAY
CARPENTEUR DRIVE
CRINGLE LANE
LINOTT CLOSE
PEPPER LANE
OSGOOS WAY
CLYDE AVENUE
CLYDE AVENUE
DUDSON STREET
HOCKING BEND
BRENNAN PROMENADE
PUBLIC OPEN SPACE
COMMUNITY PURPOSE
RESIDENTIAL
COMMERCIAL



ADDRESS



ADDRESS



72 CLYDE AVENUE



70 CLYDE AVENUE



2 LINOTT CLOSE



4 LINOTT CLOSE

01 CHARACTER

+ PITCHED ROOFS AND AWNINGS
+ CLEAN, MODERN LINES
+ LANDSCAPED BUFFER BETWEEN BOUNDARY FENCING
+ LARGER GLAZING PANELS WITHIN NEIGHBOURING COMMERCIAL DEVELOPMENT
+ CARPORTS, GARAGES AND PARKING TO THE REAR
+ PAINTED TIMBER BATTENS ALONG FRONT BOUNDARY FENCING

02 LANDSCAPE QUALITY



1 PLAY STRUCTURE

2 ARTS AND CRAFT AREA

3 WATER PLAY

4 TIMBER BRIDGE

5 WOODEN CLIMBING LOGS

6 VERTICAL TIMBER STEPPING LOGS

03 SCALE

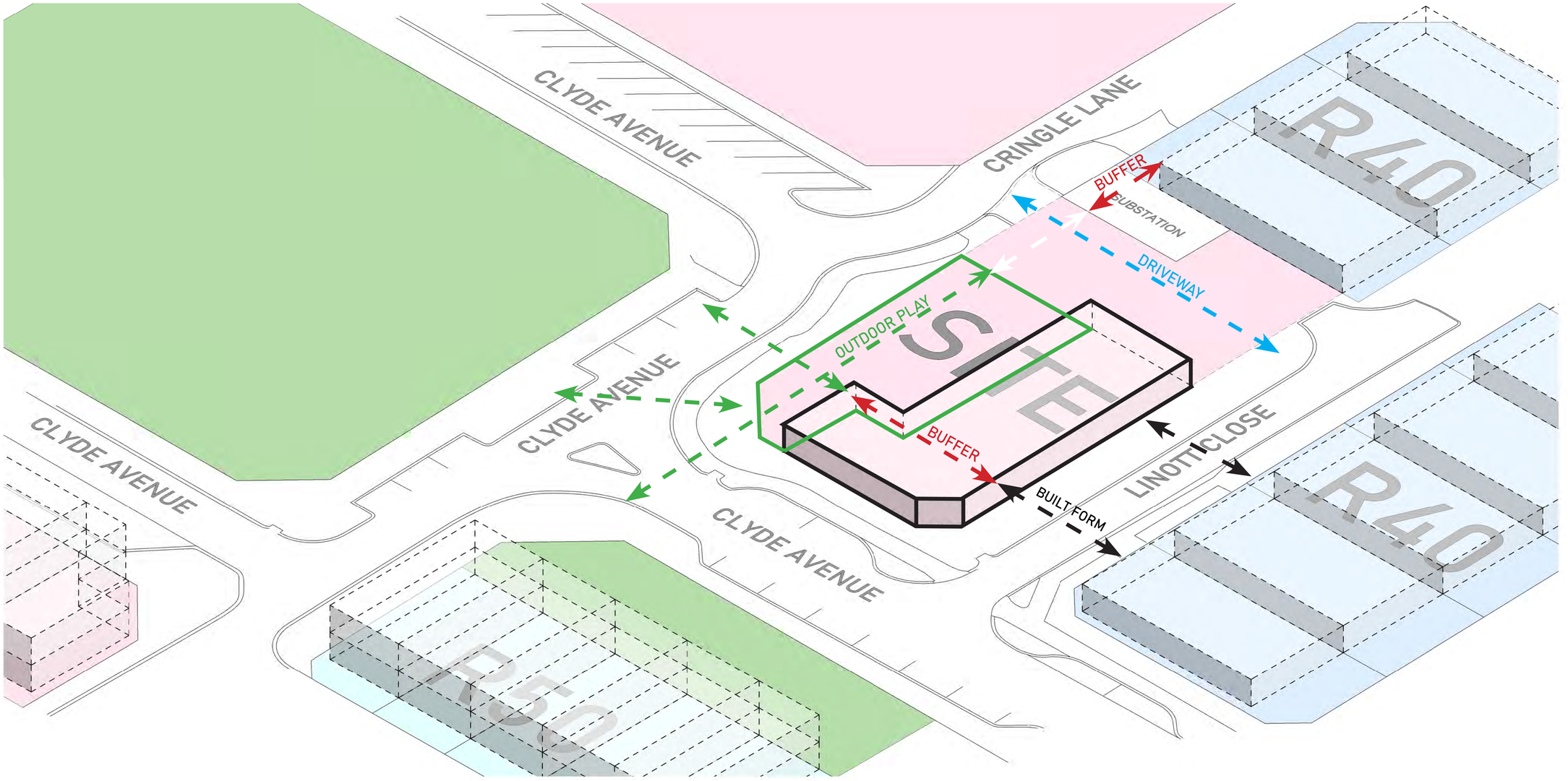
+ THE DEVELOPMENT SITE IS LOCATED ON A CORNER WITH 3 STREET FRONTAGES AND A SHARED BOUNDARY BETWEEN A RESIDENTIAL LOT.

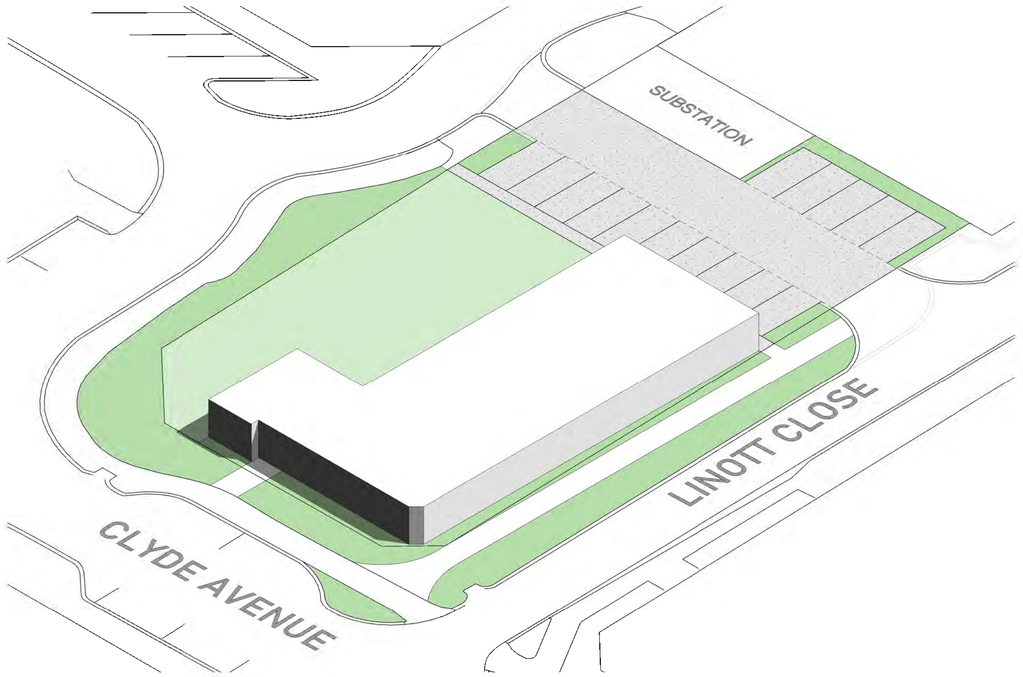
+ THE SURROUNDING AREA HAS A NUMBER OF DIFFERENT ZONINGS- SINGLE STOREY R40 AND DOUBLE STOREY R50 RESIDENTIAL LOTS AS WELL AS TWO STOREY + COMMERCIAL AREAS.

+ THE DESIGN OF THE CHILD CARE CENTRE IS A SINGLE STOREY DEVELOPMENT WHICH IS IN-KEEPING WITH THE IMMEDIATE SURROUNDING CONTEXT

+ THE OUTDOOR PLAY AREA IS ORIENTATED IN THE DIRECTION OF THE PUBLIC OPEN SPACE AND AWAY FROM THE RESIDENTIAL ZONE

+ THE BUILT-FORM IS ORIENTATED ADJACENT TO THE SINGLE STOREY HOMES ALONG LINOTT CLOSE- THESE HOUSES ARE SET CLOSE TO THE FRONT BOUNDARY WITH ALL CARPORTS AND GARAGE ENTRY AT THE REAR OF THE PROPERTY





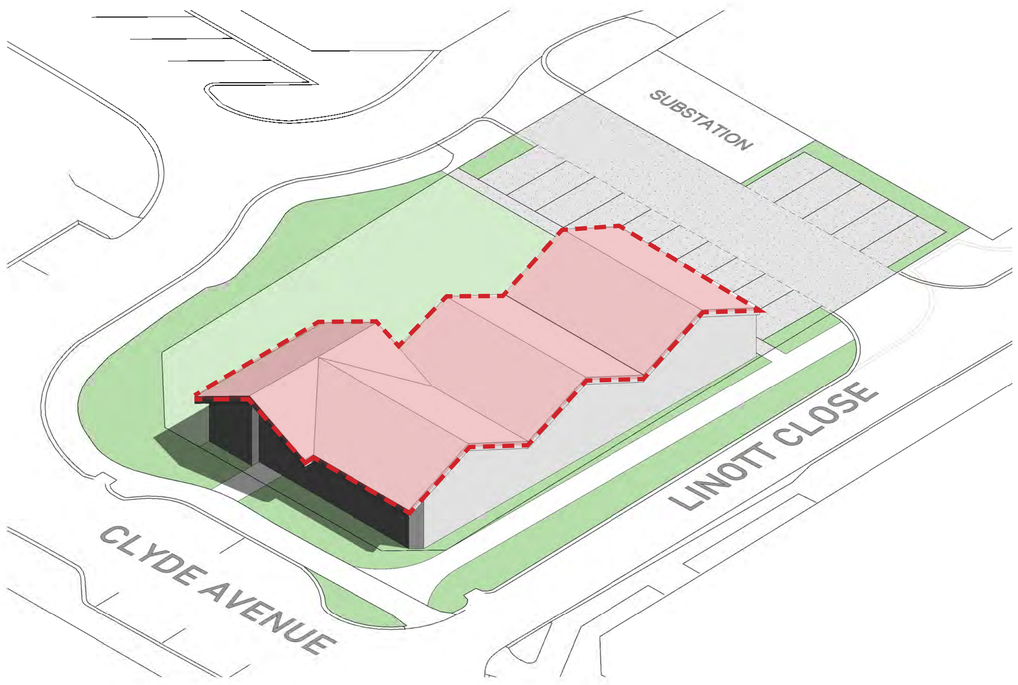
03 BUILT FORM

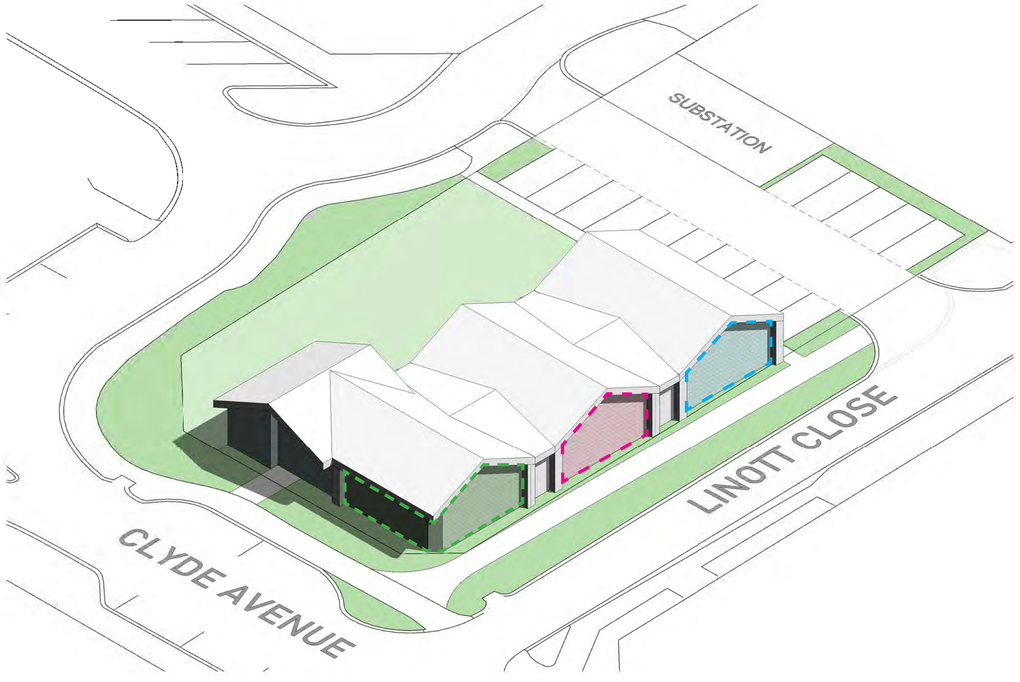
+ THE BUILT FORM HAS BEEN LOCATED ALONG THE NOISE SENSITIVE BOUNDARY TO AID IN ACOUSTIC PROTECTION TO THE NEARBY HOUSES

+ THE OUTDOOR PLAY AREA IS ORIENTATED IN THE DIRECTION OF THE PUBLIC OPEN SPACE

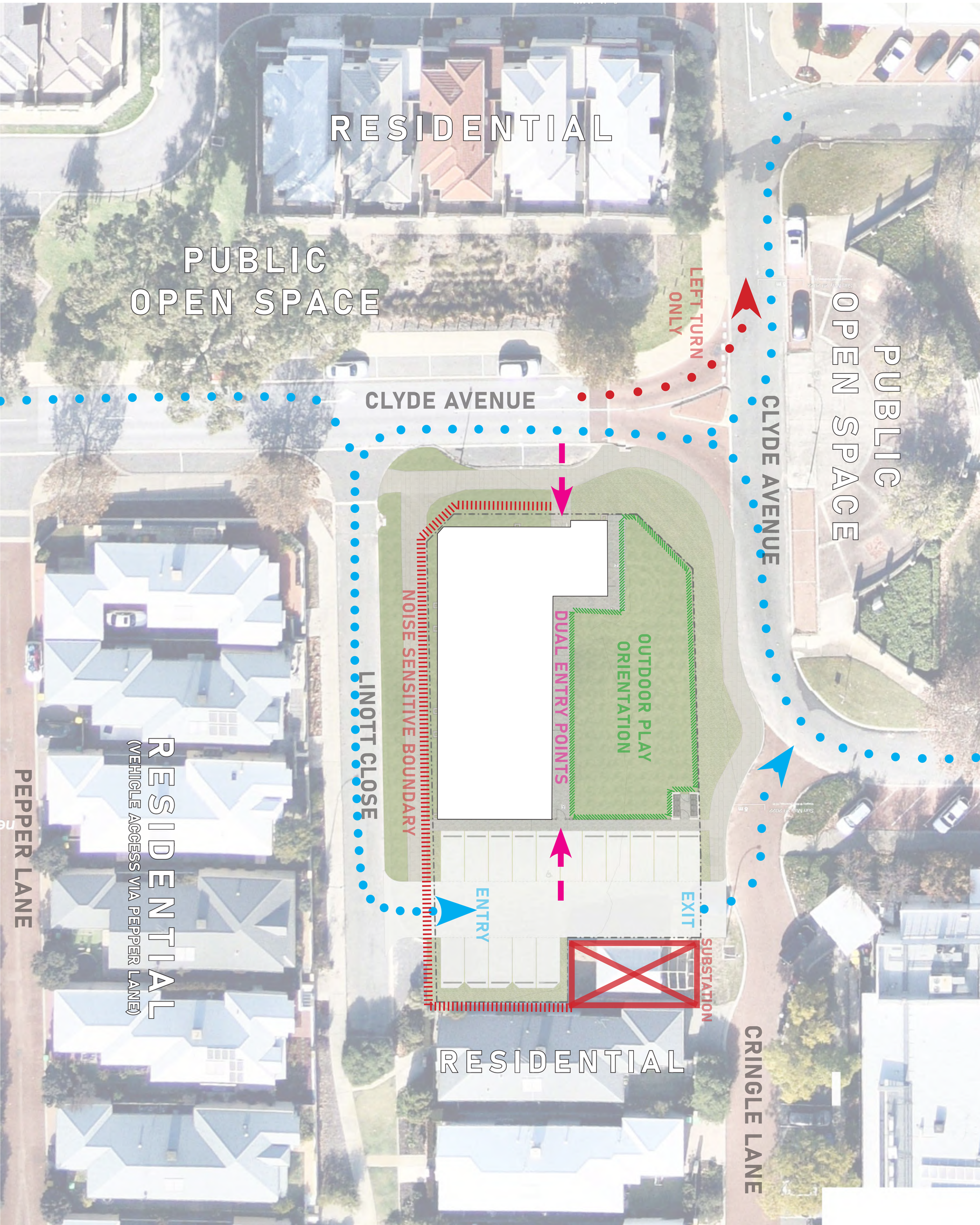
+ THE BUILD FORM HAS BEEN REFINED BY THE INCLUSION OF A SERIES OF PITCHED ROOFS TO REFLECT NEIGHBOURING DEVELOPMENTS

+ FURTHER ARTICULATION HAS BEEN INCORPORATED WITH BREAKS BETWEEN THE SERIES OF PITCHES, WHICH DRAWS A CONNECTION TO THE RESIDENCES ALONG CLYDE STREET





04 FUNCTIONALITY









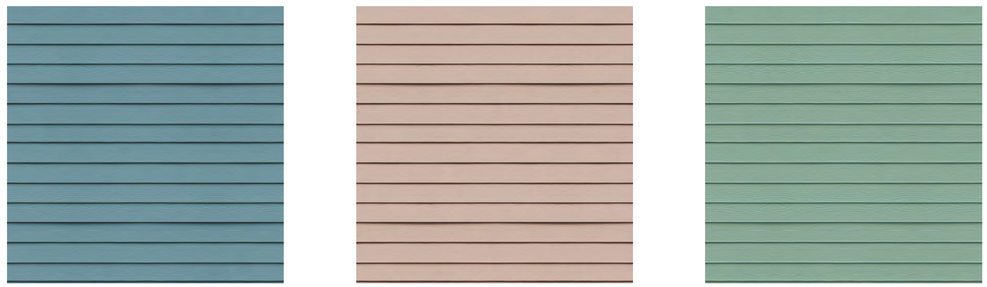
04 BUILD QUALITY

+ A SELECTION OF HIGH QUALITY MATERIALS HAVE BEEN CHOSEN FOR THE EXTERNAL AND INTERNAL FINISHES

+ THE OUTDOOR PLAY WILL CONSIST OF NATURE PLAY THEMED ELEMENTS TO FURTHER ENHANCE THE DEVELOPMENT

+ A GENEROUS LANDSCAPED AREA HAS BEEN INTEGRATED TO SOFTEN THE INTERFACE ALONG THE STREET FRONTAGES

+ THE CAR PARK AND BUILT FORM HAVE BEEN ORIENTATED TOWARDS THE RESIDENTIAL R40 ZONES TO CREATE A ACOUSTIC BUFFER BETWEEN THE OUTDOOR PLAY



PAINTED WEATHERBOARD CLADDING (VARIOUS)



LANDSCAPING



GLAZING PANELS

05 SUSTAINABILITY

+ THE LANDSCAPING PROPOSAL HAS A SELECTION OF DROUGHT TOLERANT PLANTS AND IRRIGATION SOURCES THAT WILL MINIMISE WATER USAGE.

+ INTERNALLY, ALL INDOOR PLAY AREAS HAVE ACCESS TO NATURAL LIGHT TO HELP MINIMISE ENERGY USAGE

+ THE STRUCTURE OF THE ROOF IS INTENDED TO BE FUTURE-PROOFED FOR THE INSTILLATION OF SOLAR PANELS

06 AMENITY

+ THE DEVELOPMENT PROVIDES A MUCH NEEDED CHILD CARE FACILITY IN THE AREA

+ DESIGNED ON A LARGE BLOCK THAT ALLOWS A SINGLE LEVEL DEVELOPMENT TO FIT IN THE EXISTING SCALE OF THE NEIGHBOURHOOD

+ THE LARGE INTERIOR AND EXTERNAL PLAY AREAS HAVE THE ABILITY TO BE CONFIGURED IN A VARIETY OF WAYS WHICH ALLOWS FOR A FLEXIBLE ENVIRONMENT

+ A CONSIDERABLE LANDSCAPING STRIP HAS BEEN PROVIDED AROUND THE DEVELOPMENT TO CREATE A BUFFER BETWEEN THE NEIGHBOURING LOTS AND THE BUILT FORM





07 LEGIBILITY

+ DUAL ACCESS INTO THE CENTRE HAS BEEN PROVIDED- A PEDESTRIAN ENTRY FROM CLYDE AVENUE AND AN ADDITIONAL ENTRY POINT FROM THE REAR CARPARK

+ LIGHTING HAS BEEN INCORPORATED INTO THE DEVELOPMENT WHICH ILLUMINATES THE PATHS INTO THE CENTRE.

+ THE CARPARK HAS CLEARLY MARKED KEEP CLEAR ZONES AND A WELL DEFINED FOOTPATH CONNECTING CRINGLE LANE TO LINOTT CLOSE

+ THE CROSSOVER INTO THE DEVELOPMENT IS LOCATED WITHIN CLOSE PROXIMITY TO THE EXISTING CROSSOVER LOCATION WHICH WILL AID WAY FINDING

08 SAFETY

+ THE FENCING DESIGN ALONG CRINGLE LANE AND CLYDE AVENUE, AND THE DESIGN OF THE LARGE GLAZED PORTION OF THE BUILDING ALLOWS FOR PASSIVE SURVEILLANCE

+ LIGHTING HAS BEEN INTEGRATED INTO THE DEVELOPMENT TO PROVIDE A SAFER ENVIRONMENT DURING THE MONTHS OF LATE SUNRISE AND EARLY SUNSET

09 COMMUNITY

+ THE ESTABLISHMENT OF A HIGH QUALITY CHILD CARE CENTRE IS A MUCH NEEDED SERVICE IN THE COMMUNITY

+ A VAST LANDSCAPING STRIP HAS BEEN PROVIDED AROUND THE DEVELOPMENT TO CONTRIBUTE TO THE ATTRACTIVENESS OF THE NEIGHBOURHOOD

10 AESTHETICS







Government of **Western Australia**
Development Assessment Panels

Presentation Request Form

Regulation 40(3) and DAP Standing Orders 2020 cl. 3.5

Must be submitted at least 72 hours (3 ordinary days) before the meeting

Presentation Request Guidelines

Persons interested in presenting to a DAP must first consider whether their concern has been adequately addressed in the responsible authority report or other submissions. Your request will be determined by the Presiding Member based on individual merit and likely contribution to assist the DAP's consideration and determination of the application.

Presentations are not to exceed **5 minutes**. It is important to note that the presentation content will be **published on the DAP website** as part of the meeting agenda.

Please complete a separate form for each presenter and submit to daps@dplh.wa.gov.au

Presenter Details

Name	Jesse Dunbar
Company (if applicable)	Taylor Burrell Barnett
Please identify if you have any special requirements:	**YES** ☐ **NO** ☒ If yes, please state any accessibility or special requirements: Click or tap here to enter text.

Meeting Details

DAP Name	MOJDAP/221
Meeting Date	5 January 2023
DAP Application Number	DAP/22/02305
Property Location	Lot 59 Bushmead Road, Hazelmere
Agenda Item Number	8.2

Presentation Details

I have read the contents of the report contained in the Agenda and note that my presentation content will be published as part of the Agenda:	**YES** ☒
Is the presentation in support of or against the report recommendation)? *(contained within the Agenda)*	**SUPPORT** ☒ **AGAINST** ☐
Is the presentation in support of or against the proposed development?	**SUPPORT** ☒ **AGAINST** ☐
Will the presentation require power-point facilities?	**YES** ☒ **NO** ☐ **If yes, please attach**

Government of **Western Australia**
Development Assessment Panels

Presentation Content*

These details may be circulated to the local government and applicant if deemed necessary by the Presiding Member. Handouts or power points will not be accepted on the day.

Brief sentence summary for inclusion on the Agenda	*The presentation will address:* Presenting in support of the application and requesting minor modifications to conditions.

In accordance with Clause 3.5.2 of the *DAP Standing Orders*, your presentation request must also be accompanied with a written document detailing the content of your presentation.

Please attach detailed content of presentation or provide below:

Refer to attached presentation summary.

PRESENTATION SUMMARY

Subject	Presentation in support of Item 8.2 (MOJDAP/221) – Proposed Warehouse and Incidental Office Use – Lot 59 Bushmead Road, Hazelmere
Date	5 January 2023
DAP Reference	DAP/22/02305
To	Presiding Member, Metro Outer Joint Development Assessment Panel
From	Jesse Dunbar, Taylor Burrell Barnett

Dear Panel Members,

I refer to item 8.2 of Meeting 221 of Metro Outer Joint Development Assessment Panel scheduled for consideration on 5 January 2023. On behalf of my client, Altis Property Partners, I confirm we are supportive of the responsible authority recommendation, and wish to make a brief deputation at Item 7 of the meeting.

The following sets out the content of my presentation.

Application overview

- **We have reviewed the Responsible Authority Report and are supportive of the recommendation and the vast majority of the recommended conditions.** Since lodgement in August 2022, we have worked with the City's planning officers through their assessment of our application to ensure an appropriate development outcome for the site.
- The site is located in the broader Hazelmere industrial area which is being progressively developed for industrial purposes in accordance with the vision established under the Hazelmere Enterprise Area Structure Plan.
- The development proposes a warehouse of approximately 13,500m^2, which can be split internally to form two tenancies which are flanked by incidental office buildings with staff amenities, car parking, truck loading docks and high-quality landscaping. The development is broadly compliant with the City's planning framework, and is an entirely suitable use for this site with convenient access to key freight routes.
- The proposal is supported by a range of technical inputs which inform the design and management of the development to ensure it operates appropriately in the context of the surrounding area, with no adverse impacts in terms of noise, waste and traffic generation. The proposal will complement the existing and recently approved industrial development in the immediate area.
- **Whilst we are broadly satisfied with the City's recommended conditions, there are two minor modifications which we are seeking the Panel's support for.** These are summarised below.

Condition 12

- Council, at its meeting on 14 December 2022, resolved to modify the officer's recommended Condition 12 relating to landscaping. In essence, the condition recommended by Council requires Marri trees to be planted within the entry 'boulevard' into the site, as opposed to the Illawarra Flame Trees and Red Flowering Gums as currently depicted on the landscape plans.
- The landscaping proposal includes a mix of complementary planting, with low and medium height foliage combined with tree planting to provide an enhanced screening function along the entry boulevard and site frontage. The suggested species of Red Flower Gum and Illawarra Flame Tree are medium tree species, and have been selected from the City of Swan's Tree Guidelines.
- Whilst the proponent is committed to increasing the number of Marri's accommodated on site to the extent possible, the location for additional Marri's as suggested by Council is problematic due to potential impacts on the adjacent ATU area, hardstand areas and in-ground service areas.

- It is noted the officer recommended Condition 12 requires trees planted to the front of the warehouse to be Marri, which is able to be considered at the detailed design stage post-approval. This still achieves Council's desire to increase the number of Marri's within the site.
- **We request the panel members support our request to replace Condition 12 as per the Officer Recommendation.**

Council Recommended Condition 12 (as contained in the Responsible Authority Report)	**Officer Recommended Condition 12 (as agreed by the applicant)**
Prior to submission for a Building Permit the applicant/owner shall submit to the satisfaction of the City of Swan a modified Landscape Plan that: a) Provides for an area of 2,905m2 for landscaping purposes, this being 10.1% of the site area of 28, 696m2; and b) Incorporates Corymbia callophylla trees as opposed to the Illawarra Flame Tree (Brachychiton acerifolius) and Corymbia ficifolia as depicted in the submitted Landscape Plan. The approved Landscape Plan must be implemented within the first available planting season after the initial occupation of the development and maintained thereafter to the satisfaction of the City of Swan. Where Corymbia callophylla trees fail to establish within the first (2) planting seasons following implementation they must be replaced, any other plantings must be replaced in consultation with the City of Swan.	Prior to a building permit being issued, a detailed landscaping plan for the subject site and/or the road verge(s) must be submitted to and approved by the City of Swan, and must include the following: a) The location, number, size and species type of existing ground covers, shrubs and trees; b) Trees planted in the landscaped area to the front of the warehouse are to be marri *(corymbia calophylla);* c) Any existing landscape areas to be retained; d) Those areas to be updated, reticulated or irrigated; and e) Verge treatments. The approved Landscape Plan must be implemented within the first available planting season after the initial occupation of the development and maintained thereafter to the satisfaction of the City of Swan. Where Corymbia callophylla trees fail to establish within the first (2) planting seasons following implementation they must be replaced, any other plantings must be replaced in consultation with the City of Swan.

Condition 18

- We request a minor modification to Condition 18 relating to public art. Point a) of the condition requires the payment of cash-in-lieu prior to commencement of operation **or** prior to the issuance of building permit, whichever occurs first.
- Given the sequencing of events, this essentially means payment would need to be made prior to the issuance of building permit, given this would occur prior to occupation.
- This is inconsistent with the wording of the first part of this condition, which refers to the public art contribution being made prior to commencement of operation:

  Prior to the commencement of operation, the landowner must contribute a sum of 1% of the total development construction value toward Public Art …
- In reviewing the City's Provision of Public Art local planning policy (POL-LP-1-10), we note it is silent on timing for payment of cash-in-lieu, but where provided in-kind, public art is to be commissioned and installed prior to initial occupation of the development.
- We therefore request point a) of Condition 18 be modified to require the payment of cash-in-lieu prior to the commencement of operation.
- The suggested modification provides greater flexibility for the proponent to determine whether they will be providing public art or a cash-in-lieu payment as detailed design and construction progresses, rather than requiring this decision and payment at the building permit stage.
- **We request the panel members support our request to modify Condition 18 as set out below.**

City's Recommended Condition 18	**Requested Condition 18 Wording**
Prior to the commencement of operation, the landowner must contribute a sum of 1% of the total development construction value toward Public Art in accordance with the City of Swan Local Planning Policy for the Provision of Public Art (POL-LP-1.10), by either: a. Payment to the City of a cash-in-lieu amount equal to the sum of the 1% contribution amount ($130,000). This must be paid to the City of Swan prior to the commencement of operation, or prior to the issuance of a building permit for the approved development, whichever occurs first; or b. Provision of Public Art on-site to a minimum value of the 1% contribution amount ($130,000). The following is required for the provision of Public Art on-site: i. the landowner or applicant on behalf of the landowner must seek approval from the City for a specific Public Art work including the artist proposed to undertake the work	Prior to the commencement of operation, the landowner must contribute a sum of 1% of the total development construction value toward Public Art in accordance with the City of Swan Local Planning Policy for the Provision of Public Art (POL-LP-1.10), by either: a. Payment to the City of a cash-in-lieu amount equal to the sum of the 1% contribution amount ($130,000). This must be paid to the City of Swan prior to the commencement of operation~~, or prior to the issuance of a building permit for the approved development, whichever occurs first~~; or b. Provision of Public Art on-site to a minimum value of the 1% contribution amount ($130,000). The following is required for the provision of Public Art on-site: i. the landowner or applicant on behalf of the landowner must seek approval from the City for a specific Public Art work including the artist proposed to undertake the work

to the satisfaction of the City in accordance with POL-LP-1.10 and the Developers' Handbook for Public Art (as amended). The City may apply further conditions in regard to the proposed Public Art; ii. no part of the approved development may be occupied or used until the Public Art has been installed in accordance with the approval granted by the City; and, The approved Public Art must be maintained in compliance with the approval granted by the City and any conditions thereof, to the satisfaction of the City.	to the satisfaction of the City in accordance with POL-LP-1.10 and the Developers' Handbook for Public Art (as amended). The City may apply further conditions in regard to the proposed Public Art; ii. no part of the approved development may be occupied or used until the Public Art has been installed in accordance with the approval granted by the City; and, The approved Public Art must be maintained in compliance with the approval granted by the City and any conditions thereof, to the satisfaction of the City.

Summary

In summary, we support the Responsible Authority Recommendation that the application be approved, and respectfully request the DAP supported the suggested minor modifications Conditions 12 and 18 as detailed above.
I look forward to presenting to you at the DAP meeting on 5 January 2023.

TAYLOR BURRELL BARNETT

JESSE DUNBAR
ASSOCIATE

Taylor Burrell Barnett



Lot 59 Bushmead Road, Hazelmere

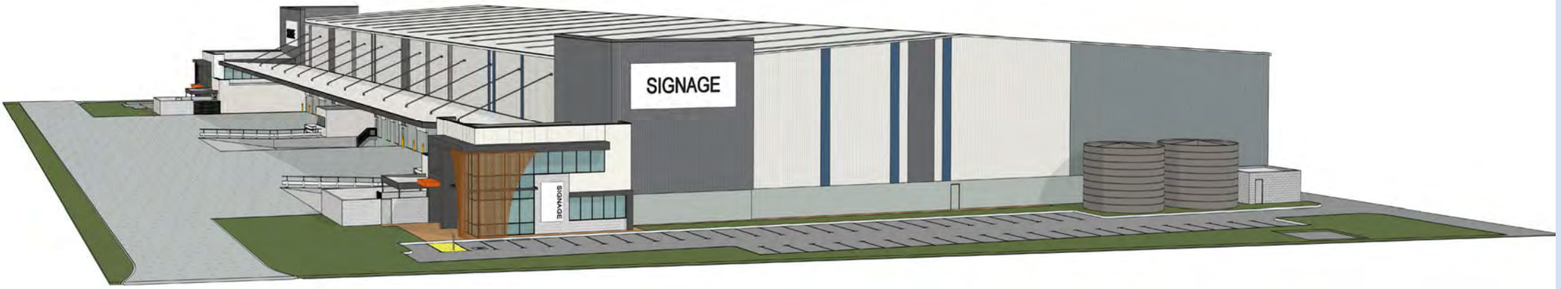
Proposed Warehouse and Incidental Office Use



Presented by: **Jesse Dunbar**

05/01/2023

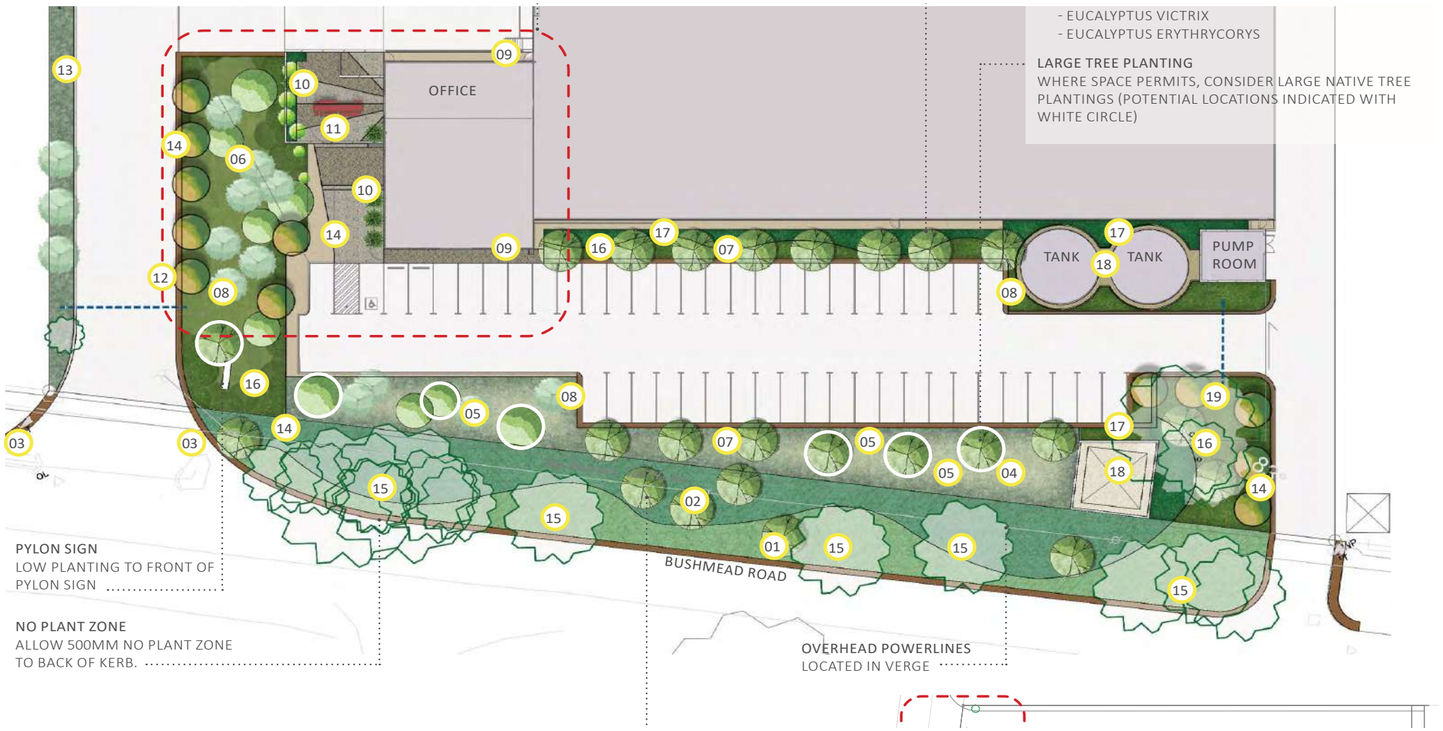
Overview



- We have reviewed the Responsible Authority Report and are supportive of the recommendation and the vast majority of the recommended conditions.
- We request minor modifications to recommended Conditions 12 and 18.

Condition 12 - Landscaping

- **Request - Condition 12 be replaced.**
- Replace Council recommended Condition 12 with Officer recommended wording.
- Requested condition wording achieves Council's desire to increase the number of Marri's within the site.



ENTRY 'BOULEVARD' TREE

PROPOSED TREE PLANTING
- 45L SIZE or 200L SIZE
- SPECTACULAR FLOWERS OR LEAVES DURING VARIOUS SEASON



Red Flowering Gum
Corymbia ficifolia
10m (h) x 6m (w)
*(Medium Tree)**



Illawarra Flame Tree
Brachychiton acerifolius
15m (h) x 8m (w)
*(Medium Tree)**

LARGE NATIVE TREES

PROPOSED TREE PLANTING
- 45L SIZE or 200L SIZE
- TO BE USED SPARINGLY DUE TO LARGE SIZE. SELECT FEATURE LOCATIONS



Flooded Gum
Eucalytpus rudis
25m (h) x 8m (w)
*(Large Tree)**



Marri
Corymbia calophylla
40m (h) x 16m (w)
*(Very Large Tree)**

** Information from City of Swan Tree Guidelines Appendix A and B*

Taylor Burrell Barnett

Condition 18 - Public Art

- **Request - Condition 18 be modified.**

- Enable cash-in-lieu to be paid prior to commencement of operation.

- Allows additional time for proponent to determine whether public art or cash-in-lieu will be provided as detailed design progresses.



Conclusion



- We very much appreciate the recommendation and collaborative efforts of the City of Swan.
- We would be happy to answer any questions of the panel.

Taylor Burrell Barnett

Government of **Western Australia**
Development Assessment Panels

Presentation Request Form

Regulation 40(3) and DAP Standing Orders 2020 cl. 3.5

Must be submitted at least 72 hours (3 ordinary days) before the meeting

Presentation Request Guidelines

Persons interested in presenting to a DAP must first consider whether their concern has been adequately addressed in the responsible authority report or other submissions. Your request will be determined by the Presiding Member based on individual merit and likely contribution to assist the DAP's consideration and determination of the application.

Presentations are not to exceed **5 minutes**. It is important to note that the presentation content will be **published on the DAP website** as part of the meeting agenda.

Please complete a separate form for each presenter and submit to daps@dplh.wa.gov.au

Presenter Details

Name	Georgina Richmond
Company (if applicable)	SITE planning + design
Please identify if you have any special requirements:	**YES ☐** **NO ☒** If yes, please state any accessibility or special requirements: Click or tap here to enter text.

Meeting Details

DAP Name	MOJDAP/221
Meeting Date	5 January 2023
DAP Application Number	DAP/22/02332
Property Location	Lot 152 + 153 Talbot Road, Hazelmere
Agenda Item Number	8.3

Presentation Details

I have read the contents of the report contained in the Agenda and note that my presentation content will be published as part of the Agenda:	**YES ☒**
Is the presentation in support of or against the report recommendation)? *(contained within the Agenda)*	**SUPPORT x AGAINST** **But with a request to modify recommended condition 11 relating to landscaping**
Is the presentation in support of or against the proposed development?	**SUPPORT ☒ AGAINST ☐**

Will the presentation require power-point facilities?	**YES** ☐ **NO** ☒ **If yes, please attach**

Presentation Content*

These details may be circulated to the local government and applicant if deemed necessary by the Presiding Member. Handouts or power points will not be accepted on the day.

Brief sentence summary for inclusion on the Agenda	*The presentation will address:* SITE planning + design will confirm support for the recommendation to approved the proposed development and request a modification to the wording of Condition 11 relating to landscaping.

In accordance with Clause 3.5.2 of the *DAP Standing Orders*, your presentation request must also be accompanied with a written document detailing the content of your presentation.

Please attach detailed content of presentation or provide below:

Refer to attached letter dated 2 January 2023

2 January 2023

Our Ref: 22-007 HAZ / 230102 22-007 HAZ lt Metro Outer JDAP Presentation Request - Modification to Conditions

Metropolitan Outer Joint Development Assessment Panel
Development Assessment Panels Secretariat
C/o Department of Planning Lands and Heritage
Locked Bag 2506
PERTH WA 6001

Attention: Presiding Member, Metropolitan Outer Joint Development Assessment Panel

METRO OUTER JDAP – REQUEST TO MODIFY CONDITION
PLANNING APPLICATION – PROPOSED INDUSTRIAL WAREHOUSE DEVELOPMENT (DAP/22/02332)
LOTS 152 + 153 TALBOT ROAD, HAZELMERE

SITE planning + design act on behalf of LOGOS Property Group and the Perpetual Corporate Trust Ltd (the registered landowner) in relation to the proposed industrial warehouse development on Lots 152 and 153, Talbot Road Hazelmere.

On behalf of our clients, we can confirm our support for the City's of Swan's recommendation to approve the proposed development and we respectfully seek Metro Outer JDAP and the City of Swan's support to modify draft Condition 11, as outlined below:

REQUEST FOR MODIFICATION TO DRAFT CONDITION 11

Draft Condition No. 11 reads:

> *"Prior to submission for a Building Permit the applicant/owner shall submit to the satisfaction of the City of Swan a modified Landscape Plan that:*
>
> 1. *Provides for an area of 3,755m2 for landscaping purposes, this being 10% of the site area of 37,550m2 ; and*
> 2. *Incorporates Corymbia callophylla trees as opposed to the Magnolia 'Teddy Bear', Callistamon and Corymbia ficifolia as depicted in the submitted Landscape Plan.*

The approved Landscape Plan must be implemented within the first available planting season after the initial occupation of the development and maintained thereafter to the satisfaction of the City of Swan. Where Corymbia callophylla trees fail to establish within the first (2) planting seasons following implementation they must be replaced, any other plantings must be replaced in consultation with the City of Swan"

We seek a modified condition to reflect the original officer recommendation to City of Swan Council, as follows:

> *"The approved landscaping plan and reticulation plan must be implemented within the first available planting season after the initial occupations of the development, and maintained thereafter, to the satisfaction of the City of Swan. Any species that fails to establish within the first two (2) planting seasons following implementation must be replaced in consultation with, and to the satisfaction of the City of Swan."*

The development proposes 2,790m^2 of landscaping, which equates to a 7.43% of the development site in lieu of the 3,755 or 10% requirement.

This reduction was sought, justified and supported by city planning officers based on the following –

- The development site is located behind another proposed warehouse that is currently under construction for Inghams (DAP/22/02258) and has no frontage to Talbot Road other than the vehicle accessway.

- Landscaping of industrial sites is typically concentrated along the street boundaries to help soften the development as viewed from the street and within carparking areas at a rate of 10% of the total site area.

- The Inghams development (DAP/22/02258) includes a 9m wide landscaping strip to the street frontage which significantly wider than the 3m minimum Policy requirement.

- As the site does not front a street, the design provides for 7.43% landscaping which is focused around providing sustainable, functional and high quality landscaping to complement the office buildings and entries, around car parking areas, in the large islands that separate the one-way shared vehicle access from the truck hardstand areas.

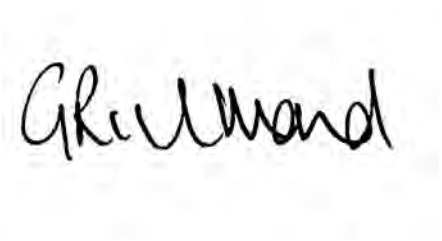
- The species selected and depicted on the landscape plan have been selected as they are fast growing, will provide shade, reduce glare, soften the development and provide wildlife habitat. All species are on the City approved species list.

- To address Council concerns our client is happy to also include Corymbia callophylla in the overall landscape design.

We look forward to the JDAP's approval to this application with modified condition as detailed above and will be available to answer any questions at the Metro Outer JDAP meeting on January 5, 2023.

Should you have any queries regarding the content of this letter, please do not hesitate to contact the undersigned on 0433986883 or by email at georgina@sitepd.com.au.

PRINCIPAL TOWN PLANNER



LINOTT CLOSE, 1-5, (LOT 1887) BALDIVIS - CHILD CARE PREMISES

Form 1 - Responsible Authority Report
(Regulation 12)

DAP Name:	Metro Outer Joint Development Assessment Panel	
Local Government Area:	City of Rockingham	
Applicant:	Ni Hidding c/- Hidding Urban Planning	
Owner:	Danmar Homes Pty Ltd	
Value of Development:	$2.015 Million ☐ Mandatory (Regulation 5) ☒ Opt In (Regulation 6)	
Responsible Authority:	City of Rockingham	
Authorising Officer:	Mr Peter Ricci, Director Planning and Development Services	
LG Reference:	DD020.2022.00000224	
DAP File No:	DAP/22/02334	
Application Received Date:	27 September 2022	
Report Due Date:	21 December 2022	
Application Statutory Process Timeframe:	90 Days	
Attachment(s):	1. Development Plans 2. Schedule of Submissions	
Is the Responsible Authority Recommendation the same as the Officer Recommendation?	☒ Yes ☐ N/A	Complete Responsible Authority Recommendation section
	☐ No	Complete Responsible Authority and Officer Recommendation sections

Responsible Authority Recommendation

That the Metro Outer Joint Development Assessment Panel resolves to:

1. **Approve** DAP Application reference DAP/22/02334 and accompanying plans listed below in accordance with Clause 68 of Schedule 2 (Deemed Provisions) of the *Planning and Development (Local Planning Schemes) Regulations 2015*, and the provisions of the City of Rockingham Town Planning Scheme No.2, subject to the following conditions:

   - Ground Floor Plan - Drawing No. A101; Rev B, and dated 5 August 2022;
   - Roof Plan - Drawing No. A102; Rev B and dated 5 August 2022;
   - Elevations - Drawing No. A103; Rev B and dated 5 August 2022.

Conditions

1. Pursuant to clause 26 of the Metropolitan Region Scheme, this approval is deemed to be an approval under clause 24(1) of the Metropolitan Region Scheme.

2. This decision constitutes planning approval only and is valid for a period of 4 years from the date of approval. If the subject development is not substantially commenced within the specified period, the approval shall lapse and be of no further effect.

3. No more than sixty one (61) children are to be accommodated by the Child Care Premises.

4. No more than ten (10) staff are permitted at the Child Care Premises at any time.

5. The Child Care Premises must only operate between the hours of 6:30am to 6:30pm, Monday to Friday, with children not permitted in the open space areas before 7:00am.

6. Prior to applying for a Building Permit, a Stormwater Management Plan must be prepared by a suitably qualified engineering showing how stormwater will be contained on-site and those plans must be submitted to the City of Rockingham for its approval. All stormwater generated by the development must be managed in accordance with Planning Policy 3.4.3 - Urban Water Management to the satisfaction of the City of Rockingham. The approved plans must be implemented and all works must be maintained for the duration of the development.

7. Prior to the commencement of works a Construction Management Plan must be submitted and approved by the City of Rockingham. The Construction Management Plan shall include, but not be limited to, the following:

   (i) A Dust, Noise and Vibration Management Plan;

   (ii) Detail how access roads to and all trafficable areas on the site/s will be treated and maintained to prevent or minimise the generation of airborne dust;

   (iii) How any stockpiles on site/s are to be managed;

   (iv) Construction waste disposal strategy and location of waste disposal bins;

   (v) How materials and equipment will be delivered and removed from the site/s; and

   (vi) A Traffic Management Strategy for the duration of the project, including the locations of all car parking and loading areas to be used, the duration and frequency of use of these areas and any exemption requests.

   All works must be carried out in accordance with the approved Construction Management Plan and maintained at all times, for duration of the development.

8. Prior to the occupation of the development, the existing crossover must be removed and the verge, footpath, kerbing and landscaping must be reinstated to the satisfaction of the City of Rockingham.

9. A 2.0m wide footpath connecting to the existing footpath network, extending along Linott Close to the southern side of the proposed vehicle crossover to the City's standard specifications shall be provided. A pram ramp will be required for the connection to the western side of Linott Close to connect to the existing footpath network to the City of Rockingham standard specifications.

10. The crossover shall be designed and constructed in accordance with the City of Rockingham Commercial Crossover Specifications.

11. Pavement markings and signage shall be provided restricting all vehicle access from Linott Close to 'entry only (no exit)', to the satisfaction of the City of Rockingham.

12. The carpark must:

    (i) provide a minimum of 15 car parking spaces;

    (ii) be designed, constructed, sealed, kerbed, drained and marked in accordance with User Class 3 of Australian/New Zealand Standard AS/NZS 2890.1:2004, Parking facilities, Part 1: Off-street car parking prior to applying for a Building Permit;

    (iii) provide one (1) these car parking spaces as a space dedicated to people with disabilities, which are designed, constructed, sealed, kerbed, drained and marked in accordance with Australian/New Zealand Standard AS/NZS 2890.6:2009, Parking facilities, Part 6: Off-street parking for people with disabilities and which are linked to the main entrance of the development by a continuous accessible path of travel designed and constructed in accordance with Australian Standard AS 1428.1—2009, Design for access and mobility, Part 1: General Requirements for access—New building work;

    (iv) be constructed, sealed, kerbed, drained and clearly marked prior to the development being occupied and maintained thereafter;

    (v) have lighting installed, prior to the occupation of the development, to the satisfaction of the City of Rockingham; and

    (vi) confine all illumination to the land in accordance with the requirements of Australian Standard AS 4282-2019, Control of the obtrusive effects of outdoor lighting, at all times.

13. Car parking shall be managed for the duration of the development in accordance with the Parking Restriction Plan contained within the Environmental Acoustic Assessment, prepared by Herring Storer Acoustics (Job No. 2244) and dated August 2022.

14. In accordance with City of Rockingham Planning Policy 3.3.14 - *Bicycle parking and End of Trip Facilities*, four (4) bicycle parking spaces must be provided for the development. The bicycle parking spaces must be designed in accordance with *AS2890.3—1993, Parking facilities, Part 3: Bicycle parking facilities* and must be approved by the City of Rockingham prior to applying for a Building Permit and constructed prior to occupancy of the development. The bicycle parking spaces must be retained and maintained in good and safe condition for the duration of the development.

15. Prior to applying for a Building Permit, an amended Waste Management Plan generally in accordance with *Waste Management Plan (Ref No. 2513-01) prepared by Hidding Urban Planning and dated 2 November 2022* must be prepared and include the following detail to the satisfaction of the City of Rockingham:

(i) the location of bin storage areas and bin collection areas;

(ii) the number, volume and type of bins, and the type of waste to be placed in the bins;

(iii) management of the bins and the bin storage areas, including cleaning, rotation and moving bins to and from the bin collection areas; and

(iv) frequency and timing of bin collections of which are to be conducted outside of operating hours only and preferably outside of residential waste collection in the immediate locality.

All works must be carried out in accordance with the Waste Management Plan and maintained at all times, for the duration of development

16. Prior to applying for a Building Permit, a bin storage area must be designed with a size suitable to service the development and screened from view of the street to the satisfaction of the City of Rockingham. The bin storage area must be constructed prior to the occupation of the development and must be retained and maintained in good condition for the duration of the development.

17. Prior to the occupation of the development, a Final Acoustic Assessment must be prepared and provided to the City of Rockingham which demonstrates to its satisfaction, that the completed development complies with the *Environmental Protection (Noise) Regulations 1997*. The Final Acoustic Assessment must include the following information:

(i) noise sources compared with the assigned noise levels as stated in the *Environmental Protection (Noise) Regulations 1997*, when the noise is received at the nearest “noise sensitive premises” and surrounding residential area;

(ii) tonality, modulation and impulsiveness of noise sources; and

(iii) confirmation of the implementation of noise attenuation measures. Any further works must be carried out in accordance with the Acoustic Report and implemented as such for the duration of the development.

18. Prior to applying for a Building Permit, a Landscaping Plan generally in accordance with *Landscape Plan – Job No. 0239, Rev B, drawn by Kelsie Davies Landscape Architecture and dated 2 November 2022*; to the satisfaction of the City of Rockingham must be prepared and include the following detail:

(i) The location, number and type of existing and proposed trees and shrubs, including calculations for the landscaping area;

(ii) Any lawns to be established and areas to be mulched;

(iii) Those areas to be reticulated or irrigated,

(iv) Proposed upgrading to landscaping, paving and reticulation of the street setback area and all verge areas;

(v) Shade trees at a rate of one (1) per four (4) car parking bays; and

(vi) Fencing heights, types and alignments consistent with the recommendations of the Environmental Acoustic Assessment, prepared by Herring Storer Acoustic (Job No: 22244), dated August 2022.

The landscaping, paving and reticulation must be completed prior to the occupation of the development, and must be maintained at all times to the satisfaction of the City of Rockingham for the duration of the development.

19. Prior to the occupation of the development, a final illumination report must be prepared which demonstrates to the satisfaction of the City of Rockingham, that the completed development complies with the requirements of *Australian Standard AS 4282—2019, Control of the obtrusive effects of outdoor lighting*.

Advice

1. This Approval relates to the details provided in the application; to undertake the development in a different manner to that stated in the application a fresh application for Development Approval must be submitted to the City.

2. A Certified Building Permit must be obtained prior to construction and thereafter an Occupancy Permit must be obtained; the applicant and owner should liaise with the City's Building Services in this regard.

3. The development must comply with the *Health (Public Building) Regulations 1992*; the applicant and owner should liaise with the City's Health Services in this regard.

4. The development must comply with the *Food Act 2008, the Food Safety Standards and Chapter 3 of the Australian New Zealand Food Standards Code (Australia Only);* the applicant and owner should liaise with the City's Health Services in this regard.
5. A Sign Permit must be obtained for any advertising associated with the development, including signage painted on the building; the applicant and owner should liaise with the City's Building Services in this regard.

6. With respect to Condition 18, the applicant and owner should liaise with the City's Land Infrastructure and Development Services to confirm requirements for landscaping plans. The landscaping shall include the turf and trees to be installed between the back of kerb and footpath on Linott Close.

7. All works in the road reserve, including construction of a crossover or footpath, installation of on-street car parking spaces, planting of street trees, bicycle parking devices, street furniture and other streetscape works and works to the road carriageway must be to the specifications of the City; the applicant and owner should liaise with the City's Land Infrastructure and Development Services in this regard

8. The applicant is advised that in respect of Condition 6, a Stormwater Management Plan will require compliance with *Planning Policy 3.4.3 - Urban Water Management*. The applicant is encouraged to discuss the specific policy requirements with the City prior to the submission of the plan.

Details: outline of development application

Region Scheme	Metropolitan Region Scheme
Region Scheme - Zone/Reserve	Urban
Local Planning Scheme	City of Rockingham TPS2
Local Planning Scheme - Zone/Reserve	Commercial
Structure Plan/Precinct Plan	Settlers Hill (Village Centre) Historical Structure Plan
Structure Plan/Precinct Plan - Land Use Designation	Mixed Use
Use Class and permissibility:	Child Care Premises;
Lot Size:	1410m^2
Existing Land Use:	Vacant land
State Heritage Register	No
Local Heritage	☒ N/A ☐ Heritage List ☐ Heritage Area
Design Review	☒ N/A ☐ Local Design Review Panel ☐ State Design Review Panel ☐ Other
Bushfire Prone Area	No
Swan River Trust Area	No

Proposal:

Proposed Land Use	Child Care Premises
Proposed Net Lettable Area	422m^2
Proposed No. Storeys	1
Proposed No. Dwellings	n/a

The application proposes the development of a CCP on Lot 1887, comprising:

- A single storey building located along the eastern boundary of the site with car parking to north and outdoor play area to the west;

- 10 staff and 61 Children consisting of age groups 0-5 years as follows:

  - Group Room 1: 0-18 months (8 spaces);
  - Group Room 2: 18-24 months (8 spaces);
  - Group Room 3: 24-36 months (15 spaces); and
  - Group Room 4: 36 months and over (30 spaces).

- The proposed hours of operation are 6:30am to 6:30pm on weekdays. No weekend operation is proposed.

- External bin store to the west of the building, and south of the car parking area. A total of 15 on-site car parking bays to the north of the CCP building are proposed, including of one accessible parking bay for people with disability.

Vehicle access and egress is proposed via two crossovers, one located on Linott Close and one on Cringle Lane respectively. Pedestrian access to the site will be via the existing pedestrian paths, along Clyde Avenue, Cringle Lane and a proposed footpath connection on Linott Close. Waste collection will occur on street from Cringle Lane.

To mitigate noise from the car park to the northern resident, a 2m high colourbond fence is proposed along the northern boundary of the site and the eastern side of the transformer.

Background:

Historical Structure Plan- Settlers Hill (Village Centre)

The subject site is identified within the historical Structure Plan known as 'Settlers Hill' (Village Centre) (SP) which guided the development of the Local Centre and surrounding Mixed Use and Residential Development. Under the SP the site is designated 'Mixed Use' with vehicular access via Linott Close and angled street parking bays. In September 2009, the City adopted the SP and it was approved by the Western Australian Planning Commission (WAPC) in October 2009.

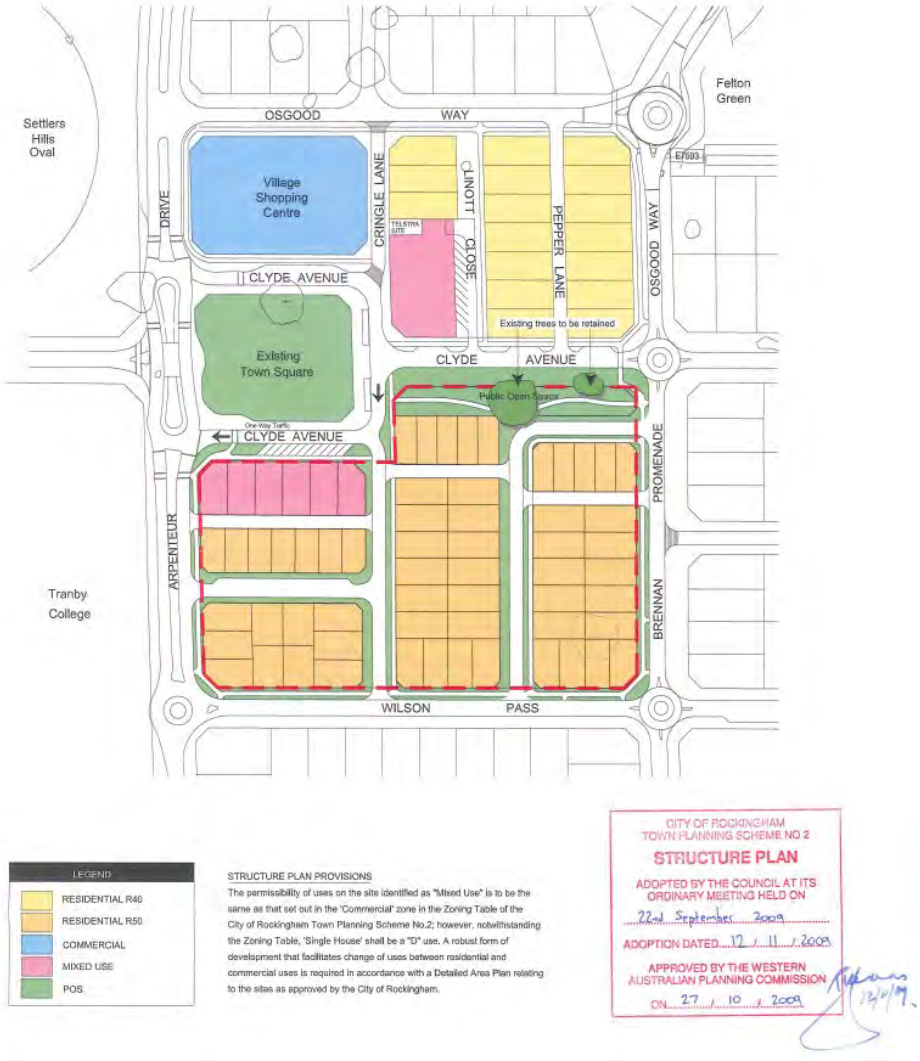


Figure 1 - Historical Structure Plan - Settlers Hill (Village Centre)

In 2010, the City approved the Detailed Area Plan (now known as a Local Development Plan - LDP) for the subject site known as 'Lot 1887 Clyde Avenue – Settlers Hill (Baldivis)'. The LDP identified the lot as 'Mixed Use' pursuant to the SP and the permissibility of uses on the lots was consistent with the 'Commercial' zone under the City of Rockingham Town Planning Scheme No.2 (TPS2). The intent of the LDP is to develop the site for residential use (R60) with a 'Studio Office/Commercial' use encourages fronting Cringle Lane.

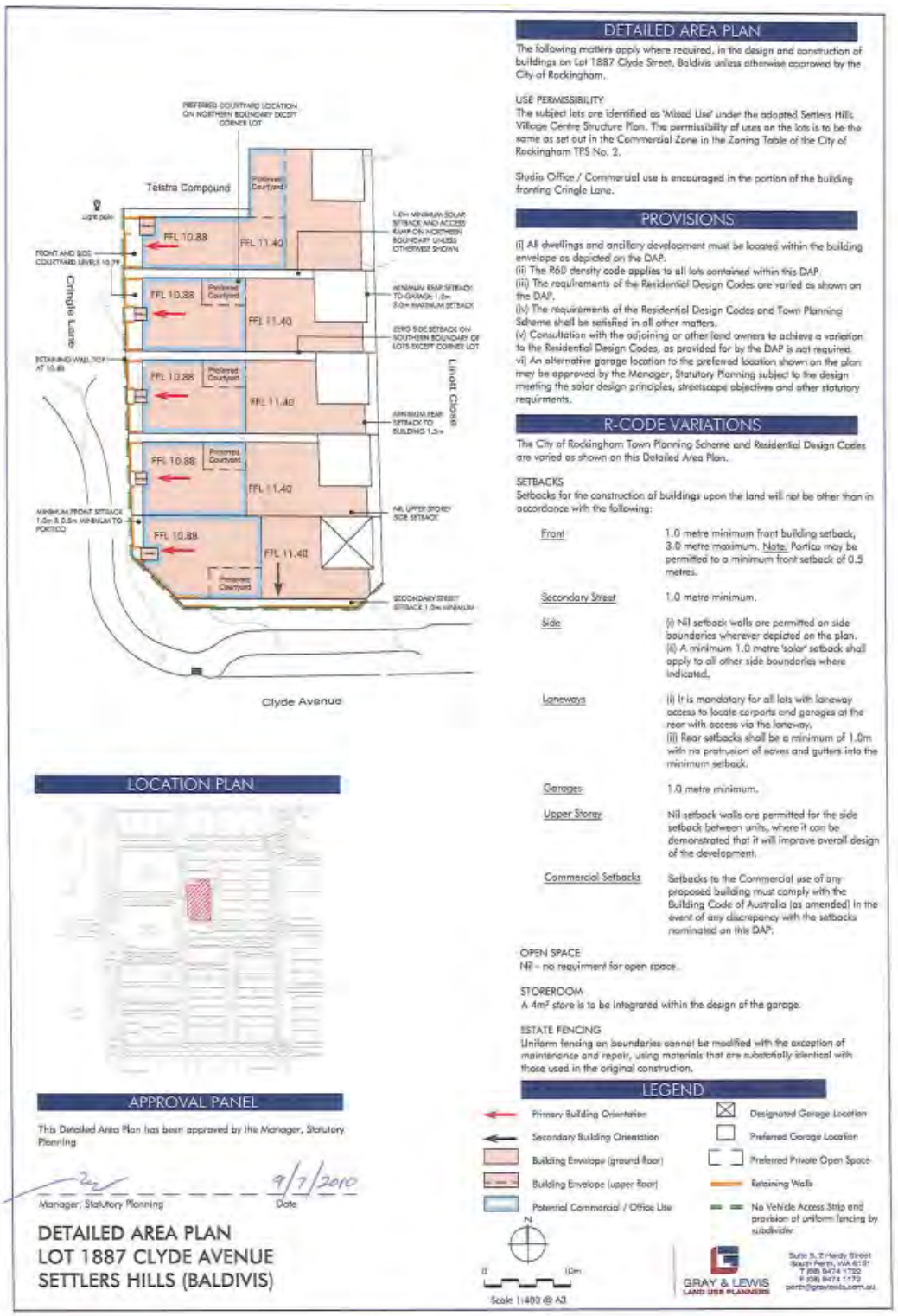


Figure 2 - Local Development Plan - Lot 1887 Clyde Avenue

Town Planning Scheme Amendment No.174

In 2019, Council initiated Town Planning Scheme Amendment No.174 (Amendment 174) to TPS2 for the purpose of bringing TPS2 into conformity with zones and reserves pursuant to adopted Structure Plans. Scheme Amendment No.174 amended the zoning of TPS2 sites designated as 'Development' to the corresponding zones that are approved on the Structure Plans.

With reference to the subject site, Scheme Amendment No.174 upon gazettal, zoned the site 'Commercial' under TPS2.

Site Context

The subject site is located within a suburban context within the Settlers Hill Neighbourhood Centre.

The subject site is bounded by Cringle Lane to the west, Linott Close to the east and Clyde Avenue to the south. To the immediate north west of the site is a small local commercial shopping amenity with Baldivis Cricket Oval and sporting fields and amenities further west on Arpenteur Drive. Tranby College is located to the south-west of the site on Arpenteur Drive. A small 'pocket park' of (Public Open Space) is immediately west of the site.



Figure 3 - Location Plan

The subject site is vacant and a Telstra substation and infrastructure adjoins the site to the immediate north-west.



Figure 4 - Aerial Photograph of the Subject Site

Legislation and Policy:

Legislation

- Planning and Development Act 2005
- Metropolitan Region Scheme
- Town Planning Scheme No.2
- Planning and Development (Local Planning Scheme) Regulations 2015
- Environmental Protection (Noise) Regulations 1997

State Government Policies

- State Planning Policy 7.0 - Design of the Built Environment

Structure Plans/Activity Centre Plans

Not Applicable

Local Policies

- Planning Policy 3.3.5 – Child Care Premises
- Planning Policy 3.3.14 - Bicycle Parking and End of Trip Facilities

- Planning Policy 3.4.3 - Urban Water Management

Consultation:

Public Consultation

The application was advertised for public comment in the following manner:

- Landowners and occupiers identified on the Consultation Map below were notified in writing of the proposed application;
- The application was made available for public inspection at the City's Administration Offices and published on the City's website; and
- Submissions were requested over a 14 day period, between 10 October and 24 October 2022.

Three (3) submissions were received at the conclusion of the advertising period, including:

- One (1) submission outside of the consultation area in support, however, raising concern with the planting palette; and
- Two (2) submissioners within the consutlation area having objected or raised concerns.

Matters raised in the submissions objecting to the proposal are summarised within the table below by theme, including the applicant's and City's responses to concerns raised.

Loss of On-Street Parking
Submission: The submissions raised concern regarding the parents dropping off and picking up children using the 6 on-street parking bays along Clyde Avenue. This was of particular concern as adjoining townhouses do not have visitor parking and the on-street parking has been provided to account for this. The concern is that if residents' visitors are unable to park in the street they will park in nearby laneways. Suggestions have been made to either fill the "ditch" along Hocking Reserve to use as parking or have the developer erect "resident only signage" and have the entrance to the child care facing westwards towards the park. Residents along Linott Close park outside the front of their homes which would in effect close off one lane to through traffic.
Applicant's Response: The applicant has undertaken a parking survey over 5 working days between 7.00am-7.30am and 5.45pm-6.15pm. The results are shown in the map and table below.



Date	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Total available bays
25/10 – Morning	2	4	11	6	4	3	9	**39**
25/10 – Evening	3	3	12	6	3	3	9	**39**
26/10 – Morning	1	4	8	6	3	4	2	**28**
26/10 – Evening	2	4	12	5	4	4	9	**40**
27/10 – Morning	3	4	12	6	3	5	9	**42**
27/10 – Evening	2	2	10	6	4	3	9	**36**
28/10 - Morning	2	3	12	6	4	3	9	**39**
28/10 – Evening	3	6	9	5	4	3	9	**39**
31/10 – Morning	3	4	12	6	3	5	8	**41**
31/10 – Evening	0	4	9	5	4	5	9	**36**

The survey results indicate that during the peak periods for the proposed CCP, parent drop-off/pick-up, there is currently significant on –street parking bays available within the public domain. None of these bays are covered with timed parking restrictions or indicated to be for a particular person or purpose. When considering only the bays closest to the development site (zones 4, 5 and 6) the number of bays available did not drop below 12 bays during the survey period. Given these bays are not directly adjacent to any other commercial operation, it is reasonable to consider that these available parking spaces could easily cover the 3-bay parking short fall presented by the CCP development.

In addition, the proposed CCP will not be open on weekends, so all on-street parking in the area would remain usable by residents and visitors, and it is considered that weekends would generate a higher need for on-street parking for residents in the area.
In response to the comment that residents along Linott Close park in front of their homes in the roadway, whilst this may have been occurring in the past, it is an informal arrangement because the subject land remains undeveloped and because Linott Close is not often used. However, this is not the intended outcome, and all residents of Linott Close have a double garage for parking of their vehicles (accessed from Pepper Lane). There are also on-street parking bays located is Osgood Way for residents of the Pepper Lane and Linott Close precinct. The Townhouses in Hocking Bend and Ramsey Lane have access to four (4) on-street parking bays in Hocking Bend and they each have their own double garage.

City's Comment:

The residential dwellings adjoining the subject site to the north take vehicle access from Cringle Lane. The residential dwellings on the eastern side of Linott Close take vehicle access from Pepper Lane. Linott Close provides vehicle access to the subject site only, with the road terminating into a pedestrian thoroughfare connecting through to Osgood Way.

There are currently no designated car parking bays on Linott Close adjoining the site. Refer to the figure below depicting the local road network.



Figure 5 - Local Road Layout and Network

The parking survey provided by the applicant has identified that the car parking bays within the vicinity of the adjacent Village Shopping Centre have been provided consistent with the historical SP to justify the shortfall in parking. The City accepts that that the on-street parking spaces on the Clyde Avenue frontage adjacent the proposed entry to the CCP are may be utilised for the CCP (zone 5). It is unlikely, in the City's opinion, that the on-street car parking across the street adjacent on Clyde Avenue (zone 4 and 6), will be practically utilised for the purposes of pick up and/or drop off to the CCP. It is likely that patron behaviour would dictate that a close, safe car parking space would be sought for this purpose.

The City accepts the results of the parking survey and therefore accepts the parking as proposed (which is further discussed in the Planning Assessment section below).

Increased Traffic

Submission:

There is concern that Linott Close will become a thoroughfare as well as Pepper Lane. It has been suggested that installing speed humps along Pepper Lane could alleviate this

Applicant's Response:

It is not understood how/why Linott Close will become a thoroughfare. Linott Close will remain a terminated roadway. Additionally, it is not understood how or why Pepper Lane would become a thoroughfare and so it is not necessary for any speed humps to be installed in Pepper Lane. Clyde Avenue will be the main road used for staff and parents to the proposed facility.

City's Comment:

The City concurs with the applicant's comments made with respect to Linott Close. There is no requirement or proposed intention to change the functionality of Linott Close.

The City also considers that the traffic calming as suggested by the submissions for Pepper Lane are not required. The Traffic Impact Assessment provided in support of the proposal does not recommend such treatments.

To ensure the site access and egress and traffic flow is managed in a safe and effective manner, consistent with the one-way road network surrounding the site, it is recommended that a condition of Development Approval be included requiring that pavement markings and signage be used to delineate:

- Linott Close crossover to be single movement entry only (no exit); and
- Cringle Lane crossover to be full movement (entry and exit).

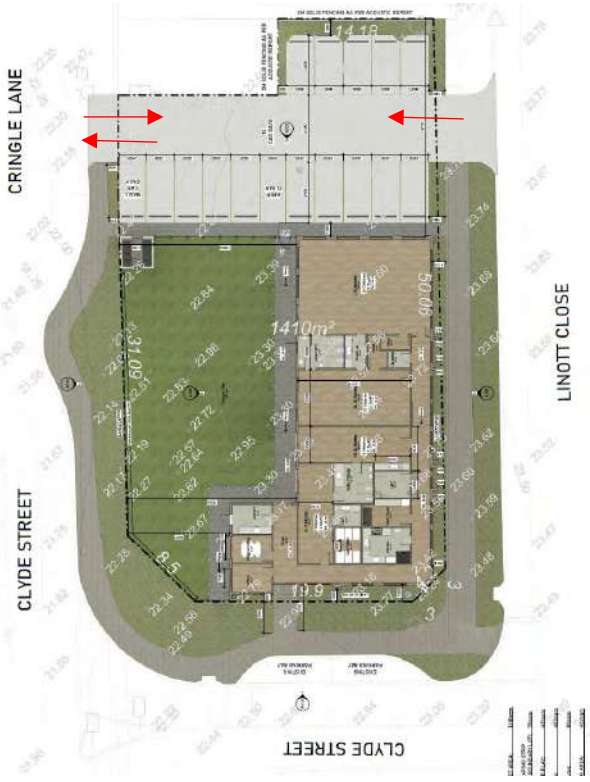


Figure 6 - Proposed Crossover Movements

Noise Impacts
Submission: Concerns have been raised regarding the noise generated from sixty (60) vehicles accessing the site at 6:30am and collecting children up until 6:30pm. It has been suggested that the noise wall be carried along Linott Close to protect the residents from noise impact.
Applicant's Response: *Not all parents drop their children off at the start of the day. Some drop off children later in the day. An Acoustic Report has been prepared addressing noise. It may be possible to extend the noise wall along the Linott Close portion of the car park, for the section north of the crossover.*
City's Comment: The Acoustic Assessment provided in support of the proposed CCP recommends a 2m high colourbond fence be erected along the car parking area adjoining the residential premises to the north. Acoustic fence treatment to Linott Close is not recommended as the outdoor play area is located on the opposite side of the site of the building and acoustic treatments have been recommended on the CCP building itself. The City's Health Services has reviewed the Acoustic Assessment and support the recommendation made. A condition is recommended by the City, in the event Development Approval is granted, for the fencing to be consistent with the recommendations of the Acoustic Assessment.
Lighting Impacts
Submission: The potential for light spill over onto the front of nearby residences in Linott Close.
Applicant's Response: *The development will not be operating through the night and so will not require a high degree of lighting. Light spill is not considered to be an issue. Any outdoor lighting of the building or car parking area (for security) will be illuminated in accordance with Australian Standards. No direct floodlighting is proposed.* *This issue can be resolved with a relevant condition of Development Approval.*
City's Comment: While it is acknowledged that the residents is on Linott Close are located on the opposite side of the road and unlikely to be affected by light impacts, it is recommended that a condition be included, requiring all illumination to comply with the requirements of *Australian Standard AS 4282-2019 - Control of the obtrusive effects of outdoor lighting.*
Street Tree Planting
Submission: Concern was raised regarding the choice of platanus acerifolia (London Plane) as a street tree. This was mainly due to the deciduous nature of the trees and the leaves dropping causing a fire hazard and being difficult to manage and clean up.
Applicant's Response: *The City can impose the requirement to submit an amended Landscaping Plan as a condition of approval to deal with species of street trees if it agrees that this is a relevant issue.*
City's Comment: The City recommends inclusion of a condition requiring submission of a Landscaping Plan should Development Approval be granted. The planting palette can be further reviewed and endorsed through the subsequent Landscaping Plan approved by the City.

Referrals/consultation with Government/Service Agencies

Not Applicable

Design Review Panel Advice

Not Applicable

Swan Valley Planning

Not Applicable

Other Advice

Not Applicable

Planning Assessment:

State Planning Policy 7.0 - Design of the Built Environment (SPP7.0)

SPP7.0 is the leading SPP to guide design outcomes in the planning system through an overarching framework that addresses design quality and built form outcomes. SPP7.0 includes 10 principles of good design and outlines the design review process. The proposed CCP presents as modern in its design and is considered sympathetic to the surrounding built form. The design lends itself to a residential style of architecture, being single storey, with pitched roof features, awnings and verandahs.

Clearly identifiable pedestrian entries are provided with internal footpath connections and the landscape intent considered to be acceptable and complementary to the design and existing streetscape. Overall, it is considered that the proposed development provides a positive contribution and achieves the intent of the SPP 7.0.

Local Development Plan - Lot 1887 Clyde Avenue Baldivis

LDPs are a planning tool used to control built form outcomes on particular lots, which consider the relationship between lot layout and built form at subdivision and development stage. The LDP is a document to which the Council may give due regard when making decisions in respect to the development of the site.

The LDP for the site suggests that development shall be for 'Mixed Use' pursuant to the SP and the permissibility of uses on the lot to be the same as the Commercial Zone for TPS2. Whilst the LDP implies an intent for development to be residential with a 'Studio Office/Commercial' use encouraged fronting Cringle Lane, the site has been rezoned to 'Commercial' under TPS2. A departure from the LDP in this case is appropriate based on the new 'Commercial' zoning and change of development intent. There is no requirement to prepare a new LDP.

Town Planning Scheme No.2 (TPS2)

Clause 3.2 - Zoning Table

The subject site is zoned 'Commercial' in TPS2. The proposed development is consistent with the land use of 'Child Care Premises' (CCP) meaning:

"(a) an education and care service as defined in the Education and Care Services National Law (Western Australia) section 5(1), other than a family day care service as defined in that section, is provided; or

(b) a child care service as defined in the Child Care Services Act 2007 section 4 is provided."

A CCP is a 'D' land use within the Commercial Zone under TPS2, meaning that the land use is not permitted unless the local government has exercised its discretion by granting development approval.

Clause 4.6.2 – Form of Development

TPS2 requires that when considering applications for Development Approval in the 'Commercial' zone, the site planning, scale, built form, elevations and landscaping of the development shall positively contribute to the streetscape, appearance and amenity of the locality.

The proposed CCP has been assessed against the SPP 7.0 in regards to built form, appearance, context and character and landscaping. It is considered that the proposal demonstrates a sympathetic design outcome consistent with the existing residential design and amenity of the locality.

Clause 4.6.3 and 4.15.1.3 - Car parking

Pursuant to Clause 4.15.1.3, car parking for a CCP is to be provided in accordance with Table 2 of TPS2. The following table shows the calculation for the proposal:

Land Use	**TPS2 Requirement**	**Proposed Staff and Children**	**Bays Required**
Child Care Premises	1 bay per 8 children	61 children	7.6 (8)
	1 per staff	10 staff	10
Total Required	18		
Total Bays Provided on-site	15		
Shortfall	**3**		

The applicant has completed a parking survey. The results are shown in the map and table provided by the applicant in the Public Consultation section of this report.

The following conclusions from the Parking Survey in support of the shortfall are presented:

- During peak periods, there is currently significant parking bays available within the public domain;
- None of the public parking bays are covered with timed parking restrictions or indicated to be for a particular person or purpose;
- When considering only the bays closest to the development site (zones 4, 5 and 6), the number of bays available did not drop below 12 bays during the survey period; and

- Given these bays are not directly adjacent to any other commercial operation, it is reasonable to consider that these available parking spaces could assist in mitigating the 3-bay parking short fall presented on site by the CCP proposal.

The City accepts the applicant's arguments in support of the shortfall, particularly noting the outcomes of the parking survey that was self-initiated. In light of the above reasons, the variation to clause 4.15 of TPS2 is sufficiently addressed.

Furthermore, through a condition of Development Approval, the use of the car parking bays are to be in a manner to ensure peak periods are managed in line with staff rosters and the Acoustic Assessment recommendations of the Parking Restriction Plan.

Planning Policy No.3.3.5 - Child Care Premises (PP3.3.5)

PP3.3.5 seek to promote the orderly and proper development of land by making suitable provisions relating to the location and design of CCP are consistent with the scale and character of the immediate area, whilst ensuring that appropriate facilities are provided to accommodate the needs of the children and their carers within a safe environment.

The proposed development has been assessed against the requirements of PP3.3.5. Where the proposal requires further refinement or specific conditions of Development Approval are proposed, these are noted in the table below. The proposal complies with the PP3.3.5 except where discussed in the table below:

Requirement	Provided	Compliant
Car Parking		
Parking to be provided in accordance with TPS2.	Provision of 15 car parking spaces on site, representing a shortfall of 3 spaces.	No. Refer to discussion under car parking contained herein.
Noise Impacts		
A noise impact assessment may be required for the development of a Child Care Premises. The objectives should be to limit the noise impact of the Child Care Premises on adjacent properties, and also limit any noise impact from external sources on the Child Care Premises. This may be achieved either by physical separation, design and layout of the premises or by implementing noise mitigation measures, such as acoustic treatments to buildings. Although each application will need to be assessed on its individual merits, the following basic principles apply:	An Acoustic Assessment has been submitted in support of the application.	The Acoustic Assessment has been assessed and demonstrates compliance with the *Environmental (Noise) Regulation 1997*.

(a) Where a Child Care Premises is located adjacent to a noise sensitive use, such as houses, retirement villages and nursing homes, the noise-generating activities of the Child Care Premises, such as the outdoor play areas, parking areas and any plant equipment, are to be located away from the noise sensitive use;	The play areas are located on the opposite side of the development facing the Clyde Avenue frontage. Car parking areas abutt the adjoining residential area to the north. The Acoustic Report recommends that a solid fence will attenuate the impacts of the noise from the car parking area	Yes. Outdoor play areas are designed and sited away from all residential areas. Fencing height and styles consistent with the Acoustic Assessment recommendations to manage impacts of car parking on the adjoining residential site can be included via condition of Development Approval.
(b) Where, due to design limitations or safety considerations, noise-generating activities such as outdoor play areas are located close to noise-sensitive uses, appropriate noise mitigation is to be undertaken; and	Refer above.	Yes
(c) The design and construction of buildings may include noise-mitigation measures to reduce impact from external sources and to achieve accepted indoor noise limits.	Refer above.	Yes

Planning Policy 3.3.14 - Bicycle Parking and End-of-Trip Facilities (PP3.3.14)

PP3.3.14 facilitates the appropriate provision of secure, well designed and effective on site bicycle parking and end-of-trip facilities to encourage the use of bicycles as a means of transport and access to and within the City.

Bicycle parking requirement

The requirement for short-term parking for a CCP pursuant to the PP3.3.14 shall be calculated using the rate of 0.05 spaces per visitor. In this case, the total number of chid placements shall be used, and is calculated at minimum four (4) spaces to be provided. The requirement to provide long term bicycle parking and associated amenities is considered not to be applicable on the basis that the CCP will operate predominately with part-time, casual or varied staff hours.

The proposed development has not shown provision of facilities for parking bicycles. A condition requiring the provision of these for (4) spaces is recommended to be included.

Conclusion:

The proposal has been assessed in accordance with TPS2 and City Policy and is generally compliant.

The proposed CCP development provides a community amenity consistent with the zone and is considered compatible with the existing surrounding context of the locality and the ‘Commercial’ zoning of the site. The design of the development is sympathetic to the surrounding residential character. The siting and layout of the development has considered the residential amenity and presents the main outdoor playing areas away from residential areas toward the Clyde Avenue and Cringle Lane frontages.

Whilst a car parking shortfall of 3 car bays is proposed, the City accepts the parking analysis provided by the applicant and considers the shortfall acceptable based on operational requirements of the CCP matched against the availability of on-street parking bays. The City is satisfied that these matters can be adequately addressed by conditions of Development Approval and as such, it is recommended that the application be conditionally approved.





PROPOSED CHILD CARE CENTRE

LOT 1887 LINOTT CLOSE, BALDIVIS 6171



10 m

N

BLOOM
ARCHITECTURE

Lot 1887 Linott Close, Baldivis

Site Plan

Project number	N/A	A100
Date	05/08/2022	
Drawn by	VD	
Revision	A	Scale



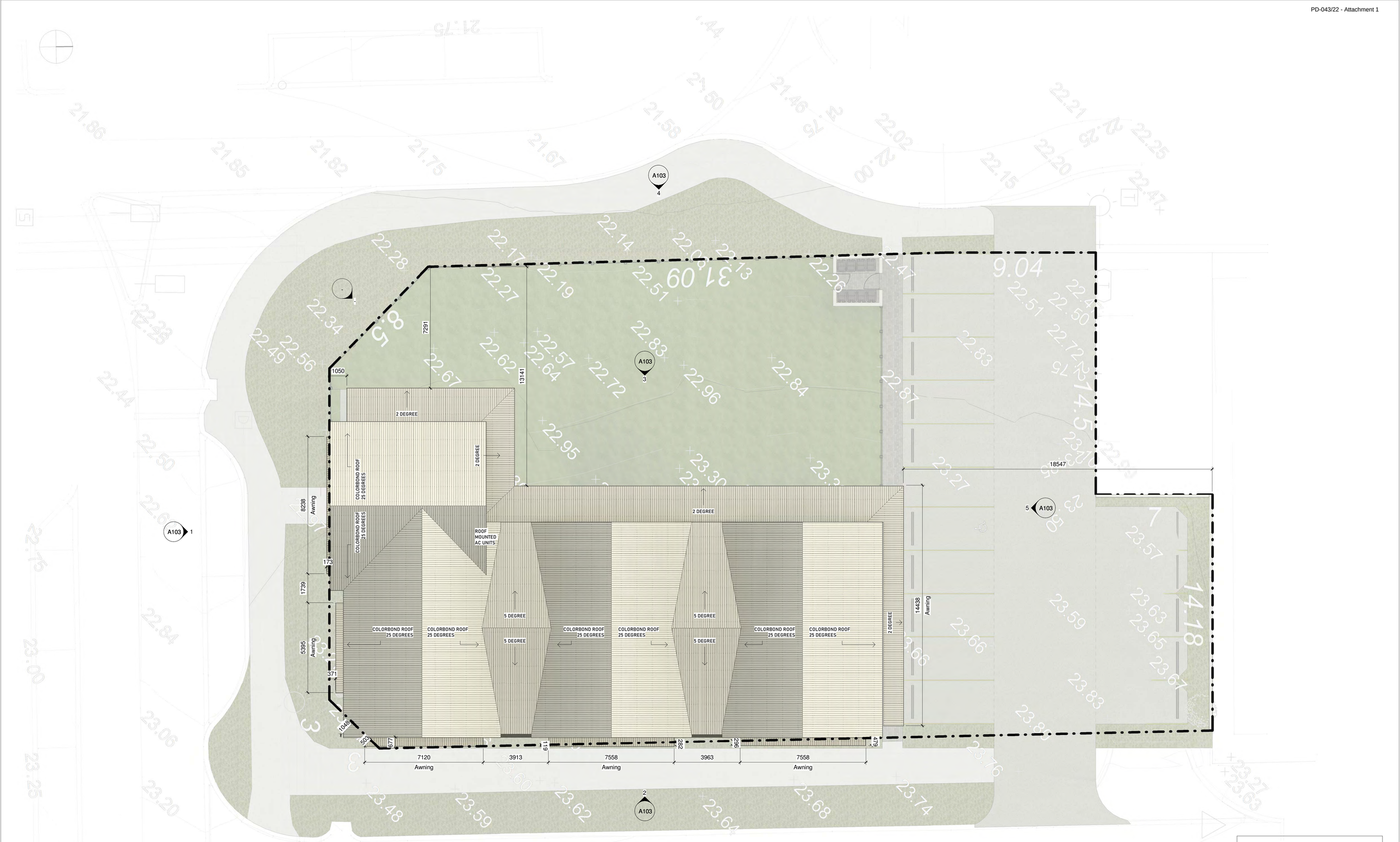
TOTAL LOT AREA:	1410sqm
LANDSCAPING STRIP (WITHIN BOUNDARY LOT):	70sqm
OUTDOOR PLAY:	431sqm
BITUMEN:	402sqm
Paving Area:	85sqm
BUILDING AREA:	422sqm

BLOOM
ARCHITECTURE

Lot 1887 Linott Close, Baldivis

Ground Floor Plan

Project number	N/A	A101
Date	05/08/2022	
Drawn by	VD	
Revision	B	Scale 1 : 100



1 **Roof Level**
1 : 100

BLOOM
ARCHITECTURE

Lot 1887 Linott Close, Baldivis

Roof Plan

Project number	N/A	A102	
Date	05/08/2022		
Drawn by	VD		
Revision	B	Scale	1 : 100



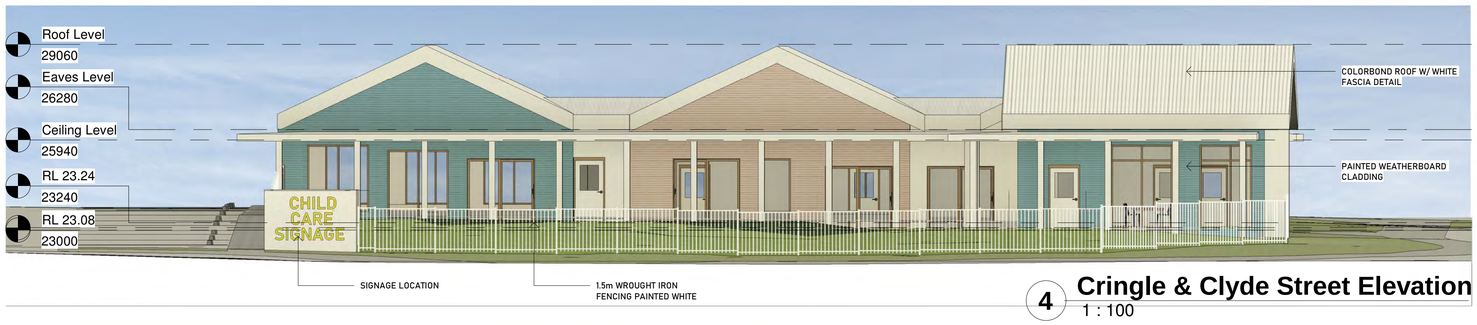
1 Clyde Street Elevation
1 : 100



2 Linott Close Elevation
1 : 100



3 Cringle & Clyde Street Building Elevation
1 : 100



4 Cringle & Clyde Street Elevation
1 : 100



5 Car Park Building Elevation
1 : 100

BLOOM
ARCHITECTURE

Lot 1887 Linott Close, Baldivis

Elevations

Project number	N/A	A103	
Date	05/08/2022		
Drawn by	VD		
Revision	B	Scale	1 : 100





PROPOSED CHILD CARE CENTRE

LOT 1887 LINOTT CLOSE, BALDIVIS 6171



BLOOM
ARCHITECTURE

Lot 1887 Linott Close, Baldivis

Site Plan

Project number	N/A	A100
Date	05/08/2022	
Drawn by	VD	
Revision	A	Scale



TOTAL LOT AREA:	1410sqm
LANDSCAPING STRIP (WITHIN BOUNDARY LOT):	70sqm
OUTDOOR PLAY:	431sqm
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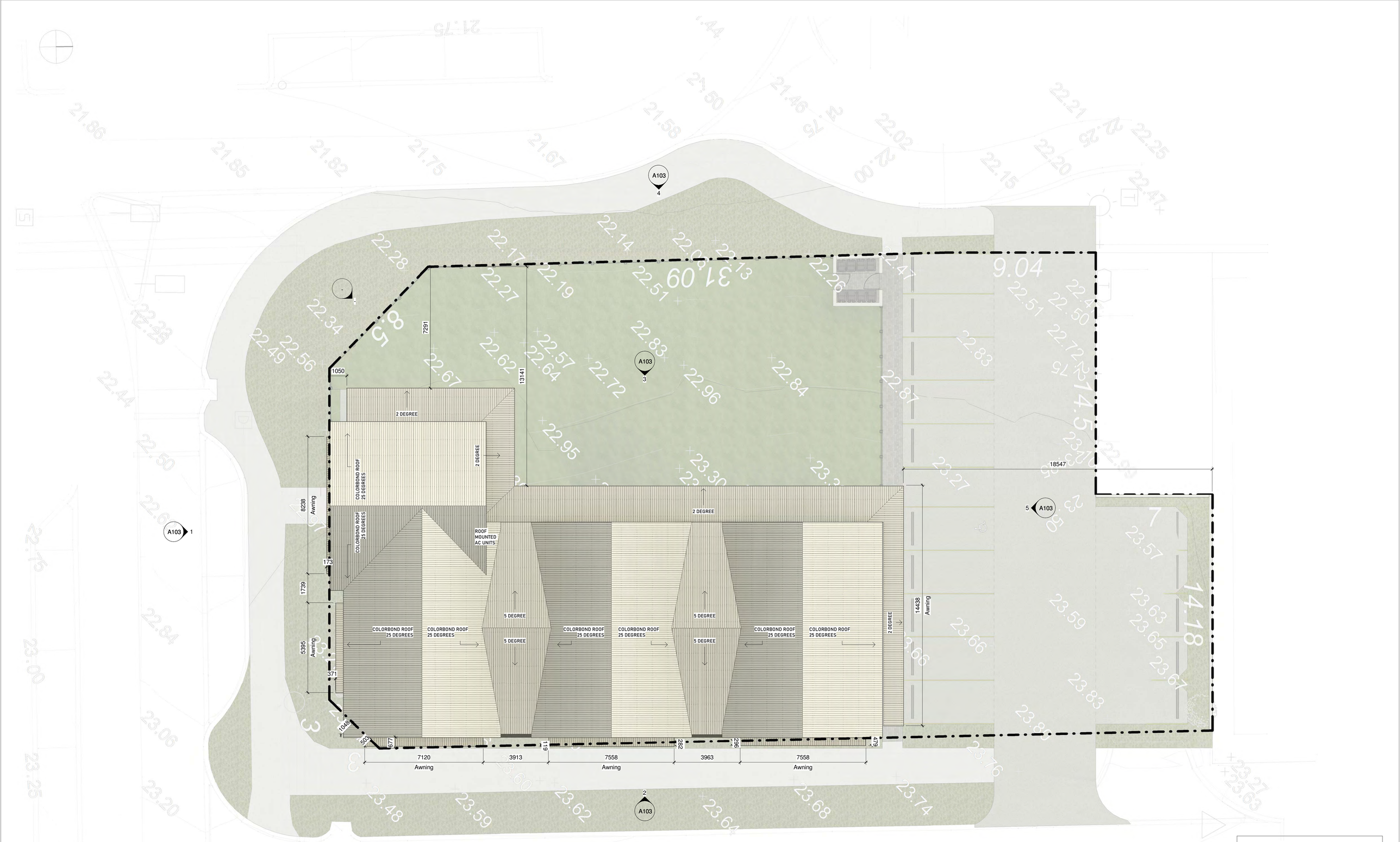
BLOOM
ARCHITECTURE

Lot 1887 Linott Close, Baldivis

Ground Floor Plan

Project number	N/A	A101
Date	05/08/2022	
Drawn by	VD	
Revision	B	Scale 1 : 100



1 Roof Level

1 : 100

BLOOM
ARCHITECTURE

Lot 1887 Linott Close, Baldivis

Roof Plan

Project number	N/A
Date	05/08/2022
Drawn by	VD
Revision	B

A102

Scale 1 : 100



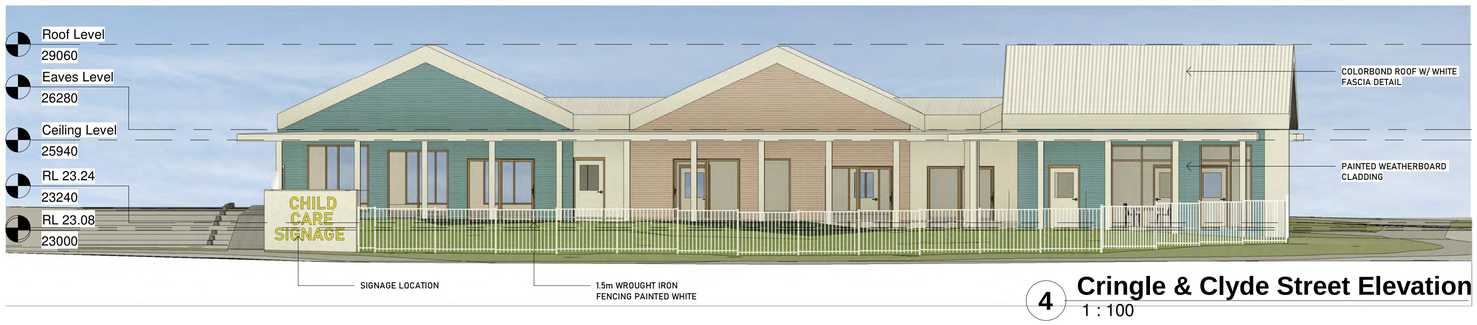
1 Clyde Street Elevation
1 : 100



2 Linott Close Elevation
1 : 100



3 Cringle & Clyde Street Building Elevation
1 : 100



4 Cringle & Clyde Street Elevation
1 : 100



5 Car Park Building Elevation
1 : 100

BLOOM
ARCHITECTURE

Lot 1887 Linott Close, Baldivis

Elevations

Project number	N/A	A103	
Date	05/08/2022		
Drawn by	VD		
Revision	B	Scale	1 : 100

Schedule Of Submissions
Proposed Child Care Premises - Lot 1887 (No. 1-5) Linott Close, Baldivis
(20.2022.224.1)

PUBLIC SCHEDULE OF SUBMISSIONS		
Name	Address	Comment
1. Mr Dean Campbell	[redacted] BALDIVIS WA 6171	Hi I have no issue with the child care centre proposal however, the planting of PLAace trees are a nuisance. As these tree s are deciduous the leaves result in an utter mess in yards and a build-up of the leaves are a fire hazard. Just look at Arpenteur Dr in Baldivis. When the trees drop their leaves the roads, gardens and lawns are a complete mess.
2. Mr Daniel M Luder	[redacted] COOLBELLUP WA 6163	My concern is that the 6 existing parking bays on Clyde Avenue will be used by the Child care centre or parents dropping off kids, Standing and waiting, Running engines of the vehicle, taking up the car spaces on the residential site. Furthermore, the Town houses 70, 72, 74, 76 and 78 do not have any carparks, but only a double a garage. As a consequence of the busy child care centre business, residents are likely to lose street parking like in the city daily. The risk of losing car parking space increases when a business moves in, when families in Townhouses occupying 2 parents with 2 kids and their belongings. They have no garden to put stuff here. Adding vehicles on Clyde Avenue/Street adds the potential to create parking problems and will cause an inconvenience for residents, which can lead to overflow onto Ramsey Ln in the back of No: 70, 72, 74 and 76, which is very tight to get a normal vehicle out of the garage. Its works well the way it is now. I.E. Hocking bend has also public car bays and they are useful for residents, because they have the same size laneway see; Godfrey Ln compared to Ramsey Ln. It is tight and you won't get 2 cars into the garages. Solutions Proposals: 1. The council and the developer to discuss a holistic approach (rather then add in), by filling in the ditch of the hocking Reserve and create car parking space in front of Clyde Avenue/Street. For anyone to use. I do not want the cost or increased rates to pay for this, but I know DANMAR is a very good developer and builder and can accomplish this. They can add all this to the development proposal to implement changes. This will alleviate any parking problem and adds value for everybody. Once you have it, you will not give space away. 2. My Suggestion is to have the Child care centre developers to agree and accept 'resident parking only' signs for 4 bays belonging to the Clyde Avenue/Street residents. And have the entrance of the child care centre changed to the west towards the park. 1a. Change the Residential Zoning to 'commercial' for Town houses 70, 72, 74, 76 and 78, but leave the rates residential to suit a home business, so residents and owners can work from home. It will increase the resell value and compensates, if the childcare centre is noisy. Kids are kids. Thanks you for reading.
3. Mr Paul & Mrs Ruth Beaumont	[redacted] BALDIVIS WA 6171	The proposed child care centre in the middle of a residential area will have a considerable detrimental cost to our properties. We also object to the following: (1) The proposal to turn a currently quiet no through road in front of our property to a thoroughfare for approximately 60 vehicles commencing at 6.30am dropping off and collecting children until 6.30p.

Schedule Of Submissions
Proposed Child Care Premises - Lot 1887 (No. 1-5) Linott Close, Baldivis
(20.2022.224.1)

PUBLIC SCHEDULE OF SUBMISSIONS		
Name	Address	Comment
No.3 - Cont…		I would like to propose that the car park area to re-designed to allow in and out traffic to all occur off of Cringle Lane so there will be no traffic interference on Linott Close. Residents along Linott Close park outside the front of their homes which would in effect close off one lane to through traffic. The noise from the traffic could be alleviated if access and exit was allowed only off of Cringle Lane. (2) If lights are to be erected around this complex it is essential to the residents along Linott Close that none of this lighting is reflected on to the front of these properties. (3) We would also like to see the sound proof fencing carried along on the boundary of proposed development and Linott Close. Having lived in this property for 18 years we have experienced a considerable number of people using Pepper Lane as a short cut to nearby shops. I envisage if the child care facility goes ahead this problem will only be exacerbated by people wanting to take a short cut to the child care centre. Perhaps consideration will need to be given to installing speed humps along Pepper Lane. I refer to my email to you dated 15th October Paul and Ruth Beaumont 10 Linott Close Baldivis 6171 regarding the proposed child care centre. Our neighbour Ms Jennifer Lisson 6 Linott Close Baldivis has expressed her concern about the centre. We have shown her our email to you and she is thoroughly in agreement with our concerns and has asked us to add her name to the list. Thankyou Paul and Ruth Beaumont.

LOT 59 BUSHMEAD ROAD, HAZELMERE – WAREHOUSE AND INCIDENTAL OFFICE USE

Form 1 – Responsible Authority Report
(Regulation 12)

DAP Name:	Metro Outer Joint Development Assessment Panel	
Local Government Area:	City of Swan	
Applicant:	Taylor Burrell Barnett Town Planning and Design	
Owner:	The Trust Company (Australia) Limited	
Value of Development:	$13 million ☒ Mandatory (Regulation 5) ☐ Opt In (Regulation 6)	
Responsible Authority:	City of Swan	
Authorising Officer:	Philip Russell - Manager Statutory Planning	
LG Reference:	DA-484/2022	
DAP File No:	DAP/22/02305	
Application Received Date:	24 August 2022	
Report Due Date:	16 December 2022	
Application Statutory Process Timeframe:	90 Days	
Attachment(s):	1. Location Plan – Sheet 1 – Rev 22 2. Accompanying Plans a. Proposed Development Plan – Sheet 2 – Rev 22 b. Existing Site Survey – Sheet 3 – Rev 22; c. Site Plan – Sheet 4 – Rev 22; d. Warehouse Plan – Sheet 5 – Rev 22; e. Typical Section and Indicative Racking Plan - Sheet 6 – Rev 22; f. Elevation Plans - Sheet 7 – Rev 22; g. Floor Plans - Sheet 8 – Rev 22; h. Elevation Plans – Sheet 9 – Rev 22; i. Roof Plan – Sheet 12 – Rev 22; j. Landscape Concept Plans – C1.101 – Rev F, C1.102 – Rev F, C1.103 – Rev F, C1.104 – Rev F, C1.105 – Rev F & C1.106 – Rev c	
Is the Responsible Authority Recommendation the same as the Officer Recommendation?	☐ Yes ☐ N/A	Complete Responsible Authority Recommendation section
	☒ No	Complete Responsible Authority and Officer Recommendation sections

Responsible Authority Recommendation

That the Metro Outer Joint Development Assessment Panel resolves to:

Approve DAP Application reference DAP/22/02305 and Accompanying Plans in accordance with clause 68 of Schedule 2 (Deemed Provisions) of the *Planning and Development (Local Planning Schemes) Regulations 2015*, and pursuant to clause 26(1) of the Metropolitan Region Scheme and the provisions of clause 10.3 of the City of Swan Local Planning Scheme No.17, subject to the following conditions:

Conditions

1. The approved development must comply in all respects with the attached approved plans, as dated, marked and stamped. The plans approved as part of this application form part of the development approval issued.

2. This approval is for 'Warehouse' as defined in the City of Swan Local Planning Scheme No.17 and the subject land may not be used for any other use without the prior approval of the City.

3. The development shall be connected to reticulated sewer or otherwise provided with an onsite effluent disposal system approved by the Department of Health to accommodate a daily volume of wastewater not exceeding 540 litres per 2,000m^2 of site area.

4. No more than 80 staff members are permitted on site at any one time.

5. Prior to occupation or use of the development, 88 vehicle parking bays must be provided on the lot in accordance with the approved plans. The design of vehicle parking and access must comply with AS/NZ 2890.1 (as amended). Accessible parking bays must comply with AS/NZ 2890.6 (as amended).

6. Vehicle parking, access and circulation areas must be sealed, kerbed, drained and maintained to the satisfaction of the City of Swan, in accordance with the approved plans.

7. All stormwater must be contained and disposed of on-site at all times, to the satisfaction of the City of Swan.

8. No fluid other than uncontaminated stormwater is to enter any stormwater drain without prior approval from the City of Swan and the Environmental Protection Authority.

9. Refuse bin areas adequate to service the development must be provided to the satisfaction of the City of Swan prior to occupation or use of development.

10. Refuse and storage areas shall be screened from view from any public street, and enclosed by a wall of masonry or other approved building material, and being not less than 1.8m in height.

11. A Lighting Plan demonstrating compliance with the requirements of AS 4282 – Control of Obtrusive Effects of Outdoor Lighting is to be prepared by a suitably qualified consultant and submitted to the City for approval prior to a building permit being issued.

12. Prior to submission for a Building Permit the applicant/owner shall submit to the satisfaction of the City of Swan a modified Landscape Plan that:

    1. Provides for an area of 2,905m^2 for landscaping purposes, this being 10.1% of the site area of 28, 696m^2; and

    2. Incorporates Corymbia callophylla trees as opposed to the Illawarra Flame Tree (Brachychiton acerifolius) and Corymbia ficifolia as depicted in the submitted Landscape Plan.

    3. The approved Landscape Plan must be implemented within the first available planting season after the initial occupation of the development and maintained thereafter to the satisfaction of the City of Swan. Where Corymbia callophylla trees fail to establish within the first (2) planting seasons following implementation they must be replaced, any other plantings must be replaced in consultation with the City of Swan..

13. All crossovers must be built and maintained in accordance with the City of Swan's specifications.

14. Prior to occupation of the development, a Notification pursuant to Section 70A of the *Transfer of Land Act 1893* must be placed on the certificate(s) of title of the subject property advising current and future land owners that:

    "The vehicular access entering and exiting this lot is expected to be affected by the future upgrade of Bushmead Road to a RAV7 standard and the potential introduction of a RAV7 compliant four-way intersection to the west of the site and that could include restricting movements to left-in, left-out only."

15. Prior to the operation of the Warehouse the applicant/owner is to install acoustic fencing to the site comprising a solid continuous 3m high barrier with a minimum 8kg/m^2 surface mass in the location shown on Figure 4 of the Acoustic Report dated 10 October 2022, as prepared by Stantec.

16. An Operational Management Plan is to be prepared by a suitably qualified consultant and submitted to the City of Swan for approval prior to a building permit being lodged. The Operational Management Plan shall outline how all noise related recommendations and 'best practice' mitigation measures, including but not limited to an assessment of mechanical service noise emission levels and appropriate noise control measures, as required by the Acoustic Report dated 10 October 2022 prepared by Stantec, will be implemented to achieve compliance with the *Environmental Protection (Noise) Regulations 1997*. This plan is to be to the satisfaction of the City of Swan and shall be maintained and complied with in perpetuity.

17. The proposed development must incorporate all requirements outlined in the submitted Bushfire Management Plan (BMP), prepared by Strategen JBS&G (dated 17 August 2022, Version R01 Rev 0), and maintain the property to this standard.

18. Prior to the commencement of operation, the landowner must contribute a sum of 1% of the total development construction value toward Public Art in accordance with the City of Swan Local Planning Policy for the Provision of Public Art (POL-LP-1.10), by either:

a. Payment to the City of Swan a cash-in-lieu amount equal to the sum of the 1% contribution amount ($130,000). This must be paid to the City of Swan prior to the commencement of operation, or prior to the issuance of a building permit for the approved development, whichever occurs first; or

b. Provision of Public Art on-site to a minimum value of the 1% contribution amount ($130,000). The following is required for the provision of Public Art on-site:

   i. the landowner or applicant on behalf of the landowner must seek approval from the City of Swan for a specific Public Art work including the artist proposed to undertake the work to the satisfaction of the City of Swan in accordance with POL-LP-1.10 and the Developers' Handbook for Public Art (as amended). The City of Swan may apply further conditions in regard to the proposed Public Art;

   ii. no part of the approved development may be occupied or used until the Public Art has been installed in accordance with the approval granted by the City of Swan; and,

   iii. The approved Public Art must be maintained in compliance with the approval granted by the City of Swan and any conditions thereof, to the satisfaction of the City of Swan.

19. Any additional development, which is not in accordance with the application (the subject of this approval) or any condition of approval, will require further approval of the City of Swan

Reasons for Responsible Authority Recommendation

1) Endorse the Officer Recommendation to the Metro-Outer Joint Development Assessment Panel to approve the development application subject to conditions but with the following recommended modification to Condition 12:

   12. Prior to submission for a Building Permit the applicant/owner shall submit to the satisfaction of the City of Swan a modified Landscape Plan that:

      1. Provides for an area of 2,905m^2 for landscaping purposes, this being 10.1% of the site area of 28, 696m^2; and

      2. Incorporates Corymbia callophylla trees as opposed to the Illawarra Flame Tree (Brachychiton acerifolius) and Corymbia ficifolia as depicted in the submitted Landscape Plan.

      3. The approved Landscape Plan must be implemented within the first available planting season after the initial occupation of the development and maintained thereafter to the satisfaction of the City of Swan. Where Corymbia callophylla trees fail to establish within the first (2) planting seasons following implementation they must be replaced, any other plantings must be replaced in consultation with the City of Swan.

2) Record the reason for changing the staff recommendation is that:

1. Marris or Corymbia callophylla are the large tree species endemic to the area which play a critical role in protecting and enhancing the biodiversity of the area through provision of food and shelter to endangered and non-endangered species of birds and reptiles.

2. Particular provision of this tree species more broadly through the landscaping area of this site can assist in provision of shade and in offsetting the rapid rate of loss of such vegetation caused by development and the adverse consequences this presents to the existing natural environment.

Details: outline of development application

Region Scheme	Metropolitan Region Scheme
Region Scheme - Zone/Reserve	Industrial
Local Planning Scheme	City of Swan Local Planning Scheme No.17
Local Planning Scheme - Zone/Reserve	Special Use Zone No.25
Structure Plan/Precinct Plan	Local Structure Plan - Lot 59 Bushmead Road, Hazelmere Hazelmere Enterprise Area Structure Plan
Structure Plan/Precinct Plan - Land Use Designation	Light Industrial Northern portion of Lot 59 (outside application area) Transport Depot
Use Class and permissibility:	Warehouse 'P'
Lot Size:	4.4384 ha
Existing Land Use:	Previously Rural Pursuit Northern portion of Lot 59 (outside application area) Transport Depot
State Heritage Register	No
Local Heritage	☒ N/A ☐ Heritage List ☐ Heritage Area
Design Review	☒ N/A ☐ Local Design Review Panel ☐ State Design Review Panel ☐ Other
Bushfire Prone Area	Yes
Swan River Trust Area	No

Proposal:

The proposal is for a new Warehouse development on the southern portion of the subject site and covers an area of 28.696m^2. The primary purpose of the development

will be the storage and distribution of goods. The warehouse is designed to be separated internally to form two (2) tenancies, if required. The northern portion of the site (outside the application area) forms part of the transport depot activities on the adjoining Lot 403 to the east.

The proposal includes:

- A main warehouse building, with the opportunity to be separated into two (2) tenancies, forming a 6,860m^2 warehouse space and a 6,590m^2 warehouse space;
- Two (2) service yards, each with a recessed loading dock to the warehouse buildings, beneath 15m wide cantilevered awnings;
- Two (2) incidental office buildings attached to the warehouse buildings, each with an area of 500m^2 across two levels;
- Two (2) shaded alfresco seating areas for staff, extending from the lunch room within the office buildings, each covering an area of 100m^2;
- 88 marked car parking bays, including two (2) ACROD bays, split between two (2) parking areas adjacent to the warehouse/office tenancies;
- A 6m wide crossover from Bushmead Road providing light vehicle access to the site and staff parking areas via an internal access way along the site's eastern boundary;
- A 12m wide crossover from Bushmead Road providing separate entry and exit for heavy vehicles accessing the service yards and loading docks;
- A fire tank and pump room located in the southern corner of the site; and
- A 2.8m wide landscaped drainage swale along the north-western boundary of the site.

It is intended the warehouses will operate 24 hours a day, seven (7) days a week.

Proposed Land Use	Warehouse
Proposed Net Lettable Area	14,450m^2
Proposed No. Storeys	Two (2) Storey
Proposed No. Dwellings	N/A

Background:

The subject site is situated 550m west of the Bushmead Road and Lloyd Street intersection. The development is in close proximity to Residential zoned land with the Hazelmere town site approximately 130m west of the subject site.

The subject site is located within the broader Hazelmere Enterprise Area Structure Plan (HEASP) area, which earmarked the land for Light Industrial activities in order to establish a 200m light industrial buffer between the core industrial precinct to its east and the residential uses to the west.

Legislation and Policy:

Legislation

Planning and Development Act 2005
Planning and Development (Local Planning Schemes) Regulations 2015
Planning and Development (Development Assessment Panels) Regulations 2011

State Government Policies

State Planning Policy 3.7 Planning in Bushfire Prone Areas

Structure Plans/Activity Centre Plans

Hazelmere Enterprise Area Structure Plan
Local Structure Plan for Lot 59 Bushmead Road, Hazelmere

Local Planning Policies

POL-TP-124 Building and Development Standards - Industrial Zones
POL-TP-129 Vehicle Parking Standards
POL-C-070 Advertising Signs within the Commercial and Industrial Zones
POL-LP-1-10 Provision of Public Art

Consultation:

Public Consultation

Consultation was undertaken in the following manner:

Duration: 14 days between 7 September 2022 and 21 September 2022.

Method: Letters to adjoining and affected landowners and notice on the City's website

Submissions Received: At the close of advertising, four (4) submissions were received. One (1) late submission was also received, totalling five (5), all submissions were objections.

The key considerations and comments contained within the submissions are summarised below:

Issue Raised	**Officer comments**
Adverse impact of traffic on Hazelmere residential area	The application entails the service of the site by as of right vehicles no greater than 19m in length. The existing road network is adequate to accommodate the anticipated development traffic.
Adverse visual impact	Appearance is consistent with development in an industrial area.
Adverse noise impact	The proposed development should comply with the *Environmental Protection (Noise) Regulations 1997* subject to the installation of a noise barrier wall to the western site boundary.
Loss of flora and fauna habitat	The proposed development will result in the removal of the majority of existing trees within the subject site, an unavoidable outcome to accommodate development in accordance with the site's designation for Industrial development under the City's scheme. Where trees are proposed to be removed, replacement tree species and their intended planting locations are indicated on the proposed Landscape Plan, which includes a comprehensive tree survey and tree protection zone

	diagram. The landscaping proposed is considered suitable and consistent with existing and recently approved developments within the surrounding area.
Encroaching of use on residential area	The proposed development within this Special use zone is not in fact an encroachment into any residential land.
Devaluation of surrounding homes	Not a planning issue.
Light pollution at night	The proposed development will be required to comply with *Australian Standard AS 4282 – Control of Obtrusive Effects of Outdoor Lighting.*

Referrals/consultation with Government/Service Agencies

The subject site does not abut any Other Regional Road Reservations or Primary Regional Road reservations. The Main Roads WA referral conducted as part of this assessment was discretionary.

Main Roads WA advised that they had no objections, but that any changes to Restricted Access Vehicles (RAV) to service the development will be subject to a separate approval process.

In this regard it should be noted that the section of Bushmead Road adjacent to the proposed site does not currently form part of the RAV network and - if required in future - would necessitate an application to be made to Main Roads WA by the applicant, in consultation with the City of Swan, to have a portion of this road (from the site access to Central Avenue) to be incorporated onto the RAV network. This will only be possible once the RAV network is upgraded in accordance with the City of Swan's 2014 approved Hazelmere Infrastructure Upgrade capitol works programme which includes the aforementioned section of Bushmead Road.

Planning Assessment:

Zoning and Permissibility

The subject land is zoned 'Industrial' under the Metropolitan Region Scheme and 'Special Use Zone No.25' under the City of Swan Local Planning Scheme No.17.

Special Use Zone No.25 has been prepared in response to the broader Hazelmere Enterprise Area Structure Plan. The subject land is earmarked for Light Industrial uses in accordance with the Hazelmere Enterprise Area Structure Plan in order to establish a 200m light industrial buffer between the general industrial zone to its east and the residential land to the west.

The proposed development is located within the southern portion of the subject property; this portion is identified as 'Light Industrial' under the approved Local Structure Plan for Lot 59 Bushmead Road, Hazelmere. The northern portion of Lot 59 is identified as 'Transport Depot' under the Local Structure Plan, which reflects its current use associated with the operations on the adjoining Lot 403.

Schedule 4 of Local Planning Scheme No.17 also outlines specific conditions pertaining to development and uses within Special Use Zone No.25, namely:

1. *Subdivision and development shall be in accordance with a Structure Plan prepared and approved in accordance with the provisions of Part 4 of the deemed provisions.*

2. *Unless development on the site is connected to reticulated sewer –*

    a. *Development is restricted to 'dry industry' whereby any development application must demonstrate that the quality and volume of effluent to be disposed of onsite can be successfully disposed of, without adverse environmental or health effects, using effluent disposal systems; and*

    b. *Development shall be restricted to the type which is predicted to generate, and/or generate waste water intended for disposal on site at a daily volume not exceeding 540 litres per 2000m^2 of site area.*

3. *A Wastewater Management Plan shall be submitted with each development application to demonstrate that Condition 1 can be achieved to the satisfaction of the local government.*

The Special Use Zone No.25 provisions under Schedule 4 of Local Planning Scheme No.17 prescribe land use permissibility to be as per the Light Industrial zone, whereby Warehouse is listed as a 'P' use, meaning a use that is permitted, subject to compliance with relevant development requirements. The office use will be ancillary and subordinate to the primary use of Warehouse.

Under Local Planning Scheme No.17, Warehouse is defined as: "…*premises used to store or display goods and may include sale by wholesale*".

Wastewater Management

The applicant can either connect to reticulated sewer or if onsite effluent disposal is proposed, approval must be obtained from the Department of Health (DOH). In this regard, the applicant has provided a Wastewater Management Plan that identifies that ground conditions at the subject site are expected to be suitable for effluent disposal using an ATU system. The Wastewater management proposal entails the installation of two (2) x 20m flatbed leach drains for the disposal of the treated effluent. City of Swan staff is satisfied that sufficient green space will be available for this to occur.

In addition, Local Planning Scheme No.17 requires onsite effluent disposal systems to not exceed a daily volume of 540 litres per 2.000m^2 of site area. The Wastewater Management Plan submitted with the application estimates that a daily wastewater volume of less than 170 litres per 2000m^2 of site area is expected and therefore complies.

Access and Traffic

The Traffic Impact Assessment provided as part of the application estimates that the development is expected to generate approximately 48 trips during the AM Peak hour and 51 trips in the PM Peak hour which is considered as a 'moderate impact'. There will be an overall increase of approximately 357 vehicles per day on Bushmead Road as a result of the development. Bushmead Road currently has capacity for 12,000 –

15,000 vehicles per day and with the current traffic volumes being 7,000 – 8,000 vehicles per day, this increase will not have any substantial impact on the surrounding road network.

The future provision of a north-south road extending between Bushmead Road and Stirling Crescent will entail a roundabout junction to Bushmead Road just west of this site. The roundabout would entail the proposed site crossover being limited to left-in / left-out movements in the future. The applicant is aware of this future scenario and is accepting of it.

Parking

Under the City of Swan Local Planning Policy POL-TP-129 Vehicle Parking Standards, a Warehouse land use requires two (2) spaces per 100m^2 GLA; or two (2) spaces per person employed; or a minimum of six (6) spaces, whichever is greater.

Based on 14,450m^2 GLA (including 13,450m^2 warehouse + 1,000m^2 incidental office, a total of 289 bays is required, whilst a total of 88 bays are provided resulting in a theoretical shortfall of 201 bays under the provisions of POL-TP-129.

The applicant has advised that the facility would accommodate no more than 80 employees onsite at any one time with expected external visitation by 2-3 persons per day. City of Swan staff accept that the provision of 88 bays would be sufficient to accommodate actual parking demand generated from the development and it is recommended that occupancy be capped at 80 employees onsite at any one time. It is further noted that there is additional land within the property to the rear of the development site that could be utilised for expanded car parking area should parking demand increase beyond the provided 88 bays.

Landscaping

The application proposes soft (green) landscaping to some 2870m^2 of the 28,696m^2 development site. All bar two (2) of the 81 trees onsite are required to be removed given the extent of ground level adjustment to facilitate the proposed development. All 16 of the existing trees within the Bushmead Road verge to the front of the subject lot are retained with additional planting of five (5) trees and provision of 65 new trees within the lot, seven (7) of these to be large natives.

Noting the site is zoned for development of this type it is considered that the extent of soft landscaping and the scope of intended replanting is acceptable.

Built Form

The proposed development is of a commercial scale typical of an industrial business park operation and is designed to present attractively to Bushmead Road. A mix of building materials, colours and articulation will ensure the development has visual interest and is complementary to nearby buildings. The signage is considered appropriate in relation to the bulk and scale of the overall development and does not constitute a proliferation of signs and will not cause problems with sight lines.

The proposal has been assessed against the City of Swan Local Planning Policy POL-TP-124 Building and Development Standards - Industrial Zones, including setback, cover, plot ratio and landscaping requirements and is compliant.

Bushfire

The subject site is partially located within a designated bushfire prone area and is subject to the provisions of State Planning Policy 3.7 - Planning in Bushfire Prone Areas. The applicant has submitted a Bushfire Management Plan which concludes that bushfire risks associated with the site are readily manageable. City of Swan staff are satisfied that, since the development is neither a high-risk nor vulnerable land use, it can be supported.

Public Art

In accordance with the City of Swan Local Planning Policy POL-LP-1.10 Provision of Public Art, the owner is liable to make a contribution to public art, either monetarily or through development onsite, should the development be approved.
.
The policy aims to ensure that certain developments in excess of $2 million construction cost will contribute toward public artworks that promote and recognise the identity of the local community. The intent of the policy is to encourage owners to develop public art on their property. As this is not always feasible however, the owner is granted discretion to make a monetary contribution toward public art instead.

The approximate cost of the proposed development as stated on the MRS Form 1 and DAP Form 1 is $13 million. This construction cost requires either a cash-in-lieu contribution of $130,000 (being 1% of the construction cost) or the provision of public art onsite (as approved by the City) to the value of $130,000. Should Public Art be constructed onsite, a Notification under Section 70A of the *Transfer of Land Act 1893* is required to be lodged on the Certificate of Title of the subject lot to advise future landowners of the need to maintain the Public Art.

Conclusion:

The application seeks approval for a Warehouse development. The primary purpose of the development will be the storage and distribution of goods. The warehouse is designed to be separated internally to form two (2) tenancies, if required. The portion of the site on which the development will be located is identified as ‘Light Industrial’ under the approved Local Structure Plan for Lot 59 Bushmead Road, Hazelmere. A 'Warehouse' use is 'P' (permitted) within the zone.

The proposal is considered consistent with the City of Swan's Industrial development standards as well as all other local planning policy provisions and scheme requirements. In light of the above, the proposed development is supported.

Officer Recommendation

That the Metro Outer Joint Development Assessment Panel resolves to:

Approve DAP Application reference DAP/22/02305 and Accompanying Plans in accordance with clause 68 of Schedule 2 (Deemed Provisions) of the *Planning and Development (Local Planning Schemes) Regulations 2015*, and pursuant to clause 26(1) of the Metropolitan Region Scheme and the provisions of clause 10.3 of the City of Swan Local Planning Scheme No.17, subject to the following conditions:

Conditions

1. The approved development must comply in all respects with the attached approved plans, as dated, marked and stamped. The plans approved as part of this application form part of the development approval issued.

2. This approval is for 'Warehouse' as defined in the City of Swan Local Planning Scheme No.17 and the subject land may not be used for any other use without the prior approval of the City.

3. The development shall be connected to reticulated sewer or otherwise provided with an onsite effluent disposal system approved by the Department of Health to accommodate a daily volume of wastewater not exceeding 540 litres per 2,000m^2 of site area.

4. No more than 80 staff members are permitted on site at any one time.

5. Prior to occupation or use of the development, 88 vehicle parking bays must be provided on the lot in accordance with the approved plans. The design of vehicle parking and access must comply with AS/NZ 2890.1 (as amended). Accessible parking bays must comply with AS/NZ 2890.6 (as amended).

6. Vehicle parking, access and circulation areas must be sealed, kerbed, drained and maintained to the satisfaction of the City of Swan, in accordance with the approved plans.

7. All stormwater must be contained and disposed of on-site at all times, to the satisfaction of the City of Swan.

8. No fluid other than uncontaminated stormwater is to enter any stormwater drain without prior approval from the City of Swan and the Environmental Protection Authority.

9. Refuse bin areas adequate to service the development must be provided to the satisfaction of the City of Swan prior to occupation or use of development.

10. Refuse and storage areas shall be screened from view from any public street, and enclosed by a wall of masonry or other approved building material, and being not less than 1.8m in height.

11. A Lighting Plan demonstrating compliance with the requirements of AS 4282 – Control of Obtrusive Effects of Outdoor Lighting is to be prepared by a suitably qualified consultant and submitted to the City for approval prior to a building permit being issued.

12. Prior to a building permit being issued, a detailed landscaping plan for the subject site and/or the road verge(s) must be submitted to and approved by the City of Swan, and must include the following:

    a) the location, number, size and species type of existing ground covers, shrubs and trees;

    b) trees planted in the landscaped area to the front of the warehouse are to be marri *(corymbia callophyla);*

c) any existing landscape areas to be retained;

d) those areas to be updated, reticulated or irrigated; and

e) verge treatments.

The approved landscaping and reticulation plan must be implemented within the first available planting season after the initial occupation of the development, and maintained thereafter, to the satisfaction of the City of Swan. Any species that fails to establish within the first two (2) planting seasons following implementation must be replaced in consultation with, and to the satisfaction of the City of Swan.

13. All crossovers must be built and maintained in accordance with the City of Swan's specifications.

14. Prior to occupation of the development, a Notification pursuant to Section 70A of the *Transfer of Land Act 1893* must be placed on the certificate(s) of title of the subject property advising current and future land owners that:

"The vehicular access entering and exiting this lot is expected to be affected by the future upgrade of Bushmead Road to a RAV7 standard and the potential introduction of a RAV7 compliant four-way intersection to the west of the site and that could include restricting movements to left-in, left-out only."

15. Prior to the operation of the Warehouse the applicant/owner is to install acoustic fencing to the site comprising a solid continuous 3m high barrier with a minimum 8kg/m^2 surface mass in the location shown on Figure 4 of the Acoustic Report dated 10 October 2022, as prepared by Stantec.

16. An Operational Management Plan is to be prepared by a suitably qualified consultant and submitted to the City of Swan for approval prior to a building permit being lodged. The Operational Management Plan shall outline how all noise related recommendations and 'best practice' mitigation measures, including but not limited to an assessment of mechanical service noise emission levels and appropriate noise control measures, as required by the Acoustic Report dated 10 October 2022 prepared by Stantec, will be implemented to achieve compliance with the *Environmental Protection (Noise) Regulations 1997*. This plan is to be to the satisfaction of the City of Swan and shall be maintained and complied with in perpetuity.

17. The proposed development must incorporate all requirements outlined in the submitted Bushfire Management Plan (BMP), prepared by Strategen JBS&G (dated 17 August 2022, Version R01 Rev 0), and maintain the property to this standard.

18. Prior to the commencement of operation, the landowner must contribute a sum of 1% of the total development construction value toward Public Art in accordance with the City of Swan Local Planning Policy for the Provision of Public Art (POL-LP-1.10), by either:

a. Payment to the City of Swan a cash-in-lieu amount equal to the sum of the 1% contribution amount ($130,000). This must be paid to the City of Swan

prior to the commencement of operation, or prior to the issuance of a building permit for the approved development, whichever occurs first; or

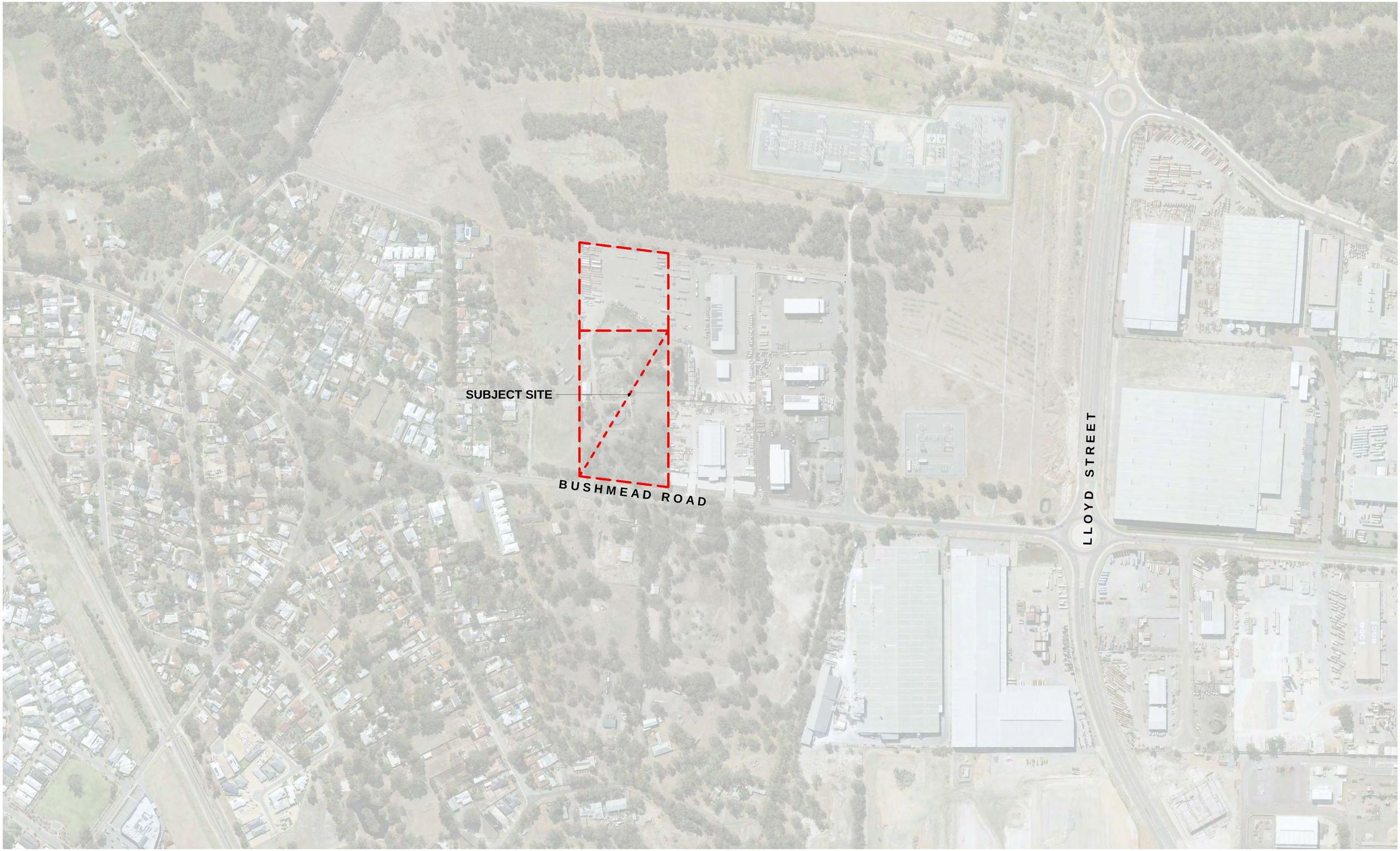
b. Provision of Public Art on-site to a minimum value of the 1% contribution amount ($130,000). The following is required for the provision of Public Art on-site:

   i. the landowner or applicant on behalf of the landowner must seek approval from the City of Swan for a specific Public Art work including the artist proposed to undertake the work to the satisfaction of the City of Swan in accordance with POL-LP-1.10 and the Developers' Handbook for Public Art (as amended). The City of Swan may apply further conditions in regard to the proposed Public Art;

   ii. no part of the approved development may be occupied or used until the Public Art has been installed in accordance with the approval granted by the City of Swan; and,

   iii. The approved Public Art must be maintained in compliance with the approval granted by the City of Swan and any conditions thereof, to the satisfaction of the City of Swan.

19. Any additional development, which is not in accordance with the application (the subject of this approval) or any condition of approval, will require further approval of the City of Swan



LOCATION PLAN
SCALE:1 : 2500

meyer shircore architects

PROPOSED WAREHOUSE DEVELOPMENT

LOCATION : LOT 59 BUSHMEAD ROAD, HAZELMERE
FOR : ALTIS PROPERTY

DATE:	AUG 2022
REVISION:	22
SHEET:	1
SCALE:	1 : 2500 @A1

PROJECT NUMBER
8889

© Meyer Shircore & Associates ACN 115 189 216
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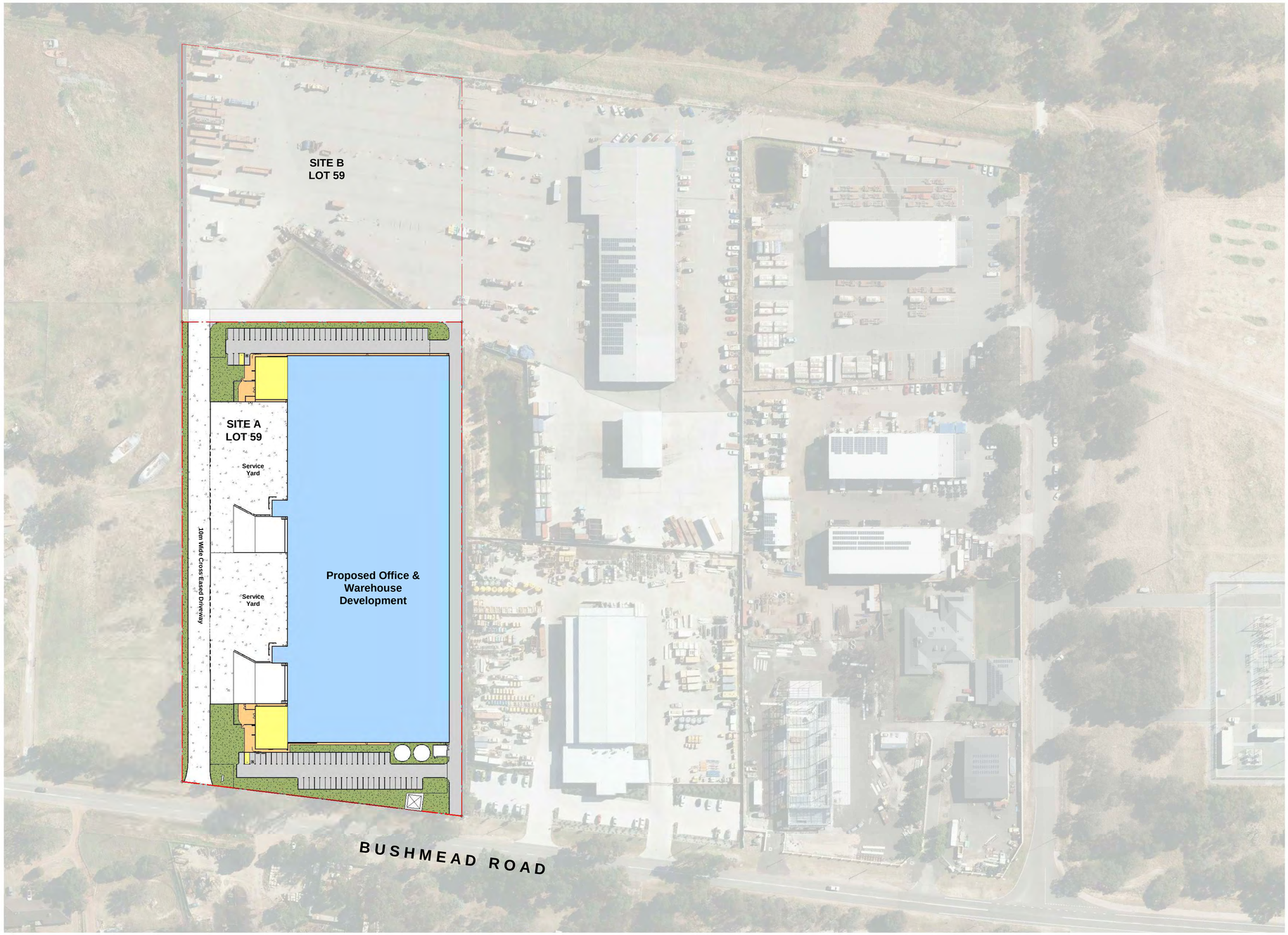

PROPOSED DEVELOPMENT PLAN
SCALE: 1 : 1000

meyer shircore architects

PROPOSED WAREHOUSE DEVELOPMENT

LOCATION : LOT 59 BUSHMEAD ROAD, HAZELMERE
FOR : ALTIS PROPERTY

0 10 20 30 40 50 100

DATE: AUG 2022
REVISION: 22
SHEET: 2
SCALE: 1 : 1000 @A1

PROJECT NUMBER
8889

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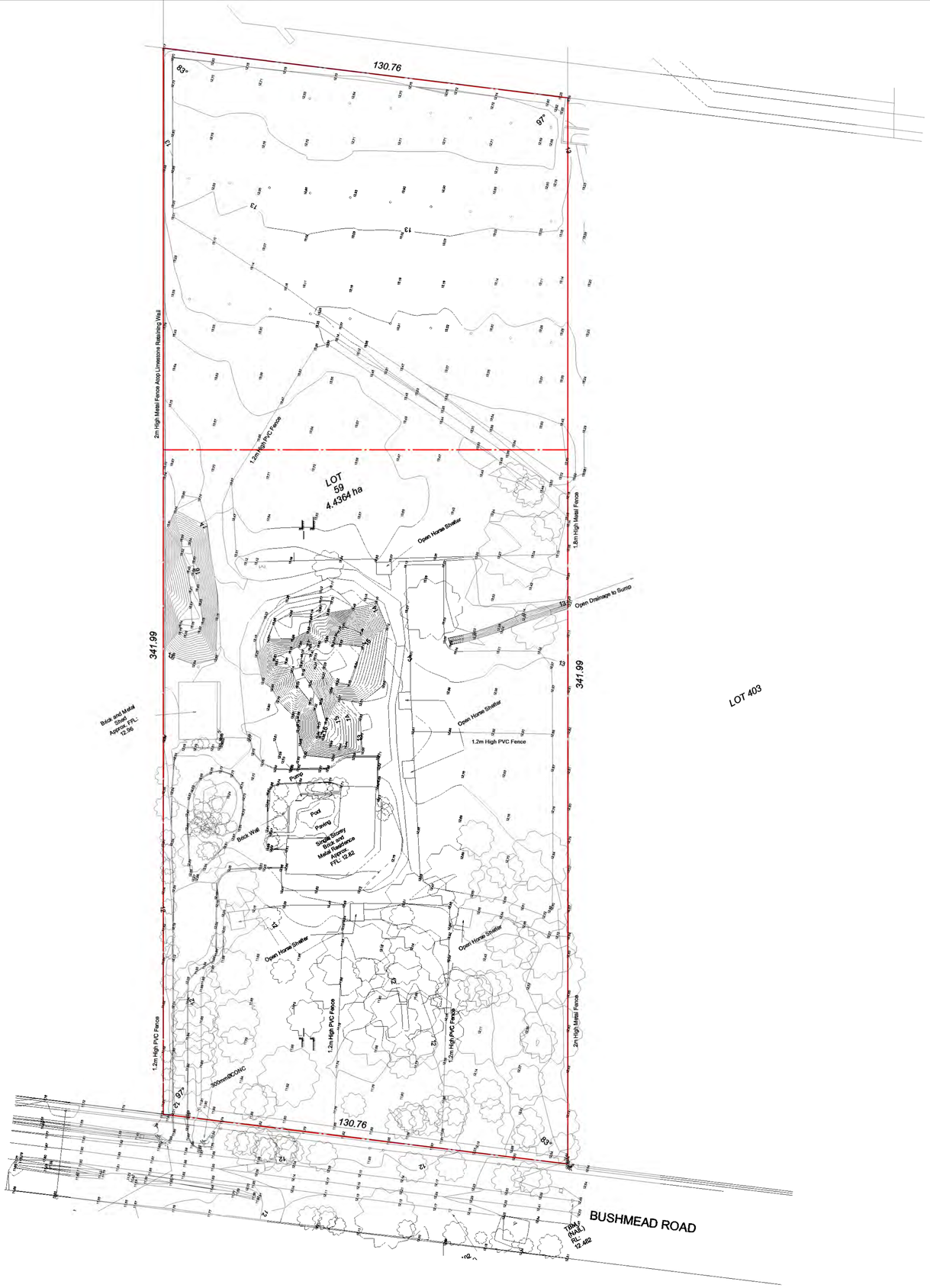

EXISTING SITE SURVEY

SCALE: 1 : 750

meyer shircore architects

PROPOSED WAREHOUSE DEVELOPMENT

LOCATION : LOT 59 BUSHMEAD ROAD, HAZELMERE

FOR : ALTIS PROPERTY

0 7.5 15 22.5 30 37.5 75

DATE:	AUG 2022
REVISION:	22
SHEET:	3
SCALE:	1 : 750 @A1

PROJECT NUMBER **8889**

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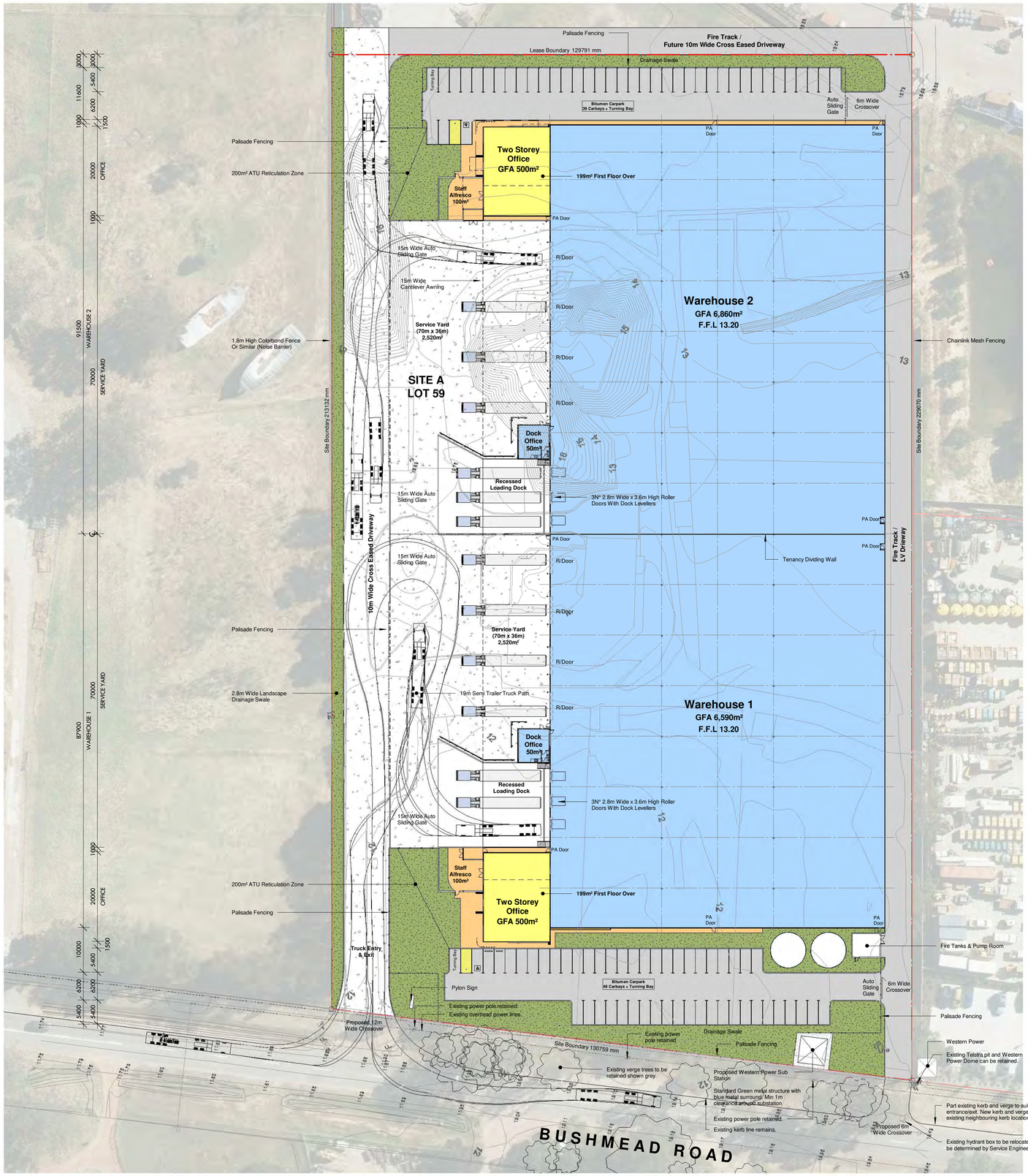
SITE CRITERIA

LOT 59
Site A **28,696m²**

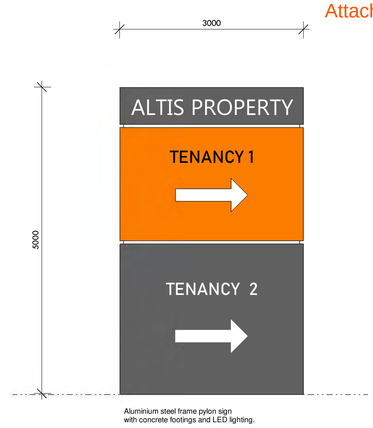
1. Landscaping
a. Soft Landscaping Required 10% 2,870m²
b. Provided
Soft 2,905m² **(10.1%)**
Hard 446m²
Total **3,351m²**

2. Floor Area (GFA)
a. Warehouse 13,450m²
b. Ground Floor Office 600m²
c. First Floor Office 400m²
Total **14,450m²**

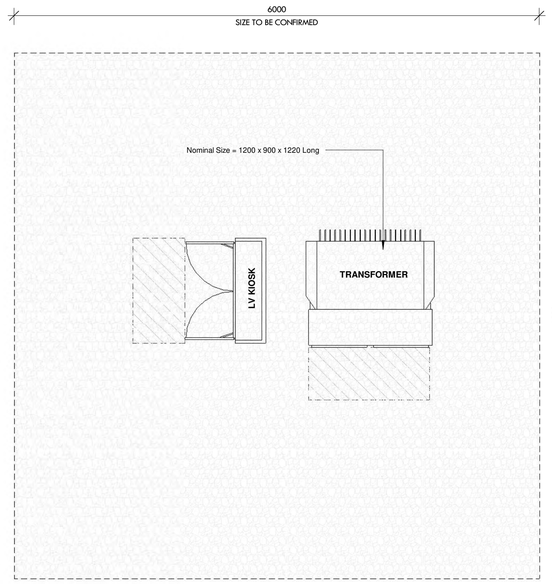
3. Carparking
a. Provided **88 Cars**



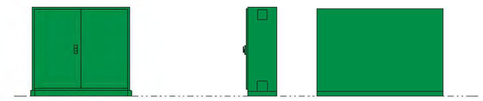
SITE PLAN
SCALE: 1 : 500



SITE PYLON SIGN
SCALE: 1 : 50



SUBSTATION PLAN
NOTE: TRANSFORMER & PAD SIZES TO BE CONFIRMED



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PROPOSED WAREHOUSE DEVELOPMENT

LOCATION : LOT 59 BUSHMEAD ROAD, HAZELMERE
FOR : ALTIS PROPERTY

0 5 10 15 20 25 50

DATE: AUG 2022
REVISION: 22
SHEET: 4
SCALE: As indicated @A1

PROJECT NUMBER **8889**

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Attachment 2d.

RACKING LEGEND

- 7 HIGH PALLETS
- BRIDGE BAY 4 HIGH PALLETS ABOVE

179400 (91500 + 87900)

Fire Track / LV Driveway

A 6

11300 TYP. PORTAL

INDICATIVE RACKING PLAN SHOWN

3700 TYP.

Ridge Line

Fire Tanks & Pump Room

74980 WAREHOUSE

4N° 5.5m H x 6m W Roller Doors

Warehouse 2
GFA 6,860m²
9,920 Pallets
F.F.L 13.20

3N° 2.8m Wide x 3.6m High Roller Doors With Dock Levellers

Option For Dividing Wall To Seperate Into 2 Tenancies

Warehouse 1
GFA 6,590m²
9,600 Pallets
F.F.L 13.20

R/Door

13.15

Dock Office 50m²

Recessed Loading Dock 11.90

Crash Rail

Handrail On Retaining Wall

Retaining Wall

Handrail On Retaining Walls

Two Storey Office
F.F.L 13.20

Staff Alfresco

Mech Plant

Louvre Screen & Gates

Blockwork Alfresco Screen Wall

15m Wide Cantilever Awning

Service Yard (70m x 36m) 2,520m²
HARDSTAND

Dividing Service Yard Chainlink Mesh Fence

15m Wide Auto Sliding Gate

Palisade Fencing

10m Wide Crossed Eased Driveway

36000 SERVICE YARD

10000

20000 OFFICE | 1000 | 70000 SERVICE YARD | 70000 SERVICE YARD | 1000 | 20000 OFFICE

WAREHOUSE PLAN

SCALE: 1 : 250

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PROPOSED WAREHOUSE DEVELOPMENT

LOCATION : LOT 59 BUSHMEAD ROAD, HAZELMERE

FOR : ALTIS PROPERTY

0 2.5 5 7.5 10 12.5 25

DATE:	AUG 2022	PROJECT NUMBER
REVISION:	22	**8889**
SHEET:	5	
SCALE:	1 : 250 @A1	

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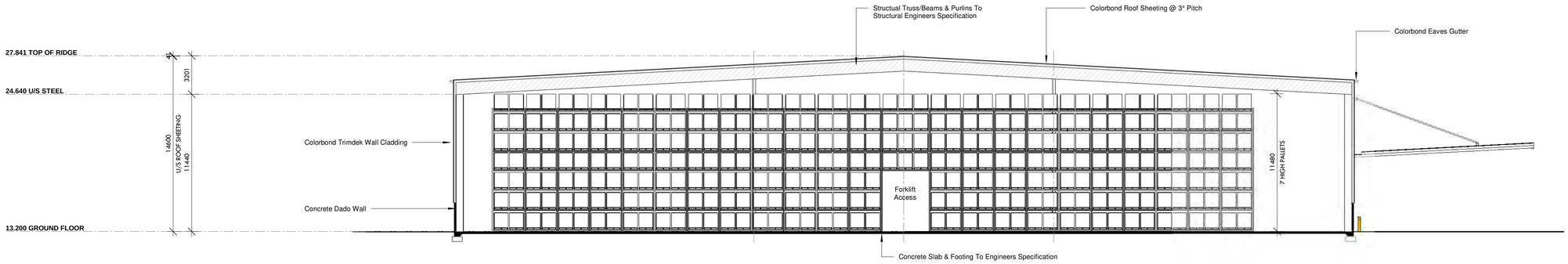
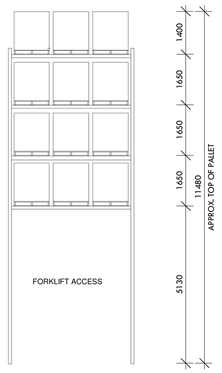


TYPICAL SECTION & INDICATIVE RACKING PLAN

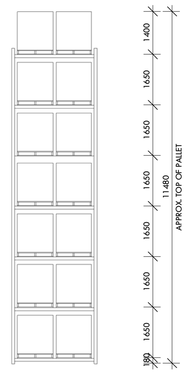
SCALE: 1 : 200

TYPICAL RACKING



BRIDGING BAY

SCALE 1:100



7 - HIGH

SCALE 1:100

PROPOSED WAREHOUSE DEVELOPMENT

LOCATION : LOT 59 BUSHMEAD ROAD, HAZELMERE

FOR : ALTIS PROPERTY

0 2 4 6 8 10 20

DATE: AUG 2022

REVISION: 22

SHEET: 6

SCALE: As indicated @A1

PROJECT NUMBER **8889**

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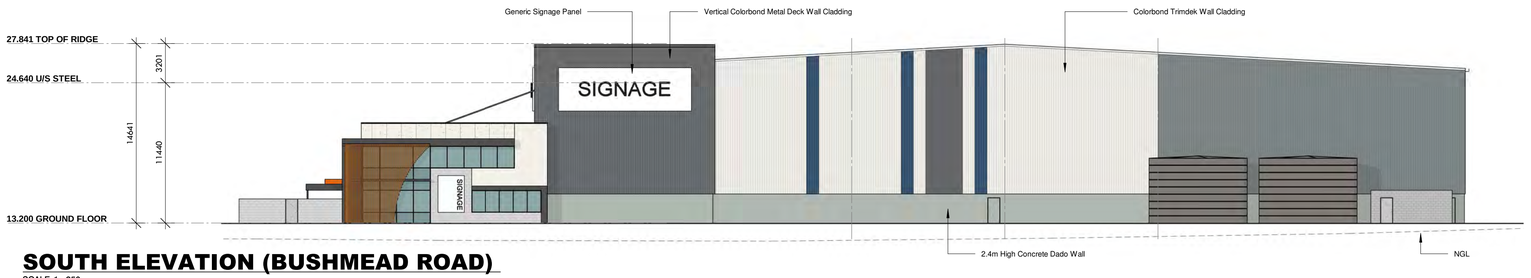
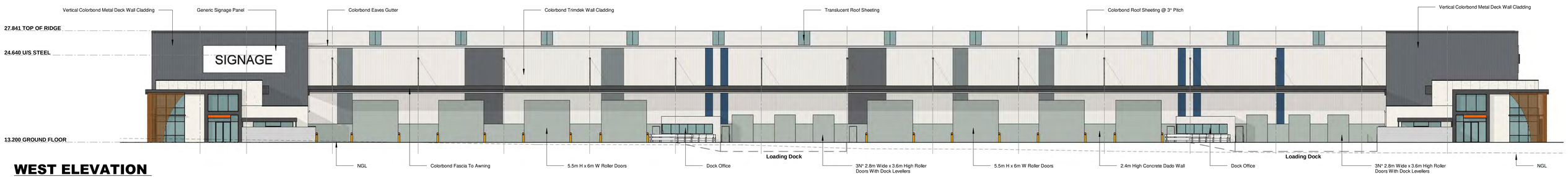
COLOUR LEGEND

- COLORBOND 'BASALT' / WALL CLADDING
- COLORBOND 'WINDSPRAY' / WALL CLADDING
- COLORBOND 'SURFMIST' / WALL CLADDING
- COLORBOND 'DEEP OCEAN' / WALL CLADDING
- COLORBOND 'SHALE GREY' / CONCRETE DADO



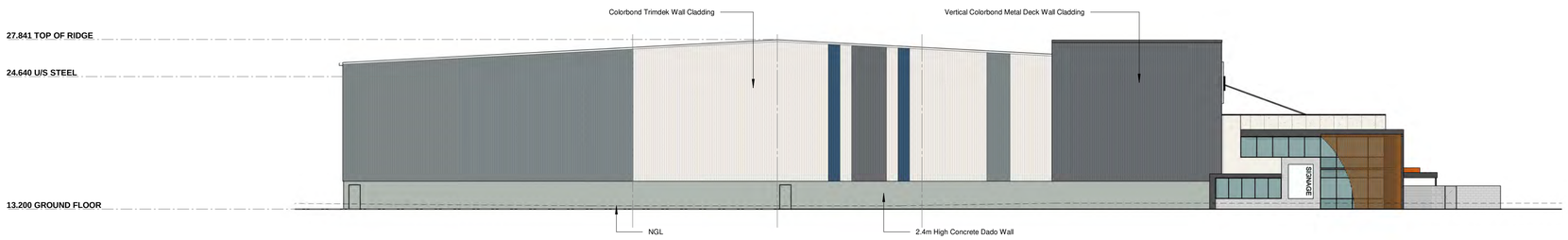
SOUTH ELEVATION (BUSHMEAD ROAD)

SCALE:1 : 250



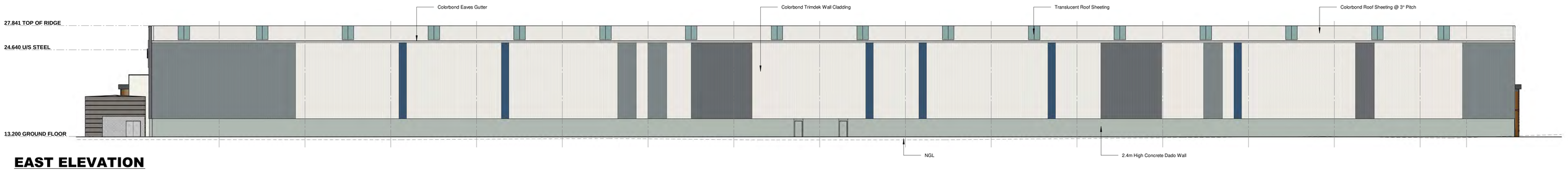
WEST ELEVATION

SCALE:1 : 250



NORTH ELEVATION

SCALE:1 : 250



EAST ELEVATION

SCALE:1 : 250

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PROPOSED WAREHOUSE DEVELOPMENT

LOCATION : LOT 59 BUSHMEAD ROAD, HAZELMERE

FOR : ALTIS PROPERTY

0 2.5 5 7.5 10 12.5 25

DATE: AUG 2022

REVISION: 22

SHEET: 7

SCALE: 1 : 250 @A1

PROJECT NUMBER **8889**

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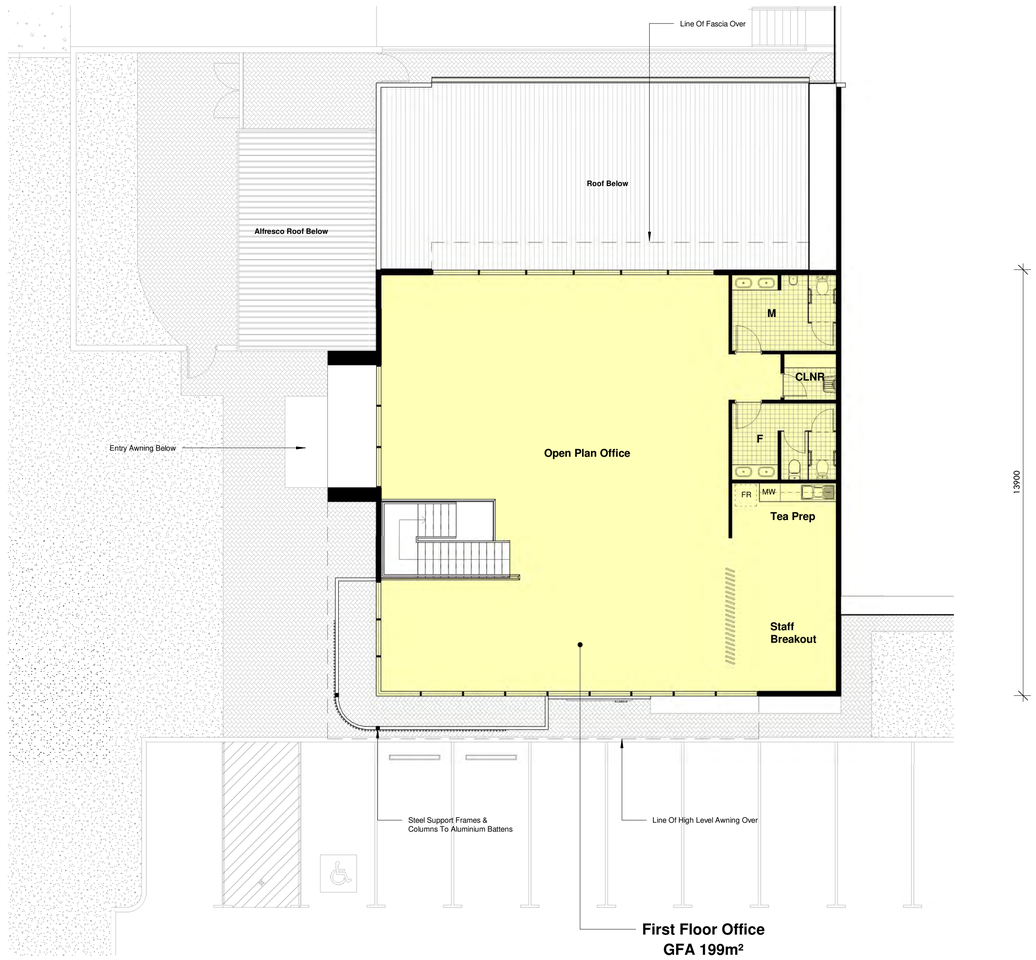
Attachment 2g.

OFFICE 1 SHOWN - OFFICE 2 IDENTICAL LAYOUT



GROUND FLOOR PLAN

SCALE: 1 : 100



FIRST FLOOR LEVEL

SCALE: 1 : 100

PROPOSED WAREHOUSE DEVELOPMENT

LOCATION : LOT 59 BUSHMEAD ROAD, HAZELMERE

FOR : ALTIS PROPERTY

0 1 2 3 4 5 10

DATE: AUG 2022

REVISION: 22

SHEET: 8

SCALE: 1 : 100 @A1

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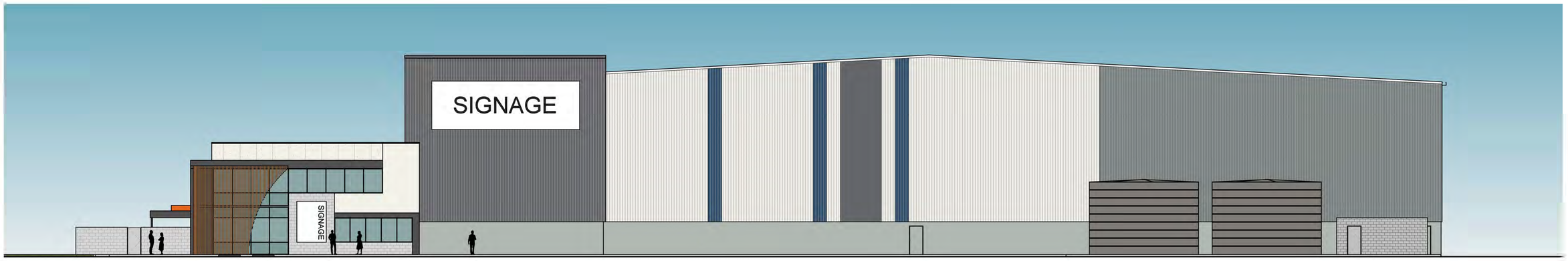
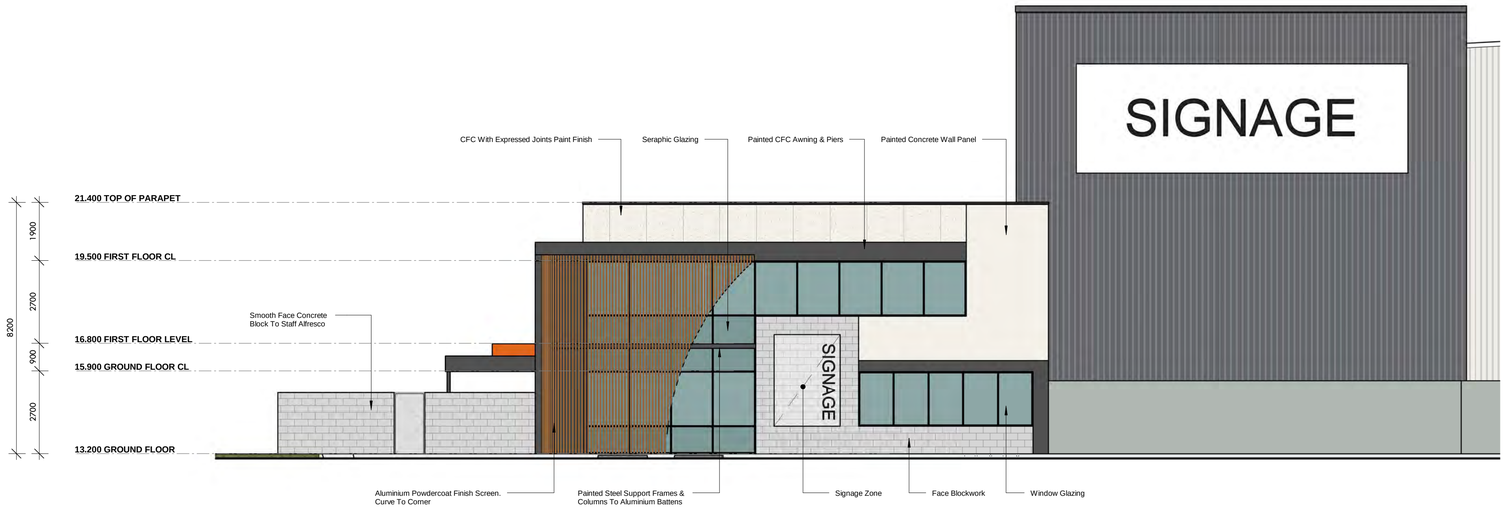


OFFICE 1 SHOWN - OFFICE 2 IDENTICAL LAYOUT & ELEVATIONS REFER - 'WAREHOUSE ELEVATIONS'



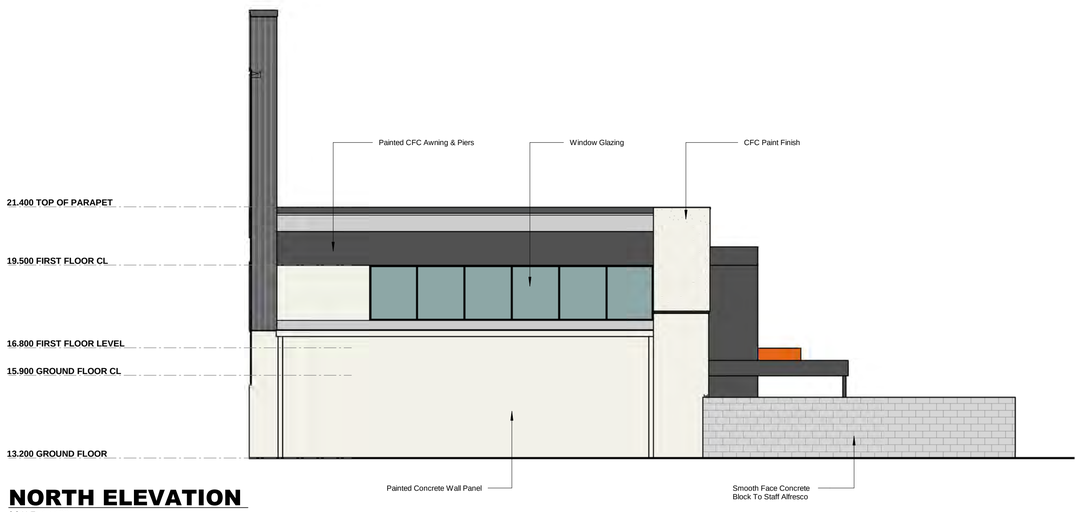
SOUTH ELEVATION (BUSHMEAD ROAD

SCALE: 1 : 100



WEST ELEVATION

SCALE: 1 : 100



NORTH ELEVATION

SCALE: 1 : 100

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PROPOSED WAREHOUSE DEVELOPMENT

LOCATION : LOT 59 BUSHMEAD ROAD, HAZELMERE

FOR : ALTIS PROPERTY

0 1 2 3 4 5 10

DATE: AUG 2022

REVISION: 22

SHEET: 9

SCALE: As indicated @A1

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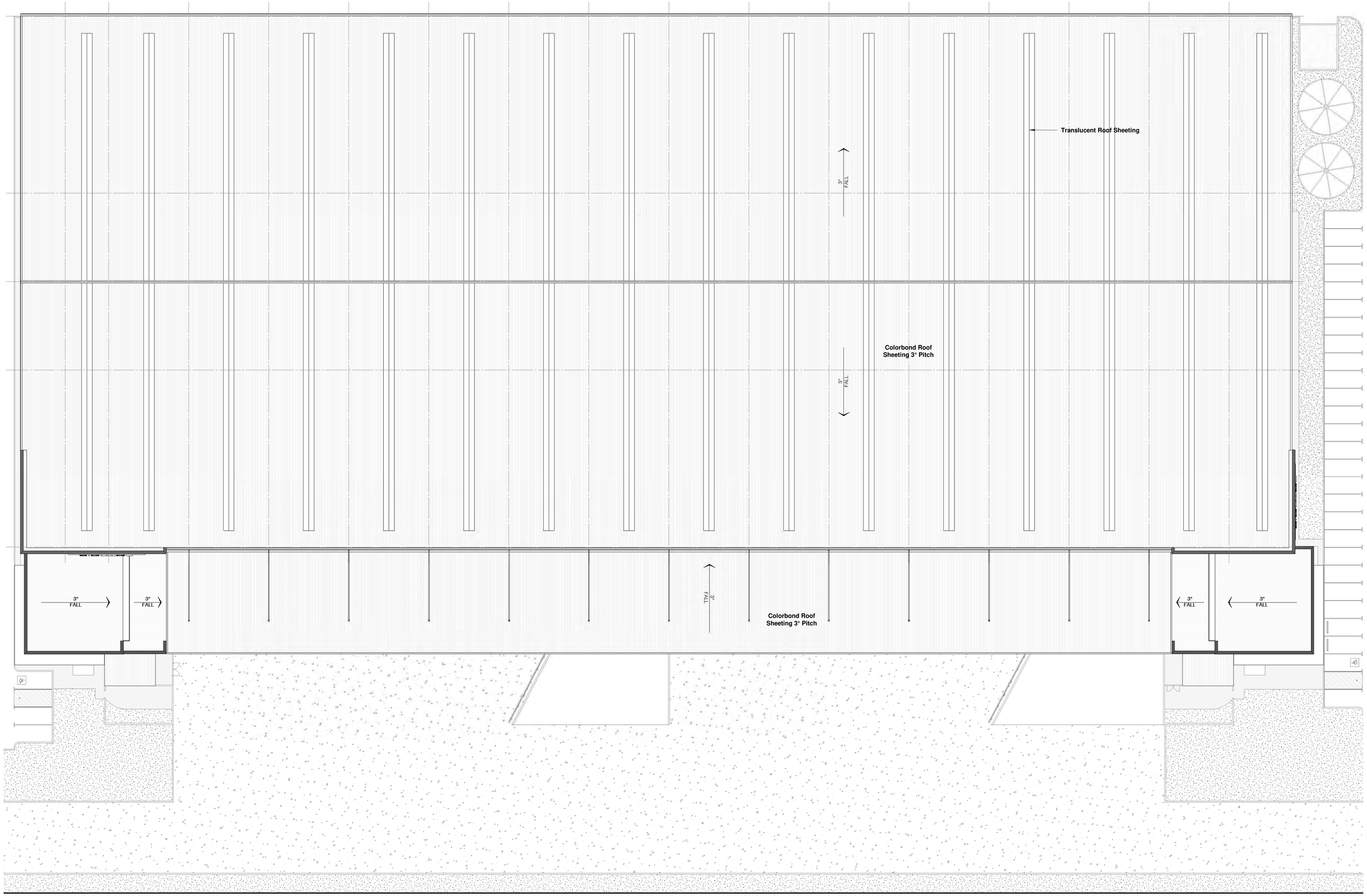
Attchment 2i.



ROOF PLAN
SCALE: 1 : 250

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PROPOSED WAREHOUSE DEVELOPMENT

LOCATION : LOT 59 BUSHMEAD ROAD, HAZELMERE
FOR : ALTIS PROPERTY

0 2.5 5 7.5 10 12.5 25

DATE:	AUG 2022
REVISION:	22
SHEET:	12
SCALE:	1 : 250 @A1

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LEGEND

01 VERGE - LANDSCAPED AND IRRIGATED.
REFER C1.102 FOR DETAIL

02 CARPARK - IRRIGATED TREE PLANTING.
REFER C1.104 FOR PLANT MIX

03 OFFICE ENTRY LANDSCAPE
REFER C1.104 FOR PLANT MIX

04 STAFF COURTYARD - LANDSCAPED AND IRRIGATED
REFER C1.103 FOR DETAIL

05 PERIMETER DRAINAGE EASEMENT TO BE LANDSCAPED
REFER C1.105 FOR PLANT MIX

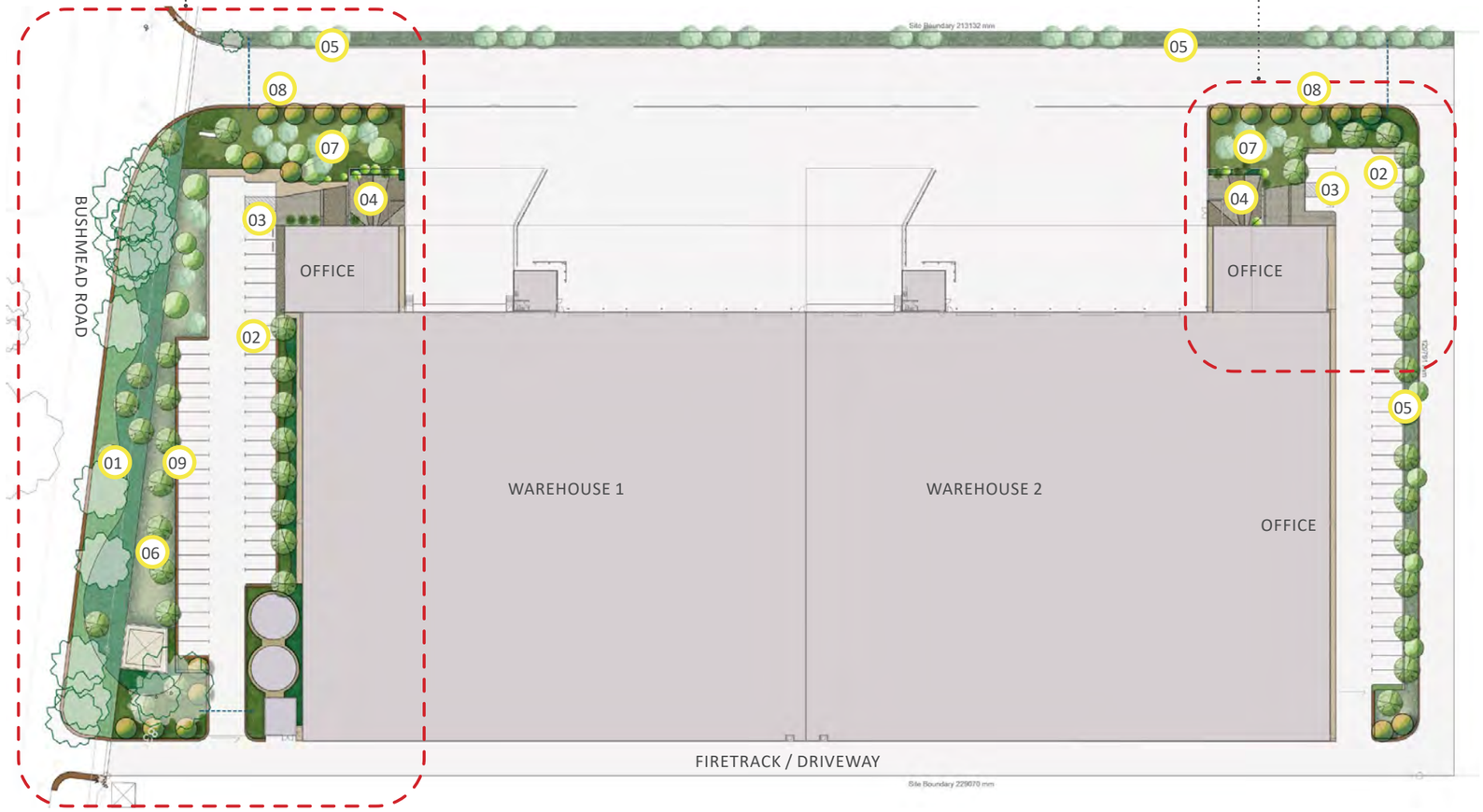
06 DRAINAGE SWALE - LANDSCAPED
REFER C1.105 FOR PLANT MIX

07 AEROBIC TREATMENT UNIT (ATU) AREA TO BE LANDSCAPED. REFER C1.105 FOR PLANT MIX

08 ENTRY 'BOULEVARD' LANDSCAPE.
REFER C1.104 FOR TREE SELECTION.
UNDERSTOREY PLANTING REFER TO C1.105 (INTERNAL DRAINAGE SWALE)

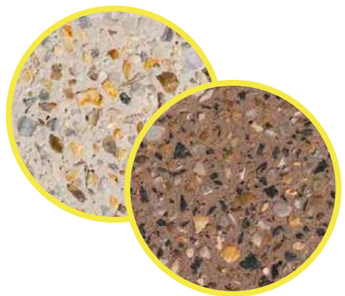
VERGE AND WAREHOUSE ONE LANDSCAPE
- REFER C1.102 FOR DETAIL

WAREHOUSE AND OFFICE 2
STAFF ALFRESCO / ENTRY ZONE
- REFER C1.103 FOR DETAIL

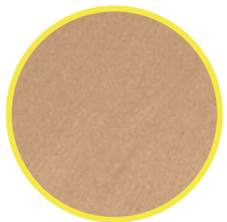


HARDWORKS PALETTE

DELINEATION PAVING
- EXPOSED AGGREGATE INSITU CONCRETE OR UNIT PAVERS TO DELINEATE KEY LOCATIONS



PAVING - GENERAL
- FULL DEPTH COLOUR



FURNITURE
- VARIETY OF SEATING OPPORTUNITIES TO BE PROVIDED WITHIN THE STAFF ALFRESCO ZONES



NOTES

PLANTING NOTES:
- PLANTING MIXES SHOWN ON C1.104 AND C1.105;
- TREES SPECIES TO BE MIXED TO CREATE AN INFORMAL NATURAL AESTHETIC;
- UNDERSTOREY PLANTING TO BE MASS PLANTED, AS A RANDOM MIX TO FURTHER ENHANCE THE NATURAL AESTHETIC;

IRRIGATION NOTES:
- IRRIGATION TO ALL LANDSCAPE AREAS;
- POP - UP FLOOD BUBBLERS TO SUIT SIZE OF GARDEN BEDS TO ENSURE ANY OVER-SPRAY AND WASTAGE IS MITIGATED;
- ATU RETICULATION AREA TO BE DESIGNED IN ACCORDANCE WITH THE RELEVANT STANDARDS AND GUIDELINES;
- ALLOW FOR SLEEVES UNDER ROAD TO IRRIGATION LANDSCAPE. SLEEVES TO BE DN200, INSTALLED 750MM BELOW GROUND AND EXTEND 600MM BEYOND THE KERB - ENDING IN SOFT LANDSCAPE AREA

GENERAL NOTES:
- **EXISTING TREES** - EXISTING VERGE TREES TO BE RETAINED WHERE LEVELS PERMIT;
- **BUSHFIRE MANAGEMENT** - ALL LANDSCAPE TO BE MAINTAINED TO MEET THE LOW THREAT BUSHFIRE STATE;
- **CROSSOVERS** - CROSSOVERS TO BE TO CITY OF SWAN SPECIFICATION;
- **OVERHEAD POWERLINES** - LOCATED ON STREET VERGE TOBE CONSIDERED;
- **FENCING** - REFER ARCHITECTURAL AND CIVIL DRAWING PACKAGES;
- **WALLING** - REFER CIVIL DRAWING PACKAGE FOR WALLING REQUIREMENTS;

LOT 403 + 59 BUSHMEAD ROAD HAZELMERE

PREPARED FOR ALTIS PROPERTY

LANDSCAPE CONCEPT - OVERALL PLAN
OCTOBER 2022

JOB NO. 2207001
1:1000 @ A3

C1.101 REV F

0 10 20 30 50m

PLAN E
LANDSCAPE ARCHITECTS
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Attachment 2j.

LEGEND

01 LOW VERGE PLANTING (IRRIGATED)
REFER C1.104 FOR PLANT MIX

02 MEDIUM HEIGHT VERGE PLANTING (IRRIGATED)
REFER C1.104 FOR PLANT MIX

03 COMPACTED GRAVEL OR MULCH ONLY STRIP TO BACK OF KERB

04 DRAINAGE SWALE (REFER CIVIL DRAWINGS FOR DETAIL)
REFER C1.105 FOR PLANT MIX

05 TREE PLANTING TO DRAINAGE SWALE
REFER C1.105 FOR PLANT MIX

06 ATU RETICULATION ZONE - PLANTED
REFER C1.105 FOR PLANT MIX

07 TREE PLANTING TO CARBAYS
LOCATED IN GARDEN BED TO OPTIMISE TREE GROWING CONDITIONS

08 PAVING NIBS - 500MM PAVED SURFACE TO BACK OF KERB ADJACENT CARBAYS

09 GENERAL PAVING (2% FALL AWAY FROM BUILDING)

10 PAVING TO DELINEATE ENTRANCE AND STAFF ALFRESCO AREAS (2% FALL AWAY FROM BUILDING)

11 STAFF ALFRESCO TO INCLUDE FURNITURE AND PLANTING

12 ENTRY DRIVEWAY - TO BE ENHANCED THROUGH DENSE FEATURE TREES TO LANDSCAPE AREAS

13 PERIMETER DRAINAGE SWALE TO BE PLANTED.
SWALE TO BE MAINTAINED TO MEET LOW THREAT REQUIREMENT. REFER C1.105 FOR PLANT MIX

14 FEATURE ENTRY TREES

15 VERGE TREES TO BE RETAINED

16 LOW HEIGHT CARPARK PLANTING MIX - IRRIGATED
REFER C1.104 FOR PLANT MIX

17 MEDIUM HEIGHT CARPARK PLANTING MIX - IRRIGATED
REFER C1.104 FOR PLANT MIX

18 GRAVEL MULCH
ALLOW GRAVEL MULCH TO PERIMETER OF TANKS AND TO THE WESTERN POWER SITE

19 EXISTING TREES (ON LOT)
WHERE POSSIBLE, RETAIN EXISTING TREES ON LOT

PERIMETER DRAINAGE SWALE
TREES PLANTED IN CLUMPS (OR SINGULARLY) WITH 20M SPACE BETWEEN TO ACCOMMODATE BUSHFIRE MANAGEMENT REQUIREMENTS

WAREHOUSE AND OFFICE 1 STAFF ALFRESCO / ENTRY ZONE
- REFER C1.103 FOR DETAIL

TREE PLANTING
TREE LOCATIONS PROPOSED TO BE OFFSET FROM EACH OTHER. THE OFFSET OF THE TREE CANOPIES IS TO CREATE A DENSE VISUAL BUFFER BETWEEN THE STREET AND THE PROPOSED BUILT FORM.
TREE SPECIES TO THE STREET FRONTAGE INCLUDE:
- EUCALYPTUS TORQUATA
- CORYMBIA FICIFOLIA
- EUCALYPTUS VICTRIX
- EUCALYPTUS ERYTHRYCORYS

LARGE TREE PLANTING
WHERE SPACE PERMITS, CONSIDER LARGE NATIVE TREE PLANTINGS (POTENTIAL LOCATIONS INDICATED WITH WHITE CIRCLE)

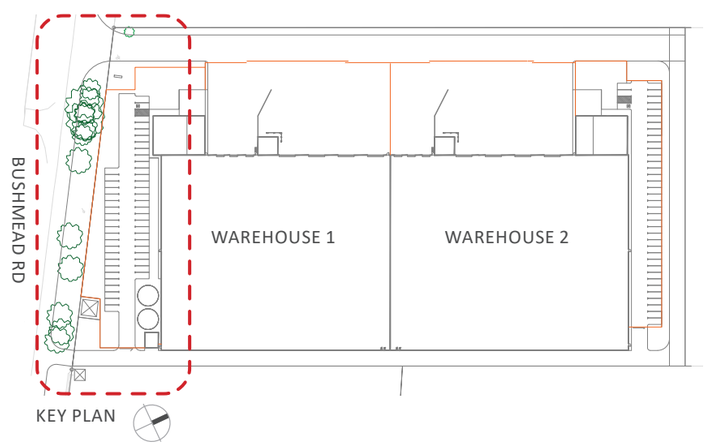


PYLON SIGN
LOW PLANTING TO FRONT OF PYLON SIGN

NO PLANT ZONE
ALLOW 500MM NO PLANT ZONE TO BACK OF KERB.

VERGE PLANTING
MEDIUM HEIGHT PLANTING AND DENSE TREE PLANTING PROPOSED TO PROVIDE A VISUAL BUFFER BETWEEN THE STREET AND THE NEW BUILDING

OVERHEAD POWERLINES
LOCATED IN VERGE



LOT 403 + 59 BUSHMEAD ROAD HAZELMERE

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LANDSCAPE CONCEPT - WAREHOUSE 1
OCTOBER 2022

JOB NO. 2207001
1:500 @ A3

C1.102
REV F

0 5 10 15 25m

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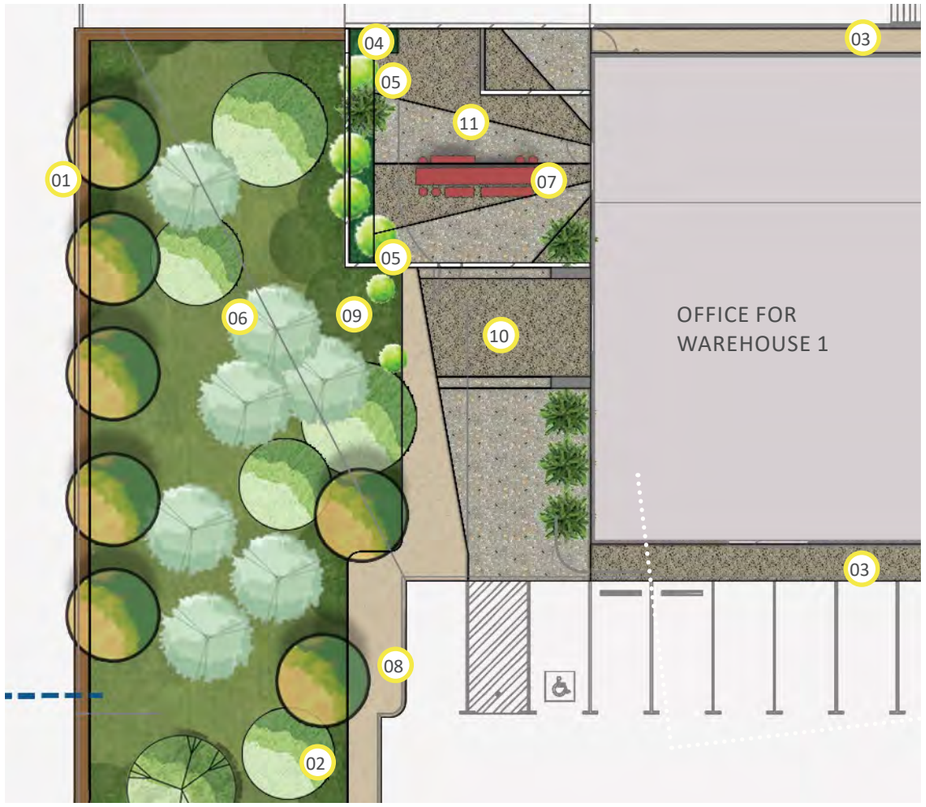
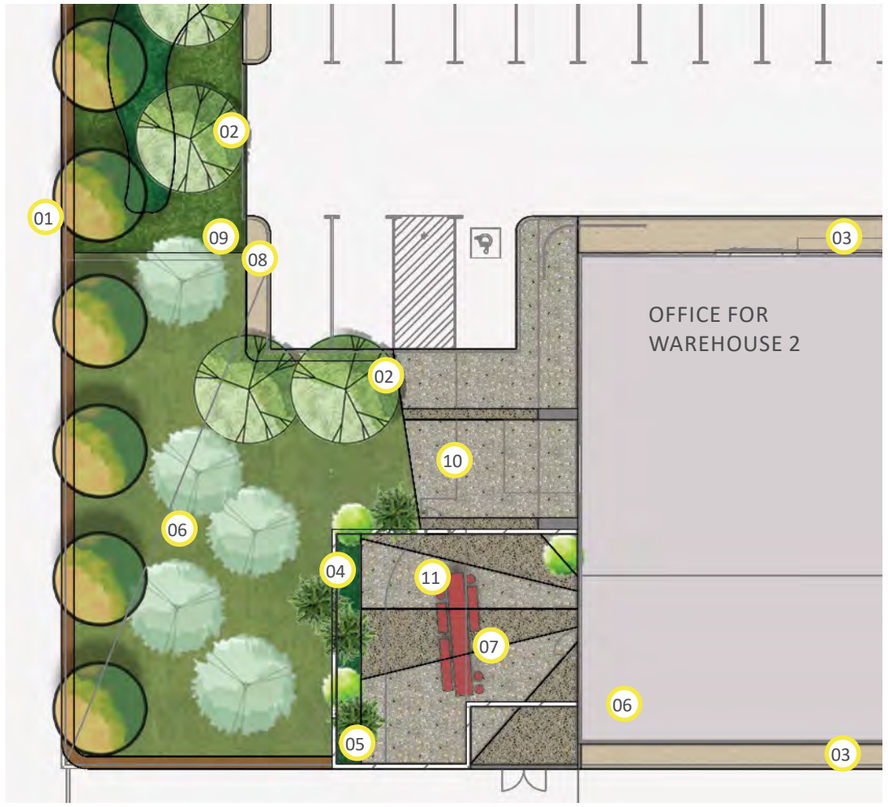


PLAN A WAREHOUSE 1 - STAFF ALFRESCO / OFFICE ENTRY CONCEPT PLAN



PLAN B WAREHOUSE 2 - STAFF ALFRESCO / **OFFICE ENTRY** CONCEPT **PLAN**

LEGEND

01 **FEATURE ENTRY TREES** - TO PROVIDE A VISUAL MARKER ALONG THE ENTRY DRIVEWAY

02 **CARPARK TREES IN GARDEN BED** REFER C1.104 FOR PLANT MIX

03 **GENERAL PAVING TO NIBS AND BUILDING PERIMETER** (2% FALL AWAY FROM BUILDING)

04 **MID HEIGHT GROUND COVER TO STAFF ALFRESCO,** MIXED WITH CLIMBING PLANTS (TO FENCE)

05 **PLANTS IN GARDEN BED** - TO PROVIDE A VISUAL AND PHYSICAL BUFFER TO THE CARPARK BEYOND

06 **ATU RETICULATION ZONE - PLANTED** REFER C1.105 FOR PLANT MIX

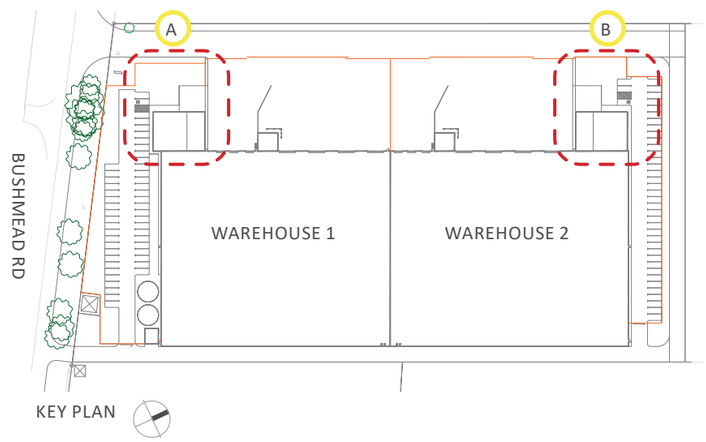
07 **FURNITURE TO STAFF ALFRESCO** - PROVIDING NUMEROUS SEATING OPPORTUNITIES

08 **PARKING NIBS** - 500MM PAVED SURFACE TO BACK OF KERB ADJACENT CARBAYS

09 **LOW HEIGHT CARPARK PLANTING MIX** - IRRIGATED REFER C1.104 FOR PLANT MIX

10 **PAVING TO DELINEATE ENTRANCE AND STAFF ALFRESCO AREAS** (2% FALL AWAY FROM BUILDING)

11 **FENCED COURTYARD** - STAFF ALFRESCO FENCED TO CREATE A 'BREAKOUT / RELAXATION' SPACE FOR STAFF



LOT 403 + 59 BUSHMEAD ROAD HAZELMERE

PREPARED FOR ALTIS PROPERTY

LANDSCAPE CONCEPT - STAFF ALFRESCO / OFFICE ENTRY CONCEPT PLAN

OCTOBER 2022

JOB NO. 2207001

1:250 @ A3

C1.103

REV F

0 2.5 5 7.5 12.5m

PLAN E

LANDSCAPE ARCHITECTS

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Attachment 2j.

VERGE PLANTING MIX

PROPOSED TREE PLANTING
- 45L UNLESS OTHERWISE NOTED
- TREE SPECIES TO CONSIDER OVERHEAD POWERLINES



Coastal Moort
Eucaluptus playtypus
6m (h) x 6m (w)
*(Small Tree)**



Cut leaf Banksia
Banksia praemorsa
5m (h) x 4m (w)
*(Small Tree)**



Pin Cushion Hakea
Hakea laurina
5m (h) x 3m (w)
*(Small Tree)**

LOW HEIGHT PLANTING MIX - GROUND COVER TO 500mm PLANTING MIX
- 3 PLANTS PER SQ.M
- TUBESTOCK PLANTING



Banksia
Banksia blechnifolia
0.5m height



Snake Vine
Hibbertia scandens
0.5m height



Morning Iris
Orthrosanthus laxus
0.5m high

MEDIUM HEIGHT PLANTING MIX - 500mm - 1500mm PLANTING MIX
- 3 PLANTS PER SQ.M
- TUBESTOCK PLANTING



Westringia
Westringia dampieri
0.5m height



Ember Glow
Grevillea
1.0m height



Kangaroo Paw
Anigozanthos sp.
1.5m height



Tar Bush
Eremophila nivea
1.5m height

CARPARK PLANTING MIX

PROPOSED TREE PLANTING
- LOCATIONS AS SHOWN
- 45L UNLESS OTHERWISE NOTED
  (CORAL GUM TO CARPARK NIBS)



Coral Gum
Eucalyptus torquata
8m (h) x 3m (w)
*(Small Tree)**



Dwarf Snow Gum
Eucalyptus victrix
7m (h) x 5m (w)
*(Small Tree)**



Illyarrie
Eucalyptus erythrycorys
7m (h) x 4m (w)
*(Small Tree)**

LOW HEIGHT PLANTING MIX - GROUND COVER TO 500mm PLANTING MIX
- 3 PLANTS PER SQ.M
- 140MM



Gin Gin Gem
Grevillia obtusifolia
0.25m height



Stalked Guinea Flower
Hibbertia racemosa
0.5m height



Kalbarri Carpet
Eremophila glabra
50cm height

MEDIUM HEIGHT PLANTING MIX - 500mm - 1500mm PLANTING MIX
- 3 PLANTS PER SQ.M
- 140MM



Ashby's Banksia
Banksia ashbyi dwarf
1.5m height



Honeybird Yellow
Grevillea
1.0m height



Egg and Bacon Plant
Eutaxia sp
1.0m height



Native Hibiscus
Alyogyne hakeifolia
2.0m height

ENTRY 'BOULEVARD' TREE

PROPOSED TREE PLANTING
- 45L SIZE or 200L SIZE
- SPECTACULAR FLOWERS OR LEAVES DURING VARIOUS SEASON



Red Flowering Gum
Corymbia ficifolia
10m (h) x 6m (w)
*(Medium Tree)**



Illawarra Flame Tree
Brachychiton acerifolius
15m (h) x 8m (w)
*(Medium Tree)**

LARGE NATIVE TREES

PROPOSED TREE PLANTING
- 45L SIZE or 200L SIZE
- TO BE USED SPARINGLY DUE TO LARGE SIZE. SELECT FEATURE LOCATIONS



Flooded Gum
Eucalytpus rudis
25m (h) x 8m (w)
*(Large Tree)**



Marri
Corymbia calophylla
40m (h) x 16m (w)
*(Very Large Tree)**

COURTYARD PLANTING

COURTYARD PLANTING
- 3 PLANTS PER SQ.M
- 140MM POTS MINIMUM
- FEATURE PLANTS TO POTS



Jasmine
Trachelospermum jasminoides



Kangaroo Paw
Anigozanthos sp.
1.5m height



Creeping boobialla
Myoporum parvifolium
30cm height



FEATURE:
Citrus sp.
Dwarf varieties

** Information from City of Swan Tree Guidelines Appendix A and B*

LOT 403 + 59 BUSHMEAD ROAD HAZELMERE

PREPARED FOR ALTIS PROPERTY

LANDSCAPE CONCEPT - PLANTING PALETTE
OCTOBER 2022

JOB NO. 2207001 C1.104 REV F
NTS

PLAN E
LANDSCAPE ARCHITECTS
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Attachment 2j.

PERIMETER DRAINAGE EASEMENT PLANTING MIX

PROPOSED SHRUB PLANTING
- 4 PLANTS PER SQ.M
- TUBESTOCK PLANTING
- WINTER PLANTING



Tall Sedge ^
Carex appressa
1.8m height
(Habit - Sedge)



Spiny Cottonhead ^
Conostylis aculeata
0.5m height
(Herb)



Pale Rush ^
Juncus pallidus
1.5m height
(Rush)



Claw Honey Myrtle ^
Melaleuca pulchella
1 - 2m height
(Shrub)



Coast Tussock ^
Poa poiformis
0.9m height
(Grass)

PROPOSED TREE PLANTING
- TREES TO BE PLANTING IN CLUMPS OF THREE, WITH TRUNK LOCATED 8M FROM BUILDING (45L SIZE)



Pin Cushion Hakea
Hakea laurina (45L)
5m (h) x 3m (w)
*(Small Tree)**

^ *Species from the 'Vegetation Guidelines for Stormwater Biofilters in the South West of WA' (Monash University)*

INTERNAL DRAINAGE SWALE PLANTING

PROPOSED SHRUB PLANTING
- 4 PLANTS PER SQ.M
- TUBESTOCK PLANTING
- TREE SPECIES AS NOTED IN 'ENTRY BOULEVARD TREE' REFER C1.104



Coast Tussock Grass
Poa poiformis
0.9m height
Plant to centre of swale



Purple Flag
Pattersonia occidentalis
0.5m height
Plant to top of swale



Morning Iris
Orthrosanthus laxus
0.5m height
Plant to top of swale



Flaxlily
Dianella revoluta
up to 1.0m height



Spiny head mat rush
Lomandra longifolia

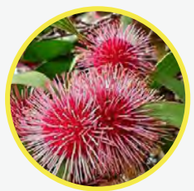


Claw Honey Myrtle ^
Melaleuca pulchella
1 - 2m height
(Shrub)

PROPOSED TREE PLANTING
- 45L TREES
- RANDOMLY LOCATED



Swamp peppermint ^
Taxandria linearifolia
4m (h)



Pin Cushion Hakea
Hakea laurina
5m (h) x 3m (w)
*(Small Tree)**

ATU RETICULATION ZONE PLANTING MIX

PROPOSED SHRUB PLANTING
- GRAVEL MULCH/ GRAVEL BED
- IRRIGATION DESIGNED TO MEET ATU STANDARDS
- TUBESTOCK PLANTING



Tall Sedge ^
Carex Appress
1.8m height
(Habit - Sedge)



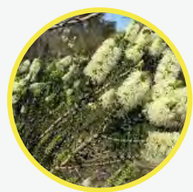
Flaxlily
Dianella revoluta
up to 1.0m height



Pale Rush ^
Juncus pallidus
1.5m height
(Rush)



Spiny head mat rush
Lomandra longifolia



Scented paperbark
Melaleuca squarossa

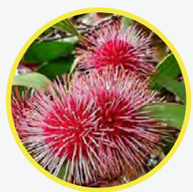
PROPOSED TREE PLANTING
- TREES TO BE RANDOMLY LOCATED WITHIN THE ATU ZONE
- 45 LITRE SIZE



Cut leaf Banksia
Banksia praemorsa
5m (h) x 4m (w)
*(Small Tree)**



Illyarrie
Eucalyptus erythrycorys
7m (h) x 4m (w)
*(Small Tree)**



Pin Cushion Hakea
Hakea laurina
5m (h) x 3m (w)
*(Small Tree)**

LOT 403 + 59 BUSHMEAD ROAD HAZELMERE

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LANDSCAPE CONCEPT - PLANTING PALETTE

OCTOBER 2022

JOB NO. 2207001 C1.105 REV F

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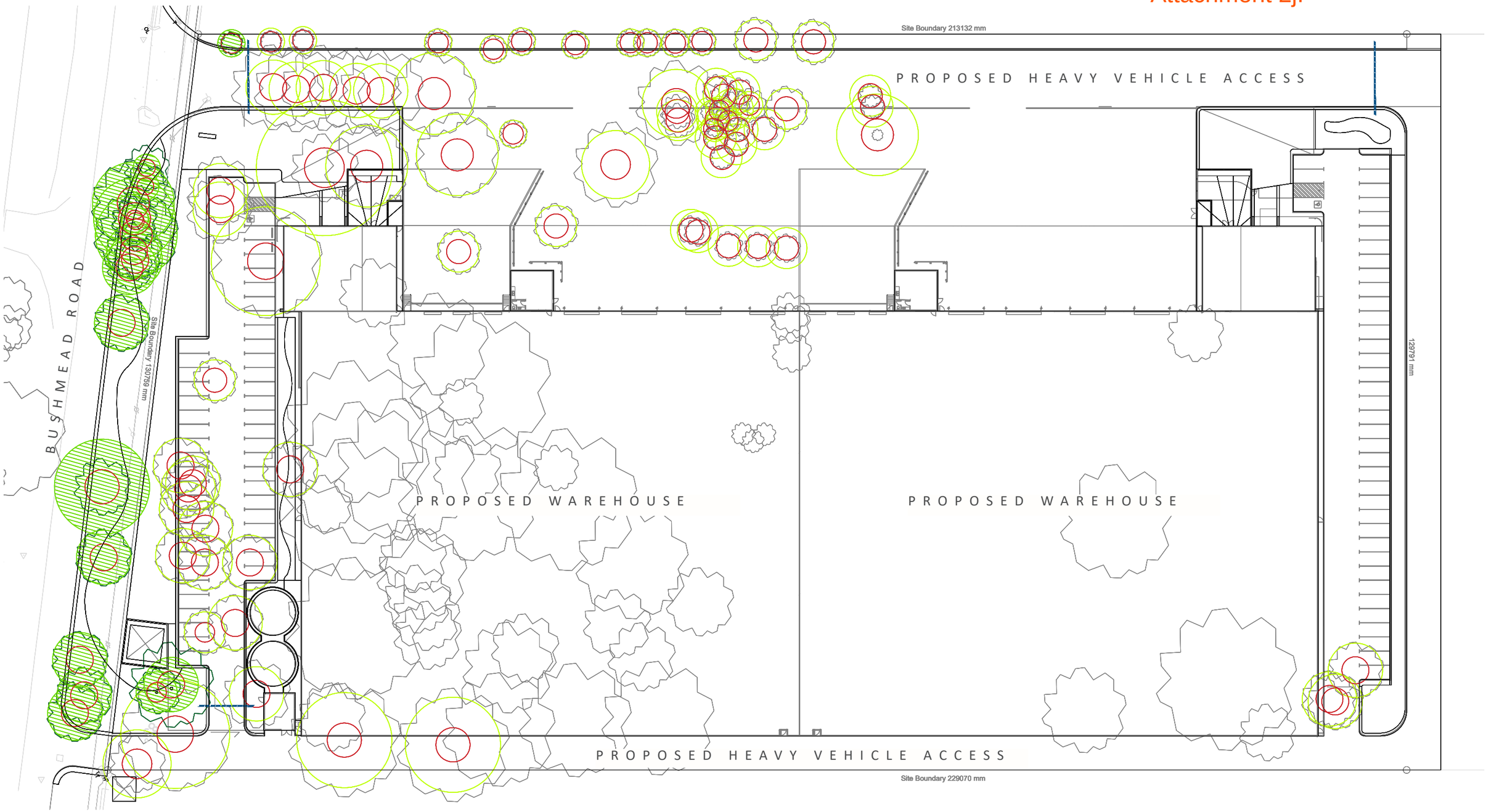

EXISTING TREE (SURVEYED MAY 2022)

TREE PROTECTION ZONE (TPZ) - EXISTING TREES PROPOSED TO BE RETAINED

TREE PROTECTION ZONE (TPZ) - EXISTING TREES PROPOSED TO BE REMOVED (

STRUCTURAL ROOT ZONE (SRZ)

NOTES:

- TREE SURVEY AS PROVIDED BY MNG (REFERENCE 104975-DE-003 (A) AND 104975doc-002(A) dated May 2022.
- TREES WITHIN WAREHOUSE FOOTPRINT NOT MAPPED FOR TPZ/SRZ
- TPZ BASED ON TREE DIAMETER LISTED ON 104975doc-002(A)
- SRZ BASED ON TREE DIAMETER LISTED ON 104975doc-002(A) x 1.15 (Estimate of the diameter at the tree root crown)
- RETENTION OF EXISTING TREES AND ASSOCIATED PROTECTION REQUIREMENTS ARE TO BE FURTHER DETAILED DURING DETAILED DESIGN AND DOCUMENTATION PROCESS.
- TREE PROTECTION TO BE TO AUSTRALIAN STANDARDS AS970 PROTECTION OF TREES ON DEVELOPMENT SITES

LOT 403 + 59 BUSHMEAD ROAD HAZELMERE

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LANDSCAPE CONCEPT - TREE PROTECTION ZONE DIAGRAM

OCTOBER 2022

JOB NO. 2207001 C1.106 REV C

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LOT 152 & LOT 153 TALBOT ROAD, HAZELMERE – PROPOSED INDUSTRIAL WAREHOUSE AND ANCILLARY USES

Form 1 – Responsible Authority Report
(Regulation 12)

DAP Name:	Metro Outer Joint Development Assessment Panel
Local Government Area:	City of Swan
Applicant:	SITE Planning + Design (Georgina Richmond)
Owner:	Perpetual Corporate Trust Ltd
Value of Development:	$21 million ☒ Mandatory (Regulation 5) ☐ Opt In (Regulation 6)
Responsible Authority:	City of Swan
Authorising Officer:	Philip Russell - Manager Statutory Planning
LG Reference:	DA-691/2022
DAP File No:	DAP/22/02332
Application Received Date:	27 September 2022
Report Due Date:	15 December 2022
Application Statutory Process Timeframe:	90 Days
Attachment(s):	1. Location Plan 2. Accompanying Plans a. Cover Sheet – Drawing No.TP00; b. Estate Plan – Drawing No.TP01 Rev B; c. Site Plan – Drawing No.TP02 Rev C; d. Office A Plans – Drawing No.TP03 Rev B; e. Office B Plans – Drawing No.TP04 Rev B; f. Office C Plans – Drawing No.TP05 Rev B; g. Roof Plan – Drawing No.TP06 Rev B; h. Overall Elevations 1 – Drawing No.TP07 Rev B; i. Overall Elevations 2 – Drawing No.TP08 Rev B; j. Office A Elevations – Drawing No.TP09 Rev B; k. Office B & C Elevations – Drawing No.TP10 Rev B; l. Typical Section – Drawing No.TP11 Rev B; m. Fence Details – Drawing No.TP12 Rev B; n. 3D Visualisation – Drawing No.TP13 Rev B;

	o. Signage Details – Building Signage – Drawing No.TP14 Rev B; p. Signage Details – Directory Board – Drawing No.TP15 Rev C; q. Signage Details – Entrance Sign – Drawing No.TP16 Rev B r. Signage Details – Directional Signage – Drawing No.TP17 Rev B s. Landscape Plan – Drawing No.LA-DG-0001 Rev C) <u>Other reports not subject of approval</u> 1. Planning Report (Oct 2022) 2. Site Feature Survey (101437-DE-009-A) 3. Environmental Site Assessment (1 June 2022) 4. Geotechnical Study (29 April 2022) 5. Site and Soil Evaluation (1 Sept 2022) 6. Wastewater and Stormwater Management Plan (25 Oct 2022) 7. Bushfire Attack Level Assessment (2 Sept 2022) 8. Traffic Impact Statement (28 Oct 2022)	
Is the Responsible Authority Recommendation the same as the Officer Recommendation?	☐ Yes ☐ N/A	Complete Responsible Authority Recommendation section
	☒ No	Complete Responsible Authority and Officer Recommendation sections

Responsible Authority Recommendation

1) Endorse the Officer Recommendation to the Metro-Outer Joint Development Assessment Panel to approve the development application subject to conditions but with the following recommended modification to Condition 11:

    11. Prior to submission for a Building Permit the applicant/owner shall submit to the satisfaction of the City of Swan a modified Landscape Plan that:

        1. Provides for an area of 3,755m^2 for landscaping purposes, this being 10% of the site area of 37,550m^2; and

        2. Incorporates Corymbia callophylla trees as opposed to the Magnolia 'Teddy Bear', Callistamon and Corymbia ficifolia as depicted in the submitted Landscape Plan.

    The approved Landscape Plan must be implemented within the first available planting season after the initial occupation of the development and maintained thereafter to the satisfaction of the City of Swan. Where Corymbia callophylla trees fail to establish within the first (2) planting seasons following implementation they must be replaced, any other plantings must be replaced in consultation with the City of Swan.

It is recommended that the Metro Outer Joint Development Assessment Panel resolves to:

1. **Approve** DAP Application reference DAP/22/02332 and Accompanying Plans in accordance with Clause 68 of Schedule 2 (Deemed Provisions) of the *Planning and Development (Local Planning Schemes) Regulations 2015,* Clause 26 of the Metropolitan Region Scheme and the provisions of Clause 10.3 of the City of Swan Local Planning Scheme No.17, subject to the following conditions:

Conditions

1. The approved development must comply in all respects with the attached approved plans, as dated, marked and stamped by the City of Swan. The plans approved as part of this application form part of the development approval issued.

2. This approval is for a 'Warehouse' as defined under the City of Swan's Local Planning Scheme No.17 and the subject land may not be used for any other use without prior approval of the City of Swan.

3. All building works to be carried out under this development approval are required to be contained within the boundaries of the subject lot.

4. A maximum of 120 staff members are permitted on site at any one time.

5. Prior to occupation or use of the development, 127 vehicle parking bays must be provided on the lot in accordance with the approved plans. The design of vehicle parking and access must comply with AS/NZ 2890.1 (as amended). Accessible parking bays must comply with AS/NZ 2890.6 (as amended).

6. Vehicle parking, access and circulation areas must be sealed, kerbed, drained and maintained to the satisfaction of the City of Swan, in accordance with the approved plans.

7. The Development shall be connected to reticulated sewer or otherwise provided with an onsite effluent disposal system approved by the Department of Health to accommodate a daily volume of wastewater not exceeding 540 litres per 2,000m^2 of site area.

8. Stormwater is to be contained onsite in accordance with the approved Stormwater Management Plan to the satisfaction of the City of Swan.

9. Prior to a building permit being issued, detailed stormwater disposal plans, details and calculations must be submitted for approval by the City of Swan and thereafter implemented, constructed and maintained on-site to the satisfaction of the City of Swan.

10. No fluid other than uncontaminated stormwater is to enter any stormwater drain without prior approval from the City of Swan and the Environmental Protection Authority.

11. Prior to submission for a Building Permit the applicant/owner shall submit to the satisfaction of the City of Swan a modified Landscape Plan that:

1. Provides for an area of 3,755m^2 for landscaping purposes, this being 10% of the site area of 37,550m^2; and

2. Incorporates Corymbia callophylla trees as opposed to the Magnolia 'Teddy Bear', Callistamon and Corymbia ficifolia as depicted in the submitted Landscape Plan.

The approved Landscape Plan must be implemented within the first available planting season after the initial occupation of the development and maintained thereafter to the satisfaction of the City of Swan. Where Corymbia callophylla trees fail to establish within the first (2) planting seasons following implementation they must be replaced, any other

12. Refuse bin areas adequate to service the development must be provided to the satisfaction of the City of Swan prior to occupation or use of development.

13. Wash down bays where petrol, other hydrocarbons or similar matter is likely to be discharged must be constructed in accordance with Water Corporation guidelines. In particular bays should be bunded and graded to trap all waste which then passes through an approved petrol and oil separator before being discharged to sewer. External wash down bays greater than 20m^2 are to be roofed.

14. All fuels, oils and other liquids shall be appropriately stored within a bunded and covered area capable of trapping all wastes.

15. Where sewer is not available treated liquid wastes shall be disposed of onsite in a manner outlined in the Department of Water's Water Quality Protection Note WQPN 68 (Mechanical Equipment Washdown) dated March 2006.

16. All crossovers must be built and maintained in accordance with the City of Swan's specifications.

17. Prior to a building permit being issued, the landowner must contribute a sum of 1% of the total development construction value toward Public Art in accordance with the City of Swan Local Planning Policy POL-LP-1.10 Provision of Public Art, by either:

    a. Payment to the City of Swan a cash-in-lieu amount equal to the sum of the 1% contribution amount ($210,000). This must be paid to the City of Swan prior to the date specified in an invoice issued by the City of Swan, or prior to the issuance of a building permit for the approved development, whichever occurs first; or

    b. Provision of Public Art on-site to a minimum value of the 1% contribution amount ($210,000). The following is required for the provision of Public Art on-site:

        i. the landowner or applicant on behalf of the landowner must seek approval from the City of Swan for a specific Public Art work including the artist proposed to undertake the work to the satisfaction of the City of Swan in accordance with POL-LP-1.10 and the Developers' Handbook for Public Art (as amended). The City of Swan may apply further conditions in regard to the proposed Public Art;

ii. no part of the approved development may be occupied or used until the Public Art has been installed in accordance with the approval granted by the City of Swan; and,

iii. The approved Public Art must be maintained in compliance with the approval granted by the City of Swan and any conditions thereof, to the satisfaction of the City of Swan.

18. External lighting shall comply with the requirements of AS 4282 – Control of Obtrusive Effects of Outdoor Lighting.

19. External illumination shall not flash or pulsate to the satisfaction of the City of Swan.

20. No bunting is to be erected on the site (including streamers, streamer strips, banner strips or decorations of similar kind).

21. The noise generated by activities on-site, including machinery motors or vehicles is not to exceed the levels as set out under the *Environmental Protection (Noise) Regulations 1997*.

    Noisy Construction Work outside the period 7.00am to 7.00pm Monday to Saturday and at any time on Sundays and Public Holidays is not permitted unless a Noise Management Plan for the construction site has been approved in writing by the City of Swan.

Reasons for Responsible Authority Recommendation

1. Marris or Corymbia callophylla are the large tree species endemic to the area which play a critical role in protecting and enhancing the biodiversity of the area through provision of food and shelter to endangered and non-endangered species of birds and reptiles.
2. Particular provision of this tree species though an expanded landscaping area for this development site can assist in offsetting the rapid rate of loss of such vegetation caused by development and the adverse consequences this presents to the existing natural environment.

Details: outline of development application

Region Scheme	Metropolitan Region Scheme
Region Scheme - Zone/Reserve	Industrial
Local Planning Scheme	Local Planning Scheme No.17
Local Planning Scheme - Zone/Reserve	General Industrial
Structure Plan/Precinct Plan	Hazelmere Enterprise Area Structure Plan (2011)
Structure Plan/Precinct Plan - Land Use Designation	General Industry
Use Class and permissibility:	Warehouse 'P'
Lot Size:	60,267m^2 (Lot 152)

	69,016m^2 (Lot 153)
Existing Land Use:	Vacant
State Heritage Register	No
Local Heritage	☒ N/A
Design Review	☒ N/A
Bushfire Prone Area	Yes – Partially
Swan River Trust Area	No

Proposal:

The application seeks approval for the proposed use of the rear portion of Lot 153 and a portion of Lot 152 for a Warehouse and associated development to construct a building inclusive of associated parking areas, landscaping, civil, drainage and earthworks. The proposed development includes the following particulars:

- The development will comprise three (3) freight and logistics Warehouses with associated office space. Tenants for the facility will either be secured during or following the completion of the facility's construction.
- The construction of a Warehouse over this portion of land totalling 18,010m^2 in area and associated office and staff amenities area totalling 864m^2 combined.
- It is anticipated, that the combined Warehouse facilities would only be realistically occupied by a maximum of between 30 – 60 staff in total.
- 124 standard vehicle car spaces inclusive of three (3) accessible car spaces;
- 2,790m^2 area of landscaping of the subject site;
- Earthworks and associated retaining;
- Associated signage carrying future tenants and LOGO's branding; and
- Standard industrial fencing consisting of powder coated steel pole, link mesh and three (3) strand barbed wire.

The facility has been designed to accommodate the specific needs of logistics warehouse operators where the primary intent of the facilities is the temporary storage of goods for redistribution to offsite locations.

The proposal will operate 24hrs a day, seven (7) days a week, 365 days a year, consistent with the operating hours of existing distribution warehouses within the estate.

Proposed Land Use	Warehouse
Proposed Net Lettable Area	N/A
Proposed No. Storeys	Single Storey Industrial Buildings
Proposed No. Dwellings	N/A

Background:

The subject lot is located approximately 270m east of the Talbot Road and Stirling Crescent intersection within the existing Hazelmere Industrial Precinct. The site forms part of a larger landholding owned by Perpetual Corporate Trust Ltd comprising the

LOGOS Hazelmere Logistics Park comprising Lot 11, Lot 152 and Lot 153 Talbot Road and accommodates four (4) established warehouse distribution centres; DHL, Fisher and Paykel, McFee Distribution Services and Primary Connect.

Approval was recently issued by the Metro Outer Joint Development Assessment Panel for a similar Warehouse development on the front of Lot 153 Talbot Road for the Ingham's Warehouse facility (DAP/22/02258). This proposal falls within the rear portion of the site, along with a portion of Lot 152, in a battle-axe style configuration.

The subject lots also form part of a recent subdivision approval issued on 9 September 2020 (WAPC 159322) which realigns the above-mentioned lot boundaries to enable each development (particularly the DHL and Fisher and Paykel developments which encroach into Lot 153) to be contained entirely within the boundaries of the central lot.

Legislation and Policy:

Legislation

Planning and Development Act 2005
Planning and Development (Development Assessment Panels) Regulations 2011
Planning and Development (Local Planning Schemes) Regulations 2015
Metropolitan Region Scheme
City of Swan Local Planning Scheme No.17

Structure Plan

Hazelmere Enterprise Area Structure Plan (2011)

State Government Policies

Government Sewerage Policy

Local Planning Policies

POL-TP-129 Vehicle Parking Standards
POL-TP-124 Building and Development Standards - Industrial Zones
POL-C-070 Advertising Signs within Commercial and Industrial Zones
POL-LP-1.10 Provision of Public Art

Consultation:

Public Consultation

Consultation was undertaken in the following manner:

Duration: 14 days between 20 October 2022 and 3 November 2022.

Method: Letters to adjoining landowners and notice on the City of Swan's website.

Submissions Received: At the close of advertising, one (1) submission of objection had been received from Burgess Design Group on behalf of the landowner to the south-east of the subject lot, Lot 20 Adelaide Street, Hazelmere.

Issue Raised	**Officer comments**
Development on Talbot Road does not provide any consideration of the broader locality in terms of providing or coordinating access to the abutting lots to the south along Adelaide Street. The ongoing development of the area with no consideration of the access and development issues of the lots fronting Adelaide Street may ultimately result in the sterilisation of valuable land that is highly suitable for further development similar to those lots being developed along Talbot Road.	Development of Lot 152 and Lot 153 is not required by the extant planning framework to make provision for access for any of the lots to the south that front Adelaide Street. The approved *Hazelmere Enterprise Area Structure Plan 2011* clearly indicates that a structure plan encompassing all these lots is to make provision for consolidated access, nominally by way of an access road running along their rear boundaries.

Referrals/consultation with Government/Service Agencies

The subject site does not abut any Other Regional Road reservations or Primary Regional Road reservations. All agency referrals conducted as part of this assessment are discretionary.

A referral was undertaken to Main Roads WA who advised of no objection towards the proposal.

Planning Assessment:

Zoning

The subject land is zoned 'Industrial' under the Metropolitan Region Scheme and 'General Industrial' under the City of Swan Local Planning Scheme No.17 with a restricted use designation.

Land use classification and permissibility

The proposed development is considered to fall within the use class of 'Warehouse'. Warehouse is defined under the City of Swan Local Planning Scheme No.17 as

"…premises used to store or display goods and may include sale by wholesale;"

The use class 'Warehouse' is listed as a 'P' Use within the 'General Industrial' zone which means that the use is permitted provided the use complies with the relevant development standards and requirements of Local Planning Scheme No.17.

Restricted Use No.14

The subject site is designated a Restricted Use under the City of Swan's Local Planning Scheme No.17 in which Schedule No.3 lists the particular conditions set with respect to that land. Restricted Use No.14 provides direction on stormwater and effluent disposal, site limitations regarding wastewater generation, stormwater disposal and effluent disposal and requirements for contamination and acid sulphate investigation. With regard to this application, the pertinent conditions for Restricted Use No.14 are listed below:

- Provision of a wastewater management plan which demonstrates that the wastewater generated onsite as a result of a proposed development not exceed a daily volume of 540 litres per 2000m^2 of site area;
- Development to connect to reticulated sewer where possible or where sewer is not available, connection to an Aerobic Treatment Unit (ATU) or Nutrient Effluent Disposal System where acceptable groundwater depths exist;
- A Stormwater Management Plan submitted to the satisfaction of the Local Government which demonstrates that stormwater can be contained onsite;
- The provision of a landscape plan in association with any stormwater compensation basin;
- Site investigation and remediation report with respect to potential soil and groundwater contamination on site;
- Investigation of ground water levels and requirements for future fill and/or subsoil drainage; and
- Acid sulphate Soils Self-Assessment, soils report and Management plan.

The plans submitted by the applicant which address the aforementioned conditions are considered acceptable by City of Swan staff.

Traffic and Access

The development proposes vehicle access for light vehicles (staff and visitor cars) and heavy vehicles (19m long trucks and B Doubles up to 27.5m long) via a 9m wide two-way private access road off Talbot Road. One-way internal access is proposed once vehicles have left the access road.

The applicant has provided a Traffic Impact Statement (TIS) prepared by Stantec with swept path analysis of the entry, exit and manoeuvrability through the site undertaken which demonstrates all vehicle movements are achievable. City staff concur with these findings.

The submitted TIS has estimated the amount of traffic generated by the development and its impact on the road network. The TIS contends:

- A total of 755 vehicle movements per day will be generated, based on the applicable trip generation of four (4) trips per day per 100m^2 of warehouse floor space;
- Stantec previously undertook a Traffic Impact Assessment for the front site with further modelling having been undertaken with the additional trips of the rear site to determine the effects of both sites post build-out. A comparison between the intersection volumes at Talbot Road and Stirling Crescent with the front site only and the additional movements from the rear site have been calculated for 2023 and 2033.
- The rear site is anticipated to have minimal further impacts on the surrounding network with only 1-2s delays being added to the approach legs from the front site; and
- The estimated development traffic added to existing traffic will, at peak PM hours, have the intersection of Talbot Road and Stirling Crescent operating at a level of service 'B'.

City staff are satisfied with the above contentions inclusive of the capacity of the Talbot Road/Stirling Crescent intersection to accommodate the estimated traffic.

The application and the Applicants' Traffic Impact Statement were referred to Main Roads WA with no objection received.

Local Planning Policy POL-TP-129 Vehicle Parking Standards

Provision	Requirement	Proposal	Assessment
Warehouse	377.48 (377) bays *Two (2) spaces per 100 square metres GLA;* (18,874m^2 GLA)	127 bays	Parking shortfall proposed. Refer to discussion below.

The proposed development has a total GLA of 18,874m^2, which corresponds to a requirement of 377 parking bays (including incidental office space). The proposed development provides a total of 127 vehicle parking bays and therefore represents a shortfall under the provisions of POL-TP-129.

While the onsite provision of 127 standard car spaces is significantly less than that of City of Swan Policy requirements, the applicant has advised the following by way of justification for the proposed shortfall:

- It is anticipated that the combined warehouse facilities would only be occupied by between 30 – 60 staff in total;
- Interested logistics warehouse tenants have advised their on-site staff requirements would only equate to five (5) staff per 5000m^2 generating an overall parking demand of 19 car parking bays across the entire development;
- Based upon an analysis of the existing logistics warehouse operators within the LOGOS Hazelmere Industrial Estate (refer to "Estate Plan – Drawing No.TP01 Rev B") the proposed development would generate a potential 48 staff; and
- A condition that limits the occupancy of the site to 120 staff (allowing for additional visitor needs) is welcomed in accordance with prior approvals issued across the Estate.

City staff are satisfied with the off-street parking variation sought subject to staff numbers being conditioned to be a maximum of 120 employee's onsite at any one time.

Local Planning Policy POL-TP-124 Building and Development Standards - Industrial Zones

The City of Swan's Local Planning Policy POL-TP-124 Building and Development Standards - Industrial Zones establishes building and development standards within industrial zoned land in the City of Swan and seeks to ensure development is consistent with the objectives of the zone. With regard to the proposed Warehouse, assessment against the City of Swan's Development Standards is included in the table below:

General Industrial Zone	Lot frontage	Minimum setback from Boundary			Maximum plot ratio
		Front	Side	Rear	
Required	30m	9m	Nil	Nil	0.6:1
Provided	20m – (battle-axe)	North: 52.6m to development boundary	East: 8.1m to development boundary West: 7.3m	South: 7.5m	0.48:1 (development boundary)

The proposed Warehouse will have restricted view from Talbot Road due to the battle-axe arrangement. Notwithstanding, the Warehouse facade will be constructed from a combination of texture painted precast concrete panels in Colourbond 'Windspray' and 'Monument'. The Warehouse will be finished in a combination of Colourbond colours

comprising of ‘Windspray’, ‘Monument’ and ‘Basalt’ to further articulate and break up the mass of the Warehouse structure. The roof will be clad with a profiled metal roof sheeting in zincalume with Colourbond ‘Windspray’ gutters and downpipes. Truck dock roller doors will be finished in Colourbond ‘Surfmist’.

The incidental office component proposes a combination of black aluminium framed window glazing, charcoal aluminium roof cladding with a copper coloured aluminium clad soffit feature to the underside of the office roof.

The proposed façade selections for the Warehouse and incidental office is considered to meet the intent of the City of Swan's Industrial development standards concerning facades, it presents as simple and aesthetically pleasing where visible from Talbot Road and surrounds.

The development proposes 2,790m^2 of landscaping which equates to 7.43% of the development site in lieu of the 3,755m^2 or 10% requirement across the development site. Whilst this is less than that of City of Swan Policy requirements, the variation is considered acceptable due to the fact the development site is located behind another proposed Warehouse development (DAP/22/02258) and has no frontage to Talbot Road except for the vehicle access way. The submitted detailed landscape plan has given consideration to the layout and configuration of landscaping and its relationship to building entrances, pedestrian and parking areas within the facility.

Bushfire

A small portion in the south-eastern corner of Lot 153 is partially bushfire prone and is subject to the provisions of State Planning Policy 3.7 - Planning in Bushfire Prone Areas.

The development proposal does not include the retention of any existing vegetation on site which may generate the requirement for an appropriate Asset Protection Zone or Hazard Separation Zone and there is no indication the development will include the storage of dangerous goods on site which may classify the development as a high-risk land use.

Accordingly, the fact the development is neither a high-risk nor a vulnerable land use and the site having a determined bushfire attack level of BAL-29, City staff are satisfied bushfire will not be problematic and do not consider it necessary for a Bushfire Management Plan to be submitted.

Local Planning Policy POL-C-070 Advertising Signs within the Commercial and Industrial Zones

The proposed Warehouse incorporates several signs located across the site including:

- Wall signage on the external facades of the Warehouse. The proposed signage will advertise the business on which the Warehouse is located and is integrated into the external walls and does not protrude above the existing roof;
- A 3m x 4m precast concrete entrance sign is proposed within the landscape area adjacent to Carpark No.1;

- Wayfinding signage including entry/exist signs will be located at the entrance and exit of the heavy vehicle access, staff and visitor parking to assist in the safe and legible movements of vehicles into and out of the site; and
- A 2.5m high freestanding Directory Board which supports way finding to tenants within the warehouse facility

In light of this, the built form and associated signage in the context of its surroundings is considered to meet the City of Swan's Policy regarding signage within industrial zones.

Local Planning Policy POL-LP-1.10 Provision of Public Art

In accordance with the City of Swan's Local Planning Policy POL-LP-1.10 Provision of Public Art, the owner is liable to make a contribution to public art, either monetarily or through development onsite, should the development be approved.

The policy aims to ensure that certain developments in excess of $2 million construction cost will contribute toward public artworks that promote and recognise the identity of the local community. The intent of the policy is to encourage owners to develop public art on their property. As this is not always feasible however, the owner is granted discretion to make a monetary contribution toward public art instead.

The approximate cost of the proposed development as stated on the MRS Form 1 and DAP Form 1 is $21 million. This construction cost requires either a cash-in-lieu contribution of $210,000 (being 1% of the construction cost) or the provision of public art onsite (as approved by the City of Swan) to the value of $210,000. Should Public Art be constructed onsite, a Notification under Section 70A of the *Transfer of Land Act 1893* is required to be lodged on the Certificate of Title of the subject lot to advise future landowners of the need to maintain the Public Art.

Conclusion:

The application seeks approval for three (3) freight and logistics warehouses with associated office space totalling a combined 18,874m^2 across Lot 152 and Lot 153 Talbot Road, Hazelmere. The subject site is zoned 'General Industrial' under the City of Swan's Local Planning Scheme No.17 and a 'Warehouse' use is 'P' (permitted) within the zone. The land is also subject to restricted use provisions that pertain to development requirements for these areas.

The proposal is considered largely consistent with the City of Swan's Industrial development standards. In light of the above, the City of Swan resolves to recommend approval.

Officer Recommendation

It is recommended that the Metro Outer Joint Development Assessment Panel resolves to:

2. **Approve** DAP Application reference DAP/22/02332 and Accompanying Plans in accordance with Clause 68 of Schedule 2 (Deemed Provisions) of the *Planning and Development (Local Planning Schemes) Regulations 2015,* Clause 26 of the

Metropolitan Region Scheme and the provisions of Clause 10.3 of the City of Swan Local Planning Scheme No.17, subject to the following conditions:

Conditions

1. The approved development must comply in all respects with the attached approved plans, as dated, marked and stamped by the City of Swan. The plans approved as part of this application form part of the development approval issued.

2. This approval is for a 'Warehouse' as defined under the City of Swan's Local Planning Scheme No.17 and the subject land may not be used for any other use without prior approval of the City of Swan.

3. All building works to be carried out under this development approval are required to be contained within the boundaries of the subject lot.

4. A maximum of 120 staff members are permitted on site at any one time.

5. Prior to occupation or use of the development, 127 vehicle parking bays must be provided on the lot in accordance with the approved plans. The design of vehicle parking and access must comply with AS/NZ 2890.1 (as amended). Accessible parking bays must comply with AS/NZ 2890.6 (as amended).

6. Vehicle parking, access and circulation areas must be sealed, kerbed, drained and maintained to the satisfaction of the City of Swan, in accordance with the approved plans.

7. The Development shall be connected to reticulated sewer or otherwise provided with an onsite effluent disposal system approved by the Department of Health to accommodate a daily volume of wastewater not exceeding 540 litres per 2,000m^2 of site area.

8. Stormwater is to be contained onsite in accordance with the approved Stormwater Management Plan to the satisfaction of the City of Swan.

9. Prior to a building permit being issued, detailed stormwater disposal plans, details and calculations must be submitted for approval by the City of Swan and thereafter implemented, constructed and maintained on-site to the satisfaction of the City of Swan.

10. No fluid other than uncontaminated stormwater is to enter any stormwater drain without prior approval from the City of Swan and the Environmental Protection Authority.

11. The approved landscaping and reticulation plan must be implemented within the first available planting season after the initial occupation of the development, and maintained thereafter, to the satisfaction of the City of Swan. Any species that fails to establish within the first two (2) planting seasons following implementation must be replaced in consultation with, and to the satisfaction of the City of Swan.

12. Refuse bin areas adequate to service the development must be provided to the satisfaction of the City of Swan prior to occupation or use of development.

13. Wash down bays where petrol, other hydrocarbons or similar matter is likely to be discharged must be constructed in accordance with Water Corporation guidelines. In particular bays should be bunded and graded to trap all waste which then passes through an approved petrol and oil separator before being discharged to sewer. External wash down bays greater than $20m^2$ are to be roofed.

14. All fuels, oils and other liquids shall be appropriately stored within a bunded and covered area capable of trapping all wastes.

15. Where sewer is not available treated liquid wastes shall be disposed of onsite in a manner outlined in the Department of Water's Water Quality Protection Note WQPN 68 (Mechanical Equipment Washdown) dated March 2006.

16. All crossovers must be built and maintained in accordance with the City of Swan's specifications.

17. Prior to a building permit being issued, the landowner must contribute a sum of 1% of the total development construction value toward Public Art in accordance with the City of Swan Local Planning Policy POL-LP-1.10 Provision of Public Art, by either:

    a. Payment to the City of Swan a cash-in-lieu amount equal to the sum of the 1% contribution amount ($210,000). This must be paid to the City of Swan prior to the date specified in an invoice issued by the City of Swan, or prior to the issuance of a building permit for the approved development, whichever occurs first; or

    b. Provision of Public Art on-site to a minimum value of the 1% contribution amount ($210,000). The following is required for the provision of Public Art on-site:

        i. the landowner or applicant on behalf of the landowner must seek approval from the City of Swan for a specific Public Art work including the artist proposed to undertake the work to the satisfaction of the City of Swan in accordance with POL-LP-1.10 and the Developers' Handbook for Public Art (as amended). The City of Swan may apply further conditions in regard to the proposed Public Art;

        ii. no part of the approved development may be occupied or used until the Public Art has been installed in accordance with the approval granted by the City of Swan; and,

        iii. The approved Public Art must be maintained in compliance with the approval granted by the City of Swan and any conditions thereof, to the satisfaction of the City of Swan.

18. External lighting shall comply with the requirements of AS 4282 – Control of Obtrusive Effects of Outdoor Lighting.

19. External illumination shall not flash or pulsate to the satisfaction of the City of Swan.

20. No bunting is to be erected on the site (including streamers, streamer strips, banner strips or decorations of similar kind).

21. The noise generated by activities on-site, including machinery motors or vehicles is not to exceed the levels as set out under the *Environmental Protection (Noise) Regulations 1997*.

    Noisy Construction Work outside the period 7.00am to 7.00pm Monday to Saturday and at any time on Sundays and Public Holidays is not permitted unless a Noise Management Plan for the construction site has been approved in writing by the City of Swan.

Attachment 1.



city of swan	**DISCLAIMER**: Information shown hereon is a composite of information from various different data sources. Users are warned that the information is provided by the City of Swan in this format as a general resource on the understanding that it is not suitable as a basis for decision making without verification with the original source.		10 November 2022 1:3000	N

Attchment 2a.

SHEET LIST:

TP00	COVER SHEET
TP01	ESTATE PLAN
TP02	SITE PLAN
TP03	OFFICE A PLANS
TP04	OFFICE B PLANS
TP05	OFFICE C PLANS
TP06	ROOF PLAN
TP07	OVERALL ELEVATIONS 1
TP08	OVERALL ELEVATIONS 2
TP09	OFFICE A ELEVATIONS
TP10	OFFICE B & C ELEVATIONS
TP11	TYPICAL SECTION
TP12	FENCE DETAILS
TP13	3D VISUALISATION
TP14	SIGNAGE DETAILS- BUILDING SIGNAGE
TP15	SIGNAGE DETAILS - DIRECTORY BOARD
TP16	SIGNAGE DETAILS - ENTRANCE SIGN
TP17	SIGNAGE DETAILS- DIRECTIONAL SIGNAGE



ARTISTS IMPRESSION ONLY
SCALE : NTS

PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

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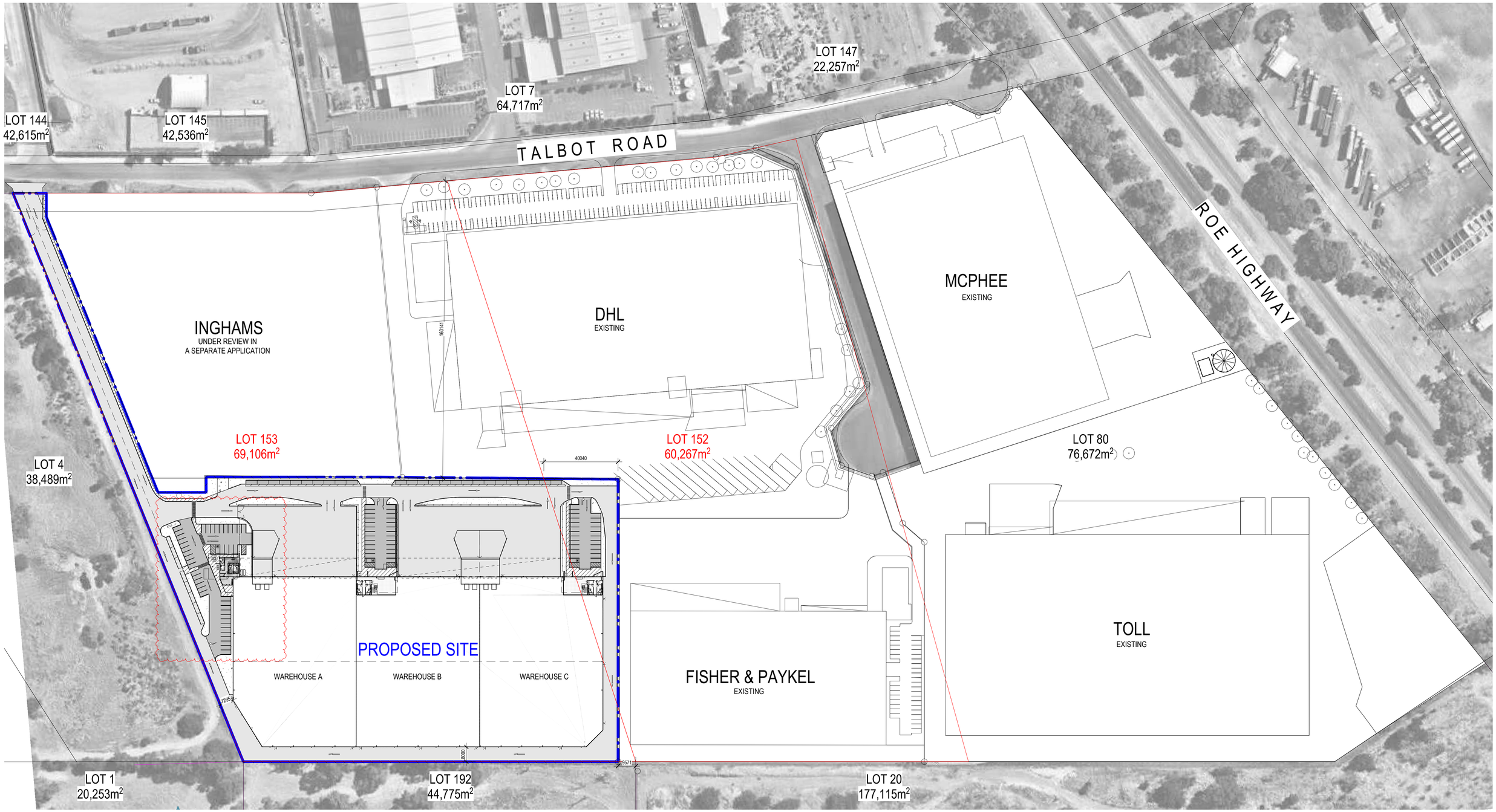
Attachment 2b.



No.	DATE:	REVISION:	BY:	CHK:
P1	04.08.2022	PRELIMINARY ISSUE	BCM	SA
A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
ESTATE PLAN

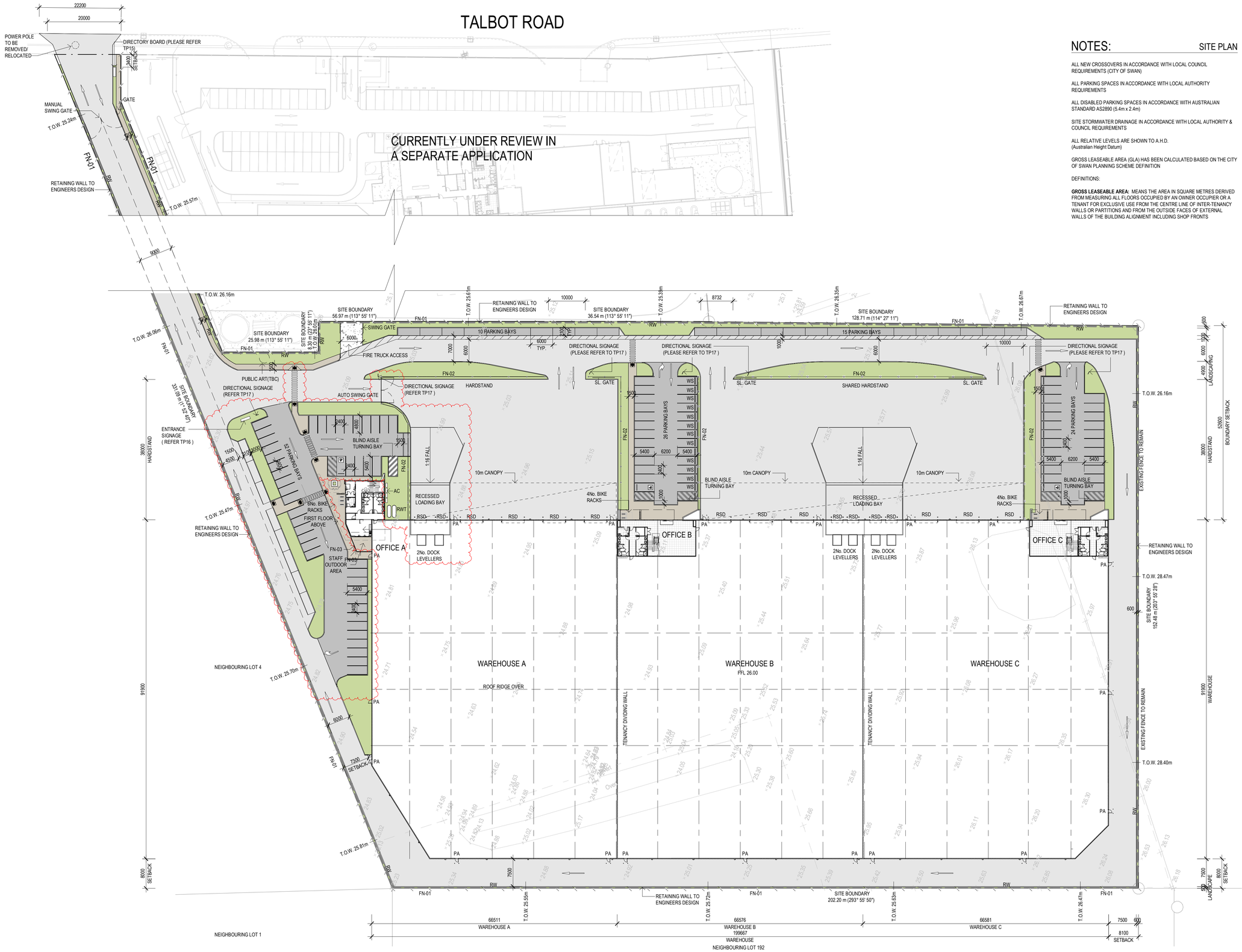
CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: BCM
SCALE: 1 : 1000 @ A1
SCALE: 1 : 2000 @ A3

JOB NO: 22099
DRAWING NO: TP01
REVISION: B

watson young

Attachment 2c.



NOTES: SITE PLAN

ALL NEW CROSSOVERS IN ACCORDANCE WITH LOCAL COUNCIL REQUIREMENTS (CITY OF SWAN)

ALL PARKING SPACES IN ACCORDANCE WITH LOCAL AUTHORITY REQUIREMENTS

ALL DISABLED PARKING SPACES IN ACCORDANCE WITH AUSTRALIAN STANDARD AS2890 (5.4m x 2.4m)

SITE STORMWATER DRAINAGE IN ACCORDANCE WITH LOCAL AUTHORITY & COUNCIL REQUIREMENTS

ALL RELATIVE LEVELS ARE SHOWN TO A.H.D. (Australian Height Datum)

GROSS LEASEABLE AREA (GLA) HAS BEEN CALCULATED BASED ON THE CITY OF SWAN PLANNING SCHEME DEFINITION

DEFINITIONS:

GROSS LEASEABLE AREA: MEANS THE AREA IN SQUARE METRES DERIVED FROM MEASURING ALL FLOORS OCCUPIED BY AN OWNER OCCUPIER OR A TENANT FOR EXCLUSIVE USE FROM THE CENTRE LINE OF INTER-TENANCY WALLS OR PARTITIONS AND FROM THE OUTSIDE FACES OF EXTERNAL WALLS OF THE BUILDING ALIGNMENT INCLUDING SHOP FRONTS

LEGEND

	INDICATES EXTENT OF HEAVY DUTY HARDSTAND TO CIVIL ENGINEERS DETAILS
	INDICATES EXTENT OF LIGHT DUTY PAVEMENT TO CIVIL ENGINEERS DETAILS
	CONCRETE PAVING WITH EXPOSED AGGREGATE FINISH OR SIMILAR
	AREA OF GRASS / LANDSCAPING, REFER TO LANDSCAPE ARCHITECTS DRAWINGS FOR LANDSCAPE LAYOUT AND DETAILS
FN-01	1800mm HIGH BLACK VINYL COATED CYCLONE WIRE FENCE, 3 BARB WIRES TO 2100mm HIGH
FN-02	2100mm HIGH BLACK PAINTED METAL PICKET (DIPLOMAT / PALISADE STYLE) FENCING
FN-03	1800mm HIGH OUTDOOR AREA FEATURE FENCE
RW	RETAINING WALL
RWT	10,000L CAPACITY RAINWATER TANK NOTE: TANKS WILL BE USED FOR TOILETS, LANDSCAPE IRRIGATION AND WASH DOWN WHERE SUITABLE. REFER TO SUSTAINABLE MANAGEMENT PLAN (SMP) FOR FURTHER INFORMATION
EV	ELECTRIC VEHICLE (EV) CHARGING STATION
WS	CAR BAY WHEEL STOP

DEVELOPMENT ANALYSIS

BUILDING	GLA
WAREHOUSE A	5,930m²
OFFICE A GF	145m²
OFFICE A FF	199m²
WAREHOUSE B	6,050m²
OFFICE B GF	60m²
OFFICE B FF	200m²
WAREHOUSE C	6,030m²
OFFICE C GF	60m²
OFFICE C FF	200m²
TOTAL AREA	18,874m²
TOTAL WAREHOUSE AREA	18,010m²

EXTERNAL AREAS (APPROX)	
CANOPIES	1,500m²
HARDSTAND	13,214m²
LIGHT DUTY	2,714m²
PAVING	737m²
LANDSCAPING INCL. KERBS	2,481m²

PARKING	
BAYS PROVIDED INCL. THREE (3) ACCESSIBLE CAR BAYS	127
BIKE RACKS	14

SITE COVERAGE	
TOTAL SITE AREA	37,550m²
TOTAL BUILDING FOOTPRINT	18,275m²
SITE COVERAGE	48.66%
LANDSCAPING SITE COVERAGE EXCL. PAVING	7.25%

No.	DATE:	REVISION:	BY:	CHK:
P3	04.08.2022	PRELIMINARY ISSUE	BCM	SA
P4	19.08.2022	PRELIMINARY ISSUE	UW	SA
A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	09.09.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
C	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
SITE PLAN

CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: BCM
SCALE: 1 : 500 @ A1
SCALE: 1 : 1000 @ A3

JOB NO: 22099
DRAWING NO: TP02
REVISION: C

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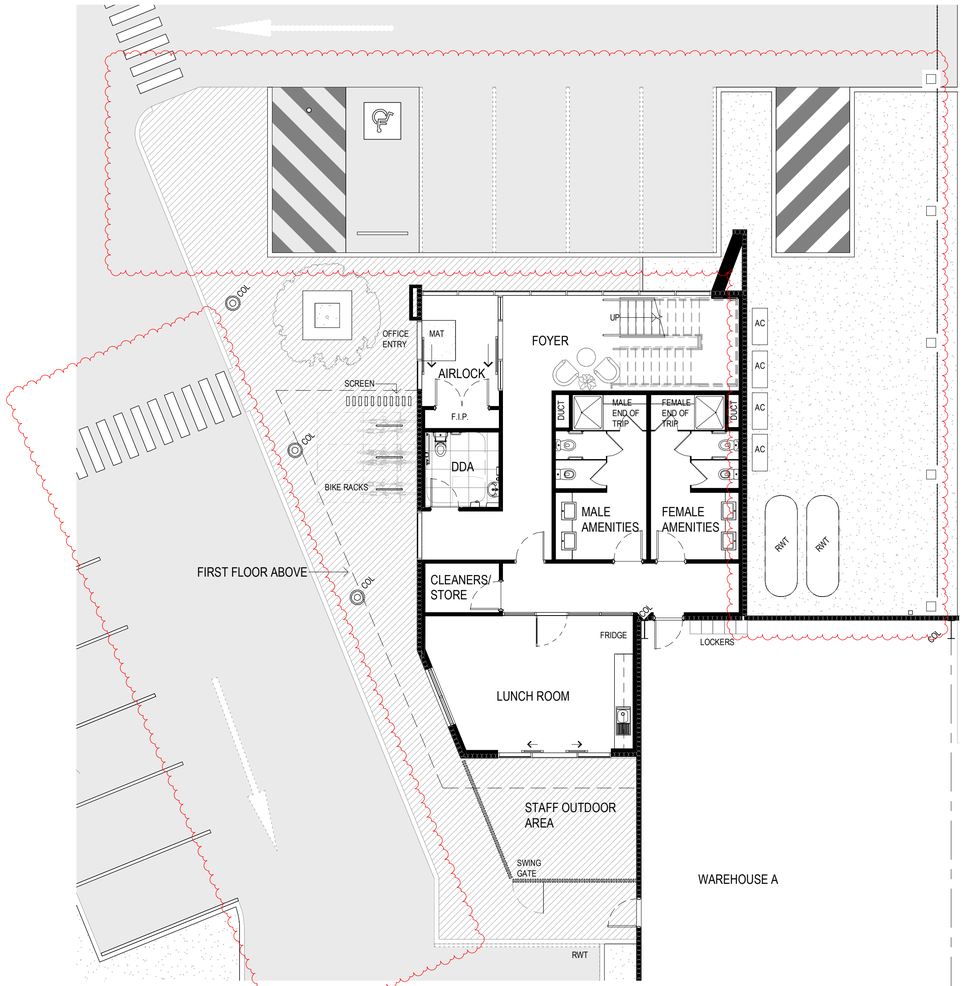
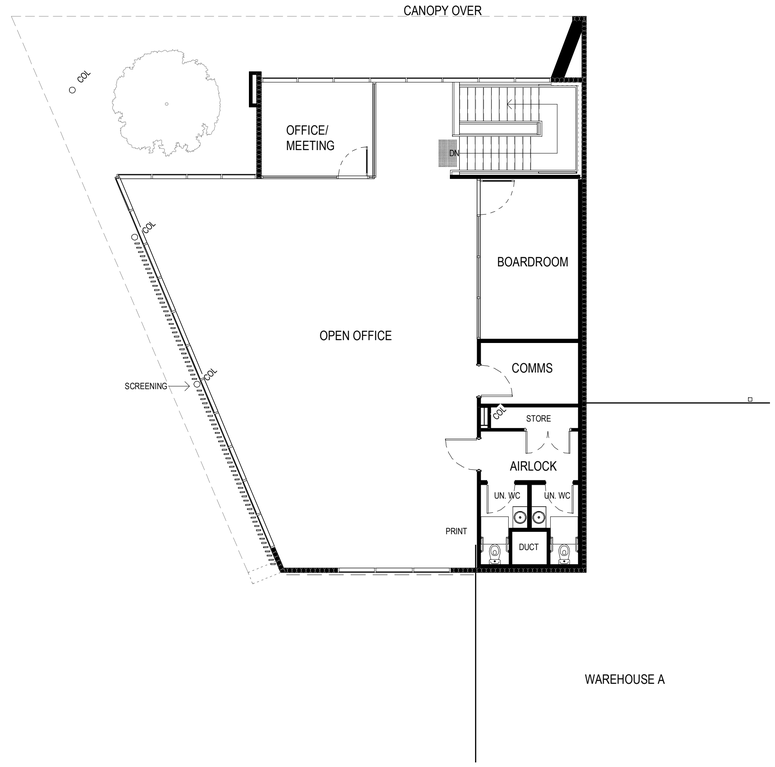
Attachment 2d.



OFFICE A GROUND FLOOR
SCALE: 1 : 100



OFFICE A FIRST FLOOR
SCALE: 1 : 100

No.	DATE:	REVISION:	BY:	CHK:
P1	07.07.2022	DESIGN APPROVAL	BCM	SA
P2	04.08.2022	PRELIMINARY ISSUE	BCM	SA
A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
OFFICE A PLANS

CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: BCM
SCALE: 1 : 100 @ A1
SCALE: 1:200 @ A3

JOB NO: 22099
DRAWING NO: TP03
REVISION: B

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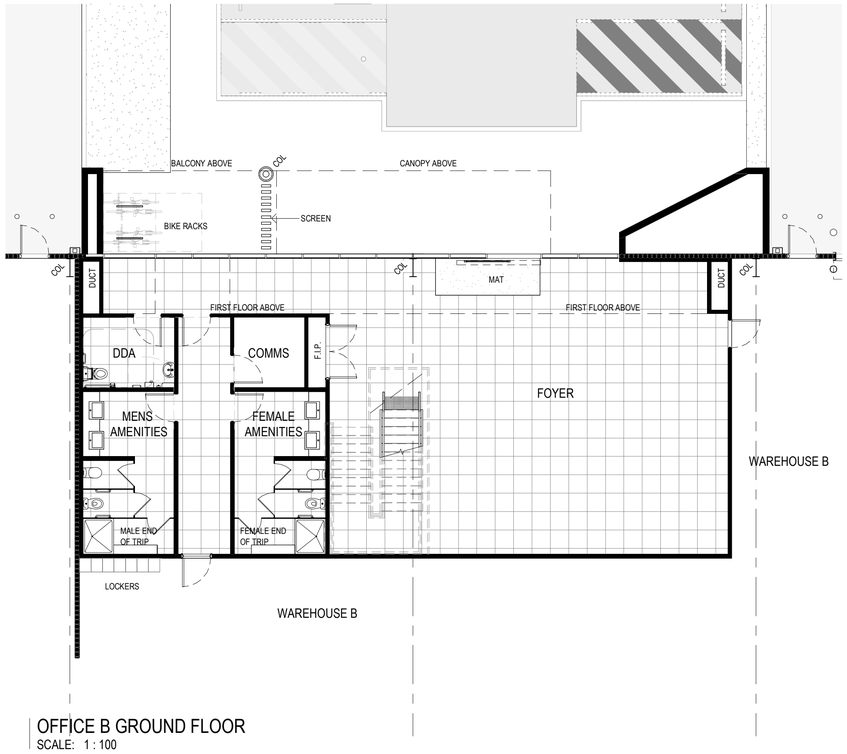
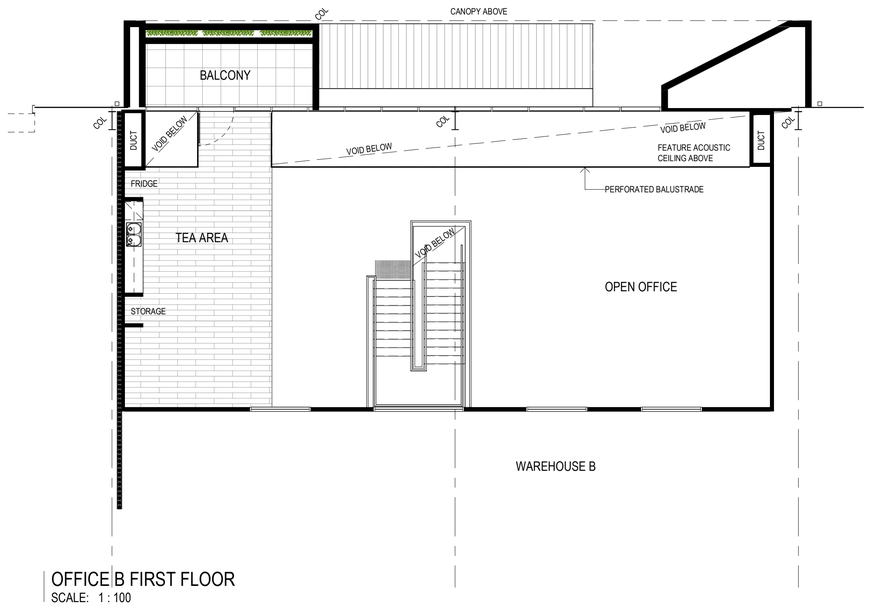
Attachment 2e.



OFFICE B GROUND FLOOR
SCALE: 1 : 100



OFFICE B FIRST FLOOR
SCALE: 1 : 100

No.	DATE:	REVISION:	BY:	CHK:
P1	07.07.2022	DESIGN APPROVAL	BCM	SA
P2	04.08.2022	PRELIMINARY ISSUE	BCM	SA
A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
OFFICE B PLANS

CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: BCM
SCALE: 1 : 100 @ A1
SCALE: 1:200 @ A3

JOB NO: 22099
DRAWING NO: TP04
REVISION: B

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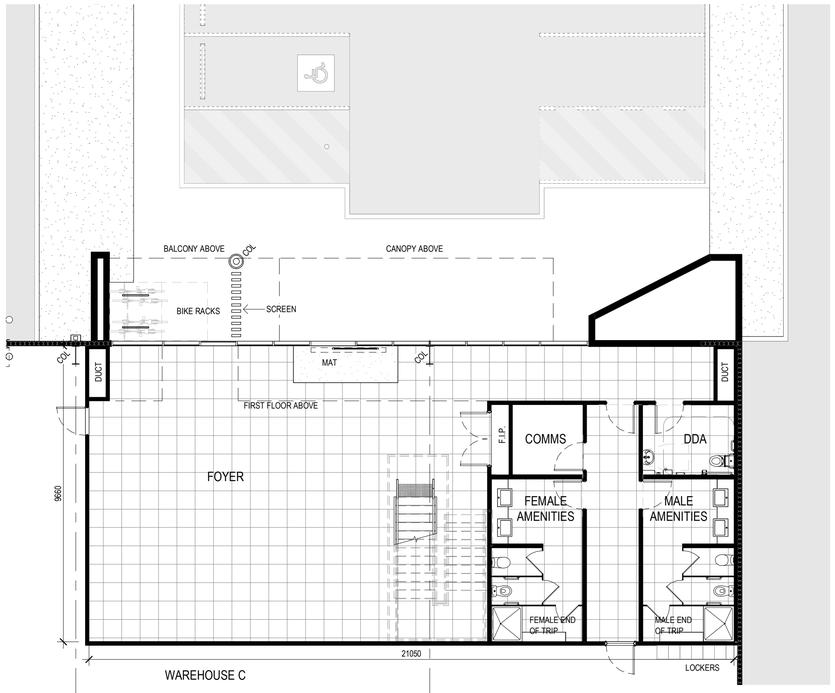
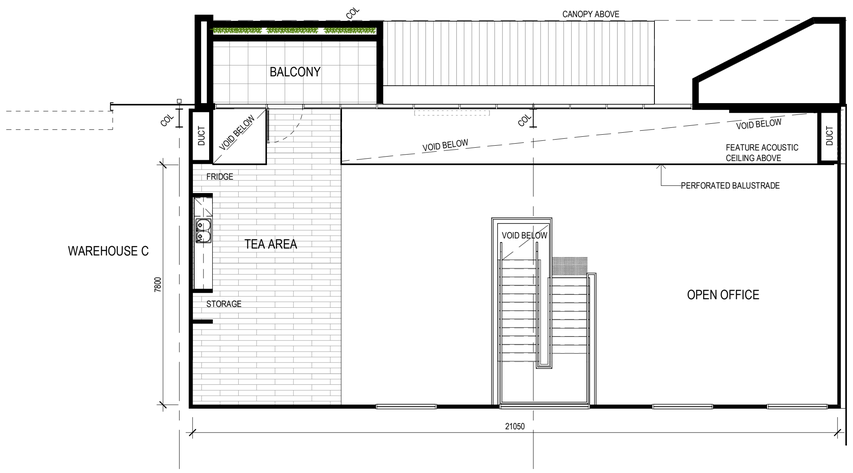
Attachment 2f.



100_OFFICE C GROUND FLOOR
SCALE: 1 : 100



100_OFFICE C FIRST FLOOR
SCALE: 1 : 100

No.	DATE:	REVISION:	BY:	CHK:
P1	07.07.2022	DESIGN APPROVAL	BCM	SA
P2	04.08.2022	PRELIMINARY ISSUE	BCM	SA
A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
OFFICE C PLANS

CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: BCM
SCALE: 1 : 100 @ A1
SCALE: 1:200 @ A3

JOB NO: 22099
DRAWING NO: TP05
REVISION: B

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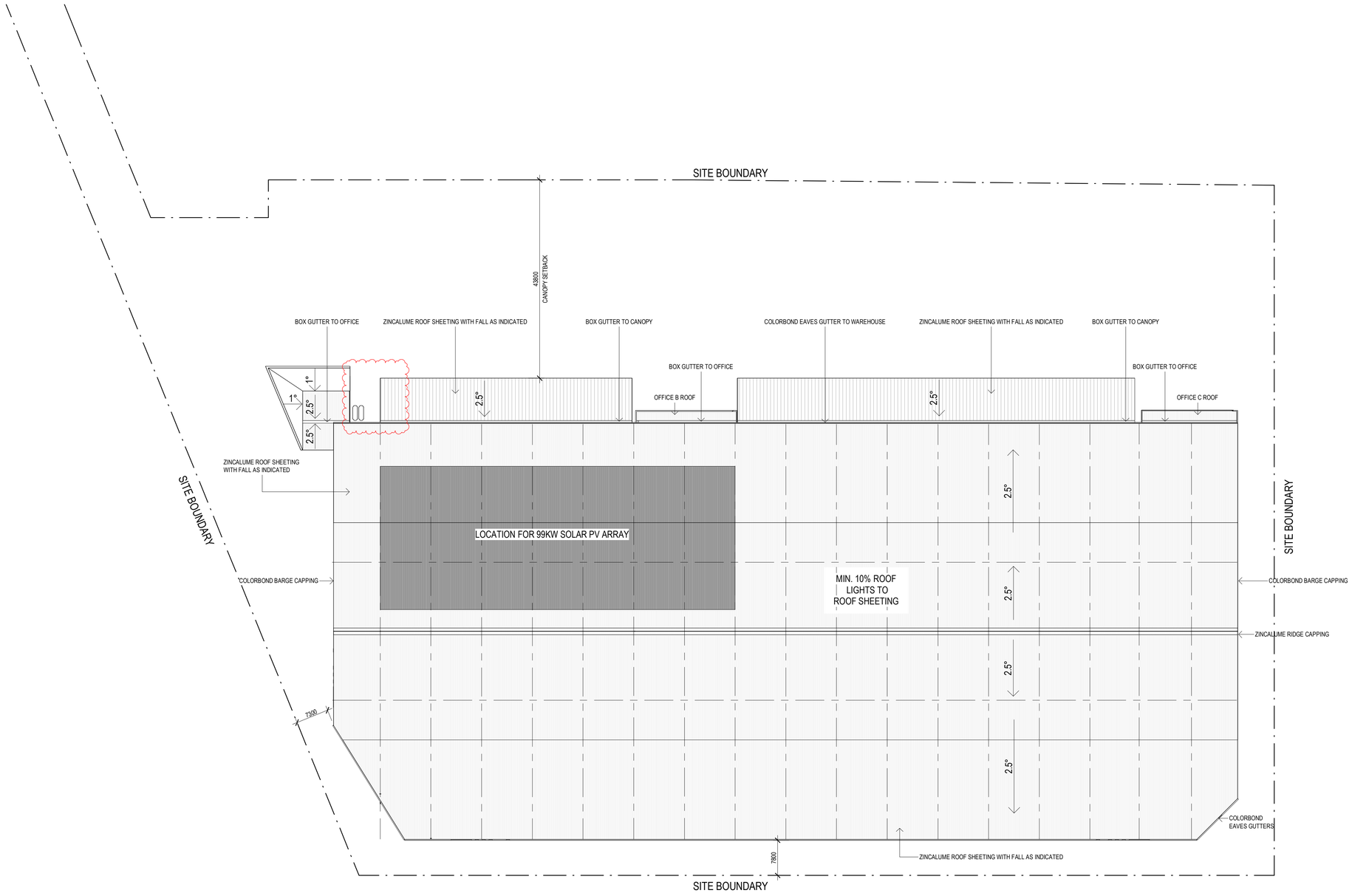
Attachment 2g.



No.	DATE:	REVISION:	BY:	CHK:
P1	04.08.2022	PRELIMINARY ISSUE	BCM	SA
A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
ROOF PLAN

CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: BCM
SCALE: 1 : 500 @ A1
SCALE: 1:1000 @ A3

JOB NO: 22099
DRAWING NO: TP06
REVISION: B

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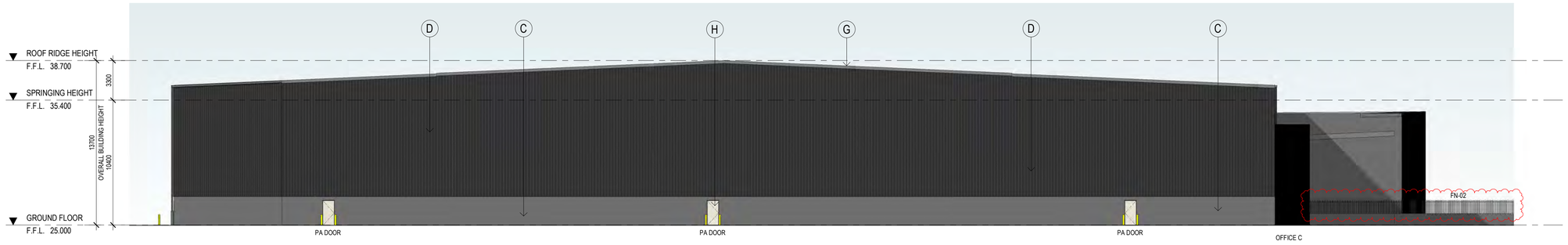
Attachment 2h.



EAST ELEVATION
SCALE: 1 : 200



NORTH ELEVATION PART 1
SCALE: 1 : 200



NORTH ELEVATION PART 2
SCALE: 1 : 200

EXTERNAL FINISHES

A	ALUMINIUM FRAMED GLAZING	GREY
B	PRECAST CONCRETE PANEL, FORMLINER	LIGHT GREY
C	PRECAST CONCRETE PANEL	BASALT
D	COLORBOND WALL CLADDING	COLORBOND MONUMENT
E	COLORBOND WALL CLADDING	COLORBOND WINDSPRAY
F	BATTENS / COLUMNS	COPPER
G	ROOF CLADDING	ZINCALUME
H	ROLLER SHUTTER DOOR CLADDING/ PA DOORS	COLORBOND SURFMIST
J	DOWNPIPES / CAPPINGS	COLORBOND WINDSPRAY
K	BOLLARDS	SAFETY YELLOW
L	ALUMINIUM CLADDING	COPPER METALLIC
M	PERFORATED SCREENING	BLACK
N	ALUMINIUM FRAMED COLOURBACK GLAZING	GREY
O	POWDERCOAT	BLACK
P	ALUMINIUM CLADDING	BLACK

No.	DATE:	REVISION:	BY:	CHK:
P1	07.07.2022	DESIGN APPROVAL	BCM	SA
P2	04.08.2022	PRELIMINARY ISSUE	BCM	SA
P3	19.08.2022	PRELIMINARY ISSUE	UW	SA
A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
OVERALL ELEVATIONS 1

CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: BCM
SCALE: 1:200 @ A1
SCALE: 1:400 @ A3

JOB NO: 22099
DRAWING NO: TP07
REVISION: B

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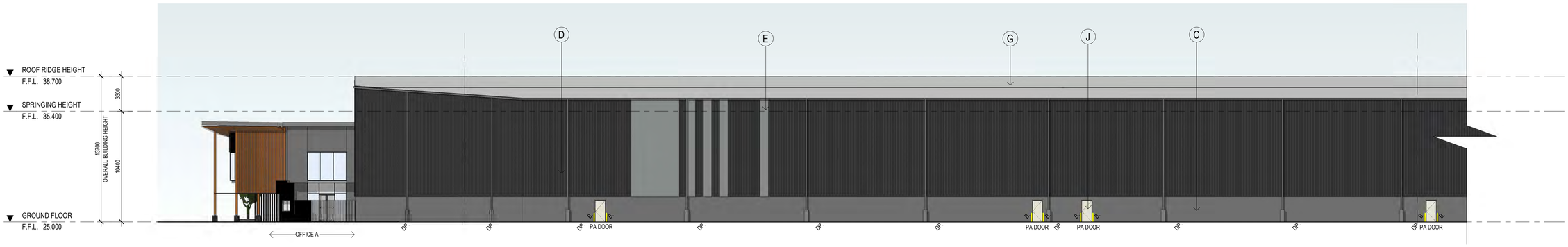
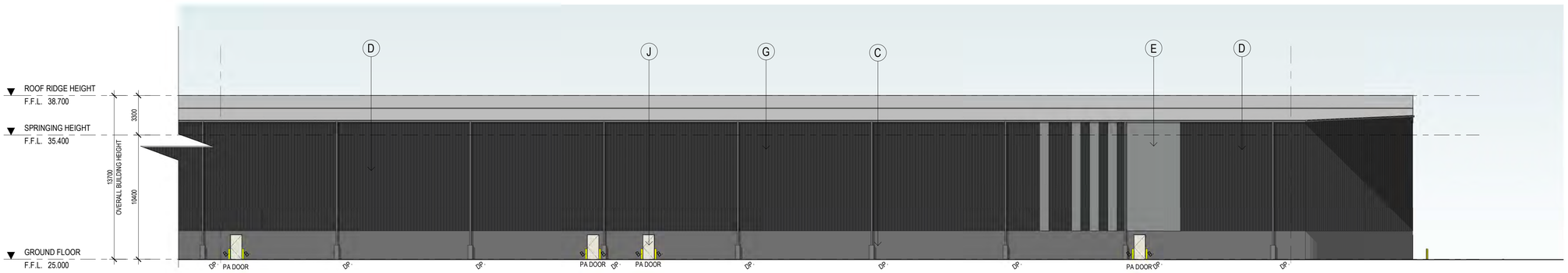
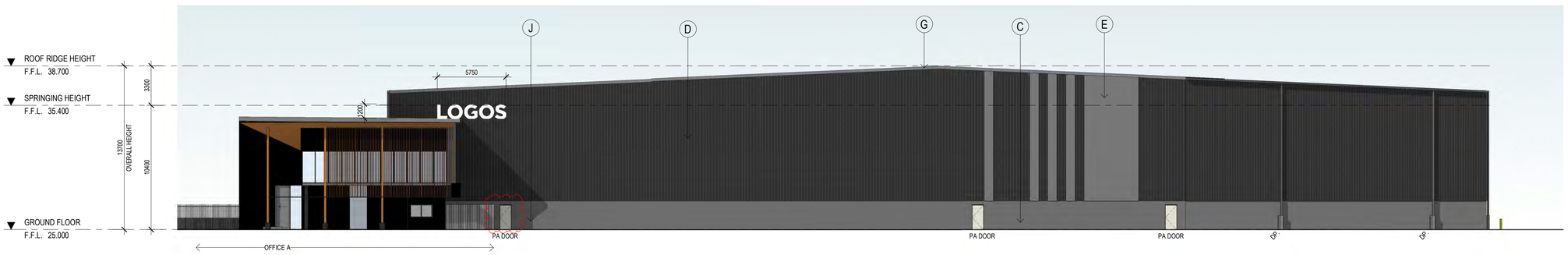


SOUTH ELEVATION PART 1
SCALE: 1 : 200



SOUTH ELEVATION PART 2
SCALE: 1 : 200



WEST ELEVATION
SCALE: 1 : 200

EXTERNAL FINISHES

A	ALUMINIUM FRAMED GLAZING	GREY
B	PRECAST CONCRETE PANEL, FORMLINER	LIGHT GREY
C	PRECAST CONCRETE PANEL	BASALT
D	COLORBOND WALL CLADDING	COLORBOND MONUMENT
E	COLORBOND WALL CLADDING	COLORBOND WINDSPRAY
F	BATTENS / COLUMNS	COPPER
G	ROOF CLADDING	ZINCALUME
H	ROLLER SHUTTER DOOR CLADDING/ PA DOORS	COLORBOND SURFMIST
J	DOWNPIPES / CAPPINGS	COLORBOND WINDSPRAY
K	BOLLARDS	SAFETY YELLOW
L	ALUMINIUM CLADDING	COPPER METALLIC
M	PERFORATED SCREENING	BLACK
N	ALUMINIUM FRAMED COLOURBACK GLAZING	GREY
O	POWDERCOAT	BLACK
P	ALUMINIUM CLADDING	BLACK

No.	DATE:	REVISION:	BY:	CHK:
P1	07.07.2022	DESIGN APPROVAL	BCM	SA
P2	04.08.2022	PRELIMINARY ISSUE	BCM	SA
P3	19.08.2022	PRELIMINARY ISSUE	UW	SA
A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
OVERALL ELEVATIONS 2

CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: BCM
SCALE: 1:200 @ A1
SCALE: 1:400 @ A3

JOB NO: 22099
DRAWING NO: TP08
REVISION: B

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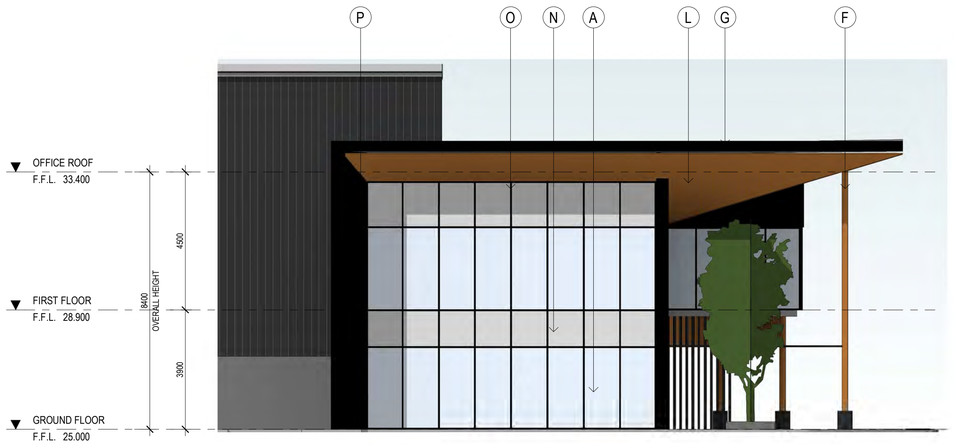
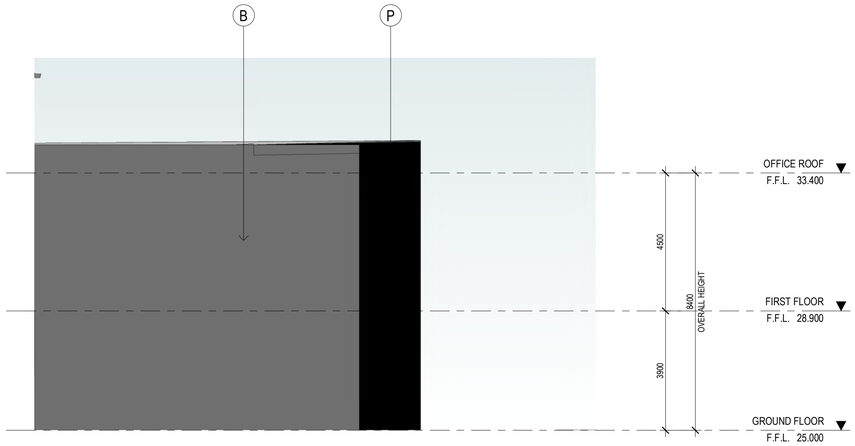
Attachment 2j.



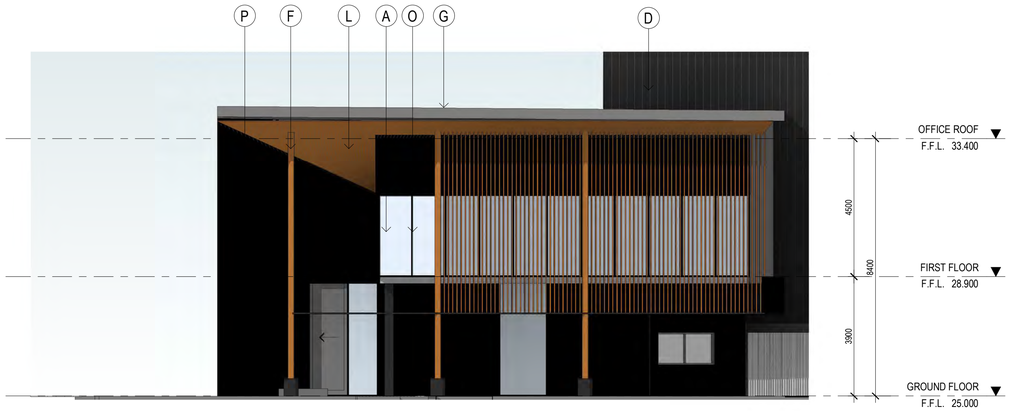
OFFICE A - NORTH ELEVATION
SCALE: 1 : 100



OFFICE A - EAST ELEVATION
SCALE: 1 : 100



OFFICE A - SOUTH ELEVATION
SCALE: 1 : 100



OFFICE A - WEST ELEVATION
SCALE: 1 : 100

EXTERNAL FINISHES

A	ALUMINIUM FRAMED GLAZING	GREY
B	PRECAST CONCRETE PANEL, FORMLINER	LIGHT GREY
C	PRECAST CONCRETE PANEL	BASALT
D	COLORBOND WALL CLADDING	COLORBOND MONUMENT
E	COLORBOND WALL CLADDING	COLORBOND WINDSPRAY
F	BATTENS / COLUMNS	COPPER
G	ROOF CLADDING	ZINCALUME
H	ROLLER SHUTTER DOOR CLADDING/ PA DOORS	COLORBOND SURFMIST
J	DOWNPIPES / CAPPINGS	COLORBOND WINDSPRAY
K	BOLLARDS	SAFETY YELLOW
L	ALUMINIUM CLADDING	COPPER METALLIC
M	PERFORATED SCREENING	BLACK
N	ALUMINIUM FRAMED COLOURBACK GLAZING	GREY
O	POWDERCOAT	BLACK
P	ALUMINIUM CLADDING	BLACK

No.	DATE:	REVISION:	BY:	CHK:
P1	07.07.2022	DESIGN APPROVAL	BCM	SA
P2	04.08.2022	PRELIMINARY ISSUE	BCM	SA
A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
OFFICE A ELEVATIONS

CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: BCM
SCALE: 1:100 @ A1
SCALE: 1:200 @ A3

JOB NO: 22099
DRAWING NO: TP09
REVISION: B

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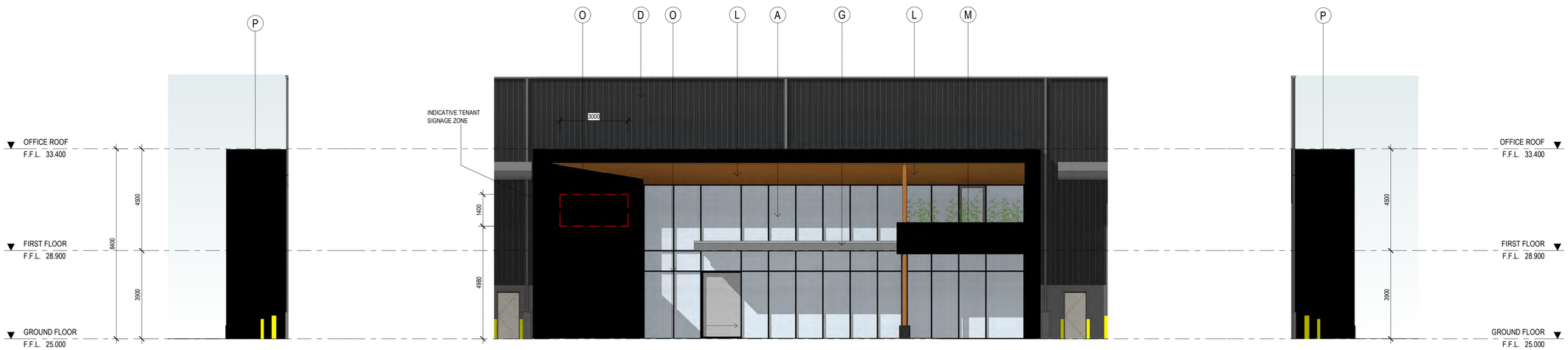
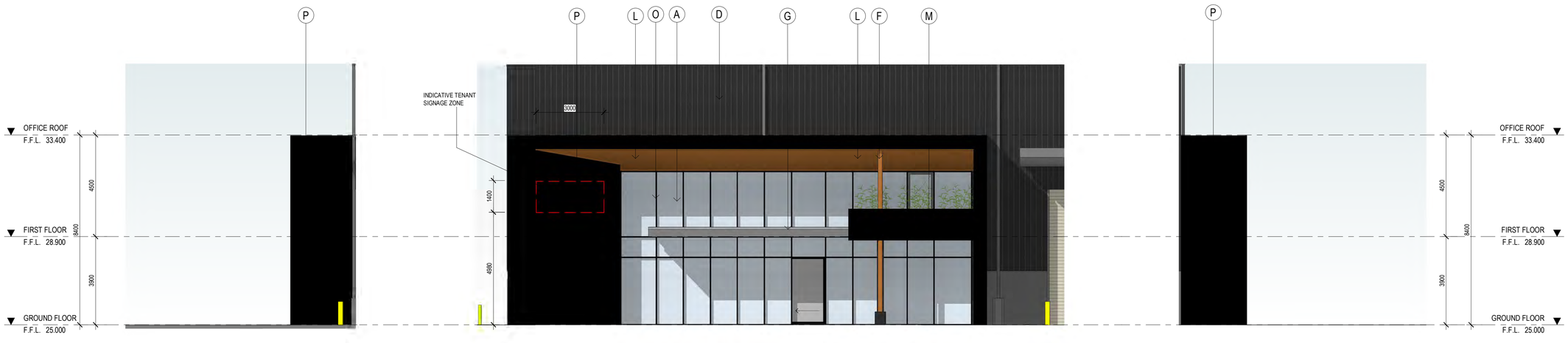
Attachment 2k.



OFFICE B - WEST ELEVATION
SCALE: 1 : 100

OFFICE B - NORTH ELEVATION
SCALE: 1 : 100

OFFICE B - EAST ELEVATION
SCALE: 1 : 100



OFFICE C - WEST ELEVATION
SCALE: 1 : 100

OFFICE C -NORTH ELEVATION
SCALE: 1 : 100

OFFICE C - EAST ELEVATION
SCALE: 1 : 100

EXTERNAL FINISHES

A	ALUMINIUM FRAMED GLAZING	GREY
B	PRECAST CONCRETE PANEL, FORMLINER	LIGHT GREY
C	PRECAST CONCRETE PANEL	BASALT
D	COLORBOND WALL CLADDING	COLORBOND MONUMENT
E	COLORBOND WALL CLADDING	COLORBOND WINDSPRAY
F	BATTENS / COLUMNS	COPPER
G	ROOF CLADDING	ZINCALUME
H	ROLLER SHUTTER DOOR CLADDING/ PA DOORS	COLORBOND SURFMIST
J	DOWNPIPES / CAPPINGS	COLORBOND WINDSPRAY
K	BOLLARDS	SAFETY YELLOW
L	ALUMINIUM CLADDING	COPPER METALLIC
M	PERFORATED SCREENING	BLACK
N	ALUMINIUM FRAMED COLOURBACK GLAZING	GREY
O	POWDERCOAT	BLACK
P	ALUMINIUM CLADDING	BLACK

No.	DATE:	REVISION:	BY:	CHK:
P1	07.07.2022	DESIGN APPROVAL	BCM	SA
P2	04.08.2022	PRELIMINARY ISSUE	BCM	SA
A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
OFFICE B & C ELEVATIONS

CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: BCM
SCALE: 1:100@ A1
SCALE: 1:200 @ A3

JOB NO: 22099
DRAWING NO: TP10
REVISION: B

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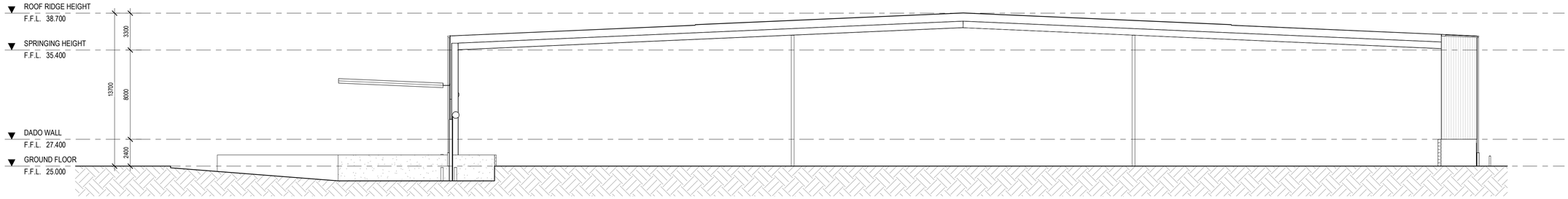
Attachment 2I.



No.	DATE:	REVISION:	BY:	CHK:
P1	04.08.2022	PRELIMINARY ISSUE	BCM	SA
A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
TYPICAL SECTION

CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: BCM
SCALE: 1 : 200 @ A1
SCALE: 1 : 400 @ A3

JOB NO: 22099
DRAWING NO: TP11
REVISION: B

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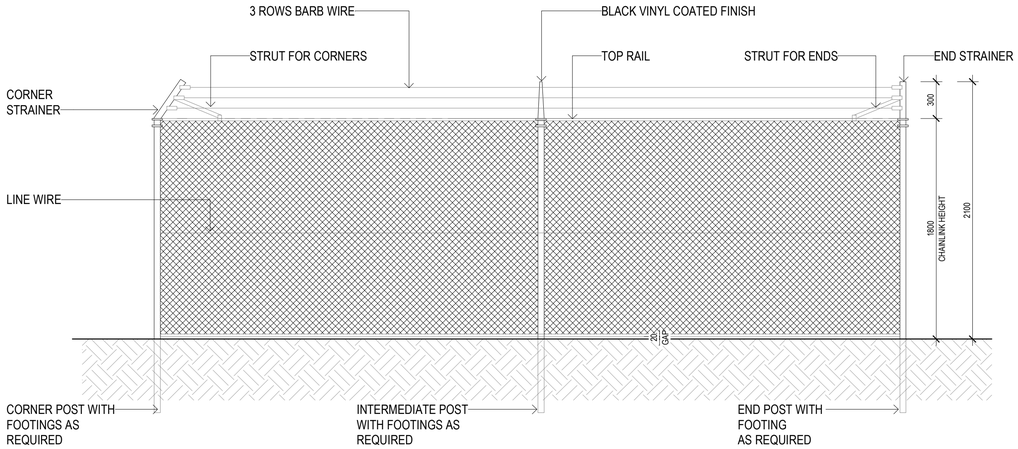
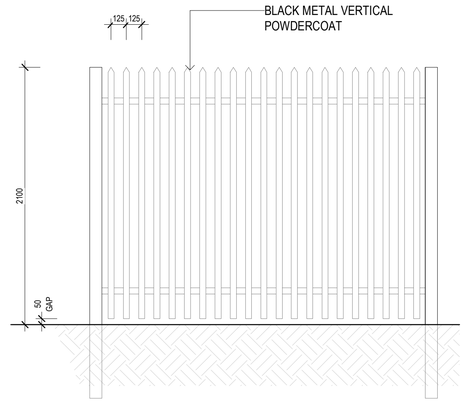
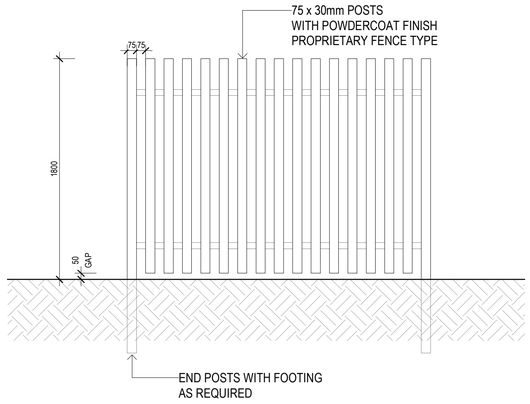
Attachment 2m.



1 FN-1 FENCE DETAIL
SCALE: 1 : 25



2 FN-2 FENCE DETAIL
SCALE: 1 : 25



3 FN-3 FENCE DETAIL
SCALE: 1 : 25

No.	DATE:	REVISION:	BY:	CHK:
P1	04.08.2022	PRELIMINARY ISSUE	BCM	SA
A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
FENCE DETAILS

CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: XXX
SCALE: 1 : 25 @ A1
SCALE: 1 : 50 @ A3

JOB NO: 22099
DRAWING NO: TP12
REVISION: B

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OFFICE A PERSPECTIVE



OFFICE B PERSPECTIVE



OFFICE A PERSPECTIVE



OFFICE B PERSPECTIVE

No.	DATE:	REVISION:	BY:	CHK:
P1	07.07.2022	DESIGN APPROVAL	BCM	SA
A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
3D VISUALISATION

CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: BCM
SCALE: @ A1
SCALE: NTS @ A3

JOB NO: 22099
DRAWING NO: TP13
REVISION: B

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Sign Designs

Estate Identification



Issue A / March 2019

No.	DATE:	REVISION:	BY:	CHK:
A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
SIGNAGE DETAILS-
BUILDING SIGNAGE

CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: UW
SCALE: NTS @ A1
SCALE: NTS @ A3

JOB NO: 22099
DRAWING NO: TP14
REVISION: B

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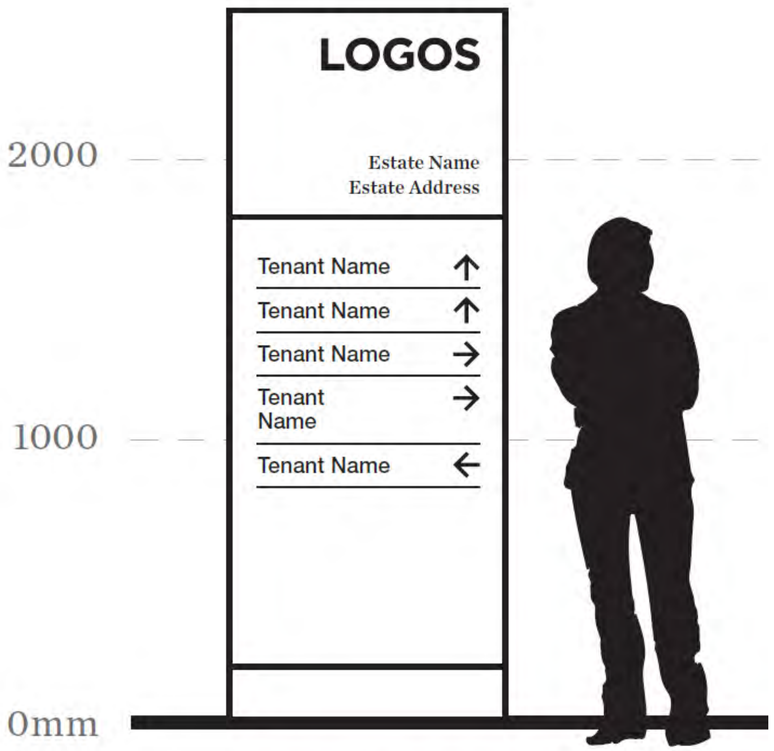

Directory Board

Directory Boards identify the site at a secondary level and provides direction.

No.	DATE:	REVISION:	BY:	CHK:
A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	09.09.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
C	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
SIGNAGE DETAILS -
DIRECTORY BOARD

CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: UW
SCALE: NTS @ A1
SCALE: NTS @ A3

JOB NO: 22099
DRAWING NO: TP15
REVISION: C

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Sign Designs

Entrance Sign Free-standing





Smooth off-form grey finish concrete

Lighting - Ground recessed up lights to illuminate front signage face

1. Formed grey concrete cast in-situ or precast with sealant applied
2. White extruded 3D lettering (10mm) flush mounted to concrete front face
3. White perspex lettering flush mounted to concrete front face
4. Additional 300mm ground clearance for low garden planting

Issue A / March 2019

No.	DATE:	REVISION:	BY:	CHK:
A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
SIGNAGE DETAILS - ENTRANCE SIGN

CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: UW
SCALE: NTS @ A1
SCALE: NTS @ A3

JOB NO: 22099
DRAWING NO: TP16
REVISION: B

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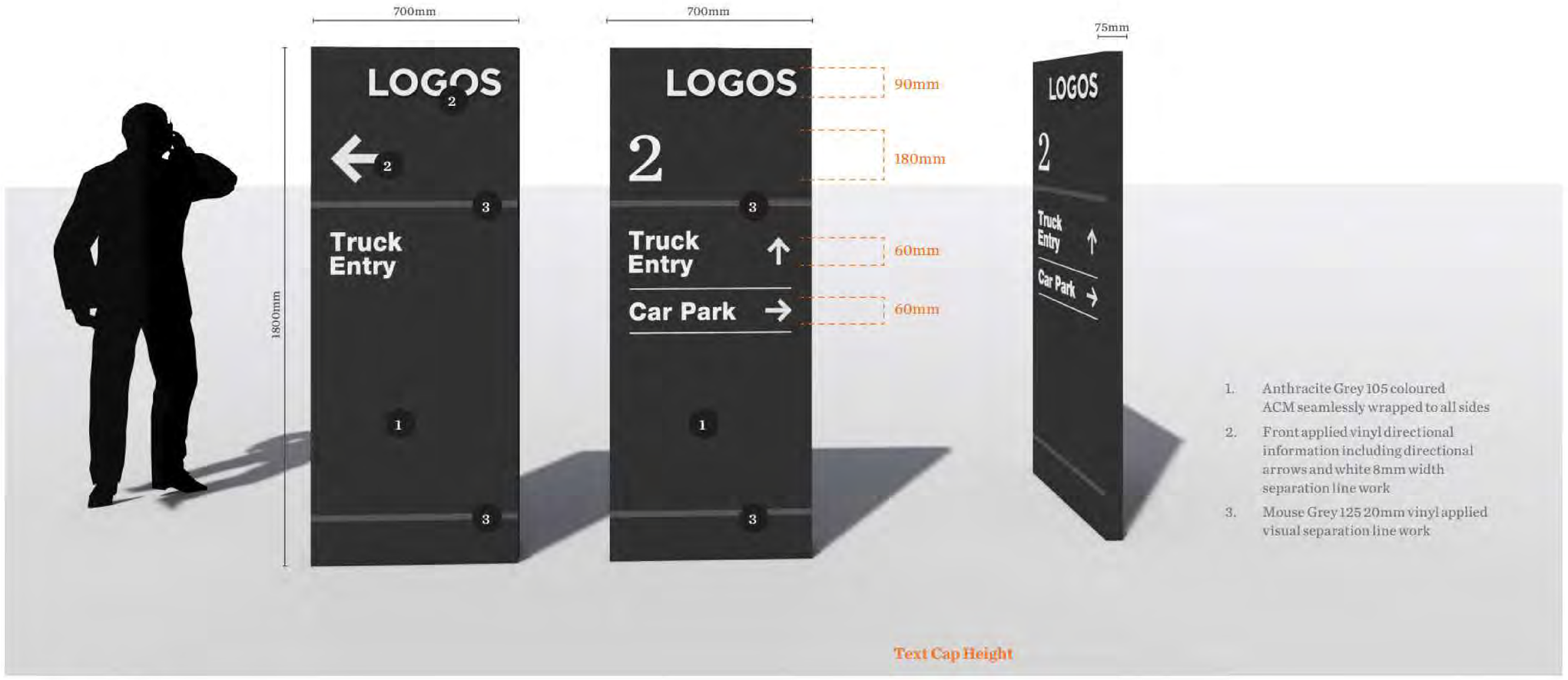
Sign Designs

Directional Free-standing



1. Anthracite Grey 105 coloured ACM seamlessly wrapped to all sides
2. Front applied vinyl directional information including directional arrows and white 8mm width separation line work
3. Mouse Grey 125 20mm vinyl applied visual separation line work

Issue A / March 2019

No.	DATE:	REVISION:	BY:	CHK:
A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
SIGNAGE DETAILS-
DIRECTIONAL SIGNAGE

CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: UW
SCALE: NTS @ A1
SCALE: NTS @ A3

JOB NO: 22099
DRAWING NO: TP17
REVISION: B

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Attachment 2s.



Trees				
Code	Botanic Name	Spacings plants/m2	Size	QTS
MG tb	Magnolia TEDDY BEAR	as shown	100LT	7
CR fc	Corymbia ficifolia	as shown	100LT	34
CL kps	Callistemon KING PARK SPECIAL	as shown	100LT	35
LG nt	Lagerstroemia natchez	as shown	100LT	1
XAN	Xanthorrhoea preissii GRASS TREE	as shown	TRANSPLANT	3



MAGNOLIA 'TEDDY BEAR'



CORYMBIA FICIFOLIA



CALLISTEMON KINGS PARK SPECIAL



Lagerstroemia natchez



Xanthorrhoea preissii GRASS TREE

LEGEND

- Bluemetal Gravel mulch 50mm deep
- Mulched Garden bed
- Concrete Paving with exposed aggregate finish or similar



MULCH: 75mm Organic Mulch



Bluemetal Mulch

MIX 1



Conostylis aculeata



Anigozanthos flavidus



Eremophila glabra KALBARRI CARPET



Dianella CASSA BLUE

MIX 2



Anigozanthos Bush Serries



Grevilea 'GIN GIN GEM'



Leucophyta brownii



Myoporum parviflorum



Lomandara 'TANIKA'



Olearia 'GHOST TOWN'



Westringia fruticosa

PLANT SCHEDULE

Code		Botanic Name	Spacings plants/m2	Size	QTS
Shrubs, groundcovers & grasses					
MiX 1					
	Can	Conostylis candicans	4	140mm	529
	Dia	Dianella 'CASSA BLUE'	4	140mm	529
	Ani	Anigozanthos flavidus	4	140mm	529
	Egl	Eremophila glabra KALBARRI CARPET	4	140mm	529
MiX 2					
	Abs	Aniozatnhos Bush Series	4	140mm	479
	Ggg	Grevillea Gin Gin Gem	4	140mm	479
	Lue	Leucophyta brownii	4	140mm	479
	Myp	Myoporum parviflorum	4	140mm	479
	Llt	Lomandra 'TANIKA'	4	140 mm	2506
	Ola	Olearia 'GHOST TOWN'	4	140 mm	328
	Wes	Westringia fruticosa	4	140 mm	704

Landscaping Notes:

- 50mm thickness of soil conditioner mixed in to site soil for all gardens and additional depth soil allowance in tree locations
- 75mm organic mulch to all shrub planting areas

deep green landscaping

23 colray avenue, osborne park
ph:9242 2299 fax: 9242 2229
julian@dgls.com.au
www.deepgreenlandscaping.com.au

N

PROJECT	DRAWING	ISSUE
WAREHOUSE DEVELOPMENT	LANDSCAPE PLAN	FOR APPROVAL

ADDRESS	DRAWING N0	SCALE	SHEET	REVISION	DRAWN	CHECKED	DATE
TALBOT ROAD, HAZELMERE WA 6055	LA-DG -0001	1:500	A1	C	JG	JR	24.10.2022

REVISIONS

No	DATE	DRAWN	DETAILS
A	14/07/22	JG	ISSUED FOR APPROVAL
B	24/08/22	JG	ISSUED FOR APPROVAL
C	24/10/22	JG	ISSUED FOR APPROVAL



SITE
PLANNING + DESIGN

DEVELOPMENT APPLICATION

LOTS 152 + 153 TALBOT ROAD HAZELMERE

PROPOSED WAREHOUSE DEVELOPMENT

PREPARED FOR:
LOGOS PROPERTY GROUP

SEPTEMBER 2022
UPDATED OCTOBER 2022

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PLANNING FREIGHT FRIENDLY CITIES + REGIONS

WWW.SITEPD.COM.AU

DEVELOPMENT APPLICATION

LOTS 152 + 153 TALBOT ROAD, HAZELMERE

PROPOSED WAREHOUSE DEVELOPMENT AND ANCILLARY USES

SEPTEMBER 2022
UPDATED OCTOBER 2022

ISSUE 2B: FOR LODGEMENT

Prepared for:	**LOGOS Property Group**
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1. INTRODUCTION

1.1 PROJECT OVERVIEW

SITE planning + design (SITE) and the broader consultant team have been engaged by LOGOS Property Group to obtain planning approval for the development of an ambient logistics warehouse facility on a portion of Lots 152 and 153 Talbot Road in Hazelmere.

The facility is being built on behalf of the landowner LOGOS, a highly experienced and specialised industrial developer in the freight and logistics sector across the Asia Pacific region. The warehouse facility is proposed to be built on the remaining vacant land within the LOGOS Hazelmere Logistics Park and will join four (4) established major logistics distribution centres within the estate, being DHL, Primary Connect (Woolworths), McPhee Distribution and Fisher and Paykel, and a proposed Inghams' cold store distribution warehouse (following approval and construction (DAP Reference 360/2022)).

The development of a state-of-the-art logistic facility in Hazelmere will provide a warehousing and distribution facility for up to three (3) freight-forwarding and logistics operators and help to ease market pressures resulting from the current low vacancy rates across Perth's industrial market.

LOGOS are in discussions with prospective tenants for the proposed warehouse development and as such the development has been designed to reflect contemporary logistics requirements and afford flexibility to accommodate a range of businesses with freight and logistics needs.

The proposed development is entirely consistent with the industrial zoning of the land under the local and region planning schemes and is supported by direct access to the metropolitan, regional and state-wide freight road network.

PROJECT TEAM

The development application has been prepared by a consultant project team, comprising:

- LOGOS Property Group – Development Manager
- SITE planning + design – Town Planning Consultant
- Watson Young Architects – Project Architect
- Stantec – Traffic Consultant
- Tadros Engineering – Civil Engineering Consultant
- Galt Geotechnics – Geotechnical Consultants
- Galt Environmental - Environmental Consultants
- Deep Green Landscaping – Landscape Consultant
- McMullen Nolan Group – Licensed Surveyor
- Modus Compliance – Bush Fire Assessor

2. SITE CONTEXT

2.1 REGIONAL CONTEXT

The site is located within the City of Swan and lies approximately 17 kilometres north-east of the Perth Central Business District, 7 kilometres south of the Midland train station and strategic activity centre and approximately 4 kilometres northeast of Perth Airport.

2.2 LOCAL CONTEXT

The site is situated within the Hazelmere industrial precinct, which is in proximity to Perth Airport, Perth (Kewdale) and Forrestfield Intermodal Freight Terminals and the Forrestfield, Kewdale and Welshpool industrial areas. Refer to **Figure 1 – Location Plan**.

The immediate area is characterised by a range of transitional industrial land uses, as former rural properties are progressively rezoned and developed for industrial purposes.

Talbot Road and Stirling Crescent are MRWA approved for Restricted Access Vehicle (RAV 4) access, allowing the movement of 27.5m long vehicles, up to 87.5 tonnes in weight. The site enjoys direct access to Talbot Road. Refer to **Figure 2 – Site Plan**.

Abernethy Road, Great Eastern Highway Bypass and Roe Highway, via Stirling Crescent, provide the site immediate access to the metropolitan and regional freight road networks.

2.3 LEGAL DESCRIPTION

The proposed warehouse will be located on a small portion of Lot 152 and the southern portion of Lot 153 Talbot Road in Hazelmere. The lots are formally described in the table below.

TABLE 1 CERTIFICATE OF TITLE DETAILS

LANDOWNER	LOT DETAILS	TOTAL LAND AREA
Perpetual Corporate Trust Ltd	Lot 152 on Deposited Plan 4553 Certificate of Title Volume 1673 Folio 71	6.0403ha
Perpetual Corporate Trust Ltd	Lot 153 on Deposited Plan 4553 Certificate of Title Volume 1087 Folio 356	6.9024ha
	Total area	12.9427ha

The area of the proposed development is 3.755ha.

There are no known limitations, encumbrances or notifications on the title affecting the land at present.

A copy of the current Certificates of Title are provided at **Appendix 1**.

2.4 SITE HISTORY AND SURROUNDING LAND USES

The site is located in an area that is in transition from historical rural land use to industrial use and development. The broader Hazelmere precinct has been consistently and strategically identified for future industrial uses, acknowledging its proximity to supply chain infrastructure and direct access to

the metropolitan and regional freight road network. The subject land was rezoned 'Industrial' under the MRS in 2014 and subsequently to 'General Industrial' under the local planning scheme.

The site forms part of the broader 'LOGOS Hazelmere Logistics Park' comprising Lots 11, 152 and 153 Talbot Road and accommodates four (4) established warehouse distribution centres; DHL, Fisher and Paykel, McFee Distribution Services and Primary Connect and a proposed Inghams cold store distribution warehouse that is currently under assessment by the City (DAP Reference 360/2022).

Refer to **Figure 2 – Site Plan**.

2.4.1.1 PREVIOUS LAND USE AND DEVELOPMENT APPROVALS

The established and operational warehouses within the LOGOS estate, (comprising Lots 11, 152 and 153 Talbot Road) were approved as follows:

- The established and operational warehouses within the LOGOS estate, (comprising Lots 11, 152 and 153 Talbot Road) were approved as follows:
- Lot 11 – Warehouse – approved by JDAP on 19 November 2015, JDAP reference DAP/15/00891. The facility is constructed and occupied by McPhee Distribution.
- Portions of Lots 11 and 152 – Transport depot, warehouse and ancillary uses – approved by JDAP on 25 January 2018, JDAP reference DAP/17/01317, LG reference DA743-17. The facility is constructed and occupied by Primary Connect (Woolworths).
- Portions of Lots 152 and 153 – Warehouse and ancillary uses – approved by JDAP on 27 July 2018, JDAP reference DAP/18/01406, LG reference DA262-18. The facility is constructed and occupied by Fisher and Paykel.
- Portions of Lots 152 and 153 with heavy vehicle access via Lot 11 – Warehouse and ancillary uses – approved by JDAP on 18 February 2020, JDAP reference DAP/19/01702, LG Reference 711/2019. The facility is constructed and occupied by DHL.

An application is currently be considered by the city for determination by JDAP for a Cold Store Distribution Warehouse for Inghams on the northern portion of Lot 153 (City Reference DAP 360/2022).

The amalgamation and re-subdivision of Lots 11, 152 and 153, conditionally approved by the Western Australian Planning Commission (WAPC) on 9 September 2020 (WAPC ref 159322), proposed to:

- Realign common boundaries to reflect the approved DHL warehouse development and the existing Primary Connect and Fisher and Paykel warehouse developments.
- Widen Talbot Road for the creation of a cul-de-sac head.

Refer to **Figure 3 – WAPC Approved Subdivision Plan**. Clearances for conditions of subdivision approval are currently being sought and a Deposited Plan has been prepared for lodgement with WAPC and Landgate.

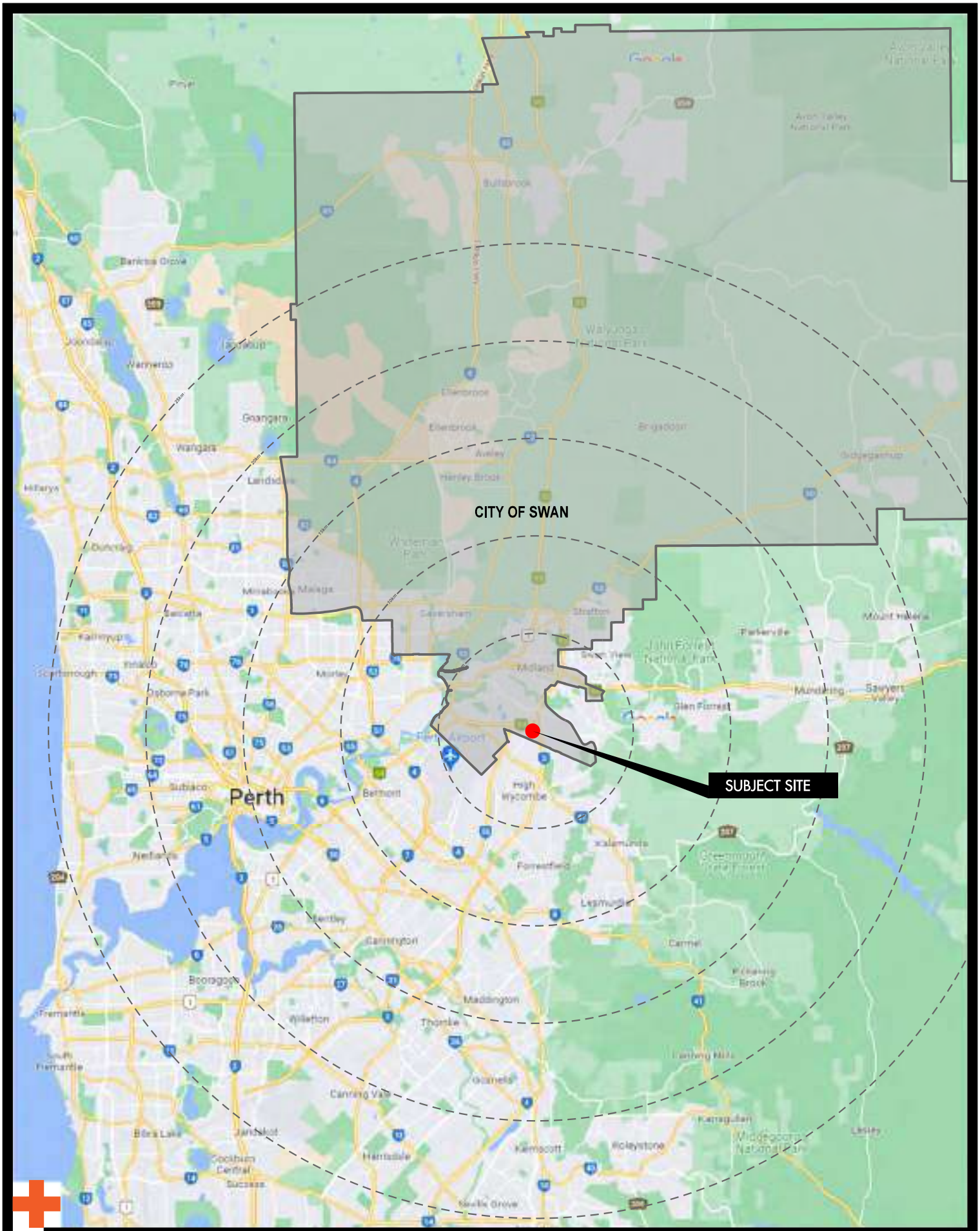
The proposed warehouse development will be located on a portion of existing Lots 152 and 153 and wholly within the boundaries of approved Lot 1001 WAPC ref: 159322). **Refer Figure 4 – Context Plan.**

2.4.2 INDIGENOUS AND EUROPEAN HERITAGE

A search of the State Heritage Register and the City of Swan Municipal Heritage Inventory did not identify any sites or buildings of heritage significance.

There are no known indigenous heritage sites in the locality.

FIGURE 1 LOCATION PLAN



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LOTS 152 & 153 TALBOT ROAD, HAZELMERE

CLIENT	: -	REVISION	: A	DRAWN	: BDL
PLAN NO.	: 21-007-5-010	DATE	: 11 August 2022	SCALE	: 1:250,000@A4

NOTE

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LEIGHTON land development DRAFTING & visuals

SITE PLANNING + DESIGN

north

0 2.5 5.0 7.5 10km

LOCATION PLAN

FIGURE 2 SITE PLAN



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LOTS 152 & 153 TALBOT ROAD, HAZELMERE

CLIENT	: -	REVISION	: A	DRAWN	: BDL
PLAN NO.	: 21-007-5-011	DATE	: 11 August 2022	SCALE	: 1:4,000@A4

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LEIGHTON land development DRAFTING & visuals

LEGEND

SUBJECT LOTS

DEVELOPMENT SITE

SITE PLANNING + DESIGN

north

0 40 80 120 160m

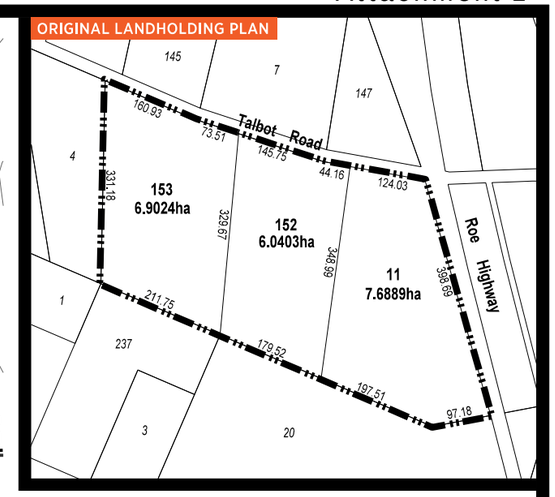
SITE PLAN

FIGURE 3 WAPC APPROVED SUBDIVISION PLAN

DEPARTMENT OF PLANNING, LANDS AND HERITAGE

DATE 09-Jun-2020 FILE 159322

ORIGINAL LANDHOLDING PLAN



PROPOSED LOT 1001
5.95ha
153
6.9024ha

PROPOSED LOT 1002
6.51ha
152
6.0403ha

PROPOSED LOT 1003
7.86ha

PROPOSED ROAD WIDENING (230m²)

EXISTING STRUCTURES TO BE MODIFIED AND/OR DEMOLISHED

EXISTING STRUCTURE TO BE RETAINED

EXISTING STRUCTURES TO BE RETAINED

EXISTING WAREHOUSE TO BE RETAINED

EXISTING WAREHOUSE TO BE RETAINED

EXISTING WAREHOUSE TO BE RETAINED

EXISTING SHED & WATER TANK TO BE RETAINED

EXISTING DRAINAGE BASIN TO BE RETAINED

Talbot Road

Roe Highway

145 7 147 4 1 237 3 20

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LOT 11, LOT 152 & LOT 153 TALBOT ROAD, HAZELMERE

CLIENT	: -	REVISION	: A	DRAWN	: BDL
PLAN NO.	: 17-074-1-003	DATE	: 25 March 2020	SCALE	: 1:2,500@A3

NOTE

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LEIGHTON land development DRAFTING & visuals

LEGEND

- SUBJECT LOTS
- PROPOSED BOUNDARY
- EXISTING BOUNDARY TO BE REMOVED
- EXISTING BUILDING / STRUCTURE
- EXISTING VEGETATION
- EXISTING DRAINAGE BASIN
- EASEMENT FOR RIGHT OF CARRIAGEWAY TO THE BENEFIT OF PROPOSED LOT 1002
- W. CORP - WATER
- W. POWER - OVERHEAD
- W. POWER - UNDERGROUND SERVICES

north

0 25 50 75 100m

SITE PLANNING + DESIGN

PROPOSED PLAN OF SUBDIVISION



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LOT 11, LOT 152 & LOT 153 TALBOT ROAD, HAZELMERE

CLIENT	: -	REVISION	: A	DRAWN	: BDL
PLAN NO.	: 17-074-1-003	DATE	: 25 March 2020	SCALE	: 1:2,500@A3

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LEIGHTON land development DRAFTING & visuals

LEGEND

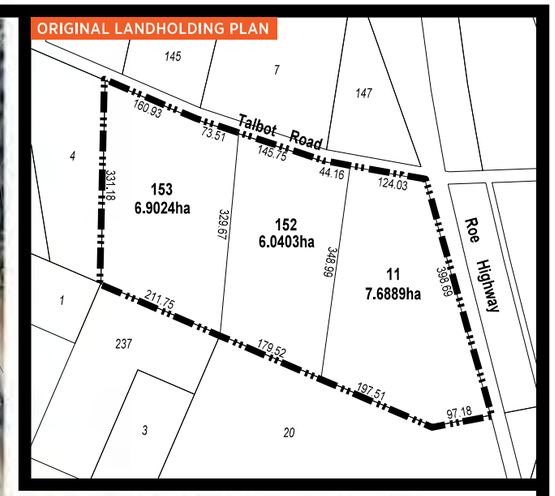
- SUBJECT LOTS
- PROPOSED BOUNDARY
- EXISTING BOUNDARY TO BE REMOVED
- EXISTING BUILDING / STRUCTURE
- EXISTING VEGETATION
- EXISTING DRAINAGE BASIN
- EASEMENT FOR RIGHT OF CARRIAGEWAY TO THE BENEFIT OF PROPOSED LOT 1002
- W. CORP - WATER
- W. POWER - OVERHEAD
- W. POWER - UNDERGROUND SERVICES

SITE PLANNING + DESIGN

north 0 25 50 75 100m

PROPOSED PLAN OF SUBDIVISION

ORIGINAL LANDHOLDING PLAN



PROPOSED LOT 1001
5.95ha
153
6.9024ha

PROPOSED LOT 1002
6.51ha
152
6.0403ha

PROPOSED LOT 1003
7.86ha
11
7.6889ha

PROPOSED ROAD WIDENING (230m²)

PROPOSED WAREHOUSE (UNDER CONSTRUCTION) TO BE RETAINED

EXISTING STRUCTURES TO BE MODIFIED AND/OR DEMOLISHED

EXISTING STRUCTURE TO BE RETAINED

EXISTING STRUCTURES TO BE RETAINED

EXISTING WAREHOUSE TO BE RETAINED

EXISTING WAREHOUSE TO BE RETAINED

EXISTING WAREHOUSE TO BE RETAINED

EXISTING SHED & WATER TANK TO BE RETAINED

EXISTING DRAINAGE BASIN TO BE RETAINED

Talbot Road

Roe Highway

145 7 147 4 1 237 3 20

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LOT 11, LOT 152 & LOT 153 TALBOT ROAD, HAZELMERE

CLIENT	:	-	REVISION	:	A	DRAWN	: BDL
PLAN NO.	:	17-074-1-003	DATE	:	25 March 2020	SCALE	: 1:2,500@A3

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LEIGHTON land development DRAFTING & visuals

LEGEND

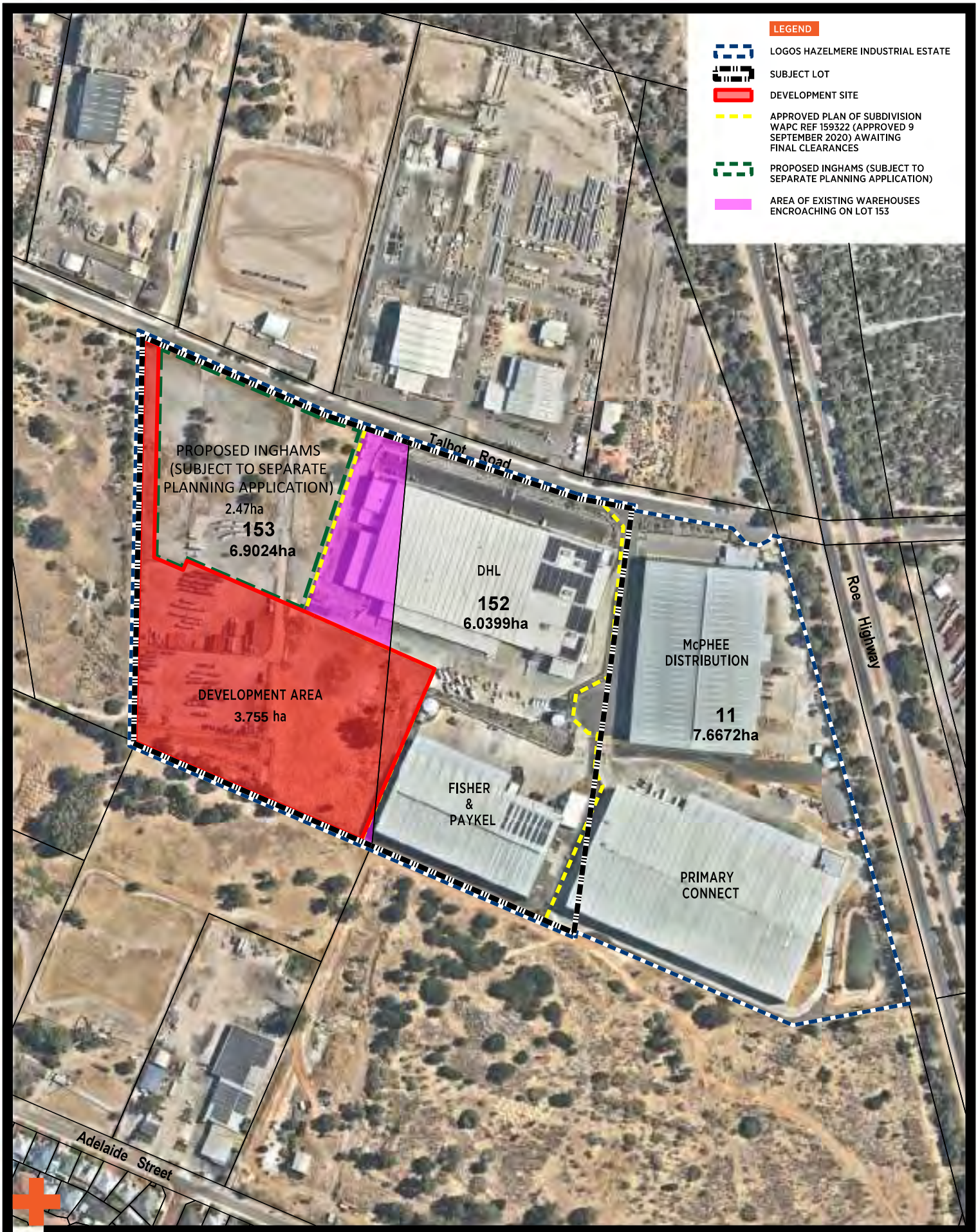
- SUBJECT LOTS
- PROPOSED BOUNDARY
- EXISTING BUILDING / STRUCTURE
- EXISTING BOUNDARY TO BE REMOVED
- EXISTING VEGETATION
- EXISTING DRAINAGE BASIN
- EASEMENT FOR RIGHT OF CARRIAGEWAY TO THE BENEFIT OF PROPOSED LOT 1002

SITE PLANNING + DESIGN

north 0 25 50 75 100m

CONTEXT PLAN

FIGURE 4 CONTEXT PLAN



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LOTS 152 & 153 TALBOT ROAD, HAZELMERE

CLIENT	: -	REVISION	: A	DRAWN	: BDL
PLAN NO.	: 21-007-5-014	DATE	: 11 August 2022	SCALE	: 1:4,000@A4

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LEIGHTON land development DRAFTING & visuals

SITE PLANNING + DESIGN

north 0 40 80 120 160m

CONTEXT PLAN

3. SITE ANALYSIS

The development site is located on the southern portion of Lot 153 and a small portion of Lot 152 and is accessed via a 11.92m wide private access road that connects to Talbot Road. With a total development site area of approximately 3.755ha the site is generally bounded by the proposed Inghams development to the north, vacant industrial land to the west, DHL and the Fisher and Paykel warehouse and distribution facilities to the east and rural land to the south.

Lot 153 was until recently occupied by a transport operator with the extent of development limited to hardstand, a small office and shed buildings.

A portion of the existing DHL development and a small portion of the existing Fisher and Paykel development encroach into Lot 153. The encroachment is being resolved through a conditionally approved subdivision application, described in Section 2.4.1.1 above.

A series of detailed technical studies have been prepared in support of this application to investigate and report on-site conditions, in accordance with the provisions applicable under 'Restricted Use 14', and to guide and inform the proposed development outcomes.

The findings and recommendations contained within the technical reports are outlined in the following report and the reports/plans are appended.

3.1 TOPOGRAPHY

The warehouse development area was surveyed as part of a detailed site feature survey prepared by MNG Surveyors in February 2022. A copy of the survey is provided in Appendix 2.

The site has previously been cleared and is characterised by a combination of open areas with surface grasses and large expanses of hardstand and bitumen sealed pavements. Several trees are located along the southwest boundary, within and external to the site.

The area includes a 70m long narrow swale drain, with a base width of about 5m, aligned in an east west direction and adjacent stockpile of soils.

The ground slopes from east to west with elevations ranging from approx. 26.6m AHD to 24.8m AHD. The ground surface in the area in the south-west corner undulates with the base of the swale drain at an elevation of about RL 24.1m AHD, the surrounding area at an elevation of about RL 25m AHD and the top of the adjacent stockpiles at an elevation of up to about RL 26.9m AHD.

3.2 SITE INVESTIGATIONS

In accordance with the site being subject to the provisions of 'Restricted Use No. 14' of the City of Swan Local Planning Scheme No 17 (LPS17), site investigations have been undertaken by Galt Geotechnical and Galt Environmental with respect to:

- Geotechnical conditions.
- Potential soil and groundwater contamination.

- Groundwater levels with respect to requirements for fill or subsoil drainage to develop the site.
- Acid sulfate soils.

A copy of Galt's Baseline Environmental Site Assessment, Geotechnical Study and Site and Soil Evaluation are provided in **Appendices 3, 4** and **5** respectively. A summary of the findings is presented below.

3.2.1 BASELINE ENVIRONMENTAL SITE ASSESSMENT

A detailed Baseline Environmental Site Assessment was undertaken by Galt Environmental to:

- assess the soil and groundwater conditions at the site to establish an appropriate baseline.
- determine if contamination is present (if any) and if it represents an unacceptable health risk.
- make recommendations for further environmental investigations and or remedial works.

Detailed fieldwork investigations were carried out between 17 March and 5 April 2022 and comprised drilling of machine auger boreholes, collection of soil samples, installation of ground water monitoring wells and collection of ground water samples.

Soil and ground water samples were analysed by NATA accredited laboratories for a range of contaminants of potential concern (COPC) comprising:

- Heavy metal analysis.
- Total recoverable hydrocarbons (TRT).
- Benzene, toluene, ethylbenzene, xylenes and naphthalene.
- Polycylic aromatic hydrocarbons.

The results of the analytical testing indicate that concentrations of all COPC in soil and groundwater were either below the laboratory and or conformed to the adopted assessment criteria at all locations. Based on the results, GALT concluded that it is unlikely that soil and groundwater present a risk to human health or the environment in the context of the proposed land use/development at the site.

3.2.2 GEOTECHNICAL

A detailed Geotechnical Study was undertaken by Galt Geotechnics to determine the suitability of the site for development and to provide guidance on-site stormwater and wastewater management requirements. Given the site will accommodate on-site effluent disposal, Galt have also prepared a full site and soil evaluation (SSE) in accordance with the Government Sewerage Policy and Department of Health Requirements (Refer Section 3.3.3 below).

Detailed fieldwork investigations were undertaken in April 2022, including core penetration testing, bore hole drilling, groundwater monitoring wells, infiltration testing and constant head permeability testing generally in accordance with AS1726 (2017) Geotechnical Site Investigations.

On-site observations and laboratory testing concluded that a site classification of Class S is appropriate for the site provided that the:

- Site levels are raised.

- Site is appropriately prepared (including the removal of vegetation, stripping of gravelly hardstand, appropriate battering of slopes for any bulk excavation and the use of compact approved fill).
- Suitable subsoil drainage control measures are implemented.

As detailed in the Section 7.3 and illustrated in the preliminary Civil Concept Plan (refer to **Appendix 6 – Tadros Engineering Stormwater and Wastewater Management Plan**), to manage on-site stormwater disposal, the preliminary design provides for underground storage devices to manage 5% annual exceedance probability (AEP) storm event or 1% AEP event under hydraulic head conditions. The management plan will be refined as part of the subsequent detailed design and building license process.

3.2.3 SITE AND SOIL EVALUATION

In accordance with the Government Sewerage Policy and Department of Health Requirements a Site and Soil Evaluation was undertaken by Galt Environmental 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.
- Identify and implement a management program to minimise these risks, if required.

Fieldwork investigations undertaken in March and April 2022 comprised of bore hole drilling, collection of soil samples, installation of groundwater monitoring wells and infiltration testing.

3.2.3.1 SUBSURFACE CONDITIONS

Subsurface conditions vary across the site with fill generally present to depths of up to 0.5m over the in-situ soils. The site has a combination of fill sand and sand that extend from the surface to 0.1 – 0.5m in depth. These overlay fine to coarse grained sand (0.75 – 2m), gravelly sands (depths ranging from 1.5 – 2.5m) and gravelly clay soils (depths of between 8 – 9.9m) with dense to very dense sand extended to maximum depth investigated at 12.2m.

3.2.3.2 GROUNDWATER LEVELS

The Department of Water and Environmental Regulation's (DWER) Perth Groundwater Map online mapping indicates that the seasonal minimum groundwater level sits at about 13m AHD which is about 12m below the current ground surface.

Groundwater monitoring wells, installed on the site and measured on 15 March 2022, found that the depth to groundwater varied across the four (4) monitoring wells from 4.5m – 8.1m from natural ground levels. Groundwater levels are not expected to rise by more than 2m during the winter months, providing a minimum separation of about 3m to the groundwater from the ground surface.

Shallower perched groundwater is expected to develop on top of the hard/cemented clayey stratum during the wetter times of the year. In addressing the perched groundwater, the Stormwater Management Plan (refer to **Appendix 6**) proposes to locate the stormwater system in an area of the site that is likely to be a sufficient height above the hard/cemented clayey stratum. Notwithstanding, given there is considerable variation in the underlying soil material throughout the site, further geotechnical testing will be undertaken during detailed design to confirm the location and depth of the stormwater system.

The site is not mapped as being in or near a public drinking water source area by DWER. The site is mapped within a sewage sensitive area associated with 'estuary catchments on the Swan and Scott Coastal Plains' by the Department of Planning Lands and Heritage's (DPLH) online mapping system.

3.2.3.3 ACID SULFATE SOILS

DWER's online mapping identifies the site as having a moderate to low risk of acid sulfate soils.

3.2.3.4 SUITABILITY FOR ON-SITE EFFLUENT DISPOSAL

Galt Geotechnics SSE (refer to **Appendix 5**) confirms that the site is suitable for the disposal of wastewater with the recommended use of ATU secondary treatment units. Discharge of treated effluent must be at least 1.5m above the maximum groundwater level. Given the depth to groundwater on the site and that surface levels are not proposed to change, Galt findings conclude that there should be no issue in conforming to this requirement based on an assumed leach drain depth of between 0.5 – 0.6m below current surface levels.

As detailed in the Stormwater and Wastewater Management Plan (refer to **Appendix 6**), the warehouse development (including three (3) administrative offices) will generate a total peak flow of 7,460L of general effluent wastewater per day. This is addressed in further detail in Section 7.3.2 of this report.

3.3 FLORA AND FAUNA

The site was cleared, and earth worked as part of historical land use and the broader industrial development. A small area in the southwest corner of the site contains a pocket of mature trees that will be removed as part of the development of the site. No fauna is expected to be encountered on the site.

3.4 BUSHFIRE MANAGEMENT

The development site is cleared and surrounded by other cleared industrial land. A small portion in the south-eastern corner of Lot 153 is identified as 'Bush Fire Prone' on the Department of Fire and Emergency Services online Bush Fire Mapping. A BAL assessment and associated Bushfire Management Statement has been prepared by Modus Compliance in association with Xero Fire that has sought to analyse the bush fire risk and threat level of the proposed development. The assessment concluded that a maximum BAL rating of BAL29 was most appropriate for the site and that the proposed development can achieve compliance with the bushfire protection criteria in

accordance the *Guidelines for Planning in Bush Fire Prone Areas*. A copy of the BAL assessment is provided at **Appendix 7 –Bush Fire Attack Level Assessment.**

FIGURE 5 BUSHFIRE SITE ASSESSMENT



Source: Modus Compliance (SITE doc ref: 220912 Modus BAL-BMS - C22-1059 - Lot 153 Talbot)

4. INFRASTRUCTURE AND SERVICES

4.1 ROAD NETWORK

A Transport Impact Statement has been prepared by Stantec and accompanies this report at Appendix 8.

4.1.1 EXISTING ROAD NETWORK

The site is accessed via Talbot Road which connects to a surrounding network of streets that support freight vehicle movements.

As outlined in Section 7 of this report, the proposed land use and development is estimated to generate up to 73 vehicle movements in the Peak AM hour.

Given Talbot Road is a no through road and Stirling Crescent has traffic volumes of 449 vehicles in both directions in the AM peak and the additional traffic (approx. 16%) generated from the development, Stantec have concluded that the development will have no major impact on the performance of the surrounding road network.

Key surrounding roads that will be utilised by light and heavy vehicles accessing this facility are described below.

Talbot Road

The subject site is accessed via Talbot Road, a two lane, two-way undivided road with a typical 9m wide carriageway set within a 20m wide road reserve and is classified as an Access Road (under the Main Roads WA functional hierarchy) with a default speed limit of 50km/hr.

Talbot Road is also approved as a Restricted Access Vehicle 4 (RAV4) network road between Abernethy Road and Roe Highway, which permits the movement of vehicles up to 27.5m in length and 87.5 tonnes in weight.

It is estimated that Talbot Road currently carries in the order of 1,400 vehicles per day (VPD) with capacity for up to approximately 3,000 vpd due to its 9m carriageway width. A 2.5m dual use path is located in the northern verge, starting approximately 50m to the east of the intersection of Stirling Crescent and Talbot Road, continuing to the eastern cul-de-sac.

Stirling Crescent

Stirling Crescent is identified as a Local Distributor road (under Main Roads WA functional hierarchy) and is constructed as a two-lane, two-way undivided road with an 8m wide carriageway within a 20m wide road reserve.

Stirling Crescent is listed as part of the RAV network as follows:

- RAV 5 network road between the Great Eastern Highway Bypass and the southern boundary of the Barminco site on the south western corner of the Talbot Road and Stirling Crescent intersection.

- RAV 2 network road south of the Barminco site to the intersection with Adelaide Street.

The road currently carries in the order of 6,180 vpd with the theoretical capacity estimated at approximately 15,000 vpd, based on the uninterrupted flow regime in the vicinity of Stirling Crescent.

Stirling Crescent provides a direct signal-controlled connection to Great Eastern Bypass and Roe Highway, both regional freight roads providing access to the metropolitan, regional, state and national freight road network.

4.1.2 PROPOSED ROAD NETWORK

Great Eastern Highway Bypass Interchanges Project (Abernethy Road/Lloyd Street, Stirling Crescent and Roe Highway)

Federal and State Government funded upgrades to Great Eastern Highway (GEH) Bypass and interchanges is underway and includes (refer **Figure 6** overleaf):

- A new grade separate interchange with Roe Highway, which will provide for non-stop freeway standard access on Roe Highway (from Kwinana Freeway to Great Eastern Highway) and on GEH Bypass (Abernethy Road to Roe Highway), upon completion of this and other road projects currently underway.
- A new grade separated interchange with Abernethy Road and Lloyd Street.
- The duplication of parts of Abernethy Road, south of Adelaide St.
- The construction of gaps in Lloyd Street to provide a continuous connection from Clayton Street in Bellevue to GEH Bypass in Hazelmere, including a new bridge over the Helena River.
- Closure of the Stirling Crescent intersection to facilitate the grade separated Great Eastern Highway Bypass / Roe Highway interchange.
- Abernethy Road intersection upgrades at Ulm Place/Yagine Close and Adelaide Street/Brinsmead Road, including a heavy vehicle standard (RAV7) connection to Adelaide Street.
- The extension of the unconstructed portion of Adelaide St to Abernethy Road.
- Modifications to the approved RAV network to provide RAV7 access to the south-eastern portion of Hazelmere (containing the LOGOS Hazelmere Logistics Park).
- Other associated minor works.

FIGURE 6 GREAT EASTERN HIGHWAY BYPASS INTERCHANGE PROJECT



Source: **Main Roads WA – Local Area Design Update: Stirling Crescent, Talbot Road and Adelaide Street, May 2022**

Early site works commenced in April 2022 and the project is expected to be completed in 2024.

Abernethy Road

The Federal and State Governments have committed $26.5 million to upgrade Abernethy Road, between Kalamunda Road and GEH Bypass, to a dual carriageway in both directions.

Information on the MRWA website indicates that the upgrade of Abernethy Road (including the funded works mentioned above) forms part of the GEH Bypass Interchanges Project and will be delivered by MRWA and the project contractor (Greater Connect Alliance).

We understand that control and responsibility for Abernethy Road will ultimately shift from the City of Swan and City of Kalamunda to MRWA, upon completion of the upgrade works.

Adelaide Street/Stirling Crescent/Talbot Road

As per the description of the GEH Bypass Interchanges Project, completion of the new interchanges on Great Eastern Highway Bypass at Roe Highway and Abernethy Road requires the removal of the signalised intersection of Stirling Crescent and Great Eastern Highway Bypass (GEH Bypass).

The MRWA's website outlines that Stirling Crescent will close (at the intersection of GEH Bypass) once the new interchange and local road upgrades are in place. This is likely to occur early to mid-2024 subject to traffic staging and relevant approvals.

To facilitate continued access to GEH Bypass from Stirling Crescent (south of GEH Bypass), the Adelaide Street will be extended to connect to Abernethy Road. It is understood that a roundabout will be built at the intersection of Adelaide Street and Abernethy Road, allowing heavy vehicles to travel north to GEH Bypass to access the freight road network.

In addition to the MRWA road works, it is understood that the City of Swan will undertake the following local upgrade works:

- Construction of new roundabouts at the intersection of Stirling Crescent and Talbot Road; and the intersection of Stirling Crescent and Adelaide Street.
  - The roundabout at the intersection of Stirling Crescent and Talbot Road will be a peanut-shaped roundabout. The intent of the peanut roundabout is to maintain the existing alignments of both roads and facilitate movement in all directions.
  - The roundabout at Adelaide Street will be a large circular roundabout facilitating all vehicle movements.
- The section of Stirling Crescent between Talbot Road and Adelaide Street will be upgraded.
- A culdesac will be constructed at the western end of Talbot Road.

4.2 POWER

Enough capacity exists within the current service network to service the proposed development. The site will connect to the existing Western Power infrastructure within Talbot Road.

4.3 WATER CORPORATION SERVICES

4.3.1 WATER

The site will connect to existing Water Corporation water services located within Talbot Road.

4.3.2 SEWER

Water Corporation's reticulated sewer network is not available within proximity to the site.

A detailed Stormwater and Wastewater Management Plan has been prepared by Tadros Engineering (Refer to **Appendix 6**) and demonstrates the suitability of the site to appropriately accommodate on-site effluent disposal through a combination of an ATU and flatbed leach drain system within landscaped areas. This is addressed in more detail in **Section 7.3.2** of this report.

4.4 DRAINAGE/STORMWATER MANAGEMENT

Existing stormwater infrastructure is located within the City of Swan road reserve.

A Stormwater and Wastewater Management Plan has been prepared by Tadros Engineering (Refer to **Appendix 6**) and demonstrates how stormwater can be managed on-site. This is addressed in more detail in **Section 7.3.1** of this report.

5. STRATEGIC AND STATUTORY PLANNING FRAMEWORK

5.1 STRATEGIC PLANNING FRAMEWORK

5.1.1 PERTH AND PEEL @ 3.5 MILLION (MARCH 2018)

The Department of Planning, Lands and Heritage's Perth and Peel @ 3.5 Million (and associated sub-regional frameworks) set out the long-term growth strategy for land use and infrastructure for Perth and Peel.

Identified as a key employment area in the northeast sub region, the Hazelmere Industrial Area is strategically located near key road infrastructure of Great Eastern and Roe Highways and in proximity to Perth Airport. Further employment growth is anticipated in the subregion in a range of sectors including transport, distribution and warehousing. The use of the site for the proposed Inghams distribution warehouse is in line with Perth and Peel @3.5 strategic vision for the area.

5.2 STATUTORY PLANNING FRAMEWORK

5.2.1 PLANNING AND DEVELOPMENT (DEVELOPMENT ASSESSMENT PANEL) REGULATIONS 2011

The Planning and Development (Development Assessment Panel) Regulations 2011, under Part 2 regulation 5, outline that a development that is estimated to cost $10 million or more is determined as an 'Mandatory' Development Assessment Panel (DAP) application to be determined by the relevant DAP and not by the relevant local government or the WAPC.

On the basis that the proposed development is estimated to cost $21 million to construct, the development application is subject to assessment by the City of Swan and determination by the Metropolitan Outer Joint DAP.

5.2.2 METROPOLITAN REGION SCHEME

The site is zoned 'Industrial' under the Metropolitan Region Scheme (MRS). Refer to **Figure 7 – Metropolitan Region Scheme Map**.

5.2.3 LOCAL PLANNING SCHEME

The site is zoned 'General Industrial' under the City of Swan Local Planning Scheme No. 17. Refer **Figure 8 – City of Swan Local Planning Scheme No. 17 Map.**

The objectives of the General Industrial Zone are to:

"a) provide for a range of generally larger scale industrial development, including manufacturing, servicing, storage and distribution;

b) ensure development within the zone is complementary to development in other zones and to avoid development of land for any purposes or in any manner which would detract from the viability or integrity of development in either the Strategic Regional Centre or the Commercial zones;

c) ensure any on-site advertising is integrated with the overall site development and does not detract from the amenities of the road frontages or of adjacent development; and

d) ensure environmental performance of industry, does not detract from the amenity of adjacent sensitive areas and conforms with any relevant environmental standards applicable to the neighbourhood."

As detailed further in this report the proposal is for the development of three logistics warehouse with associated ancillary uses. The proposed use is consistent with surrounding distribution warehouses located in the immediate area and reflects the intent of the General Industrial zone to accommodate such uses. The proposal includes details of the proposed signage for the LOGOS development.

5.2.3.1 LAND USE DEFINITION AND PERMISSIBILITY

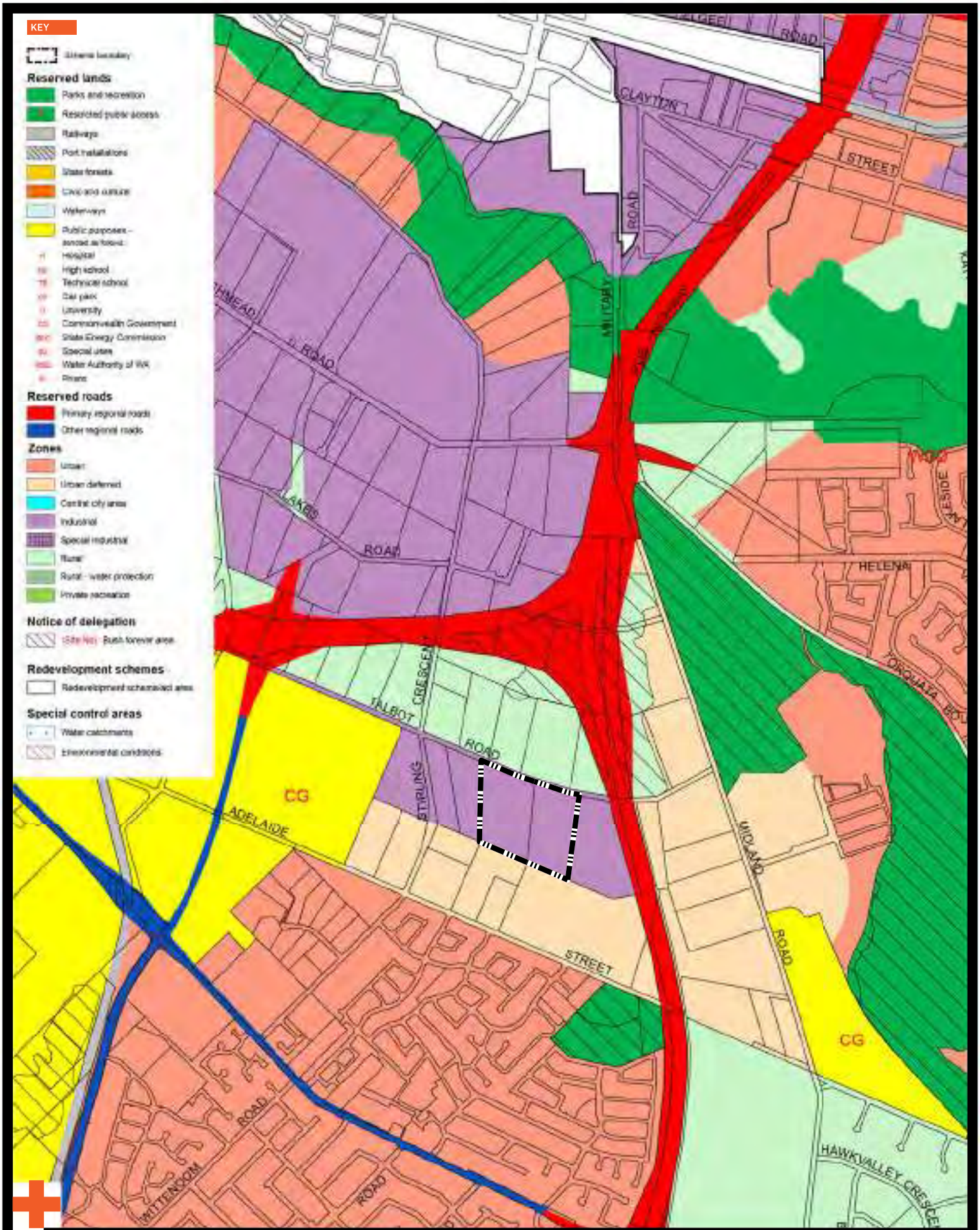
In accordance with the provisions of LPS17 the use and development of the site is most appropriately defined as a 'Warehouse':

"Warehouse means premises used to store or display goods and may include sale by wholesale"

The proposal (as detailed further in **Section 6**) includes offices, staff amenities, which are ancillary to the predominant Warehouse use.

'Warehouse' is a 'P' - permitted uses in the 'General Industrial' zone.

FIGURE 7 METROPOLITAN REGION SCHEME MAP



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LOTS 152 & 153 TALBOT ROAD, HAZELMERE

CLIENT	: -	REVISION	: A	DRAWN	: BDL
PLAN NO.	: 21-007-5-012	DATE	: 11 August 2022	SCALE	: 1:20,000@A4

LEGEND

SUBJECT LOTS

NOTE

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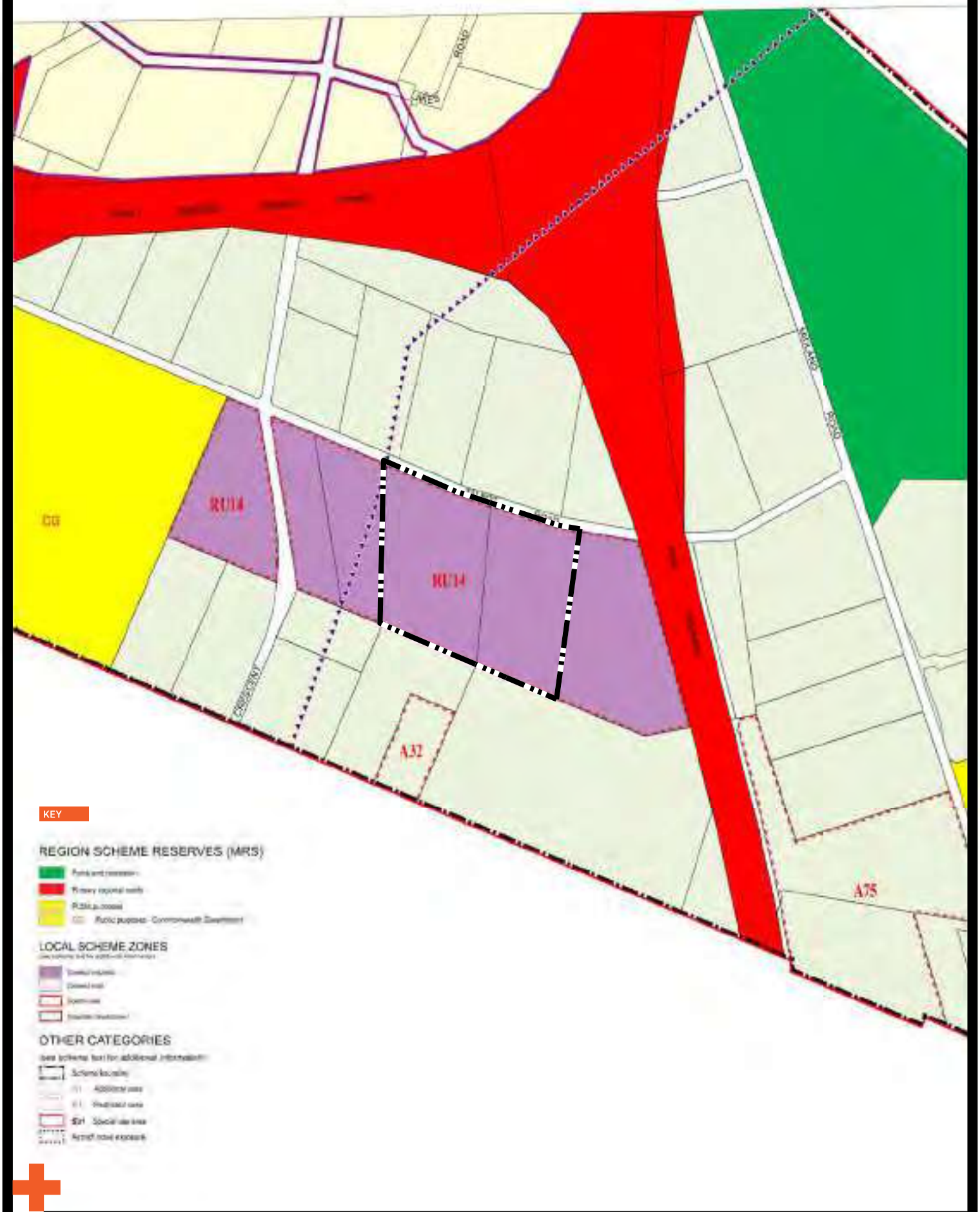
LEIGHTON land development DRAFTING & visuals

SITE PLANNING + DESIGN

north 0 200 400 600 800m

MRS EXTRACT

FIGURE 8 CITY OF SWAN LOCAL PLANNING SCHEME NO. 17 MAP



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LOT 152 AND LOT 153 TALBOT ROAD, HAZELMERE

CLIENT	: -	REVISION	: A	DRAWN	: BDL
PLAN NO.	: 21-007-5-013	DATE	: 11 August 2022	SCALE	: 1:10,000@A4

LEGEND

SUBJECT LOTS

NOTE

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LEIGHTON land development DRAFTING & visuals

SITE PLANNING + DESIGN

north 0 100 200 300 400m

LPS 17 EXTRACT

5.2.3.2 RESTRICTED USE NO 14

The subject site also forms part of 'Restricted Use Area No.14. In accordance with Clause 4.6 of LPS 17:

> *'Despite anything contained in the Zoning Tables, the land specified in Schedule 3 may only be used for the specific use or uses that are listed and subject to the conditions set out in Schedule 3 with respect to that land.'*

Restricted Use Area No 14 in Scheduled 3 of LPS 17 states:

TABLE 2 RESTRICTED USE NO. 14

DESCRIPTION OF LAND	Lot 155 on P4553 and Lot 5 on Diagram 27196 Stirling Crescent, Hazelmere Lot 4 on Diagram 27196, Lot 153 on Plan 4553, Lot 152 on Plan 4553 and Lot 11 on Diagram 52977 Talbot Road, Hazelmere. AMD 125 GG10/11/15
RESTRICTED USE	The Use Classes listed in the Zoning Table against the 'General Industrial' Zone and cross referenced with the symbols of 'P', 'D', and 'A'.
CONDITIONS	1. Unless development on the site is connected to reticulated sewer – a) development is restricted to 'dry industry' whereby any development application must demonstrate that the quality and volume of effluent to be disposed of on-site can be successfully disposed of, without adverse environmental or health effects, using effluent disposal systems; and b) development shall be restricted to the type which is predicted to generate, and/or generate wastewater intended for disposal on-site at a daily volume not exceeding 540 litres per 2,000m2 of site area. 2. A Wastewater Management Plan shall be submitted with each development application to demonstrate that Condition 1 can be achieved to the satisfaction of the Local Government. 3. Connection to an Aerobic Treatment Unit (ATU) or Nutrient Effluent Disposal System may be permitted where acceptable groundwater depths exist and subject to the approval by the Local Government and Health Department of Western Australia. 4. Land use and development should connect to reticulated sewer where available. 5. Subdivision of existing lots into smaller lot sizes shall only be supported if the land is connected to reticulated sewer, or where the subdivision represents a minor lot boundary realignment. 6. A Stormwater Management Plan shall be submitted to the satisfaction of the Local Government with each development application. The Management Plan shall demonstrate that runoff is contained on-site for a 1-year Annual Recurrence Interval (ARI) storm and discharge from lots is limited to a rate of 16L/s/ha through the use of on-site compensation. 7. A Landscape Plan shall be submitted with each development application to demonstrate that any on-site stormwater compensation basin and drainage swale will be landscaped appropriately in accordance with Water Sensitive Urban Design Guidelines to enhance the visual and landscape amenity of the site to the satisfaction of the Local Government. 8. Prior to any subdivision or development proposal, whichever occurs first, a site investigation and remediation report (if required) shall be prepared and implemented with respect to potential soil and ground water contamination of a site to the satisfaction of the relevant approval agency on advice from the Department of Environment Regulation. 9. The investigation of ground water levels on a site shall also include consideration for any requirement for future fill and/or subsoil drainage for the proposed development application or subdivision proposal, to the satisfaction of the Local Government. 10. An acid sulphate soils self-assessment form and, if required, an acid sulphate soils report and management plan may be required to be submitted to and approved by the Department of Environment Regulation with any subdivision or development application that is likely to impact on moderate or high-risk acid sulphate soils."

In accordance with the conditions outlined in Restricted Use Area No. 14 this development application is accompanied by a series of technical reports and plans relating to:

- Wastewater management and on-site effluent disposal.
- Stormwater management.

- Landscaping.
- Site and soil evaluations addressing ground water levels, soil conditions, and on-site effluent disposal capabilities.

As summarised in this report and detailed in the accompanying technical reports the site is suitable for the proposed use and development for 'Warehouse' and ancillary land uses, and the conditions outlined in Restricted Use Area No. 14 can be appropriately met.

5.2.4 HAZELMERE ENTERPRISE AREA STRUCTURE PLAN (2011)

The Hazelmere Enterprise Area Structure Plan (HEASP) aims to optimise the potential of Hazelmere to address the significant shortage of industrial land in the wider Perth metropolitan area by providing guidance that will strengthen its regional role as a logistics hub and foster local employment growth.

The HEASP identifies the site as being developed for 'General Industrial' uses and development.

5.2.5 LOCAL PLANNING POLICIES

A series of Local Planning Policies, prepared in accordance with the provisions of LPS 17, apply to the site and proposed development as outlined below.

5.2.5.1 POL-TP-124 BUILDING AND DEVELOPMENT STANDARDS – INDUSTRIAL ZONES

The City of Swan POL-TP-124 Building and Development Standards – Industrial Zones Policy outlines the building and development standards applicable to development in the 'General Industrial' zone. The standards relevant to this proposal are:

- Off Street Parking.
- Setbacks.
- Use of Setbacks.
- Landscaping.
- Refuse and Storage Areas.
- Facades.

Compliance with the requirements of the Policy is addressed in **Section 7** of this report.

5.2.5.1 POL-TP-129 VEHICLE PARKING STANDARDS

The City of Swan POL-TP-129 Vehicle Parking Standards outlines the vehicle parking requirements for industrial and commercial activities. The standards relevant to this proposal are:

- Land use parking requirements.
- Design requirements for off street parking.
- Landscaping for off street parking.
- Units of measure (when assessing parking based on number of employees).
- Commercial vehicle parking.

An assessment of the proposed development against the relevant parking standards is addressed in **Section 7** of this report and the enclosed Transport Impact Statement, included at **Appendix 7**.

5.2.5.2 POL-C-070 ADVERTISING SIGNS WITHIN THE COMMERCIAL AND INDUSTRIAL ZONES

The City of Swan POL-C-070 Advertising Signs Within the Commercial and Industrial Zones aims to control advertising signage to ensure the development of well signed commercial and industrial precincts.

The Policy outlines that signage may contain the following features:

- Business logo.
- Street number.
- Owner's name and contact details.
- Main services provided.

And be clear and well maintained.

5.2.5.3 POL-LP-1.10 PROVISION OF PUBLIC ART

The City of Swan POL-LP-1.10 Provision of Public Art Policy state that developers of prescribed development projects within the City will generally be required to provide public art to a value equivalent to 1% of the cost of development, where the prescribed development meets one or more of the criteria set out in Section 5 of the Policy – namely:

- Development cost of at least $2 million, and
- The development will cause at least 20 people to become part of, or to interact with the locality in which the prescribed development will be located, and who will benefit from the public art (determined based on the number of people and building is designed to accommodate, or by the number of daily visitors the development is estimated to generate).

6. LOGOS CORPORATE OVERVIEW

LOGOS are a highly experienced and sophisticated specialist freight and logistics developer with operations across 10 countries in the Asia Pacific region. On behalf of some of the world's leading global real estate investors, LOGOS manages every aspect of logistics real estate, including sourcing land or facilities and undertaking development and asset management.

LOGOS own and manage 15 industrial estates across Australia, comprising 1.8 million square metres of real estate and over $14.6 billion in industrial assets. LOGOS' industrial assets include the $4.2 billion Moorebank Logistics Park in Sydney NSW, the largest intermodal logistics facility in Australia, which on completion will provide 850,000sqm of high-quality industrial property and infrastructure. Major LOGOS tenants including Volvo, H&M, Catch.com, Woolworths, DHL and Toll.

The proposed warehouse facility, the subject of this application, is located on the last vacant land parcel within the LOGOS Hazelmere Logistics Park. The proposed facility will join four (4) established major logistics distribution centres within the estate, being DHL, Primary Connect (Woolworths), McPhee Distribution and Fisher and Paykel, and a proposed Inghams' cold store distribution warehouse following approval and construction (DAP Reference 360/2022).

The proposed ambient warehouse logistic facility will provide for a facility for freight distribution and warehousing and distribution activities for up to three (3) freight and logistics operators. LOGOS are in discussions with prospective tenants for the proposed warehouse development and as such the development has been designed to reflect contemporary logistics requirements and afford flexibility to accommodate a range of businesses with freight and logistics needs.

LOGOS' extensive experience in developing facilities for the freight and logistics industry ensures that whether a facility is being developed for a specific tenant (such as Inghams) or to attract a prospective occupant following construction, that they are designed to be robust, adaptable and meet contemporary warehousing requirements to support the current and anticipated future needs of the logistics warehousing industry.

6.1 DEVELOPMENT OVERVIEW

LOGOS have drawn on their extensive experience in freight and logistics warehouse development, the outcome of discussions with prospective tenants and relevant planning and building requirements to inform the design of the facility, including the site layout, the suitable provision of warehousing floorspace, provision and location of carparking, truck docking and access arrangements.

The proposed warehouse development will comprise three (3) freight and logistics warehouses with associated office space as outlined in **Table 3** below. Ancillary uses are outlined in **Table 4**.

The three (3) warehouses have been designed and will be constructed for basic ambient storage of goods and will not incorporate any chiller or freezer storage. Tenants for the facility will either be secured during or following the completion of the facility's construction.

In the event that a single or two (2) tenants enter commercial agreements to lease the entire facility an application for development approval to combine the facility into one (1) or two (2) warehouse/office facilities will be sought. As addressed further in this report in all scenarios tenants will only be accepted on the basis that the meet the parameters of the site including on-site effluent disposal, carparking and heavy vehicle access.

Detailed Site Plan, Floor Plans and Elevations, prepared by Watson Young Architects, are provided in **Plan Set 1** at the rear of this report.

TABLE 3 PROPOSED USES AND FLOOR AREAS

USE	DESCRIPTION	GLA
Warehouse	Comprises 3 separate warehouse facilities with associated recessed docks.	18,010m²
Office	Each warehouse is provided with a small open plan office space (on the first floor) to accommodate any management and general administrative staff requirements including technical service room.	Combined 864m²
Staff Amenities	The 3 warehouses office areas also include provision of staff amenities including end of trip facility showers and staff lunch / tea preparation areas including outdoor staff areas associated with the office.	
	TOTAL GFA	18,874m²

TABLE 4 ANCILLARY ELEMENTS

ELEMENT	DESCRIPTION
Car Parking	The development provides for a combined total of 124 standard vehicle car parking bays and 3 accessible parking bays accessed via the shared accessway from Talbot Road. The carparking is located adjacent to each warehouse facility with additional parallel parking provided along the northern boundary of the site. Pedestrian footpaths are provided between each parking areas and each office entry to ensure safe and legible access between parking, visitor and staff areas
Truck Hardstand and Docking	The design includes provision for two recessed dock levellers (height adjustable docks that enable goods to be transferred between the warehouse floor and the truck beds) for each warehouse and additional at-ground roller door access to warehouse facility from the truck hardstand.
Bicycle Parking	Provision for a combined total of 14 bicycle parking racks are provided outside each warehouse office area with associated end of trip facilities provided as part of the staff amenities areas.
Pump House + Sprinkler Tanks	The site will be serviced by the fire pump house and 2 sprinkler tanks provided as part of the adjoining Inghams development to the north of the site.
Landscaping	The site has been designed to include 2,790m² area of landscaping. As the site does not front a public street landscaping will be focused around the carparking areas and entrance to the warehouse office, equating to 7.43% of the site.

6.2 BUSINESS OPERATIONS

The facility has been designed to accommodate the specific needs of logistics warehouse operators where the primary intent of the facilities is the temporarily storage of goods for redistribution to off-site locations. Logistic warehouses are either operated by a company who are directly responsible for the storage and distribution of their own goods (such as Fisher and Paykel) or through a third-party logistics provider (3PL) that provides land, buildings, vehicles, systems and/or resources to allow businesses to outsource elements of their distribution, warehousing, and/or fulfillment requirements.

Given the principal intent of a logistics warehouse is simply for storage, logistics warehouse operators require a high proportion of warehouse floorspace, limited office space for general administrative duties and require minimal staff on-site to operate the facility.

These specifications are reflective of the existing and proposed logistics operators within the Hazelmere Logistics Estate" as outlined in the table below.

TABLE 5 HAZELMERE LOGISTICS PARK – EXISTING TENANT FLOORSPACE AND STAFF NUMBERS

EXISTING LOGISTIC OPERATORS WITHIN THE ESTATE	WAREHOUSE SPACE (GLA)	OFFICE + STAFF AMENITIES (GLA)	STAFF
DHL Storage + Distribution	17,885m²	1,460m²	50 per shift (100 across 16 hr/day)
FISHER AND PAYKEL Storage and Distribution	9,969m²	470m²	30
TOLL/ PRIMARY CONNECT (WOOLWORTHS)	21,280m²	470m²	44 per shifts (85 total across 2 shifts)
MCPHEE Distribution Services (3PL)	20,000m²	500m²	50
INGHAMS (Proposed) Storage and Distribution and includes labelling room	8,649m²	437m²	33 per shift (66 total across 2 shifts)
Sub Total of Areas	77,783 m²	3,337m²	
Combined Floorspace for Existing Estate			81,120 m²
Total Staff on Shift for combined Estate			207 staff
Ratio of Floorspace to Staff			391m² GLA per staff

LOGOS have discussed the facility with several companies requiring logistics warehousing space, who have provided details on their floorspace and associated site specifications to effectively and efficiently operate their warehousing needs, as outlined in the table below.

TABLE 6 HAZELMERE LOGISTICS PARK – PROSPECTIVE TENANTS FLOORPSACE AND STAFF NUMBERS

POTENTIAL LOGISTIC OPERATOR	WAREHOUSE SPACE (GLA)	OFFICE SPACE (GLA)	STAFF
Pope Packaging – Require a Distribution Warehouse (Pope Packaging supply and manufacture textiles, paper sacks and flexible packaging)	4,500m²	200m²	5
Myer – Require a Distribution Warehouse to support their stores across Metropolitan Perth	15,000m²	250m²	10

Reflective of how logistics warehouses operate, potential tenants have indicated to LOGOS that they require sites that provide medium – large floorspace storage capacity, which will be operated with limited staff.

As logistics warehouses become more sophisticated through the use of artificial intelligence to support the warehousing and retrieval of goods for fulfillment, these types of facilities will ultimately be managed and operated with less staff as technological advancement are adopted across industry.

The development has been designed to provide an appropriate balance between the needs of logistics warehouse operators and the City's standard statutory planning requirements for general warehouse developments to provide a robust and orderly development outcome.

6.3 OPERATION DAYS AND TIMES

Approval is sought for the site to operate 24hr a day, 7 days a week, 365 days a year. The proposed hours are consistent with the operating hours of existing distribution warehouses within the estate and reflect the increasing 365/24/7 operation of the freight and logistics industry to meet business and customer demands.

6.4 NUMBER OF EMPLOYEES

In the absence of secured tenants and associated staff numbers, LOGOS have drawn on their extensive experience delivering similar facilities across Australia to design a development that will accommodate the needs of typical logistics operators.

It is anticipated, based on LOGOS extensive knowledge base, that the ***combined*** warehouse facilities would only be realistically occupied by a maximum of between 30 – 60 staff in total. Delivery and dispatch of goods stored at the facility are typically managed by a third-party logistics provider and all vehicles associated with deliveries will be based off-site.

Despite the limited staff that are expected to operate each facility, the development includes 124 standard and 3 universal access parking bays to address the City's current statutory parking standards for the proposal.

The provision of carparking bays across the development will significantly exceed the likely staff and visitor numbers associated with the proposed logistics warehouses. However, to provide greater certainty to the City as the statutory planning authority responsible for managing compliance with the local planning scheme, LOGOS in leasing each warehouse will limit the allowable occupancy of each unit to ensure it does not exceed the parking capacity of the development.

A condition on the development approval, limiting the occupancy of the site to 120 staff (allowing for additional visitor needs) would be supported.

6.5 MOVEMENT AND ACCESS

As addressed in further detail in Section 7.2 of this report, the site is located behind a proposed logistics warehouse for Inghams that fronts Talbot Road. The rear portion of the site (which will be occupied by the warehouse proposed in this application) will be accessed by a 11.92m wide private access road providing light and heavy vehicle access to the site.

The logistic warehouse has been designed to accommodate standard light vehicles (cars/utes/vans etc), 19m long trucks (as of right vehicles) and B Double trucks (Restricted Access Vehicle) safely and efficiently.

In the absence of tenant staff numbers and estimated vehicle movements, Stantec based their Transport Impact Assessment on a trip generation rate of 3.6 trips per 100m^2 of warehouse per day (as derived from the average of the Roads and Traffic Authority's (RTA) Guide to Traffic Generating Development and the Institute of Traffic Engineers (ITE) Guidelines).

Given the development is being constructed prior to securing a tenant, an average trip generation rate of 3.6 trips per 100m^2 Gross Floor Area has been used to determine the trips generated by the site (in and out) during the AM peak. Based on the total gross floor area of 18,874m^2 the development is modelled to generate 73 trips during the AM peak, comprising 64 trips in and 9 trips out.

Based on a total floor area across the warehouse and office space the application of this trip generation rate would create a traffic generation of approximately 687 trips per day.

As addressed in **Section 7.2.1** of this report, based on average trip generation rates expected during the AM peak, Stantec's Transport Impact Statement confirms that the proposed development does not generate the need for any modifications to the current road network to accommodate the expected traffic flows from the development.

7. PROJECT DESCRIPTION – PROPOSED LAND USE AND DEVELOPMENT

7.1 DEVELOPMENT OVERVIEW

7.1.1 LAND USE

The proposal comprises a 'Warehouse' and associated ancillary uses. The predominant activities on the site will be the delivery, ambient storage and subsequent redistribution of goods by up to three (3) logistics operators. To facilitate this, the development will comprise three (3) warehouses with associated administration, heavy vehicle docks, vehicle manoeuvring areas, staff/visitor car parking and landscaping.

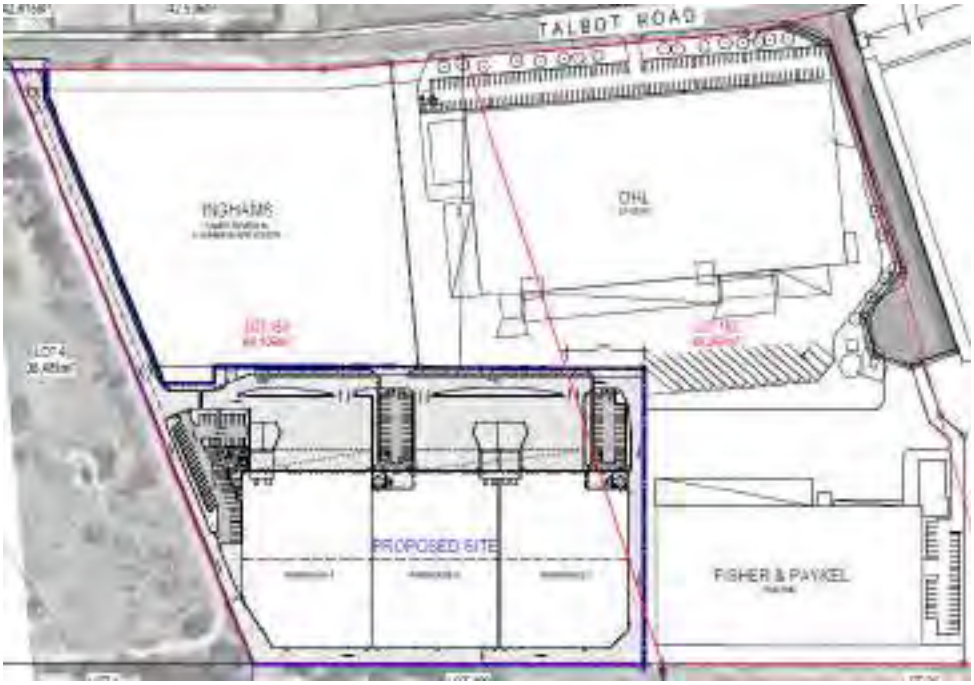
The use is defined as a 'Warehouse' under LPS17, which is a permitted use in the 'General Industrial' zone. The proposed development is wholly consistent with the objectives of the 'General Industrial' zone and the Hazelmere Enterprise Area Structure Plan and will contribute to the growing role of Hazelmere as a key transport, distribution and warehousing industrial precinct.

7.1.2 SITE LAYOUT AND DESIGN

As illustrated in the site plan, floor plans and elevations (refer to **Plan Set** 1) the proposed warehouse development has been architecturally designed to a high industrial standard reflective of LOGOS' ongoing commitment to deliver high quality facilities to support the freight and logistics industry.

The layout and operation of the proposed facility is modelled on existing and comparable facilities developed by LOGOS across Australia and New Zealand and informed by discussions with potential tenants. The warehouse development site will occupy the southern portion of Lot 153 and a small portion of Lot 152 with a combined area of 3.775ha.

FIGURE 9 SITE CONTEXT



Source: Watson Young (SITE doc ref: 221025 WY Plan Set 22099_Delevopment Approval TP Issue (B))

The development site is accessed by a 11.92m wide access road from Talbot Road comprising of a 9m wide road pavement, 1.2m wide pedestrian footpath on the eastern side and 1.7m approx. of landscaping along the eastern and western boundary of the access road.

The proposed warehouse development has been located to ensure the site can be utilised in the most effective and efficient way, with a contemporary and corporate design reflective of LOGOS commitment to the continued development of quality warehousing facilities for the freight and logistic industry.

The general layout will ensure safe, legible and easy pedestrian access from car parking areas to administrative and publicly accessible areas.

7.1.3 BUILDING SETBACKS

TABLE 7 BUILDING SETBACKS

	REQUIRED	PROVIDED	COMPLIANT
FRONTAGE			
Front / Major Road	9m	160m	✓
Side	Nil Except for corner lots where the setback shall be 6m from side streets.	East in excess of 185m (to lot 152 boundary) ** West 7.295 (minimum) to lot boundary	✓
Rear	Nil	8m to lot boundary	✓

** The re-subdivision of Lot 153 (WAPC Ref 159322) will result in a side setback of 8.1m to the eastern boundary of the proposed Lot 1001 with all other setbacks to the new lot boundaries as presented above.

The proposed warehouse complies with setbacks requirements outlined in the City of Swan Planning Policy POL-TP-124 Building and Development Standards – Industrial Zone (POL-TP-124).

Furthermore, as indicated in the above table and illustrated in the site plan, the warehouse will be located behind the proposed Inghams warehouse and will not be visible from Talbot Road.

7.1.4 MAXIMUM PLOT RATIO

POL-TP-124 requires a maximum plot ratio of 0.6:1 for 'General Industrial' and 0.5:1 for 'Light Industrial' development. The Warehouse with associated administrative and staff areas comprises a total gross floor area of 18,874 sqm which represents a 48.66% site coverage or a plot ratio of 0.48:1 of the development site. The development is therefore less than the maximum permissible plot ratio allowed under this policy.

7.1.5 BUILT FORM

POL-TP-124 requires that the facades of a building constructed in an Industrial zone comply with the following requirements:

> *"a) each facade of the building shall be constructed of brick, stone, concrete or glass or a combination of one or more of those materials or similar material as approved by the Council;*

b) other materials of a type and to a design approved by the Council may be permitted on a facade no part of which is less than 3.6 metres from the ground floor level of the building, provided that no part of the facade extends more than 6.6 metres above the ground level."

In accordance with Clause 2.9.2 of POL-TP-124 the Council may, in cases where the facade of a building is set back not less than 20 metres from the street alignment which it faces or otherwise which is nearest to it, permit the walls in the facade to be constructed of materials other than those specified above, provided that the materials proposed to be used are structurally and aesthetically acceptable to the Council.

7.1.5.1 MATERIALS, FINISHES AND COLOUR

The proposed warehouse development has been architecturally designed and will be constructed to a very high standard in accordance with LOGOS corporate profile. Refer to **Plan Set** 1 for a full set of architectural plans.

As illustrated on the submitted elevations key aspects of the design include:

Warehouse

The warehouse structure will be constructed from a combination of texture painted precast concrete panels and Colourbond wall cladding in a combination of Colourbond 'Windspray' and 'Monument'.

The warehouse will be finished in a combination of Colourbond colours comprising 'Windspray', 'Monument' and 'Basalt' to further articulate and break up the mass of the warehouse structure.

The roof will be clad with a profiled metal roof sheeting in zincalume with Colourbond 'Windspray' gutters and downpipes. Truck dock roller doors will be finished in Colourbond 'Surfmist'.

FIGURE 10 WAREHOUSE ELEVATIONS – FRONT (NORTH)



Source: Watson Young (SITE doc ref: 221025 WY Plan Set 22099_Delevopment Approval TP Issue (B))

FIGURE 11 WAREHOUSE ELEVATIONS – SIDE AND REAR (SOUTH AND WEST)



Source: Watson Young (SITE doc ref: 221025 WY Plan Set 22099_Delevopment Approval TP Issue (B))

Administration Office

The three (3) two-storey office, administration and staff amenities buildings are located along the front (northern) façade of the building and assist in breaking up the mass of the warehouse buildings behind. The office design incorporates a combination of strong vertical and horizontal elements that provide a contemporary and attractive built form outcome.

The office associated with Warehouse A is located on the northwest corner of the building and will provide a strong entry statement and focal point for the entire building as vehicles reaches the end of the private accessway.

Consistent with LOGOS corporate logistics warehouse designs, the office component is almost completely comprised of black aluminium framed glazing that will maximise the opportunity for natural light.

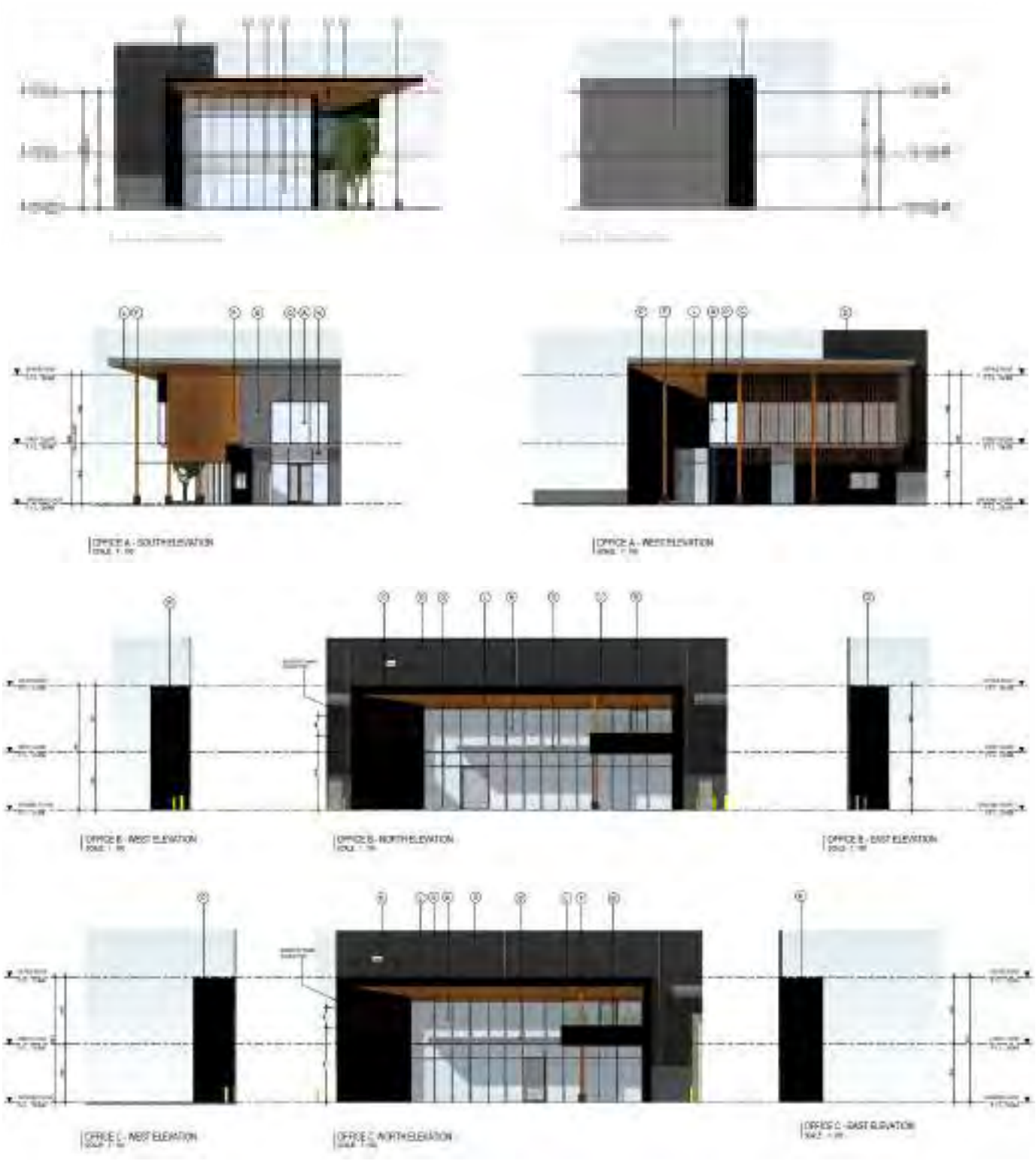
The office roofs will be finished in dark charcoal aluminium cladding adding a strong horizontal element to the design which is further enhanced by a striking copper coloured aluminium clad soffit feature to the underside of the office roof and on the office columns.

FIGURE 12 ARTIST IMPRESSION – ADMINISTRATION OFFICES



Source: Watson Young (SITE doc ref: 221025 WY Plan Set 22099_Delevopment Approval TP Issue (B))

FIGURE 13 OFFICE ELEVATIONS (A to C)



Source: Watson Young (SITE doc ref: 220912 WY Plan Set 22099_Delevopment Approval TP Issue (B))

7.2 TRAFFIC AND TRANSPORT

7.2.1 TRANSPORT IMPACT STATEMENT

As referred to in **Section 6.5** of this report, Stantec have undertaken a Transport Impact Statement to assess the potential impact, if any, of the proposed development on the surrounding road network.

At a worst-case scenario Stantec have based their impact statement on a traffic generation of 687 trips per day from the development with 73 trips in and out of the site. Based on a percentage split in the AM of 88% inbound trips and 12% outbound trips, the development will generate an equivalent 64 trips in and 9 trips out in the AM peak.

As the proposed development is located behind the proposed Inghams development (City of Swan Reference DAP 360/2022) and will therefore occupy the same site, further modelling has been undertaken by Stantec to determine the effects of traffic from both sites combined post build-out.

The impact of this traffic generation has been assessed based on potential increases to traffic flows on surrounding roads (namely Talbot Road and Stirling Crescent) and the impact of the additional traffic on the performance of the Talbot Road and Stirling Crescent traffic intersection.

The Transport Impact Statement concluded that there is adequate capacity in the surrounding road network and that the development is not expected to have any potential adverse impacts on the existing road network or generate the need for any modifications to the physical infrastructure of the local road network.

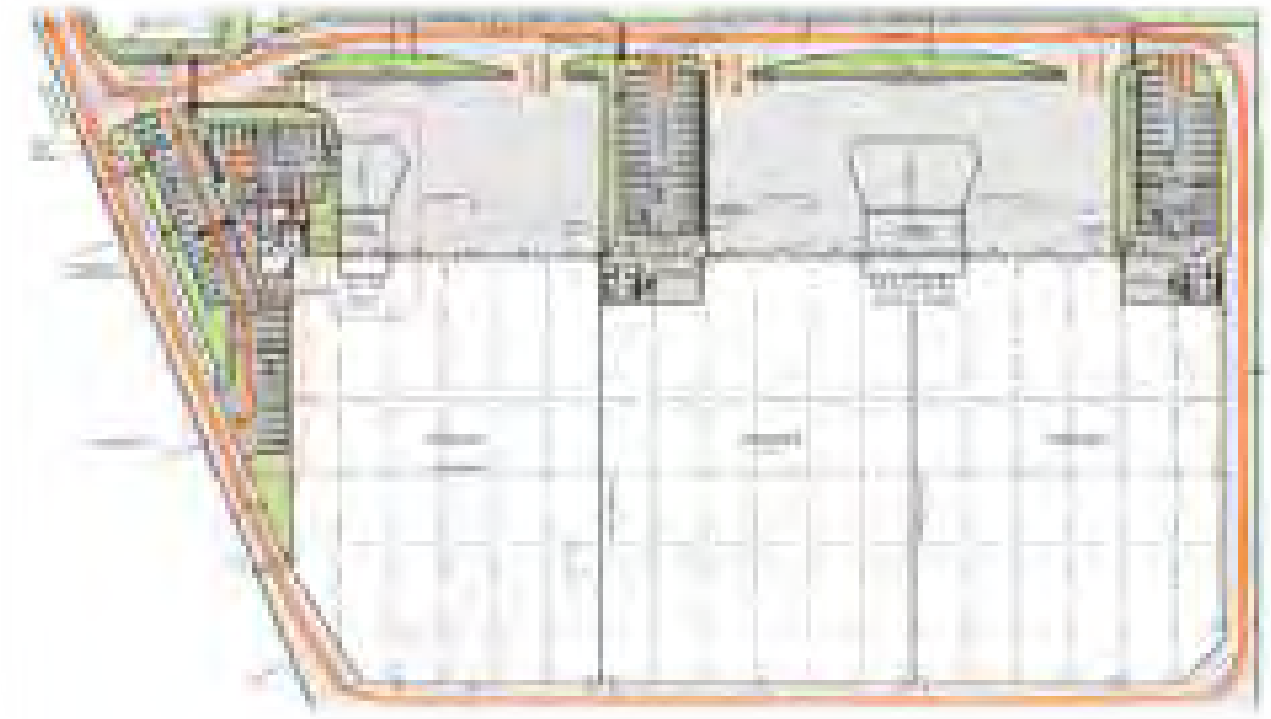
7.2.2 VEHICLE ACCESS AND MANOEUVRING

The site has been designed to ensure safe and efficient vehicle access and manoeuvring into and around the site. Light vehicles (staff and visitor cars) and heavy vehicles (19m long trucks and B Doubles up to 27.5m long) will access the site via a two-way private access road off Talbot Road.

Once a vehicle has left the access road and entered the site, all vehicles will travel along a one-way internal access way to individual staff and visitor parking areas or the heavy vehicle hardstand areas before exiting via a one-way access road around the perimeter of the building and site. Refer to **Figure 14**.

Access to the loading docks, dock levellers and hardstand areas for each warehouse is separated from staff and visitor parking areas and pedestrian paths to ensure safe vehicle manoeuvring within the site. Refer to **Figure 15**.

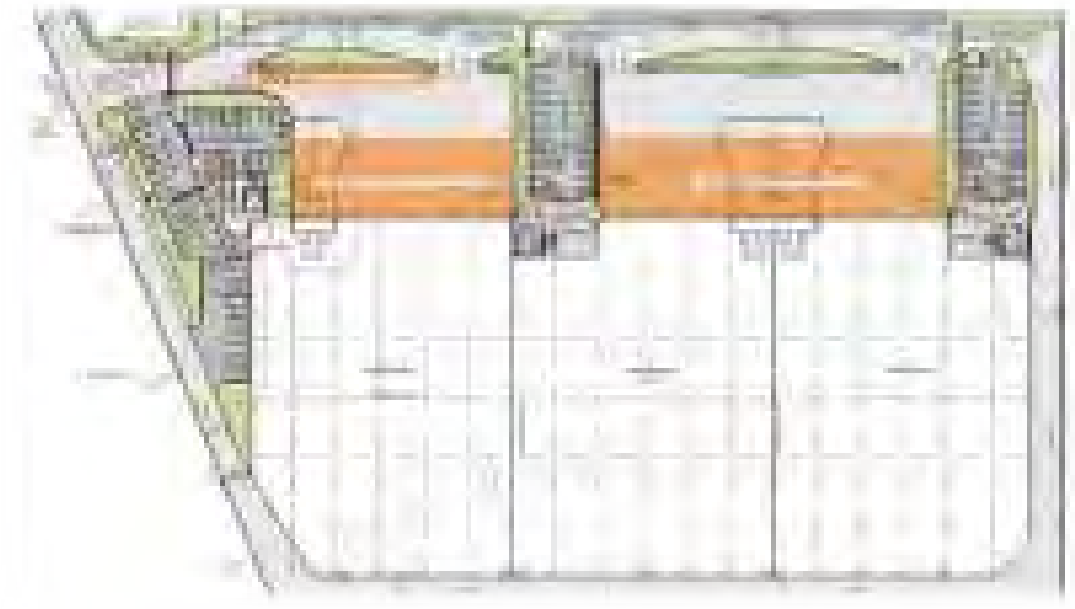
FIGURE 14 SITE ACCESS



Source: Stantec (SITE doc ref: 221028_rpt_3972_Hazelmere_Logistics_Estate_tis_final_2_combined)

Detailed swept path assessments have been prepared by Stantec as part of their Transport Impact Statement (refer **Appendix 8**). The swept path assessment demonstrates the suitability of the external access arrangements and internal movement network to accommodate the movements, turning circles and sweep paths of a 19m semi-trailer for all warehouse (A-C) loading areas and a 27.5m B Double (RAV 4) heavy vehicle for warehouse A.

FIGURE 15 ON/OFF-SITE LOADING FACILITIES



Source: Stantec (SITE doc ref: 221028_rpt_3972_Hazelmere_Logistics_Estate_tis_final_2_combined)

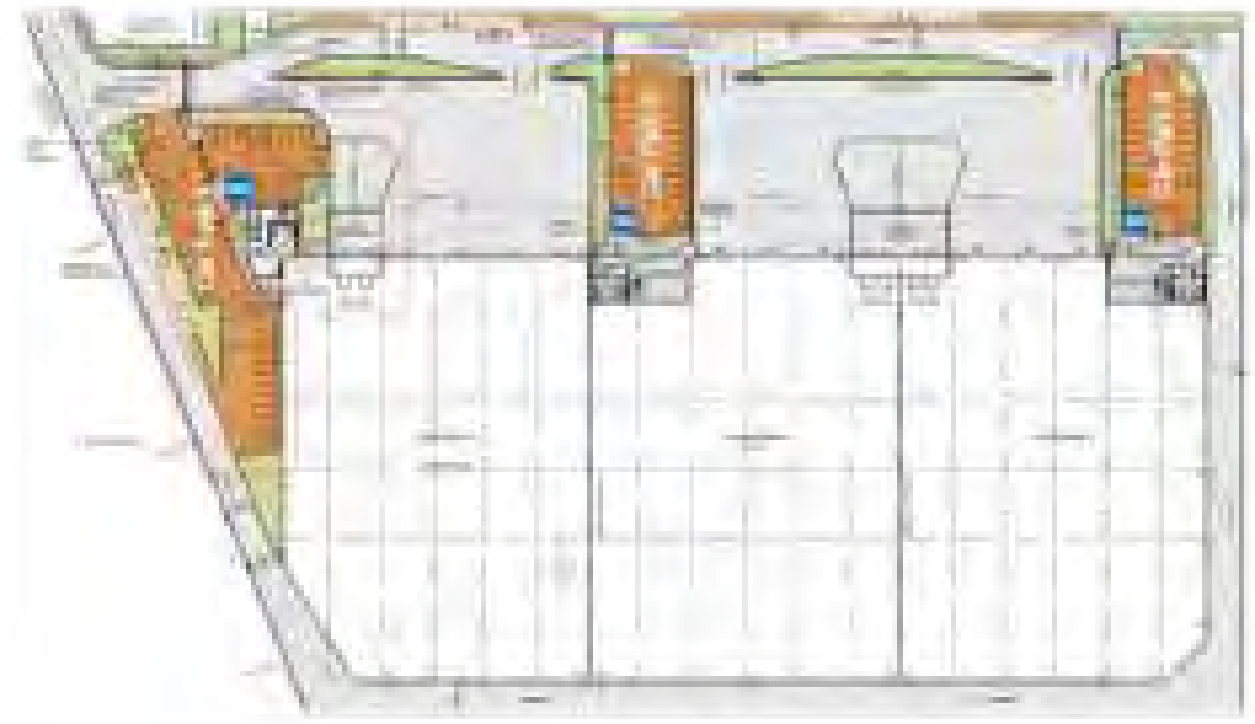
Talbot Road (east and west of Stirling Crescent) is MRWA approved for Network 4 Restricted Access Vehicle (RAV) movements, allowing heavy vehicle access to the site for vehicles up to 27.5m in length and 87.5 tonnes in weight.

7.2.3 CAR PARKING

The proposal includes the provision of 127 carparking bays (including 3 universal access bay) to service the development. The carparking bays are in 4 separate parking areas (refer **Figure 16**) comprising:

- Car Park 1 – Adjacent to Warehouse A – comprising 52 bays (including 1 universal access bay)
- Car Park 2 – Adjacent to Warehouse B – comprising 26 bays (including 1 universal access bay)
- Car Park 3 – Adjacent to Warehouse C – comprising 24 bays (including 1 universal access bay)
- Parallel Parking – Along northern boundary – comprising 25 bays

FIGURE 16 PARKING LAYOUT



Source: Stantec (SITE doc ref: 221028_rpt_3972_Hazelmere_Logistics_Estate_tis_final_2_combined)

Car parking bays within each area are accessed either via a central 6.2m wide two-way access driveway and a one-way 6.2m wide driveway ensuring appropriate manoeuvring for vehicles using the carparking areas.

The universal access bays are all located directly adjacent to each office building.

The carparking areas include landscaping adjacent to each parking bays to help screen the parking areas and provide shade during the day.

A 1.2m wide pedestrian paths also connects the parking area to the warehouse, administration building and along the access driveway through to Talbot Road.

As indicated in **Table 8** below, the proposal generally complies with the relevant standards contained within the City of Swan POL-TP-129 Vehicle Parking Standards relating to car and commercial vehicle parking.

TABLE 8 CITY OF SWAN PARKING REQUIREMENTS

CLAUSE	REQUIRED	PROVIDED	COMPLIANT
Off Street Parking (Clause 2.1, Table 1, 2.10 Units of Measure)	2 spaces per 100 square metres GLA; or 2 spaces per person employed; or a minimum of 6 spaces; whichever is the greater. Where unit of measure is based on number of employees – the shift with greatest number of staff shall apply).	127 car parking bays. Careful consideration has been given to the carparking needs of logistic warehouse tenants to determine the most appropriate provision of parking on-site. Further analysis has also been provided by Stantec (refer Appendix 7) demonstrating that an appropriate ratio of floor space to vehicle parking has been achieved. In the absence of details of proposed shift times and staff numbers, and consistent with JDAP decisions on the adjoining, DHL warehouse facilities (refer to **Section 2.4.1.1**) approval is sought for the provision of car parking bays based on a maximum number of staff approved for the site, assuming 1 bay per staff/visitor. Interested logistics warehouse tenants have advised their on-site staff requirements would only equate to 5 staff per 5000m^2 generating an overall parking demand of 19 car parking bays across the entire development. Given the logistics warehouse tenants will be secured post approval a condition restricting the overall occupancy of the development to 120 allowing for 7 bays available to visitors would be considered appropriate.	Variation sought
General and Specific Design for Off Street Parking (Clause 2.7 and 2.8)	Adequate access, egress, circulation, lighting, ACROD compliant.	6.2m wide two-way access and egress, a 6.2m wide one way access, 5.4 x 2.4m standard bays and 6m x 2.1m parallel bays, suitability designed and located universal access bay, lighting design to be submitted as part of building license	✓
Landscaping (Clause 2.9)	3m wide landscape area adjoining street.	The development site does not front a street as it is located to the rear of a proposed logistics warehouse for Inghams (City of Swan Reference 360/2022). The Inghams development has been designed to include a 9m wide landscaping strip along Talbot Road.	✓
Landscaping (Clause 2.9)	1m^2 landscape for every 10m2 parking (bays) = 1635^2/10 = 163.5m^2	As the development site does not front a public road, landscaping has been concentrated around vehicle parking and manoeuvring areas. More than 2,700m^2 of landscaping has been provided adjacent to the carparking area and along the internal accessways.	✓
Commercial Vehicle Parking (Clause 2.11)	One space for every commercial vehicle used in conjunction with operation.	The facility has been designed to be serviced by third-party logistics operators who will be contracted by the tenants to deliver and pick up products for redistribution off-site. No vehicles will therefore be parked on-site. In the event a vehicle needs to be parked, 19m semi-trailers can be parked in front of any unused loading docks which will be managed as part of the operation of each facility.	✓

As indicated above, the proposal incorporates 127 carparking bays to service the development.

The provision of parking on-site has been determined based on LOGOS extensive experience in developing freight and logistics facilities, a review of the parking ratios provided for the existing logistics warehouses within the estate and in consideration of the City's parking standards for warehouse development.

In addition, Stantec have undertaken an assessment of parking ratios based on the parking requirements of surrounding local authorities and other relevant resources to demonstrate and support the suitability of the proposed number of car parking bays.

LOGOS as a highly experienced freight and logistics developer has designed the site to accommodate the needs of typical logistics operators. It is anticipated based on LOGOS extensive knowledge that the ***combined*** warehouse facilities would only be occupied by between 30 – 60 staff in total.

Despite the low number of staff expected to occupy the facility, the proposal includes provision for 124 standard and 3 universal access parking bays to suitably address the City's current statutory parking standards for the proposal. The provision of carparking bays across the development is expected to significantly exceed the likely staff and visitor numbers associated with each logistics warehouse.

To further support the allocation of parking proposed for the site and likely staff numbers versus floorspace, an analysis of the existing logistics warehouse operators within the LOGOS Hazelmere Logistics Estate has also been completed.

The outcome of this analysis is presented in **Table 9** below.

TABLE 9 HAZELMERE LOGISTICS PARK – EXISTING TENANT FLOORSPACE AND STAFF NUMBERS

EXISTING LOGISTIC OPERATORS WITHIN THE ESTATE	WAREHOUSE SPACE (GLA)	OFFICE + STAFF AMENITIES (GLA)	STAFF	PARKING PROVIDED ON-SITE
DHL Storage + Distribution	17,885m²	1,460m²	50 per shift (100 across 16 hr/day)	150 bays
FISHER AND PAYKEL Storage and Distribution	9,969m²	470m²	30	33 bays
TOLL/ PRIMARY CONNECT (WOOLWORTHS)	21,280m²	470m²	44 per shifts (85 total across 2 shifts)	87 bays + 6 motorcycle bays
MCPHEE Distribution Services (3PL)	20,000m²	500m²	50	73 bays
INGHAMS (Proposed) Storage and Distribution and includes labelling room	8,649m²	437m²	33 per shift (66 total across 2 shifts)	80 bays
	77,783 m²	3337 m²	207	423
Combined Floorspace for Existing Estate				81,120 m²
Total Staff on Shift for combined Estate				207 staff
Total Parking for Existing Estate				423 standard parking bays
Ratio of Floorspace to Staff				391m² GLA per staff
Ratio of Floorspace to Parking				192m² per bay

The proposal includes a total combined floorspace of 18,874m^2. Based on the average ratio of the existing warehouses within the estate as a comparison (as per **Table 9**), the proposed development would generate a potential 48 staff and a total parking provision of 99 bays (that equates to 1 bay per 192m^2). This is consistent with LOGOS expectations that overall development would be operated by (conservatively) between 30 – 60 staff.

The proposed development includes provision of 127 bays (that equates to a rate of 1 bay per 148m^2) which is greater than the parking ratio provided throughout the existing estate and considerably higher than the anticipated needs of a potential logistics warehouse operator.

Given the development includes provision of 127 bays, it is reasonable to apply a maximum staff occupancy of 120 staff across the development based on provision of 1 bay per employee, allowing for 7 visitor bays across the site.

While it is noted that the City's Policy applies a ratio of 2 bays per employee, 1 bay per employee is typically applied for industrial development in other local government areas. This approach has previously and consistently been supported by the City of Swan and approved by JDAP on the adjoining, DHL, Toll and Fisher and Paykel warehouse facilities (refer to **Section 2.4.1.1**).

In seeking a variation to the standard parking requirements, LOGOS would support a condition on the development approval that limited the occupancy of the site to 120 staff (allowing for additional visitor needs).

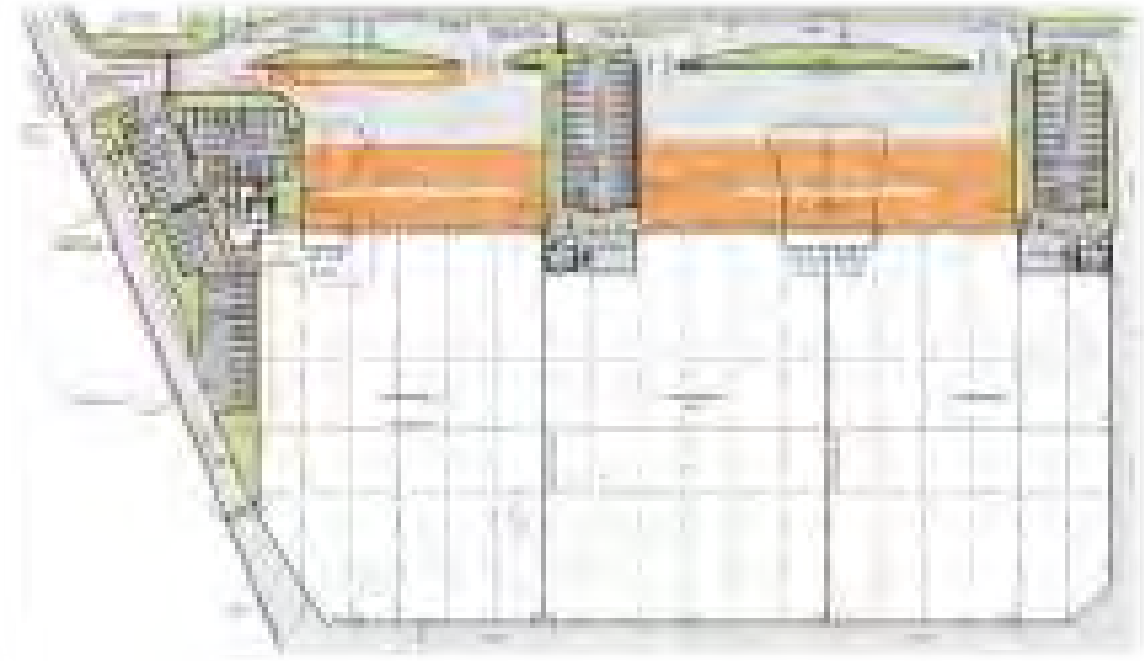
7.2.4 TRUCK PARKING

The facility has been designed to accommodate a logistics operator that utilises a third-party freight company using predominantly 19m trucks to deliver and pick up goods from the facilities for redistribution across the metropolitan region. These vehicles will be based off-site and therefore not be required to park on-site. In the event a vehicle is required to park on-site, temporary parking could be provided in front of the warehouses loading docks.

Each warehouse has also been designed to accommodates four (4) at grade loading docks and two (2) recessed docks for loading and unloading of vehicles for each facility. All loading docks can be accessed by a 19m long semi-trailers.

Warehouse A also accommodates a loading bay to accommodate a 26.5m B Double heavy vehicle that can be unloaded within the dedicated warehouse hardstand area.

FIGURE 17 TRUCK LOADING FACILITIES



Source: Stantec (SITE doc ref: 220902_rpt_3972_hazelmere_logistics_estate_tis_final_1_combined)

7.2.5 BICYCLE PARKING AND END OF TRIP FACILITIES

The development incorporates bicycle racks to accommodate up to six (6) bicycles adjacent to Warehouse A and four (4) bays adjacent to Warehouses B and C, the use of which are supported by the provision of appropriate end of trip facilities (showers/lockers etc) within each office buildings.

7.3 SERVICING

7.3.1 STORMWATER AND DRAINAGE MANAGEMENT

Tadros Engineering have prepared a Wastewater and Stormwater Management Plan to accompany the proposal and demonstrate how stormwater and drainage can be suitability managed on-site. Refer to Appendix 6.

The preliminary drainage plan has been designed to ensure stormwater can be suitability accommodated on-site. A series of stormtech stormwater cells connected to a network of drainage pipes are proposed within the access driveway and underneath a portion of the internal driveways (Refer Appendix A of Tadros Report). The system is designed to accommodate the 1:100 ARI Storm Event for the critical duration within a 72-hour period.

Further detail is provided at Appendix 6 – Wastewater and Stormwater Management Plan.

7.3.2 WASTEWATER DISPOSAL

As the area is not currently serviced by Water Corporations reticulated sewerage network Tadros Engineering propose to service the development by a combined ATU and leach drain system located within landscaped areas of the site.

In accordance with the City of Swan Local Planning Scheme 17 Restricted Use Area 14 requirements, the site is restricted to a (single residential equivalent) daily volume intended for disposal on-site not exceeding 450L of wastewater output/day per 2,000m^2 of site area.

Based on an overall site area of 37,550m^2 the site is restricted to a daily volume not exceeding 10,139m^2. The effluent disposal system has been designed to accommodate general effluent waste requirements based on a total conservative occupancy of 134 people. This will generate a total peak flow of 7,460L/day of wastewater for disposal on-site which is significantly less that the permissible volume allowed for under the Scheme.

Occupation of the development will be restricted to tenants that do not generate trade waste requirements, i.e., dry industries.

Further detail is provided at **Appendix 6 – Wastewater and Stormwater Management Plan**

7.4 RETAINING WALLS

As part of the development of the site, a series of low retaining walls (less than 1m in height) will be constructed along the southern and western boundaries of the site, with additional retaining (varying between 0.25m and 2.5m in height) to the eastern and northern boundaries.

The retaining walls on the northern boundary will abut the proposed Inghams development to the north, while the retaining wall proposed on the eastern boundary of the site will abut the existing Fisher and Paykel and DHL developments. Both Fisher and Paykel and DHL developments have retaining walls along the common boundary with the development site that will remain in situ.

Indicative retaining wall heights are illustrated on the site plan (refer Plan Set 1) and will be subject to further detailed designed at the building permit stage.

7.5 LANDSCAPE DESIGN

A Landscape Concept Plan (provided in **Appendix 9**), prepared by Deep Green Landscaping, proposes the planting of a combination of Australian native grasses, shrubs and trees.

Landscape areas are located along the vehicle access road, within the carparking area and separating the truck loading areas from the internal accessway with the aims of softening the development and providing shade to car parking areas.

FIGURE 18 LANDSCAPE CONCEPT PLAN - EXTRACT



Source: Deep Green Landscaping (SITE doc ref: 221025 LA-DG-0001_Hazelmere_RevC)

Clause 2.5 of the City's POL-TP-124 Building and Development Standards – Industrial Zone requires that landscaping shall cover a minimum of 10% of the total site area with a minimum 3m wide landscape area adjoining all street boundaries.

TABLE 10 LANDSCAPE REQUIREMENTS

CLAUSE	REQUIRED	PROVIDED	COMPLIANT
Landscape / Site Area (Clause 2.5 a)	10% total site area Site area = 37,550m^2 10% = 3,755m^2	2,790.00m^2 7.43% of the site area	Variation sought
Landscape Street boundary (Clause 2.5 a)	3m minimum to street boundaries	The development site does not adjoin a street. The front portion of Lot 153 is being developed as an Inghams Logistics Warehouse Facility includes a 9m wide landscaping area to Talbot Road.	✓
Landscape separated (Clause 2.5 b)	Landscape separated and protected by wall or kerb min 150mm high 1m^2 landscape for every 10m2 parking (bays) = 1635^2/10 = 163.5m^2	Landscape areas will be suitably separated from parking and access areas. Final engineering plans for these areas will be prepared as part of the building license stage of the development. More than 2,700m^2 of landscaping has been provided adjacent to the carparking area and along the internal accessways.	✓

Landscaping of industrial sites is typically concentrated along the street boundaries to help soften the development as viewed from the street and within carparking areas at a rate of 10% of the total site area.

The development site is located behind another proposed logistics warehouse (City of Swan DAP reference 360/2022) which provides a 9m wide landscaping strip to the street frontage significantly wider than the 3m minimum Policy requirement.

Given this, the landscaping design for this development is focused around providing both sustainable and functional landscaping to complement office buildings and entries, around car parking areas, in the large islands that separate the one-way shared vehicle access from the truck hardstand areas and along the length of the vehicle accessway from Talbot Road.

The landscaping scheme has been designed to provide an aesthetically pleasing and cohesive landscape that will complement the warehouse project. The design has sought to provide a balance between landscaped and hardscaped areas and provide -

- shade to carparking and outdoor staff areas,
- reduce glare,
- provide visual screening and softening of the warehouse development
- wildlife habitat.

In the absence of direct frontage to a public road, there is no requirement to provide landscaping along the street boundary as part of this development, however careful consideration has been given to the layout and configuration of landscaping and its relationship to building entrances, pedestrian and parking areas.

The design provides for 7.43% the overall site area to be landscaped, as opposed to the 10% outlined in the City's policy. Given the development will still provide a high quality, sustainable and functional landscaping design, which fulfills the overall landscaping objectives and intent, a variation to the standard landscaping requirement is sought.

The landscape concept plan provides an overall landscaping design that reflects the corporate and industrial nature of the site that is supported by an appropriate plan for irrigation and ongoing maintenance of the landscaped areas.

7.5.1 PLANT SELECTION PHILOSOPHY

The plant selection philosophy is summarised below:

- Low maintenance.
- Mostly endemic and bird attracting plant species to create wildlife habitat.
- Suit sunny to part shade positions.
- Hardy species - waterwise/low water demand.
- Combination of high quality planting soil , reticulation and use of waterwise mulch to reduce water evaporation.
- Landscaping design to reflect the sites corporate appearance with an appropriate mix of low species that retain a neat appearance.
- Staff parking areas to incorporate trees species that provide shade and respond well to pruning, if needed.

FIGURE 19 PLANT SELECTION – EXTRACT



Source: Deep Green Landscaping (SITE doc ref: 221025 LA-DG-0001_Hazelmere_RevC)

7.5.2 IRRIGATION AND ONGOING MAINTENANCE

The irrigation and maintenance program are summarised below:

- Irrigation of landscape areas will be based on an initial Water Corporation scheme water supply point located on-site.
- To ensure a sustainable and efficient method of irrigation pop-up sprays are proposed to garden beds and flood bubblers to trees.
- Following planting the Landscape areas will be irrigated 5 days per week for the first 6 weeks to a depth of 50mm.
- Once established the ongoing irrigation plan will be for the landscape areas to be watered twice a week to a depth of 20mm.

7.6 SIGNAGE

Signage is integrated into the overall design of the warehouse development and the broader LOGOS Hazelmere Logistics Park. All signage will be located within the existing (and proposed) lot boundary.

The location of all signage is notated on the site plan and detailed signage plans are included as part of the submitted plan series (refer **Plan Set 1**).

Wall Signage

The design includes LOGOS corporate logo that will be affixed to the corner of the warehouse structure adjacent to Office A with tenant signage positioned in proximity to each office entrance as depicted on the submitted elevations.

FIGURE 20 WALL SIGNAGE



Source: Watson Young (SITE doc ref: 221025 WY Plan Set 22099_Delevopment Approval TP Issue (B))

Way Finding Signage

Entry / exit signs will be located at the entrance and exit of the heavy vehicle access, staff and visitor parking to assist in the safe and legible movements of vehicles into and out of the site.

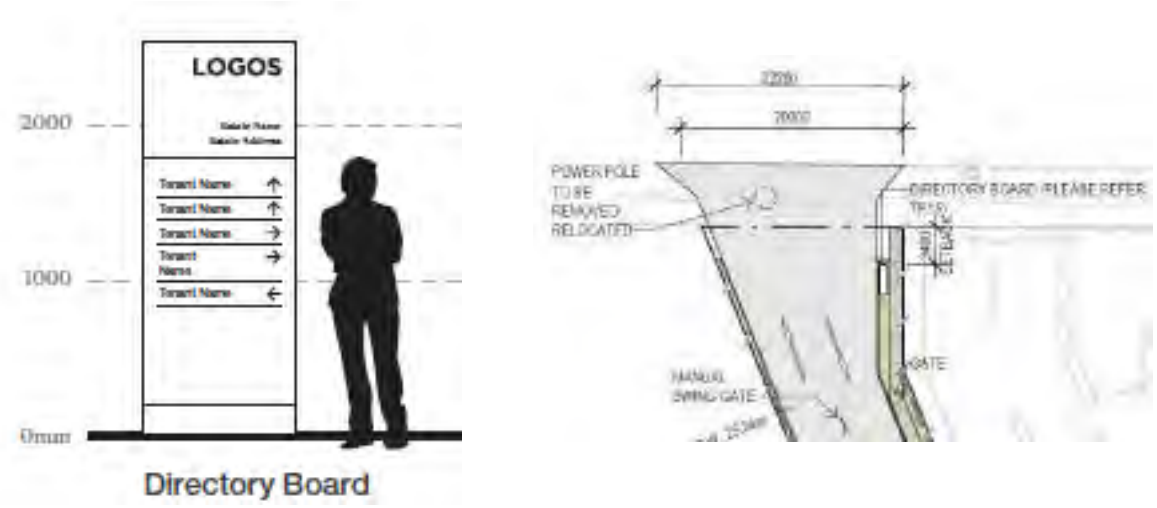
Entrance Sign

A simple 3m x 4m precast concrete sign, which is 300mm in width with white flush mounted lettering to promoting the LOGOS Hazelmere Logistics Park will be located within the landscaped area adjacent to Carpark 1.

Directory Board

To support way finding to tenants within the warehouse facility, a simple Directory Board is proposed on the eastern side of the vehicle entrance to the development. Consistent with LOGOS corporate signage strategy the directory board will be designed as a 2.5m high free-standing sign that will include both the LOGOS corporate logo and the names of each tenant.

FIGURE 21 DIRECTORY BOARD



Source: Watson Young (SITE doc ref: 220912 WY Plan Set 22099_Delevopment Approval TP Issue (B)))

7.7 FENCING

For security the site will be fenced along all exterior boundaries. Refer **Plan Set 1** for location and fence details.

Standard black vinyl coated steel poles, link mesh and three-strand barbed wire security fencing will be erected along the side and rear boundaries of the development site.

A powder coated fence will screen the proposed outdoor staff area associated with Warehouse A from the public.

7.8 ENERGY EFFICIENCY

LOGOS have a long-standing commitment to sustainability including reducing energy usage within their facilities. As part of this commitment, the proposed development includes the installation of solar panels on the warehouse roof as indicatively shown on the roof plan (refer **Plan Set 1**).

The solar panels will reduce demand on Western Power's transmission network and the environmental footprint of the facility.

The facility is located outside of Perth Airport Limited's (PAPL) trigger distance of 2 nautical miles from the runway thresholds, as illustrated in **Figure 21** overleaf, and therefore does not require referral to PAPL for the installation of solar panels.

FIGURE 22 PAPL REFERRAL ZONE



Source: Perth Airport Limited, 22 October 2019

8. CONCLUSION

This proposed development comprises the sixth purpose-built logistics warehouse facility to be built and managed by LOGOS Property Group on land owned by Perpetual Corporate Trust Ltd.

The proposed development is consistent and complementary to the existing McPhee, Toll (Primary Connect), Fisher and Paykel, DHL and proposed Inghams developments on adjoining sites and will facilitate the continued growth of, and investment by, global businesses in the WA market.

LOGOS are a highly experienced and specialist freight and logistics developer and operator, leasing purpose-built developments to tenants across their 15 logistics estates throughout Australia.

The continued investment by LOGOS Property Group in their Hazelmere Logistics Park is substantial and demonstrates their long-term commitment to providing logistic warehousing facilities to support the supply chain management needs of their tenants in the WA market.

The site is ideally suited to support the proposed development for the following reasons:

- The site enjoys immediate access to Great Eastern Highway Bypass, Abernethy Road and Roe Highway, which are major and strategic freight road corridors connecting to the broader Perth region and ultimately customers across the State.
- The site is located within proximity to the Forrestfield and Kewdale intermodal terminals associated with the freight railway line, enabling ease of access to freight movements to/from Fremantle Ports Inner Harbour and the east coast of Australia.
- The land is appropriately zoned 'Industrial' under the MRS and 'General Industrial' under the City of Swan LPS17.
- While the site has been designed to accommodate predominantly 19m long semi-trailers, the site is accessed via Talbot Road, which is MRWA approved for Network 4 Restricted Access Vehicle (RAV) movements, allowing for vehicles up to 27.5m in length and 87.5 tonnes in weight to also access proposed warehouse A.
- Extensive technical investigations have been undertaken and demonstrate the suitability of the land for industrial development.
- The site is large enough and the development has been specifically designed to meet the current and anticipated future needs of potential logistic warehouse operators.

The application has been prepared in accordance with the strategic and statutory planning and transport framework, including Perth and Peel @ 3.5 Million, the Metropolitan Region Scheme and the City of Swan's Local Planning Scheme No. 17 and local planning policies.

The architectural design, colour scheme and layout of the proposed development presents a contemporary and corporate industrial image that reflects the proposed land uses and the highly regarded reputation of LOGOS as one of the largest and most sophisticated logistic warehouse developers and manages across Australia.

Once occupied and operational it is considered that the development will make a substantial and positive contribution to the existing Hazelmere Industrial Precinct.

Considering the preceding material and enclosed design drawings, the support of the City of Swan and the approval of the Metropolitan East Joint Development Assessment Panel is sought for the proposed development at the earliest opportunity.



ARCHITECTURAL PLAN SET

Watson Young Architects

(SITE doc ref: 221025 WY Plan Set 22099_Delevopment Approval TP Issue (B))

Estate Plan Ref: TP01 Issue Rev A July 2022

Site Plan Ref: TP02 Issue Rev B July 2022

Office Plans A-C Ref: TP03 – TP05 Issue Rev A July 2022

Roof Plan Ref: TP06 Issue Rev A July 2022

Overall Elevations 1 + 2 Ref: TP07 -TP08 Issue Rev A July 2022

Office Elevations A-C Ref: TP09-TP10 Issue Rev A July 2022

Typical Section Ref: TP11 Issue Rev A July 2022

Fencing Details Ref: TP12 Issue Rev A July 2022

3D Visualisation Ref: TP13 Issue Rev A July 2022

Signage Details Ref: TP14 – TP17 Issue Rev A+B July 2022

SHEET LIST:

TP00	COVER SHEET
TP01	ESTATE PLAN
TP02	SITE PLAN
TP03	OFFICE A PLANS
TP04	OFFICE B PLANS
TP05	OFFICE C PLANS
TP06	ROOF PLAN
TP07	OVERALL ELEVATIONS 1
TP08	OVERALL ELEVATIONS 2
TP09	OFFICE A ELEVATIONS
TP10	OFFICE B & C ELEVATIONS
TP11	TYPICAL SECTION
TP12	FENCE DETAILS
TP13	3D VISUALISATION
TP14	SIGNAGE DETAILS- BUILDING SIGNAGE
TP15	SIGNAGE DETAILS - DIRECTORY BOARD
TP16	SIGNAGE DETAILS - ENTRANCE SIGN
TP17	SIGNAGE DETAILS- DIRECTIONAL SIGNAGE



ARTISTS IMPRESSION ONLY
SCALE : NTS

PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

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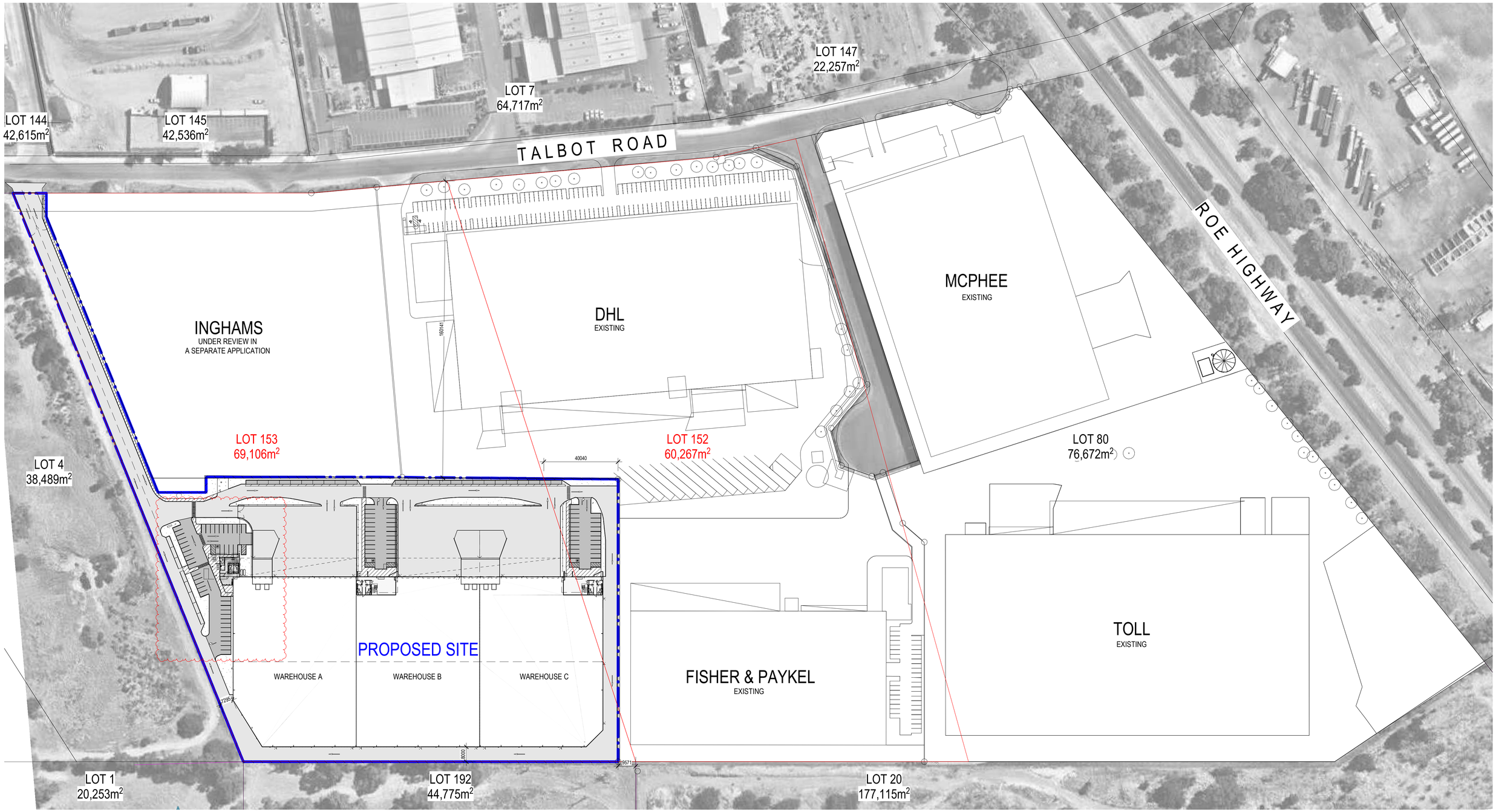

No.	DATE:	REVISION:	BY:	CHK:
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A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
ESTATE PLAN

CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: BCM
SCALE: 1 : 1000 @ A1
SCALE: 1 : 2000 @ A3

JOB NO: 22099
DRAWING NO: TP01
REVISION: B

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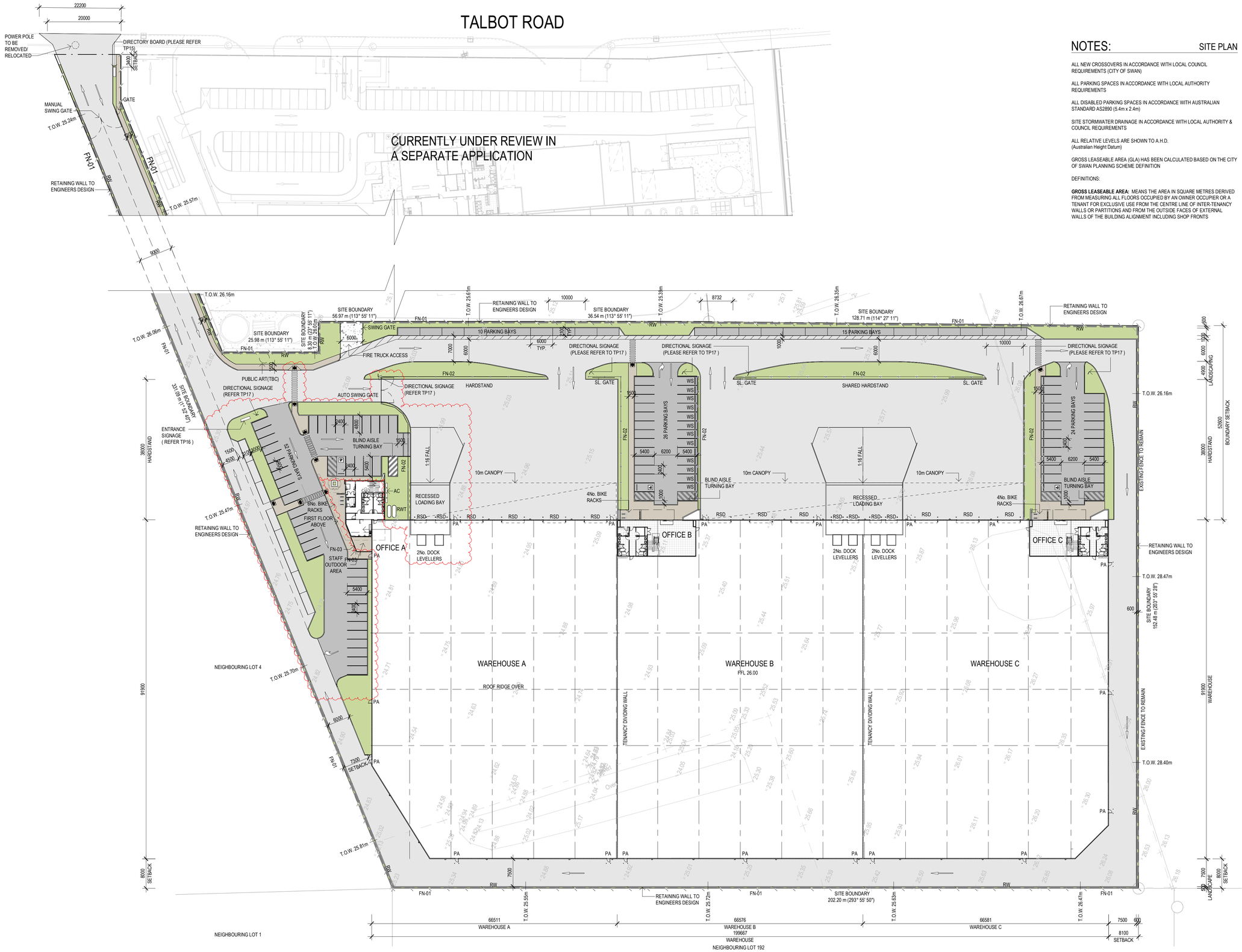

NOTES: SITE PLAN

ALL NEW CROSSOVERS IN ACCORDANCE WITH LOCAL COUNCIL REQUIREMENTS (CITY OF SWAN)

ALL PARKING SPACES IN ACCORDANCE WITH LOCAL AUTHORITY REQUIREMENTS

ALL DISABLED PARKING SPACES IN ACCORDANCE WITH AUSTRALIAN STANDARD AS2890 (5.4m x 2.4m)

SITE STORMWATER DRAINAGE IN ACCORDANCE WITH LOCAL AUTHORITY & COUNCIL REQUIREMENTS

ALL RELATIVE LEVELS ARE SHOWN TO A.H.D. (Australian Height Datum)

GROSS LEASEABLE AREA (GLA) HAS BEEN CALCULATED BASED ON THE CITY OF SWAN PLANNING SCHEME DEFINITION

DEFINITIONS:

GROSS LEASEABLE AREA: MEANS THE AREA IN SQUARE METRES DERIVED FROM MEASURING ALL FLOORS OCCUPIED BY AN OWNER OCCUPIER OR A TENANT FOR EXCLUSIVE USE FROM THE CENTRE LINE OF INTER-TENANCY WALLS OR PARTITIONS AND FROM THE OUTSIDE FACES OF EXTERNAL WALLS OF THE BUILDING ALIGNMENT INCLUDING SHOP FRONTS

LEGEND

	INDICATES EXTENT OF HEAVY DUTY HARDSTAND TO CIVIL ENGINEERS DETAILS
	INDICATES EXTENT OF LIGHT DUTY PAVEMENT TO CIVIL ENGINEERS DETAILS
	CONCRETE PAVING WITH EXPOSED AGGREGATE FINISH OR SIMILAR
	AREA OF GRASS / LANDSCAPING, REFER TO LANDSCAPE ARCHITECTS DRAWINGS FOR LANDSCAPE LAYOUT AND DETAILS
FN-01	1800mm HIGH BLACK VINYL COATED CYCLONE WIRE FENCE, 3 BARB WIRES TO 2100mm HIGH
FN-02	2100mm HIGH BLACK PAINTED METAL PICKET (DIPLOMAT / PALISADE STYLE) FENCING
FN-03	1800mm HIGH OUTDOOR AREA FEATURE FENCE
RW	RETAINING WALL
RWT	10,000L CAPACITY RAINWATER TANK NOTE: TANKS WILL BE USED FOR TOILETS, LANDSCAPE IRRIGATION AND WASH DOWN WHERE SUITABLE. REFER TO SUSTAINABLE MANAGEMENT PLAN (SMP) FOR FURTHER INFORMATION
EV	ELECTRIC VEHICLE (EV) CHARGING STATION
WS	CAR BAY WHEEL STOP

DEVELOPMENT ANALYSIS

BUILDING	GLA
WAREHOUSE A	5,930m²
OFFICE A GF	145m²
OFFICE A FF	199m²
WAREHOUSE B	6,050m²
OFFICE B GF	60m²
OFFICE B FF	200m²
WAREHOUSE C	6,030m²
OFFICE C GF	60m²
OFFICE C FF	200m²
TOTAL AREA	18,874m²
TOTAL WAREHOUSE AREA	18,010m²

EXTERNAL AREAS (APPROX)	
CANOPIES	1,500m²
HARDSTAND	13,214m²
LIGHT DUTY	2,714m²
PAVING	737m²
LANDSCAPING INCL. KERBS	2,481m²

PARKING	
BAYS PROVIDED INCL. THREE (3) ACCESSIBLE CAR BAYS	127
BIKE RACKS	14

SITE COVERAGE	
TOTAL SITE AREA	37,550m²
TOTAL BUILDING FOOTPRINT	18,275m²
SITE COVERAGE	48.66%
LANDSCAPING SITE COVERAGE EXCL. PAVING	7.25%

No.	DATE:	REVISION:	BY:	CHK:
P3	04.08.2022	PRELIMINARY ISSUE	BCM	SA
P4	19.08.2022	PRELIMINARY ISSUE	UW	SA
A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	09.09.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
C	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
SITE PLAN

CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: BCM
SCALE: 1 : 500 @ A1
SCALE: 1 : 1000 @ A3

JOB NO: 22099
DRAWING NO: TP02
REVISION: C

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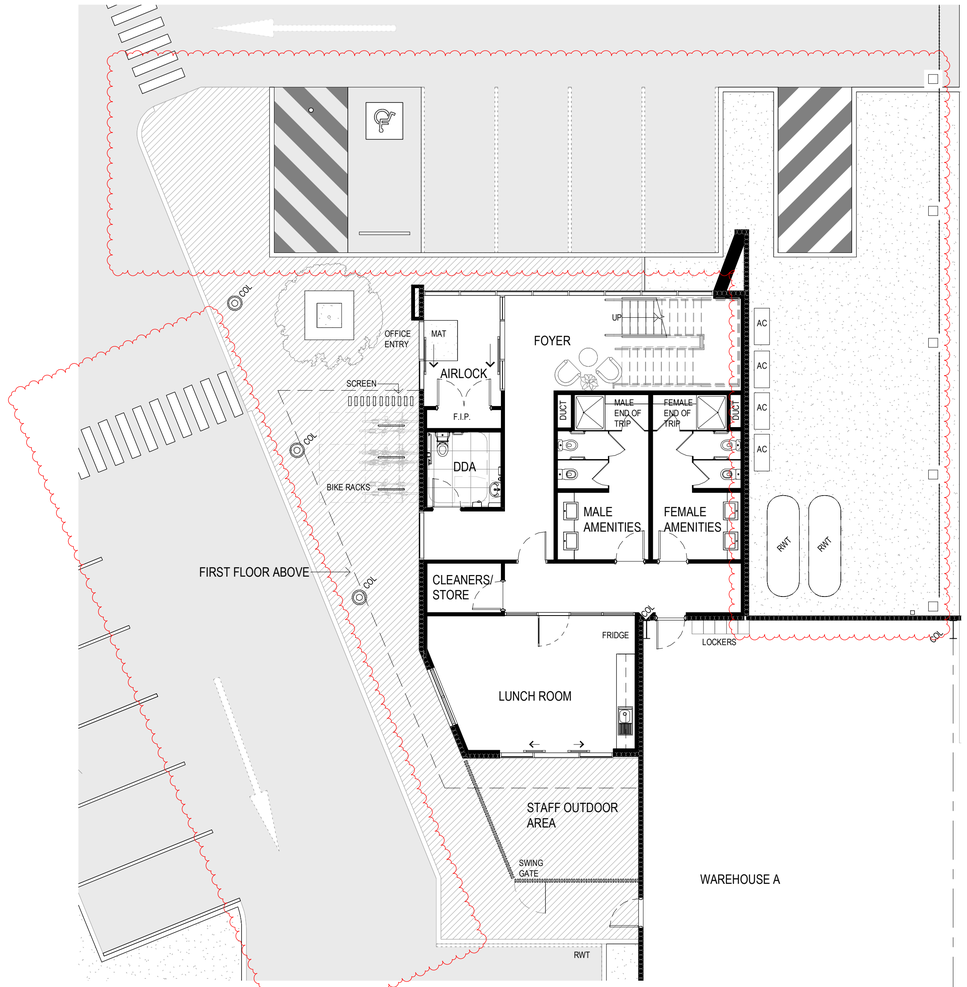

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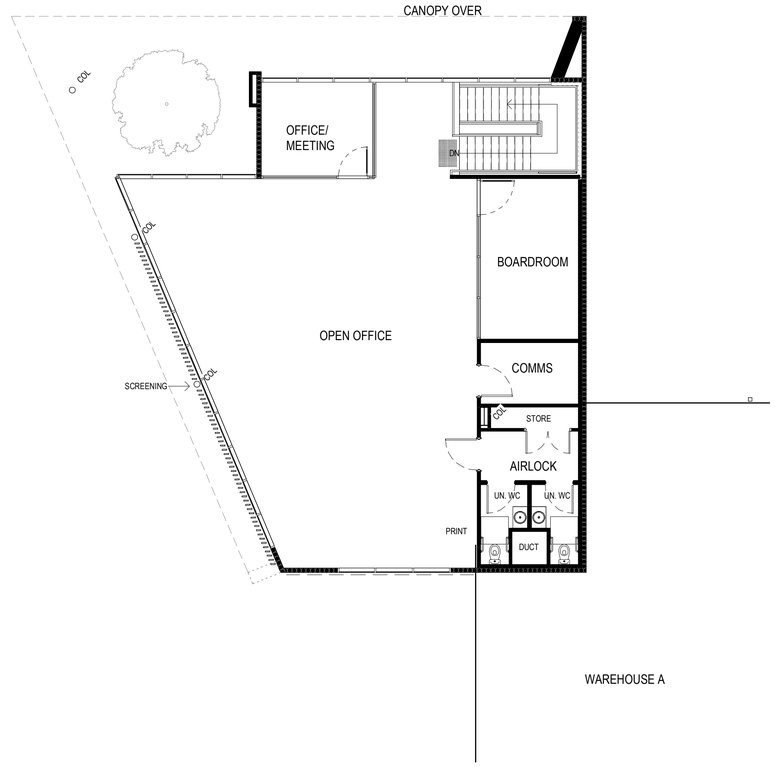

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
OFFICE A PLANS

CLIENT:
LOGOS

DATE: OCTOBER, 2022
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SCALE: 1:200 @ A3

JOB NO: 22099
DRAWING NO: TP03
REVISION: B

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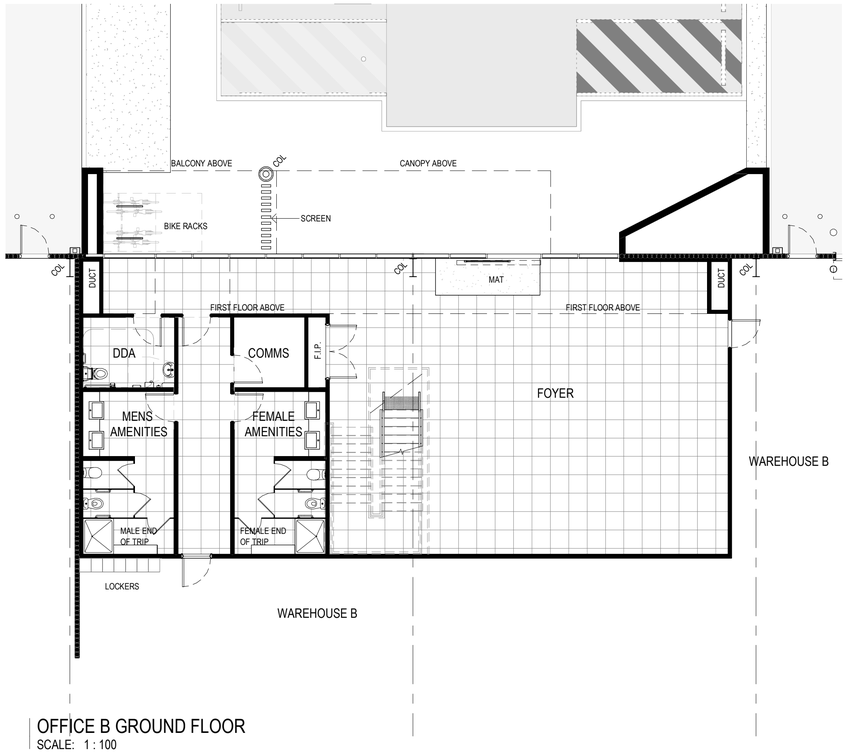

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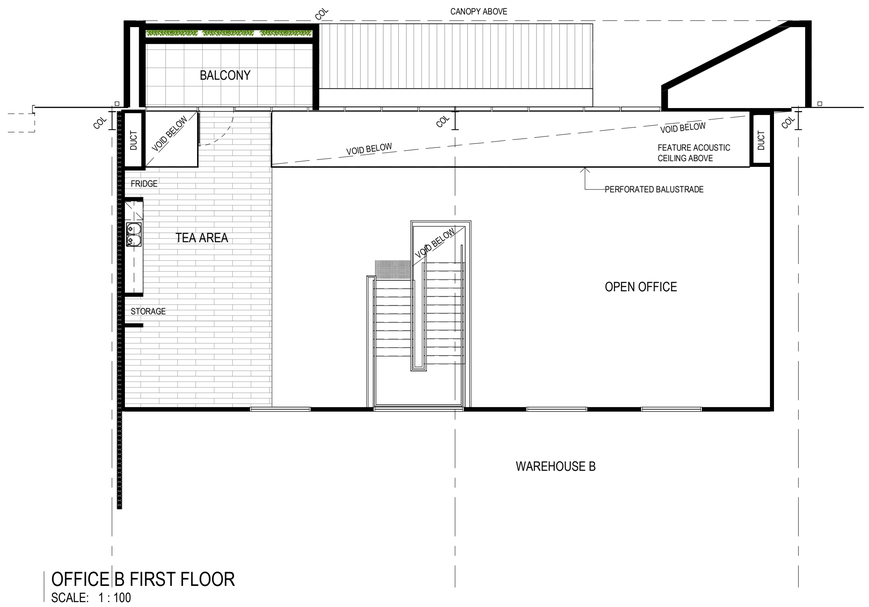

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SCALE: 1 : 100

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
OFFICE B PLANS

CLIENT:
LOGOS

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SCALE: 1 : 100 @ A1
SCALE: 1:200 @ A3

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DRAWING NO: TP04
REVISION: B

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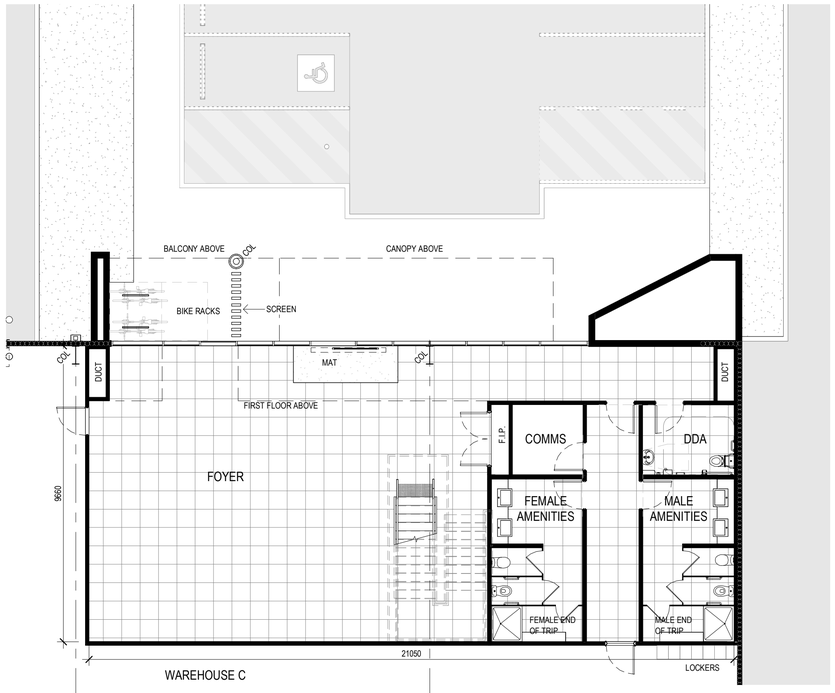

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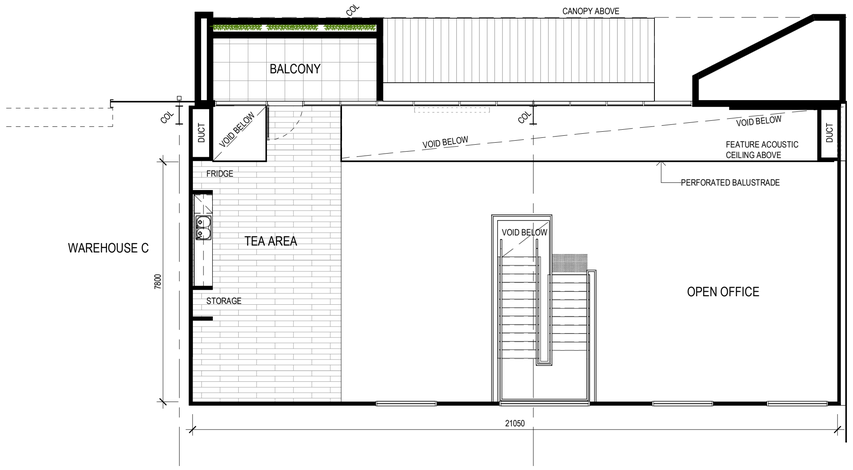

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
OFFICE C PLANS

CLIENT:
LOGOS

DATE: OCTOBER, 2022
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SCALE: 1 : 100 @ A1
SCALE: 1:200 @ A3

JOB NO: 22099
DRAWING NO: TP05
REVISION: B

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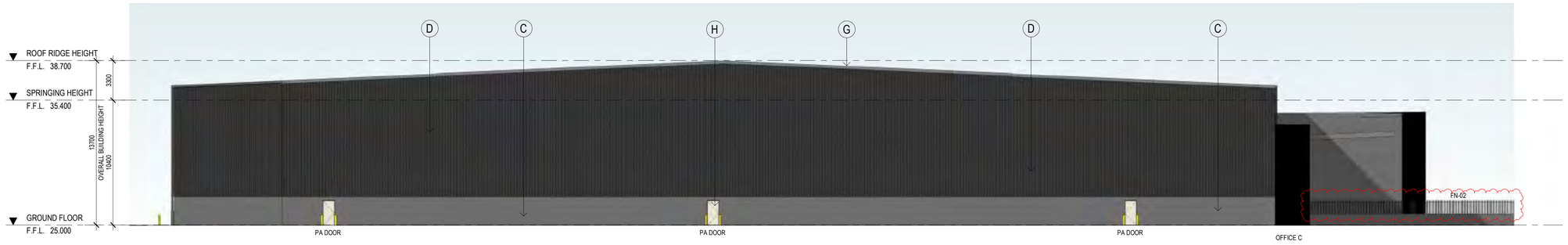

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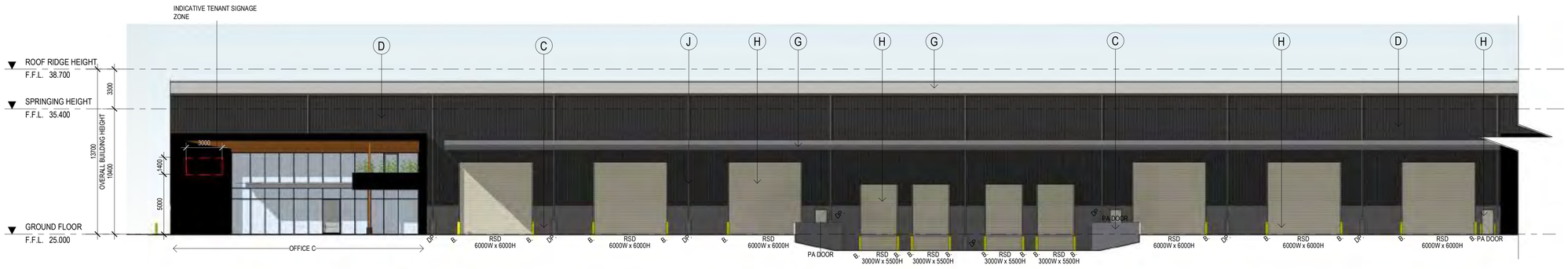

NORTH ELEVATION PART 1
SCALE: 1 : 200



NORTH ELEVATION PART 2
SCALE: 1 : 200

EXTERNAL FINISHES

A	ALUMINIUM FRAMED GLAZING	GREY
B	PRECAST CONCRETE PANEL, FORMLINER	LIGHT GREY
C	PRECAST CONCRETE PANEL	BASALT
D	COLORBOND WALL CLADDING	COLORBOND MONUMENT
E	COLORBOND WALL CLADDING	COLORBOND WINDSPRAY
F	BATTENS / COLUMNS	COPPER
G	ROOF CLADDING	ZINCALUME
H	ROLLER SHUTTER DOOR CLADDING/ PA DOORS	COLORBOND SURFMIST
J	DOWNPIPES / CAPPINGS	COLORBOND WINDSPRAY
K	BOLLARDS	SAFETY YELLOW
L	ALUMINIUM CLADDING	COPPER METALLIC
M	PERFORATED SCREENING	BLACK
N	ALUMINIUM FRAMED COLOURBACK GLAZING	GREY
O	POWDERCOAT	BLACK
P	ALUMINIUM CLADDING	BLACK

No.	DATE:	REVISION:	BY:	CHK:
P1	07.07.2022	DESIGN APPROVAL	BCM	SA
P2	04.08.2022	PRELIMINARY ISSUE	BCM	SA
P3	19.08.2022	PRELIMINARY ISSUE	UW	SA
A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
OVERALL ELEVATIONS 1

CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: BCM
SCALE: 1:200 @ A1
SCALE: 1:400 @ A3

JOB NO: 22099
DRAWING NO: TP07
REVISION: B

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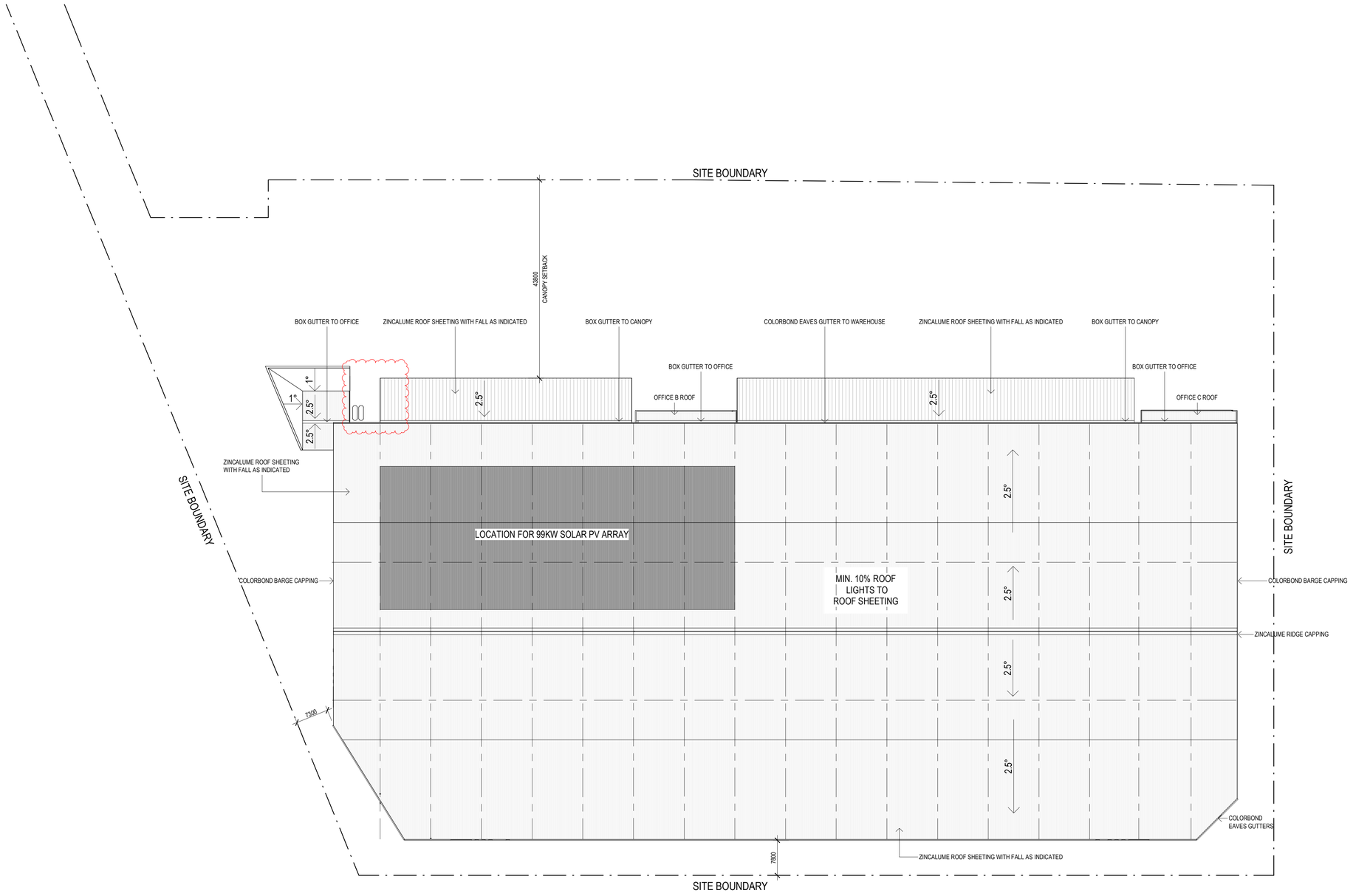

No.	DATE:	REVISION:	BY:	CHK:
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A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
ROOF PLAN

CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: BCM
SCALE: 1 : 500 @ A1
SCALE: 1:1000 @ A3

JOB NO: 22099
DRAWING NO: TP06
REVISION: B

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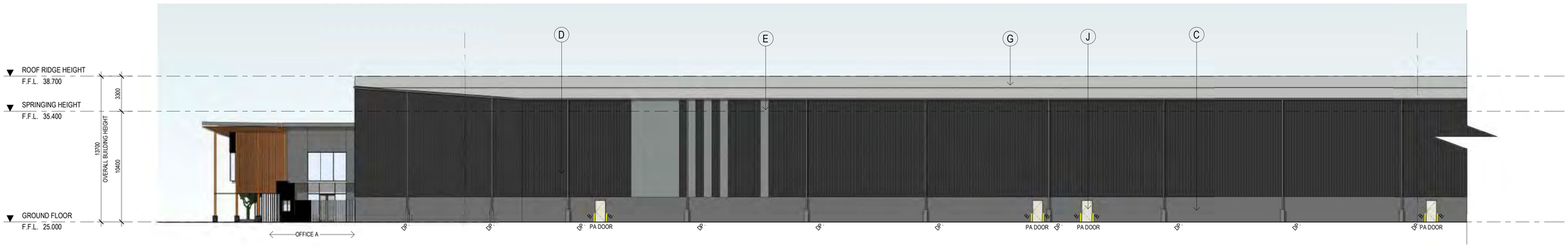

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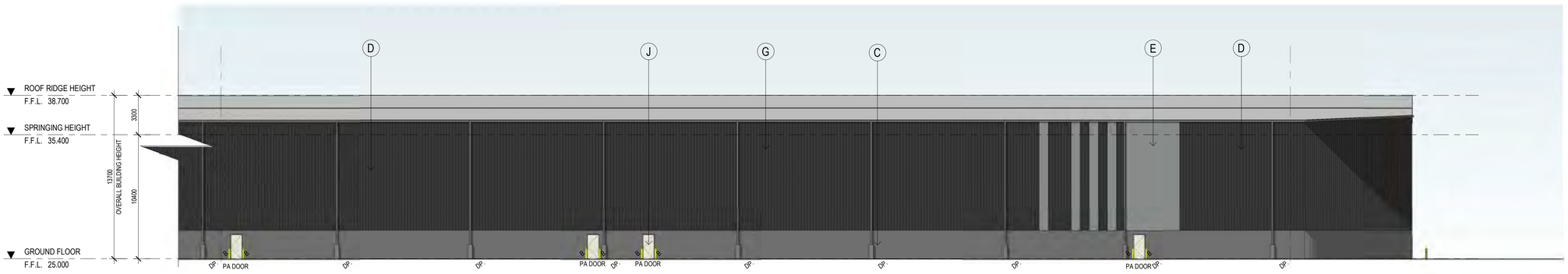

SOUTH ELEVATION PART 2
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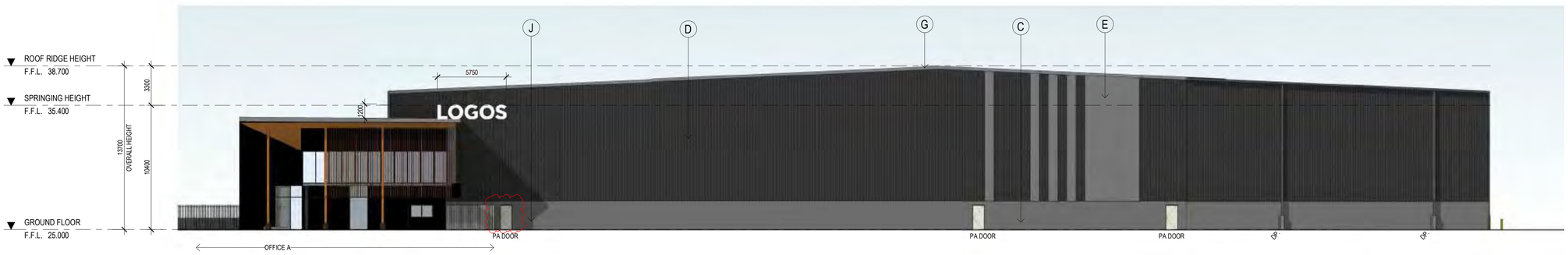

WEST ELEVATION
SCALE: 1 : 200

EXTERNAL FINISHES

A	ALUMINIUM FRAMED GLAZING	GREY
B	PRECAST CONCRETE PANEL, FORMLINER	LIGHT GREY
C	PRECAST CONCRETE PANEL	BASALT
D	COLORBOND WALL CLADDING	COLORBOND MONUMENT
E	COLORBOND WALL CLADDING	COLORBOND WINDSPRAY
F	BATTENS / COLUMNS	COPPER
G	ROOF CLADDING	ZINCALUME
H	ROLLER SHUTTER DOOR CLADDING/ PA DOORS	COLORBOND SURFMIST
J	DOWNPIPES / CAPPINGS	COLORBOND WINDSPRAY
K	BOLLARDS	SAFETY YELLOW
L	ALUMINIUM CLADDING	COPPER METALLIC
M	PERFORATED SCREENING	BLACK
N	ALUMINIUM FRAMED COLOURBACK GLAZING	GREY
O	POWDERCOAT	BLACK
P	ALUMINIUM CLADDING	BLACK

No.	DATE:	REVISION:	BY:	CHK:
P1	07.07.2022	DESIGN APPROVAL	BCM	SA
P2	04.08.2022	PRELIMINARY ISSUE	BCM	SA
P3	19.08.2022	PRELIMINARY ISSUE	UW	SA
A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
OVERALL ELEVATIONS 2

CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: BCM
SCALE: 1:200 @ A1
SCALE: 1:400 @ A3

JOB NO: 22099
DRAWING NO: TP08
REVISION: B

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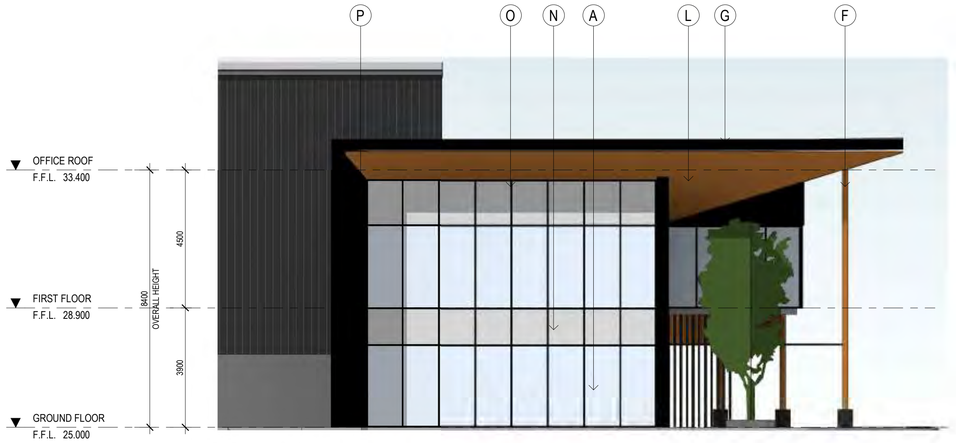
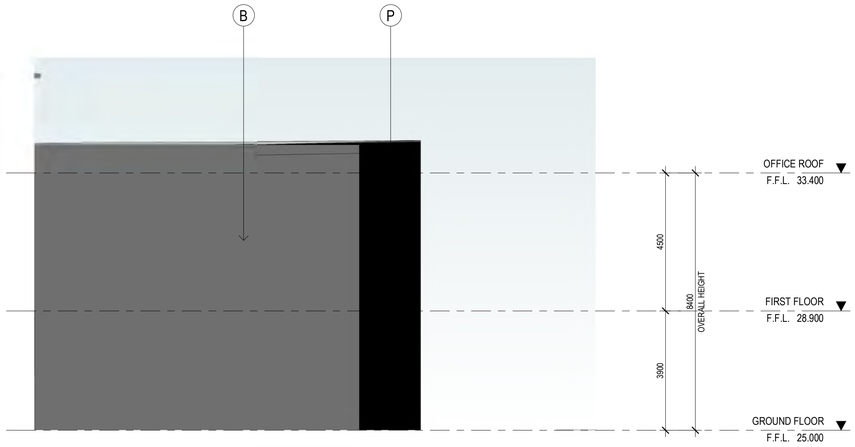


OFFICE A - NORTH ELEVATION
SCALE: 1 : 100



OFFICE A - EAST ELEVATION
SCALE: 1 : 100



OFFICE A - SOUTH ELEVATION
SCALE: 1 : 100



OFFICE A - WEST ELEVATION
SCALE: 1 : 100

EXTERNAL FINISHES

A	ALUMINIUM FRAMED GLAZING	GREY
B	PRECAST CONCRETE PANEL, FORMLINER	LIGHT GREY
C	PRECAST CONCRETE PANEL	BASALT
D	COLORBOND WALL CLADDING	COLORBOND MONUMENT
E	COLORBOND WALL CLADDING	COLORBOND WINDSPRAY
F	BATTENS / COLUMNS	COPPER
G	ROOF CLADDING	ZINCALUME
H	ROLLER SHUTTER DOOR CLADDING/ PA DOORS	COLORBOND SURFMIST
J	DOWNPIPES / CAPPINGS	COLORBOND WINDSPRAY
K	BOLLARDS	SAFETY YELLOW
L	ALUMINIUM CLADDING	COPPER METALLIC
M	PERFORATED SCREENING	BLACK
N	ALUMINIUM FRAMED COLOURBACK GLAZING	GREY
O	POWDERCOAT	BLACK
P	ALUMINIUM CLADDING	BLACK

No.	DATE:	REVISION:	BY:	CHK:
P1	07.07.2022	DESIGN APPROVAL	BCM	SA
P2	04.08.2022	PRELIMINARY ISSUE	BCM	SA
A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
OFFICE A ELEVATIONS

CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: BCM
SCALE: 1:100 @ A1
SCALE: 1:200 @ A3

JOB NO: 22099
DRAWING NO: TP09
REVISION: B

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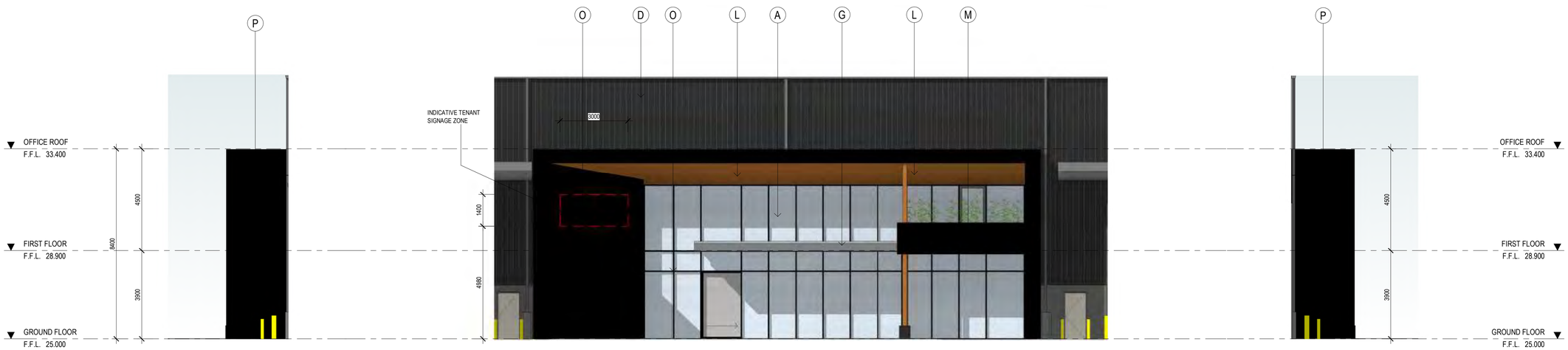
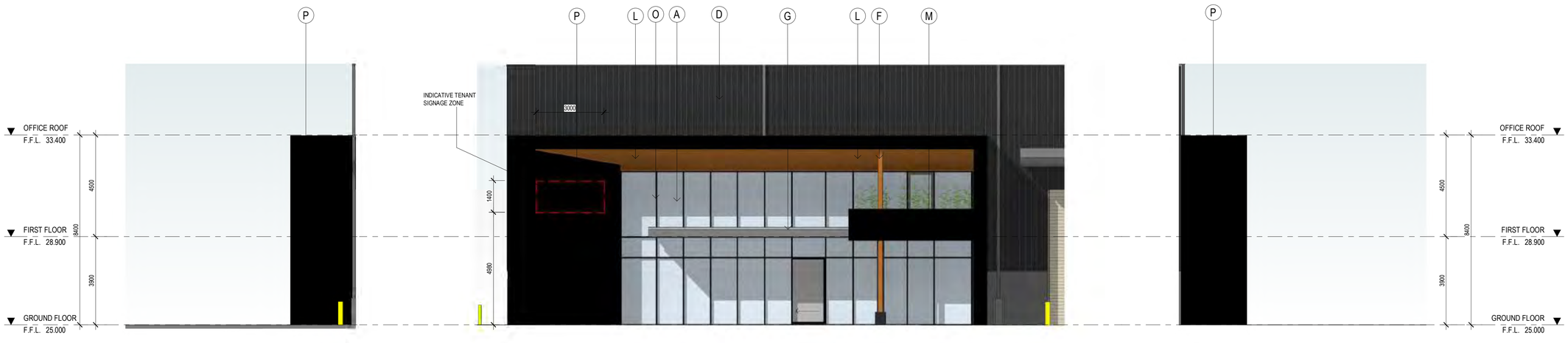


OFFICE B - WEST ELEVATION
SCALE: 1 : 100

OFFICE B - NORTH ELEVATION
SCALE: 1 : 100

OFFICE B - EAST ELEVATION
SCALE: 1 : 100



OFFICE C - WEST ELEVATION
SCALE: 1 : 100

OFFICE C -NORTH ELEVATION
SCALE: 1 : 100

OFFICE C - EAST ELEVATION
SCALE: 1 : 100

EXTERNAL FINISHES

A	ALUMINIUM FRAMED GLAZING	GREY
B	PRECAST CONCRETE PANEL, FORMLINER	LIGHT GREY
C	PRECAST CONCRETE PANEL	BASALT
D	COLORBOND WALL CLADDING	COLORBOND MONUMENT
E	COLORBOND WALL CLADDING	COLORBOND WINDSPRAY
F	BATTENS / COLUMNS	COPPER
G	ROOF CLADDING	ZINCALUME
H	ROLLER SHUTTER DOOR CLADDING/ PA DOORS	COLORBOND SURFMIST
J	DOWNPIPES / CAPPINGS	COLORBOND WINDSPRAY
K	BOLLARDS	SAFETY YELLOW
L	ALUMINIUM CLADDING	COPPER METALLIC
M	PERFORATED SCREENING	BLACK
N	ALUMINIUM FRAMED COLOURBACK GLAZING	GREY
O	POWDERCOAT	BLACK
P	ALUMINIUM CLADDING	BLACK

No.	DATE:	REVISION:	BY:	CHK:
P1	07.07.2022	DESIGN APPROVAL	BCM	SA
P2	04.08.2022	PRELIMINARY ISSUE	BCM	SA
A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
OFFICE B & C ELEVATIONS

CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: BCM
SCALE: 1:100@ A1
SCALE: 1:200 @ A3

JOB NO: 22099
DRAWING NO: TP10
REVISION: B

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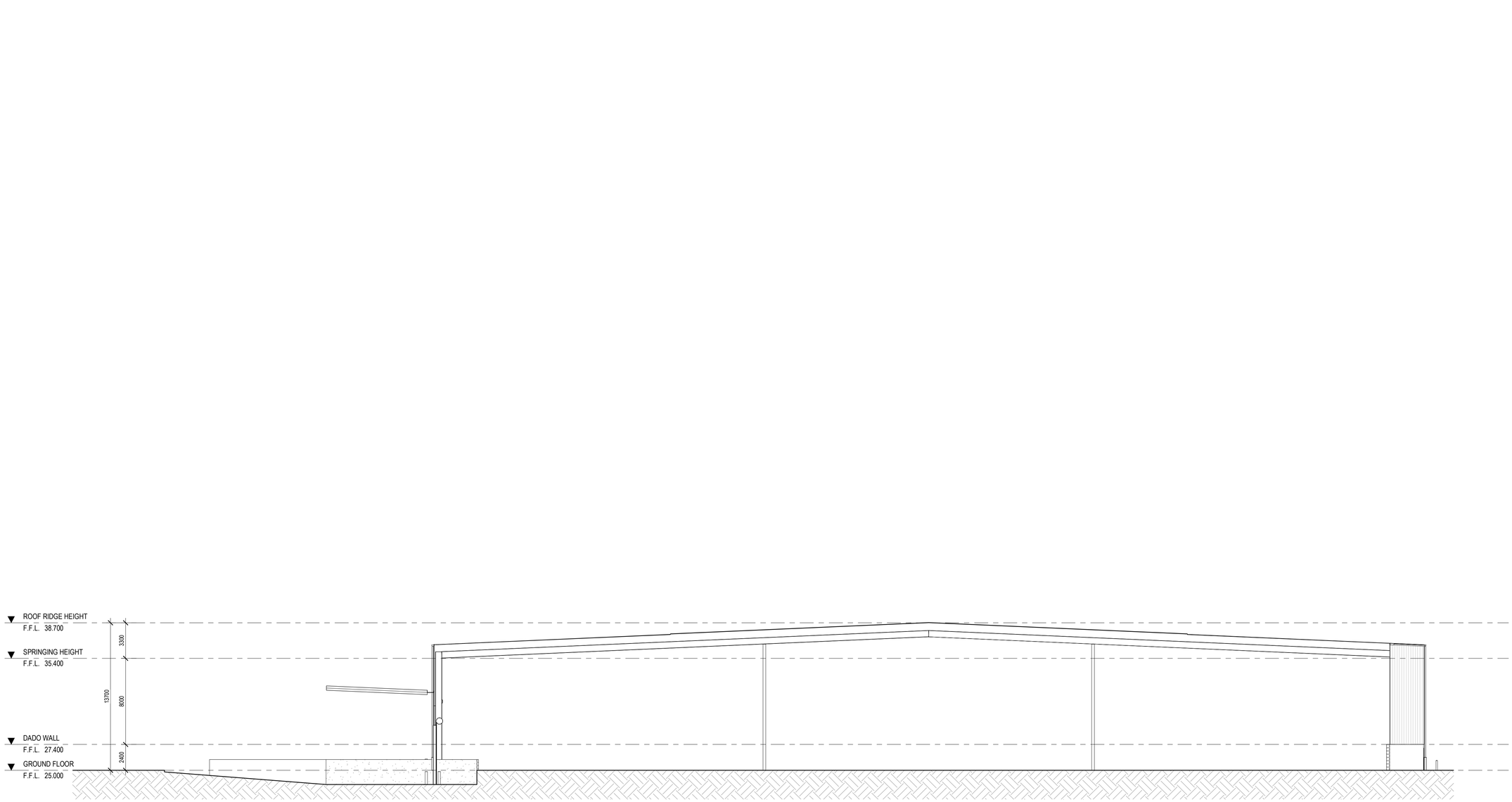

No.	DATE:	REVISION:	BY:	CHK:
P1	04.08.2022	PRELIMINARY ISSUE	BCM	SA
A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
TYPICAL SECTION

CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: BCM
SCALE: 1 : 200 @ A1
SCALE: 1 : 400 @ A3

JOB NO: 22099
DRAWING NO: TP11
REVISION: B

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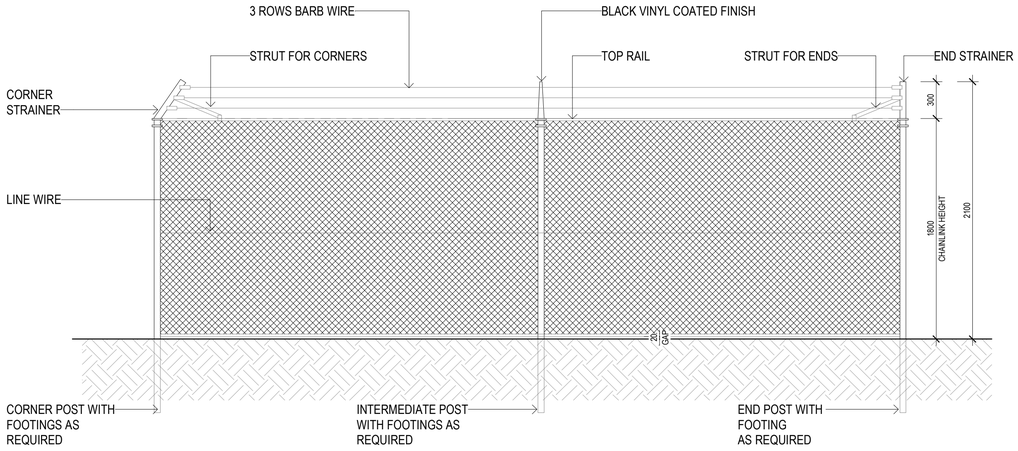
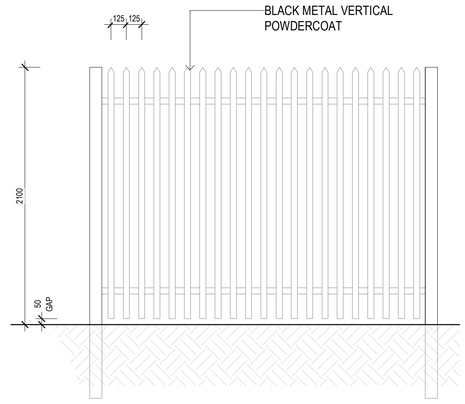
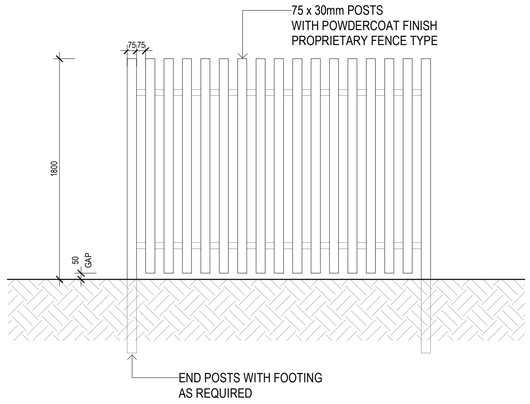


1 FN-1 FENCE DETAIL
SCALE: 1 : 25



2 FN-2 FENCE DETAIL
SCALE: 1 : 25



3 FN-3 FENCE DETAIL
SCALE: 1 : 25

No.	DATE:	REVISION:	BY:	CHK:
P1	04.08.2022	PRELIMINARY ISSUE	BCM	SA
A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
FENCE DETAILS

CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: XXX
SCALE: 1 : 25 @ A1
SCALE: 1 : 50 @ A3

JOB NO: 22099
DRAWING NO: TP12
REVISION: B

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OFFICE A PERSPECTIVE



OFFICE B PERSPECTIVE



OFFICE A PERSPECTIVE



OFFICE B PERSPECTIVE

No.	DATE:	REVISION:	BY:	CHK:
P1	07.07.2022	DESIGN APPROVAL	BCM	SA
A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
3D VISUALISATION

CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: BCM
SCALE: @ A1
SCALE: NTS @ A3

JOB NO: 22099
DRAWING NO: TP13
REVISION: B

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Sign Designs

Estate Identification



Issue A / March 2019

No.	DATE:	REVISION:	BY:	CHK:
A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
SIGNAGE DETAILS-
BUILDING SIGNAGE

CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: UW
SCALE: NTS @ A1
SCALE: NTS @ A3

JOB NO: 22099
DRAWING NO: TP14
REVISION: B

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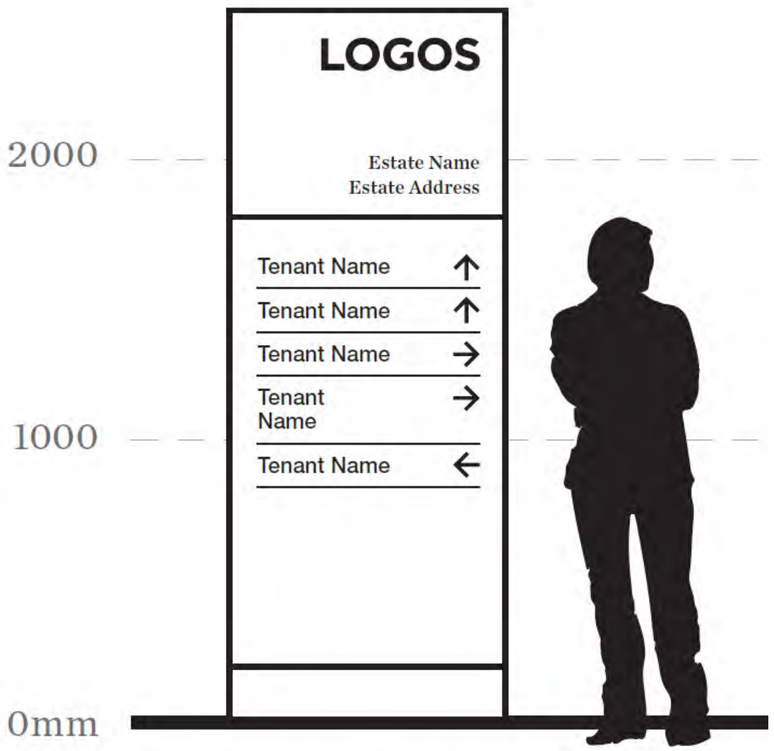

Directory Board

Directory Boards identify the site at a secondary level and provides direction.

No.	DATE:	REVISION:	BY:	CHK:
A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	09.09.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
C	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
SIGNAGE DETAILS -
DIRECTORY BOARD

CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: UW
SCALE: NTS @ A1
SCALE: NTS @ A3

JOB NO: 22099
DRAWING NO: TP15
REVISION: C

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Sign Designs

Entrance Sign Free-standing





Smooth off-form grey finish concrete

Lighting - Ground recessed up lights to illuminate front signage face

1. Formed grey concrete cast in-situ or precast with sealant applied
2. White extruded 3D lettering (10mm) flush mounted to concrete front face
3. White perspex lettering flush mounted to concrete front face
4. Additional 300mm ground clearance for low garden planting

Issue A / March 2019

No.	DATE:	REVISION:	BY:	CHK:
A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
SIGNAGE DETAILS - ENTRANCE SIGN

CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: UW
SCALE: NTS @ A1
SCALE: NTS @ A3

JOB NO: 22099
DRAWING NO: TP16
REVISION: B

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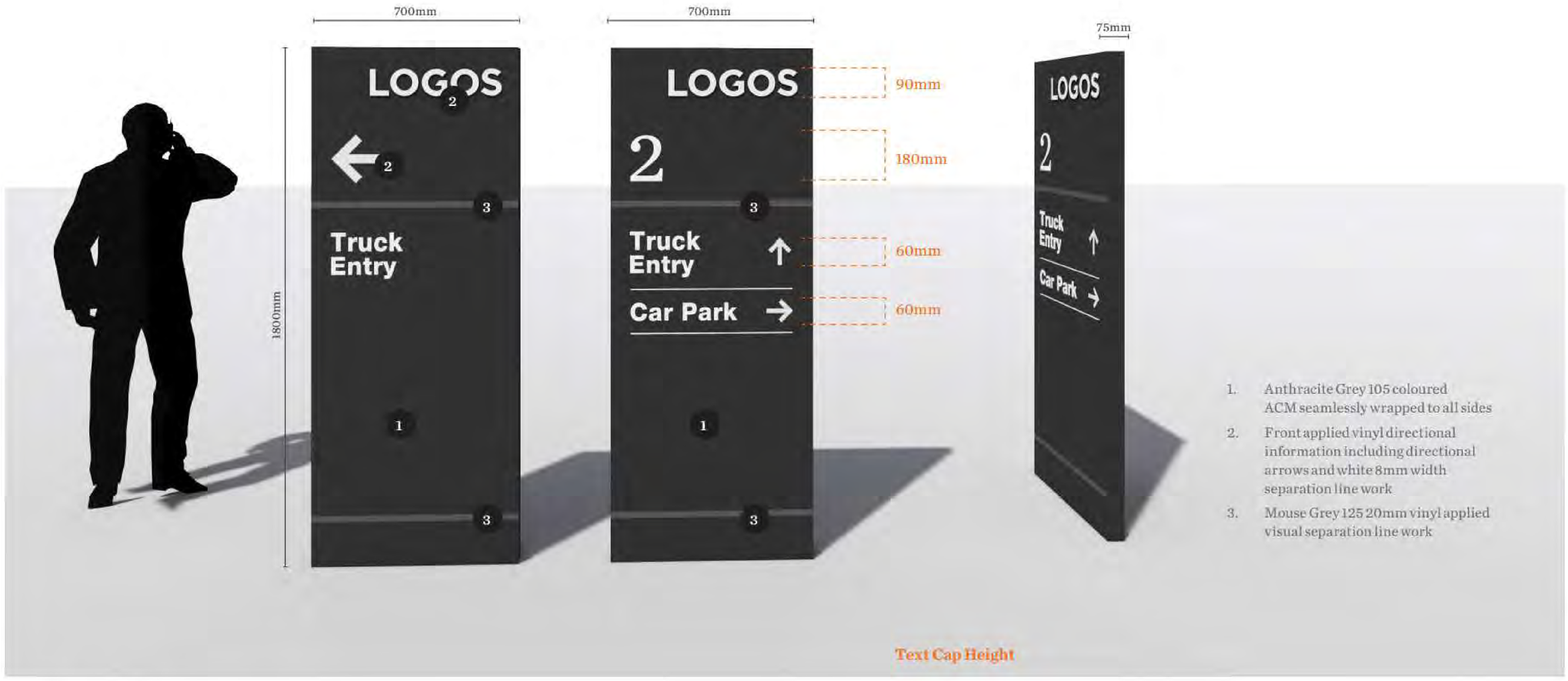
Sign Designs

Directional Free-standing



Issue A / March 2019

No.	DATE:	REVISION:	BY:	CHK:
A	26.08.2022	DEVELOPMENT APPROVAL ISSUE	BCM	SA
B	21.10.2022	DEVELOPMENT APPROVAL ISSUE	MSH	SA

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PROJECT:
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE:
SIGNAGE DETAILS-
DIRECTIONAL SIGNAGE

CLIENT:
LOGOS

DATE: OCTOBER, 2022
DRAWN BY: UW
SCALE: NTS @ A1
SCALE: NTS @ A3

JOB NO: 22099
DRAWING NO: TP17
REVISION: B

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LEGEND

- Bluemetal Gravel mulch 50mm deep
- Mulched Garden bed
- Concrete Paving with exposed aggregate finish or similar



MULCH: 75mm Organic Mulch



Bluemetal Mulch

MIX 1



Conostylis aculeata



Anigozanthos flavidus



Eremophila glabra KALBARRI CARPET



Dianella CASSA BLUE

MIX 2



Anigozanthos Bush Serries



Grevilea 'GIN GIN GEM'



Leucophyta brownii



Myoporum parviflorum



Lomandara 'TANIKA'



Olearia 'GHOST TOWN'



Westringia fruticosa

Trees				
Code	Botanic Name	Spacings plants/m2	Size	QTS
MG tb	Magnolia TEDDY BEAR	as shown	100LT	7
CR fc	Corymbia ficifolia	as shown	100LT	34
CL kps	Callistemon KING PARK SPECIAL	as shown	100LT	35
LG nt	Lagerstroemia natchez	as shown	100LT	1
XAN	Xanthorrhoea preissii GRASS TREE	as shown	TRANSPLANT	3



MAGNOLIA 'TEDDY BEAR'



CORYMBIA FICIFOLIA



CALLISTEMON KINGS PARK SPECIAL



Lagerstroemia natchez



Xanthorrhoea preissii GRASS TREE

PLANT SCHEDULE

Code		Botanic Name	Spacings plants/m2	Size	QTS
Shrubs, groundcovers & grasses					
MiX 1					
	Can	Conostylis candicans	4	140mm	529
	Dia	Dianella 'CASSA BLUE'	4	140mm	529
	Ani	Anigozanthos flavidus	4	140mm	529
	Egl	Eremophila glabra KALBARRI CARPET	4	140mm	529
MiX 2					
	Abs	Aniozatnhos Bush Series	4	140mm	479
	Ggg	Grevillea Gin Gin Gem	4	140mm	479
	Lue	Leucophyta brownii	4	140mm	479
	Myp	Myoporum parviflorum	4	140mm	479
	Llt	Lomandra 'TANIKA'	4	140 mm	2506
	Ola	Olearia 'GHOST TOWN'	4	140 mm	328
	Wes	Westringia fruticosa	4	140 mm	704

Landscaping Notes:

- 50mm thickness of soil conditioner mixed in to site soil for all gardens and additional depth soil allowance in tree locations
- 75mm organic mulch to all shrub planting areas

deep green landscaping
23 colray avenue, osborne park
ph:9242 2299 fax: 9242 2229
julian@dgls.com.au
www.deepgreenlandscaping.com.au

N

PROJECT	DRAWING	ISSUE
WAREHOUSE DEVELOPMENT	LANDSCAPE PLAN	FOR APPROVAL

ADDRESS	DRAWING N0	SCALE	SHEET	REVISION	DRAWN	CHECKED	DATE
TALBOT ROAD, HAZELMERE WA 6055	LA-DG -0001	1:500	A1	C	JG	JR	24.10.2022

REVISIONS

No	DATE	DRAWN	DETAILS
A	14/07/22	JG	ISSUED FOR APPROVAL
B	24/08/22	JG	ISSUED FOR APPROVAL
C	24/10/22	JG	ISSUED FOR APPROVAL



APPENDICES INDEX

Appendix 1 – Certificates of Title

Appendix 2 – Site Feature Survey

Appendix 3 – Baseline Environmental Site Assessment

Appendix 4 – Geotechnical Study

Appendix 5 - Site and Soil Evaluation

Appendix 6 – Wastewater and Stormwater Management Plan

Appendix 7– BushFire Attack Level Assessment

Appendix 8 – Transport Impact Assessment

Appendix 9 – Landscape Concept Plan

Document Set ID: 7363023
Version: 10, Version Date: 17/11/2022



1. CERTIFICATE OF TITLE

(SITE doc ref: 220906 Certificate of Title 1087-356 Lot 153 Talbot Road, HAZELMERE 6055 and 220906_1 Landgate Certificate of Title with Sketch 1673-71 (Subject to Dealing) 150 Talbot Road, HAZELMERE 6055 - Sketch for 1673-71)

Document Set ID: 7363023
Version: 10, Version Date: 17/11/2022

RECEIVED
13 Sept 2022

REGISTER NUMBER	
152/P4553	
DUPLICATE EDITION	DATE DUPLICATE ISSUED
1	5/1/2016

WESTERN AUSTRALIA

RECORD OF CERTIFICATE OF TITLE

VOLUME 1673 FOLIO 71

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

BG Roberts

REGISTRAR OF TITLES

LAND DESCRIPTION:

LOT 152 ON PLAN 4553

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

PERPETUAL CORPORATE TRUST LIMITED OF LEVEL 18 123 PITT STREET SYDNEY NSW 2000
(T N211356) REGISTERED 22/12/2015

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

1. *N879438 MORTGAGE TO ANZ FIDUCIARY SERVICES PTY LTD OF LEVEL 20 242 PITT STREET SYDNEY NSW 2000 REGISTERED 20/4/2018.
2. *O454812 LEASE TO FISHER & PAYKEL AUSTRALIA PTY. LIMITED OF 5 EDEN PARK DRIVE MACQUARIE PARK NSW 2113 EXPIRES: SEE LEASE. AS TO PORTION ONLY REGISTERED 23/7/2020.
3. *O469744 LEASE TO TOLL TRANSPORT PTY. LIMITED OF LEVEL 7 380 ST KILDA ROAD MELBOURNE VIC 3004 EXPIRES: SEE LEASE. AS TO PORTION ONLY REGISTERED 12/8/2020.
4. *P034811 LEASE TO DHL SUPPLY CHAIN (AUSTRALIA) PTY LIMITED OF LEVEL 4 1G HOMEBUSH BAY DRIVE RHODES NSW 2138 EXPIRES: SEE LEASE. REGISTERED 7/2/2022.

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: 1673-71 (152/P4553)
PREVIOUS TITLE: 1547-577
PROPERTY STREET ADDRESS: 150 TALBOT RD, HAZELMERE.
LOCAL GOVERNMENT AUTHORITY: CITY OF SWAN

NOTE 1: DUPLICATE CERTIFICATE OF TITLE NOT ISSUED AS REQUESTED BY DEALING N879438

END OF PAGE 1 - CONTINUED OVER

Subject to dealing

LANDGATE COPY OF ORIGINAL NOT TO SCALE 06/09/2022 12:13 PM Request number: 64085128

Landgate
www.landgate.wa.gov.au

Document Set ID: 7363023
Version: 10, Version Date: 17/11/2022

RECEIVED
19 Sept 2022

RECORD OF CERTIFICATE OF TITLE

REGISTER NUMBER: 152/P4553 VOLUME/FOLIO: 1673-71 PAGE 2

NOTE 2: O595549 DEPOSITED PLAN 420031 LODGED

Subject to dealing

Document Set ID: 7363023
Version: 10, Version Date: 17/11/2022

RECEIVED
13 Sept 2022

REGISTER NUMBER	
153/P4553	
DUPLICATE EDITION	DATE DUPLICATE ISSUED
6	22/12/2015

WESTERN AUSTRALIA

VOLUME 1087 FOLIO 356

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

LAND DESCRIPTION:

LOT 153 ON PLAN 4553

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

PERPETUAL CORPORATE TRUST LIMITED OF LEVEL 18 123 PITT STREET SYDNEY NSW 2000
(T N207871) REGISTERED 18/12/2015

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

1. *N879438 MORTGAGE TO ANZ FIDUCIARY SERVICES PTY LTD OF LEVEL 20 242 PITT STREET SYDNEY NSW 2000 REGISTERED 20/4/2018.
2. *O456812 LEASE TO FISHER & PAYKEL AUSTRALIA PTY. LIMITED OF 5 EDEN PARK DRIVE MACQUARIE PARK NSW 2113 EXPIRES: SEE LEASE. AS TO PORTION ONLY REGISTERED 23/7/2020.
3. *P034811 LEASE TO DHL SUPPLY CHAIN (AUSTRALIA) PTY LIMITED OF LEVEL 4 1G HOMEBUSH BAY DRIVE RHODES NSW 2138 EXPIRES: SEE LEASE. REGISTERED 7/2/2022.

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: 1087-356 (153/P4553)
PREVIOUS TITLE: 1015-105
PROPERTY STREET ADDRESS: LOT 153 TALBOT RD, HAZELMERE.
LOCAL GOVERNMENT AUTHORITY: CITY OF SWAN

NOTE 1: DUPLICATE CERTIFICATE OF TITLE NOT ISSUED AS REQUESTED BY DEALING N879438
NOTE 2: O595549 DEPOSITED PLAN 420031 LODGED

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2. SITE FEATURE SURVEY

MNG Surveyors

(SITE doc ref: 220218 MNG 101437DE-009A.pdf dated 16 February 2022)

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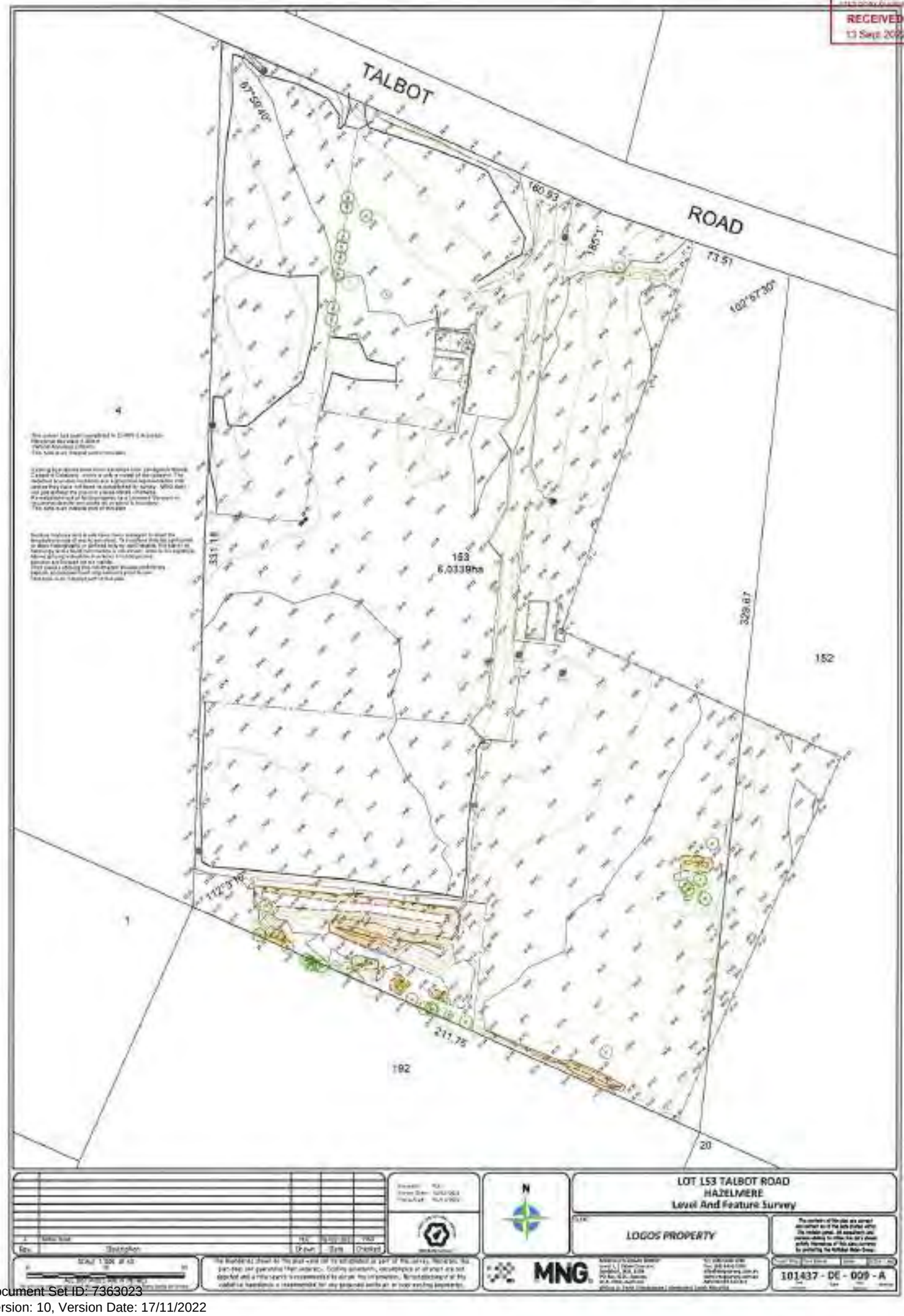

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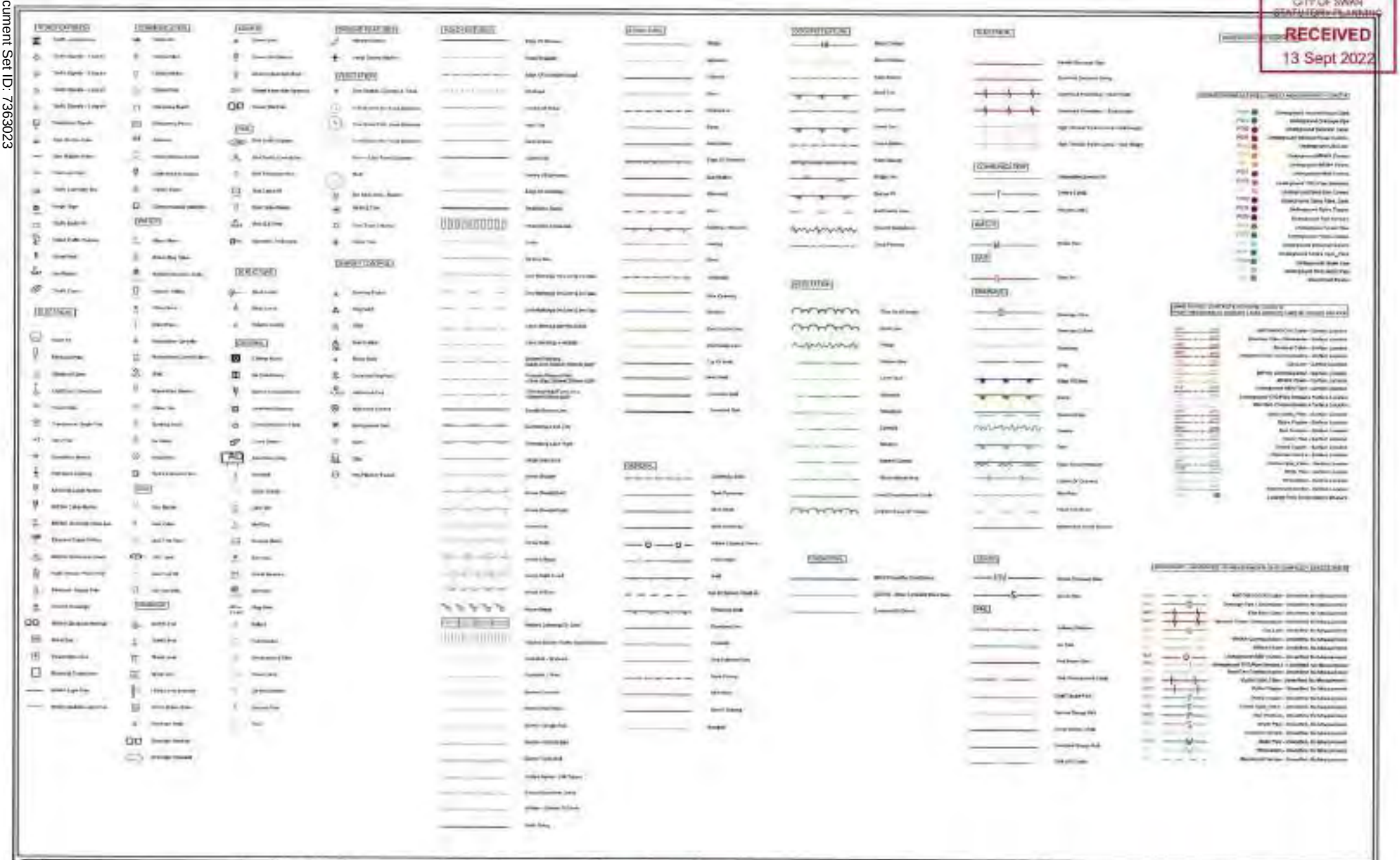

Rev.	Description	Drawn	Date	Checked
1	Underground Aerodrome Survey Added	[illegible]	[illegible]	[illegible]
2	Shaded Area Service Updated	[illegible]	[illegible]	[illegible]
3	Cadastral Added	[illegible]	[illegible]	[illegible]
4	Underground NBN Fibre Added	[illegible]	[illegible]	[illegible]
5	Feature Lines Removed	[illegible]	[illegible]	[illegible]
6	Initial Issue	[illegible]	[illegible]	[illegible]

SCALE 1:500 @ A3

ALL DISTANCES ARE IN METRES

The boundaries shown on this plan were not re-established as part of this survey, therefore this plan does not guarantee their accuracy. Existing easements, encumbrances or adjacent are not depicted and a title search is recommended to obtain this information. Re-establishment of the cadastral boundaries is recommended for any proposed works, as or near existing boundaries.

MNG.

McMULLEN NOLAN GROUP
FEATURE SURVEY - GENERAL LEGEND

N/A

95465 - DOC-012 - F

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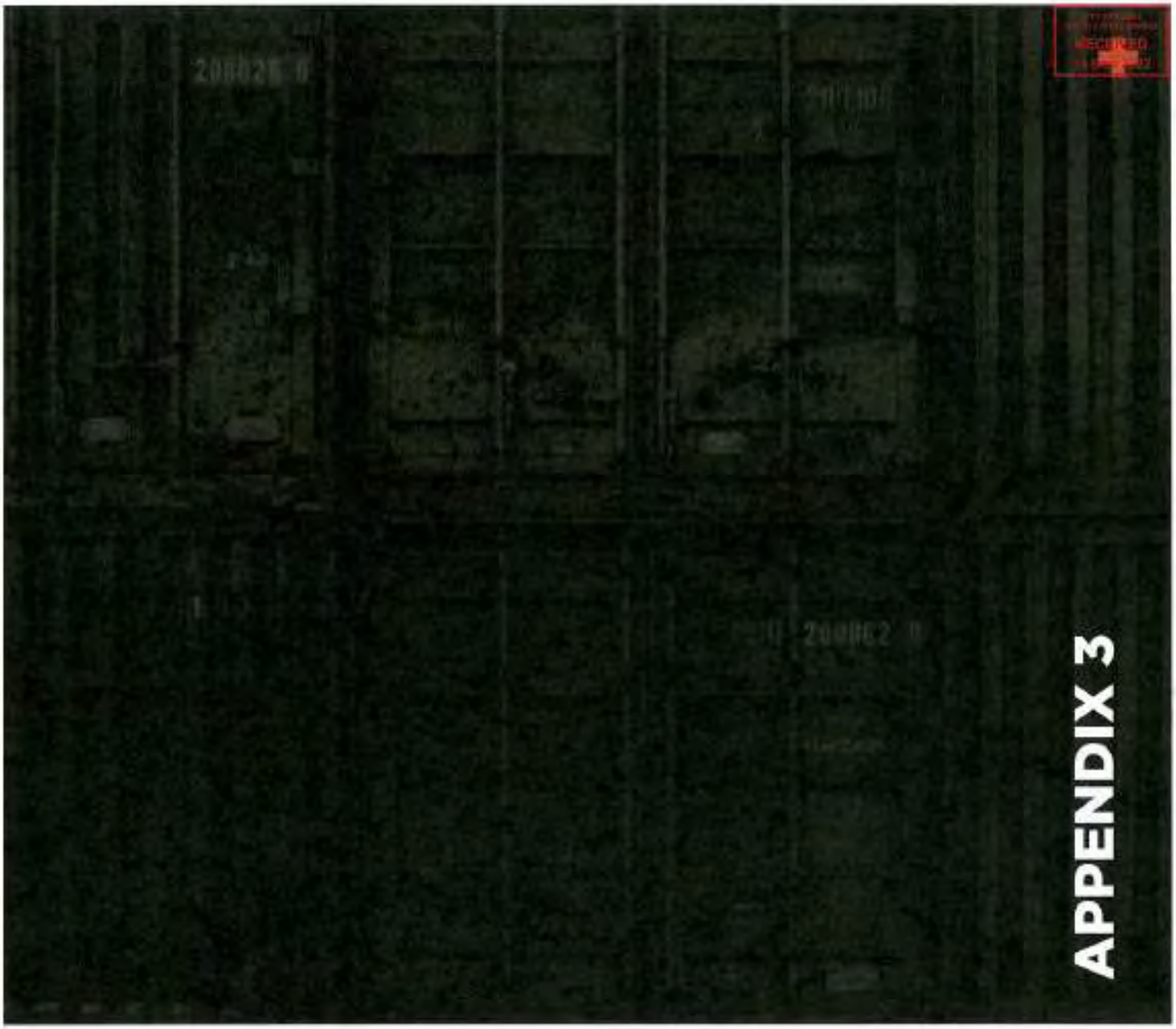

3. BASELINE ENVIRONMENTAL SITE ASSESSMENT

Galt Environmental

(SITE doc ref: 220629 Galt Baseline Environmental Report J2201067 003 R Rev0)

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Report on

BASELINE ENVIRONMENTAL SITE ASSESSMENT PROPOSED WAREHOUSE AND OFFICE FACILITIES PART OF LOT 153 TALBOT ROAD HAZELMERE

Submitted to:

Logos Development Management Pty Ltd
Suite 2, Level 29, Aurora Place, 88 Phillip Street
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J2201067 003 R RevO

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1. INTRODUCTION

This report presents the findings of Galt Environmental Pty Ltd's (Galt's) baseline environmental site assessment (ESA) for the proposed warehouse and office facilities at Part of Lot 153 Talbot Road, Hazelmere (the "site"). The location of the site relative to the surrounding area is shown on Figure 1.

2. SITE DESCRIPTION

The site is irregular in plan with an area of about 37,795m^2 and is open ground and generally covered with bitumen sealed pavements and hardstand apart from:

- an area in the south-west corner which is covered with surface grasses and a number of large mature trees adjacent to the south-west boundary. The area includes a 70 m long narrow swale drain with a base width of about 5 m aligned in an east west direction and adjacent stockpiles of soil; and
- an area adjacent the eastern boundary which is covered with surface grasses and includes a grove of mature trees.

A feature survey plan provided shows that the ground surface generally slopes down from east to west with elevations ranging from about RL 26.6 m to RL 24.8 m AHD. The ground surface in the area in the south-west corner undulates with the base of the swale drain at an elevation of about RL 24.1 m AHD, the surrounding area at an elevation of about RL 25 m AHD and the top of the adjacent stockpiles at an elevation of up to about RL 26.9 m AHD.

A plan provided shows the proposed development consists of:

- three rectangular warehouse structures, designated A to C, with areas ranging from 6,020 m^2 to 6,410 m^2;
- a single storey office at the north-west corner of warehouse A with a total area of 200 m^2
- two storey offices each with a total floor area of 300 m^2 in the south-east corner of warehouse B and south-west corner of warehouse C;
- heavy duty pavements along the northern side of the warehouses with a total area of 11,308 m^2;
- car parking bays for light vehicles along the southern and western sides of the site; and
- landscaped areas.

We assume that the warehouses and offices will be of steel framed construction supported on shallow footings. Information has not been provided on the pavement type, the type and size of trucks or the type of vehicles that will operate within the warehouse. We assume that the warehouse will have a concrete floor slab and pavements outside the warehouse will be a combination of rigid concrete slab and flexible pavements for heavy and light vehicles.

We understand that the site is not connected to a sewage system and effluent treatment and disposal will occur on site.

A supplied drawing of the proposed development is presented in Appendix A. Also included in Appendix A is a copy of the feature survey plan.

3. PROJECT OBJECTIVES

The objectives of the study were to:

- assess the soil and groundwater quality conditions at the site to establish an appropriate baseline;
- determine if contamination is present (if any) and if it represents an unacceptable heath risk; and
- make recommendation for further environmental investigation and/or remedial works (if required).

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4. FIELDWORK

Fieldwork was carried out the period 17 March to 5 April 2022 and comprised:

- a walkover and inspection of the site including taking photographs;
- drilling of machine auger boreholes at 12 locations to depths ranging from 2.0 m to 2.4 m;
- collection of soil samples at 0.5 m intervals until the termination of each borehole;
- drilling of 4 direct push boreholes, BH01 to BH04, to depths ranging from 9.0 m to 10.0 m;
- installation of groundwater monitoring wells in boreholes BH01 to BH04 to depths ranging from of 9.95 m to 10.90 m; and
- collection of groundwater samples from the groundwater monitoring wells.

General

An environmental scientist from Galt positioned the test locations, supervised the borehole drilling, logged the materials encountered in the boreholes and collected soil and groundwater samples for inspection and laboratory testing.

The test locations are shown on Figure 1 and are summarised in Table 1. Photographs of the site are presented in Appendix B.

Table 1: Summary of Tests

Test Names	Test Depth (m)	Monitoring Well Embedment (m)	Depth to Groundwater (m)		General Stratigraphy[3]
			Drilling[1]	Groundwater Monitoring[2]	
BH01/MW01	10.0	10.20	8.1	8.19	SAND over Sandy GRAVEL over Clayey SAND
BH02/MW02	10.0	10.26	7.38	7.49	SAND over Gravelly SAND over Clayey Gravelly SAND over Clayey SAND
BH03/MW03	9.0	9.36	4.5	4.72	SAND over Clayey SAND over Sandy CLAY
BH04/MW04	9.0	9.53	5.63	5.78	SAND over Gravelly SAND over Sandy GRAVEL over Clayey SAND over Sandy CLAY
MA01	2.0	-	GNE	-	FILL: Sandy GRAVEL; overlying SAND
MA02	2.0	-		-	
MA03	2.4	-		-	SAND
MA04	2.0	-		-	SAND; overlying Sandy GRAVEL; overlying Sandy CLAY
MA05	2.0	-		-	FILL: Sandy GRAVEL; overlying SAND; overlying Sandy GRAVEL
MA06	2.0	-		-	FILL: Sand, overlying SAND; overlying Gravelly SAND; overlying Sandy GRAVEL; overlying Gravelly CLAY
MA07	2.0	-		-	FILL: Sandy GRAVEL; overlying Gravelly SAND; overlying Sandy GRAVEL; overlying Gravelly CLAY
MA08	2.0	-		-	FILL: Sandy GRAVEL; overlying Gravelly SAND; overlying Sandy GRAVEL
MA09	2.0	-		-	FILL: Sandy GRAVEL; overlying SAND; overlying Sandy GRAVEL; overlying Gravelly CLAY
MA10	2.0	-		-	FILL: Sandy GRAVEL; overlying SAND; overlying Gravelly SAND; overlying Sandy GRAVEL
MA11	2.0	-		-	FILL: Sandy GRAVEL; overlying SAND; overlying Gravelly SAND; overlying Gravelly CLAY

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Test Names	Test Depth (m)	Monitoring Well Embedment (m)	Depth to Groundwater (m)		General Stratigraphy[3]
			Drilling[1]	Groundwater Monitoring[2]	
MA12	2.0	-			FILL: Sandy GRAVEL; overlying SAND; overlying Gravelly SAND

Notes:
1. Depth to groundwater measured during drilling on 17 and 18 March 2022 and was inferred from borehole spoil moisture condition
2. Depth to groundwater was measured during groundwater monitoring undertaken on 5 April 2022. These levels are considered to be more accurate than the levels recorded during drilling.
3. Detailed soil profiles presented in Appendix C and Appendix D.

Machine Auger Boreholes

Machine auger boreholes were drilled using a utility mounted EVH Scout 1750 drill rig equipped with a 90 mm nominal diameter solid auger. Machine auger borehole reports including a list of notes and abbreviations and the method of soil description used on the reports are included in Appendix C. Photographs of the core recovered are presented at the bottom of each report.

Direct Push Boreholes

Boreholes were drilled using a Geoprobe 6620DT drill rig supplied and operated by Direct Push Probing.

Direct push borehole reports are presented in Appendix D along with a method of soil description and a list of explanatory notes and abbreviations used in the reports. A photograph of the core recovered from each borehole is included on each borehole report.

Soil Sampling

Soil grab samples were collected from the boreholes in accordance with the following Australian Standards (AS):

- 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*; and
- Department of Environment Regulation (DER) (2014) *Assessment and management of contaminated sites*.

Samples were collected from the surface of soil-accessible locations using disposable nitrile gloves and placed in laboratory supplied glass jars. The samples were then placed in an ice-chilled cooler until submission to the laboratory for analysis.

Groundwater Monitoring Well Installation

Four groundwater monitoring wells (MW01-MW04) were installed at the site. The wells comprise 50 mm PVC standpipes extending to depths ranging from 9.36 m to 10.26 m with a 3.0 m slotted section at the base of each well. Gravel pack was placed over the slotted sections in the annulus between the borehole wall and standpipe, followed by a bentonite seal (typically 1.0 m thick). The annulus above the bentonite was backfilled to ground level using drill cuttings and on-site soils. The wells were finished with a lockable steel monument cover.

Groundwater monitoring well construction reports are presented in Appendix E.

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Groundwater Sampling

The groundwater wells were sampled in accordance with the following Australian Standards:

- AS/NZS 5667.1:1998 *Water Quality Sampling. Part I – Guidance on the Design of Sampling Programs, Sampling Techniques and the Preservation and Handling of Samples*; and
- AS/NZS 5667.11:1998 *Water Quality Sampling. Part II – Guidance on the Sampling of Groundwater.*

Representative groundwater samples for laboratory analysis were recovered on 30 July 2021. Prior to sampling, measurements of field parameters, including temperature, pH, electrical conductivity (EC), redox potential and dissolved oxygen (DO) were taken every two minutes using a calibrated YSI water quality meter. Samples were collected once these parameters stabilised (stabilisation of groundwater parameters is considered to be achieved when there is less than 10% variation in physiochemical parameters between three successive readings).

Groundwater samples were recovered utilising a low-flow submersible pump. A minimum of 10 L from each well was purged before monitoring and sampling to remove any stagnant water and residual contaminants from the well installation process. All groundwater purged from the monitoring wells was carefully disposed into the ground in the vicinity of the well it was extracted from at a rate that did not result in unsightly or nuisance conditions. New disposable nitrile gloves were used at each monitoring bore location to prevent cross-contamination between sampling locations.

Groundwater samples were collected directly from the pump into appropriately preserved and labelled, laboratory supplied bottles and filled to zero headspace. Samples that required field filtering were collected using a single use, sterile, catheter tip syringe which connects directly to an in-line, single-use 0.45 µm filter.

All samples were stored with adequate packing and ice and transported to the laboratory to ensure that they arrived intact and at the appropriate temperature to ensure sample preservation.

Groundwater monitoring logs are shown in Appendix F.

5. LABORATORY ANALYSIS

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 analysis;
- total recoverable hydrocarbons (TRH) analysis;
- benzene, toluene, ethylbenzene, xylenes and naphthalene (BTEXN) analysis; and
- polycyclic aromatic hydrocarbons (PAH) analysis.

All laboratory analysis was undertaken using NATA-accredited methods of analysis. Laboratory certificates of analysis are presented in Appendix G and summarised in Section 9.1 and 9.2.

6. SITE CONDITIONS

6.1 Geology

The Perth sheet of the 1:50,000 scale Environmental Geology series map indicates that the majority of the site is underlain by a thin layer of Bassendean Sand overlying fine grained soils of the Guildford Formation.

The findings of the investigation are generally consistent with the geological mapping although a layer of fill is present over most of the site.

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6.2 Subsurface Conditions

The subsurface conditions can generally be summarised as follows:

- Sandy GRAVEL (GP - inferred road base): fine to coarse grained, sub-angular to sub-rounded, typically pale grey and brown, dry, very dense, present from ground surface to depths ranging from 0.1 m to 0.5 m; overlying
- SAND (SP): fine to coarse grained, sub-angular to sub-rounded, typically pale grey to off white, trace to some fine to medium grained lateritic gravel, trace non plastic fines, dry, typically dense, present to depths ranging from 0.75 m to 2.0 m; overlying
- Gravelly SAND (SP)/ Sandy GRAVEL (GP): fine to coarse grained sand and gravel, sub-angular to sub-rounded, variably cemented, typically pale brown to brown, lateritic, dry, typically dense, extending to depths ranging from 1.5 m to 2.5 m, overlying
- Gravelly CLAY (CI)/ Clayey SAND (SC): medium plasticity, mostly pale red, red and grey, generally containing layers of sand, silty sand and cemented sand, moist becoming wet at depth, very stiff to hard, extending to depths ranging from 8.0 m to 9.9 m; overlying
- SAND: dense to very dense, extending to the maximum investigated depth of 12.2 m.

Variations to the above comprise:

- no FILL: Sandy GRAVEL present at the surface in boreholes MA03, MA04 and BH01 to BH04;
- no Gravelly SAND/Sandy GRAVEL below the SAND in boreholes MA01 to MA03;
- inferred hard Silty CLAY below the SAND at depths below 10.9 m and 8.5 m in CPT05 and CPT06 respectively; and
- inferred thin layers of stiff Sandy SILT and Clayey SILT within SAND below a depth of about 8.0 m in CPT04.

Road base material is not present at the surface in the area in the south-west corner of the site (BH03, MA03 and MA04). The area is used to dispose of stormwater and a few small stockpiles of material are present on the ground surface.

6.3 Groundwater

The Perth Groundwater Atlas (2004) shows the seasonal minimum groundwater level to be around RL 13 m AHD. This is about 12 m below the current ground surface.

The levels used to interpolate the groundwater contours in this edition of the atlas were based on levels recorded in May 2003 following a long dry period. These levels are generally considered to reflect minimum groundwater levels. Groundwater levels can be expected to be significantly higher than shown in the 2004 atlas.

Groundwater was measured in the boreholes and monitoring wells during fieldwork at the following depths:

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Table 2: Summary of Groundwater Depths (March 2022)

Test Location	Depth to Groundwater (m)	
	Drilling[1]	Groundwater Monitoring[2]
MW01	8.1	8.19
MW02	7.38	7.49
MW03	4.5	4.72
MW04	5.63	5.78

Notes:
1 Depth to groundwater measured during drilling on 17 and 18 March 2022 and was inferred from borehole spoil moisture condition.
2 Depth to groundwater was measured during groundwater monitoring undertaken on 5 April 2022. These levels are considered to be more accurate than the levels recorded during drilling.

Shallower perched groundwater is expected to develop on top of the hard/cemented clayey stratum during the wetter times of the year.

6.4 Acid Sulfate Soils

The Department of Water and Environment Regulation (DWER) acid sulfate soils (ASS) risk mapping indicates that the site is located in an area having moderate to low risk of ASS occurrence.

6.5 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.

A registered contaminated site classified as Contaminated – remediation required is located adjacent the southern boundary of the site (site ID No. 9998 [Lot 20 on Diagram 76128). This site was historically used as a landfill (between 1987 and 1997) and asbestos, metals (copper, zinc) and polychlorinated biphenyls (PCBs) are present in fill materials and soil beneath the site. Furthermore, metals and metalloids (aluminium, copper lead, mercury, zinc and iron), nutrients (total nitrogen, total phosphorus, ammonium), sulfide and low pH are present in groundwater beneath the site.

Contaminated sites are shown on Figure 2.

6.6 Site History

A review of historical aerial imagery indicates the site was undeveloped until sometime between 2006 and 2007. The site formed part of the larger lot adjacent Talbot Road. The site historically contained a wetland along the western boundary (visible in 1974 aerial imagery) and a track (assumed for horse trotting etc.) along the western and southern boundaries, transecting the middle of the site (from the south eastern corner to the north western corner). The site

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remains largely in this state until about 2008, when stockpiles appear to be paddock dumped in the north western corner of the site. In 2011 the stockpiles appear to have been spread across the site and equipment/machinery laydown is evident. Around 2013, additional filling occurs to the east of the lot and equipment/machinery laydown operations expand to the newly filled area. Operations at the site appear to decrease around 2016. The site remains largely unchanged since this time (with the exception of additional filling across the eastern portion of the site around 2020).

Historical aerial imagery is shown on Figures 3A to 3J.

7. REGULATORY ASSESSMENT CRITERIA

Regulatory assessment criteria for soil and groundwater analysis were selected taking into account the current land use, proposed use as a commercial/industrial development, applicable soil and groundwater 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 assessed against the following:

- health investigation levels - commercial/industrial (HIL D); and
- health screening levels - commercial/industrial (HSL D).

Beneficial uses of groundwater are likely to be for commercial and irrigation purposes. Criteria for the assessment of groundwater contamination were adopted from the following documents:

- NEPM (2013) *National Environmental Protection (Assessment of Site Contamination) Measure;* and
- Australian and New Zealand Environment and Conservation Council (ANZECC) (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*.

Groundwater quality was assessed against the following criteria:

- Non potable groundwater use (NPUG); and
- health screening levels - commercial/industrial (HSL D).

8. QUALITY ASSURANCE AND QUALITY CONTROL

8.1 General QA/QC Testing and Analysis

Quality assurance/quality control (QA/QC) measures were adopted in accordance with NEPM (2013) *National Environmental Protection (Assessment of Site Contamination) Measure* and are necessary to ensure the precision, accuracy, representativeness, comparability and completeness of the data.

The following QA/QC measures were implemented during this assessment:

- collection of field quality control samples including duplicate and triplicate samples at the recommended rate of 1 per 20 primary samples;
- assessment of relative percentage difference (RPD) calculated for duplicate and triplicate samples;
- collection of rinsate samples from equipment used during sampling;
- inclusion of trip blank samples for the duration of each sampling event and transportation to the laboratory; and
- all samples were submitted to NATA-accredited laboratories for selected analysis.

The QA/QC program also considered internal laboratory QA/QC results. These include laboratory duplicate and blank sample results, method blanks, surrogates and matrix spikes.

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8.2 Field Sampling QA/QC

The purpose of taking field QA/QC samples is to ensure quality and reproducibility of all testing methods used. These samples provide information which eliminates any errors due to sources of cross-contamination, inconsistencies in sampling methods and checks on analytical techniques used.

The following measures were implemented during the sampling program at the site:

- all samples were collected using new disposable nitrile gloves;
- groundwater sampling equipment was decontaminated between sampling locations; and
- all samples collected for laboratory analysis were stored in laboratory-supplied containers.

Duplicate samples were taken in order to identify the variation in analyte concentration between samples collected from the same sampling point, and triplicate samples were taken for the purpose of repeatability of the laboratory's analysis. Duplicate samples were sent along with the primary sample to the primary testing laboratory Eurofins and triplicate samples were sent to the secondary laboratory Envirolab for analysis.

Rinsate samples were collected to demonstrate samples were free from contamination introduced to samples through contact with sampling equipment or the sampler, and that decontamination measures undertaken between successive sampling location were adequate.

Trip (or transport) blank samples were prepared using laboratory supplied de-ionised water and sample containers prior to sampling. These samples were used to demonstrate the presence or absence of cross-contamination of samples during transport and storage.

8.3 Laboratory QA/QC

Laboratory analysis was undertaken by NATA-accredited laboratories using NATA-accredited methods of analysis. Galt requires that laboratories have a QA/QC program that is endorsed by NATA. Both laboratories have a comprehensive QA/QC program to monitor and control every aspect of the laboratory process. The internal QA/QC processes includes laboratory control samples, method blanks, matrix spikes, laboratory duplicates and surrogates at frequencies at or above that are detailed in the NEPM guidelines.

8.4 Chain of Custody Documentation

All samples were transported under Galt's chain of custody (CoC) procedures. This process details the links in the transfer of samples between the time of collection and arrival at the laboratory. The CoC documentation includes the name of the person transferring the samples, name of the person receiving laboratory samples, time and date the samples are collected, time and date samples are received at the laboratory, name and contact details of the client, scope of analysis applicable to each sample, details of the sample matrix and any other specific instructions in the handling of the samples during the analysis.

8.5 Evaluation of Quality Control Sample Results

The analytical results and quality control data were evaluated for accuracy, precision and representativeness of the data. Laboratory data was checked for any analytical errors, such as contamination identified in rinsates, and laboratory blanks, which may indicate cross contamination of samples.

A summary of QA/QC data is presented in Table 3.

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Table 3: QA/QC Summary

Item	Objective	Outcome	Compliance
Calibration check of field instruments	Instruments calibrated within acceptable limits	Completed in full	Yes
Chain of custody documentation	Completed in full	Completed in full	Yes
Recovery and analysis of rinsate blanks	No contamination of blanks	No contamination of rinsate blanks	Yes
Recovery and analysis of field blanks	No contamination of blanks	No contamination of field blanks	Yes
Recovery and analysis of field replicate samples	Collect replicate samples at a minimum rate of 5% and assessment that RPDs are within acceptable limits	Not all replicate samples were within RPD limits	No[1]
NATA-certified and approved analytical methods	Comply with reference standards	All complied	Yes
Sample preservation and holding times	Samples subjected to correct preservation procedures and analysed within holding times	All complied	Yes
Analysis of laboratory method blanks	No contamination of blanks	No contamination of method blanks	Yes
Analysis of laboratory duplicates	RPDs within acceptable limits	All RPDs within acceptable limits	Yes
Analysis of surrogate and spike recoveries	Recoveries within acceptable limits	All recoveries within acceptable limits	Yes
Frequency of laboratory duplicate samples	Frequency of duplicates ≥ 5%	All analyses met required frequency	Yes

Note 1 Field and interlaboratory duplicate samples QC1 and QC2 exceeded the RPD for copper, however all values conformed to the adopted assessment criteria (approximately 3 orders of magnitude below the NPUG criterion for copper). Furthermore, the higher concentration of the 3 results (0.017 mg/L) has been adopted for interpretative purposes. As such, the RPD exceedance does not impact the findings of this investigation.

Based on our review of the QA/QC data, we consider that the results are an accurate representation of conditions at the site. A QA/QC report is presented in Appendix H.

9. RESULTS

9.1 Soil

A summary of the laboratory analytical results is shown in Table 4. The soil analytical results table including relevant assessment criteria is provided in Appendix I.

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Table 4: Analytical Results Summary - Soil

Analyte	Results Range	Exceedances
Metals		
Arsenic	<LOR[1] - 2.1 mg/kg	None
Cadmium	<LOR	None
Chromium (III+VI)	<LOR - 16 mg/kg	None
Copper	<LOR – 15 mg/kg	None
Lead	<LOR – 17 mg/kg	None
Mercury	<LOR	None
Nickel	<LOR – 5.4 mg/kg	None
Zinc	<LOR – 31 mg/kg	None
Hydrocarbons		
C_6-C_{10}	< LOR	None
C_6-C_{10} (F1 minus BTEX)	<LOR	None
>C_{10}-C_{16}	<LOR	None
>C_{10}-C_{16} (F2 minus Naphthalene)	<LOR	None
>C_{16}-C_{34}	<LOR – 360 mg/kg	None
>C_{34}-C_{40}	<LOR – 370 mg/kg	None
>C_{10}-C_{40} (Sum of total)	<LOR – 630 mg/kg	None
BTEXN	<LOR	None
PAHs	<LOR	None

Note 1. < LOR indicates result/s were below the laboratory limits of reporting.

9.2 Groundwater

A summary of groundwater field and laboratory test results are shown in Table 5. The results table including relevant assessment criteria is provided in Appendix J.

Table 5: Analytical Results Summary - Groundwater

Analyte	Results Range	Exceedances
Field Parameters		
pH (pH Units)	5.2 – 6.2	N/A
Electrical conductivity (uS/cm)	276 – 499	N/A
Redox potential (mV)	93 – 162	N/A
Dissolved oxygen (mg/L)	2.34 – 3.05	N/A
Metals		
Arsenic (filtered)	<LOR	None
Cadmium (filtered)	<LOR	None
Chromium (III+VI) (filtered)	<LOR	None

[1] < LOR indicates below laboratory limit of reporting

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Analyte	Results Range	Exceedances
Copper (filtered)	<LOR – 0.017 mg/L	None
Lead (filtered)	<LOR	None
Mercury (filtered)	<LOR	None
Nickel (filtered)	<LOR – 0.001 mg/L	None
Zinc (filtered)	<LOR – 0.008 mg/L	None
Hydrocarbons		
C_6-C_{10}	< LOR	None
C_6-C_{10} (F1 minus BTEX)	< LOR	None
>C_{10}-C_{16}	<LOR	None
>C_{10}-C_{16} (F2 minus Naphthalene)	<LOR	None
>C_{16}-C_{34}	<LOR	None
>C_{34}-C_{40}	<LOR	None
>C_{10}-C_{40} (Sum of total)	<LOR	None
BTEXN	<LOR	None
PAHs	<LOR	None

9.3 Summary

The results of the analytical testing indicate that concentrations of all COPC in soil and groundwater were either below the laboratory LOR and/or conformed to the adopted assessment criteria at all locations.

We note the minor detections of hydrocarbons in the following soil samples:

- MA01/0.0
- MA06/0.0
- MA07/0.0
- MA08/0.0
- MA09/0.5; and
- MA10/1.5

The detections noted are generally surficial (i.e. within the top 0.5 m of the soil profile) and likely present due to historical land use activities undertaken at the site (including Ad-hoc fill importation/placement [see borehole reports] which may have been impacted prior to arriving on site). Furthermore, minor leakage of hydrocarbon-based fuels/oils from trucks, machinery or equipment stored at the site for any period of time may have encroached into the soil profile. This could be considered 'expected' for a site such as the study site where large scale storage of equipment has occurred.

The detection of hydrocarbons at 1.5 m below the existing surface at location MA10 may be indicative of contaminant migration during drilling (i.e. smearing of the borehole wall). The concentrations detected (total TRH >C10-C40) are notably lower than those detected within the top 0.5 m at the aforementioned locations. A review of borehole logs indicates fill material at MA10 extends to a depth of 0.5m, and as such it is considered unlikely that the presence of hydrocarbons at the depth detected is present from importation of contaminated fill material. Furthermore, it is unlikely that the minor detections noted are indicative of broader soil contamination.

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10. CONCLUSION

Based on the results of the study, we consider it unlikely that soil and groundwater presents a risk to human health or the environment in context of the proposed land use/development at the site. Furthermore, we consider that data collected during this study is an adequate characterisation baseline conditions at the site.

11. RECOMMENDATIONS

Due to the presence of a registered contaminated site (former landfill with legacy soil and groundwater contamination) directly adjacent the southern boundary of the site, groundwater monitoring should be undertaken at a regular interval (i.e. annual) to ensure contaminants are not migrating to the site. The results of any additional/routine groundwater monitoring and analysis should be assessed against the findings of this study for comparative purposes.

12. LIMITATIONS

We draw your attention to Appendix K 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 ENVIRONMENTAL PTY LTD



Brad Palmer

Environmental Scientist

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Legend

- Site Boundary
- Borehole / Groundwater Monitoring Well
- Machine Auger Borehole

N

NOTES
Aerial Imagery and Contours sourced from Landgate/SDP



SCALE	1:1,000
DRAWN	CSD
DATE	7/05/2022
PROJECT	–
SITE LOCATION	–
FILE NO.	GSA1 MN MG4 Zone 50

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Osborne Park WA 6017

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PROJECT	PROPOSED WAREHOUSE AND OFFICE FACILITIES
LOCATION	PART OF LOT 153 TALBOT ROAD HAZELMERE
TITLE	SITE & LOCATION PLAN
DATE	J2201067
TOTAL	FIGURE 1
REV	A

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Legend

Site Boundary

Contaminated Sites

Contaminated - remediation required

Contaminated - restricted use

Remediated for restricted use

N

NOTES

Power Imagery sourced from Landgate / 2017



DATE	17.5.00
SCALE	1:500
DRAWN	CRD
DRAWING NUMBER	1/50/2000
DATUM	—
PROJECTION	—
PROJECTION	GDA 1994 MGA Zone 50

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PROJECT	PROPOSED WAREHOUSE AND OFFICE FACILITIES
LOCATION	PART OF LOT 153 TALBOT ROAD HAZELMERE
TITLE	CONTAMINATED SITES
DATE	J2201067
FIGURE 2	A

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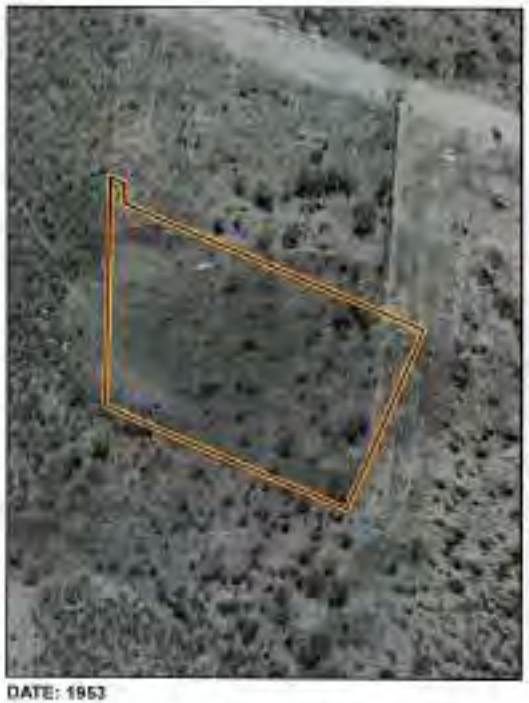
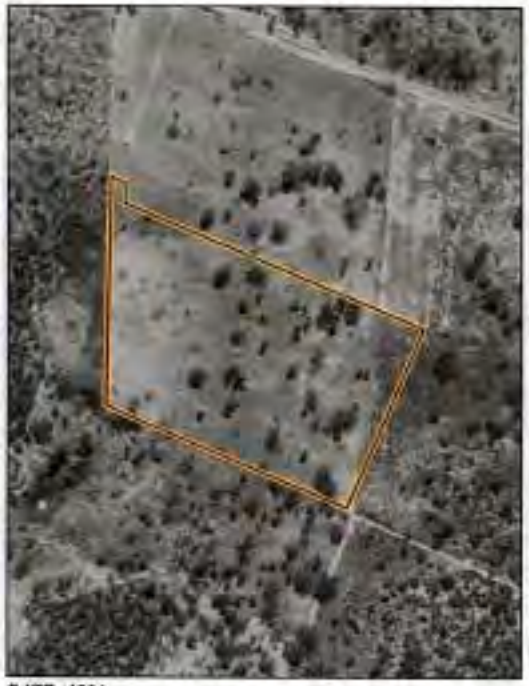


DATE: 1953



DATE: 1961



DATE: 1965



DATE: 1974



DATE: 1977



DATE: 1979



Legend

Site Boundary

N



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PROPOSED WAREHOUSE AND OFFICE FACILITIES

PART OF LOT 153 TALBOT ROAD
HAZELMERE

HISTORICAL AERIAL IMAGERY (1953 - 1979)

J2201067 | FIGURE 3A | A

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DATE: 1981



DATE: 1983



DATE: 1985



DATE: 1989



DATE: 1995



DATE: 2000



Legend

Site Boundary

N

NOTES
Aerial imagery sourced from Landgate/DLIP



SCALE	1:4,000 (A3)
DRAWN	CEO
DATE DRAWN	7/06/2022
CHECKED	-
MAP CHECKED	-
DATUM	GDA 1994 MGA Zone 50

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PROJECT	PROPOSED WAREHOUSE AND OFFICE FACILITIES
LOCATION	PART OF LOT 153 TALBOT ROAD HAZELMERE
TITLE	HISTORICAL AERIAL IMAGERY (1981 - 2000)
DRAWING	J2201067
FIGURE 3B	A

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Version: 10, Version Date: 17/11/2022

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DATE: 2001



DATE: 2002



DATE: 2003



DATE: 2004



DATE: 2005



DATE: 2006



Legend

Site Boundary

N

NOTES



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PROJECT	PROPOSED WAREHOUSE AND OFFICE FACILITIES
LOCATION	PART OF LOT 153 TALBOT ROAD HAZELMERE
TITLE	HISTORICAL AERIAL IMAGERY (2001 - 2006)
JOB NO.	J2201067
FIGURE NO.	FIGURE 3C
REV.	A

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DATE: 2007



DATE: 2008



DATE: 2009



DATE: 2010



DATE: 2011 SUMMER



DATE: 2011 WINTER



Legend

Site Boundary

N

NOTES
Aerial imagery sourced from Landgate/SLIP



SCALE	1:4,000 (A3)
DRAWN	CEO
DATE	[illegible]
	-
	-
	GDA 1994 MGA Zone 50

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PROJECT	PROPOSED WAREHOUSE AND OFFICE FACILITIES
LOCATION	PART OF LOT 153 TALBOT ROAD HAZELMERE
TITLE	HISTORICAL AERIAL IMAGERY (2007 - 2011 WINTER)
JOB NO.	J2201067
FIGURE NO.	FIGURE 3D
REV	A

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Version: 10, Version Date: 17/11/2022

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[illegible]22



DATE: 2012 SUMMER



DATE: 2012 WINTER



DATE: 2013 WINTER



DATE: 2013 SUMMER



DATE: 2014 SUMMER



DATE: 2014 AUTUMN



Legend

Site Boundary

N

BASED
Aerial imagery sourced from Landgate/SLIP



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PROPOSED WAREHOUSE AND OFFICE FACILITIES

PART OF LOT 153 TALBOT ROAD
HAZELMERE

HISTORICAL AERIAL IMAGERY (2012 SUMMER - 2014 AUTUMN)

J2201067 | FIGURE 3E | A

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DATE: 2014 WINTER



DATE: 2014 SPRING



DATE: 2015 SUMMER



DATE: 2015 AUTUMN



DATE: 2015 WINTER



DATE: 2015 SPRING



Legend

Site Boundary

N

NOTES
Aerial Imagery sourced from Landgate/SLIP



SCALE	1:4,000
DATE	[illegible]
DATE CHANGE	[illegible]
LOCATION	-
GRID COORDINATE	-
PROJECTION	GDA 1994 MGA Zone 50

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LOCATION	PART OF LOT 153 TALBOT ROAD HAZELMERE
TITLE	HISTORICAL AERIAL IMAGERY (2014 WINTER - 2015 SPRING)
DRAWN	J2201067
FIGURE	FIGURE 3F
REV	A

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DATE: 2016 SUMMER



DATE: 2016 AUTUMN



DATE: 2016 WINTER



DATE: 2016 SPRING



DATE: 2017 SUMMER



DATE: 2017 AUTUMN



Legend

Site Boundary

N



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PART OF LOT 153 TALBOT ROAD
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HISTORICAL AERIAL IMAGERY (2016 SUMMER - 2017 AUTUMN)

J0201067 | FIGURE 3G | A

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DATE: 2017 WINTER



DATE: 2017 SPRING



DATE: 2018 SUMMER



DATE: 2018 AUTUMN



DATE: 2018 WINTER



DATE: 2019 SUMMER



Legend

Site Boundary

N

NOTES
Aerial imagery sourced from Landgate/SLIP



SCALE	1:4,000 (A3)
DRAWN	CEB
DATE DRAWN	[illegible]
CHECKED	-
APPROVED	-
PROJECT NO.	[illegible]

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PROJECT	PROPOSED WAREHOUSE AND OFFICE FACILITIES
LOCATION	PART OF LOT 153 TALBOT ROAD HAZELMERE
TITLE	HISTORICAL AERIAL IMAGERY (2017 WINTER - 2019 SUMMER)
DRAWING NO.	J2201067
FIGURE 3H	A

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DATE: 2019 AUTUMN



DATE: 2019 WINTER



DATE: 2020 SUMMER



DATE: 2020 AUTUMN



DATE: 2020 WINTER



DATE: 2020 AUTUMN



Legend

Site Boundary

N

NOTES



SCALE	1:4,000
DRAWN	GEO
DATE	[illegible]
CHECKED	-
DATE	-
PROJECTION	GDA [illegible]

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PROJECT	PROPOSED WAREHOUSE AND OFFICE FACILITIES
LOCATION	PART OF LOT 153 TALBOT ROAD HAZELMERE
TITLE	HISTORICAL AERIAL IMAGERY (2019 AUTUMN - 2020 AUTUMN)
JOB	J2201067
FIGURE 3	A

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Appendix A: Supplied Drawings

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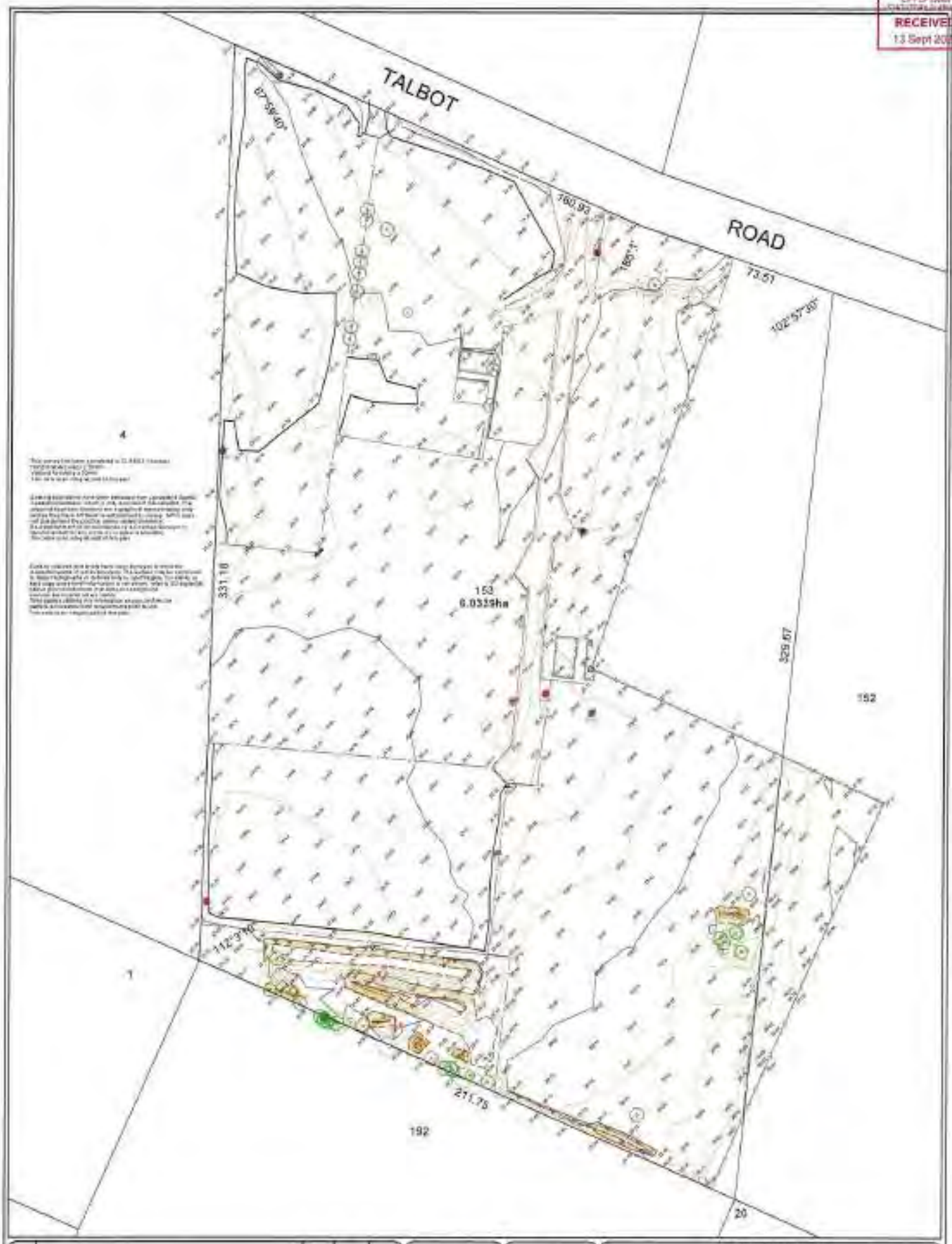

LOT 153 TALBOT ROAD
HAZELMERE
Level And Feature Survey

LOGOS PROPERTY

MNG

101437 - DE - 009 - A

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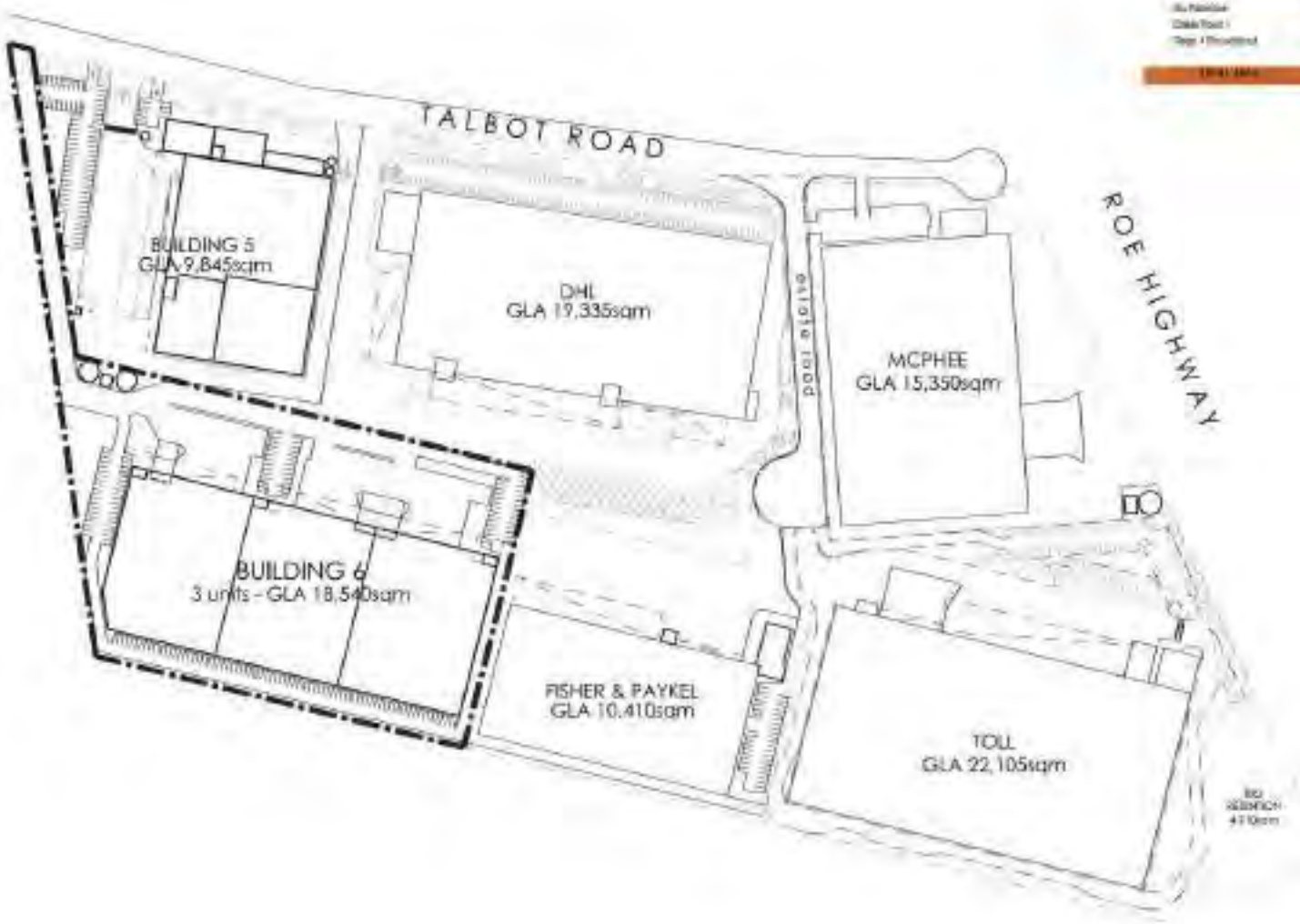
SCHEDULE OF AREAS

1								
2								
3								
4								
5								
6								



1 ESTATE PLAN

NOTE: INDICATIVE ONLY, SUBJECT TO DETAILED DESIGN

LOGOS

HAZELMERE LOGISTICS ESTATE
PROPOSED WAREHOUSE DISTRIBUTION & OFFICE FACILITIES
TALBOT ROAD, HAZELMERE, WA

ESTATE PLAN

CITY OF SWAN
STATUTORY PLANNING
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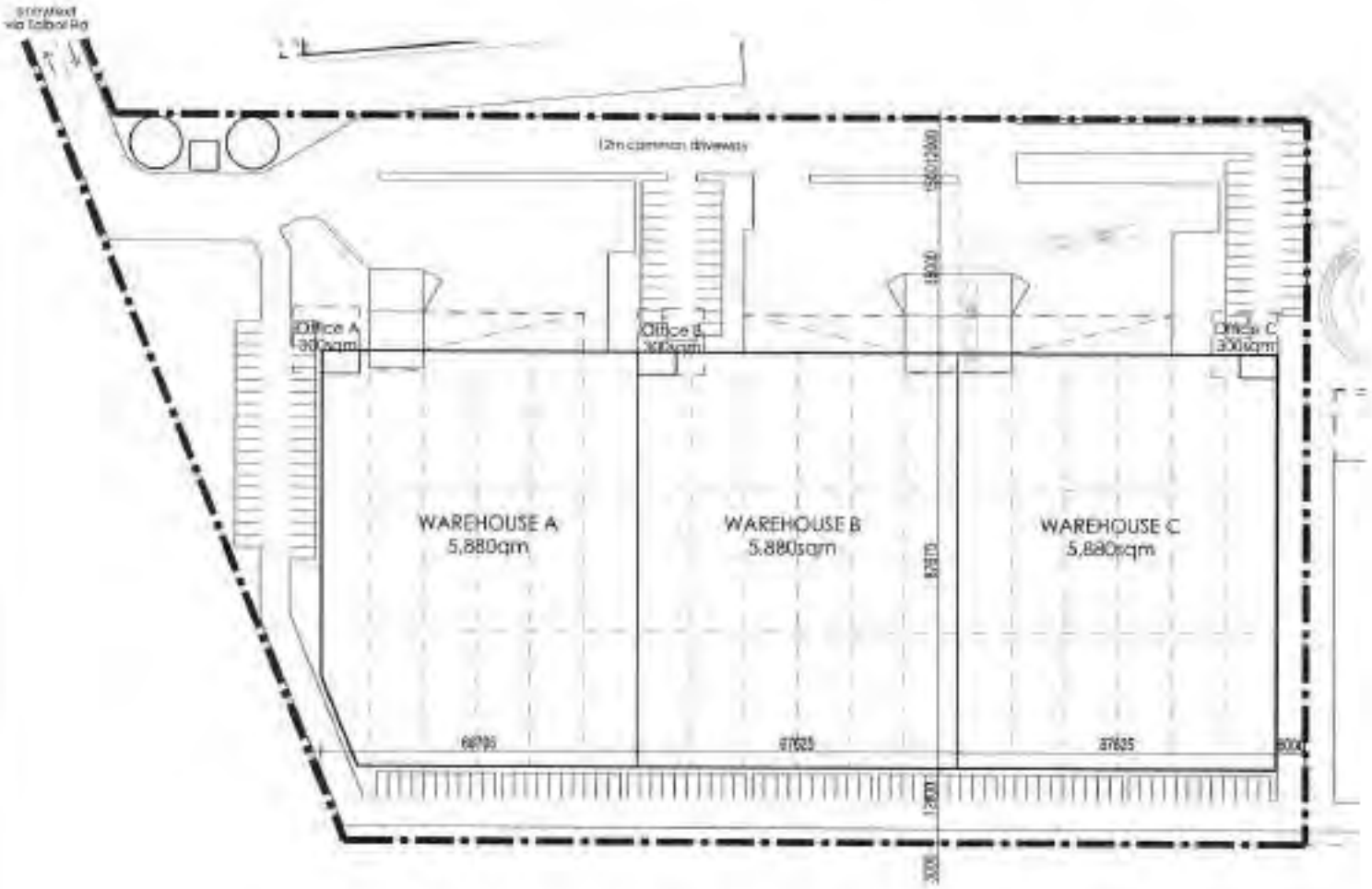

SCHEDULE OF AREAS

SITE AREA	17,735 sqm
WAREHOUSE A	5,880 sqm
WAREHOUSE B	5,880 sqm
WAREHOUSE C	5,880 sqm
OFFICE A (Mezz.)	300 sqm
OFFICE B (Mezz.)	300 sqm
OFFICE C (Mezz.)	300 sqm
TOTAL BUILDING AREA	13,640 sqm
No PARKING	603 sqm
HEAVY DUTY PAVEMENT	9,650 sqm
LIGHT DUTY PAVEMENT	5,812 sqm
	162 car spaces incl. 3 disabled
EFFICIENCY	5%
LANDSCAPE - (without green roof)	4,775sqm

2 SITE PLAN

NOTE : INDICATIVE ONLY, SUBJECT TO DETAILED DESIGN

LOGOS

HAZELMERE LOGISTICS ESTATE
PROPOSED WAREHOUSE DISTRIBUTION & OFFICE FACILITIES
TALBOT ROAD, HAZELMERE, WA

SITE PLAN

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Appendix B: Site Photographs

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Photograph 1: Looking north east across the central portion of the site



Photograph 2:Looking east across the northern portion of the site

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Photograph 3: Looking east from the south western corner of the site



Photograph 4: Looking north from the south eastern corner of the site

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Photograph 5: looking west adjacent the southern boundary



Photograph 6:Typical machinery/equipment laydown/storage area present across the northern portion of the site

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Appendix C: Machine Auger Borehole Reports

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EXPLANATORY NOTES TO BE READ WITH BOREHOLE AND TEST PIT REPORTS

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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

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METHOD OF SOIL DESCRIPTION
BOREHOLE AND TEST PIT REPORTS

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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%.

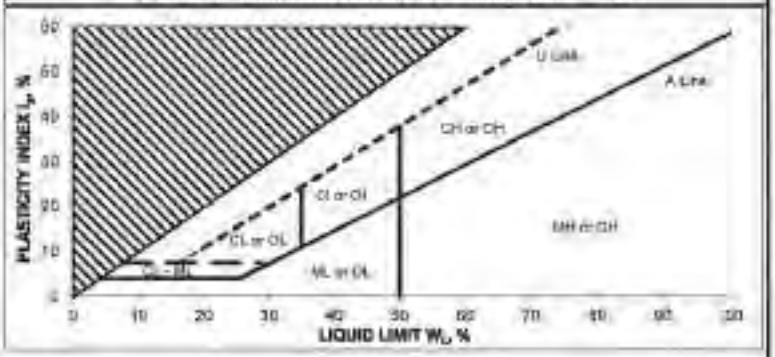
SOIL CLASSIFICATION AND INFERRED STRATIGRAPHY

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

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CITY OF WHITE
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Galt GEOTECHNICS

BOREHOLE: MA01

Sheet 1 OF 1

Job Number:	J2201067	Contractor:	Galt	Date:	23/03/2022
Client:	Logos Property Group	Drill Rig:	Scout	Logged:	MDS
Project:	Proposed Warehouse and Office Facilities	Inclination:	-90°	Checked Date:	30/03/2022
Location:	Part of Lot 193 Talbot Road, Hazelmere			Checked By:	FAD

Drilling					Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AOV			0.0					GP	FILL: Sandy GRAVEL, fine to coarse grained, sub-angular to angular, pale grey, with sand, trace fines	D		Hand stand
			0.5					SP	SAND: fine to coarse grained, sub-angular to sub-rounded, pale grey to off-white, trace fines	M	MD	
			1.0						Trace laterite gravel			
			1.5									
			2.0						Hole terminated at 2.20 m Target depth Groundwater not encountered			
			2.5									

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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Galt GEOTECHNICS

BOREHOLE: MA02

Sheet 1 OF 1

Job Number:	J2201067	**Contractor:**	Galt	**Date:**	23/03/2022
Client:	Logos Property Group	**Drill Rig:**	Scout	**Logged:**	MDS
Project:	Proposed Warehouse and Office Facilities	**Inclination:**	-90°	**Checked Date:**	30/03/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Drilling					Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV	1T		0.0					GP	FILL: Sandy GRAVEL, fine to coarse grained, sub-angular to angular, pale grey, with sand, trace fines	D		
	1T		0.5					SP	SAND: fine to coarse grained, sub-angular to sub-rounded, pale grey to off-white, trace fines	M	VD	
			1.0						Becoming pale brown			
			1.5									
			2.0						Hole terminated at 2.00 m Target depth Groundwater not encountered			
			2.5									

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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BOREHOLE: MA03

Sheet 1 OF 1

Job Number:	J2201067	**Contractor:**	Galt	**Date:**	23/03/2022
Client:	Logos Property Group	**Drill Rig:**	Scout	**Logged:**	MDS
Project:	Proposed Warehouse and Office Facilities	**Inclination:**	-90°	**Checked Date:**	30/03/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Drilling					Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV			0.0					SP	SAND: fine to medium grained, sub-angular to sub-rounded, pale yellow, trace fines	D	VD	
			0.5									
			1.0									
			1.5						Trace laterite gravel			
			2.0									
			2.5						Hole terminated at 2.40 m Target depth Groundwater not encountered			

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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BOREHOLE: MA04

Sheet 1 OF 1

Job Number:	J2201087	Contractor:	Galt	Date:	23/03/2022
Client:	Logos Property Group	Drill Rig:	Scout	Logged:	MDS
Project:	Proposed Warehouse and Office Facilities	Inclination:	-90°	Checked Date:	30/03/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			Checked By:	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV	E		0.0					SP	SAND: fine to medium grained, sub-angular to sub-rounded, pale grey to pale brown, trace gravel, trace fines	D	VD	
			0.5					GP	Sandy GRAVEL: fine to coarse grained, sub-angular to sub-rounded, brown/red, with sand, trace fines	M		
			1.0					CL-CI	Sandy CLAY: low to medium plasticity, brown, with sand, with laterite gravel			
			1.5									
			2.0						Hole terminated at 2.00 m Target depth Groundwater not encountered			
			2.5									

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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Galt GEOTECHNICS

BOREHOLE: MA05

Sheet 1 OF 1

Job Number:	J2201067	Contractor:	Galt	Date:	23/03/2022
Client:	Logos Property Group	Drill Rig:	Scout	Logged:	MDS
Project:	Proposed Warehouse and Office Facilities	Inclination:	-90°	Checked Date:	30/03/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			Checked By:	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY/ DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV	R		0.0					GP-GM	FILL: Sandy GRAVEL, fine to coarse grained, sub-angular to sub-rounded, brown, with sand, with fines	D		
			0.5					SP	SAND: fine to medium grained, sub-angular to sub-rounded, pale grey, trace gravel, trace fines	M	VD	
			1.0									
			1.5					GP	Sandy GRAVEL: fine to coarse grained, sub-angular to sub-rounded, yellow-brown, laterite, with 30-50% fine to coarse grained sand, trace fines			
			2.0						Hole terminated at 2.00 m Target depth Groundwater not encountered			
			2.5									

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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Galt GEOTECHNICS

BOREHOLE: MA06

Job Number:	J2201067	**Contractor:** Galt	**Date:** 23/03/2022
Client:	Logos Property Group	**Drill Rig:** Scout	**Logged:** MDS
Project:	Proposed Warehouse and Office Facilities	**Inclination:** -90°	**Checked Date:** 30/03/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere		**Checked By:** FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (Metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY/ DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV	n		0.0					SP, SM	FILL: SAND, fine to medium grained, sub-angular to sub-rounded, pale brown, with non-plastic fines, trace gravel			
			0.5					SP	SAND: fine to medium grained, sub-angular to sub-rounded brown, trace fines, trace gravel			
			1.0					SP	Gravelly SAND: fine to medium grained, sub-angular to sub-rounded, brown, with laterite gravel	D	D	
			1.5					GP	Sandy GRAVEL: fine to coarse grained, sub-rounded to rounded, brown, with sand, trace fines			
								CI	Gravelly CLAY: medium plasticity, brown, with fine to medium grained laterite gravel	M	H	
			2.0						Hole terminated at 2.00 m Target depth Groundwater not encountered			
			2.5									

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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BOREHOLE: MA07

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Job Number:	J2201087	Contractor:	Galt	Date:	23/03/2022
Client:	Logos Property Group	Drill Rig:	Scout	Logged:	MDS
Project:	Proposed Warehouse and Office Facilities	Inclination:	-90°	Checked Date:	30/03/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			Checked By:	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY/ DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AOV	H		0.0					GP	FILL: Sandy GRAVEL, fine to coarse grained, sub-rounded to angular pale grey to white, with sand, trace fines			
	H		0.5					SP	Gravelly SAND: fine to coarse grained, sub-angular to sub-rounded, pale brown, with laterite gravel, trace fines	D - M	D	
			1.0					GP	Sandy GRAVEL: fine to coarse grained, sub-rounded to rounded laterite, with sand			
	H		1.5					CI-CH	Gravelly CLAY: medium to high plasticity, brown		H	
			2.0						Hole terminated at 2.00 m Target depth Groundwater not encountered			
			2.5									

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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Galt GEOTECHNICS

BOREHOLE: MA08

Sheet 1 OF 1

Job Number:	J2201067	**Contractor:**	Galt	**Date:**	23/03/2022
Client:	Logos Property Group	**Drill Rig:**	Scout	**Logged:**	MDS
Project:	Proposed Warehouse and Office Facilities	**Inclination:**	-90°	**Checked Date:**	30/03/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADW	F		0.0					GP	FILL: Sandy GRAVEL, fine to coarse grained, sub-rounded to angular, pale grey, with sand, trace fines	D		
			0.5					SP	Gravelly SAND: fine to coarse grained, pale grey to off-white, with sub-angular to sub-rounded gravel, trace fines	M	D - MD	
	R		1.0					GP	Sandy GRAVEL: fine to coarse grained, sub-rounded to rounded, pale brow, with sand, trace fines Becoming brown			
			2.0						Hole terminated at 2.30 m Target depth Groundwater not encountered			
			2.5									

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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BOREHOLE: MA09

Sheet 1 OF 1

Job Number:	J2201067	**Contractor:**	Galt	**Date:**	23/03/2022
Client:	Logos Property Group	**Drill Rig:**	Scout	**Logged:**	MDS
Project:	Proposed Warehouse and Office Facilities	**Inclination:**	-90°	**Checked Date:**	30/03/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV	F F		0.0 0.5 1.0 1.5 2.0 2.5				GP GM	GM	FILL: Sandy GRAVEL, fine to coarse grained, sub-angular to sub-rounded, brown, with sand, with fines	D		
								SP	SAND, fine to medium grained, brown to dark grey, trace gravel, trace fines	M	D	
									Becoming pale grey			
									Becoming brown to grey			
								GP	Sandy GRAVEL, fine to coarse grained, sub-angular to rounded, laterite, brown, with sand, trace fines			
								CI-CH	Gravelly CLAY, medium to high plasticity, with laterite gravel, with sand		H	
									Hole terminated at 2.00 m Target depth Groundwater not encountered			

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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BOREHOLE: MA10

Sheet 1 OF 1

Job Number:	J2201087	Contractor:	Galt	Date:	23/03/2022
Client:	Logos Property Group	Drill Rig:	Scout	Logged:	MDS
Project:	Proposed Warehouse and Office Facilities	Inclination:	-90°	Checked Date:	30/03/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			Checked By:	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV	F		0.0					GP, GM	FILL: Sandy GRAVEL: fine to coarse grained, sub-angular to sub-rounded, brown, with sand, with low plasticity fines	D	D	
			0.5					SP	SAND: fine to medium grained, sub-angular to sub-rounded, pale grey to off-white, trace gravel, trace fines			
			1.0					SP	Gravelly SAND: fine to medium grained, sub-angular to sub-rounded, dark grey, with laterite gravel, trace fines	W	D - MD	
			1.5					GP	Sandy GRAVEL: fine to coarse grained, sub-rounded to rounded, laterite, dark brown, with sand,trace fines			
			2.0						Hole terminated at 2.00 m Target depth Groundwater not encountered			
			2.5									

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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BOREHOLE: MA11

Sheet 1 OF 1

Job Number:	J2201007	Contractor:	Galt	Date:	23/03/2022
Client:	Logos Property Group	Drill Rig:	Scout	Logged:	MDS
Project:	Proposed Warehouse and Office Facilities	Inclination:	-90°	Checked Date:	30/03/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			Checked By:	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV			0.0					GP	FILL: Sandy GRAVEL, fine to coarse grained, sub-angular to angular, pale grey, with sand, trace fines	D		
			0.5					SP	SAND: fine to medium grained, sub-angular to sub-rounded, pale grey to pale brown, trace gravel, trace fines	M	D	
			1.0					SP	Gravelly SAND: fine to medium grained, sub-angular to sub-rounded, grey to pale brow, with laterite gravel, trace fines			
			1.5					CI-CH	Gravelly CLAY: medium to high plasticity, with laterite gravel, with sand		F	
			2.0						Hole terminated at 2.00 m Target depth Groundwater not encountered			
			2.5									

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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Galt GEOTECHNICS

BOREHOLE: MA12

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Job Number:	J2201047	**Contractor:**	Galt	**Date:**	23/03/2022
Client:	Logos Property Group	**Drill Rig:**	Scout	**Logged:**	MDS
Project:	Proposed Warehouse and Office Facilities	**Inclination:**	-90°	**Checked Date:**	30/03/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV	L M		0.0 0.5 1.0 1.5 2.0 2.5					GP	FILL: Sandy GRAVEL, fine to coarse grained, sub-angular to angular, pale grey, with sand, trace non-plastic fines.	D		
								SP	SAND: fine to medium grained, sub-angular to sub-rounded, pale grey becoming off-white, trace gravel, trace fines.	M	D	
								SP	Gravelly SAND: fine to medium grained, sub-angular to sub-rounded, pale brown, with laterite gravel, trace fines.			
									Hole terminated at 2.00 m Target depth Groundwater not encountered			

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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Appendix D: Direct Push Borehole Reports

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EXPLANATORY NOTES TO BE READ WITH BOREHOLE AND TEST PIT REPORTS

Galt

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

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METHOD OF SOIL DESCRIPTION
BOREHOLE AND TEST PIT REPORTS

Galt

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

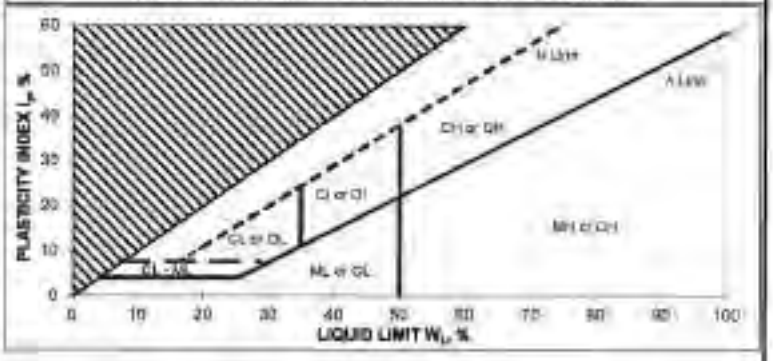
Soil descriptions are based on AS1726-2017. Material properties are assessed in the field by visual/tactile methods in combination with field and laboratory testing techniques (where used).

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

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BOREHOLE: BH01

Sheet 1 OF 1

Job Number:	J2201067	Contractor:	DPP	Date:	17/03/2022
Client:	Logos Property Group	Drill Rig:	8620DT	Logged:	AM
Project:	Proposed Warehouses and Office Facilities	Inclination:	-90°	Checked Date:	12/04/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			Checked By:	FAD

Drilling					Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH (m)	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV			0					SP	SAND: fine to medium grained, sub-angular to sub-rounded, pale brown, with gravel, trace fines			Moisture condition not observed
			1					GP	Sandy GRAVEL: fine to coarse grained, sub-angular to sub-rounded, grey, trace fines			
			2						Clayey SAND: fine to medium grained, sub-angular to sub-rounded, yellow, with gravel			
			3									
			4						Residual red, trace silt fines, trace gravel			
			5						Pale red			
			6					SC	Grey			
			7									
			8						Fine to medium grained, pale green, trace silt fines			
			9									
			10						Hole terminated at 10.00 m Target depth Groundwater encountered at 6.1 m			
			11									

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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BOREHOLE: BH02

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Job Number:	J2201067	**Contractor:**	DPP	**Date:**	17/03/2022
Client:	Logos Property Group	**Drill Rig:**	9520DT	**Logged:**	AM
Project:	Proposed Warehouses and Office Facilities	**Inclination:**	-90°	**Checked Date:**	12/04/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Drilling					Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV		▼	0					SP	SAND: fine to medium grained, sub-angular to sub-rounded, yellow, trace fines, trace gravel Brown-grey		Moisture condition not observed
			1					SP-SM	Gravelly SAND: fine to coarse grained, sub-angular to sub-rounded, pale brown, with fines		
			2					SC-SW	Clayey Gravelly SAND: fine to coarse grained, sub-angular to sub-rounded, pale brown		
			3					SC	Clayey SAND: fine to medium grained, sub-angular to sub-rounded, pale brown mottled red, 20-35% fines, trace gravel Trace gravel		
			4					SC	Clayey SAND: fine to medium grained, sub-angular to sub-rounded, grey, 20-35% fines		
			5								
			6								
			7						Pale yellow		
			8						Fine to medium grained sand		
			9						Grey		
			10						Pale brown mottled grey, 20-35% fines		
			11						Hole terminated at 10.00 m Target depth Groundwater encountered at 7.30 m		

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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BOREHOLE: BH03

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Job Number:	J2201067	**Contractor:**	DPP	**Date:**	18/03/2022
Client:	Logos Property Group	**Drill Rig:**	6620DT	**Logged:**	AM
Project:	Proposed Warehouses and Office Facilities	**Inclination:**	-90°	**Checked Date:**	12/04/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV		▼	0					SP	SAND: fine to medium grained, sub-angular to sub-rounded, pale yellow, trace gravel, trace fines			Moisture condition not observed
			1						Yellow			
									With gravel			
			2					SC	Clayey SAND: fine to coarse grained, sub-angular to sub-rounded, red, with fine to coarse grained gravel			
			3									
			4									
			5						Grey, trace gravel			
			6									
			7									
			8					CI-CH	Sandy CLAY: medium to high plasticity, grey, fine to medium grained sand			
			9						Hole terminated at 9.05 m Target depth Groundwater encountered at 4.5 m			
			10									
			11									

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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BOREHOLE: BH04

Sheet 1 OF 1

Job Number:	J2201087	Contractor:	DPP	Date:	18/03/2022
Client:	Logos Property Group	Drill Rig:	6620DT	Logged:	AM
Project:	Proposed Warehouses and Office Facilities	Inclination:	-90°	Checked Date:	12/04/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			Checked By:	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV		▼	0					SP	SAND: fine to medium grained, sub-angular to sub-rounded, grey, with gravel, trace fines			Moisture condition not observed
			1					SP	Pale grey, trace gravel			
								SP-SM	Brown, with fines			
			2					GP	Gravelly SAND: fine to medium grained, sub-angular to sub-rounded, brown, with fines			
								SC	Sandy GRAVEL: fine to coarse grained, sub-angular to sub-rounded, pale red/brown, with fines			
			3						Clayey SAND: fine to coarse grained, sub-angular to sub-rounded, pale red, approximately 20-30% fines, with gravel			
			4									
			5									
			6									
			7									
			8					CH	Sandy CLAY: medium to high plasticity, grey, fine to medium grained sand			
									Pale green mottled grey, with nodules of sandy clay			
			9					CI	Sandy CLAY: medium plasticity, red mottled pale grey			
			10						Hole terminated at 9.00 m Target depth Groundwater encountered at 5.83 m			
			11									

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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Appendix E: Groundwater Monitoring Well Construction Reports

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EXPLANATORY NOTES TO BE READ WITH BOREHOLE AND TEST PIT REPORTS

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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 Loss (complete)
◁	Water Loss (partial)
▼	Water Level

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

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METHOD OF SOIL DESCRIPTION
BOREHOLE AND TEST PIT REPORTS

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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

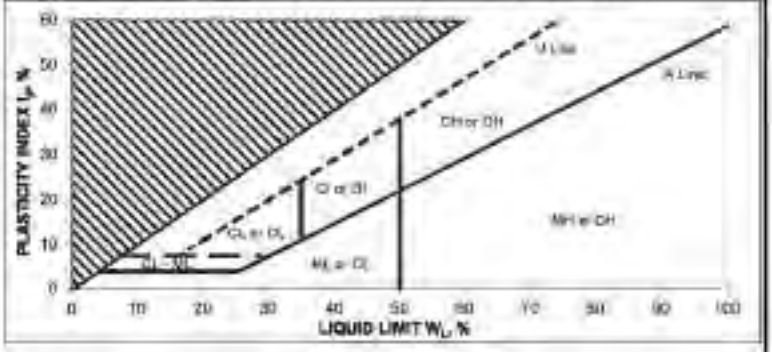
NOTE: Dual classification given for soils with a fines content between 5% and 12%.

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

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GROUNDWATER MONITORING BORE: MW01

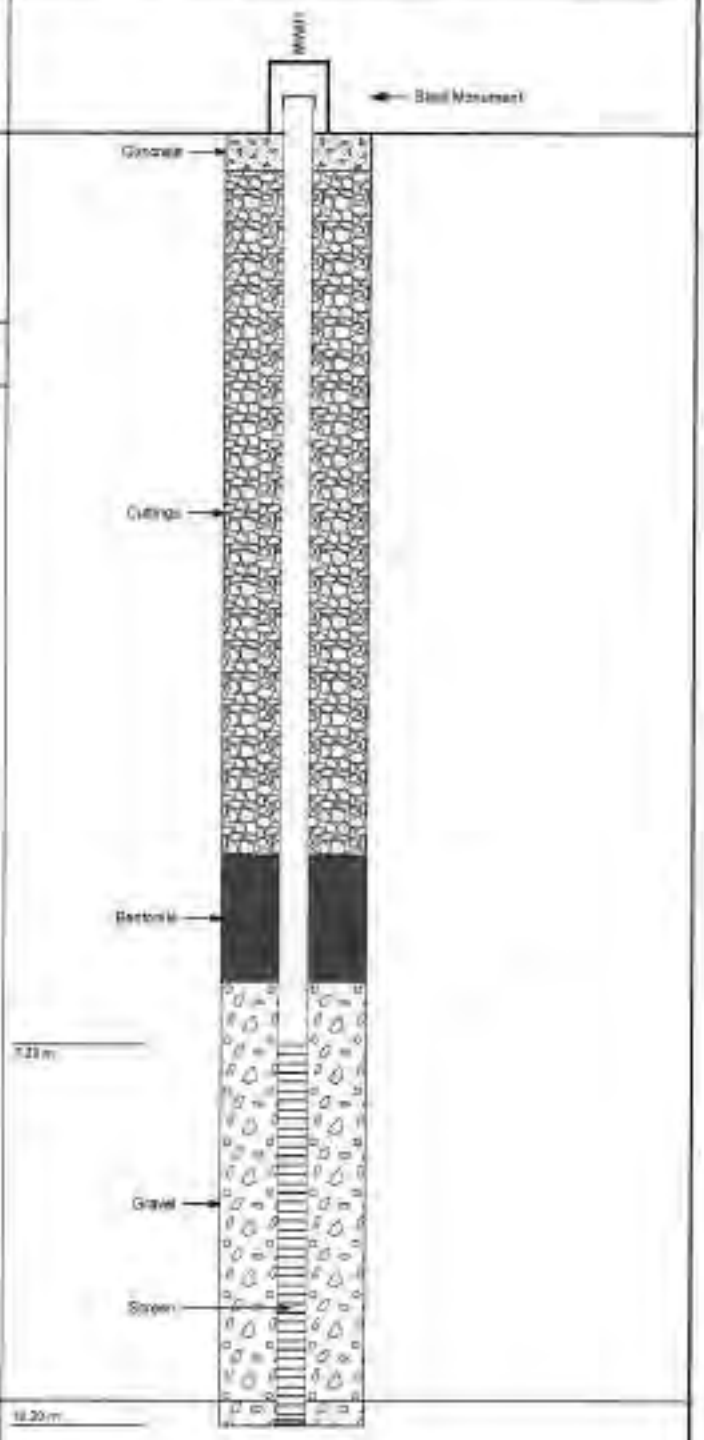
Sheet 1 OF 1

Job Number:	22301067	Contractor:	DPP	Date:	17/03/2022
Client:	Logos Property Group	Drill Rig:	6520DT	Logged:	AM
Project:	Proposed Warehouses and Office Facilities	Inclination:	-90°	Checked Date:	12/04/2022
Location:	Part of Lot 183 Talbot Road, Hazelmere			Checked By:	FAD

Method	Ground Water	Depth (m)	Elevation (m AHD)	Graphic Log	Soil / Rock Description
ADV		0			SAND: fine to medium grained, sub-angular to sub-rounded, pale brown, with gravel, trace fines
		2			Sandy GRAVEL: fine to coarse grained, sub-angular to sub-rounded, grey, trace fines
					Clayey SAND: fine to medium grained, sub-angular to sub-rounded, yellow, with gravel
		4			Reddish red, trace silt fines, trace gravel
					Pale red
		6			Grey
		8			Fine to medium grained, pale green, trace silt fines
		10			Hole terminated at 10.00 m Target depth Groundwater encountered at 8.1 m

WELL INSTALLATION DETAILS

ID:	MW01	Stick Up & RL:	0.65 m
Type:	Standpipe	Tip Depth & RL:	10.20 m
Installation Date:	16/03/2022	Static Water Level:	NA



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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GROUNDWATER MONITORING BORE: MW02

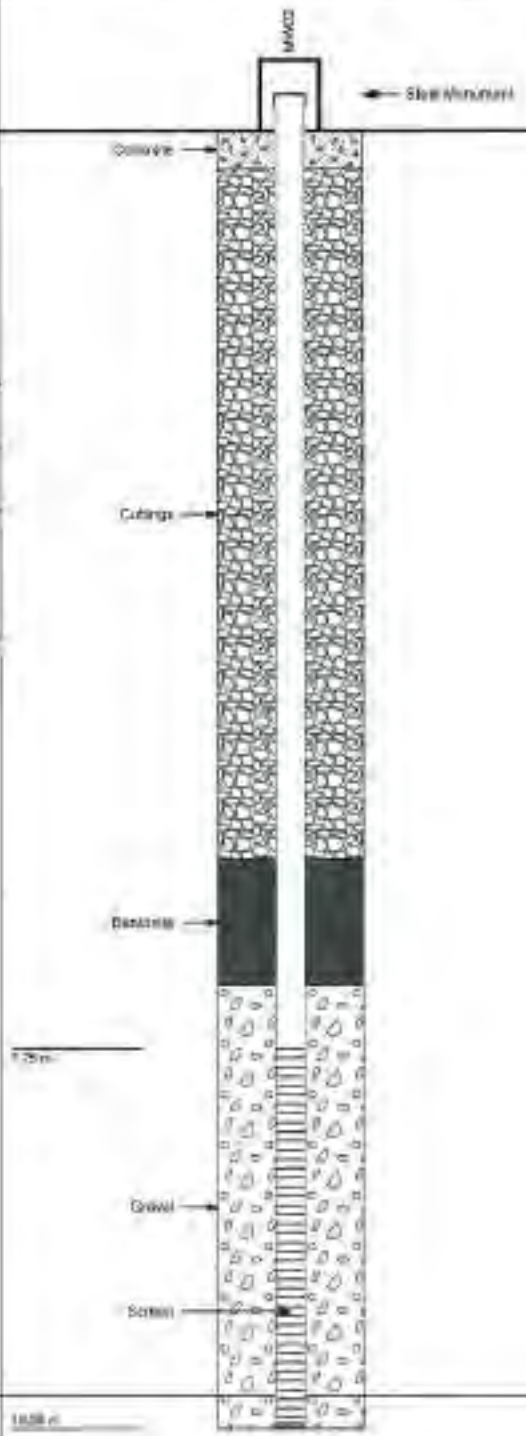
Sheet 1 OF 1

Job Number:	J2201067	Contractor:	DPP	Date:	17/03/2022
Client:	Logos Property Group	Drill Rig:	6620DT	Logged:	AM
Project:	Proposed Warehouses and Office Facilities	Inclination:	-90°	Checked Date:	12/04/2022
Location:	Part of Lot 153 Talbot Road, Hassall Grove			Checked By:	FAC

Method	Ground Water	Depth (m)	Elevation (m AHD)	Graphic Log	Soil / Rock Description
ADW		0			SAND: fine to medium grained, sub-angular to sub-rounded, yellow, trace fines, trace gravel Brown-grey
		1			Gravelly SAND: fine to coarse grained, sub-angular to sub-rounded, pale brown, with fines
					Clayey Gravelly SAND: fine to coarse grained, sub-angular to sub-rounded, pale brown
					Clayey SAND: fine to medium grained, sub-angular to sub-rounded, pale brown mottled red, 25-35% fines with gravel Trace gravel
		4			Clayey SAND: fine to medium grained, sub-angular to sub-rounded, grey, 20-30% fines
		6			Pale yellow
					Fine to medium grained sand
		8			Grey
		10			Pale brown mottled grey, 25-45% fines
					Hole terminated at 10.05 m Target depth Groundwater encountered at 1.35 m

WELL INSTALLATION DETAILS

ID:	MW02	Stick Up & RL:	0.58 m
Type:	Standpipe	Tip Depth & RL:	10.25 m
Installation Date:	17/03/2022	Static Water Level:	NA



Comments:

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GROUNDWATER MONITORING BORE: MW03

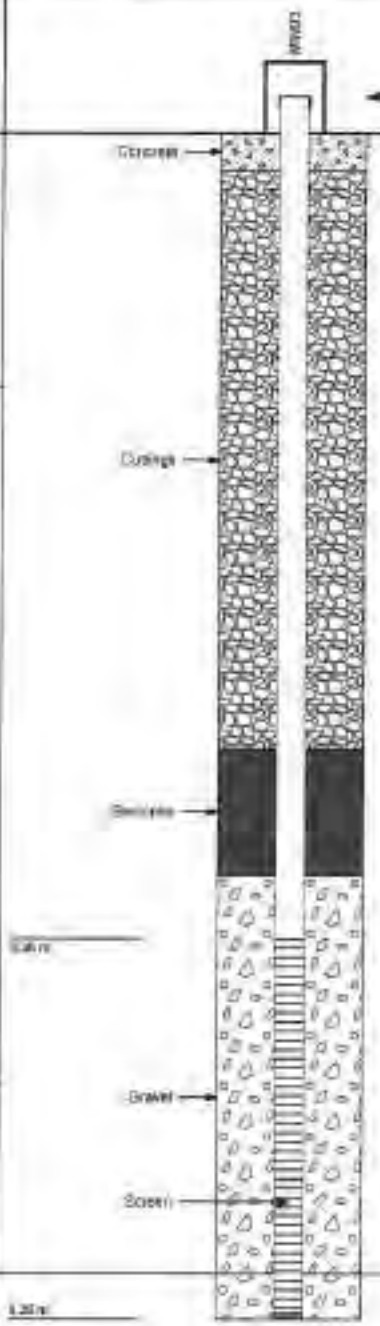
Sheet 1 OF 1

Job Number:	J2201057	Contractor:	DPP	Date:	18/03/2022
Client:	Logos Property Group	Drill Rig:	9620DT	Logged:	AM
Project:	Proposed Warehouses and Office Facilities	Inclination:	-90°	Checked Date:	12/04/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			Checked By:	FAD

Method	Ground Water	Depth (m)	Elevation (m AHD)	Graphic Log	Soil / Rock Description
		0			
					SAND: fine to medium grained, sub-angular to sub-rounded, pale yellow, trace gravel, trace roots
					Yellow
					With gravel
		2			Clayey SAND: fine to coarse grained, sub-angular to sub-rounded, red, with fine to coarse grained gravel
					Grey, trace gravel
		4			
		6			
					Sandy CLAY: medium to high plasticity, grey, fine to medium grained sand
		8			
					Hole terminated at 9.00 m Target depth Groundwater encountered at 4.5 m
		10			

WELL INSTALLATION DETAILS

ID:	MW03	Stick Up & RL:	0.60 m
Type:	Standpipe	Tip Depth & RL:	8.35 m
Installation Date:	18/03/2022	Static Water Level:	NA



Comments:

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GROUNDWATER MONITORING BORE: MW04

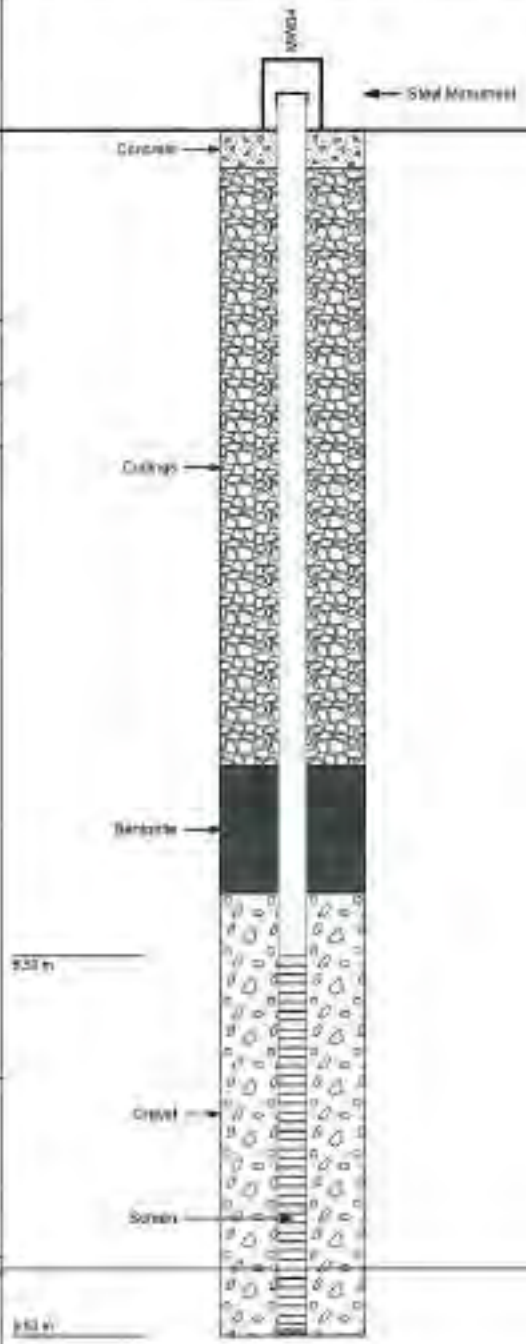
Sheet 1 OF 1

Job Number:	J2201087	Contractor:	DPP	Date:	18/03/2022
Client:	Logos Property Group	Drill Rig:	6520DT	Logged:	AM
Project:	Proposed Warehouses and Office Facilities	Inclination:	-90°	Checked Date:	12/04/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			Checked By:	PAD

Method	Ground Water	Depth (m)	Elevation (m AHD)	Graphic Log	Soil / Rock Description
AUW		0			SAND: fine to medium grained, sub-angular to sub-rounded, grey, with gravel, trace fines
					Pale grey, trace gravel
					Brown, with fines
		2			Gravelly SAND: fine to medium grained, sub-angular to sub-rounded, brown, with fines
					Sandy GRAVEL: fine to coarse grained, sub-angular to sub-rounded, pale red/brown, with fines
		4			Clayey SAND: fine to coarse grained, sub-angular to sub-rounded, pale red, approximately 20-50% fines, with gravel
		6			Sandy CLAY: medium to high plasticity, grey, fine to medium grained sand
		8			Pale green mottled grey, with nodules of sandy clay
					Sandy CLAY: medium plasticity, red mottled pale grey
		10			Hole terminated at 9.60 m Target depth Groundwater encountered at 5.53 m

WELL INSTALLATION DETAILS

ID:	MW04	Stick Up & RL:	0.53 m
Type:	Standpipe	Tip Depth & RL:	9.53 m
Installation Date:	18/03/2022	Static Water Level:	NA



Comments:

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Appendix F: Groundwater Monitoring Logs

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GROUNDWATER FIELD PARAMETERS

Galt ENVIRONMENTAL

Date/Time: 5- 22 **Monitoring Well:** MW01 **Sampling Method:** LF

Job Number: [illegible] **Depth To Water (mTOC):** 9.34 **Purge Volume:** 6L

Site: [illegible] **Depth of Well (mTOC):** 10.91 **Flow Rate (L/min):** 1L

Field Rep: MS **Height of Stick-up (m):** 0.653 **Flow Cell Used:** y

Observations	SWL (m)	Volume	Time	Temperature (°C)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Conductivity (uS/cm)	pH	Redox - ORP (mV)
pale brown, no odour, highly turbid		2	2	23.1	31.1	2.68	487	6.2	103
		2	2	22.7	30.2	2.60	497	6.1	95
		2	2	22.8	30.0	2.59	499	6.1	93

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GROUNDWATER FIELD PARAMETERS

Galt ENVIRONMENTAL

Date/Time: 5- 22 **Monitoring Well:** MW02 **Sampling Method:** LF

Job Number: 0102 **Depth To Water (mTOC):** 8.07 **Purge Volume:** 6L

Site: Tinsletwood **Depth of Well (mTOC):** 11.02 **Flow Rate (L/min):** 1L

Field Rep: MG **Height of Stick-up (m):** 0.536 **Flow Cell Used:** y

Observations	SWL (m)	Volume	Time	Temperature (°C)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Conductivity (uS/cm)	pH	Redox - ORP (mV)
pale brown, no odour, highly turbid		2	2	22.2	27.5	2.40	247	5.5	140
		2	2	20.0	27.1	2.37	267	5.2	143
		2	2	22.1	26.8	2.34	276	5.2	162

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GROUNDWATER FIELD PARAMETERS

Galt ENVIRONMENTAL

Date/Time: 5- 22 **Monitoring Well:** MW03 **Sampling Method:** LF

Job Number: 010e7 **Depth To Water (mTOC):** 5.27 **Purge Volume:** 6L

Site: Ironstone **Depth of Well (mTOC):** 9.77 **Flow Rate (L/min):** 1L

Field Rep: MG **Height of Stick-up (m):** 0.554 **Flow Cell Used:** y

Observations	SWL (m)	Volume	Time	Temperature (°C)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Conductivity (uS/cm)	pH	Redox - ORP (mV)
pale brown, no odour moderately turbid		2	2	23.6	37.7	3.00	440	5.8	154
		2	2	23.3	36.3	3.08	438	5.7	153
		2	2	23.5	36.0	3.05	437	5.7	154

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GROUNDWATER FIELD PARAMETERS

Galt ENVIRONMENTAL

Date/Time: 5-4-22 **Monitoring Well:** MW04 **Sampling Method:** LF

Job Number: [illegible] **Depth To Water (mTOC):** 6.41 **Purge Volume:** 3L

Site: [illegible] **Depth of Well (mTOC):** 10.22 **Flow Rate (L/min):** 1L

Field Rep: [illegible] **Height of Stick-up (m):** 0.626 **Flow Cell Used:** y

Observations	SWL (m)	Volume	Time	Temperature (°C)	Dissolved Oxygen (%)	Dissolved Oxygen (mg/L)	Conductivity (uS/cm)	pH	Redox - ORP (mV)
pale brown, no odour, highly turbid — QC taken		2	2	23.6	36.1	3.06	411	6.0	171
		2	2	23.3	30.5	2.60	362	5.9	131
		2	2	23.1	29.9	2.56	363	5.9	124
		2	2	23.0	29.9	2.55	362	5.9	125

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Appendix G: Laboratory Test Results

Document Set ID: 7363023
Version: 10, Version Date: 17/11/2022

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Certificate of Analysis

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

NATA Accredited
Accreditation Number 2377
Site Number 2370

Attention: Mariesa Greenwood

Report 878217-S-V2
Project name Hazelmere
Project ID J2201067
Received Date Apr 07, 2022

Client Sample ID			MA07/0.0	MA11/1.0	MA08/0.0	MA04/1.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L22-Ap0015474	L22-Ap0015475	L22-Ap0015476	L22-Ap0015477
Date Sampled			Mar 24, 2022	Mar 24, 2022	Mar 24, 2022	Mar 24, 2022
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	95	< 50	110	< 50
TRH C29-C36	50	mg/kg	260	< 50	250	< 50
TRH C10-C36 (Total)	50	mg/kg	355	< 50	360	< 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	%	79	74	71	91
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[#2]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH >C10-C16 less Naphthalene (F2)[#1]	50	mg/kg	< 50	< 50	< 50	< 50
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[#3]	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[#2]	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

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Client Sample ID			MA07/0.0	MA11/1.0	MA08/0.0	MA04/1.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L22-Ap0015474	L22-Ap0015475	L22-Ap0015476	L22-Ap0015477
Date Sampled			Mar 24, 2022	Mar 24, 2022	Mar 24, 2022	Mar 24, 2022
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
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	%	83	84	83	79
p-Terphenyl-d14 (surr.)	1	%	105	109	104	94
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	260	< 100	280	< 100
TRH >C34-C40	100	mg/kg	370	< 100	340	< 100
TRH >C10-C40 (total)*	100	mg/kg	630	< 100	620	< 100
Heavy Metals						
Arsenic	2	mg/kg	< 2	< 2	< 2	< 2
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	13	6.5	15	10
Copper	5	mg/kg	15	< 5	15	< 5
Lead	5	mg/kg	16	< 5	15	6.0
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	5.4	< 5	< 5	< 5
Zinc	5	mg/kg	18	< 5	26	< 5
% Moisture	1	%	1.4	4.7	4.2	4.3

Client Sample ID			MA09/0.5	MA10/1.5	MA06/0.0	MA12/1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L22-Ap0015478	L22-Ap0015479	L22-Ap0015480	L22-Ap0015481
Date Sampled			Mar 24, 2022	Mar 24, 2022	Mar 24, 2022	Mar 24, 2022
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	56	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	140	92	81	< 50
TRH C10-C36 (Total)	80	mg/kg	196	92	81	< 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	%	71	64	61	67

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Client Sample ID			MA09/0.5	MA10/1.5	MA09/0.0	MA12/1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L22-Ap0015478	L22-Ap0015479	L22-Ap0015480	L22-Ap0015481
Date Sampled			Mar 24, 2022	Mar 24, 2022	Mar 24, 2022	Mar 24, 2022
Test/Reference	LOR	Unit				
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[N01]	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	0.9	< 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	0.8	< 0.5	< 0.5
Total PAH*	0.5	mg/kg	< 0.5	2.2	< 0.5	< 0.5
2-Fluorobiphenyl (surr.)	1	%	89	81	84	92
p-Terphenyl-d14 (surr.)	1	%	112	101	108	103
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	140	< 100	100	< 100
TRH >C34-C40	100	mg/kg	210	120	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	350	120	100	< 100
Heavy Metals						
Arsenic	2	mg/kg	< 2	< 2	< 2	< 2
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	< 5	11	16	< 5
Copper	5	mg/kg	9.3	< 5	7.2	< 5
Lead	5	mg/kg	8.0	7.7	8.0	5.3
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	< 5	< 5	< 5	< 5
Zinc	5	mg/kg	11	< 5	15	8.9
% Moisture	1	%	3.3	4.4	5.0	4.4

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Client Sample ID			MA01/0.0	MA02/1.0	QC4	MA05/2.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L22-Ap0015482	L22-Ap0015483	L22-Ap0015487	L22-Ap0015695
Date Sampled			Mar 24, 2022	Mar 24, 2022	Mar 24, 2022	Mar 24, 2022
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	210	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	190	< 50	< 50	< 50
TRH C10-C36 (Total)	50	mg/kg	400	< 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	%	66	63	59	59
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[#2]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH >C10-C16 less Naphthalene (F2)[#1]	50	mg/kg	< 50	< 50	< 50	< 50
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[#3]	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[#3]	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	%	88	80	91	83
p-Terphenyl-d14 (surr.)	1	%	110	96	119	106
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	360	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	360	< 100	< 100	< 100

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Client Sample ID			MA01/0.0	MA02/1.0	QC4	MA05/2.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L22-Ap0015482	L22-Ap0015483	L22-Ap0015487	L22-Ap0015695
Date Sampled			Mar 24, 2022	Mar 24, 2022	Mar 24, 2022	Mar 24, 2022
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	< 2	< 2	< 2	2.1
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	6.8	9.5	8.9	11
Copper	5	mg/kg	11	< 5	< 5	< 5
Lead	5	mg/kg	17	7.0	16	9.2
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	< 5	< 5	< 5	< 5
Zinc	5	mg/kg	31	< 5	9.9	< 5
% Moisture	1	%	< 1	5.8	4.8	8.1

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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
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Welshpool	Apr 11, 2022	14 Days
BTEX - Method: LTM-ORG-2010 TRH C6-C40	Welshpool	Apr 11, 2022	14 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Welshpool	Apr 11, 2022	14 Days
Polycyclic Aromatic Hydrocarbons - Method: LTM-ORG-2130 PAH and Phenols in Soil and Water	Welshpool	Apr 11, 2022	14 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Welshpool	Apr 11, 2022	14 Days
Metals M8 - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Welshpool	Apr 11, 2022	28 Days
% Moisture - Method: ARL135 Moisture in Solids	Welshpool	Apr 07, 2022	14 Days

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IANZ # 1290

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3 April 2022

Company Name:	Galt Environment P/L	**Order No.:**	J2201066
Address:	50 Edward Street Osborne Park WA 6017	**Report #:**	878217
		Phone:	08 6272 0200
		Fax:	08 9285 8444
Project Name:	Hazelmere		
Project ID:	J2201067		

Received:	Apr 7, 2022 10:51 AM
Due:	Apr 12, 2022
Priority:	3 Day
Contact Name:	Mariesa Greenwood

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						BTEX and Naphthalene	Moisture Set	Eurofins Suite B7	Eurofins Suite B7 (filtered metals)
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X
Melbourne Laboratory - NATA # 1261 Site # 1254						X		X	X
Sydney Laboratory - NATA # 1261 Site # 18217									
Brisbane Laboratory - NATA # 1261 Site # 20794									
Mayfield Laboratory - NATA # 1261 Site # 25079									
External Laboratory									
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID				
1	MW01	Apr 05, 2022		Water	L22-Ap0015470				X
2	MW02	Apr 05, 2022		Water	L22-Ap0015471				X
3	MW03	Apr 05, 2022		Water	L22-Ap0015472				X
4	MW04	Apr 05, 2022		Water	L22-Ap0015473				X
5	MA07/0.0	Mar 24, 2022		Soil	L22-Ap0015474		X	X	
6	MA11/1.0	Mar 24, 2022		Soil	L22-		X	X	

Document Set ID: 7363023
Version: 10, Version Date: 17/11/2022

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STATUTORY PLANNING
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7 Sept 2022

Company Name:	Galt Environment P/L	**Order No.:**	J2201066
Address:	50 Edward Street Osborne Park WA 6017	**Report #:**	878217
		Phone:	08 6272 0200
		Fax:	08 9285 8444
Project Name:	Hazelmere		
Project ID:	J2201067		

Received:	Apr 7, 2022 10:51 AM		
Due:	Apr 12, 2022		
Priority:	3 Day		
Contact Name:	Mariesa Greenwood		

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						BTEX and Naphthalene	Moisture Set	Eurofins Suite B7	Eurofins Suite B7 (Reject metals)
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X
Melbourne Laboratory - NATA # 1261 Site # 1254						X		X	X
Sydney Laboratory - NATA # 1261 Site # 18217									
Brisbane Laboratory - NATA # 1261 Site # 20794									
Mayfield Laboratory - NATA # 1261 Site # 25079									
External Laboratory									
					Ap0015475				
7	MA08/0.0	Mar 24, 2022		Soil	L22-Ap0015476		X	X	
8	MA04/1.0	Mar 24, 2022		Soil	L22-Ap0015477		X	X	
9	MA09/0.5	Mar 24, 2022		Soil	L22-Ap0015478		X	X	
10	MA10/1.5	Mar 24, 2022		Soil	L22-Ap0015479		X	X	
11	MA06/0.0	Mar 24, 2022		Soil	L22-Ap0015480		X	X	
12	MA12/1.0	Mar 24, 2022		Soil	L22-Ap0015481		X	X	

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Company Name:	Galt Environment P/L	**Order No.:**	J2201066
Address:	50 Edward Street Osborne Park WA 6017	**Report #:**	878217
		Phone:	08 6272 0200
		Fax:	08 9285 8444
Project Name:	Hazelmere		
Project ID:	J2201067		

Received:	Apr 7, 2022 10:51 AM
Due:	Apr 12, 2022
Priority:	3 Day
Contact Name:	Marlesa Greenwood

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						BTEX and Naphthalene	Moisture Soil	Eurofins Suite B7	Eurofins Suite B7 (mixed metals)
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X
Melbourne Laboratory - NATA # 1261 Site # 1254						X		X	X
Sydney Laboratory - NATA # 1261 Site # 18217									
Brisbane Laboratory - NATA # 1261 Site # 20794									
Mayfield Laboratory - NATA # 1261 Site # 25079									
External Laboratory									
13	MA01/0.0	Mar 24, 2022		Soil	L22-Ap0015482		X	X	
14	MA02/1.0	Mar 24, 2022		Soil	L22-Ap0015483		X	X	
15	QC1	Apr 05, 2022		Water	L22-Ap0015484				X
16	QC3	Apr 05, 2022		Water	L22-Ap0015485				X
17	QC4	Apr 05, 2022		Water	L22-Ap0015486	X			
18	QC4	Mar 24, 2022		Soil	L22-Ap0015487		X	X	
19	QC7	Apr 05, 2022		Water	L22-				X

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CITY OF SWAN
DEVELOPMENT PLANNING
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13 Sept 2022

Company Name:	Galt Environment P/L	**Order No.:**	J2201066
Address:	50 Edward Street Osborne Park WA 6017	**Report #:**	879217
		Phone:	08 6272 0200
		Fax:	08 9285 8444
Project Name:	Hazelmere		
Project ID:	J2201067		

Received:	Apr 7, 2022 10:51 AM		
Due:	Apr 12, 2022		
Priority:	3 Day		
Contact Name:	Marlesa Greenwood		

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						BTEX and Naphthalene	Moisture Set	Eurofins Suite B7	Eurofins Suite B7 (filtered metals)
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X
Melbourne Laboratory - NATA # 1261 Site # 1254						X		X	X
Sydney Laboratory - NATA # 1261 Site # 18217									
Brisbane Laboratory - NATA # 1261 Site # 20794									
Mayfield Laboratory - NATA # 1261 Site # 25079									
External Laboratory									
					Ap0015488				
20	QC8	Apr 05, 2022		Water	L22-Ap0015489	X			
21	MA05/2.0	Mar 24, 2022		Soil	L22-Ap0015695		X	X	
Test Counts						2	12	12	7

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Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines stipulated 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/biosolid results are reported on a dry basis, unless otherwise stated.
3. All biological 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 grey 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 (CS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 72 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. Breaches/future 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

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 in
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, N-EtFOSAA, N-MeFOSAA

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 be between 0-50%

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

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

Surrogate Recoveries: Recoveries must be between 20-130% for Speciated Phenols & 30-150% for PFAS.

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.

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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							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							

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Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	98			70-130	Pass	
TRH C10-C14	%	96			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	92			70-130	Pass	
Toluene	%	92			70-130	Pass	
Ethylbenzene	%	94			70-130	Pass	
m&p-Xylenes	%	102			70-130	Pass	
o-Xylene	%	99			70-130	Pass	
Xylenes - Total*	%	101			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	113			70-130	Pass	
TRH C6-C10	%	97			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	106			70-130	Pass	
Acenaphthylene	%	89			70-130	Pass	
Anthracene	%	109			70-130	Pass	
Benz(a)anthracene	%	91			70-130	Pass	
Benzo(a)pyrene	%	94			70-130	Pass	
Benzo(b&j)fluoranthene	%	83			70-130	Pass	
Benzo(g,h,i)perylene	%	106			70-130	Pass	
Benzo(k)fluoranthene	%	100			70-130	Pass	
Chrysene	%	99			70-130	Pass	
Dibenz(a,h)anthracene	%	91			70-130	Pass	
Fluoranthene	%	87			70-130	Pass	
Fluorene	%	97			70-130	Pass	
Indeno(1,2,3-cd)pyrene	%	103			70-130	Pass	
Naphthalene	%	96			70-130	Pass	
Phenanthrene	%	99			70-130	Pass	
Pyrene	%	83			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	%	94			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	95			80-120	Pass	
Cadmium	%	97			80-120	Pass	
Chromium	%	97			80-120	Pass	
Copper	%	95			80-120	Pass	
Lead	%	96			80-120	Pass	
Mercury	%	95			80-120	Pass	
Nickel	%	97			80-120	Pass	
Zinc	%	92			80-120	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	L22-Ap0015475	CP	%	101			70-130	Pass	
TRH C10-C14	L22-Ap0015475	CP	%	102			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	L22-Ap0015475	CP	%	91			70-130	Pass	

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Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Toluene	L22-Ap0015475	CP	%	92			70-130	Pass	
Ethylbenzene	L22-Ap0015475	CP	%	97			70-130	Pass	
m&p-Xylenes	L22-Ap0015475	CP	%	104			70-130	Pass	
o-Xylene	L22-Ap0015475	CP	%	109			70-130	Pass	
Xylenes - Total*	L22-Ap0015475	CP	%	106			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	L22-Ap0015475	CP	%	119			70-130	Pass	
TRH C6-C10	L22-Ap0015475	CP	%	101			70-130	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	L22-Ap0015475	CP	%	96			70-130	Pass	
Acenaphthylene	L22-Ap0015475	CP	%	93			70-130	Pass	
Anthracene	L22-Ap0015475	CP	%	102			70-130	Pass	
Benz(a)anthracene	L22-Ap0015475	CP	%	98			70-130	Pass	
Benzo(a)pyrene	L22-Ap0015475	CP	%	95			70-130	Pass	
Benzo(b&j)fluoranthene	L22-Ap0015475	CP	%	100			70-130	Pass	
Benzo(g,h,i)perylene	L22-Ap0015475	CP	%	81			70-130	Pass	
Benzo(k)fluoranthene	L22-Ap0015475	CP	%	118			70-130	Pass	
Chrysene	L22-Ap0015475	CP	%	109			70-130	Pass	
Dibenz(a,h)anthracene	L22-Ap0015475	CP	%	76			70-130	Pass	
Fluoranthene	L22-Ap0015475	CP	%	100			70-130	Pass	
Fluorene	L22-Ap0015475	CP	%	98			70-130	Pass	
Indeno(1,2,3-cd)pyrene	L22-Ap0015475	CP	%	81			70-130	Pass	
Naphthalene	L22-Ap0015475	CP	%	109			70-130	Pass	
Phenanthrene	L22-Ap0015475	CP	%	93			70-130	Pass	
Pyrene	L22-Ap0015475	CP	%	93			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	L22-Ap0015475	CP	%	101			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	L22-Ap0015483	CP	%	104			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	L22-Ap0015483	CP	%	93			70-130	Pass	
Toluene	L22-Ap0015483	CP	%	93			70-130	Pass	
Ethylbenzene	L22-Ap0015483	CP	%	98			70-130	Pass	
m&p-Xylenes	L22-Ap0015483	CP	%	99			70-130	Pass	
o-Xylene	L22-Ap0015483	CP	%	103			70-130	Pass	
Xylenes - Total*	L22-Ap0015483	CP	%	101			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	L22-Ap0015483	CP	%	107			70-130	Pass	
TRH C6-C10	L22-Ap0015483	CP	%	105			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C10-C14	L22-Ap0015487	CP	%	91			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	L22-Ap0015487	CP	%	90			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	L22-Ap0015487	CP	%	96			75-125	Pass	

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Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Cadmium	L22-Ap0015487	CP	%	96			75-125	Pass	
Chromium	L22-Ap0015487	CP	%	90			75-125	Pass	
Copper	L22-Ap0015487	CP	%	91			75-125	Pass	
Lead	L22-Ap0015487	CP	%	76			75-125	Pass	
Mercury	L22-Ap0015487	CP	%	100			75-125	Pass	
Nickel	L22-Ap0015487	CP	%	93			75-125	Pass	
Zinc	L22-Ap0015487	CP	%	89			75-125	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	L22-Ap0015695	CP	%	94			70-130	Pass	
Acenaphthylene	L22-Ap0015695	CP	%	91			70-130	Pass	
Anthracene	L22-Ap0015695	CP	%	107			70-130	Pass	
Benz(a)anthracene	L22-Ap0015695	CP	%	87			70-130	Pass	
Benzo(a)pyrene	L22-Ap0015695	CP	%	91			70-130	Pass	
Benzo(b&j)fluoranthene	L22-Ap0015695	CP	%	88			70-130	Pass	
Benzo(g,h,i)perylene	L22-Ap0015695	CP	%	47			70-130	Fail	Q08
Benzo(k)fluoranthene	L22-Ap0015695	CP	%	107			70-130	Pass	
Chrysene	L22-Ap0015695	CP	%	94			70-130	Pass	
Dibenz(a,h)anthracene	L22-Ap0015695	CP	%	55			70-130	Fail	Q08
Fluoranthene	L22-Ap0015695	CP	%	99			70-130	Pass	
Fluorene	L22-Ap0015695	CP	%	94			70-130	Pass	
Indeno(1,2,3-cd)pyrene	L22-Ap0015695	CP	%	54			70-130	Fail	Q08
Naphthalene	L22-Ap0015695	CP	%	94			70-130	Pass	
Phenanthrene	L22-Ap0015695	CP	%	91			70-130	Pass	
Pyrene	L22-Ap0015695	CP	%	90			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	L22-Ap0015474	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	L22-Ap0015474	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	L22-Ap0015474	CP	mg/kg	95	110	17	30%	Pass	
TRH C29-C36	L22-Ap0015474	CP	mg/kg	260	310	17	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	L22-Ap0015474	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	L22-Ap0015474	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	L22-Ap0015474	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	L22-Ap0015474	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	L22-Ap0015474	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total*	L22-Ap0015474	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	L22-Ap0015474	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	L22-Ap0015474	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	L22-Ap0015474	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	L22-Ap0015474	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	L22-Ap0015474	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	L22-Ap0015474	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	L22-Ap0015474	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	L22-Ap0015474	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g,h,i)perylene	L22-Ap0015474	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	L22-Ap0015474	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	

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Duplicate								
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD		
Chrysene	L22-Ap0015474	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Dibenz(a.h)anthracene	L22-Ap0015474	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Fluoranthene	L22-Ap0015474	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Fluorene	L22-Ap0015474	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Indeno(1.2.3-cd)pyrene	L22-Ap0015474	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Naphthalene	L22-Ap0015474	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Phenanthrene	L22-Ap0015474	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Pyrene	L22-Ap0015474	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	L22-Ap0015474	CP	mg/kg	< 50	< 50	<1	30%	Pass
TRH >C16-C34	L22-Ap0015474	CP	mg/kg	260	310	16	30%	Pass
TRH >C34-C40	L22-Ap0015474	CP	mg/kg	370	440	19	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD		
TRH C6-C9	L22-Ap0015481	CP	mg/kg	< 20	< 20	<1	30%	Pass
TRH C10-C14	L22-Ap0015481	CP	mg/kg	< 20	< 20	<1	30%	Pass
TRH C15-C28	L22-Ap0015481	CP	mg/kg	< 50	< 50	<1	30%	Pass
TRH C29-C36	L22-Ap0015481	CP	mg/kg	< 50	< 50	<1	30%	Pass
Duplicate								
BTEX				Result 1	Result 2	RPD		
Benzene	L22-Ap0015481	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Toluene	L22-Ap0015481	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Ethylbenzene	L22-Ap0015481	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
m&p-Xylenes	L22-Ap0015481	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass
o-Xylene	L22-Ap0015481	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Xylenes - Total*	L22-Ap0015481	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD		
Naphthalene	L22-Ap0015481	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
TRH C6-C10	L22-Ap0015481	CP	mg/kg	< 20	< 20	<1	30%	Pass
Duplicate								
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD		
Acenaphthene	L22-Ap0015481	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Acenaphthylene	L22-Ap0015481	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Anthracene	L22-Ap0015481	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Benz(a)anthracene	L22-Ap0015481	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Benzo(a)pyrene	L22-Ap0015481	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Benzo(b&j)fluoranthene	L22-Ap0015481	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Benzo(g.h.i)perylene	L22-Ap0015481	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Benzo(k)fluoranthene	L22-Ap0015481	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Chrysene	L22-Ap0015481	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Dibenz(a.h)anthracene	L22-Ap0015481	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Fluoranthene	L22-Ap0015481	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Fluorene	L22-Ap0015481	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Indeno(1.2.3-cd)pyrene	L22-Ap0015481	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Naphthalene	L22-Ap0015481	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Phenanthrene	L22-Ap0015481	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass
Pyrene	L22-Ap0015481	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	L22-Ap0015481	CP	mg/kg	< 50	< 50	<1	30%	Pass
TRH >C16-C34	L22-Ap0015481	CP	mg/kg	< 100	< 100	<1	30%	Pass
TRH >C34-C40	L22-Ap0015481	CP	mg/kg	< 100	< 100	<1	30%	Pass

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Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	L22-Ap0015481	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Cadmium	L22-Ap0015481	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	L22-Ap0015481	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Copper	L22-Ap0015481	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Lead	L22-Ap0015481	CP	mg/kg	5.3	< 5	28	30%	Pass	
Mercury	L22-Ap0015481	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	L22-Ap0015481	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Zinc	L22-Ap0015481	CP	mg/kg	8.9	8.9	25	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	L22-Ap0015481	CP	%	4.4	3.9	12	30%	Pass	

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Comments

V2 - This report has been amended to provide updated client sample IDs

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	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
A01	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).
A02	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 QA/QC acceptance criteria and are entirely technically valid.
A04	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.
A07	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.

Authorised by:

Kim Rodgers	Analytical Services Manager
John Harwood	Senior Analyst-Organic
John Harwood	Senior Analyst-Volatile
Kylie Royce	Senior Analyst-Metal
Monique Jackson	Senior Analyst-Sample Preparation

Kim Rodgers
Business Unit 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

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

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Accreditation Number 2377
Site Number 2370

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Attention: Marissa Greenwood

Report 878217-W
Project name Hazelmere
Project ID J220167
Received Date Apr 07, 2022

Client Sample ID			MW01	MW02	MW03	MW04
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			L22-Ap0015470	L22-Ap0015471	L22-Ap0015472	L22-Ap0015473
Date Sampled			Apr 05, 2022	Apr 05, 2022	Apr 05, 2022	Apr 05, 2022
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Xylenes - Total*	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
BTEX						
4-Bromofluorobenzene (surr.)	1	%	101	106	104	108
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[#33]	0.01	mg/L	< 0.01	< 0.01	< 0.01	< 0.01
TRH >C10-C16 less Naphthalene (F2)[#33]	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1)[#34]	0.02	mg/L	< 0.02	< 0.02	< 0.02	< 0.02
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo(a)pyrene TEQ (medium bound) *	0.001	mg/L	0.001	0.001	0.001	0.001
Acenaphthene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Acenaphthylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Anthracene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benz[a]anthracene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo[a]pyrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo[b&j]fluoranthene[#37]	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo[g,h,i]perylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Benzo[k]fluoranthene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Chrysene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Dibenz[a,h]anthracene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Fluoranthene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Fluorene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001

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Client Sample ID			MW01	MW02	MW03	MW04
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			L22-Ap0015470	L22-Ap0015471	L22-Ap0015472	L22-Ap0015473
Date Sampled			Apr 05, 2022	Apr 05, 2022	Apr 05, 2022	Apr 05, 2022
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Indeno(1,2,3-cd)pyrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Naphthalene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Phenanthrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Pyrene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Total PAH*	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
2-Fluorobiphenyl (surr.)	1	%	118	107	113	109
p-Terphenyl-d14 (surr.)	1	%	128	102	101	112
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	< 0.1	< 0.1	< 0.1
Heavy Metals						
Arsenic (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Copper (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Nickel (filtered)	0.001	mg/L	< 0.001	0.001	< 0.001	0.001
Zinc (filtered)	0.005	mg/L	< 0.005	< 0.005	< 0.005	0.008

Client Sample ID			QC1	QC3	QC4	QC7
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			L22-Ap0015484	L22-Ap0015485	L22-Ap0015486	L22-Ap0015488
Date Sampled			Apr 05, 2022	Apr 05, 2022	Apr 05, 2022	Apr 05, 2022
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	-	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	-	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	-	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	-	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	< 0.1	< 0.1	-	< 0.1
BTEX						
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002	< 0.002
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001	< 0.001
Xylenes - Total*	0.003	mg/L	< 0.003	< 0.003	< 0.003	< 0.003
BTEX						
4-Bromofluorobenzene (surr.)	1	%	106	108	105	109
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[NC]	0.01	mg/L	< 0.01	< 0.01	-	< 0.01
TRH >C10-C16 less Naphthalene (F2)[N1]	0.05	mg/L	< 0.05	< 0.05	-	< 0.05
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	-	< 0.02
TRH C6-C10 less BTEX (F1)[N4]	0.02	mg/L	< 0.02	< 0.02	-	< 0.02

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Client Sample ID			QC1	QC3	QC4	QC7
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			L22-Ap0015484	L22-Ap0015485	L22-Ap0015486	L22-Ap0015488
Date Sampled			Apr 05, 2022	Apr 05, 2022	Apr 05, 2022	Apr 05, 2022
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.001	mg/L	< 0.001	< 0.001	-	< 0.001
Benzo(a)pyrene TEQ (medium bound) *	0.001	mg/L	0.001	0.001	-	0.001
Acenaphthene	0.001	mg/L	< 0.001	< 0.001	-	< 0.001
Acenaphthylene	0.001	mg/L	< 0.001	< 0.001	-	< 0.001
Anthracene	0.001	mg/L	< 0.001	< 0.001	-	< 0.001
Benz(a)anthracene	0.001	mg/L	< 0.001	< 0.001	-	< 0.001
Benzo(a)pyrene	0.001	mg/L	< 0.001	< 0.001	-	< 0.001
Benzo(b&j)fluoranthene[NO]	0.001	mg/L	< 0.001	< 0.001	-	< 0.001
Benzo(g,h,i)perylene	0.001	mg/L	< 0.001	< 0.001	-	< 0.001
Benzo(k)fluoranthene	0.001	mg/L	< 0.001	< 0.001	-	< 0.001
Chrysene	0.001	mg/L	< 0.001	< 0.001	-	< 0.001
Dibenz(a,h)anthracene	0.001	mg/L	< 0.001	< 0.001	-	< 0.001
Fluoranthene	0.001	mg/L	< 0.001	< 0.001	-	< 0.001
Fluorene	0.001	mg/L	< 0.001	< 0.001	-	< 0.001
Indeno(1,2,3-cd)pyrene	0.001	mg/L	< 0.001	< 0.001	-	< 0.001
Naphthalene	0.001	mg/L	< 0.001	< 0.001	-	< 0.001
Phenanthrene	0.001	mg/L	< 0.001	< 0.001	-	< 0.001
Pyrene	0.001	mg/L	< 0.001	< 0.001	-	< 0.001
Total PAH*	0.001	mg/L	< 0.001	< 0.001	-	< 0.001
2-Fluorobiphenyl (surr.)	1	%	111	110	-	109
p-Terphenyl-d14 (surr.)	1	%	115	120	-	108
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	-	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	-	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	-	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	< 0.1	-	< 0.1
Heavy Metals						
Arsenic (filtered)	0.001	mg/L	< 0.001	< 0.001	-	< 0.001
Cadmium (filtered)	0.0002	mg/L	< 0.0002	< 0.0002	-	< 0.0002
Chromium (filtered)	0.001	mg/L	< 0.001	< 0.001	-	< 0.001
Copper (filtered)	0.001	mg/L	0.017	< 0.001	-	< 0.001
Lead (filtered)	0.001	mg/L	< 0.001	< 0.001	-	< 0.001
Mercury (filtered)	0.0001	mg/L	< 0.0001	< 0.0001	-	< 0.0001
Nickel (filtered)	0.001	mg/L	0.003	< 0.001	-	< 0.001
Zinc (filtered)	0.005	mg/L	0.010	< 0.005	-	< 0.005
Naphthalene[NO]	0.01	mg/L	-	-	< 0.01	-

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Client Sample ID			QC3
Sample Matrix			Water
Eurofins Sample No.			L22-Ap0015489
Date Sampled			Apr 05, 2022
Test/Reference	LOR	Unit	
BTEX			
Benzene	0.001	mg/L	< 0.001
Toluene	0.001	mg/L	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002
o-Xylene	0.001	mg/L	< 0.001
Xylenes - Total*	0.003	mg/L	< 0.003
BTEX			
4-Bromofluorobenzene (surr.)	1	%	105
Naphthalene[N02]	0.01	mg/L	< 0.01

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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 corresponding results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Welshpool	Apr 08, 2022	7 Days
BTEX - Method: LTM-ORG-2010 TRH C6-C40	Welshpool	Apr 08, 2022	14 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Welshpool	Apr 08, 2022	7 Days
Polycyclic Aromatic Hydrocarbons - Method: LTM-ORG-2130 PAH and Phenols in Soil and Water	Welshpool	Apr 08, 2022	7 Days
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Welshpool	Apr 08, 2022	7 Days
Metals M8 filtered - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Welshpool	Apr 08, 2022	28 Days
Naphthalene - Method: LTM-ORG-2010 TRH C6-C40	Welshpool	Apr 08, 2022	14 Days

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DEVELOPMENT PLANNING
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Company Name:	Gall Environment P/L	**Order No.:**	J2201066
Address:	50 Edward Street Osborne Park WA 6017	**Report #:**	878217
		Phone:	08 6272 0200
		Fax:	08 9265 8444
Project Name:	Hazelmere		
Project ID:	JZ201067		

Received:	Apr 7, 2022 10:51 AM
Due:	Apr 12, 2022
Priority:	3 Day
Contact Name:	Mariesa Greenwood

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						BTEX and Naphthalene	Moisture Set	Eurofins Suite B7	Eurofins Suite B7 (filtered metals)
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X
Melbourne Laboratory - NATA # 1261 Site # 1254						X		X	X
Sydney Laboratory - NATA # 1261 Site # 18217									
Brisbane Laboratory - NATA # 1261 Site # 20794									
Mayfield Laboratory - NATA # 1261 Site # 25079									
External Laboratory									
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**				
1	MW01	Apr 05, 2022		Water	L22-Ap0015470				X
2	MW02	Apr 05, 2022		Water	L22-Ap0015471				X
3	MW03	Apr 05, 2022		Water	L22-Ap0015472				X
4	MW04	Apr 05, 2022		Water	L22-Ap0015473				X
5	BH15/0.0	Mar 24, 2022		Soil	L22-Ap0015474		X	X	
6	BH15/1.0	Mar 24, 2022		Soil	L22-		X	X	

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Company Name:	Galt Environment P/L	**Order No.:**	J2201066
Address:	50 Edward Street Osborne Park WA 6017	**Report #:**	878217
		Phone:	08 6272 0200
		Fax:	08 9285 8444
Project Name:	Hazelmere		
Project ID:	J2201067		

Received:	Apr 7, 2022 10:51 AM		
Due:	Apr 12, 2022		
Priority:	3 Day		
Contact Name:	Mariesa Greenwood		

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						BTEX and Naphthalene	Moisture Set	Eurofins Suite B7	Eurofins Suite B7 (Blend metals)
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X
Melbourne Laboratory - NATA # 1261 Site # 1254						X		X	X
Sydney Laboratory - NATA # 1261 Site # 18217									
Brisbane Laboratory - NATA # 1261 Site # 20794									
Mayfield Laboratory - NATA # 1261 Site # 25079									
External Laboratory									
					Ap0015475				
7	BH14/0.0	Mar 24, 2022		Soil	L22-Ap0015476		X	X	
8	BH14/1.0	Mar 24, 2022		Soil	L22-Ap0015477		X	X	
9	BH13/0.0	Mar 24, 2022		Soil	L22-Ap0015478		X	X	
10	BH13/1.0	Mar 24, 2022		Soil	L22-Ap0015479		X	X	
11	BH16/0.0	Mar 24, 2022		Soil	L22-Ap0015480		X	X	
12	BH16/1.0	Mar 24, 2022		Soil	L22-Ap0015481		X	X	

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Company Name:	Galt Environment P/L	**Order No.:**	J2201068
Address:	50 Edward Street Osborne Park WA 6017	**Report #:**	878217
		Phone:	08 6272 0200
		Fax:	08 9285 8444
Project Name:	Hazelmere		
Project ID:	J2201067		

Received:	Apr 7, 2022 10:51 AM
Due:	Apr 12, 2022
Priority:	3 Day
Contact Name:	Marlesa Greenwood

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						BTEX and Naphthalene	Moisture Set	Eurofins Suite B7	Eurofins Suite B7 (filtered metals)
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X
Melbourne Laboratory - NATA # 1261 Site # 1254						X		X	X
Sydney Laboratory - NATA # 1261 Site # 18217									
Brisbane Laboratory - NATA # 1261 Site # 20794									
Mayfield Laboratory - NATA # 1261 Site # 25079									
External Laboratory									
13	BH12/0.0	Mar 24, 2022		Soil	L22-Ap0015482		X	X	
14	BH12/1.0	Mar 24, 2022		Soil	L22-Ap0015483		X	X	
15	QC1	Apr 05, 2022		Water	L22-Ap0015484				X
16	QC3	Apr 05, 2022		Water	L22-Ap0015485				X
17	QC4	Apr 05, 2022		Water	L22-Ap0015486	X			
18	QC4	Mar 24, 2022		Soil	L22-Ap0015487		X	X	
19	QC7	Apr 05, 2022		Water	L22-				X

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Company Name:	Gall Environment P/L	**Order No.:**	J2201066
Address:	50 Edward Street Osborne Park WA 6017	**Report #:**	878217
		Phone:	08 6272 0200
		Fax:	08 9285 8444
Project Name:	Hazelmere		
Project ID:	J2201067		

Received:	Apr 7, 2022 10:51 AM
Due:	Apr 12, 2022
Priority:	3 Day
Contact Name:	Mariesa Greenwood

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						BTEX and Naphthalene	Moisture Set	Eurofins Suite B7	Eurofins Suite B7 (filtered metals)
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X	X
Melbourne Laboratory - NATA # 1261 Site # 1254						X		X	X
Sydney Laboratory - NATA # 1261 Site # 18217									
Brisbane Laboratory - NATA # 1261 Site # 20794									
Mayfield Laboratory - NATA # 1261 Site # 25079									
External Laboratory									
					Ap0015488				
20	QC8	Apr 05, 2022		Water	L22-Ap0015489	X			
21	BH16/2.0	Mar 24, 2022		Soil	L22-Ap0015695		X	X	
Test Counts						2	12	12	1

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Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follow guidelines as required 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 dependent. 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 [illegible] 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

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 unit 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
MSP	Non-Client Parent - QC performed on samples not pertaining to this report. QC is reported on as 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 like Woodlyn 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	Suite of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS & 2:FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when lab 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 be between 0-50%

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

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

Surrogate Recoveries: Recoveries must be between 20-130% for Speciated Phenols & 50-150% for PFAS.

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 estimated 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.

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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/L	< 0.02			0.02	Pass	
TRH C10-C14	mg/L	< 0.05			0.05	Pass	
TRH C15-C28	mg/L	< 0.1			0.1	Pass	
TRH C29-C36	mg/L	< 0.1			0.1	Pass	
Method Blank							
BTEX							
Benzene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
Ethylbenzene	mg/L	< 0.001			0.001	Pass	
m&p-Xylenes	mg/L	< 0.002			0.002	Pass	
o-Xylene	mg/L	< 0.001			0.001	Pass	
Xylenes - Total*	mg/L	< 0.003			0.003	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/L	< 0.001			0.001	Pass	
Acenaphthylene	mg/L	< 0.001			0.001	Pass	
Anthracene	mg/L	< 0.001			0.001	Pass	
Benz(a)anthracene	mg/L	< 0.001			0.001	Pass	
Benzo(a)pyrene	mg/L	< 0.001			0.001	Pass	
Benzo(b&j)fluoranthene	mg/L	< 0.001			0.001	Pass	
Benzo(g,h,i)perylene	mg/L	< 0.001			0.001	Pass	
Benzo(k)fluoranthene	mg/L	< 0.001			0.001	Pass	
Chrysene	mg/L	< 0.001			0.001	Pass	
Dibenz(a,h)anthracene	mg/L	< 0.001			0.001	Pass	
Fluoranthene	mg/L	< 0.001			0.001	Pass	
Fluorene	mg/L	< 0.001			0.001	Pass	
Indeno(1,2,3-cd)pyrene	mg/L	< 0.001			0.001	Pass	
Naphthalene	mg/L	< 0.001			0.001	Pass	
Phenanthrene	mg/L	< 0.001			0.001	Pass	
Pyrene	mg/L	< 0.001			0.001	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
Heavy Metals							
Arsenic (filtered)	mg/L	< 0.001			0.001	Pass	
Cadmium (filtered)	mg/L	< 0.0002			0.0002	Pass	
Chromium (filtered)	mg/L	< 0.001			0.001	Pass	
Copper (filtered)	mg/L	< 0.001			0.001	Pass	
Lead (filtered)	mg/L	< 0.001			0.001	Pass	
Mercury (filtered)	mg/L	< 0.0001			0.0001	Pass	
Nickel (filtered)	mg/L	< 0.001			0.001	Pass	
Zinc (filtered)	mg/L	< 0.005			0.005	Pass	
LCS - % Recovery							

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Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	92			70-130	Pass	
TRH C10-C14	%	107			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	93			70-130	Pass	
Toluene	%	94			70-130	Pass	
Ethylbenzene	%	94			70-130	Pass	
m&p-Xylenes	%	99			70-130	Pass	
o-Xylene	%	100			70-130	Pass	
Xylenes - Total*	%	99			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	94			70-130	Pass	
TRH C6-C10	%	90			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	97			70-130	Pass	
Acenaphthylene	%	101			70-130	Pass	
Anthracene	%	97			70-130	Pass	
Benz(a)anthracene	%	90			70-130	Pass	
Benzo(a)pyrene	%	80			70-130	Pass	
Benzo(b&j)fluoranthene	%	80			70-130	Pass	
Benzo(g,h,i)perylene	%	85			70-130	Pass	
Benzo(k)fluoranthene	%	85			70-130	Pass	
Chrysene	%	93			70-130	Pass	
Dibenz(a,h)anthracene	%	84			70-130	Pass	
Fluoranthene	%	95			70-130	Pass	
Fluorene	%	103			70-130	Pass	
Indeno(1,2,3-cd)pyrene	%	81			70-130	Pass	
Naphthalene	%	92			70-130	Pass	
Phenanthrene	%	99			70-130	Pass	
Pyrene	%	85			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
TRH >C10-C16	%	105			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic (filtered)	%	97			80-120	Pass	
Cadmium (filtered)	%	98			80-120	Pass	
Chromium (filtered)	%	96			80-120	Pass	
Copper (filtered)	%	94			80-120	Pass	
Lead (filtered)	%	93			80-120	Pass	
Mercury (filtered)	%	98			80-120	Pass	
Nickel (filtered)	%	97			80-120	Pass	
Zinc (filtered)	%	97			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	L22-Ap0015306	NCP	%	117			70-130	Pass	
Acenaphthylene	L22-Ap0015306	NCP	%	112			70-130	Pass	
Anthracene	L22-Ap0015306	NCP	%	107			70-130	Pass	
Benz(a)anthracene	L22-Ap0015306	NCP	%	77			70-130	Pass	
Benzo(a)pyrene	L22-Ap0015306	NCP	%	77			70-130	Pass	

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Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Benzo(b&j)fluoranthene	L22-Ap0015306	NCP	%	57			70-130	Fail	Q08
Benzo(g,h,i)perylene	L22-Ap0015306	NCP	%	77			70-130	Pass	
Benzo(k)fluoranthene	L22-Ap0015306	NCP	%	80			70-130	Pass	
Chrysene	L22-Ap0015306	NCP	%	80			70-130	Pass	
Dibenz(a,h)anthracene	L22-Ap0015306	NCP	%	77			70-130	Pass	
Fluoranthene	L22-Ap0015306	NCP	%	89			70-130	Pass	
Fluorene	L22-Ap0015306	NCP	%	112			70-130	Pass	
Indeno(1,2,3-cd)pyrene	L22-Ap0015306	NCP	%	77			70-130	Pass	
Naphthalene	L22-Ap0015306	NCP	%	111			70-130	Pass	
Phenanthrene	L22-Ap0015306	NCP	%	101			70-130	Pass	
Pyrene	L22-Ap0015306	NCP	%	91			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic (filtered)	L22-Ap0015320	NCP	%	87			75-125	Pass	
Cadmium (filtered)	L22-Ap0015320	NCP	%	87			75-125	Pass	
Chromium (filtered)	L22-Ap0015320	NCP	%	85			75-125	Pass	
Copper (filtered)	L22-Ap0015320	NCP	%	82			75-125	Pass	
Lead (filtered)	L22-Ap0015320	NCP	%	82			75-125	Pass	
Mercury (filtered)	L22-Ap0015320	NCP	%	86			75-125	Pass	
Nickel (filtered)	L22-Ap0015320	NCP	%	83			75-125	Pass	
Zinc (filtered)	L22-Ap0015320	NCP	%	87			75-125	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	L22-Ap0015471	CP	%	94			70-130	Pass	
TRH C10-C14	L22-Ap0015471	CP	%	105			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	L22-Ap0015471	CP	%	95			70-130	Pass	
Toluene	L22-Ap0015471	CP	%	99			70-130	Pass	
Ethylbenzene	L22-Ap0015471	CP	%	99			70-130	Pass	
m&p-Xylenes	L22-Ap0015471	CP	%	100			70-130	Pass	
o-Xylene	L22-Ap0015471	CP	%	105			70-130	Pass	
Xylenes - Total*	L22-Ap0015471	CP	%	101			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	L22-Ap0015471	CP	%	96			70-130	Pass	
TRH C6-C10	L22-Ap0015471	CP	%	89			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	L22-Ap0015471	CP	%	103			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	L22-Ap0015470	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH C10-C14	L22-Ap0015470	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	L22-Ap0015470	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH C29-C36	L22-Ap0015470	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	L22-Ap0015470	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Toluene	L22-Ap0015470	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Ethylbenzene	L22-Ap0015470	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
m&p-Xylenes	L22-Ap0015470	CP	mg/L	< 0.002	< 0.002	<1	30%	Pass	
o-Xylene	L22-Ap0015470	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Xylenes - Total*	L22-Ap0015470	CP	mg/L	< 0.003	< 0.003	<1	30%	Pass	

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Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	L22-Ap0015470	CP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
TRH C6-C10	L22-Ap0015470	CP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	L22-Ap0015470	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Acenaphthylene	L22-Ap0015470	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Anthracene	L22-Ap0015470	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benz(a)anthracene	L22-Ap0015470	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(a)pyrene	L22-Ap0015470	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(b&j)fluoranthene	L22-Ap0015470	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(g,h,i)perylene	L22-Ap0015470	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Benzo(k)fluoranthene	L22-Ap0015470	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Chrysene	L22-Ap0015470	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Dibenz(a,h)anthracene	L22-Ap0015470	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Fluoranthene	L22-Ap0015470	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Fluorene	L22-Ap0015470	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Indeno(1,2,3-cd)pyrene	L22-Ap0015470	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Naphthalene	L22-Ap0015470	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Phenanthrene	L22-Ap0015470	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Pyrene	L22-Ap0015470	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
TRH >C10-C16	L22-Ap0015470	CP	mg/L	< 0.08	< 0.08	<1	30%	Pass	
TRH >C16-C34	L22-Ap0015470	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	L22-Ap0015470	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic (filtered)	L22-Ap0015488	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Cadmium (filtered)	L22-Ap0015488	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass	
Chromium (filtered)	L22-Ap0015488	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Copper (filtered)	L22-Ap0015488	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Lead (filtered)	L22-Ap0015488	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Mercury (filtered)	L22-Ap0015488	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass	
Nickel (filtered)	L22-Ap0015488	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Zinc (filtered)	L22-Ap0015488	CP	mg/L	< 0.005	< 0.005	<1	30%	Pass	

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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	Yes
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 the calculation is obtained from volatile (Purge & Trap analysis).
N05	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 QA/QC 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.
D08	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.

Authorised by:

Robert Johnston	Analytical Services Manager
Ruchi Pathak	Senior Analyst (WA)
Sean Sangster	Senior Analyst (WA)

Kim Rodgers
Business Unit 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

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CERTIFICATE OF ANALYSIS 279793

Client Details

Client	Galt Environmental Pty Ltd
Attention	Brad Palmer
Address	50 Edward Street, Osborne Park, WA, 6017

Sample Details

Your Reference	**Hazelmere - J2201067**
Number of Samples	1 Water, 1 Soil
Date samples received	07/04/2022
Date completed instructions received	07/04/2022

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	12/04/2022
Date of Issue	12/04/2022

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Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Todd Lee, Group Operations Manager
Travis Carey, Organics - Team Leader

Authorised By

Michael Kubiak, Laboratory Manager

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Metals in Water - Low Level			
Our Reference			278793-1
Your Reference	UNITS	PQL	QC2
Date Sampled			05/04/2022
Type of sample			Water
Date prepared	-		08/04/2022
Date analysed	-		08/04/2022
Arsenic-Dissolved	mg/L	0.001	<0.001
Cadmium-Dissolved	mg/L	0.0001	<0.0001
Chromium-Dissolved	mg/L	0.001	<0.001
Copper-Dissolved	mg/L	0.001	0.016
Lead-Dissolved	mg/L	0.001	<0.001
Mercury-Dissolved	mg/L	0.00005	<0.00005
Nickel-Dissolved	mg/L	0.001	0.002
Zinc-Dissolved	mg/L	0.001	0.009

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vTRH(C6-C10)/MBTEXN in water			
Our Reference	UNITS	PQL	279793-1
Your Reference			QC2
Date Sampled			05/04/2022
Type of sample			Water
Date analysed	-		11/04/2022
TRH C_6 - C_9	µg/L	10	<10
TRH C_6 - C_{10}	µg/L	10	<10
TRH C_6-C_{10} less BTEX (F1)	µg/L	10	<10
MTBE	µg/L	1	<1
Benzene	µg/L	1	<1
Toluene	µg/L	1	<1
Ethylbenzene	µg/L	1	<1
m+p-xylene	µg/L	2	<2
o-xylene	µg/L	1	<1
Naphthalene	µg/L	1	<1
Surrogate Dibromofluoromethane	%		104
Surrogate toluene-d8	%		97
Surrogate 4-BFB	%		101

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svTRH(C10-C40) in water			
Our Reference	UNITS	PQL	279793-1
Your Reference			QC2
Date Sampled			05/04/2022
Type of sample			Water
Date extracted	-		08/04/2022
Date analysed	-		08/04/2022
TRH C_{10} - C_{14}	µg/L	50	<50
TRH C_{15} - C_{28}	µg/L	100	<100
TRH C_{29} - C_{36}	µg/L	100	<100
TRH >C_{10} - C_{16}	µg/L	50	<50
TRH >C_{10} -C_{16} less N (F2)	µg/L	50	<50
TRH >C_{16} - C_{34}	µg/L	100	<100
TRH >C_{34} - C_{40}	µg/L	100	<100
Surrogate o-Terphenyl	%		99

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PAHs in Water			
Our Reference			279793-1
Your Reference	UNITS	PQL	QC2
Date Sampled			05/04/2022
Type of sample			Water
Date extracted	-		08/04/2022
Date analysed	-		08/04/2022
Naphthalene	µg/L	0.1	<0.1
Acenaphthylene	µg/L	0.1	<0.1
Acenaphthene	µg/L	0.1	<0.1
Fluorene	µg/L	0.1	<0.1
Phenanthrene	µg/L	0.1	<0.1
Anthracene	µg/L	0.1	<0.1
Fluoranthene	µg/L	0.1	<0.1
Pyrene	µg/L	0.1	<0.1
Benzo(a)anthracene	µg/L	0.1	<0.1
Chrysene	µg/L	0.1	<0.1
Benzo(b,j+k)fluoranthene	µg/L	0.2	<0.2
Benzo(a)pyrene	µg/L	0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	<0.1
Dibenzo(a,h)anthracene	µg/L	0.1	<0.1
Benzo(g,h,i)perylene	µg/L	0.1	<0.1
Benzo(a)pyrene TEQ	µg/L	0.5	<0.5
Total +ve PAH's	µg/L	0.1	<0.1
Surrogate p-Terphenyl-D14	%		82

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Acid Extractable metals in soil			
Our Reference	UNITS	PQL	279793-2
Your Reference			QC5
Date Sampled			24/03/2022
Type of sample			Soil
Date digested	-		8/04/2022
Date analysed	-		11/04/2022
Arsenic	mg/kg	2	<2
Cadmium	mg/kg	0.4	<0.4
Chromium	mg/kg	1	4
Copper	mg/kg	1	3
Lead	mg/kg	1	6
Mercury	mg/kg	0.1	<0.1
Nickel	mg/kg	1	<1
Zinc	mg/kg	1	10

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vTRH(C6-C10)/MBTEXN in soil			
Our Reference	UNITS	PQL	279793-2
Your Reference			QC6
Date Sampled			24/03/2022
Type of sample			Soil
Date extracted	-		08/04/2022
Date analysed	-		11/04/2022
TRH C_6 - C_9	mg/kg	25	<25
TRH C_6 - C_{10}	mg/kg	25	<25
TRH C_6-C_{10} less BTEX (F1)	mg/kg	25	<25
MTBE	mg/kg	0.5	<0.5
Benzene	mg/kg	0.2	<0.2
Toluene	mg/kg	0.5	<0.5
Ethylbenzene	mg/kg	1	<1
m+p-xylene	mg/kg	2	<2
o-xylene	mg/kg	1	<1
Naphthalene	mg/kg	1	<1
Surrogate aaa-Trifluorotoluene	%		88

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svTRH(C10-C36) in soil			
Our Reference			279793-2
Your Reference	UNITS	POL	QC6
Date Sampled			24/03/2022
Type of sample			Soil
Date extracted	-		06/04/2022
Date analysed	-		06/04/2022
TRH C_{10} - C_{14}	mg/kg	50	<50
TRH C_{15} - C_{28}	mg/kg	100	<100
TRH C_{29} - C_{36}	mg/kg	100	<100
TRH >C_{10} - C_{16}	mg/kg	50	<50
TRH >C_{10} -C_{16} less N (F2)	mg/kg	50	<50
TRH >C_{16} - C_{34}	mg/kg	100	<100
TRH >C_{34} - C_{40}	mg/kg	100	<100
Surrogate o-Terphenyl	%		108

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PAHs in Soil			
Our Reference			279793-2
Your Reference	UNITS	PQL	QC6
Date Sampled			24/03/2022
Type of sample			Soil
Date extracted	-		06/04/2022
Date analysed	-		09/04/2022
Naphthalene	mg/kg	0.1	<0.1
Acenaphthylene	mg/kg	0.1	<0.1
Acenaphthene	mg/kg	0.1	<0.1
Fluorene	mg/kg	0.1	<0.1
Phenanthrene	mg/kg	0.1	<0.1
Anthracene	mg/kg	0.1	<0.1
Fluoranthene	mg/kg	0.1	<0.1
Pyrene	mg/kg	0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	<0.1
Chrysene	mg/kg	0.1	<0.1
Benzo(b,j+k)fluoranthene	mg/kg	0.2	<0.2
Benzo(a)pyrene	mg/kg	0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	0.1	<0.1
Benzo(a)pyrene TEQ calc (zero)	mg/kg	0.5	<0.5
Benzo(a)pyrene TEQ calc(half)	mg/kg	0.5	<0.5
Benzo(a)pyrene TEQ calc(PQL)	mg/kg	0.5	<0.5
Total Positive PAHs	mg/kg	0.05	<0.05
Surrogate p-Terphenyl-D14	%		100

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Moisture			
Our Reference			279793-2
Your Reference	UNITS	PQL	QC6
Date Sampled			24/03/2022
Type of sample			Soil
Date prepared	-		8/04/2022
Date analysed	-		11/04/2022
Moisture	%	0.1	5.6

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Method ID	Methodology Summary
INORG-008	Moisture content determined by heating at 106 deg C for a minimum of 12 hours.
METALS-020	Determination of various metals by ICP-AES.
METALS-021	Determination of Mercury by Cold Vapour AAS. For urine samples total Mercury is determined, however, mercury in urine is almost entirely in the inorganic form (CDC).
METALS-022	Determination of various metals by ICP-MS.
Org-020	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
Org-022/025	For soil results:- 1. 'EQ PQL' values are assuming all contributing PAHs reported as <PQL are actually at the PQL. This is the most conservative approach and can give false positive TEQs given that PAHs that contribute to the TEQ calculation may not be present. 2. 'EQ zero' values are assuming all contributing PAHs reported as <PQL are zero. This is the least conservative approach and is more susceptible to false negative TEQs when PAHs that contribute to the TEQ calculation are present but below PQL. 3. 'EQ half PQL' values are assuming all contributing PAHs reported as <PQL are half the stipulated PQL. Hence a mid-point between the most and least conservative approaches above. Note, the Total +ve PAHs PQL is reflective of the lowest individual PQL and is therefore" Total +ve PAHs" is simply a sum of the positive individual PAHs.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS.
Org-022/025	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS/GC-MSMS. Benzo(a)pyrene TEQ as per NEPM draft B1 Guideline on Investigation Levels for Soil and Groundwater.
Org-023	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.

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QUALITY CONTROL: Metals in Water - Low Level					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			08/04/2022	1	08/04/2022	08/04/2022		08/04/2022	
Date analysed	-			08/04/2022	1	08/04/2022	08/04/2022		08/04/2022	
Arsenic-Dissolved	mg/L	0.001	METALS-022	<0.001	1	<0.001	<0.001	0	107	
Cadmium-Dissolved	mg/L	0.0001	METALS-022	<0.0001	1	<0.0001	<0.0001	0	102	
Chromium-Dissolved	mg/L	0.001	METALS-022	<0.001	1	<0.001	<0.001	0	113	
Copper-Dissolved	mg/L	0.001	METALS-022	<0.001	1	0.016	0.016	0	113	
Lead-Dissolved	mg/L	0.001	METALS-022	<0.001	1	<0.001	<0.001	0	126	
Mercury-Dissolved	mg/L	0.00005	METALS-021	<0.00005	1	<0.00005	<0.00005	0	101	
Nickel-Dissolved	mg/L	0.001	METALS-022	<0.001	1	0.002	0.002	0	113	
Zinc-Dissolved	mg/L	0.001	METALS-022	<0.001	1	0.009	0.008	12	112	

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QUALITY CONTROL: vTRH(C6-C10)/MBTEXN in water				Duplicate					Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup	RPD	LCS-1	[NT]
Date analysed	-			11/04/2022					11/04/2022	
TRH C_6 - C_9	µg/L	10	Org-023	<10					101	
TRH C_6 - C_{10}	µg/L	10	Org-023	<10					101	
MTBE	µg/L	1	Org-023	<1						
Benzene	µg/L	1	Org-023	<1					103	
Toluene	µg/L	1	Org-023	<1					103	
Ethylbenzene	µg/L	1	Org-023	<1					100	
m+p-xylene	µg/L	2	Org-023	<2					100	
o-xylene	µg/L	1	Org-023	<1					100	
Naphthalene	µg/L	1	Org-023	<1						
Surrogate Dibromofluoromethane	%		Org-023	102					103	
Surrogate toluene-d8	%		Org-023	84					102	
Surrogate 4-BFB	%		Org-023	104					99	

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QUALITY CONTROL: svTRH(C10-C40) in water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			08/04/2022	1	08/04/2022	08/04/2022		08/04/2022	
Date analysed	-			08/04/2022	1	08/04/2022	08/04/2022		08/04/2022	
TRH C_{10} - C_{14}	µg/L	50	Org-020	<50	1	<50	<50	0	111	
TRH C_{15} - C_{28}	µg/L	100	Org-020	<100	1	<100	<100	0	107	
TRH C_{29} - C_{36}	µg/L	100	Org-020	<100	1	<100	<100	0	98	
TRH >C_{10} - C_{16}	µg/L	50	Org-020	<50	1	<50	<50	0	116	
TRH >C_{16} - C_{34}	µg/L	100	Org-020	<100	1	<100	<100	0	105	
TRH >C_{34} - C_{40}	µg/L	100	Org-020	<100	1	<100	<100	0	93	
Surrogate o-Terphenyl	%		Org-020	112	1	99	87	13	114	

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QUALITY CONTROL: PAHs in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			08/04/2022	1	08/04/2022	08/04/2022		08/04/2022	
Date analysed	-			08/04/2022	1	08/04/2022	08/04/2022		08/04/2022	
Naphthalene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	67	
Acenaphthylene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0		
Acenaphthene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0		
Fluorene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	68	
Phenanthrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	72	
Anthracene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0		
Fluoranthene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	69	
Pyrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	70	
Benzo(a)anthracene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0		
Chrysene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	72	
Benzo(b,j+k)fluoranthene	µg/L	0.2	Org-022/025	<0.2	1	<0.2	<0.2	0		
Benzo(a)pyrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0	66	
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0		
Dibenzo(a,h)anthracene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0		
Benzo(g,h,i)perylene	µg/L	0.1	Org-022/025	<0.1	1	<0.1	<0.1	0		
Surrogate p-Terphenyl-D_{14}	%		Org-022/025	78	1	82	87	20	72	

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QUALITY CONTROL: Acid Extractable metals in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup	RPD	LCS-1	[NT]
Date digested	-			8/04/2022					8/04/2022	
Date analysed	-			11/04/2022					11/04/2022	
Arsenic	mg/kg	2	METALS-020	<2					94	
Cadmium	mg/kg	0.4	METALS-020	<0.4					96	
Chromium	mg/kg	1	METALS-020	<1					100	
Copper	mg/kg	1	METALS-020	<1					102	
Lead	mg/kg	1	METALS-020	<1					100	
Mercury	mg/kg	0.1	METALS-021	<0.1					103	
Nickel	mg/kg	1	METALS-020	<1					98	
Zinc	mg/kg	1	METALS-020	<1					99	

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QUALITY CONTROL: vTRH(C6-C10)/MBTEXN in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			08/04/2022					08/04/2022	
Date analysed	-			11/04/2022					11/04/2022	
TRH C_6 - C_9	mg/kg	25	Org-023	<25					106	
TRH C_6 - C_{10}	mg/kg	25	Org-023	<25					106	
MTBE	mg/kg	0.5	Org-023	<0.5						
Benzene	mg/kg	0.2	Org-023	<0.2					102	
Toluene	mg/kg	0.5	Org-023	<0.5					102	
Ethylbenzene	mg/kg	1	Org-023	<1					109	
m+p-xylene	mg/kg	2	Org-023	<2					108	
o-xylene	mg/kg	1	Org-023	<1					101	
Naphthalene	mg/kg	1	Org-023	<1						
Surrogate aaa-Trifluorotoluene	%		Org-023	90					91	

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QUALITY CONTROL: svTRH(C10-C36) in soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			08/04/2022					08/04/2022	
Date analysed	-			08/04/2022					08/04/2022	
TRH C_{10} - C_{14}	mg/kg	50	Org-020	<50					118	
TRH C_{15} - C_{28}	mg/kg	100	Org-020	<100					109	
TRH C_{29} - C_{36}	mg/kg	100	Org-020	<100					104	
TRH >C_{10} - C_{16}	mg/kg	50	Org-020	<50					116	
TRH >C_{16} - C_{34}	mg/kg	100	Org-020	<100					107	
TRH >C_{34} - C_{40}	mg/kg	100	Org-020	<100					100	
Surrogate o-Terphenyl	%		Org-020	112					114	

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QUALITY CONTROL: PAHs in Soil					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup	RPD	LCS-1	[NT]
Date extracted	-			08/04/2022					08/04/2022	
Date analysed	-			09/04/2022					09/04/2022	
Naphthalene	mg/kg	0.1	Org-022/025	<0.1					104	
Acenaphthylene	mg/kg	0.1	Org-022/025	<0.1						
Acenaphthene	mg/kg	0.1	Org-022/025	<0.1						
Fluorene	mg/kg	0.1	Org-022/025	<0.1					100	
Phenanthrene	mg/kg	0.1	Org-022/025	<0.1					106	
Anthracene	mg/kg	0.1	Org-022/025	<0.1						
Fluoranthene	mg/kg	0.1	Org-022/025	<0.1					99	
Pyrene	mg/kg	0.1	Org-022/025	<0.1					101	
Benzo(a)anthracene	mg/kg	0.1	Org-022/025	<0.1						
Chrysene	mg/kg	0.1	Org-022/025	<0.1					103	
Benzo(b,j+k)fluoranthene	mg/kg	0.2	Org-022/025	<0.2						
Benzo(a)pyrene	mg/kg	0.05	Org-022/025	<0.05					100	
Indeno(1,2,3-c,d)pyrene	mg/kg	0.1	Org-022/025	<0.1						
Dibenzo(a,h)anthracene	mg/kg	0.1	Org-022/025	<0.1						
Benzo(g,h,i)perylene	mg/kg	0.1	Org-022/025	<0.1						
Surrogate p-Terphenyl-D_{14}	%		Org-022/025	104					106	

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QUALITY CONTROL: Moisture					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			08/04/2022						
Date analysed	-			11/04/2022						
Moisture	%	0.1	INORG-008	<0.1						

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Result Definitions	
NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

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Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
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.
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.
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.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

The recommended maximums for analytes in urine are taken from "2016 TLVs and BEIs", as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

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.

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 QA/QC tables for details. <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 (not SPOCAS); 60-140% for organics/SPOCAS (+/-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 insufficient in order to satisfy laboratory QA/QC protocols.

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.

Measurement Uncertainty estimates are available for most tests upon request.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

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Appendix H: Quality Assurance & Quality Control Report

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Lab Report Number			878217	878217		878217	179783	
Field ID			MA06/0.0	QC4		MA06/0.0	QC5	
Date			24/03/2022	24/03/2022		24/03/2022	24/03/2022	
Matrix Type			Soil	Soil	RPD	Soil	Soil	RPD
	Unit	EQL						
BTEX								
Naphthalene (VOC)	mg/kg	0.5	<0.5	<0.5	0	<0.5	<1	0
Benzene	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.2	0
Toluene	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.5	0
Ethylbenzene	mg/kg	0.1	<0.1	<0.1	0	<0.1	<1	0
Xylene (m & p)	mg/kg	0.2	<0.2	<0.2	0	<0.2	<2	0
Xylene (o)	mg/kg	0.1	<0.1	<0.1	0	<0.1	<1	0
Xylene Total	mg/kg	0.3	<0.3	<0.3	0	<0.3		
TRH								
C6-C10 Fraction (F1)	mg/kg	20	<20	<20	0	<20	<25	0
C6-C10 (F1 minus BTEX)	mg/kg	20	<20	<20	0	<20	<25	0
>C10-C16 Fraction (F2)	mg/kg	50	<50	<50	0	<50	<50	0
>C10-C16 Fraction (F2 minus Naphthalene)	mg/kg	50	<50	<50	0	<50	<50	0
>C16-C34 Fraction (F3)	mg/kg	100	100	<100	0	100	<100	0
>C34-C40 Fraction (F4)	mg/kg	100	<100	<100	0	<100	<100	0
>C10-C40 Fraction (Sum)	mg/kg	100	100	<100	0	100		
Metals								
Arsenic	mg/kg	2	<2	<2	0	<2	<2	0
Cadmium	mg/kg	0.4	<0.4	<0.4	0	<0.4	<0.4	0
Chromium (III+VI)	mg/kg	1	38	6.8	79	38	4	120
Copper	mg/kg	1	7.2	<5	36	7.2	3	82
Lead	mg/kg	1	8.6	16	61	8.6	6	29
Mercury	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0
Nickel	mg/kg	1	<5	<5	0	<5	<1	0
Zinc	mg/kg	1	35	9.3	41	35	10	40
PAH								
Benzo(b+j+k)fluoranthene	mg/kg	0.2					<0.2	
Acenaphthene	mg/kg	0.1	<0.5	<0.5	0	<0.5	<0.1	0
Acenaphthylene	mg/kg	0.1	<0.5	<0.5	0	<0.5	<0.1	0
Anthracene	mg/kg	0.1	<0.5	<0.5	0	<0.5	<0.1	0
Benz[a]anthracene	mg/kg	0.1	<0.5	<0.5	0	<0.5	<0.1	0
Benzo[a] pyrene	mg/kg	0.05	<0.5	<0.5	0	<0.5	<0.05	0
Benzo[b+j]fluoranthene	mg/kg	0.5	<0.5	<0.5	0	<0.5		
Benzo[g,h,i]perylene	mg/kg	0.1	<0.5	<0.5	0	<0.5	<0.1	0
Benzo[k]fluoranthene	mg/kg	0.5	<0.5	<0.5	0	<0.5		
Chrysene	mg/kg	0.1	<0.5	<0.5	0	<0.5	<0.1	0
Dibenz[a,h]anthracene	mg/kg	0.1	<0.5	<0.5	0	<0.5	<0.1	0
Fluoranthene	mg/kg	0.1	<0.5	<0.5	0	<0.5	<0.1	0
Fluorene	mg/kg	0.1	<0.5	<0.5	0	<0.5	<0.1	0
Indeno[1,2,3-c,d]pyrene	mg/kg	0.1	<0.5	<0.5	0	<0.5	<0.1	0
Naphthalene	mg/kg	0.1	<0.5	<0.5	0	<0.5	<0.1	0
Phenanthrene	mg/kg	0.1	<0.5	<0.5	0	<0.5	<0.1	0
Pyrene	mg/kg	0.1	<0.5	<0.5	0	<0.5	<0.1	0
PAHs (Sum of total)	mg/kg	0.5	<0.5	<0.5	0	<0.5		
PAHs (Sum of positives)	mg/kg	0.05					<0.05	
Solvents								
MTBE	mg/kg	0.3					<0.3	
TPH								
C6-C9 Fraction	mg/kg	20	<20	<20	0	<20	<25	0
C10-C14 Fraction	mg/kg	20	<20	<20	0	<20	<50	0
C15-C28 Fraction	mg/kg	50	<50	<50	0	<50	<100	0
C29-C36 Fraction	mg/kg	50	81	<50	47	81	<100	0
C10-C36 Fraction (Sum)	mg/kg	50	81	<50	47	81		

*RPDs have only been considered where a concentration is greater than 1 times the EQL

**Elevated RPDs are highlighted as per QA/QC Profile settings (Acceptable RPDs for each EQL multiplier range are: 120 (1 - 10 x EQL); 50 (10 - 30 x EQL); 30 (> 30 x EQL))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

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Lab Report Number			878217	878217		878217	279793	
Field ID			MW01	QC1		MW01	QC2	
Date			5/04/2022	5/04/2022		5/04/2022	5/04/2022	
Matrix Type			Water	Water	RPD	Water	Water	RPD
	Unit	EQL						
BTEX								
Naphthalene (VOC)	mg/L	0.001	<0.01	<0.01	0	<0.01	<0.001	0
Benzene	µg/L	1	<1	<1	0	<1	<1	0
Toluene	µg/L	1	<1	<1	0	<1	<1	0
Ethylbenzene	µg/L	1	<1	<1	0	<1	<1	0
Xylene (m & p)	µg/L	2	<2	<2	0	<2	<2	0
Xylene (o)	µg/L	1	<1	<1	0	<1	<1	0
Xylene Total	µg/L	3	<3	<3	0	<3		
TRH								
C6-C10 Fraction (F1)	µg/L	10	<20	<20	0	<20	<10	0
C6-C10 (F1 minus BTEX)	µg/L	10	<20	<20	0	<20	<10	0
>C10-C16 Fraction (F2)	µg/L	50	<50	<50	0	<50	<50	0
>C10-C16 Fraction (F2 minus Naphthalene)	µg/L	50	<50	<50	0	<50	<50	0
>C16-C34 Fraction (F3)	µg/L	100	<100	<100	0	<100	<100	0
>C34-C40 Fraction (F4)	µg/L	100	<100	<100	0	<100	<100	0
>C10-C40 Fraction (Sum)	µg/L	100	<100	<100	0	<100		
Metals								
Arsenic (filtered)	mg/L	0.001	<0.001	<0.001	0	<0.001	<0.001	0
Cadmium (filtered)	mg/L	0.0001	<0.0002	<0.0002	0	<0.0002	<0.0001	0
Chromium (III+VI) (filtered)	mg/L	0.001	<0.001	<0.001	0	<0.001	<0.001	0
Copper (filtered)	mg/L	0.001	<0.001	0.017	179	<0.001	0.014	174
Lead (filtered)	mg/L	0.001	<0.001	<0.001	0	<0.001	<0.001	0
Mercury (filtered)	mg/L	0.00005	<0.0001	<0.0001	0	<0.0001	<0.00005	0
Nickel (filtered)	mg/L	0.001	<0.001	0.008	100	<0.001	0.002	67
Zinc (filtered)	mg/L	0.001	<0.005	0.010	67	<0.005	0.003	57
PAH								
Benzo(br)+b]fluoranthene	mg/L	0.0002					<0.0002	
Acenaphthene	µg/L	0.1	<1	<1	0	<1	<0.1	0
Acenaphthylene	µg/L	0.1	<1	<1	0	<1	<0.1	0
Anthracene	µg/L	0.1	<1	<1	0	<1	<0.1	0
Benz[a]anthracene	µg/L	0.1	<1	<1	0	<1	<0.1	0
Benzo(a) pyrene	µg/L	0.1	<1	<1	0	<1	<0.1	0
Benz[b+j]fluoranthene	mg/L	0.001	<0.001	<0.001	0	<0.001		
Benzo[g,h,i]perylene	µg/L	0.1	<1	<1	0	<1	<0.1	0
Benzo[k]fluoranthene	µg/L	1	<1	<1	0	<1		
Chrysene	µg/L	0.1	<1	<1	0	<1	<0.1	0
Dibenz[a,h]anthracene	µg/L	0.1	<1	<1	0	<1	<0.1	0
Fluoranthene	µg/L	0.1	<1	<1	0	<1	<0.1	0
Fluorene	µg/L	0.1	<1	<1	0	<1	<0.1	0
Indeno[1,2,3-c,d]pyrene	µg/L	0.1	<1	<1	0	<1	<0.1	0
Naphthalene	µg/L	0.1	<1	<1	0	<1	<0.1	0
Phenanthrene	µg/L	0.1	<1	<1	0	<1	<0.1	0
Pyrene	µg/L	0.1	<1	<1	0	<1	<0.1	0
Benzo(a)pyrene TEQ	mg/L	0.0005					<0.0005	
PAHs (Sum of total)	µg/L	1	<1	<1	0	<1		
PAHs (Sum of positives)	mg/L	0.0001					<0.0001	
Solvents								
MTBE	mg/L	0.001					<0.001	
TPH								
C6-C9 Fraction	µg/L	10	<20	<20	0	<20	<10	0
C10-C14 Fraction	µg/L	50	<50	<50	0	<50	<50	0
C15-C28 Fraction	µg/L	100	<100	<100	0	<100	<100	0
C29-C36 Fraction	µg/L	100	<100	<100	0	<100	<100	0
C10-C36 Fraction (Sum)	µg/L	100	<100	<100	0	<100		

*RPDs have only been considered where a concentration is greater than 1 times the EQL

**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: 120 (1 - 10 x EQL); 50 (10 - 30 x EQL); 30 (> 30 x EQL))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

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		Lab Report Number	878217	878217	878217	878217
		Field ID	QC3	QC4	QC7	QC8
		Date	5/04/2022	5/04/2022	5/04/2022	5/04/2022
		Matrix Type	Water	Water	Water	Water
	Unit	EQL				
BTEX						
Naphthalene (VOC)	mg/L	0.01	<0.01	<0.01	<0.01	<0.01
Benzene	µg/L	1	<1	<1	<1	<1
Toluene	µg/L	1	<1	<1	<1	<1
Ethylbenzene	µg/L	1	<1	<1	<1	<1
Xylene (m & p)	µg/L	2	<2	<2	<2	<2
Xylene (o)	µg/L	1	<1	<1	<1	<1
Xylene Total	µg/L	3	<3	<3	<3	<3
TRH						
C6-C10 Fraction (F1)	µg/L	20	<20		<20	
C6-C10 (F1 minus BTEX)	µg/L	20	<20		<20	
>C10-C16 Fraction (F2)	µg/L	50	<50		<50	
>C10-C16 Fraction (F2 minus Naphthalene)	µg/L	50	<50		<50	
>C16-C34 Fraction (F3)	µg/L	100	<100		<100	
>C34-C40 Fraction (F4)	µg/L	100	<100		<100	
>C10-C40 Fraction (Sum)	µg/L	100	<100		<100	
Metals						
Arsenic (filtered)	mg/L	0.001	<0.001		<0.001	
Cadmium (filtered)	mg/L	0.0002	<0.0002		<0.0002	
Chromium (III+VI) (filtered)	mg/L	0.001	<0.001		<0.001	
Copper (filtered)	mg/L	0.001	<0.001		<0.001	
Lead (filtered)	mg/L	0.001	<0.001		<0.001	
Mercury (filtered)	mg/L	0.0001	<0.0001		<0.0001	
Nickel (filtered)	mg/L	0.001	<0.001		<0.001	
Zinc (filtered)	mg/L	0.005	<0.005		<0.005	
PAH						
Acenaphthene	µg/L	1	<1		<1	
Acenaphthylene	µg/L	1	<1		<1	
Anthracene	µg/L	1	<1		<1	
Benz[a]anthracene	µg/L	1	<1		<1	
Benzo[a] pyrene	µg/L	1	<1		<1	
Benzo[b+j]fluoranthene	mg/L	0.001	<0.001		<0.001	
Benzo[g,h,i]perylene	µg/L	1	<1		<1	
Benzo[k]fluoranthene	µg/L	1	<1		<1	
Chrysene	µg/L	1	<1		<1	
Dibenz[a,h]anthracene	µg/L	1	<1		<1	
Fluoranthene	µg/L	1	<1		<1	
Fluorene	µg/L	1	<1		<1	
Indeno(1,2,3-c,d)pyrene	µg/L	1	<1		<1	
Naphthalene	µg/L	1	<1		<1	
Phenanthrene	µg/L	1	<1		<1	
Pyrene	µg/L	1	<1		<1	
PAHs (Sum of total)	µg/L	1	<1		<1	
TPH						
C6-C9 Fraction	µg/L	20	<20		<20	
C10-C14 Fraction	µg/L	50	<50		<50	
C15-C28 Fraction	µg/L	100	<100		<100	
C29-C36 Fraction	µg/L	100	<100		<100	
C10-C36 Fraction (Sum)	µg/L	100	<100		<100	

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Appendix I: Soil Analytical Results

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[illegible] - Lagoi Hazeltown
Soil Analytical Results

Field ID						MA01/0.0	MA02/1.0	MA04/1.5	MA05/2.0	MA06/0.0	MA07/1.0
Date						24/05/2022	24/05/2022	24/05/2022	24/05/2022	24/05/2022	24/05/2022
	Unit	EQL	[illegible]	NEPM 2013 Table 1A(3) Commercial/Ind D Soil HSL for Vapour Intrusion, Sand	NEPM 2013 Table 1A(1) Criteria [illegible] HIL Comm/Ind D Soil						
BTEX											
Naphthalene (VOC)	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzene	mg/kg	0.1	[illegible]	1 / 3 / 5 / 1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	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
Xylene (m & p)	mg/kg	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
Xylene Total	mg/kg	0.3		163		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
TPH											
C6-C10 Fraction (F1)	mg/kg	20				<20	<20	<20	<20	<20	<20
C6-C10 (F1 minus BTEX)	mg/kg	20	[illegible]	260 / 310 / 440		<20	<20	<20	<20	<20	<20
>C10-C16 Fraction (F2)	mg/kg	50				<50	<50	<50	<50	<50	<50
>C10-C16 Fraction (F2 minus Naphthalene)	mg/kg	50				<50	<50	<50	<50	<50	<50
>C16-C34 Fraction (F3)	mg/kg	100				560	<100	<100	<100	180	290
>C34-C40 Fraction (F4)	mg/kg	100				<100	<100	<100	<100	<100	170
>C10-C40 Fraction (Sum)	mg/kg	100				560	<100	<100	<100	180	460
Metals											
Arsenic	mg/kg	2			[illegible]	<2	<2	<2	2.1	<2	<2
Cadmium	mg/kg	0.4			900	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Chromium (III+VI)	mg/kg	5				6.8	8.5	10	11	16	13
Copper	mg/kg	5			[illegible]	11	<5	<5	<5	7.7	15
Lead	mg/kg	5			2,500	17	7.0	6.0	9.2	8.0	10
Mercury	mg/kg	0.1			730	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	5			6,000	<5	<5	<5	<5	<5	5.4
Zinc	mg/kg	5			400,000	31	<5	<5	<5	15	18
PAH											
Acenaphthene	mg/kg	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
Anthracene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene	mg/kg	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
Benzo[b+j]fluoranthene	mg/kg	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
Benzo(k)fluoranthene	mg/kg	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
Dibenz(a,h)anthracene	mg/kg	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
Fluorene	mg/kg	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
Naphthalene	mg/kg	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
Pyrene	mg/kg	0.5				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PAH (Sum of total)	mg/kg	0.5			4,000	<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
C10-C14 Fraction	mg/kg	20				<20	<20	<20	<20	<20	<20
C15-C28 Fraction	mg/kg	50				210	<50	<50	<50	<50	96
C29-C36 Fraction	mg/kg	50				190	<50	<50	<50	80	260
C10-C36 Fraction (Sum)	mg/kg	50				400	<50	<50	<50	80	365

Environmental Standards
3015, NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Clay
3016, NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand
3014, NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil

Statistics
* A Non Detect Multiplier of 0.5 has been applied.

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[illegible] - Logos Abandonment
Soil Analytical Results

						Field ID	MA08/0.8	MA09/0.5	MA10/1.5	MA11/1.0	MA12/1.0
						Date	24/08/2022	24/08/2022	24/08/2022	24/08/2022	24/08/2022
	Unit	EQL	[illegible] Criteria [illegible] Commercial or Low Density Residential, Clay	NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand	NEPM 2013 Table 1A(1) Min Comm/Ind D Soil						
BTEX											
Naphthalene (VOC)	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5
Benzene	mg/kg	0.1	[illegible]	3 | 3 | 3 | 3			<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	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
Xylene (m & p)	mg/kg	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
Xylene Total	mg/kg	0.3		230			<0.3	<0.3	<0.3	<0.3	<0.3
TPH											
C6-C10 Fraction (F1)	mg/kg	20					<20	<20	<20	<20	<20
C6-C10 (F1 minus BTEX)	mg/kg	20	[illegible]	260 | 370 | 490			<20	<20	<20	<20	<20
>C10-C16 Fraction (F2)	mg/kg	50					<50	<50	<50	<50	<50
>C10-C16 Fraction (F2 minus Naphthalene)	mg/kg	50					<50	<50	<50	<50	<50
>C16-C34 Fraction (F3)	mg/kg	100					180	140	<100	<100	<100
>C34-C40 Fraction (F4)	mg/kg	100					340	210	110	<100	<100
>C10-C40 Fraction (Sum)	mg/kg	100					520	350	110	<100	<100
Metals											
Arsenic	mg/kg	2			[illegible]		<2	<2	<2	<2	<2
Cadmium	mg/kg	0.4			[illegible]		<0.4	<0.4	<0.4	<0.4	<0.4
Chromium (III+VI)	mg/kg	5					15	<5	11	8.9	<5
Copper	mg/kg	5			[illegible]		15	8.3	<5	<5	<5
Lead	mg/kg	5			[illegible]		14	8.4	7.7	<5	5.8
Mercury	mg/kg	0.1			[illegible]		<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	5			[illegible]		<5	<5	<5	<5	<5
Zinc	mg/kg	5			[illegible]		25	11	<5	<5	8.9
PAH											
Acenaphthene	mg/kg	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
Anthracene	mg/kg	0.5					<0.5	<0.5	0.5	<0.5	<0.5
Benz[a]anthracene	mg/kg	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
Benzo[b+j]fluoranthene	mg/kg	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
Benzo[k]fluoranthene	mg/kg	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
Dibenz[a,h]anthracene	mg/kg	0.5					<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg	0.5					<0.5	<0.5	0.9	<0.5	<0.5
Fluorene	mg/kg	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
Naphthalene	mg/kg	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
Pyrene	mg/kg	0.5					<0.5	<0.5	0.8	<0.5	<0.5
PAHs (Sum of total)	mg/kg	0.5			[illegible]		<0.5	<0.5	2.2	<0.5	<0.5
TPH											
C6-C9 Fraction	mg/kg	20					<20	<20	<20	<20	<20
C10-C14 Fraction	mg/kg	20					<20	<20	<20	<20	<20
C15-C28 Fraction	mg/kg	50					110	98	<50	<50	<50
C29-C36 Fraction	mg/kg	50					250	140	90	<50	<50
C10-C36 Fraction (Sum)	mg/kg	50					360	238	90	<50	<50

Environmental Standards
2013 NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Clay
2013 NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for Vapour Intrusion, Sand
2013 NEPM 2013 Table 1A(1) Min Comm/Ind D Soil

Statistics
* A Non Detect Multiplier of 0.5 has been applied.

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Appendix J: Groundwater Analytical Results

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22E0367 - Lagos Warehouse
Groundwater Analytical Results

						Field ID	MW01	MW02	MW03	MW04
						Date	5/04/2022	5/04/2022	5/04/2022	5/04/2022
	Units	LOR	Non-potable use of groundwater	Applicable Tier 1 Soil Investigation Level (HSL) D GW for Vapour Intrusion, Sand	Applicable Tier 1 Soil Investigation Level (HSL) D GW for Vapour Intrusion, Clay					
BTEX										
Naphthalene (VOC)	mg/L	0.01					<0.01	<0.01	<0.01	<0.01
Benzene	µg/L	1	10	4,000	80,000		<1	<1	<1	<1
Toluene	µg/L	1	8,000				<1	<1	<1	<1
Ethylbenzene	µg/L	1	3,000				<1	<1	<1	<1
Xylene (m & p)	µg/L	2					<2	<2	<2	<2
Xylene (o)	µg/L	1					<1	<1	<1	<1
Xylene Total	µg/L	3	6,000				<3	<3	<3	<3
TPH										
C6-C10 Fraction (F1)	µg/L	20					<20	<20	<20	<20
C6-C10 (F1 minus BTEX)	µg/L	20		700	1,400	7,000	<20	<20	<20	<20
>C10-C16 Fraction (F2)	µg/L	50					<50	<50	<50	<50
>C10-C16 Fraction (F2 minus Naphthalene)	µg/L	50					<50	<50	<50	<50
>C16-C34 Fraction (F3)	µg/L	100					<100	<100	<100	<100
>C34-C40 Fraction (F4)	µg/L	100					<100	<100	<100	<100
>C10-C40 Fraction (Sum)	µg/L	100					<100	<100	<100	<100
Metals										
Arsenic (Filtered)	mg/L	0.001	0.1				<0.001	<0.001	<0.001	<0.001
Cadmium (Filtered)	mg/L	0.0002	0.02				<0.0002	<0.0002	<0.0002	<0.0002
Chromium (Total) (Filtered)	mg/L	0.001					<0.001	<0.001	<0.001	<0.001
Copper (Filtered)	mg/L	0.001	20				<0.001	<0.001	<0.001	<0.001
Lead (Filtered)	mg/L	0.001	0.1				<0.001	<0.001	<0.001	<0.001
Mercury (Filtered)	mg/L	0.0001	0.01				<0.0001	<0.0001	<0.0001	<0.0001
Nickel (Filtered)	mg/L	0.001	0.2				<0.001	<0.001	<0.001	<0.001
Zinc (Filtered)	mg/L	0.005					<0.005	<0.005	<0.005	0.008
PAH										
Acenaphthene	µg/L	1					<1	<1	<1	<1
Acenaphthylene	µg/L	1					<1	<1	<1	<1
Anthracene	µg/L	1					<1	<1	<1	<1
Benz[a]anthracene	µg/L	1					<1	<1	<1	<1
Benzo(a) pyrene	µg/L	1	0.1				<1	<1	<1	<1
Benzo[b]fluoranthene	mg/L	0.001					<0.001	<0.001	<0.001	<0.001
Benzo[g,h,i]perylene	µg/L	1					<1	<1	<1	<1
Benzo[k]fluoranthene	µg/L	1					<1	<1	<1	<1
Chrysene	µg/L	1					<1	<1	<1	<1
Dibenz[a,h]anthracene	µg/L	1					<1	<1	<1	<1
Fluoranthene	µg/L	1					<1	<1	<1	<1
Fluorene	µg/L	1					<1	<1	<1	<1
Indeno[1,2,3-c,d]pyrene	µg/L	1					<1	<1	<1	<1
Naphthalene	µg/L	1					<1	<1	<1	<1
Phenanthrene	µg/L	1					<1	<1	<1	<1
Pyrene	µg/L	1					<1	<1	<1	<1
PAHs (Sum of total)	µg/L	1					<1	<1	<1	<1
TPH										
C6-C9 Fraction	µg/L	20					<20	<20	<20	<20
C10-C14 Fraction	µg/L	50					<50	<50	<50	<50
C15-C28 Fraction	µg/L	100					<100	<100	<100	<100
C29-C36 Fraction	µg/L	100					<100	<100	<100	<100
C10-C36 Fraction (Sum)	µg/L	100					<100	<100	<100	<100

Environmental Standards
Department of Health, 2014, Non-potable use of groundwater
2013, NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand
2013, NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Clay

Statistics
* A Non Detect Multiplier of 0.5 has been applied.

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Appendix K: Understanding Your Report

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UNDERSTANDING YOUR REPORT

GALT FORM PMP29 Rev3

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.

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3. SOIL LOGS

Our reports often include logs of intrusive and non-intrusive investigation techniques. 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.

4. 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.

5. 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.

6. 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.

7. 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.

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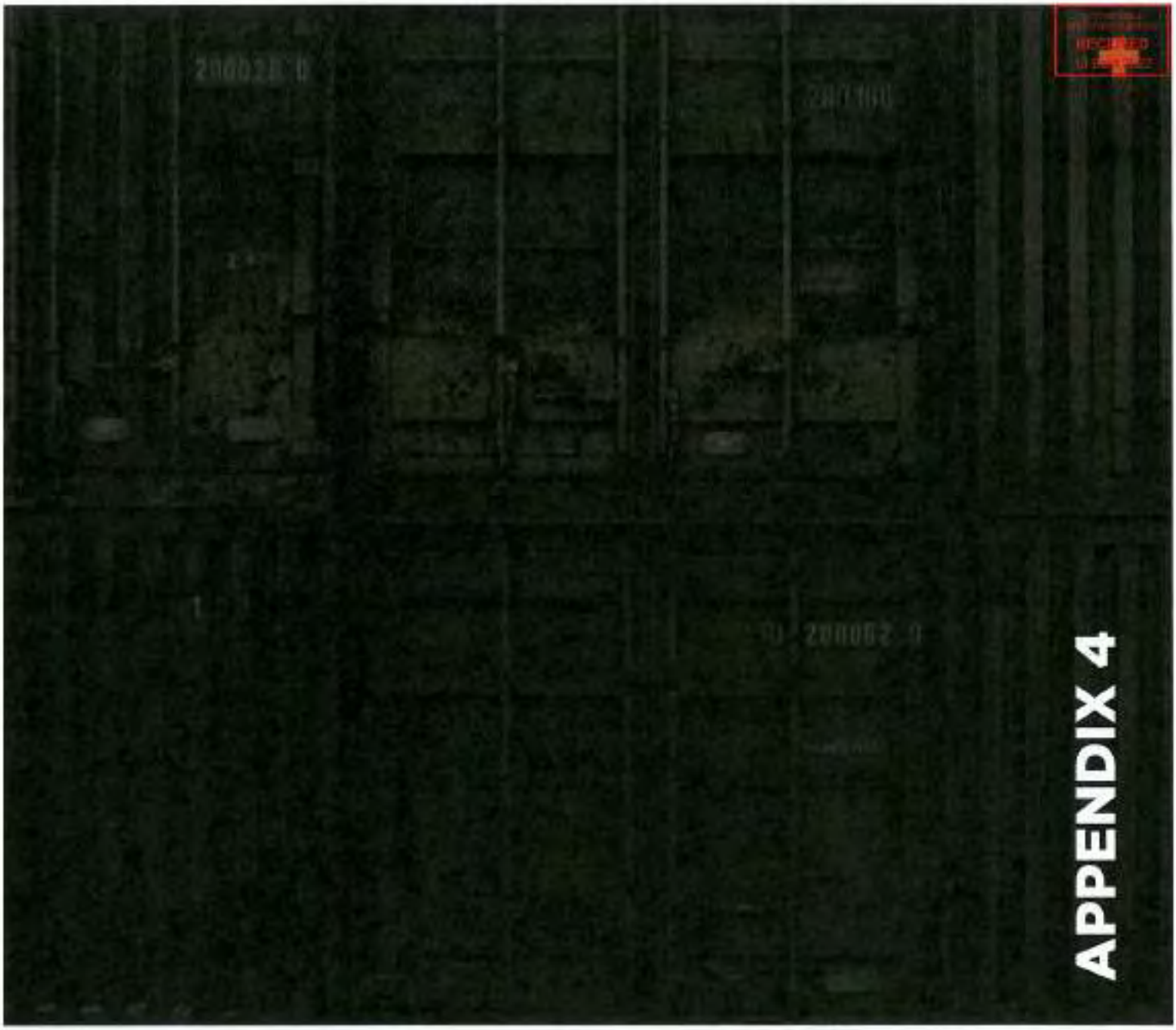

4. GEOTECHNICAL STUDY

GALT Geotechnical

(SITE doc ref: 220429 Galt residual geotechnical study J2201067 001 R Rev0-GS)

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Galt GEOTECHNICS

Report on

GEOTECHNICAL STUDY PROPOSED WAREHOUSES AND OFFICE DEVELOPMENTS PART OF LOT 153 TALBOT ROAD HAZELMERE

Submitted to:

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1. INTRODUCTION

This report presents the outcomes of the geotechnical study conducted by Galt Geotechnics (Galt) for proposed warehouse and office developments on part of Lot 153 Talbot Road, Hazelmere ("the site"). The location of the site relative to the surrounding area is shown on Figure 1, Site and Location Plan.

2. SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The site is irregular in plan with an area of about 37,795m^2. The site is generally covered with bitumen sealed pavements and hardstand apart from:

- an area in the south-west corner which is covered with grass and a number of large mature trees adjacent to the south-west boundary. The area includes a 70 m long narrow swale drain with a base width of about 5 m aligned in an east west direction and adjacent stockpiles of soils including laterite cobbles and boulders; and
- an area adjacent the eastern boundary which is covered with grass and includes a grove of mature trees.

A feature survey plan provided shows that the ground surface generally slopes down from east to west with elevations ranging from about RL 26.6 m to RL 24.8 m AHD. The ground surface in the area in the south-west corner undulates with the base of the swale drain at an elevation of about RL 24.1 m AHD, the surrounding area at an elevation of about RL 25 m AHD and the top of the adjacent stockpiles at an elevation of up to about RL 26.9 m AHD.

A plan provided shows the proposed development consists of:

- three rectangular warehouse structures, designated A to C, with areas ranging from 6,020 m^2 to 6,410 m^2;
- a single storey office at the north-west corner of Warehouse A with a total area of 200 m^2
- two storey offices each with a total floor area of 300 m^2 in the south-east corner of Warehouse B and south-west corner of Warehouse C;
- heavy duty pavements along the northern side of the warehouses with a total area of 11,308 m^2;
- car parking bays for light vehicles along the southern and western sides of the site; and
- landscaped areas.

We assume that the warehouses and offices will be of steel framed construction supported on shallow footings. Information has not been provided on the pavement type, the type and size of trucks or the type of vehicles that will operate within the warehouse. We assume that the warehouse will have a concrete floor slab and pavements outside the warehouse will be a combination of rigid concrete slab and flexible pavements for heavy and light vehicles.

We understand that the site is not connected to a sewage system and effluent treatment and disposal will occur on site.

A supplied drawing of the proposed development is presented in Appendix A: Supplied Drawing. Also included in Appendix A is a feature survey plan.

3. OBJECTIVES

The objectives of the study were to:

- assess subsurface soil and groundwater conditions across the site;
- provide recommendations on suitable footing systems for the proposed development;
- provide allowable bearing pressures and settlement estimates for shallow foundations;
- provide a site classification(s) in accordance with AS 2870-2011 "Residential Slabs and Footings";
- provide recommendations and geotechnical design parameters for earth retaining structures;
- assess the appropriate site subsoil class for the site in accordance with AS 1170.4-2007;

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- recommend appropriate site preparation procedures including compaction criteria;
- assess the permeability of the soils at the site for potential on-site disposal of stormwater by infiltration;
- assess the permeability of the soils at the site for on-site effluent disposal by infiltration in accordance with Local Authority and Department of Health requirements; and
- provide a subgrade California bearing ratio (CBR) value for pavement thickness design by others.

4. FIELDWORK

The fieldwork was conducted over the period 14 to 19 April 2022 and comprised:

- a walkover and inspection of the site including taking photographs;
- cone penetration testing at 6 locations (CPT01 to CPT06) each extending to a depth of 12.2 m;
- drilling of machine auger boreholes at 12 locations (MA01 to MA12) extending to a depth of 2.0 m apart from MA03 which extended to a depth of 2.4 m;
- drilling of four direct push boreholes, BH01 to BH04, to depths ranging from 9 m to 10 m
- installation of groundwater monitoring wells in boreholes BH01 to BH04 at depths ranging from of 9.36 m to 10.26 m;
- infiltration testing in eight of the machine auger boreholes (IT01 to IT08), at depths ranging from 1.35 m to 1.85 m;
- constant head permeability testing at 6 locations (G01 to G06), at a depth of about 0.5 m.
- collection of 2 bulk samples for inspection and possible laboratory testing.

General

The fieldwork was generally conducted in accordance with AS1726 (2017) "Geotechnical Site Investigations".

Geotechnical engineers from Galt positioned the tests using a hand-held GPS accurate to about 5 m in the horizontal plane. The engineers conducted the walkover survey, observed the direct push drilling and CPTs, carried out the machine auger drilling, performed the field tests and collected samples for inspection and laboratory testing.

The approximate test locations are shown on Figure 1. Details of the tests are shown in Table A1 at the end of the text. Photographs of the site are presented in Appendix B: Site Photographs.

Cone Penetration Tests

The CPTs were carried out using a 25 tonne truck mounted CPT rig, supplied and operated by Probedrill Pty Ltd. Testing was carried out in accordance with AS 1289.6.5.1 (1999). The CPT results are presented in Appendix C: Cone Penetration Test Results along with a method of interpretation proposed by Robertson et al (1986).

Machine Auger Boreholes

Machine auger boreholes were drilled using a utility mounted EVH Scout 1750 drill rig equipped with a 90 mm nominal diameter solid auger. Borehole reports including a list of notes and abbreviations and the method of soil description used on the reports are included in Appendix C: Machine Borehole Reports. Photographs of the core recovered are presented at the bottom of each report.

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Direct Push Boreholes

Boreholes were drilled using a Geoprobe 6620DT drill rig supplied and operated by Direct Push Probing.

Borehole reports are presented in Appendix D: Borehole Reports along with a method of soil description and a list of explanatory notes and abbreviations used in the reports. A photograph of the core recovered from each borehole is included in each of the borehole reports.

Groundwater Monitoring Well Installation

Four groundwater monitoring wells (MW01-MW04) were installed. The wells comprise 50 mm PVC standpipes extending to depths ranging from 9.36 m to 10.26 m with a 3.0 m slotted section at the base of each well. Gravel pack was placed over the slotted sections in the annulus between the borehole wall and standpipe, followed by a bentonite seal (typically 1.0 m thick). The annulus above the bentonite was backfilled to ground level using drill cuttings and on-site soils. The wells were finished with a lockable steel monument cover.

Groundwater monitoring well construction reports are presented in Appendix E: Groundwater Monitoring Well Construction Reports.

Infiltration Tests

Infiltration testing was undertaken using the 'inverse auger hole' method described by Cocks[1]. The test results recorded to date are presented in Appendix F: Infiltration Test Results and are summarised in

Table 1. The table will be updated once the remainder of the testing is carried out.

Table 1: Summary of Infiltration Test Results

Test No.	Soil Description	Test Depth (m)	Minimum Unsaturated Hydraulic Conductivity k (m/day)
IT01/MA01	SAND	1.54	4.0
IT02/MA02	SAND	1.85	3.4
IT03/MA03	SAND	1.55	13.4
IT04/MA04	Sandy GRAVEL over Sandy CLAY	1.70	3.6
IT05/MA05	SAND	1.35	3.3
IT06/MA06	Gravelly SAND over Sandy GRAVEL	1.60	7.1
IT07/MA07	Gravelly SAND over Sandy GRAVEL	1.44	8.0
IT08/MA08	Sandy GRAVEL	1.50	5.4

Guelph Permeameter Tests

Constant-head permeameter testing was carried out in general accordance with AS 1547 (2012), "On-site domestic wastewater management" using a Guelph permeameter. The test results are presented in Appendix G: Constant Head Permeability Results and sunimarised in Table 2.

[1] Cocks, G (2007), "Disposal of Stormwater Runoff by Soakage in Perth Western Australia", Journal and News of the Australian Geomechanics Society, Volume 42 No. 3, pp 101-114

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Table 2: Summary of Constant Head Permeability Test Results

Permeability Test	Soil Description to 1 m depth	Test Depth (m)	Constant Head Permeability, k (m/day)	Soil Category AS/NZS 1547:2012
G01	FILL: Sandy GRAVEL over SAND	0.5	1.03	3
G02	FILL: Sandy GRAVEL over SAND	0.5	1.37	3
G03	SAND	0.5	6.58	2
G04	SAND over Sandy GRAVEL	0.5	0.41	3
G05	FILL: Sandy GRAVEL over SAND	0.75	0.56	3
G06	FILL: SAND over SAND over Gravelly SAND	0.5	1.20	3

5. LABORATORY TESTING

Laboratory testing is currently being carried out by Western Geotechnical & Laboratory Services (WG&LS) in their NATA accredited laboratory. The testing in progress comprises determination of:

- particle size distribution on 2 samples;
- Atterberg limits and linear shrinkage on 2 samples;
- dry density-moisture content relationship using Modified compactive effort on 2 samples; and
- soaked California bearing ratio (CBR) tests on 2 samples.

The laboratory test results will be presented in Appendix H: Laboratory Test Results of the final report, along with the test methods. The results will also be summarised in Table 3 of the final report.

Table 3: Summary of Laboratory Test Results

Test Name	Sample Depth (m)	Soil Class AS1726 (2017)	% Gravel	% Sand	% Fines	MMDD (t/m³)	OMC (%)	CBR (%)	CBR Swell (%)
MA03	0.3 – 0.6	SAND with fines (SP-SM)	3	89	8	1.87	9.0	20	0.0
MA07	0.4 – 0.7	Gravelly SAND with fines (SP-SM)	33	56	11	2.03	8.5	50	0.0

Note: MMDD – Maximum Modified Dry Density OMC – Optimum Moisture Content
CBR - California bearing ratio (95% MMDD, 6.75 kg surcharge, 4 day soak)

6. SITE CONDITIONS

6.1 Geology

The Perth sheet of the 1:50,000 scale Environmental Geology series map indicates that the majority of the site is underlain by a thin layer of Bassendean Sand overlying fine grained soils of the Guildford Formation.

The findings of the investigation are generally consistent with the geological mapping although a layer of fill is present over most of the site.

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6.2 Subsurface Conditions

The subsurface conditions can generally be summarised as follows:

- Sandy GRAVEL (GP - inferred road base): fine to coarse grained, sub-angular to sub-rounded, typically pale grey and brown, dry, very dense, present from ground surface to depths ranging from 0.1 m to 0.5 m; overlying
- SAND (SP): fine to coarse grained, sub-angular to sub-rounded, typically pale grey to off white, trace to some fine to medium grained lateritic gravel, trace non plastic fines, dry, typically dense, present to depths ranging from 0.75 m to 2.0 m; overlying
- Gravelly SAND (SP)/ Sandy GRAVEL (GP): fine to coarse grained sand and gravel, sub-angular to sub-rounded, variably cemented, typically pale brown to brown, lateritic, dry, typically dense, extending to depths ranging from 1.5 m to 2.5 m; overlying
- Gravelly CLAY (CI)/ Clayey SAND (SC): medium plasticity, mostly pale red, red and grey, generally containing layers of sand, silty sand and cemented sand, moist becoming wet at depth, very stiff to hard, extending to depths ranging from 8.0 m to 9.9 m; overlying
- SAND: dense to very dense, extending to the maximum investigated depth of 12.2 m.

Variations to the above comprise:

- no FILL: Sandy GRAVEL present at the surface in boreholes MA03, MA04 and BH01 to BH04;
- no Gravelly SAND/Sandy GRAVEL below the SAND in boreholes MA01 to MA03;
- inferred hard Silty CLAY below the SAND at depths below 10.9 m and 8.5 m in CPT05 and CPT06 respectively; and
- inferred thin layers of stiff Sandy SILT and Clayey SILT within SAND below a depth of about 8.0 m in CPT04.

Surface road base material is not present at the surface in the area in the south-west corner of the site (BH03, MA03 and MA04). The area is used to dispose stormwater and a few small stockpiles of soilse present on the ground surface.

6.3 Groundwater

The Perth Groundwater Atlas (2004) shows the seasonal minimum groundwater level to be around RL 13 m AHD. This is about 12 m below the current ground surface.

The levels used to interpolate the groundwater contours in this edition of the atlas were based on levels recorded in May 2003 following a long dry period. These levels are generally considered to reflect minimum groundwater levels. Groundwater levels can be expected to be significantly higher than shown in the 2004 atlas.

Groundwater was measured in the monitoring wells on 157 March 2022 at the following depths:

Test Location	Depth to Groundwater (m)
MW01	8.1
MW02	7.38
MW03	4.5
MW04	5.63

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Shallower perched groundwater is expected to develop on top of the hard/cemented clayey stratum during the wetter times of the year.

7. GEOTECHNICAL ASSESSMENT

7.1 Site Classification

We have assessed the site classification in accordance with AS2870 (2011) "Residential Slabs and Footings". We consider that a site classification of "Class S" is appropriate for the site provided that:

- site levels are raised and not lowered – we must be consulted if this is the case;
- the site preparation guidelines in Section 7.3 are followed; and
- suitable drainage control measures are implemented.

Note that footing and slab details provided in AS2870 (2011) are limited to single to double storey structures supported on shallow footings with a maximum bearing pressure of 100 kPa. This must be considered by the structural designers.

7.2 Site Subsoil Class

We have assessed the site subsoil class in accordance with AS1170.4 (2007), "Earthquake Design Actions in Australia" and consider that a site subsoil class of "Ce" is appropriate for the site.

7.3 Site Preparation

The following site preparation guidelines are provided to prepare the site for construction, including on-ground slabs, footings, retaining walls and pavements.

General

- Remove vegetation and trees including grubbing out of tree roots;
- Strip gravelly hardstand where present and stockpile for later re-use as structural fill;
- Strip topsoil – this should only require a thin 50 mm strip where present.
- Conduct bulk excavations where required using safely battered slopes in accordance with Section 7.6.
- Moisture condition and compact the exposed ground to a minimum depth of 0.45 m to the minimum required density outlined in Section 7.4.
- Over-excavation and replacement with approved compacted fill is required where the minimum density cannot be achieved.
- Place and compact approved fill (Section 7.5) where required in layers no greater than 0.3 m loose thickness. Each layer must be compacted to the minimum required density outlined in Section 7.4.
- Excavate to the underside of slabs and footings and compact the exposed the base. The minimum required density outlined in Section 7.4 must be achieved to a depth of at least 0.9 m below footings and slab.

South-West Section

- Remove vegetation and trees including grubbing out of tree roots;
- Strip topsoil – this should only require a 100 mm strip where present.
- Remove stockpiles of soil to a stockpile for later re-use as structural fill or remove off site.
- Remove surface growth from surface of swale drain and batter sides to safe slopes as per Section 7.6.
- Remove any sediment from base of swale drain and dispose off site.
- Moisture condition and compact the exposed base of the swale drain to the minimum required density outlined in Section 7.4 to a minimum depth of 0.45 m.

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- Place and compact approved fill (Section 7.5) within swale drain in layers no greater than 0.3 m loose thickness. Each layer must be compacted to the minimum required density outlined in Section 7.4.
- Moisture condition and compact the exposed ground to a minimum depth of 0.45 m to the minimum required density outlined in Section 7.4.
- Excavate to the underside of slabs and footings and compact the exposed the base. The minimum required density outlined in Section 7.4 must be achieved to a depth of at least 0.9 m below footings and slab.

7.4 Compaction

Approved granular fill must be compacted using suitable compaction equipment to achieve a dry density ratio of at least 95% MMDD (maximum modified dry density) as determined in accordance with AS 1289.5.2.1 at a moisture content within 2% of optimum moisture content (OMC).

Where sand is used as fill (<15% gravel, < 5% fines), a Perth sand penetrometer (PSP) may be used for compaction control in accordance with AS 1289.6.3.3. The following minimum blow counts may be assumed to correspond to a DDR of 95% MMDD:

- 0-150 mm: SET
- 150-450 mm: 8
- 450-750 mm: 10
- 750-1050 mm: 12 (or 750-900 mm: 6).

Where the above blow counts cannot be achieved, a site-specific PSP correlation should be carried out to determine the PSP blow count correlating to a DDR of 95% MMDD. The correlation must:

- be done on site;
- use the nuclear density gauge (NDG) to determine density at a minimum of 5 points with varying density to a depth of 300 mm below surface (at least one point must be at a density greater than 95% MMDD);
- use a calibrated PSP to determine the PSP blow count from 150 mm to 450 mm at each of the NDG test points; and
- be plotted on a chart of PSP blow count vs DDR.

We generally do not recommend re-use of the in-situ clayey soils (refer to Section 7.5). However, where limited filling is required, the clayey material must be compacted to a dry density ratio of at least 95% SMDD (standard maximum dry density) as determined in accordance with AS 1289.5.1.1 at a moisture content within 2% of optimum moisture content (OMC). Compaction control of clayey soils should be conducted with the nuclear density gauge (NDG) in accordance with AS 1289.5.8.1.

For any soil with more than about 5% fines (including the silty and clayey materials on-site), nuclear density gauge testing must be done for compaction control in accordance with AS 1289.5.8.1.

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

Granular fill must be placed in horizontal layers of not greater than 0.3 m loose thickness. 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.

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Testing Frequency

The compaction must be assessed by testing to a minimum depth of 0.3 m:

- On each lift of fill on a 30 m grid
- At each spread footing location;
- At 10 m centres along strip footings; and
- On a grid of 15 m centres below on-ground slabs and pavements.

Compaction Vibrations

Care will need to be taken when compacting in the vicinity of existing services and structures. This is particularly important if vibratory compaction is being carried out. Tynan (1973)[2] provides assistance with the selection of compaction equipment for use adjacent to services.

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

7.5 Approved Fill

Imported granular fill must comply with the material requirements of AS 3798 (2007) "Guidelines on Earthworks for Commercial and Residential Developments".

The in-situ sand, gravelly sand and sandy gravel is considered suitable for re-use as structural fill.

The re-use of in-situ clayey sand and clay is generally not recommended as it will be difficult to moisture condition and compact and may adversely impact on site classification, pavements subgrades and drainage. Re-use of such material should be limited to backfilling of excavations into the clayey soils where required. Alternatively, these excavations could be backfilled using lean mix concrete or crushed limestone.

If there is any doubt regarding the suitability of the in-situ and/or potential fill materials, we must be engaged to inspect and approve the materials.

7.6 Excavation and Slopes

Based on the soil profile encountered, we consider that excavation of the in-situ sand, gravelly sand and sandy gravel should be readily achieved using conventional earthmoving equipment (10 tonne or larger excavator equipped with a rock bucket). Excavations that extend into the hard and variably cemented clayey sand and clay may require a 30 tonne or larger excavator equipped with a rock bucket. The possible presence of obstructions such as cemented layers in the clayey soil must be taken into account when selecting excavation equipment.

Excavations in sand are prone to instability unless support is provided.

Excavations in the in-situ sand, gravelly sand and sandy gravel must be battered at slopes no steeper than 1V:2H for temporary slopes and 1V:3H for permanent slopes at least 1 m above the water table. Even at these slope angles, erosion and rilling is likely to occur especially during significant rainfall events. A temporary slope angle of 1V:1H may be assumed for excavations that extend into the in-situ clayey soils above the water table.

[2] Tynan (1973) Ground Vibration and Damage Effects on Buildings, Australia Road Research Board, Special Report No. 11.

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Surcharges (such as structures, plant and soil stockpiles) must not be placed at or close to the crest of unsupported excavations.

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

7.7 Retaining Structures

Retaining structures may be designed in accordance with AS 4678-2002 "Earth-Retaining Structures". Permeable granular fill must be used as gravity retaining wall backfill. The following parameters may be assumed for approved granular fill that is compacted to the requirements of Section 7.4.

- Angle of internal friction, $\phi = 35°$
- Coefficient of active earth pressure $K_a = 0.27$
- Coefficient of passive earth pressure $K_p = 3.69$
- At rest coefficient of earth pressure $K_o = 0.43$
- Bulk unit weight: 18 kN/m^3 above the water table

Compaction plant can augment the lateral earth pressure acting on retaining walls. Hand operated compaction equipment is recommended within 2 m of any retaining walls to minimise compaction pressures.

It is important to note that some ground movement is to be expected behind any soil retaining system, including gravity retaining walls.

7.8 Shallow Footings

Structures may be founded on shallow footings and on-grounds slabs. Table 4 and Table 5 give allowable bearing pressure and estimated settlements for pad footings and strip footings with a minimum embedment of 0.5 m. These values assume that the site preparation procedures in Section 7.3 are followed.

Table 4: Pad Footing Allowable Bearing Pressures and Estimated Settlements

Minimum Footing Embedment (m)	Minimum Footing Dimension (m)	Allowable Bearing Pressure (kPa)	Estimated Settlement (mm)
0.5	0.5	150	< 5
	1.0	200	< 5
	2.0	200	5 – 10
	3.0	200	10 – 15

Table 5: Strip Footing Allowable Bearing Pressures and Estimated Settlements

Minimum Footing Embedment (m)	Minimum Footing Dimension (m)	Allowable Bearing Pressure (kPa)	Estimated Settlement (mm)
0.5	0.5	120	< 5
	1.0	170	5 – 10
	2.0	200	10 – 15

Allowable bearing pressures for footings of intermediate plan dimensions to those tabulated can be interpolated. Footings that have a plan dimension either smaller or larger than those covered by tables above will need to be considered individually along with other embedment depths. Footings carrying significant eccentric loading, such as below retaining walls, must be assessed separately.

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An allowable working bearing pressure of 200 kPa is considered to be an upper limit for pad footings and strip footings to limit total and differential settlements as well as the risk of long-term settlement which may occur under high bearing pressures.

The settlement of the proposed structure will depend upon a number of factors including the applied pressures, footings size and base preparation. The estimates of settlement provided above assume that the site preparation measures in Section 7.3 have been completed. The estimated settlements are for the working bearing pressure values shown. Differential settlements of up to half of the total estimated settlement values are likely between footings of similar sizes, loads and elevations. About 50% of the settlement is expected to occur during construction.

All footing excavations must be checked by a competent person prior to blinding.

7.9 Stormwater Disposal

Infiltration tests were conducted in areas proposed for pavements and landscaped areas around the perimeter of the warehouse. The results of the infiltration tests conducted varied across the site with minimum unsaturated permeability values ranging from:

- western boundary of site (IT01 to IT03) – 3.4 m/day to 13.4 m/day;
- north-east part of site (IT06, IT07 and IT08) – 5.4 m/day to 8.0 m/day; and
- south-west boundary (IT04 and IT05) – 3.3 m/day and 3.6 m/day

We note that:

- the depth of permeable in-situ sand, gravelly sand and sandy gravel varies between about 0.9 m to 2.5 m across the site and is typically greater than 1.8 m; and
- the clayey soil below the surficial granular soils is generally hard and possibly cemented.

Based on the test results we consider the following design values of permeability to be appropriate:

Western boundary (depth of granular soil – 2.0 m to > 2.3 m)

- SAND – 3.0 m/day
- Gravelly CLAY/Clayey SAND – impermeable.

North-east part (depth of granular soil - 1.6 m to > 2.0 m)

- SAND – 4.0 m/day
- Gravelly SAND/Clayey GRAVEL – 4.0 m/day
- Gravelly CLAY/Clayey SAND – impermeable.

South-west boundary (depth of granular soil - 1.6 m and >2.0 m)

- SAND – 3.0 m/day
- Sandy GRAVEL – 3.0 m/day
- Gravelly CLAY/Clayey SAND – impermeable.

The design values of permeability given above have been reduced from the test results to allow for the variability in materials and reduced permeability as a consequence of:

- densification of sand during site preparation works;
- natural variation in sands; and
- clogging of the sand around soak wells and soakage basins over time with fines.

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Soak wells should be placed outside a line of 1V:2H extending below the edge of the nearest footing subject to local council regulations. Discharge from soak wells has been known to promote densification of loose sandy soils, leading to settlements of footings and slabs. Soak wells should be carefully wrapped with geotextile to prevent migration of sand and fines into the soak well.

The bases of soak wells must be at least 0.5 m above the impermeable clay as we expect perched groundwater to develop on top of the clay. We further note that the soak wells must be designed to overflow into the council drainage system (subject to local regulations).

7.10 Effluent Disposal

Constant head permeability testing was undertaken in proposed pavement and landscaped areas for on-site disposal of effluent. Based on the test results presented in Table 2, we have assessed the in-situ sand and gravelly sand at the site in accordance with AS1547 (2012) "On-site domestic wastewater management" as follows:

- *Soil Category 3 – Loams -weakly structured for G01, G02, G04 to G06.*
- *Soil Category 2 – Sandy Looms -weakly structured for G03.*

Other soil types should be assumed to impermeable with regards to effluent disposal without further assessment.

A full site and soil evaluation (SSE) prepared in accordance with Government Sewerage Policy and Department of Health (DoH) requirements is presented in report J2201067 002 R Rev0 dated 20 April 2022.

7.11 Pavement Subgrades

Laboratory test results indicate that the in situ sand and in situ gravelly sand have a 4 day soaked CBRs of 20% and 50% with no swell when compacted to 95% MMDD with a 6.75 kg surcharge.

Despite the high CBR values, we note that:

- the gravelly sands have a variable gravel content; and
- the in-situ sand is largely consistent with Bassendean Sand.

Based on the above, we recommend the following design subgrade CBRs for flexible pavements, assuming site preparation in accordance with Section 7.3.

- In-situ sand – CBR 10%; and
- In-situ gravelly sand– CBR 15%

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8. CLOSURE

We draw your attention to Appendix J 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 ground-works 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

Fred Davenport MIE (Aust)

Geotechnical Engineer

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Table

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Table A1: Summary of Tests

Test Reference	Test Depth (m)	Depth of Granular Material (m)	Depth to Groundwater (m)	Reason for termination	Stratigraphy[3]
BH01/MW01	10.0	2.0	8.1	Target depth	SAND over Sandy GRAVEL over Clayey SAND
BH02/MW02	10.0	2.5	7.38		SAND over Gravelly SAND over Clayey Gravelly SAND over Clayey SAND
BH03/MW03	9.0	2.0	4.5		SAND over Clayey SAND over Sandy CLAY
BH04/MW04	9.0	2.0	5.63		SAND over Gravelly SAND over Sandy GRAVEL over Clayey SAND over Sandy CLAY
MA01	2.0	>2.0	GNE[1]	Target depth	FILL: Sandy GRAVEL over SAND
MA02	2.0	>2.0			
MA03	2.4	>2.4			SAND
MA04	2.0	1.4			SAND over Sandy GRAVEL over Sandy CLAY
MA05	2.0	>2.0			FILL: Sandy GRAVEL over SAND over GRAVEL
MA06	2.0	1.8			FILL: SAND over SAND over Gravelly SAND over Sandy GRAVEL over Gravelly CLAY
MA07	2.0	1.6			FIL: Sandy GRAVEL over Gravelly SAND over Sandy GRAVEL over Gravelly CLAY
MA08	2.0	>2.0			FILL: Sandy GRAVEL over Gravelly SAND over Sandy GRAVEL
MA09	2.0	1.8			FILL: Sandy GRAVEL over SAND over Sandy GRAVEL over Gravelly CLAY
MA10	2.0	>2.0			FILL: Sandy GRAVEL over SAND over Gravelly SAND over Sandy GRAVEL
MA11	2.0	1.5			FILL: Sandy GRAVEL over SAND over Gravelly SAND over Gravelly CLAY
MA12	2.0	>2.0			FILL: Sandy GRAVEL over SAND over Gravelly SAND
CPT01	12.2	2.2	D 4.5[2]	Target depth	SAND over Very Stiff Fine Grained Material with thin lenses of SAND and Silty SAND over SAND
CPT02	12.2	1.6	D 6.5		
CPT03	12.2	1.7	6.4		
CPT04	12.2	0.9	5.8		SAND over Very Stiff Fine Grained Material with thin lenses of SAND and Silty SAND over SAND with thin lens of clayey soil
CPT05	12.2	1.5	4.6		SAND over Very Stiff Fine Grained Material over SAND over Silty CLAY
CPT06	12.2	1.7	4.6		SAND over Very Stiff Fine Grained Material over Clayey SAND over Silty CLAY

Notes:
1. GNE – Groundwater not encountered.
2. Dry to recorded depth (collapse of the CPT hole occurred below this depth).
3. Stratigraphy in CPTs inferred using the Robertson et al (1986) CPT interpretation.

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Legend

Site Boundary

Galt Test Locations

- Borehole / Groundwater Monitoring Well
- Machine Auger Borehole
- Machine Auger Borehole / Infiltration Test
- Cone Penetration Test
- Guelph Permeameter

N

NOTES
Aerial imagery and Cadastre sourced from Landgate/SLIP



SCALE	1:1,250 (A3)
DRAWN	DAG
DATE	21/04/2022
CHECKED	DAG
DATE	21/04/2022
DRAWING	[illegible]

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Galt Geotechnics Pty Ltd
[illegible]
[illegible]
[illegible]
Osborne Park WA 6017

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CLIENT	LOGOS PROPERTY GROUP
PROJECT	PROPOSED WAREHOUSE AND OFFICES FACILITIES
LOCATION	PART LOT 153 TALBOT ROAD HAZELMERE
TITLE	SITE & LOCATION PLAN
DRAWING	J2201067
FIGURE 1	A

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Appendix A: Supplied Drawings

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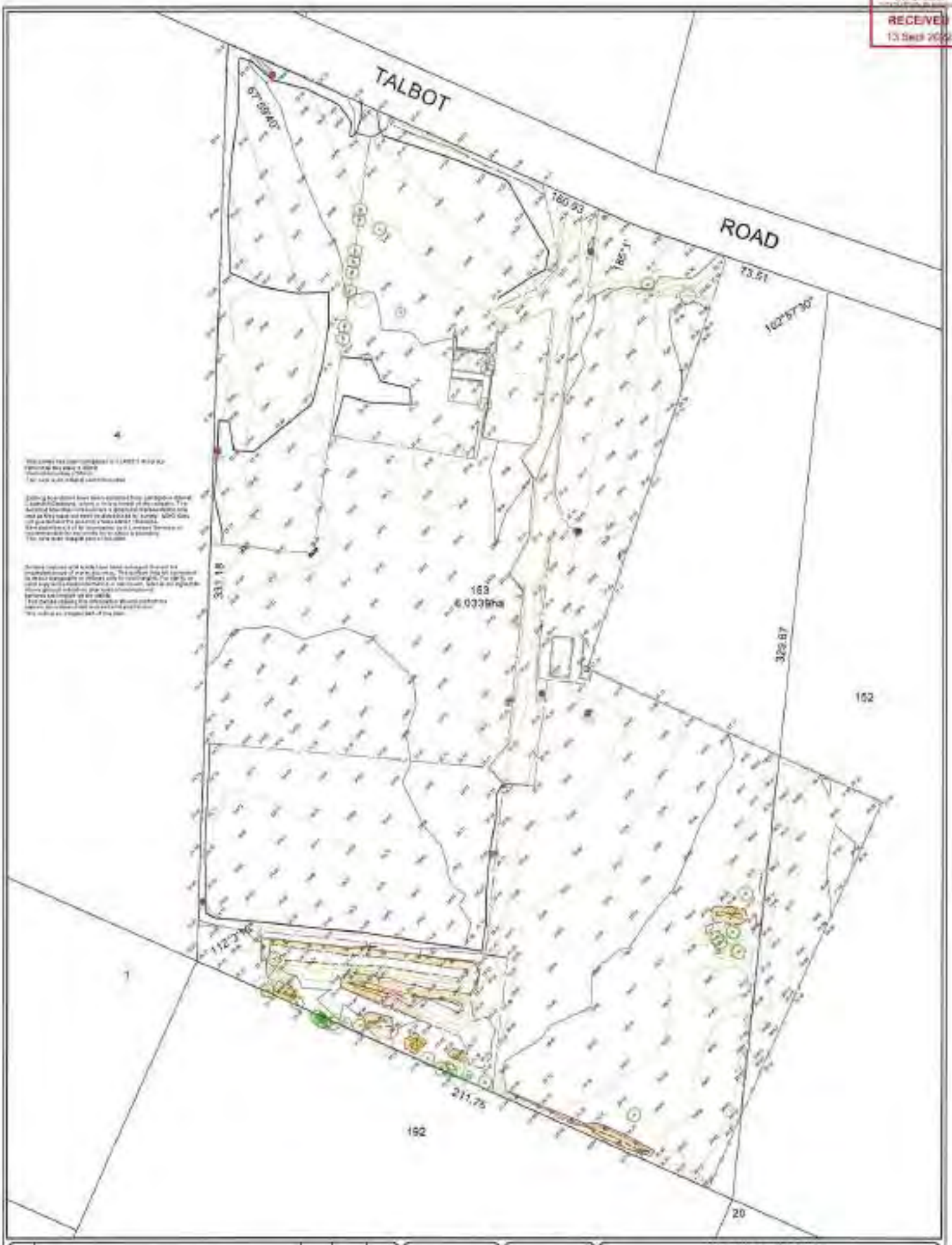

LOT 153 TALBOT ROAD
HAZELMERE
Level And Feature Survey

LOGOS PROPERTY

MNG

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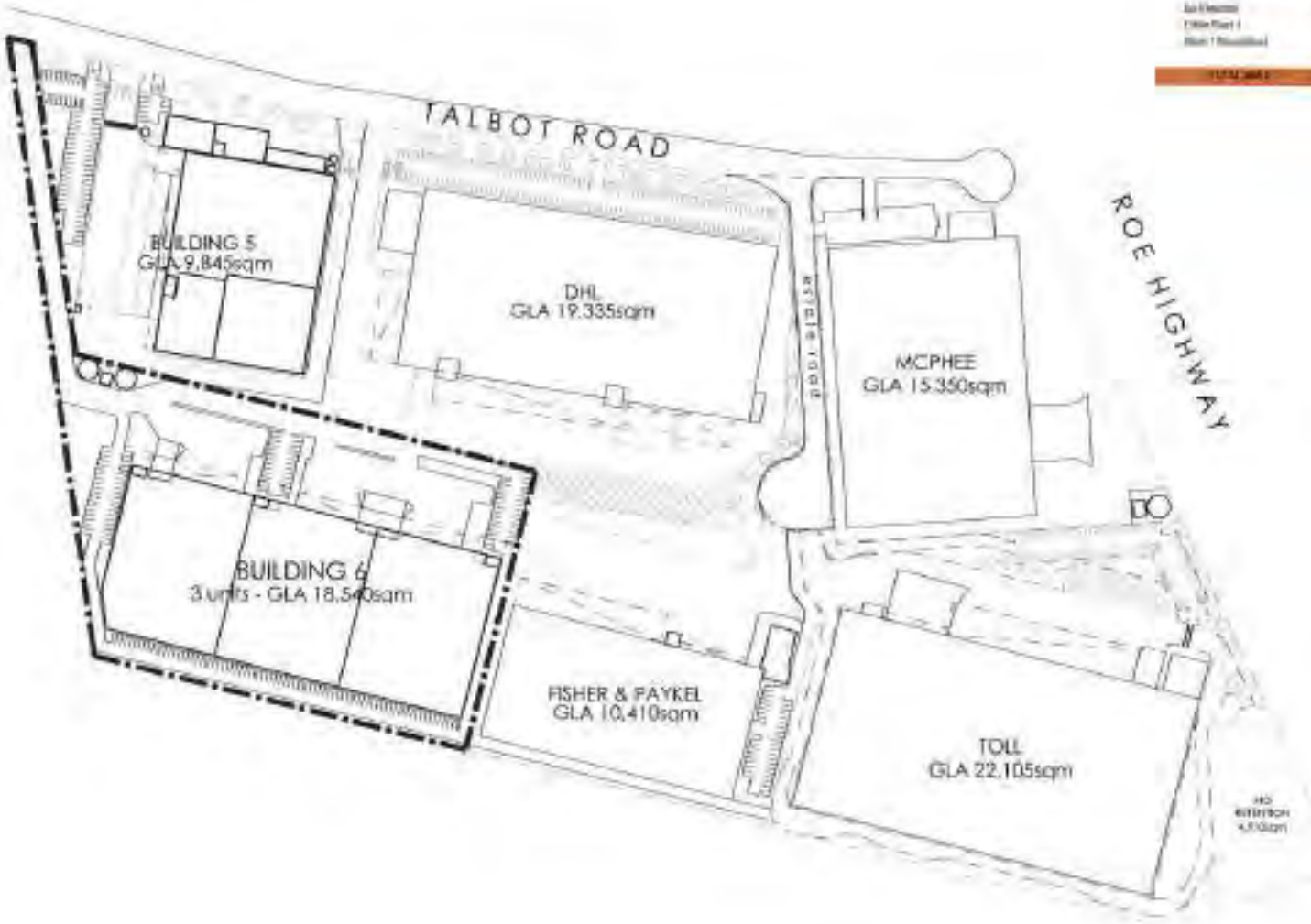
SCHEDULE OF AREAS

Developments	[illegible]						
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	McPhee	[illegible]	[illegible]	[illegible]			
2	Toll	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	Fisher & Paykel	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]
4	DHL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	Building 5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]
	[illegible]	[illegible]					
	[illegible]	[illegible]					
	[illegible]	[illegible]					
	TOTAL AREAS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]



ESTATE PLAN

NOTE : INDICATIVE ONLY, SUBJECT TO DETAILED DESIGN

LOGOS

HAZELMERE LOGISTICS ESTATE
PROPOSED WAREHOUSE DISTRIBUTION & OFFICE FACILITIES
TALBOT ROAD, HAZELMERE, WA

ESTATE PLAN

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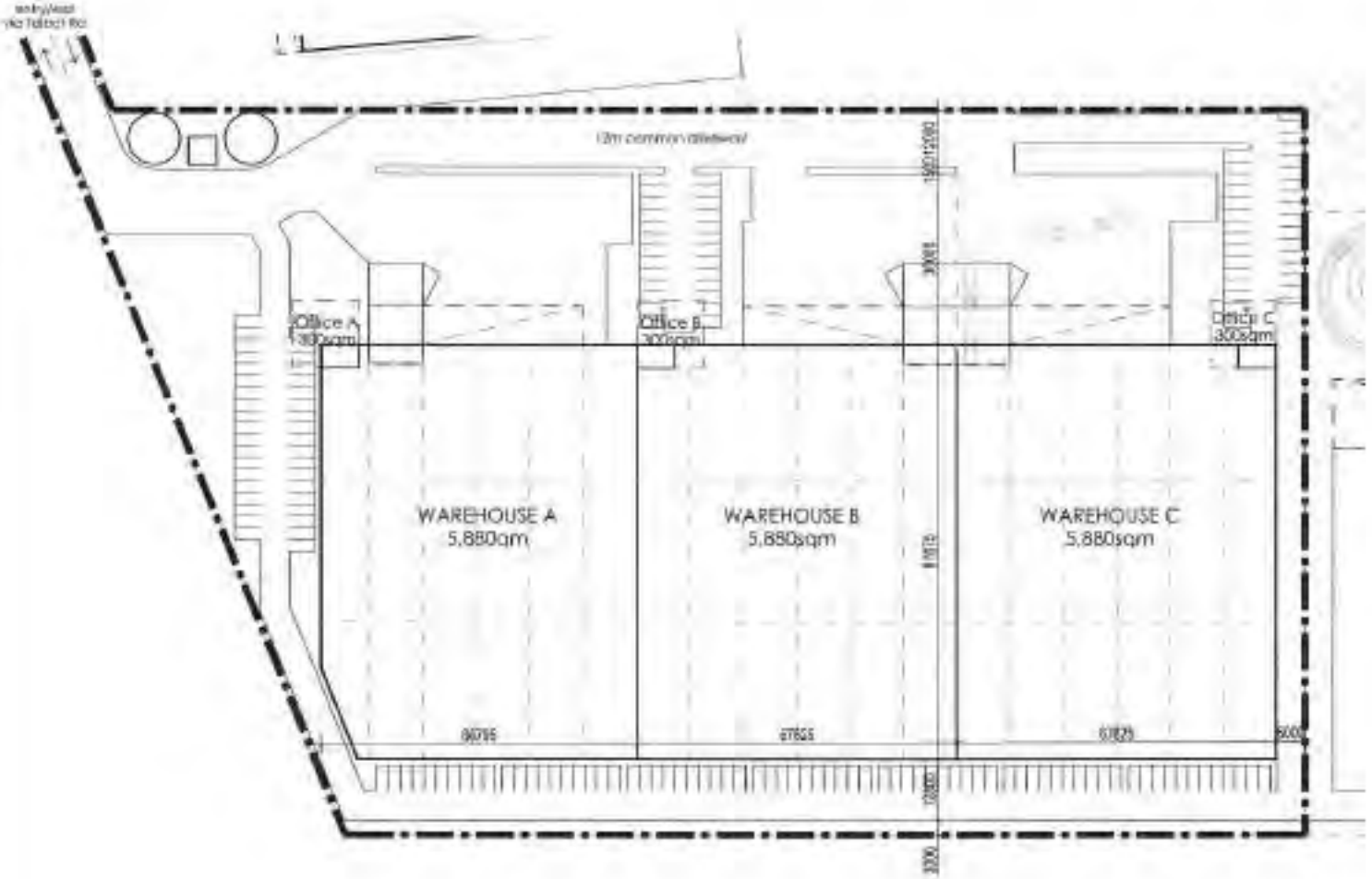

SCHEDULE OF AREAS

SITE AREA	11,795 sqm
WAREHOUSE A	5,880 sqm
WAREHOUSE B	5,880 sqm
WAREHOUSE C	5,880 sqm
OFFICE A (Mezz.)	300 sqm
OFFICE B (Mezz.)	300 sqm
OFFICE C (Mezz.)	300 sqm
TOTAL BUILDING AREA	11,660 sqm
Rx AWNING	300 sqm
HEAVY DUTY PAVEMENT	7,648 sqm
LIGHT DUTY PAVEMENT	3,142 sqm
	167 car spaces incl. 1 disabled
EFFICIENCY	51%
LANDSCAPE - hatched green (combined with highlands)	0.778 sqm

2 SITE PLAN

NOTE : INDICATIVE ONLY. SUBJECT TO DETAILED DESIGN

LOGOS

HAZELMERE LOGISTICS ESTATE
PROPOSED WAREHOUSE DISTRIBUTION & OFFICE FACILITIES
TALBOT ROAD, HAZELMERE, WA

SITE PLAN

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Appendix B: Site Photographs

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Photograph Locations



Photograph 1: View to south at Location 1

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Photograph 2: View to north-east at Location 2



Photograph 3: View to north-west at Location 2

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Photograph 4: View to south-west at Location 2



Photograph 5: View to north-west at Location 3

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Photograph 6: View to west at Location 3



Photograph 7: View to east at Location 4

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Photograph 8: View to south-east at Location 4



Photograph 9: View to south at Location 5

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Photograph 10: View to south-west at Location 5



Photograph 11: View to west at Location 6

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Photograph 12: View to north at Location 7



Photograph 13: View to west at Location 8

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Photograph 14: View to south at Location 8



Photograph 15: View to south-east at Location 9

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Photograph 16: View to east at Location 10



Photograph 17: View to east at Location 11

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Photograph 18: View to south-east at Location 12



Photograph 19: View to north-east at Location 13

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Photograph 20: View to north-west at Location 14

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Appendix C: Cone Penetration Test Results

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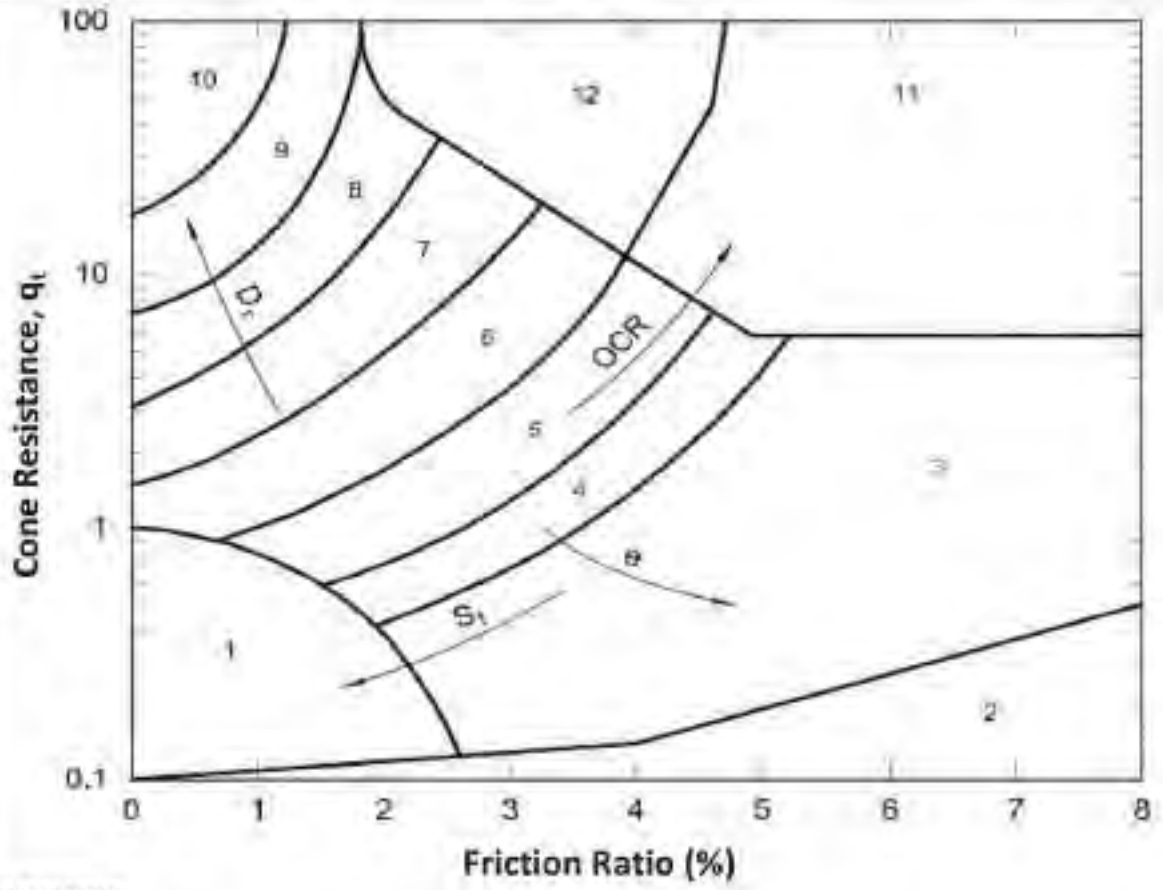

DEFINITIONS

q_t : Cone tip resistance corrected for pore water pressure
S_t : Sensitivity
e : Void ratio
D_r : Relative density
OCR : Overconsolidation ratio
OC : Overconsolidated

SOIL BEHAVIOUR TYPE ZONES

1. Sensitive fine grained
2. Organic material
3. Clay
4. Silty clay to clay
5. Clayey silt to silty clay
6. Sandy silt to clayey silt
7. Silty sand to sandy silt
8. Sand to silty sand
9. Sand
10. Gravelly sand to sand
11. Very stiff fine grained material (OC/cemented)
12. Sand to clayey sand (OC/cemented)

NOTES

A. Some overlap in type zones is expected
B. Local correlations are preferred and may indicate soil type boundaries that are different from those shown above

Reference: Robertson, P.K., Campanella, R.G., Gillespie, D. and Grieg, J. (1986) 'Use of Piezometer Cone Data', Proceedings of the ASCE Specialty Conference in Situ '86: Use of In Situ Tests in Geotechnical Engineering, Blacksburg, pp.1263-80, American Society of Civil Engineers (ASCE)

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CONE PENETRATION TESTING (CPT) SOIL TYPE INTERPRETATION

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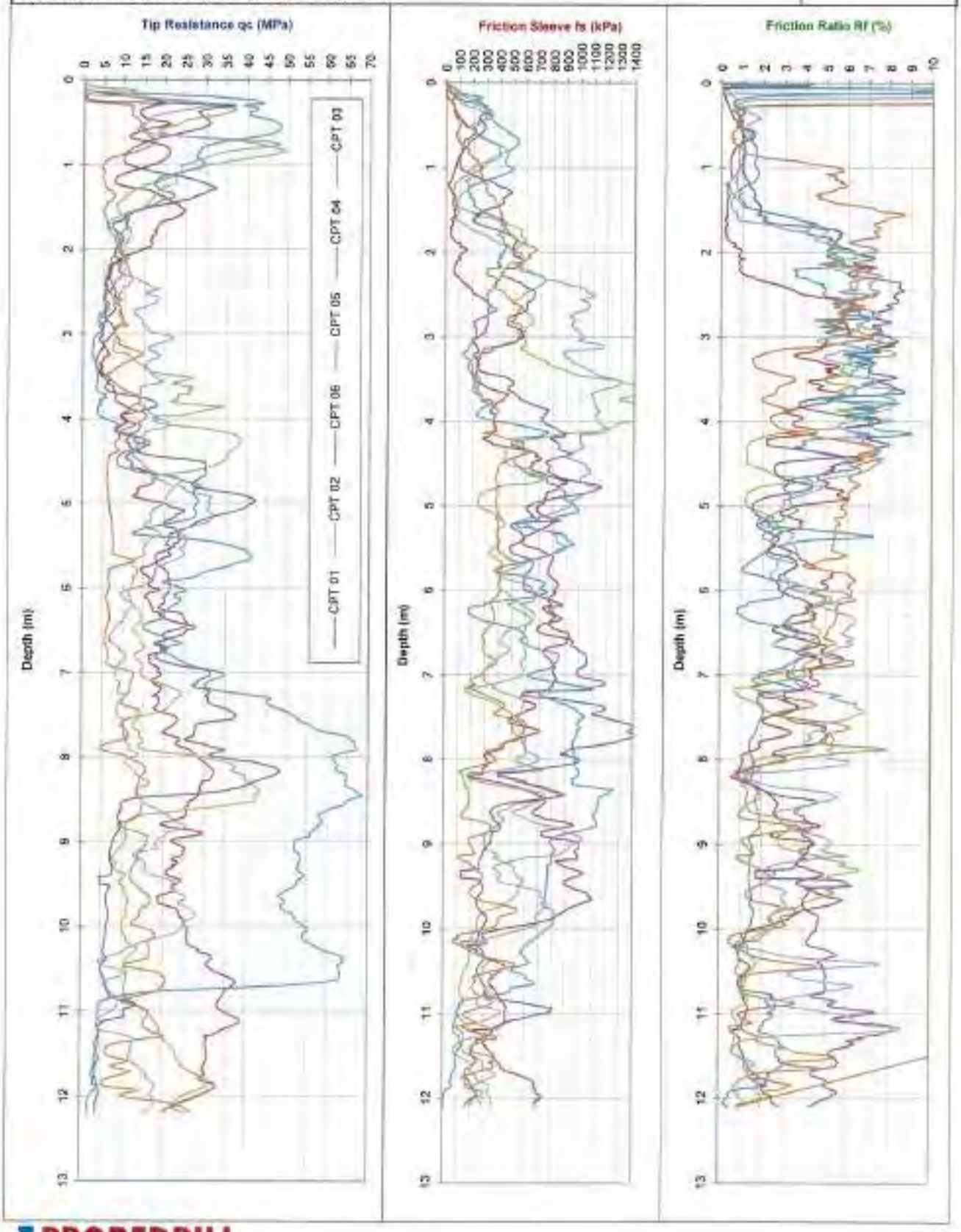
ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Logos Property Group
Job No.: J2201067

PROJECT: Proposed Warehouses and Office Facilities
Date/s: 10/Mar/2022

LOCATION: Part of Lot 150 Talbot Road Hazelmere

ALL DATA



PROBEDRILL
GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Rig Type: 25t truck (RFW)

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Version: 10, Version Date: 17/11/2022

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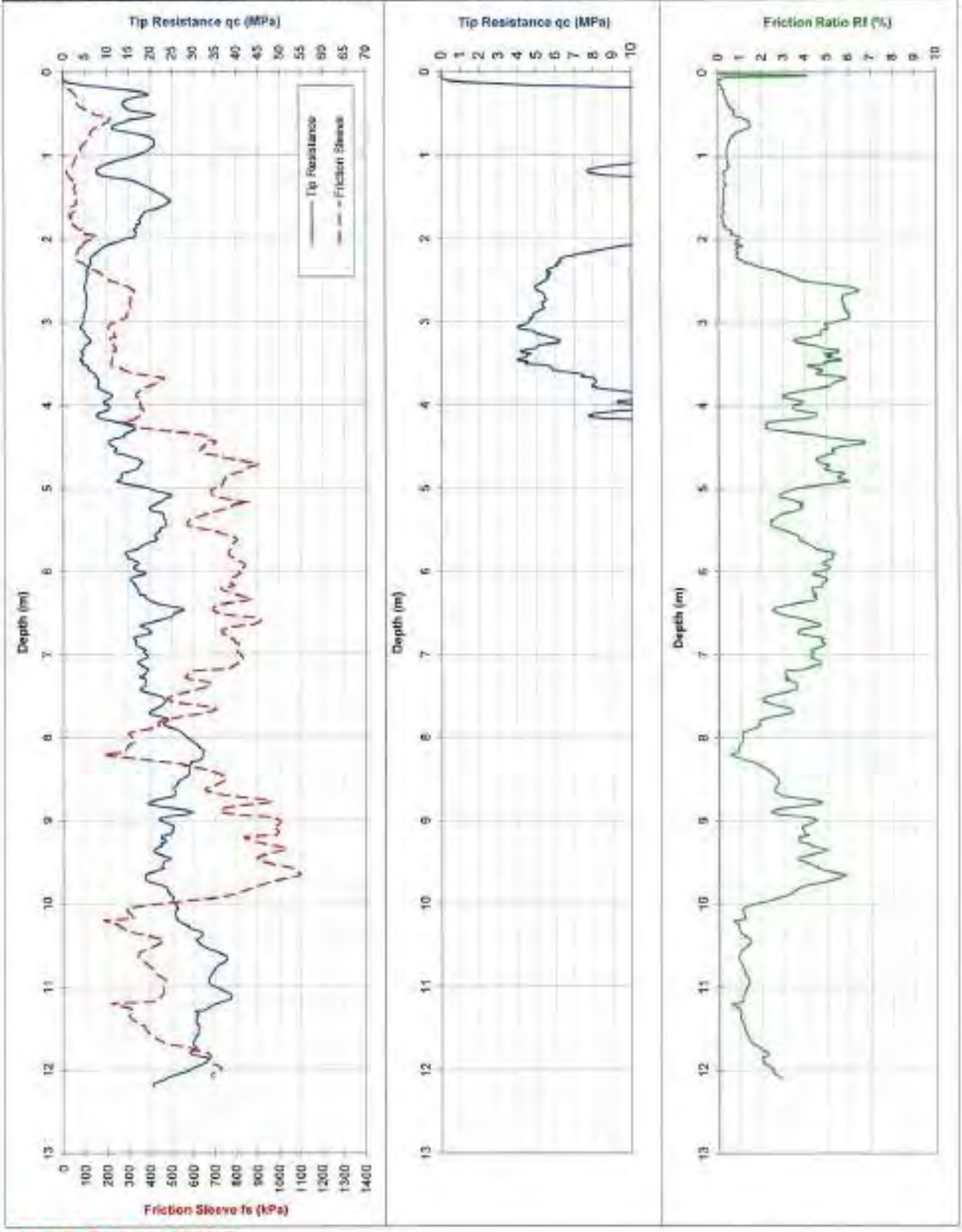
ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Logos Property Group	Job No.: J2201057	Probe I.D
PROJECT: Proposed Warehouses and Office Facilities	RL (m):	**CPT 01**
LOCATION: Part of Lot 150 Talbot Road Hazelmere	Co-ords:	10-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): Dry to 4.5

Dummy probe to (m): 0.3

Refusal

Cone I.D.: EC07

File: GL0985R

Rig Type: 25t truck (RFW)

Document Set ID: 7363023
Version: 10, Version Date: 17/11/2022

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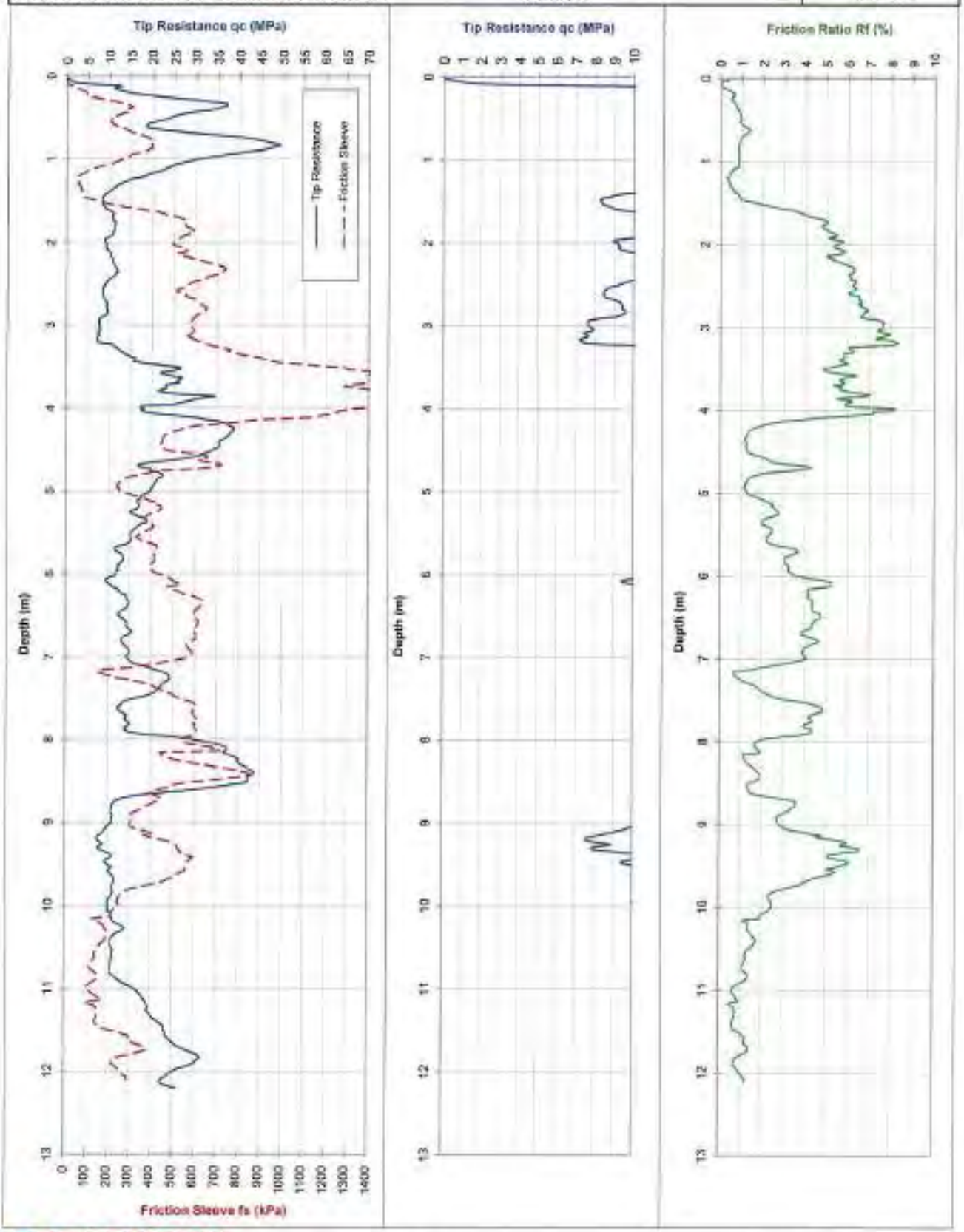
ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Logos Property Group	Job No.: J2201067	Probe I.D
PROJECT: Proposed Warehouses and Office Facilities	RL (m):	**CPT 02**
LOCATION: Part of Lot 150 Talbot Road Hazelmere	Co-ords:	10-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.6.1-1999 and ISTP 2001 for friction reducer

Approx. water (m): Dry to 6.5

Dummy probe to (m):

Refusal:

Cone I.D.: EC07

File: CL0088R

Rig Type: 25t truck (RFW)

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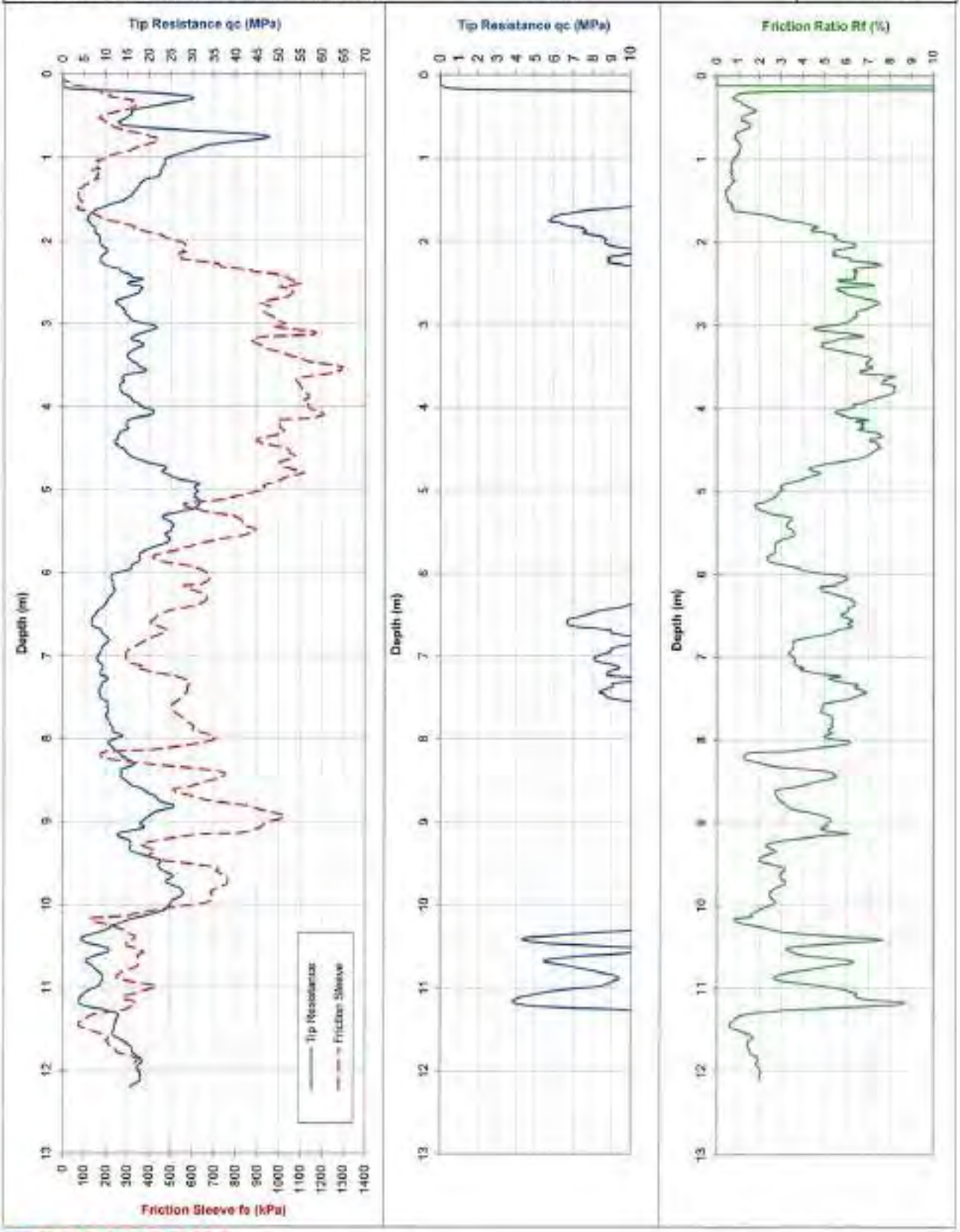
ELECTRIC FRICTION-CONE PENETROMETER

CLIENT:	Logos Property Group	Job No.: J2201067	Probe I.D
PROJECT:	Proposed Warehouses and Office Facilities	RL (m):	CPT 03
LOCATION:	Part of Lot 150 Talbot Road Hazelmere	Co-ords:	10-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): 6.4

Dummy probe to (m): 0.3

Refusal

Cone I.D.: EC07

File: GL0990R

Rig Type: 25t truck (RFW)

Document Set ID: 7363023
Version: 10, Version Date: 17/11/2022

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ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Logos Property Group	Job No.: J2201067	Probe I.D
PROJECT: Proposed Warehouses and Office Facilities	RL (m):	**CPT 04**
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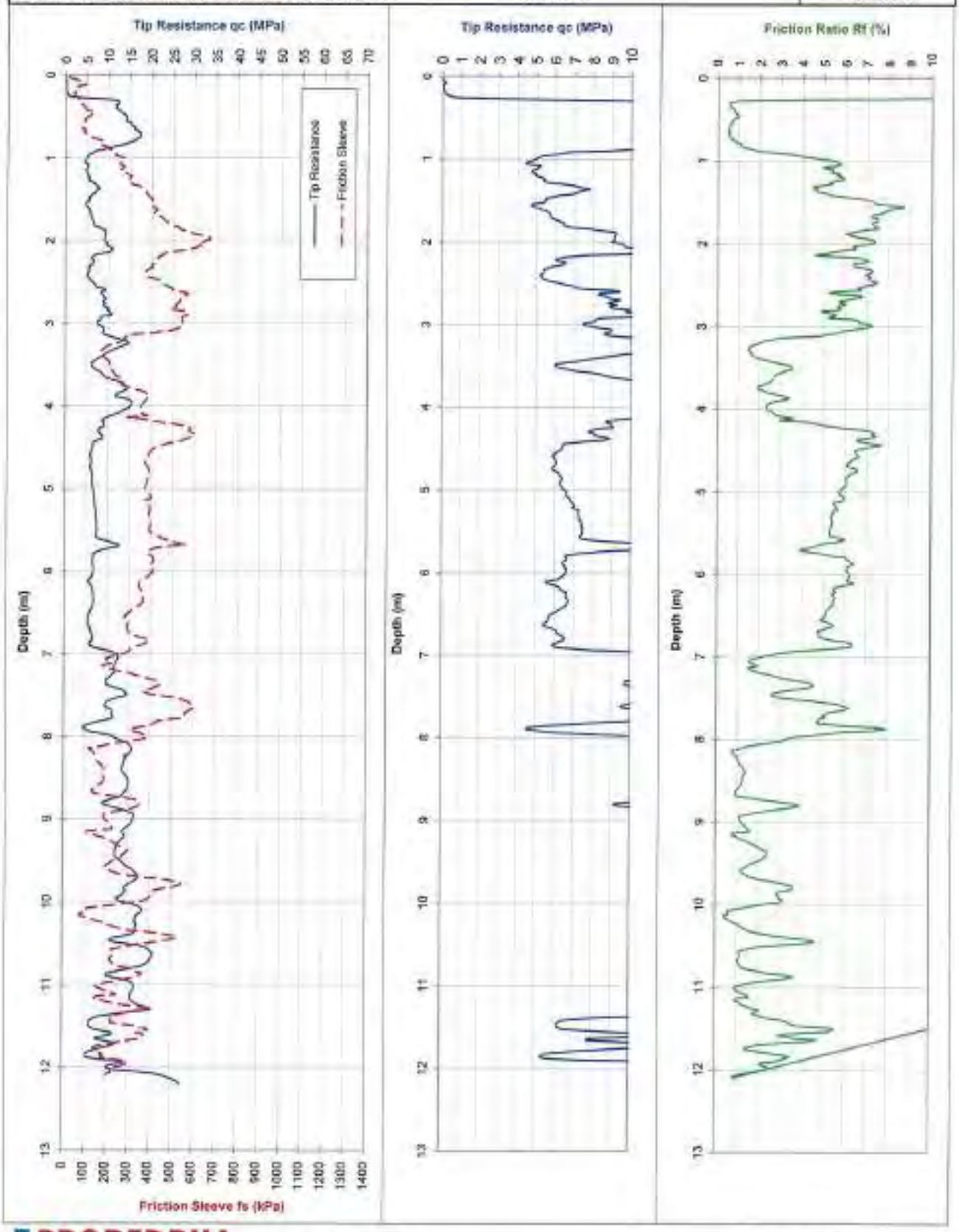

PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.6.1-1999 and ITP 2001 for friction reducer

Approx. water (m): 5.8

Dummy probe to (m): 0.3

Refusal:

Cone I.D.: EC07

File: GL0989R

Rig Type: 25t truck (RFW)

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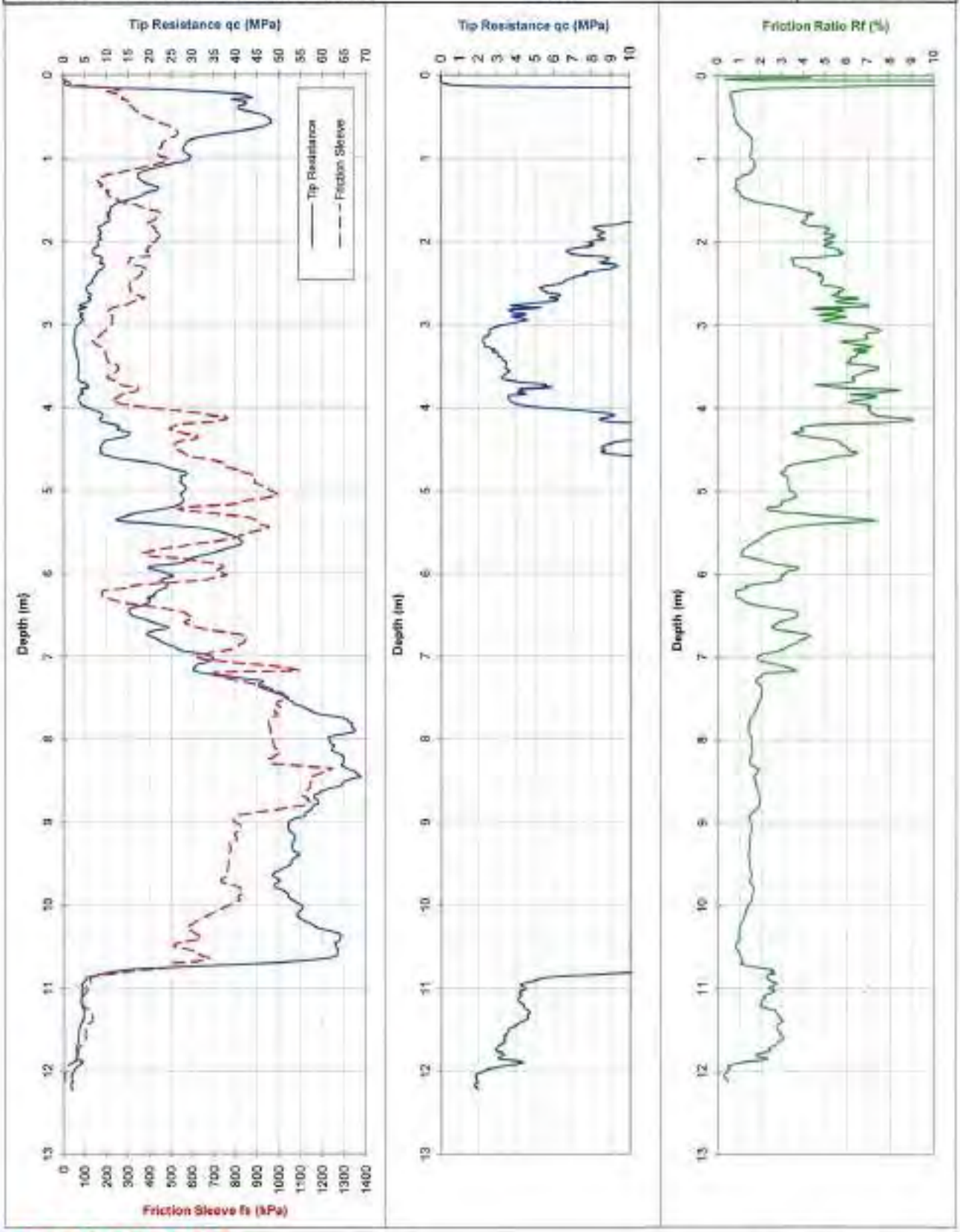
ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Logos Property Group	Job No.: J2201067	Probe I.D
PROJECT: Proposed Warehouses and Office Facilities	RL (m)	**CPT 05**
LOCATION: Part of Lot 150 Talbot Road Hazelmere	Co-ords:	10-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.3.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): 4.6

Dummy probe to (m): 0.3

Refusal:

Cone I.D.: EC07

File: GL05BR

Rig Type: 25t truck (RFW)

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Version: 10, Version Date: 17/11/2022

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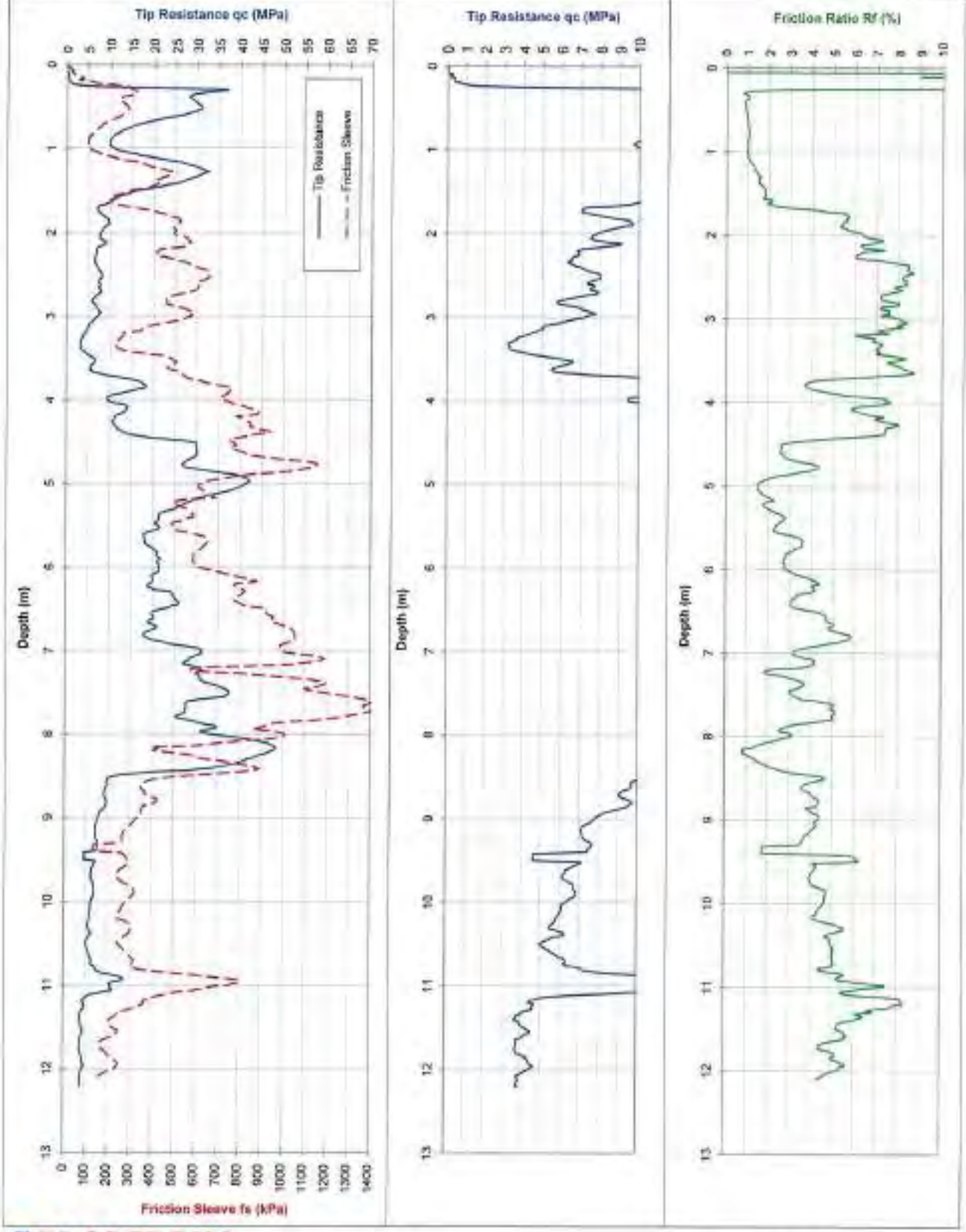
ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Logos Property Group	Job No.: J2201067	Probe I.D
PROJECT: Proposed Warehouses and Office Facilities	RL (m):	**CPT 06**
LOCATION: Part of Lot 150 Talbot Road Hazelmere	Co-ords:	10-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and ISTP 2001 for friction reducer

Approx. water (m): 4.6

Dummy probe to (m): 0.3

Refusal:

Cone I.D.: EC07

File: GL0997R

Rig Type: 25t truck (RFW)

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Appendix D: Machine Auger Borehole Reports

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EXPLANATORY NOTES TO BE READ WITH BOREHOLE AND TEST PIT REPORTS

Galt

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

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METHOD OF SOIL DESCRIPTION
BOREHOLE AND TEST PIT REPORTS

Galt GEOTECHNICS

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%.

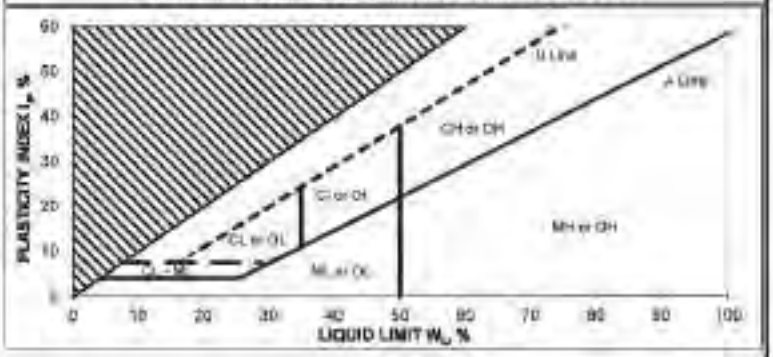
SOIL CLASSIFICATION AND INFERRED STRATIGRAPHY

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

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Galt GEOTECHNICS

BOREHOLE: MA01

Sheet 1 OF 1

Job Number:	J2201067	Contractor:	Galt	Date:	23/03/2022
Client:	Logos Property Group	Drill Rig:	Scout	Logged:	MDS
Project:	Proposed Warehouse and Office Facilities	Inclination:	-90°	Checked Date:	30/03/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			Checked By:	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH TO	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV			0.0					GP	FILL: Sandy GRAVEL, fine to coarse grained, sub-angular to angular, pale grey, with sand, trace fines	D		Hard stand
			0.5					SP	SAND: fine to coarse grained, sub-angular to sub-rounded, pale grey to off-white, trace fines	M	VD	
			1.0						Trace laterite gravel			
			1.5									
			2.0						Hole terminated at 2.00 m Target depth Groundwater not encountered			
			2.5									

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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Galt GEOTECHNICS

BOREHOLE: MA02

Sheet 1 OF 1

Job Number:	J2201087	**Contractor:**	Galt	**Date:**	23/03/2022
Client:	Logos Property Group	**Drill Rig:**	Scout	**Logged:**	MDS
Project:	Proposed Warehouse and Office Facilities	**Inclination:**	-90°	**Checked Date:**	30/03/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Drilling					Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (Metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV	H D		0.0 0.5 1.0 1.5 2.0 2.5					GP SP	FILL: Sandy GRAVEL, fine to coarse grained, sub-angular to angular, pale grey; with sand, trace fines SAND: fine to coarse grained, sub-angular to sub-rounded, pale grey to off-white, trace fines Becoming pale brown Hole terminated at 2.00 m Target depth Groundwater not encountered	D M	VD	

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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Galt GEOTECHNICS

BOREHOLE: MA03

Sheet 1 OF 1

Job Number:	J2201067	**Contractor:**	Galt	**Date:**	23/03/2022
Client:	Logos Property Group	**Drill Rig:**	Scout	**Logged:**	MCS
Project:	Proposed Warehouse and Office Facilities	**Inclination:**	-90°	**Checked Date:**	30/03/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV			0.0					SP	SAND: fine to medium grained, sub-angular to sub-rounded, pale yellow, trace fines	D	VD	
			0.5									
			1.0									
			1.5						Trace laterite gravel			
			2.0									
			2.5						Hole terminated at 2.40 m Target depth Groundwater not encountered			

Sketch & Other Observations



Comments:

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BOREHOLE: MA04

Sheet 1 OF 1

Job Number:	J2201067	**Contractor:**	Galt	**Date:**	23/03/2022
Client:	Logos Property Group	**Drill Rig:**	Scout	**Logged:**	MDS
Project:	Proposed Warehouse and Office Facilities	**Inclination:**	-90°	**Checked Date:**	30/03/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (Metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADW	F		0.0					SP	SAND: fine to medium grained, sub-angular to sub-rounded pale grey to pale brown, trace gravel, trace fines	D	VD	
			0.5					GP	Sandy GRAVEL: fine to coarse grained, sub-angular to sub-rounded, brown/red, with sand, trace fines	M		
			1.0					CI	Sandy CLAY: low to medium plasticity, brown, with sand, with laterite gravel			
			1.5									
			2.0						Hole terminated at 2.00 m Target depth Groundwater not encountered			
			2.5									

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Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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BOREHOLE: MA05

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Job Number:	J2201067	**Contractor:**	Galt	**Date:**	23/03/2022
Client:	Logos Property Group	**Drill Rig:**	Scout	**Logged:**	MDS
Project:	Proposed Warehouse and Office Facilities	**Inclination:**	-90°	**Checked Date:**	30/03/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV	E		0.0					GP-GM	FILL: Sandy GRAVEL: fine to coarse grained, sub-angular to sub-rounded, brown, with sand, with fines			
			0.5					SP	SAND: fine to medium grained, sub-angular to sub-rounded, pale grey, trace gravel, trace fines	D		
			1.0							M	VD	
			1.5					GP	Sandy GRAVEL: fine to coarse grained, sub-angular to sub-rounded, yellow-brown, laterite, with 30-50% fine to coarse grained sand, trace fines			
			2.0						Hole terminated at 2.00 m Target depth Groundwater not encountered			
			2.5									

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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BOREHOLE: MA06

Sheet 1 OF 1

Job Number:	J2201057	**Contractor:**	Galt	**Date:**	23/03/2022
Client:	Logos Property Group	**Drill Rig:**	Scout	**Logged:**	MDS
Project:	Proposed Warehouse and Office Facilities	**Inclination:**	-90°	**Checked Date:**	30/03/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/V	E		0.0					SP-SM	FILL: SAND, fine to medium grained, sub-angular to sub-rounded, pale brown, with non-plastic fines, trace gravel	D	D	
			0.5					SP	SAND: fine to medium grained, sub-angular to sub-rounded, brown, trace fines, trace gravel			
			1.0					SP	Gravelly SAND: fine to medium grained, sub-angular to sub-rounded, brown, with laterite gravel			
			1.5					GP	Sandy GRAVEL: fine to coarse grained, sub-rounded to rounded, brown, with sand, trace fines			
								CI	Gravelly CLAY: medium plasticity, brown, with fine to medium grained laterite gravel	M	H	
			2.0						Hole terminated at 2.20 m Target depth Groundwater not encountered			
			2.5									

Sketch & Other Observations



Comments:

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Galt GEOTECHNICS

BOREHOLE: MA07

Sheet 1 OF 1

Job Number:	J2201067	Contractor:	Galt	Date:	29/09/2022
Client:	Logos Property Group	Drill Rig:	Scout	Logged:	MDS
Project:	Proposed Warehouse and Office Facilities	Inclination:	-90°	Checked Date:	30/09/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			Checked By:	FAD

Drilling					Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH (m)	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY/ DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADW	n		0.0					GP	FILL: Sandy GRAVEL, fine to coarse grained, sub-rounded to angular pale grey to white, with sand, trace fines			
	n		0.5					SP	Gravelly SAND: fine to coarse grained, sub-angular to sub-rounded, pale brown, with laterite gravel, trace fines	D - M	D	
			1.0					GP	Sandy GRAVEL: fine to coarse grained, sub-rounded to rounded, laterite, with sand			
	n		1.5					CH	Gravelly CLAY: medium to high plasticity, brown		H	
			2.0						Hole terminated at 2.00 m Target depth Groundwater not encountered			
			2.5									

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Comments:

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Job Number:	J2201067	**Contractor:**	Galt	**Date:**	23/03/2022
Client:	Logos Property Group	**Drill Rig:**	Scout	**Logged:**	MDS
Project:	Proposed Warehouse and Office Facilities	**Inclination:**	-90°	**Checked Date:**	30/03/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
NDW	7		0.0					GP	FILL: Sandy GRAVEL, fine to coarse grained, sub-rounded to angular, pale grey, with sand, trace fines	D		
	8		0.5					SP	Gravelly SAND: fine to coarse grained, pale grey to off-white, with sub-angular to sub-rounded gravel, trace fines	M	D - MD	
			1.0						Sandy GRAVEL: fine to coarse grained, sub-rounded to rounded, pale brow, with sand, trace fines			
			1.5					GP	Becoming brown			
			2.0						Hole terminated at 2.00 m Target depth Groundwater not encountered			
			2.5									

Sketch & Other Observations



Comments:

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Galt GEOTECHNICS

BOREHOLE: MA09

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Job Number:	J3201067	**Contractor:**	Galt	**Date:**	23/03/2022
Client:	Logos Property Group	**Drill Rig:**	Scout	**Logged:**	MDS
Project:	Proposed Warehouse and Office Facilities	**Inclination:**	-90°	**Checked Date:**	30/03/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV	F F		0.0 0.5 1.0 1.5 2.0 2.5				GP-GM SP GP CI-CH		FILL: Sandy GRAVEL, fine to coarse grained, sub-angular to subrounded, brown, with sand, with fines SAND: fine to medium grained, brown to dark grey, trace gravel, trace fines Becoming pale grey Becoming brown to grey Sandy GRAVEL: fine to coarse grained, sub-angular to rounded, laterite, brown, with sand, trace fines Gravelly CLAY: medium to high plasticity, with laterite gravel, with sand Hole terminated at 2.30 m Target depth Groundwater not encountered	D M	D H	

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BOREHOLE: MA10

Job Number:	J2201067	**Contractor:**	Galt	**Date:**	23/03/2022
Client:	Logos Property Group	**Drill Rig:**	Scout	**Logged:**	MDS
Project:	Proposed Warehouse and Office Facilities	**Inclination:**	-90°	**Checked Date:**	30/03/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV	F		0.0					GP-GM	FILL: Sandy GRAVEL, fine to coarse grained, sub-angular to sub-rounded, brown, with sand, with low plasticity fines	D	D	
			0.5					SP	SAND: fine to medium grained, sub-angular to sub-rounded, pale grey to off-white, trace gravel, trace fines	M	D - MD	
	R		1.0					SP	Gravelly SAND: fine to medium grained, sub-angular to sub-rounded, dark grey, with laterite gravel, trace fines			
			1.5					GP	Sandy GRAVEL: fine to coarse grained, sub-rounded to rounded, laterite, dark brown, with sand, trace fines			
			2.0						Hole terminated at 2.00 m Target depth Groundwater not encountered			
			2.5									

Sketch & Other Observations



Comments:

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BOREHOLE: MA11

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Job Number:	J2201067	**Contractor:**	Galt	**Date:**	23/03/2022
Client:	Logos Property Group	**Drill Rig:**	Scout	**Logged:**	MDS
Project:	Proposed Warehouse and Office Facilities	**Inclination:**	-90°	**Checked Date:**	30/03/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AOV			0.0					GP	FILL: Sandy GRAVEL, fine to coarse grained, sub-angular to angular, pale grey, with sand, trace fines	D	D	
			0.5					SP	SAND: fine to medium grained, sub-angular to sub-rounded, pale grey to pale brown, trace gravel, trace fines	M		
			1.0					SP	Gravelly SAND: fine to medium grained, sub-angular to sub-rounded, grey to pale brow, with laterite gravel, trace fines			
			1.5					CI-CH	Gravelly CLAY: medium to high plasticity, with laterite gravel, with sand		H	
			2.0						Hole terminated at 2.05 m Target depth Groundwater not encountered			
			2.5									

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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Job Number:	J2201087	Contractor:	Galt	Date:	23/03/2022
Client:	Logos Property Group	Drill Rig:	Scout	Logged:	MDS
Project:	Proposed Warehouse and Office Facilities	Inclination:	-90°	Checked Date:	30/09/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			Checked By:	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV	F		0.0					GP	FILL: Sandy GRAVEL, fine to coarse grained, sub-angular to angular, pale grey, with sand, trace non-plastic fines	D		
	F		0.5					SP	SAND: fine to medium grained, sub-angular to sub-rounded, pale grey becoming off-white, trace gravel, trace fines	M	D	
			1.0					SP	Gravelly SAND: fine to medium grained, sub-angular to sub-rounded, pale brown, with laterite gravel, trace fines			
			1.5									
			2.0						Hole terminated at 2.00 m Target depth Groundwater not encountered			
			2.5									

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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Appendix E: Direct Push Probe Borehole Reports

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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 Loss (complete)
◁	Water Loss (partial)
▼	Water Level

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

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METHOD OF SOIL DESCRIPTION
BOREHOLE AND TEST PIT REPORTS

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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%.

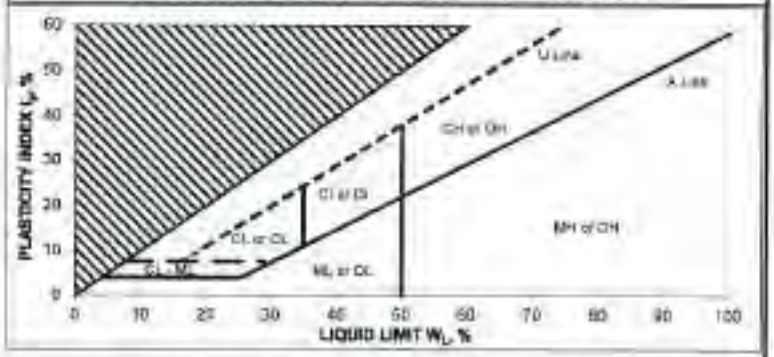
SOIL CLASSIFICATION AND INFERRED STRATIGRAPHY

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

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BOREHOLE: BH01

Job Number:	J2201067	**Contractor:**	DPP	**Date:**	17/03/2022
Client:	Logos Property Group	**Drill Rig:**	6620DT	**Logged:**	AM
Project:	Proposed Warehouses and Office Facilities	**Inclination:**	-90°	**Checked Date:**	12/04/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV			0					SP	SAND: fine to medium grained, sub-angular to sub-rounded, pale brown, with gravel, trace fines			Moisture condition not observed
			1					GP	Sandy GRAVEL: fine to coarse grained, sub-angular to sub-rounded, grey, trace fines			
			2					SC	Clayey SAND: fine to medium grained, sub-angular to sub-rounded, yellow, with gravel			
			3						Red/pale red, trace silt fines, trace gravel			
			4									
			5						Pale red			
			6						Grey			
			7						Fine to medium grained, pale green, trace silt fines			
		▼	8									
			9									
			10						Hole terminated at 10.00 m Target depth Groundwater encountered at 8.1 m			
			11									

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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BOREHOLE: BH02

Sheet 1 OF 1

Job Number:	J2201067	**Contractor:**	DPP	**Date:**	17/03/2022
Client:	Logos Property Group	**Drill Rig:**	5620DT	**Logged:**	AM
Project:	Proposed Warehouses and Office Facilities	**Inclination:**	-90°	**Checked Date:**	12/04/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV			0					SP	SAND: fine to medium grained, sub-angular to sub-rounded, yellow, trace fines, trace gravel Brown-grey			Moisture condition not observed
			1					SP-SM	Gravelly SAND: fine to coarse grained, sub-angular to sub-rounded, pale brown, with fines			
			2					SC-SW	Clayey Gravelly SAND: fine to coarse grained, sub-angular to sub-rounded, pale brown			
			3					SC	Clayey SAND: fine to medium grained, sub-angular to sub-rounded, pale brown mottled red, 20-35% fines, trace gravel Trace gravel			
			4						Clayey SAND: fine to medium grained, sub-angular to sub-rounded, grey, 20-30% fines			
			5									
			6									
			7					SC	Pale yellow			
			8						Fine to medium grained sand			
			9						Grey			
			10						Pale brown mottled grey, 20-35% fines			
			11						Hole terminated at 10.00 m Target depth Groundwater encountered at 7.38 m			

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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BOREHOLE: BH03

Sheet 1 OF 1

Job Number:	J2201067	**Contractor:**	DPP	**Date:**	18/03/2022
Client:	Logos Property Group	**Drill Rig:**	6620DT	**Logged:**	AM
Project:	Proposed Warehouses and Office Facilities	**Inclination:**	-90°	**Checked Date:**	12/04/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH (m)	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY/ DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADW		▼	0	0				SP	SAND: fine to medium grained, sub-angular to sub-rounded, pale yellow, trace gravel, trace fines Yellow			Moisture condition not observed
			1	1					With gravel			
			2	2				SC	Clayey SAND: fine to coarse grained, sub-angular to sub-rounded, red, with fine to coarse grained gravel			
			3	3								
			4	4								
			5	5					Grey, trace gravel			
			6	6								
			7	7								
			8	8				CL-CH	Sandy CLAY: medium to high plasticity, grey, fine to medium grained sand			
			9	9					Hole terminated at 9.00 m Target depth Groundwater encountered at 4.5 m			
			10	10								
			11	11								

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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BOREHOLE: BH04

Sheet 1 OF 1

Job Number:	J2201067	**Contractor:**	DPP	**Date:**	16/03/2022
Client:	Logos Property Group	**Drill Rig:**	6620CT	**Logged:**	AM
Project:	Proposed Warehouses and Office Facilities	**Inclination:**	-90°	**Checked Date:**	12/04/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV		▼	0					SP	SAND: fine to medium grained, sub-angular to sub-rounded, grey, with gravel, trace fines			Moisture condition not observed
			1						Pale grey, trace gravel			
									Brown, with fines			
			2					SP-SM	Gravelly SAND: fine to medium grained, sub-angular to sub-rounded, brown, with fines			
								GP	Sandy GRAVEL: fine to coarse grained, sub-angular to sub-rounded, pale red/brown, with fines			
			3					SC	Clayey SAND: fine to coarse-grained, sub-angular to sub-rounded, pale red, approximately 25-35% fines, with gravel			
			4									
			5									
			6									
			7									
			8					CI-CH	Sandy CLAY: medium to high plasticity, grey, fine to medium grained sand			
									Pale green mottled grey, with nodules of sandy clay			
			9					CI	Sandy CLAY: medium plasticity, red mottled pale grey			
			10						Hole terminated at 9.00 m Target depth Groundwater encountered at 5.63 m			
			11									

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Comments:

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Appendix F: Groundwater Monitoring Well Construction Reports

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GROUNDWATER MONITORING BORE: MW01

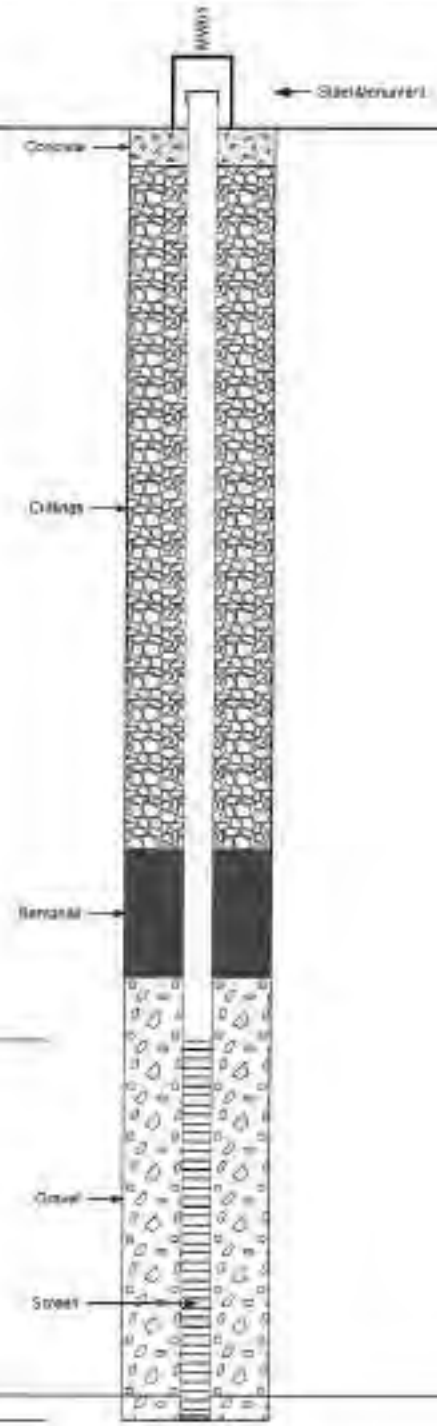
Sheet 1 OF 1

Job Number:	J2201067	**Contractor:**	DFP	**Date:**	17/03/2022
Client:	Logos Property Group	**Drill Rig:**	6620DT	**Logged:**	AM
Project:	Proposed Warehouses and Office Facilities	**Inclination:**	-90°	**Checked Date:**	12/04/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Method	Ground Water	Depth (m)	Elevation (m AHD)	Graphic Log	Soil / Rock Description
AD/V	▽	0			SAND: fine to medium grained, sub-angular to sub-rounded, pale brown, with gravel, trace fines
					Sandy GRAVEL: fine to coarse grained, sub-angular to sub-rounded, grey, trace fines
		2			Clayey SAND: fine to medium grained, sub-angular to subrounded, yellow, with gravel
					Red/pale red, trace silt lines, fine gravel
		4			Pale red
		6			Grey
		8			Fine to medium grained, some gravel, trace silt lines
		10			Hole terminated at 10.00 m Target depth Groundwater encountered at 9.1 m

WELL INSTALLATION DETAILS

ID:	MW01	**Stick Up & RL:**	0.68 m
Type:	Standpipe	**Tip Depth & RL:**	10.20 m
Installation Date:	16/03/2022	**Static Water Level:**	NA



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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GROUNDWATER MONITORING BORE: MW02

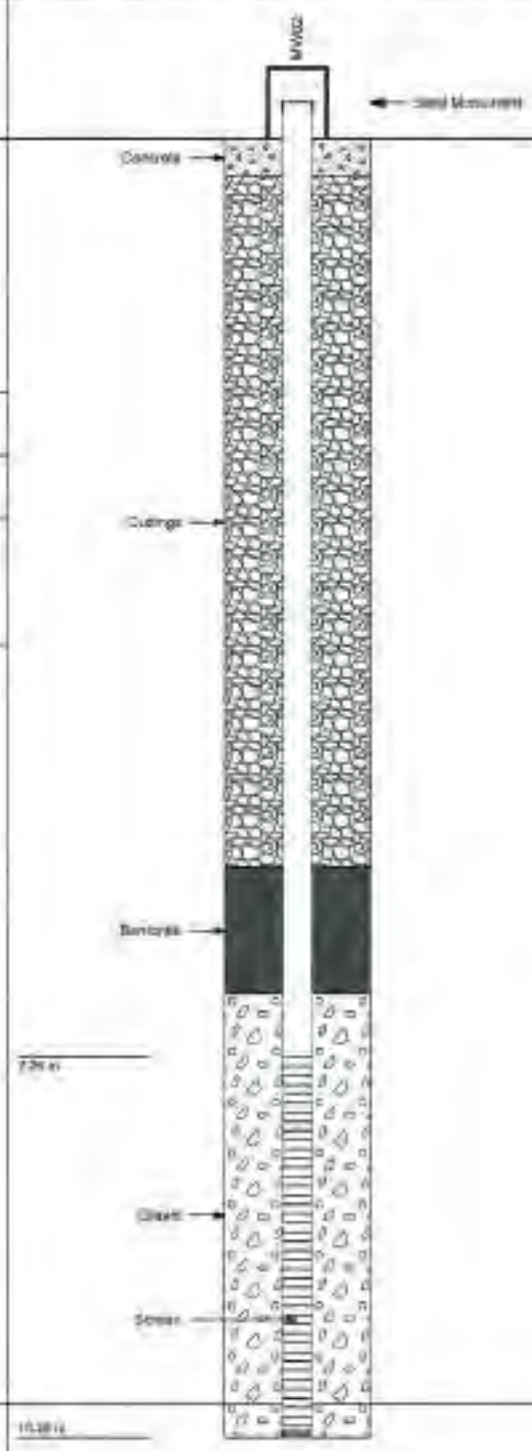
Sheet 1 OF 1

Job Number:	J2201087	Contractor:	DPP	Date:	17/03/2022
Client:	Logos Property Group	Drill Rig:	662DT	Logged:	AM
Project:	Proposed Warehouses and Office Facilities	Inclination:	-90°	Checked Date:	12/04/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			Checked By:	FAD

Method	Ground Water	Depth (m)	Elevation (m AHD)	Graphic Log	Soil / Rock Description
AD/V		0			SAND: fine to medium grained, sub-angular to sub-rounded, yellow, trace fines, trace gravel
					Brown-grey
		2			Gravelly SAND: fine to coarse grained, sub-angular to sub-rounded, pale brown, with fines
					Clayey Gravelly SAND: fine to coarse grained, sub-angular to sub-rounded, pale brown
		4			Clayey SAND: fine to medium grained, sub-angular to sub-rounded, pale brown mottled red, 25-35% fines, with gravel
					Trace gravel
					Clayey SAND: fine to medium grained, sub-angular to sub-rounded, grey, 20-30% fines
		6			Pale yellow
					Fine to medium grained sand
		8			Grey
					Pale brown mottled grey, 20-35% fines
		10			Hole terminated at 10.00 m Target depth Groundwater encountered at 7.38 m

WELL INSTALLATION DETAILS

ID:	MW02	Stick Up & RL:	0.58 m
Type:	Standpipe	Tip Depth & RL:	10.28 m
Installation Date:	17/03/2022	Static Water Level:	NA



Comments:

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GROUNDWATER MONITORING BORE: MW03

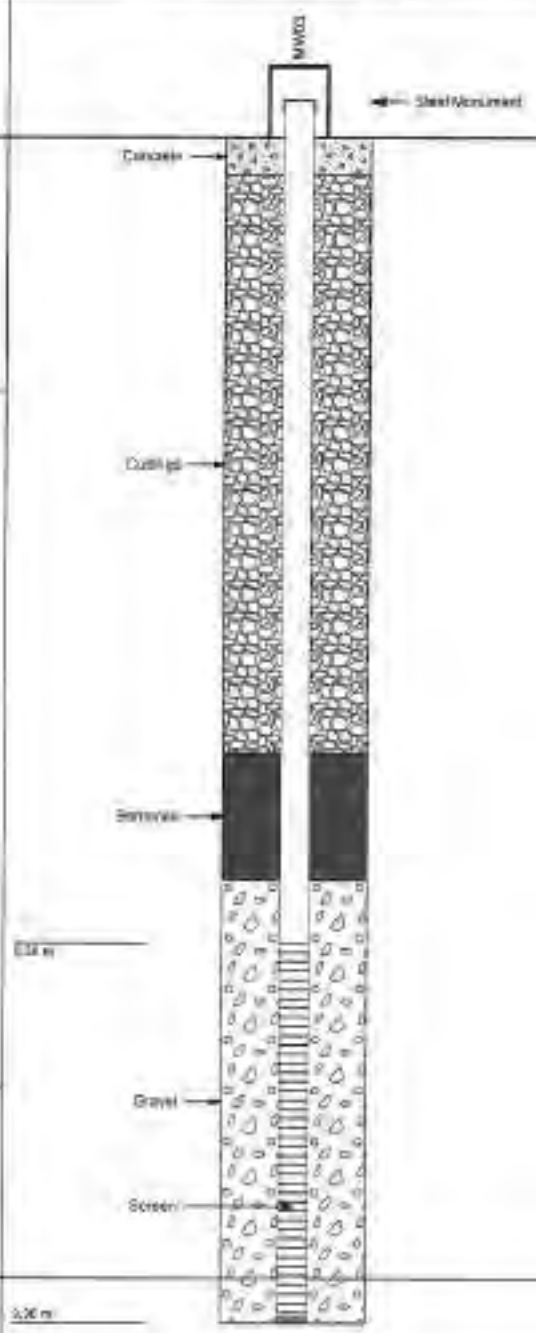
Sheet 1 OF 1

Job Number:	J2201087	**Contractor:**	DPP	**Date:**	18/03/2022
Client:	Logos Property Group	**Drill Rig:**	9520DT	**Logged:**	AM
Project:	Proposed Warehouses and Office Facilities	**Inclination:**	-90°	**Checked Date:**	12/04/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Method	Ground Water	Depth (m)	Elevation (m AHD)	Graphic Log	Soil / Rock Description
		0			
					SAND: fine to medium grained, sub-angular to sub-rounded, pale yellow, trace gravel, trace fines
					Yellow
					With gravel
		2			
					Clayey SAND: fine to coarse grained, sub-angular to sub-rounded, red, with fine to coarse grained gravel
		4			
ADV					Grey, mass gravel
		6			
					Sandy CLAY: medium to high plasticity, grey, fine to medium grained sand
		8			
					Hole terminated at 9.00 m Target depth Groundwater encountered at 4.0 m
		10			

WELL INSTALLATION DETAILS

ID:	MW03	**Stick Up & RL:**	0.60 m
Type:	Standpipe	**Tip Depth & RL:**	9.36 m
Installation Date:	18/03/2022	**Static Water Level:**	NA



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GROUNDWATER MONITORING BORE: MW04

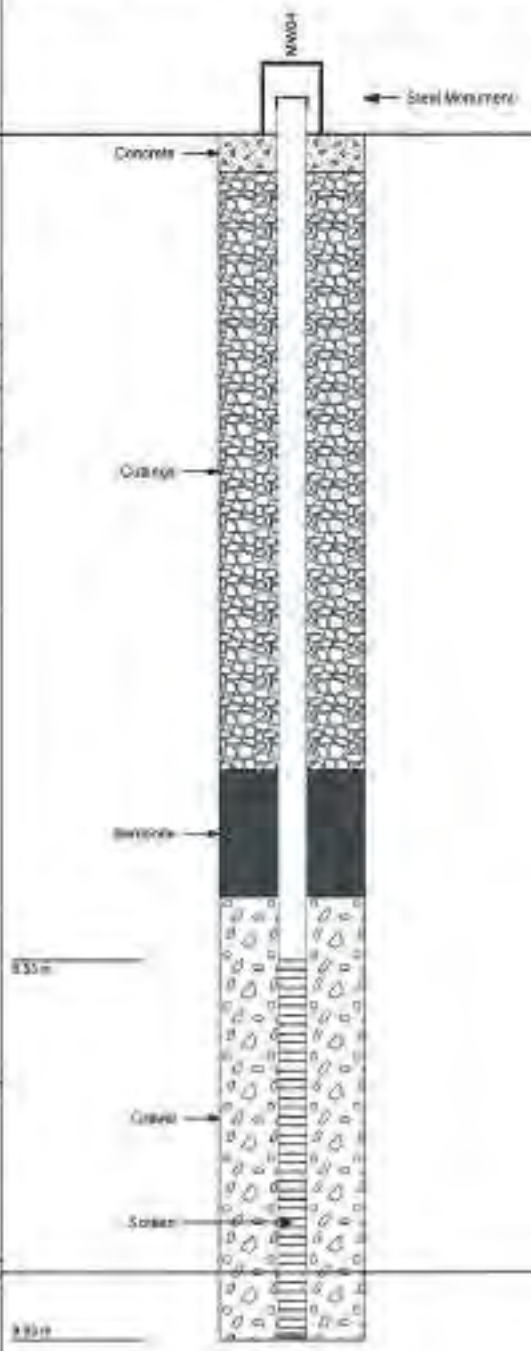
Sheet 1 OF 1

Job Number:	J2201057	Contractor:	DPP	Date:	18/03/2022
Client:	Logos Property Group	Drill Rig:	6620DT	Logged:	AM
Project:	Proposed Warehouses and Office Facilities	Inclination:	-90°	Checked Date:	12/04/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			Checked By:	PAD

Method	Ground Water	Depth (m)	Elevation (m AHD)	Graphic Log	Soil / Rock Description
AUW	▽	0			SAND: fine to medium grained, sub-angular to sub-rounded, grey, with gravel, trace fines
					Pale grey, moist, gravel
					Brown, with fines
		2			Gravelly SAND: fine to medium grained, sub-angular to sub-rounded, brown, with fines
					Sandy GRAVEL: fine to coarse grained, sub-angular to sub-rounded, pale red/brown, with fines
					Clayey SAND: fine to coarse grained, sub-angular to sub-rounded, pale red, approximately 20-30% fines with gravel
		4			
		6			
		8			Sandy CLAY: medium to high plasticity, grey, fine to medium grained sand
					Pale green mottled grey, with nodules of sandy clay
					Sandy CLAY: medium plasticity, red mottled pale grey
		10			Hole terminated at 9.50 m Target depth Groundwater encountered at 5.63 m

WELL INSTALLATION DETAILS

ID:	MW04	Stick Up & RL:	0.63 m
Type:	Standpipe	Tip Depth & RL:	9.53 m
Installation Date:	18/03/2022	Static Water Level:	NA



Comments:

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Appendix G: Infiltration Test Results

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Hydraulic Conductivity Calculation - Inverse Auger Hole Method

Galt Geotechnics	Spreadsheet author:	ORW	17-Oct-09

Job No:	J2201067
Client:	Logos Property Group
Project:	Warehouse
Location:	Hazelmere
Calc by:	AM
BH Name:	IT 01
Test Depth:	1.54 m

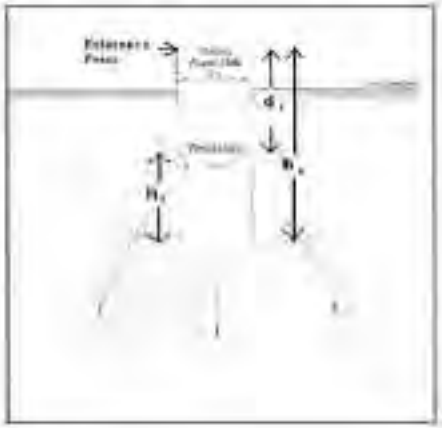
$$K = 1.15r \frac{\log_{10}(h_0 + \frac{1}{2}r) - \log_{10}(h_t + \frac{1}{2}r)}{t - t_0}$$

REFERENCE: Cocks, G. *Disposal of Stormwater Runoff by Soakage in Perth Western Australia*, Journal and News of the Australian Geomechanics Society, Volume 42 No 3 September 2007 pp101-114

Spreadsheet Legend

	Required input
	Calculated field
	Comment field
	Field not used
	Fixed field

Parameter	Description	Value	Units
K	Hydraulic Conductivity		m/s
r	radius of test hole	0.05	m
t	time since start of measurement		s
h_r	reference point height above base	2.1	m
d_t	depth from reference point to water at time t		m
h_t	Water column height at time t		m
h_0	h_t at t=0		m



Test 1

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	0.967	1.133		
10	1.125	0.975	3.7E-04	31.7
20	1.284	0.816	4.0E-04	34.5
30	1.421	0.679	4.1E-04	35.8
40	1.498	0.602	3.8E-04	33.1
50	1.520	0.580	3.2E-04	28.0
60	1.588	0.512	3.2E-04	27.6
70	1.602	0.498	2.8E-04	24.5
80	1.629	0.471	2.6E-04	22.9
90	1.660	0.440	2.5E-04	21.9
100	1.682	0.418	2.4E-04	20.7
110	1.707	0.393	2.3E-04	20.0
120	1.724	0.376	2.2E-04	19.1
130	1.754	0.346	2.2E-04	18.9
140	1.770	0.330	2.1E-04	18.2
150	1.785	0.311	2.1E-04	17.8
		AVERAGE	2.9E-04	25.0

Test 2

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.021	1.079		
20	1.241	0.859	2.8E-04	24.0
40	1.366	0.734	2.3E-04	20.2
60	1.448	0.652	2.0E-04	17.6
80	1.448	0.652	1.5E-04	13.2
100	1.484	0.616	1.4E-04	11.7
120	1.539	0.561	1.3E-04	11.4
140	1.554	0.546	1.2E-04	10.2
160	1.574	0.526	1.1E-04	9.4
180	1.582	0.518	9.8E-05	8.5
200	1.614	0.486	9.5E-05	8.3
220	1.631	0.469	9.1E-05	7.9
240	1.648	0.452	8.7E-05	7.5
260	1.645	0.455	8.0E-05	6.9
		AVERAGE	1.4E-04	12.1

Test 3

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.367	0.733		
20	1.417	0.683	8.5E-05	7.4
40	1.453	0.647	7.5E-05	6.5
60	1.515	0.585	9.0E-05	7.8
80	1.545	0.555	8.4E-05	7.2
100	1.544	0.556	6.6E-05	5.7
120	1.578	0.522	6.8E-05	5.9
140	1.594	0.506	6.3E-05	5.5
160	1.606	0.494	5.9E-05	5.1
180	1.616	0.484	5.5E-05	4.8
200	1.649	0.451	5.8E-05	5.0
220	1.661	0.439	5.6E-05	4.8
240	1.675	0.425	5.4E-05	4.7
260	1.696	0.404	5.5E-05	4.7
280	1.690	0.410	5.0E-05	4.3
300	1.701	0.399	4.8E-05	4.2
320	1.719	0.381	4.9E-05	4.2
340	1.726	0.374	4.7E-05	4.1
360	1.733	0.367	4.6E-05	4.0
		AVERAGE	6.2E-05	5.3

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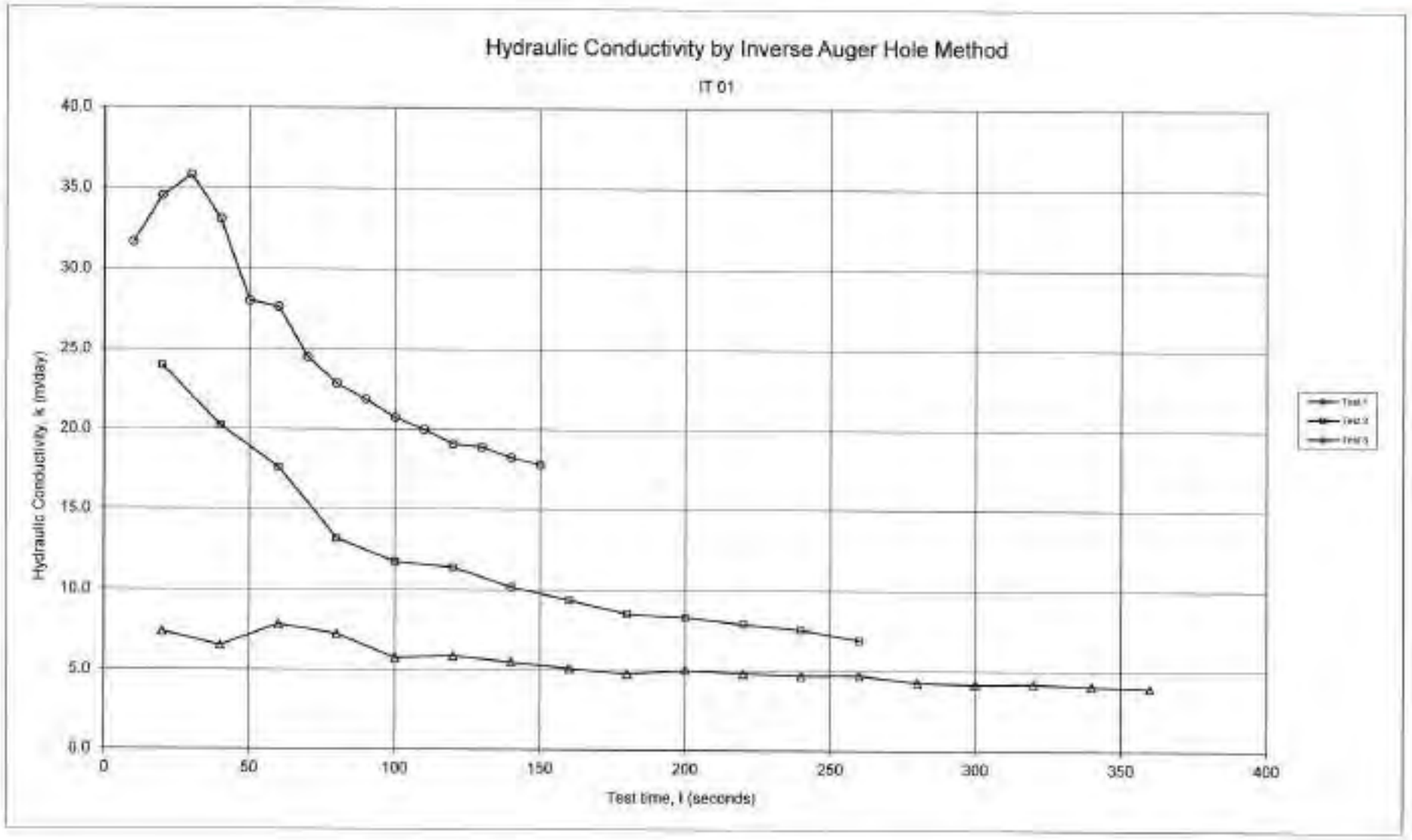

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Hydraulic Conductivity Calculation - Inverse Auger Hole Method

Galt Geotechnics

Job No:	J2201067
Client:	Logos Property Group
Project:	Warehouse
Location:	Hazelmere
Calc by:	AM
BH Name:	IT 02
Test Depth:	1.85 m

Spreadsheet author:	DRW	17-Oct-09

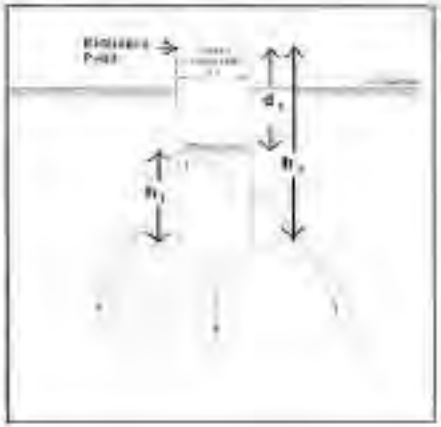
$$K = 1.15r\frac{\log_{10}(h_0 + \frac{1}{2}r) - \log_{10}(h_t + \frac{1}{2}r)}{t - t_0}$$

REFERENCE: Cooke, G. Disposal of Stormwater Runoff by Soakage in Perth Western Australia, Journal and News of the Australian Geomechanics Society, Volume 42 No 3 September 2007, pp101-114

Spreadsheet Legend

	Required input
	Calculated field
	Comment field
	Field not used
	Fixed field

Parameter	Description	Value	Units
K	Hydraulic Conductivity		m/s
r	radius of test hole	0.05	m
t	time since start of measurement		s
h_r	reference point height above base	2.1	m
d_t	depth from reference point to water at time t		m
h_t	Water column height at time t		m
h_0	h_t at t=0		m



Test 1

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.047	1.053		
20	1.310	0.790	3.5E-04	30.2
40	1.547	0.553	3.9E-04	33.6
60	1.619	0.481	3.1E-04	27.2
80	1.738	0.362	3.2E-04	27.6
100	1.786	0.314	2.9E-04	25.0
120	1.824	0.276	2.7E-04	22.9
140	1.878	0.222	2.6E-04	22.7
160	1.918	0.182	2.6E-04	22.3
180	1.924	0.176	2.3E-04	20.1
200	1.949	0.151	2.3E-04	19.5
220	2.004	0.096	2.5E-04	21.4
240	2.012	0.088	2.3E-04	20.3
260	2.036	0.064	2.4E-04	20.7
280	2.051	0.049	2.4E-04	20.6
300	2.072	0.028	2.5E-04	21.7
320	2.076	0.024	2.4E-04	20.8
340	2.076	0.024	2.3E-04	19.6
360	2.097	0.003	2.5E-04	21.9
		AVERAGE	2.7E-04	23.2

Test 2

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.437	0.663		
20	1.508	0.592	1.4E-04	11.8
40	1.543	0.557	1.0E-04	9.0
60	1.586	0.514	1.0E-04	8.8
80	1.618	0.482	9.5E-05	8.2
100	1.647	0.453	9.1E-05	7.9
120	1.697	0.403	9.9E-05	8.5
140	1.713	0.387	9.1E-05	7.9
160	1.736	0.364	8.9E-05	7.7
180	1.756	0.344	8.6E-05	7.5
200	1.778	0.322	8.5E-05	7.4
220	1.796	0.304	8.4E-05	7.2
240	1.807	0.293	8.0E-05	6.9
260	1.818	0.282	7.8E-05	6.7
280	1.826	0.274	7.4E-05	6.4
300	1.838	0.262	7.3E-05	6.3
320	1.853	0.247	7.2E-05	6.3
340	1.867	0.233	7.2E-05	6.2
360	1.878	0.222	7.1E-05	6.1
		AVERAGE	8.8E-05	7.6

Test 3

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.011	1.089		
20	1.075	1.025	7.4E-05	6.4
40	1.079	1.021	3.9E-05	3.4
60	1.153	0.947	5.7E-05	4.9
80	1.186	0.914	5.3E-05	4.6
100	1.223	0.877	5.3E-05	4.6
120	1.260	0.840	5.3E-05	4.6
140	1.325	0.775	5.9E-05	5.1
160	1.346	0.754	5.6E-05	4.8
180	1.397	0.703	5.9E-05	5.1
200	1.420	0.680	5.7E-05	4.9
220	1.448	0.652	5.7E-05	4.9
240	1.463	0.637	5.4E-05	4.7
260	1.489	0.611	5.4E-05	4.7
280	1.507	0.593	5.3E-05	4.5
300	1.536	0.564	5.3E-05	4.6
320	1.558	0.542	5.3E-05	4.6
340	1.571	0.529	5.1E-05	4.4
360	1.592	0.508	5.1E-05	4.4
		AVERAGE	5.5E-05	4.7

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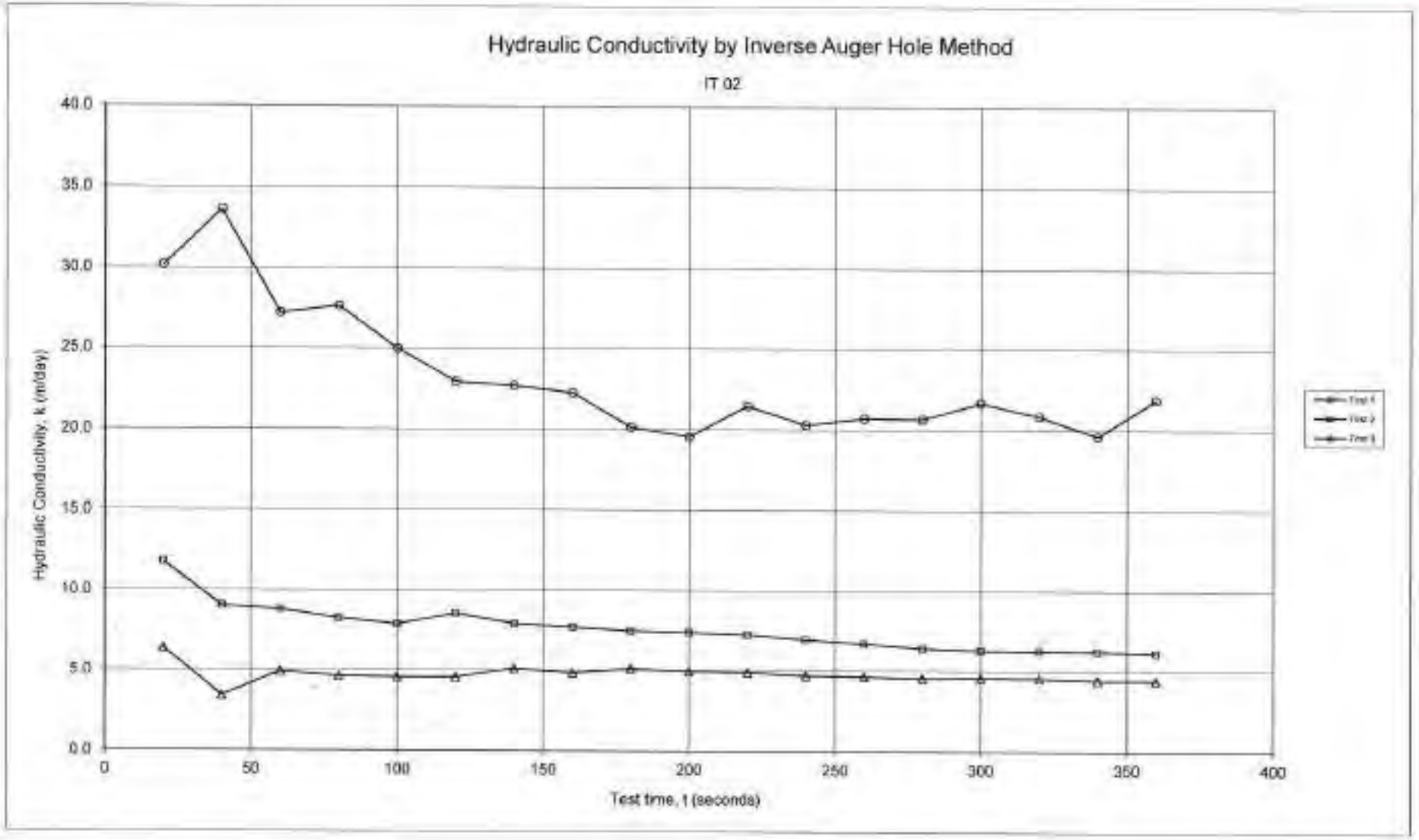

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Hydraulic Conductivity Calculation - Inverse Auger Hole Method

Galt Geotechnics	Spreadsheet author:	ORW	17-Oct-09

Job No:	J2201067
Client:	Logos Property Group
Project:	Warehouse
Location:	Hazelmere
Calc by:	AM
BH Name:	IT 03
Test Depth:	1.55 m

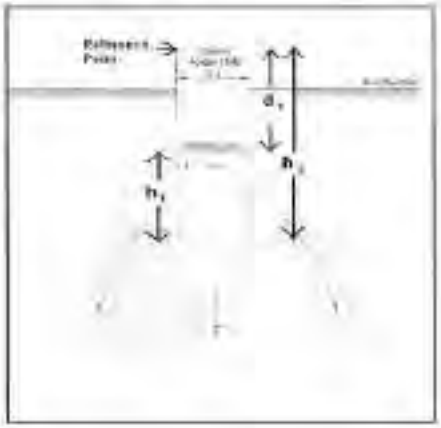
$$K = 1.15r\frac{\log_{10}(h_0 + \frac{1}{2}r) - \log_{10}(h_t + \frac{1}{2}r)}{t - t_0}$$

REFERENCE: Cocks, G. *Disposal of Stormwater Runoff by Soakage in Perth Western Australia*, Journal and News of the Australian Geomechanics Society, Volume 42 No 3 September 2007, pp101-114

Spreadsheet Legend

	Required input
	Calculated field
	Comment field
	Field not used
	Fixed field

Parameter	Description	Value	Units
K	Hydraulic Conductivity		m/s
r	radius of test hole	0.05	m
t	time since start of measurement		s
h_r	reference point height above base	2.1	m
d_t	depth from reference point to water at time t		m
h_t	Water column height at time t		m
h_0	h_t at t=0		m



Test 1

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	0.975	1.125		
20	1.396	0.704	5.7E-04	49.2
40	1.538	0.562	4.2E-04	36.3
60	1.608	0.492	3.3E-04	28.7
80	1.651	0.449	2.8E-04	23.9
100	1.737	0.363	2.7E-04	23.4
120	1.782	0.318	2.5E-04	21.8
140	1.786	0.314	2.2E-04	18.8
160	1.824	0.276	2.1E-04	18.1
180	1.872	0.228	2.1E-04	18.1
200	1.917	0.183	2.1E-04	18.4
220	1.930	0.170	2.0E-04	17.4
		AVERAGE	2.9E-04	24.9

Test 2

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	0.929	1.171		
20	1.267	0.833	4.1E-04	35.8
40	1.459	0.641	3.7E-04	31.6
60	1.576	0.524	3.2E-04	28.0
80	1.607	0.493	2.6E-04	22.6
100	1.668	0.432	2.4E-04	20.8
120	1.719	0.381	2.2E-04	19.4
140	1.767	0.333	2.2E-04	18.6
160	1.817	0.283	2.1E-04	18.3
180	1.878	0.222	2.2E-04	18.9
200	1.880	0.220	2.0E-04	17.1
220	1.928	0.172	2.0E-04	17.7
240	1.928	0.172	1.9E-04	16.2
260	1.928	0.172	1.7E-04	15.0
280	1.989	0.111	1.9E-04	16.8
300	1.965	0.135	1.7E-04	14.5
		AVERAGE	2.4E-04	20.7

Test 3

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	0.957	1.143		
20	1.190	0.910	2.8E-04	24.0
40	1.361	0.739	2.7E-04	22.9
60	1.476	0.622	2.5E-04	21.2
80	1.588	0.512	2.4E-04	21.0
100	1.591	0.509	2.0E-04	16.9
120	1.666	0.434	1.9E-04	16.8
140	1.761	0.339	2.1E-04	18.0
160	1.767	0.333	1.8E-04	15.9
180	1.810	0.290	1.8E-04	15.7
200	1.873	0.227	1.9E-04	16.5
220	1.856	0.244	1.7E-04	14.4
240	1.863	0.237	1.6E-04	13.4
260	1.892	0.208	1.5E-04	13.4
280	2.033	0.067	2.3E-04	19.6
		AVERAGE	2.1E-04	17.8

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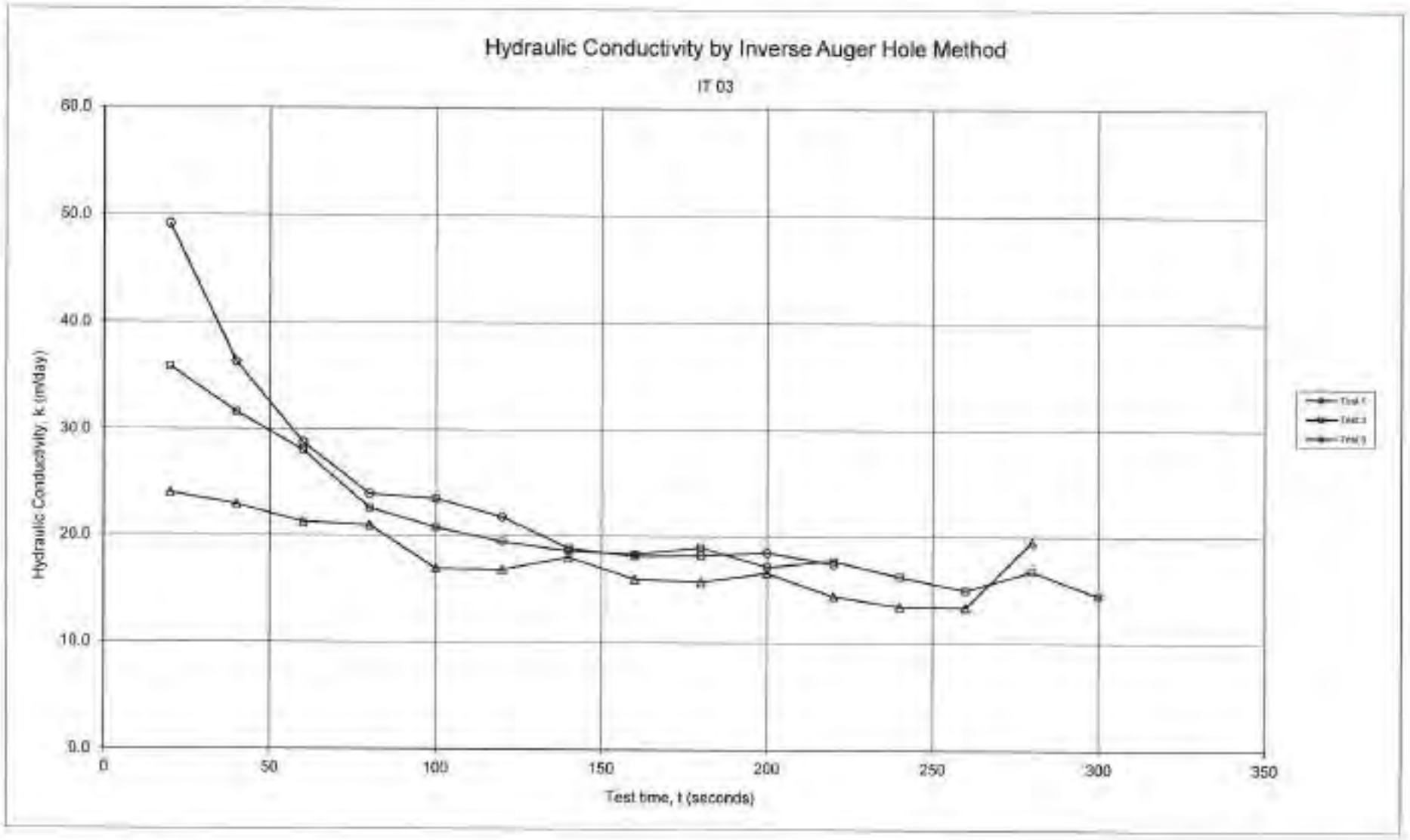

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Hydraulic Conductivity Calculation - Inverse Auger Hole Method

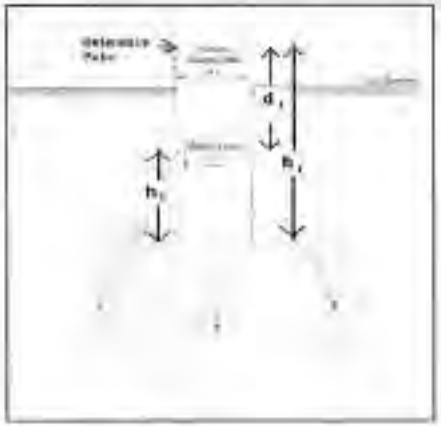
Galt Geotechnics

Job No:	J2201067
Client:	Logos Property Group
Project:	Warehouse
Location:	Hazelmere
Calc by:	AM
BH Name:	IT 04
Test Depth:	1.70 m

Spreadsheet author	ORW	17-Oct-09

$$K = 1.15r\frac{\log_{10}(h_0+\frac{1}{2}r)-\log_{10}(h_t+\frac{1}{2}r)}{t-t_0}$$

REFERENCE: Cocks, G. *Disposal of Stormwater Runoff by Soakage in Perth Western Australia*, Journal and News of the Australian Geomechanics Society. Volume 42 No 3 September 2007. pp101-114



Spreadsheet Legend

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Parameter	Description	Value	Units
K	Hydraulic Conductivity		m/s
r	radius of test hole	0.05	m
t	time since start of measurement		s
h_0	reference point height above base	2.1	m
d_t	depth from reference point to water at time t		m
h_t	Water column height at time t		m
h_0	h_t at t=0		m

Test 1

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.623	0.477		
20	1.780	0.320	4.7E-04	40.5
40	1.845	0.255	3.6E-04	31.5
60	1.885	0.215	3.1E-04	26.5
80	1.904	0.196	2.6E-04	22.1
100	1.924	0.176	2.3E-04	19.7
120	1.942	0.158	2.1E-04	18.1
140	1.956	0.144	1.9E-04	16.8
160	1.970	0.130	1.8E-04	15.9
180	1.978	0.122	1.7E-04	14.7
200	1.999	0.101	1.7E-04	14.9
220	2.015	0.085	1.7E-04	14.9
240	2.016	0.084	1.6E-04	13.7
260	2.031	0.069	1.6E-04	13.9
280	2.050	0.050	1.7E-04	14.6
300	2.061	0.039	1.7E-04	14.8
320	2.072	0.028	1.8E-04	15.2
340	2.081	0.019	1.8E-04	15.4
360	2.092	0.008	1.9E-04	16.3
		AVERAGE	2.2E-04	18.9

Test 2

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.294	0.806		
20	1.464	0.636	2.9E-04	24.7
40	1.568	0.532	2.5E-04	21.8
60	1.628	0.472	2.1E-04	18.5
80	1.682	0.418	2.0E-04	17.0
100	1.694	0.406	1.6E-04	14.2
120	1.724	0.376	1.5E-04	13.1
140	1.745	0.355	1.4E-04	12.1
160	1.763	0.337	1.3E-04	11.2
180	1.776	0.324	1.2E-04	10.4
200	1.793	0.307	1.1E-04	9.9
220	1.801	0.299	1.1E-04	9.2
240	1.810	0.290	1.0E-04	8.7
260	1.821	0.279	9.7E-05	8.3
280	1.827	0.273	9.1E-05	7.9
		AVERAGE	1.5E-04	13.3

Test 3

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.636	0.464		
20	1.660	0.440	6.3E-05	5.4
40	1.683	0.417	6.3E-05	5.5
60	1.702	0.398	6.0E-05	5.2
80	1.714	0.386	5.4E-05	4.7
100	1.729	0.371	5.3E-05	4.6
120	1.749	0.351	5.5E-05	4.7
140	1.774	0.326	5.9E-05	5.1
160	1.777	0.323	5.3E-05	4.6
180	1.782	0.318	4.9E-05	4.3
200	1.795	0.305	4.9E-05	4.2
220	1.809	0.291	5.0E-05	4.3
240	1.813	0.287	4.7E-05	4.0
260	1.822	0.278	4.6E-05	4.0
280	1.829	0.271	4.5E-05	3.9
300	1.844	0.256	4.6E-05	4.0
320	1.848	0.252	4.4E-05	3.8
340	1.849	0.251	4.2E-05	3.6
360	1.866	0.234	4.4E-05	3.8
		AVERAGE	5.1E-05	4.4

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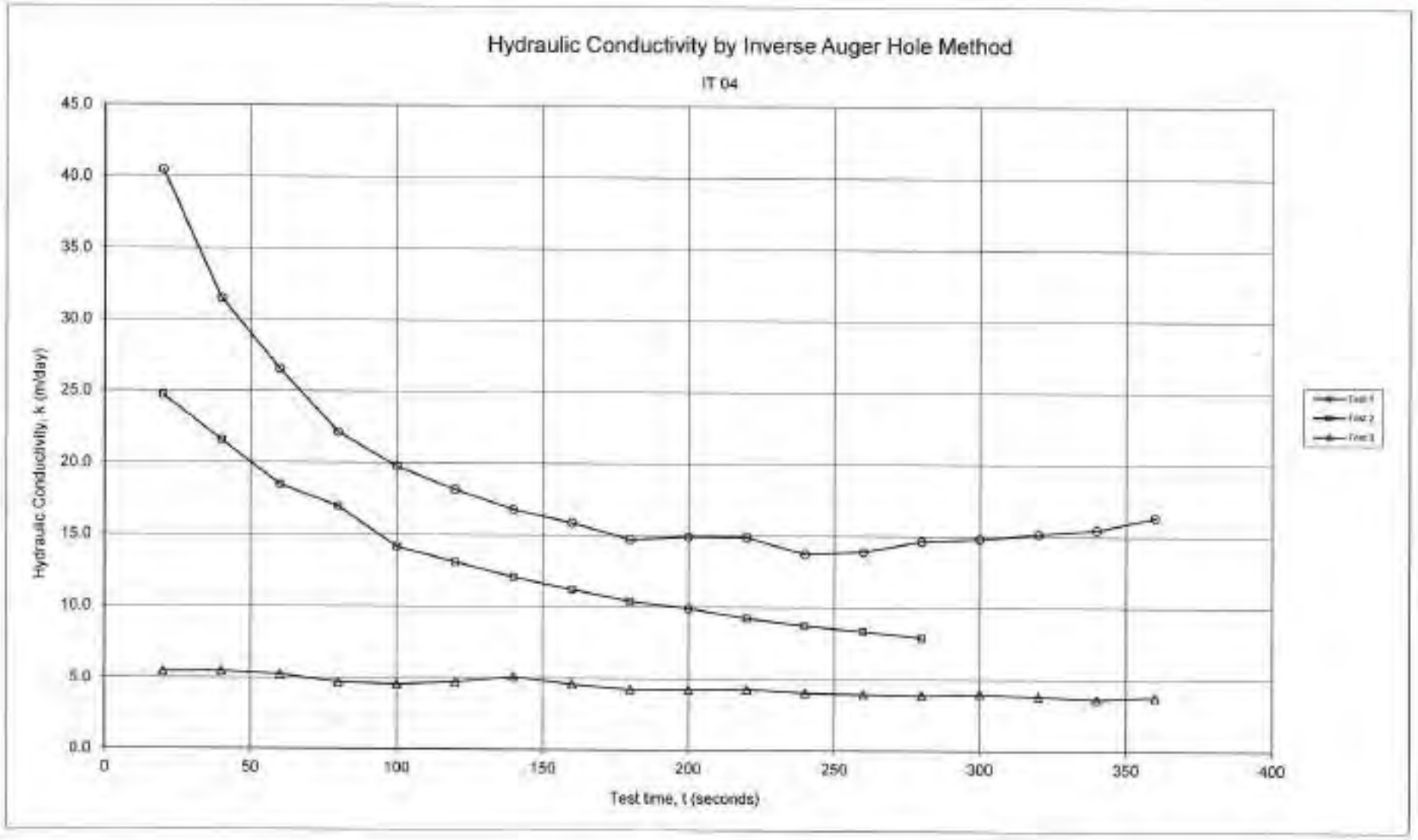

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Hydraulic Conductivity Calculation - Inverse Auger Hole Method

Galt Geotechnics

Job No:	J2201067
Client:	Logos Property Group
Project:	Warehouse
Location:	Hazelmere
Calc by:	AM
BH Name:	IT 05
Test Depth:	1.35 m

Spreadsheet author: ORW 17-Oct-09

$$K = 1.15r \frac{\log_{10}(h_0 + \frac{1}{2}r) - \log_{10}(h_t + \frac{1}{2}r)}{t - t_0}$$

REFERENCE: Cocks, G. *Disposal of Stormwater Runoff by Soakage in Perth Western Australia*, Journal and News of the Australian Geomechanics Society, Volume 42 No 3 September 2007, pp101-114

Spreadsheet Legend

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	Comment field
	Field not used
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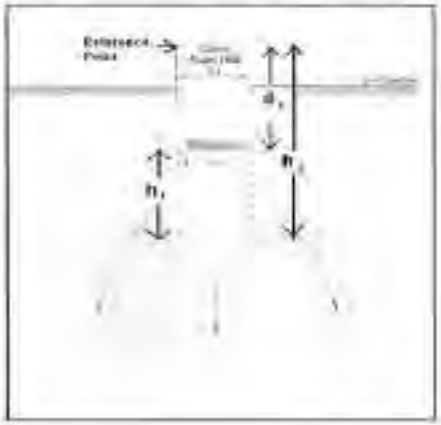
Parameter	Description	Value	Units
K	Hydraulic Conductivity		m/s
r	radius of test hole	0.05	m
t	time since start of measurement		s
h_r	reference point height above base	2.1	m
d_t	depth from reference point to water at time t		m
h_t	Water column height at time t		m
h_0	h_t at t=0		m



Test 1

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.926	0.174		
20	1.927	0.173	6.3E-06	0.5
40	1.943	0.157	5.6E-05	4.8
60	1.947	0.153	4.6E-05	4.0
80	1.951	0.149	4.2E-05	3.6
100	1.956	0.144	4.1E-05	3.5
120	1.958	0.142	3.6E-05	3.2
140	1.973	0.127	4.8E-05	4.2
160	1.972	0.128	4.1E-05	3.5
180	1.980	0.120	4.4E-05	3.8
200	1.982	0.118	4.1E-05	3.6
220	1.991	0.109	4.5E-05	3.9
240	2.000	0.100	4.8E-05	4.2
260	1.992	0.108	3.9E-05	3.3
280	2.001	0.099	4.2E-05	3.6
300	2.004	0.096	4.1E-05	3.6
320	2.019	0.081	4.9E-05	4.2
340	2.018	0.082	4.5E-05	3.9
360	2.02	0.08	4.4E-05	3.8
		AVERAGE	4.2E-05	3.6

Test 2

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.760	0.340		
20	1.774	0.326	4.9E-05	4.2
40	1.790	0.310	5.4E-05	4.6
60	1.803	0.297	5.2E-05	4.5
80	1.815	0.285	5.1E-05	4.4
100	1.826	0.274	5.0E-05	4.3
120	1.838	0.262	5.0E-05	4.3
140	1.843	0.257	4.6E-05	4.0
160	1.852	0.248	4.5E-05	3.9
180	1.874	0.226	5.2E-05	4.5
200	1.873	0.227	4.6E-05	4.0
220	1.888	0.212	4.9E-05	4.2
		AVERAGE	4.9E-05	4.3

Test 3

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.694	0.406		
20	1.713	0.387	5.6E-05	4.9
40	1.736	0.364	6.4E-05	5.5
60	1.758	0.342	6.7E-05	5.8
80	1.766	0.334	5.7E-05	4.9
100	1.782	0.318	5.7E-05	4.9
120	1.804	0.296	6.1E-05	5.3
140	1.813	0.287	5.8E-05	5.0
160	1.814	0.286	5.1E-05	4.4
180	1.833	0.267	5.4E-05	4.7
200	1.842	0.258	5.3E-05	4.6
220	1.853	0.247	5.2E-05	4.5
240	1.859	0.241	5.0E-05	4.3
260	1.872	0.228	5.1E-05	4.4
		AVERAGE	5.6E-05	4.9

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Photograph 5: View to north-west at Location 3



Photograph 6: View to west at Location 3

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Photograph 3: View to north-west at Location 2



Photograph 4: View to south-west at Location 2

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Photograph 1: View to south at Location 1



Photograph 2: View to north-east at Location 2

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Photograph Locations

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Appendix B: Site Photographs

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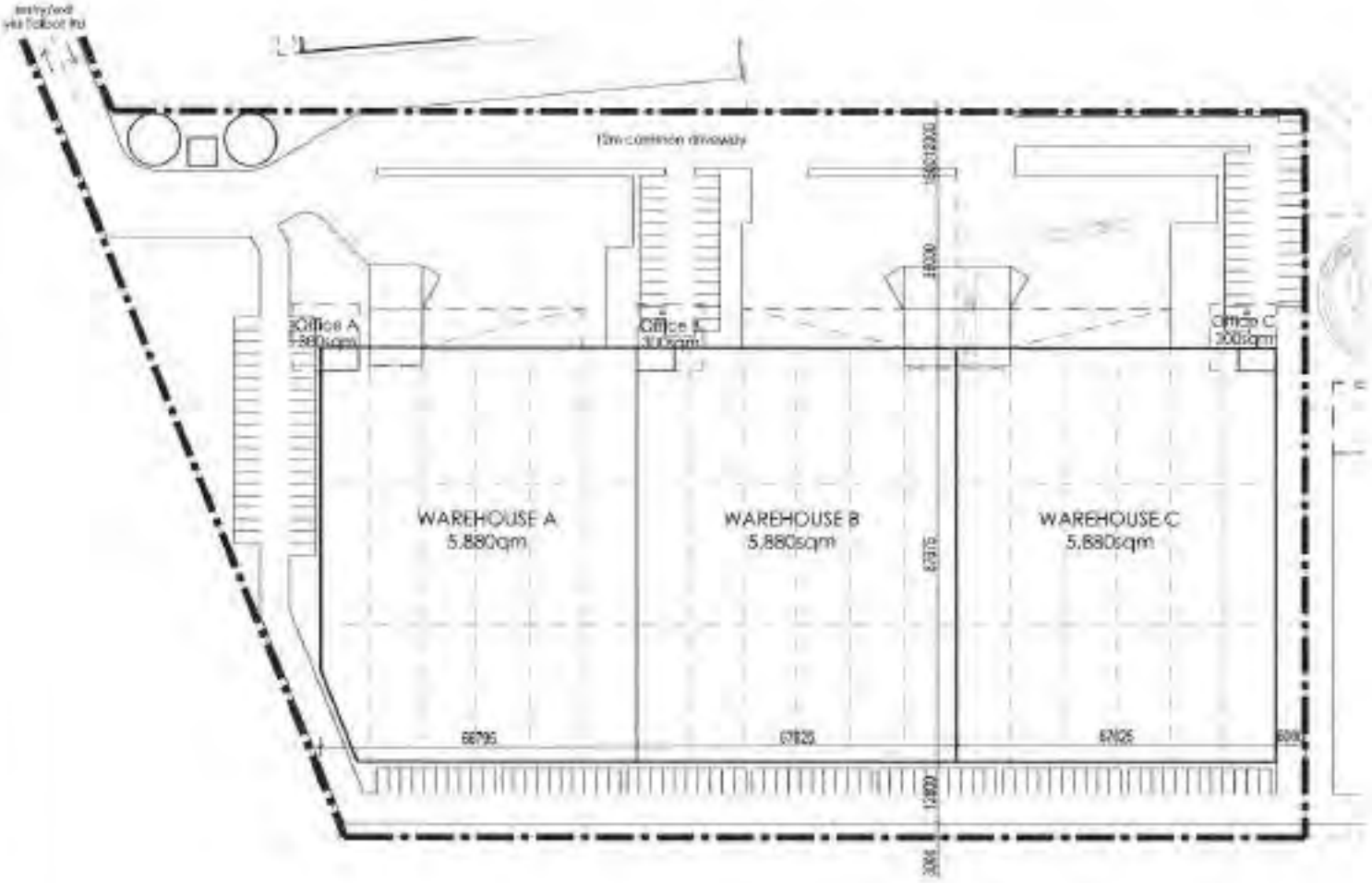

SCHEDULE OF AREAS

SITE AREA	11,795 sqm
WAREHOUSE A	5,880 sqm
WAREHOUSE B	5,880 sqm
WAREHOUSE C	5,880 sqm
OFFICE A (Mezz.)	300 sqm
OFFICE B (Mezz.)	300 sqm
OFFICE C (Mezz.)	300 sqm
TOTAL BUILDING AREA	17,640 sqm
Re AMMING	870 sqm
HEAVY DUTY PAVEMENT	9,650 sqm
LIGHT DUTY PAVEMENT	5,147 sqm
	367 car spaces incl. 3 disabled
EFFICIENCY	1.72
LANDSCAPE - Hatched green (combined with highway)	6,318sqm

1 : 1000 scale @ A3

2 SITE PLAN
1 : 1000 scale @ A3

NOTE : INDICATIVE ONLY, SUBJECT TO DETAILED DESIGN

LOGOS

HAZELMERE LOGISTICS ESTATE
PROPOSED WAREHOUSE DISTRIBUTION & OFFICE FACILITIES
TALBOT ROAD, HAZELMERE, WA

SITE PLAN

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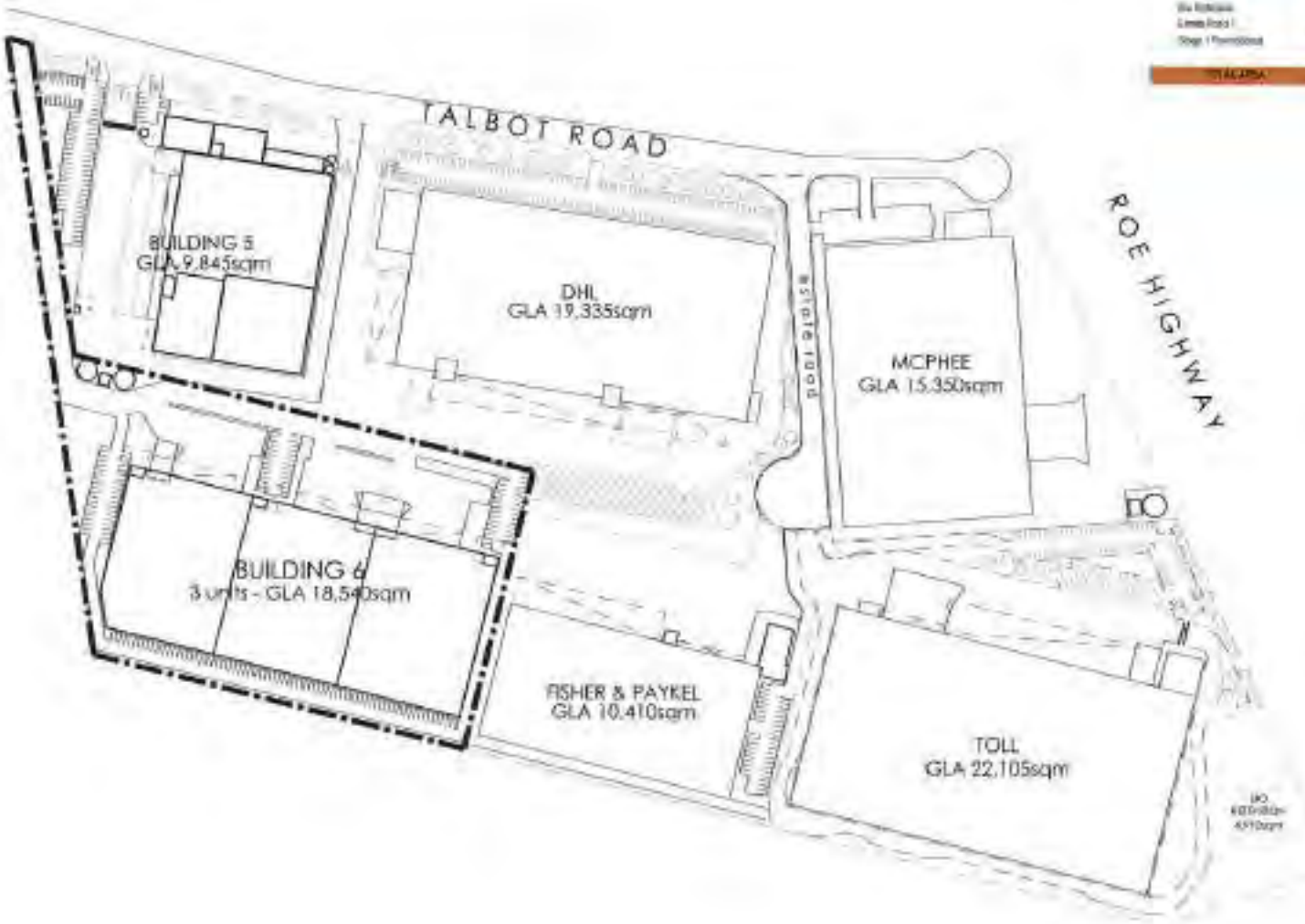
SCHEDULE OF AREAS

Development Manager							
Developments	205844						
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	[illegible]	[illegible]				
2	Toll	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
4	DHL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	Building 5	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
6	PROPOSED	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]
	Site Reference	[illegible]					
	Lewis Road 1	[illegible]					
	Stage 1 Permitted	[illegible]					
	TOTAL AREA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]



1 ESTATE PLAN

NOTE : INDICATIVE ONLY. SUBJECT TO DETAILED DESIGN

LOGOS

HAZELMERE LOGISTICS ESTATE
PROPOSED WAREHOUSE DISTRIBUTION & OFFICE FACILITIES
TALBOT ROAD, HAZELMERE, WA

ESTATE PLAN

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Galt GEOTECHNICS

Appendix A: Supplied Drawings

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Legend

Site Boundary

Galt Test Locations

- Borehole / Groundwater Monitoring Well
- Machine Auger Borehole
- Machine Auger Borehole / Infiltration Test
- Cone Penetration Test
- Guelph Permeameter

N

NOTES:
Aerial imagery and Cadastre sourced from Landgate/SLIP



SCALE	1 : 250 (A3)
DRAWN	GAO
CHECKED	[illegible]
APPROVED	GAO
DATE	[illegible]
DRAWING NO.	[illegible]

Galt GEOTECHNICS

Galt Geotechnics Pty Ltd
ACN: [illegible]
Tel: [illegible]
Address: [illegible]

CLIENT	LOGOS PROPERTY GROUP
PROJECT	PROPOSED WAREHOUSE AND OFFICES FACILITIES
LOCATION	PART LOT 153 TALBOT ROAD HAZELMERE
TITLE	SITE & LOCATION PLAN
DRAWING NO.	J2201067
FIGURE 1	A

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Table A1: Summary of Tests

Test Reference	Test Depth (m)	Depth of Granular Material (m)	Depth to Groundwater (m)	Reason for termination	Stratigraphy[3]
BH01/MW01	10.0	2.0	8.1	Target depth	SAND over Sandy GRAVEL over Clayey SAND
BH02/MW02	10.0	2.5	7.38		SAND over Gravelly SAND over Clayey Gravelly SAND over Clayey SAND
BH03/MW03	9.0	2.0	4.5		SAND over Clayey SAND over Sandy CLAY
BH04/MW04	9.0	2.0	5.63		SAND over Gravelly SAND over Sandy GRAVEL over Clayey SAND over Sandy CLAY
MA01	2.0	>2.0	GNE[1]	Target depth	FILL: Sandy GRAVEL over SAND
MA02	2.0	>2.0			
MA03	2.4	>2.4			SAND
MA04	2.0	1.4			SAND over Sandy GRAVEL over Sandy CLAY
MA05	2.0	>2.0			FILL: Sandy GRAVEL over SAND over GRAVEL
MA06	2.0	1.8			FILL: SAND over SAND over Gravelly SAND over Sandy GRAVEL over Gravelly CLAY
MA07	2.0	1.6			FIL: Sandy GRAVEL over Gravelly SAND over Sandy GRAVEL over Gravelly CLAY
MA08	2.0	>2.0			FILL: Sandy GRAVEL over Gravelly SAND over Sandy GRAVEL
MA09	2.0	1.8			FILL: Sandy GRAVEL over SAND over Sandy GRAVEL over Gravelly CLAY
MA10	2.0	>2.0			FILL: Sandy GRAVEL over SAND over Gravelly SAND over Sandy GRAVEL
MA11	2.0	1.5			FILL: Sandy GRAVEL over SAND over Gravelly SAND over Gravelly CLAY
MA12	2.0	>2.0			FILL: Sandy GRAVEL over SAND over Gravelly SAND
CPT01	12.2	2.2	D 4.5[2]	Target depth	SAND over Very Stiff Fine Grained Material with thin lenses of SAND and Silty SAND over SAND
CPT02	12.2	1.6	D 6.5		
CPT03	12.2	1.7	6.4		
CPT04	12.2	0.9	5.8		SAND over Very Stiff Fine Grained Material with thin lenses of SAND and Silty SAND over SAND with thin lens of clayey soil
CPT05	12.2	1.5	4.6		SAND over Very Stiff Fine Grained Material over SAND over Silty CLAY
CPT06	12.2	1.7	4.6		SAND over Very Stiff Fine Grained Material over Clayey SAND over Silty CLAY

Notes:
1. GNE – Groundwater not encountered.
2. Dry to recorded depth (collapse of the CPT hole occurred below this depth).
3. Stratigraphy in CPTs inferred using the Robertson et al (1986) CPT interpretation.

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Table

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Leach drains, trenches and beds for the treated effluent should abide by the setbacks as outlined in Section 6.15.

ATUs must be 1.2 m from any boundaries or buildings, and 1.8 m from the surface irrigation disposal area (leach drains, beds, trenches etc.).

8. CLOSURE

We draw your attention to Appendix I 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 ground-works 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

Fred Davenport MIE (Aust)

Geotechnical Engineer

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Table 7: Design Loading Rates (mm/day)

Trenches and Beds		
Primary Treated Effluent (Conservative Rate)	Primary Treated Effluent (Maximum Rate)	Secondary Treated Effluent (ATUs)
10	15	30

6.17.3 Soil Properties

The soil properties, as required by AS1547, are summarised below:

- Soil colour: pale grey to off white and pale brown
- Soil texture: Sand and Gravelly Sand
- Coarse fragments: Very few to few (<10%)
- Soil structure: Weak
- Dispersion: No Emerson testing undertaken –non-dispersive based on field logging.
- Shrink-swell properties: Granular soils with no obvious shrink-swell characteristics.
- Water table: True groundwater > 3 m below surface
- Surface condition and soil moisture status: Dry

7. SITE SUITABILITY AND RECOMMENDATIONS

Based on our assessment of the site we consider it is suitable for disposal of wastewater, but treatment units will be required. The treatment units can dispose of treated effluent into leach drains or trenches and beds.

Treatment Units

We recommend that the wastewater is treated with an ATU (secondary treatment), also known as aerated wastewater treatment systems (AWTS). ATUs use the processes of aeration followed by clarification to achieve biological treatment of wastewater.

ATUs (or any other proposed system) must be certified to AS1546.3 (2008) and require approval by the Chief Health Officer. A list of approved ATUs is presented in Table 2 on the Department of Health website. The selected ATU must meet the required hydraulic loading for the site and should treat sewage to achieve the following nutrient targets:

- Phosphorous: <1 mg/L
- Nitrogen: <10 mg/L

Land Application Area

The minimum land application area (LAA) will be determined based on the hydraulic load of sewage and the soil type and is required to meet the requirements of the Government Sewerage Policy (GSP).

Given the very flat grade across the site interception drains or stormwater diversion drains should not be required to divert stormwater away from the land application area.

Setbacks

Discharge of treated effluent must be at least 1.5 m above the maximum groundwater level. Given the depth to groundwater on the site and that surface levels are not proposed to change, there should be no issue in conforming to this requirement, based on an assumed leach drain depth of say 0.5 m to 0.6 m below current surface levels.

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6.13 Rainfall Run-on

There is no evidence of significant rainfall run-on at the site. The surrounding sites are of a similar elevation to that of the site and the site to the east at the higher elevations is fully developed with its own stormwater disposal systems. We therefore do not expect any stormwater flows onto the site from this property.

6.14 Flood Potential

The Department of Water maps the site as being above the flood level for both the 1:10 (10%) and 1:100 (1%) annual exceedance probability (AEP).

6.15 Setback Distances

All relevant setback distances can be accommodated on site.

Relevant setbacks include:

Site Feature	Setback Distance (m)
Treatment units to buildings, property boundaries, driveways, paths and other tanks	2.0
Trenches and beds to boundary, building, tanks and other land application systems	1.8
Trenches and beds to trafficable areas	1.2
Any land application system to wells, streams, private bores or underground source of water	30
Trenches and beds to subsoil drainage or open drainage channels	6
Trenches or beds to waterway or significant wetland (without treatment of the discharge)	100

6.16 Available Land Application Area

The minimum Land Application Area (LAA) will need to be determined based on the proposed hydraulic loading required and the soil category. Note that we recommend secondary treatment via ATUs as discussed in Section 7.

6.17 Soil Assessment

6.17.1 Soil Category (AS1547)

Based on the results of our constant head permeability testing, most of the soil types present on site within the upper 1 m have been classed as "Category 3" in accordance with Table L1 of AS1547 – 2012. Disposal of effluent through evapotranspiration absorption (ETA)/evapotranspiration seepage (ETS) trenches and beds are not suitable according to the guidance of AS1547. It is recommended that aerobic treatment units (ATUs) with secondary treatment are used and disposing the treated effluent into conventional trenches or beds or other approved receptors are recommended.

We recommend a design indicative hydraulic conductivity of no greater than 1 m/day.

6.17.2 Design Loading Rates

Based on Table 5.2 of AS1547-2012, the following design loading rates (DLRs) are considered applicable for this site for secondary treated effluent in trenches and beds.

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The south-west corner of the site is not covered by pavements and surface grasses present over this area. Also present is a number of large mature trees adjacent to the south-west boundary.

6.5 Landform

As shown in Gozzard (2007)[4] the site is part of the Bassendean Dune System and is around 3 km from the Darling Scarp. The system is a series of shoreline deposits and coastal dunes developed during several dune-building events. The dunes developed on a broad ridge of older, dominantly marine and lacustrine deposits that were eroded and reworked, so that the dune system is superimposed on several planed surfaces. The dunes consist of low hills of quartz sand.

6.6 Slope

Based on the supplied feature survey the slope of the site is relatively flat (0.6%) across the site.

6.7 Fill (Imported)

The subsurface conditions are summarised in Section 5.2. A gravelly sand road base fill is generally present to depths of up to 0.5 m across most of the site.

6.8 Surface Gravel and Rock Outcrops

Apart from the presence of the road base gravelly material across most of the site, no significant surface gravel or rock outcrops were noted at the site.

6.9 Erosion Potential

Based on our experience, there is a low risk of erosion potential given the relatively flat slope of the site.

6.10 Separation from Groundwater

The depth to groundwater recorded in the monitoring wells on 15 March 2022 (end of summer) ranged from 4.5 m to 7.38 m. We expect these levels to rise by no more than about 2 m during the winter months. Even with the rise the groundwater would still be about 3 m below the ground surface.

6.11 PDWSAs and SSAs

The site is not mapped as being near a public drinking water source area (PDWSA) by the Department of Water.

The Department of Planning, Lands and Heritage maps shows the site is within a Sewage Sensitive Area (SSA).

6.12 Surface Water

There was no sign of surface water at the site. Based on the general grade of the site, we do not expect surface water to form or pond.

[4] Gozzard, J R. (2007), *Geology and Landforms of The Perth Region*. Western Australian Geological Survey, East Perth.

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Table 4: Perth Airport Weather Stations (9021) Monthly Rainfall Data for All Years (1886-2021)

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	0.7	15.0	16.2	39.6	97.8	154.5	155.6	117.8	72.2	43.3	26.0	11.0
Median	2.0	5.1	9.7	32.8	88.8	144.2	154.3	118.5	66.8	36.6	19.7	7.7
Highest Daily	90.2	132.0	43.2	61.0	57.4	78.2	99.0	66.4	59.6	60.2	41.1	36.0

Evaporation

Evaporation data is estimated from The Department of Agriculture and Food (1987)[3] using the data for Upper Swan (~15 km from the site).

Table 5: Evaporation Data Estimates -Monthly

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	327	281	241	136	89	63	60	87	110	161	221	303	2079

Table 6: Evaporation Data Estimates -Annual

Mean Evaporation (mm)	Coefficient of Variation (%)	Standard Deviation (mm)	Evaporation which will be exceeded		
			1 year in 3 (mm)	1 year in 10 (mm)	1 year in 20 (mm)
2079	6	125	2104	2284	2329

We consider that the evaporation exceeds the rainfall for this site (annually). There are 4 months during the year where the mean rainfall exceeds the mean evaporation (May-August).

Water Balance

A water balance calculation for zero storage will need to be undertaken in accordance with the Department of Health requirements based on the information presented in this report and the required hydraulic loading. The purpose of the calculation is to ensure the minimum storage requirement is met. The calculation will indicate the minimum land application area (LAA) required for zero storage.

6.3 Exposure

The site has minimal tree cover and will therefore have a high sun exposure.

A feature survey plan provided shows that the ground surface generally slopes down from east to west with elevations ranging from about RL 26.6 m to RL 24.8 m AHD.

6.4 Vegetation

The site is open ground and generally covered with hardstand and bitumen sealed pavements. Also present are open areas covered with surface grasses including a few trees. Several fences are also present. (Refer to Appendix B: Site Photographs).

[3] 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.

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Road base material is not present at the surface in the area in the south-west corner of the site (BH03, MA03 and MA04). The area is used to dispose of stormwater and a few small stockpiles of material are present on the ground surface.

5.3 Groundwater

The Perth Groundwater Atlas (2004) shows the seasonal minimum groundwater level to be around RL 13 m AHD. This is about 12 m below the current ground surface.

The levels used to interpolate the groundwater contours in this edition of the atlas were based on levels recorded in May 2003 following a long dry period. These levels are generally considered to reflect minimum groundwater levels. Groundwater levels can be expected to be significantly higher than shown in the 2004 atlas.

Groundwater was measured in the monitoring wells on 15 March 2022 at the following depths

Table 3: Summary of Groundwater Depths (March 2022)

Test Location	Depth to Groundwater (m)
MW01	8.1
MW02	7.38
MW03	4.5
MW04	5.63

Shallower perched groundwater is expected to develop on top of the hard/cemented clayey stratum during the wetter times of the year.

6. SITE ASSESSMENT

6.1 Hydraulic Loading

The design hydraulic loading should be determined in accordance with the WA Department of Health Regulations 29 and Schedule 9 of The Health Regulations (1974).

6.2 Climate

Rainfall

The closest Bureau of Meteorology (BoM) weather station to the site is the Perth Airport weather station:

- Station Number: 9021
- Latitude: 31.93° S
- Longitude: 115.98°E
- Elevation: 15 m

The historical monthly rainfall data for this site has been sourced from the BoM and is presented below. This data was downloaded on 28 April 2022.

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Table 2: Summary of Constant Head Permeability Test Results

Permeability Test	Soil Description to 1 m depth	Test Depth (m)	Constant Head Permeability, k (m/day)	Soil Category AS/NZS 1547:2012
G01	FILL: Sandy GRAVEL over SAND	0.5	1.03	3
G02	FILL: Sandy GRAVEL over SAND	0.5	1.37	3
G03	SAND	0.5	6.58	2
G04	SAND over Sandy GRAVEL	0.5	0.41	3
G05	FILL: Sandy GRAVEL over SAND	0.75	0.56	3
G06	FILL: SAND over SAND over Gravelly SAND	0.5	1.20	3

5. SITE CONDITIONS

5.1 Geology

The Perth sheet of the 1:50,000 scale Environmental Geology series map indicates that the majority of the site is underlain by a thin layer of Bassendean Sand overlying fine grained soils of the Guildford Formation.

The findings of the investigation are generally consistent with the geological mapping although a layer of fill is present over most of the site.

5.2 Subsurface Conditions

The subsurface conditions can generally be summarised as follows:

- Sandy GRAVEL (GP - inferred road base): fine to coarse grained, sub-angular to sub-rounded, typically pale grey and brown, dry, very dense, present from ground surface to depths ranging from 0.1 m to 0.5 m; overlying
- SAND (SP): fine to coarse grained, sub-angular to sub-rounded, typically pale grey to off white, trace to some fine to medium grained lateritic gravel, trace non plastic fines, dry, typically dense, present to depths ranging from 0.75 m to 2.0 m; overlying
- Gravelly SAND (SP)/ Sandy GRAVEL (GP): fine to coarse grained sand and gravel, sub-angular to sub-rounded, variably cemented, typically pale brown to brown, lateritic, dry, typically dense, extending to depths ranging from 1.5 m to 2.5 m; overlying
- Gravelly CLAY (CI)/ Clayey SAND (SC): medium plasticity, mostly pale red, red and grey, generally containing layers of sand, silty sand and cemented sand, moist becoming wet at depth, very stiff to hard, extending to depths ranging from 8.0 m to 9.9 m; overlying
- SAND: dense to very dense, extending to the maximum investigated depth of 12.2 m.

Variations to the above comprise:

- no FILL: Sandy GRAVEL present at the surface in boreholes MA03, MA04 and BH01 to BH04;
- no Gravelly SAND/Sandy GRAVEL below the SAND in boreholes MA01 to MA03;
- inferred hard Silty CLAY below the SAND at depths below 10.9 m and 8.5 m in CPT05 and CPT06 respectively; and
- inferred thin layers of stiff Sandy SILT and Clayey SILT within SAND below a depth of about 8.0 m in CPT04.

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Direct Push Boreholes

Boreholes were drilled using a Geoprobe 6620DT drill rig supplied and operated by Direct Push Probing.

Borehole reports are presented in Appendix D: Borehole Reports along with a method of soil description and a list of explanatory notes and abbreviations used in the reports. A photograph of the core recovered from each borehole is included in each of the borehole reports.

Groundwater Monitoring Well Installation

Four groundwater monitoring wells (MW01-MW04) were installed at the site. The wells comprise 50 mm PVC standpipes extending to depths ranging from 9.36 m to 10.26 m with a 3.0 m slotted section at the base of each well. Gravel pack was placed over the slotted sections in the annulus between the borehole wall and standpipe, followed by a bentonite seal (typically 1.0 m thick). The annulus above the bentonite was backfilled to ground level using drill cuttings and on site soils. The wells were finished with a lockable steel monument cover.

Groundwater monitoring well construction reports are presented in Appendix E: Groundwater Monitoring Well Construction Reports.

Infiltration Tests

Infiltration testing was undertaken using the 'inverse auger hole' method described by Cocks[1]. The test results recorded to date are presented in Appendix F: Infiltration Test Results and are summarised in Table 1: Summary of Infiltration Test Results

. The table will be updated once the remainder of the testing is carried out.

Table 1: Summary of Infiltration Test Results

Test No.	Soil Description	Test Depth (m)	Minimum Unsaturated Permeability, k (m/day)
IT01/MA01	SAND	1.54	4.0
IT02/MA02	SAND	1.85	3.4
IT03/MA03	SAND	1.55	13.4
IT04/MA04	Sandy GRAVEL over Sandy CLAY	1.70	3.6
IT05/MA05	SAND	1.35	3.3
IT06/MA06	Gravelly SAND over Sandy GRAVEL	1.60	7.1
IT07/MA07	Gravelly SAND over Sandy GRAVEL	1.44	8.0
IT08/MA08	Sandy GRAVEL	1.50	5.4

Guelph Permeameter Tests

Constant-head permeameter testing was carried out in general accordance with AS 1547 (2012), "On-site domestic wastewater management" using a Guelph permeameter. The test results are presented in Appendix G: Constant Head Permeability Results and summarised in Table 2.

[1] Cocks, G (2007), "Disposal of Stormwater Runoff by Soakage in Perth Western Australia". Journal and News of the Australian Geomechanics Society, Volume 42 No. 3, pp 101-114

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- *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 study addresses the first 3 items. The last item will be addressed by the Civil Engineer, Tadros Engineering, in consultation with the owner, depending on their specific requirements, sewage loading, etc.

4. FIELDWORK

The fieldwork was conducted over the period 14 March to 19 April 2022 and comprised:

- a walkover and inspection of the site including taking photographs;
- cone penetration testing at 6 locations (CPT01 to CPT06) each extending to a depth of 12.2 m;
- drilling of machine auger boreholes at 12 locations (MA01 to MA12) extending to a depth of 2.0 m apart from MA03 which extended to a depth of 2.4 m;
- drilling of four direct push boreholes, BH01 to BH04, to depths ranging from 9 m to 10 m
- installation of groundwater monitoring wells in boreholes BH01 to BH04 at depths ranging from of 9.36 m to 10.26 m;
- infiltration testing in eight of the machine auger boreholes (IT01 to IT08), at depths ranging from 1.35 m to 1.85 m; and
- constant head permeability testing at 6 locations (G01 to G06), at a depth of about 0.5 m.

General

The fieldwork was generally conducted in accordance with AS1726 (2017) "Geotechnical Site Investigations".

Geotechnical engineers from Galt positioned the tests using a hand-held GPS accurate to about 5 m in the horizontal plane. The engineers conducted the walkover survey, observed the direct push drilling and CPTs, carried out the machine auger drilling and performed the field tests.

The approximate test locations are shown on Figure 1. Details of the tests are shown in Table A1 at the end of the text. Photographs of the site are presented in Appendix B: Site Photographs.

Cone Penetration Tests

The CPTs were carried out using a 25 tonne truck mounted CPT rig, supplied and operated by Probedrill Pty Ltd. Testing was carried out in accordance with AS 1289.6.5.1 (1999). The CPT results are presented in Appendix C: Cone Penetration Test Results along with a method of interpretation proposed by Robertson et al (1986).

Machine Auger Boreholes

Machine auger boreholes were drilled using a utility mounted EVH Scout 1750 drill rig equipped with a 90 mm nominal diameter solid auger. Borehole reports including a list of notes and abbreviations and the method of soil description used on the reports are included in Appendix D: Machine Borehole Reports. Photographs of the core recovered are presented at the bottom of each report.

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1. INTRODUCTION

This report presents the outcomes of the site and soil evaluation conducted by Galt Geotechnics (Galt) for the proposed warehouse and office developments on part of Lot 153 Talbot Road, Hazelmere ("the site"). The location of the site relative to the surrounding area is shown on Figure 1: Site and Location Plan.

2. SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The site is irregular in plan with an area of about 37,795 m^2 and is open ground and generally covered with bitumen sealed pavements and hardstand apart from:

- an area in the south-west corner which is covered with surface grasses and a number of large mature trees adjacent to the south-west boundary. The area includes a 70 m long narrow swale drain with a base width of about 5 m aligned in an east west direction and adjacent stockpiles of soil; and
- an area adjacent the eastern boundary which is covered with surface grasses and includes a grove of mature trees.

A feature survey plan provided shows that the ground surface generally slopes down from east to west with elevations ranging from about RL 26.6 m to RL 24.8 m AHD. The ground surface in the area in the south-west corner undulates with the base of the swale drain at an elevation of about RL 24.1 m AHD, the surrounding area at an elevation of about RL 25 m AHD and the top of the adjacent stockpiles at an elevation of up to about RL 26.9 m AHD.

A plan provided shows the proposed development consists of:

- three rectangular warehouse structures, designated A to C, with areas ranging from 6,020 m^2 to 6,410 m^2;
- a single storey office at the north-west corner of warehouse A with a total area of 200 m^2
- two storey offices each with a total floor area of 300 m^2 in the south-east corner of warehouse B and south-west corner of warehouse C;
- heavy duty pavements along the northern side of the warehouses with a total area of 11,308 m^2;
- car parking bays for light vehicles along the southern and western sides of the site; and
- landscaped areas.

We assume that the warehouses and offices will be of steel framed construction supported on shallow footings. Information has not been provided on the pavement type, the type and size of trucks or the type of vehicles that will operate within the warehouse. We assume that the warehouse will have a concrete floor slab and pavements outside the warehouse will be a combination of rigid concrete slab and flexible pavements for heavy and light vehicles.

We understand that the site is not connected to a sewage system and effluent treatment and disposal will occur on site.

A supplied drawing of the proposed development is presented in Appendix A: Supplied Drawings. Also included in Appendix A is a copy of the feature survey plan.

3. OBJECTIVES

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;*

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

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APPENDIX B:	SITE PHOTOGRAPHS
APPENDIX C:	CONE PENETRATION TEST RESULTS
APPENDIX D:	MACHINE AUGER BOREHOLE REPORTS
APPENDIX E:	DIRECT PUSH PROBE BOREHOLE REPORTS
APPENDIX F:	GROUNDWATER MONITORING WELL CONSTRUCTION REPORTS
APPENDIX G:	INFILTRATION TEST RESULTS
APPENDIX H:	CONSTANT HEAD PERMEABILITY TEST RESULTS
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TABLE (ATTACHED)

Table A1: Summary of Tests

FIGURES

FIGURE 1: SITE AND LOCATION PLAN

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Galt GEOTECHNICS

Report on

SITE AND SOIL EVALUATION PROPOSED WAREHOUSES AND OFFICE DEVELOPMENTS PART OF LOT 153 TALBOT ROAD HAZELMERE

Submitted to:

Logos Development Management Pty Ltd
Suite 2, Level 29, Aurora Place, 88 Phillip Street
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50 Edward Street
OSBORNE PARK WA 6017
T: +61 (8) 6272-0200

J2201067 002 R Rev1

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5. SITE AND SOIL EVALUATION

GALT Geotechnical

(SITE doc ref: J2201067 Galt Site and Soil Evaluation 002 R Rev1)

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3. SOIL LOGS

Our reports often include logs of intrusive and non-intrusive investigation techniques. 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.

4. 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.

5. 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.

6. 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.

7. 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.

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UNDERSTANDING YOUR REPORT

GALT FORM PMP11 Rev3

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.

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Appendix J: Understanding Your Report

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50 Edward Street OSBORNE PARK WA 6017
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WESTERN GEOTECHNICAL
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SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.6.1.1

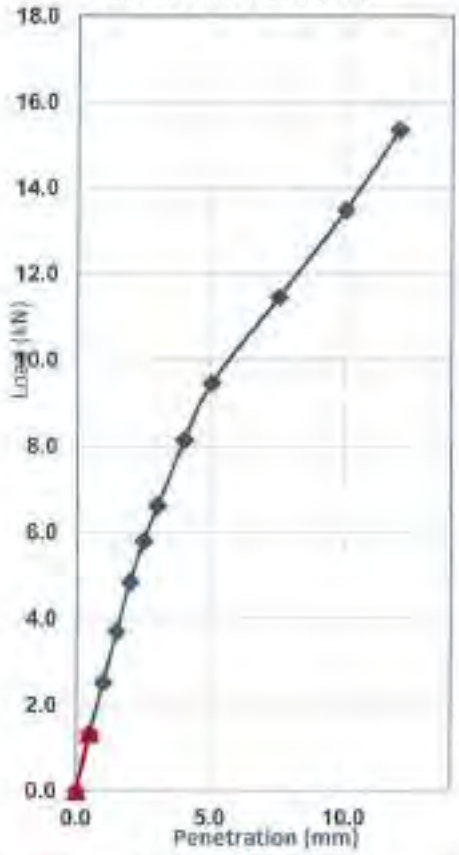
Client:	Logos Property Group	*Ticket No.*	56139
Client Address:	-	*Report No.*	WG22.6009_1_SCBR
Project:	Proposed Warehouse and Office Facilities	*Sample No.*	WG22.6009
Location:	Part of Lot 153 Talbot Road, Hazelmere	*Date Sampled:*	Not Specified
Sample Identification:	MA07 (0.4-0.7)m	*Date Tested:*	20/4 - 26/4/22

TEST RESULTS - CALIFORNIA BEARING RATIO

Sample Description: Sandy 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)	24.0
% Retained 19.0mm	0	Excluded/Replaced	Excluded
Maximum Dry Density (t/m^3)	2.03	Optimum Moisture (%)	8.5
Target Dry Density Ratio (%)	95	Target Moisture Ratio (%)	100

Specimen Conditions At Compaction			
Dry Density (t/m3)	1.94	Moisture Content (%)	8.2
Density Ratio (%)	95.5	Moisture Ratio (%)	95.5

Specimen Conditions After Soak			
Soaked or Unsoaked	Soaked	Soaking Period (days)	4
Surcharges Applied (kg)	6.25	Measured Swell (%)	0.0
Dry Density (t/m^3)	1.94	Dry Density Ratio (%)	95.5
Moisture Content (%)	11.8	Moisture Ratio (%)	137.0

Specimen Conditions After Test			
Top 30mm Moisture (%)	9.1	Remaining Depth (%)	12.6

Correction applied to Penetration: 0mm

Determined at a Penetration of: 5.0mm

California Bearing Ratio (CBR): 50%

Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 28-April-2022

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SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.5.2.1

Client:	Logos Property Group	*Ticket No.*	S6139
Client Address:	-	*Report No.*	WG22.6009_1_MMDD
Project:	Proposed Warehouse and Office Facilities	*Sample No.*	WG22.6009
Location:	Part of Lot 153 Talbot Road, Hazelmere	*Date Sampled:*	Not Specified
Sample Identification:	MA07 (0.4-0.7)m	*Date Tested:*	20-04-2022

TEST RESULTS - Modified Maximum Dry Density

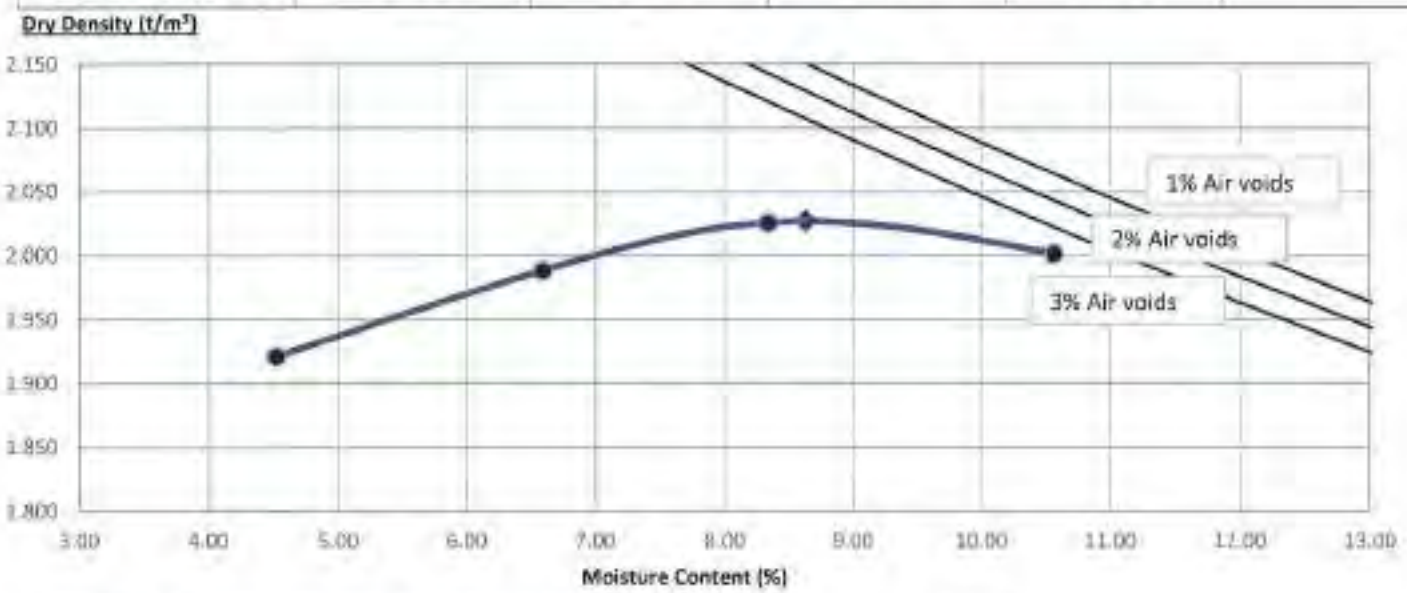
Sampling Method: Sampled by Client, Tested as Received

Sample Curing Time: 24 hrs

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

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

Moisture Content (%)	4.5	6.6	8.3	10.6	
Dry Density (t/m³)	1.921	1.988	2.026	2.001	



Modified Maximum Dry Density (t/m³) 2.03

Optimum Moisture Content (%) 8.5

Comments: *The above air void lines are derived from a calculated apparent particle density of 2.673 t/m³*

Approved Signatory:

Name: Brooke Elliott

Date: 21-April-2022

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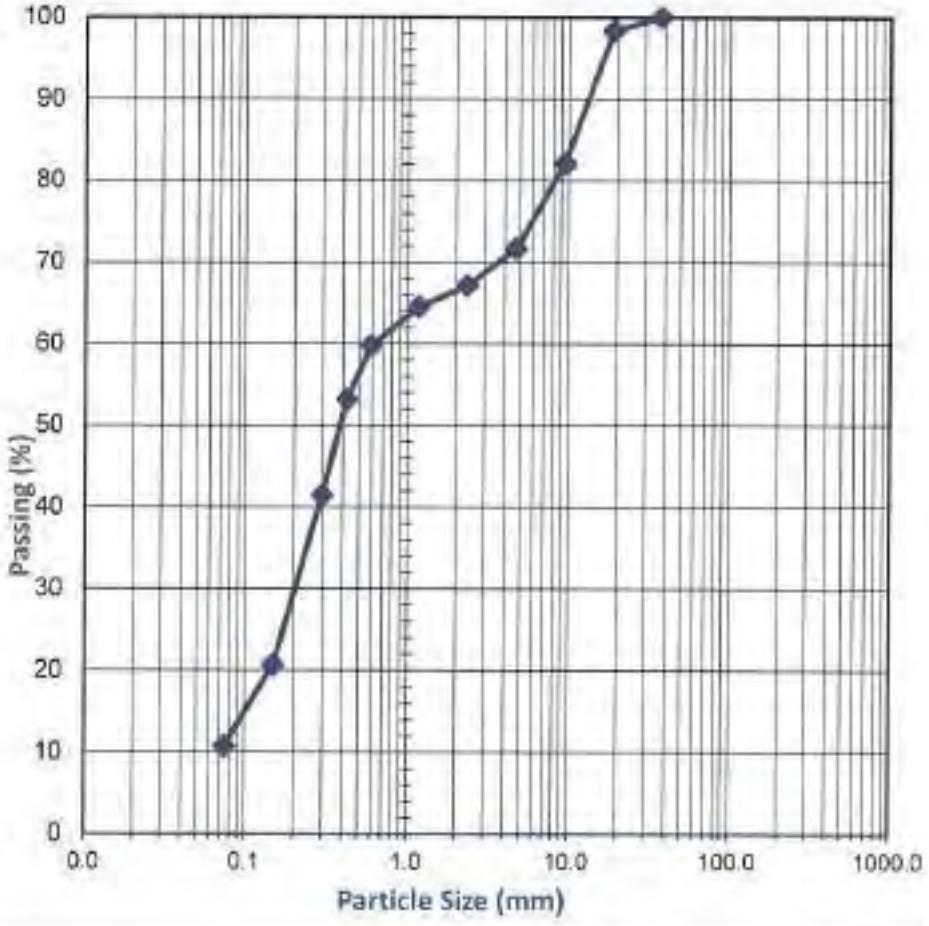
TEST REPORT - AS 1289.3.6.1

Client:	Logos Property Group	*Ticket No.*	S6139
Client Address:	-	*Report No.*	WG22.6009_1_PSD
Project:	Proposed Warehouse and Office Facilities	*Sample No.*	WG22.6009
Location:	Part of Lot 153 Talbot Road, Hazelmere	*Date Sampled:*	Not Specified
Sample Identification:	MA07 (0.4-0.7)m	*Date Tested:*	20/4 - 21/4/22

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	100
19.0	98
9.5	82
4.75	72
2.36	67
1.18	65
0.600	60
0.425	53
0.300	41
0.150	21
0.075	11



Comments:

Approved Signatory:

Name: Brooke Elliott
Date: 21-April-2022

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SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.6.1.1

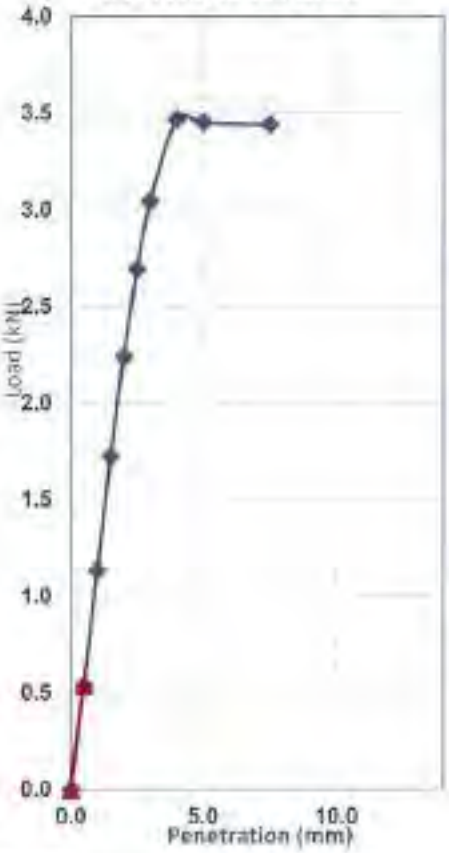
Client:	Logos Property Group	*Ticket No.*	S6139
Client Address:	-	*Report No.*	WG22.6008_1_SCBR
Project:	Proposed Warehouse and Office Facilities	*Sample No.*	WG22.6008
Location:	Part of Lot 153 Talbot Road, Hazelmere	*Date Sampled:*	Not Specified
Sample Identification:	MA03 (0.3-0.6)m	*Date Tested:*	20/4 - 26/4/22

TEST RESULTS - CALIFORNIA BEARING RATIO

Sample Description: Sand, trace 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)	24.0
% Retained 19.0mm	0	Excluded/Replaced	Excluded
Maximum Dry Density (t/m^3)	1.82	Optimum Moisture (%)	9.0
Target Dry Density Ratio (%)	95	Target Moisture Ratio (%)	100

Specimen Conditions At Compaction			
Dry Density (t/m3)	1.73	Moisture Content (%)	9.2
Density Ratio (%)	95.0	Moisture Ratio (%)	104.0

Specimen Conditions After Soak			
Soaked or Unsoaked	Soaked	Soaking Period (days)	4
Surcharges Applied (kg)	6.25	Measured Swell (%)	0.0
Dry Density (t/m^3)	1.73	Dry Density Ratio (%)	95.0
Moisture Content (%)	17.0	Moisture Ratio (%)	191.5

Specimen Conditions After Test			
Top 30mm Moisture (%)	14.9	Remaining Depth (%)	16.3

Correction applied to Penetration: 0mm

Determined at a Penetration of: 2.5mm

California Bearing Ratio (CBR): 20%

Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 27-April-2022

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SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.5.2.1

Client:	Logos Property Group	*Ticket No.*	56139
Client Address:		*Report No.*	WG22.6008_1_MMDD
Project:	Proposed Warehouse and Office Facilities	*Sample No.*	WG22.6008
Location:	Part of Lot 153 Talbot Road, Hazelmere	*Date Sampled:*	Not Specified
Sample Identification:	MA03 (0.3-0.6)m	*Date Tested:*	20-04-2022

TEST RESULTS - Modified Maximum Dry Density

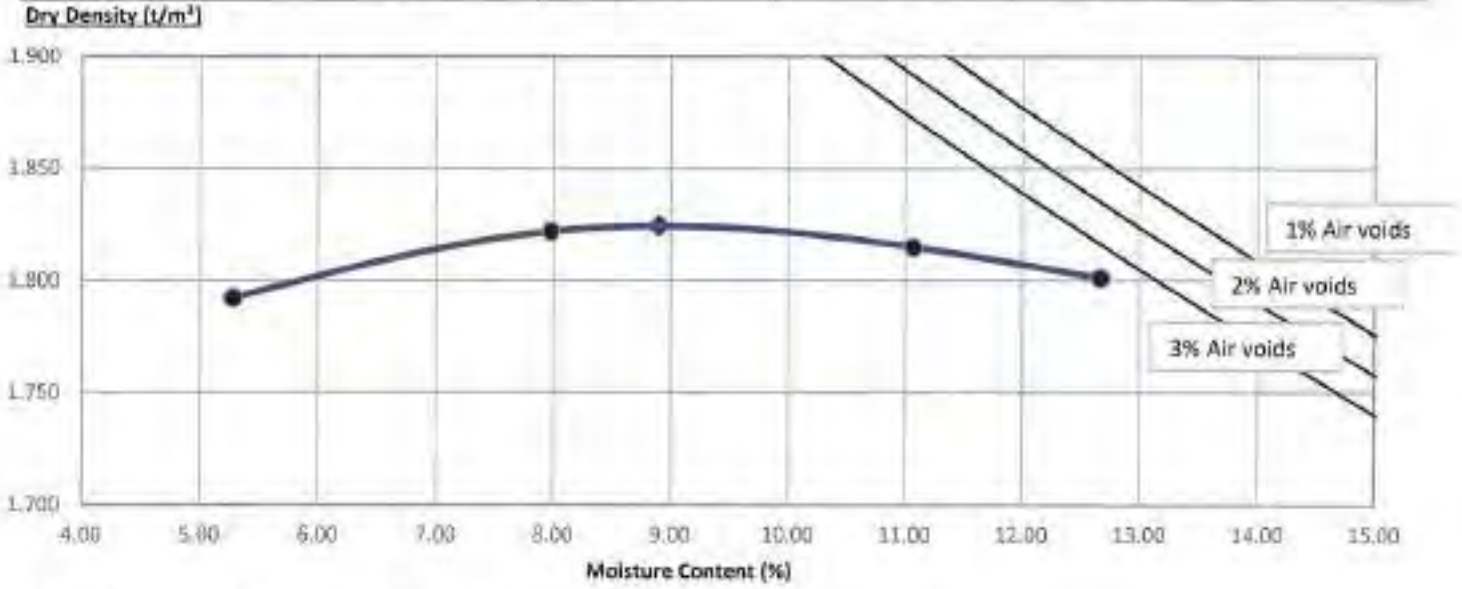
Sampling Method: Sampled by Client, Tested as Received

Sample Curing Time: 24 hrs

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

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

Moisture Content (%)	**5.3**	**8.0**	**11.1**	**12.7**	
Dry Density (t/m³)	**1.792**	**1.822**	**1.815**	**1.801**	



Modified Maximum Dry Density (t/m³) 1.82

Optimum Moisture Content (%) 9.0

Comments: *The above air void lines are derived from a calculated apparent particle density of 2.454 t/m³*

Approved Signatory:

Name: Brooke Elliott

Date: 21-April-2022

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SOIL | AGGREGATE | CONCRETE | CRUSHING

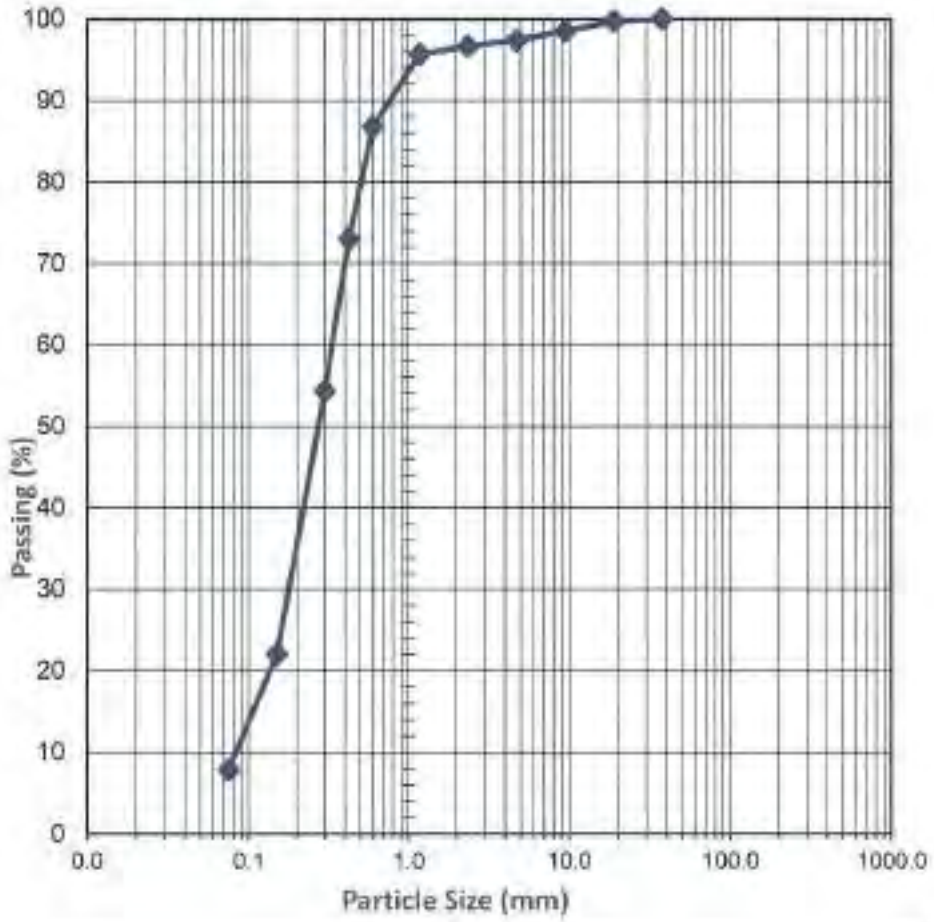
TEST REPORT - AS 1289.3.6.1

Client:	Logos Property Group	*Ticket No.*	S6139
Client Address:	-	*Report No.*	WG22.6008_1_PSD
Project:	Proposed Warehouse and Office Facilities	*Sample No.*	WG22.6008
Location:	Part of Lot 153 Talbot Road, Hazelmere	*Date Sampled:*	Not Specified
Sample Identification:	MA03 (0.3-0.6)m	*Date Tested:*	20/4 - 21/4/22

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	100
19.0	100
9.5	98
4.75	97
2.36	97
1.18	96
0.600	87
0.425	73
0.300	54
0.150	22
0.075	8



Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 21-April-2022

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Appendix I: Laboratory Test Results

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Hydraulic Conductivity Calculation - Constant Head by Permeameter

Galt Geotechnics

Spreadsheet author:

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

Job No.	J2201067
Client:	Logos Property Group
Project:	Proposed Warehouse and Office Facilities
Location:	Hazelmere
Calc by:	AM
Test Name	G08-B

Spreadsheet Legend

	Required input
	Calculated field
	Comment field
	Field not used
	Fixed field

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

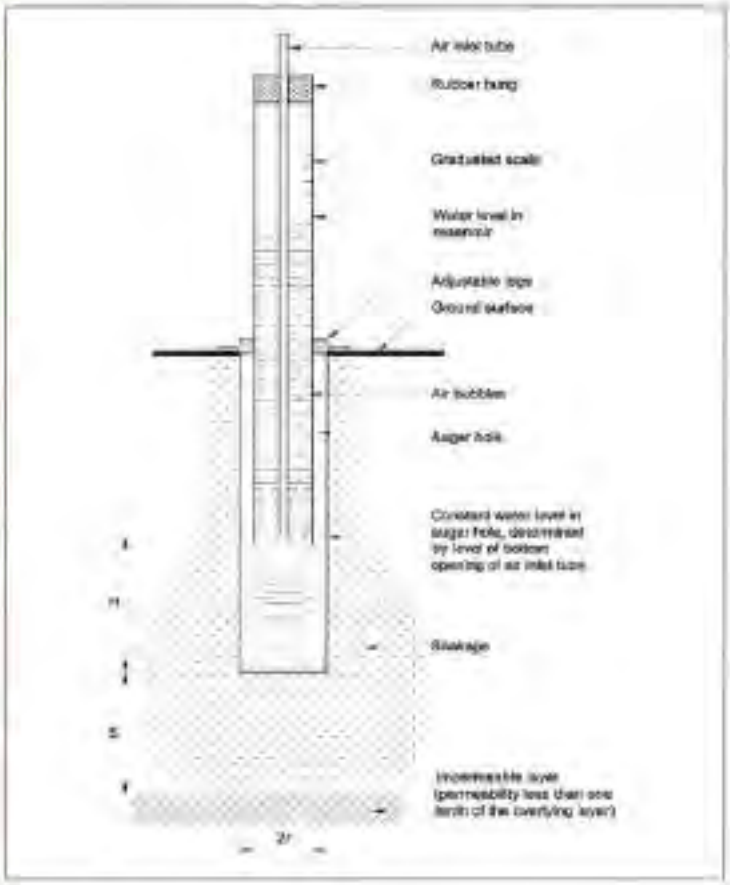
Parameter	Description	Value	Units
K_{sat}	Saturated hydraulic conductivity		cm/min
D	Depth of auger hole	50	cm
H	Head of water above base	10	cm
r	Radius of auger hole	5	cm
S	Depth to impermeable stratum		cm
Reservoir	Chosen Guelph reservoir (inner or outer)	Outer	
Area	Area of chosen reservoir	38.3	cm^2
F	Reading of water level in reservoir		cm

Test Results

Time (min)	F (cm)	ΔF (cm)	ΔF (cm)/min
0	56		
1	54	2.00	2.00
2	52.5	1.50	1.50
3	51	1.50	1.50
4	50	1.00	1.00
5	49	1.00	1.00
6	47.5	1.50	1.50
7	46	1.50	1.50
8	44.5	1.50	1.50
9	43	1.50	1.50
10	41.5	1.50	1.50
11	40	1.50	1.50
12	39	1.00	1.00
13	37.5	1.50	1.50
14	36	1.50	1.50
15	35	1.00	1.00
16	33.5	1.50	1.50
17	32	1.50	1.50
18	31	1.00	1.0
19	29.5	1.50	1.5
20	28	1.50	1.5
AVERAGE - LAST 5 READINGS			1.40

Calculation

Steady State Flow	1.40	cm/min
Flow from reservoir (Q)	50.82	cm^3/min
K_{sat}	0.093	cm/min
K_{sat}	1.385E-05	m/s
K_{sat}	**1.20**	**m/day**



Where:

H = depth of water in test hole

S = the depth to an underlying impermeable layer

r = radius of the test hole

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Hydraulic Conductivity Calculation - Constant Head by Permeameter

Galt Geotechnics | Spreadsheet author:

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

Job No: J2201067
Client: Logos Property Group
Project: Proposed Warehouse and Office Facilities
Location: Hazelmere
Calc by: AM
Test Name: G06-A

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

Spreadsheet Legend

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

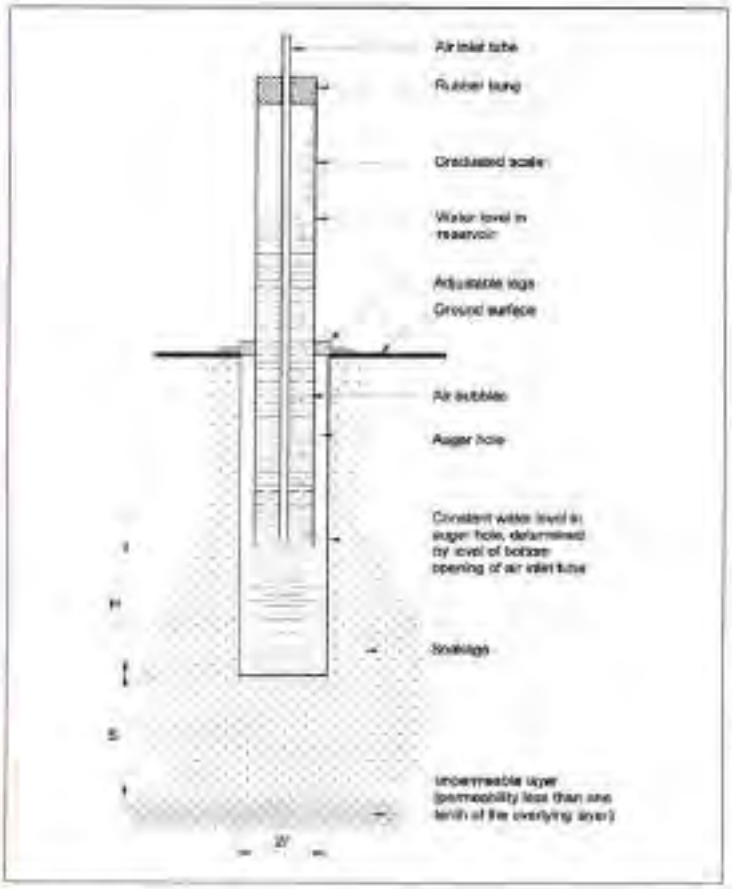
Parameter	Description	Value	Units
K_{sat}	Saturated hydraulic conductivity	X	cm/min
D	Depth of auger hole	50	cm
H	Head of water above base	10	cm
r	Radius of auger hole	5	cm
S	Depth to impermeable stratum		cm
Reservoir	Chosen Guelph reservoir (inner or outer)	Outer	
Area	Area of chosen reservoir	36.3	cm^2
F	Reading of water level in reservoir	X	cm

Test Results

Time (min)	F (cm)	ΔF (cm)	ΔF (cm)/min
0	48.5	X	X
1	48.5	0.00	0.00
2	48.5	0.00	0.00
3	48.5	0.00	0.00
4	46	2.50	2.50
5	44.5	1.50	1.50
6	43	1.50	1.50
7	41.5	1.50	1.50
8	40	1.50	1.50
9	39	1.00	1.00
10	37.5	1.50	1.50
11	35.7	1.80	1.80
12	33.8	1.90	1.90
13	32	1.80	1.80
14	30.8	1.20	1.20
15	29.5	1.30	1.30
16	27	2.50	2.50
17	27	0.00	0.00
18	24.5	2.50	2.5
19	23	1.50	1.5
20	21.5	1.50	1.5
AVERAGE - LAST 5 READINGS			1.60

Calculation

Steady State Flow	1.60	cm/min
Flow from reservoir (Q)	58.08	cm^3/min
K_{sat}	0.095	cm/min
K_{sat}	1.583E-05	m/s
K_{sat}	**1.37**	**m/day**



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

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Hydraulic Conductivity Calculation - Constant Head by Permeameter

Galt Geotechnics | Spreadsheet author: | | | REFERENCE: AS1547-2012, "On-site domestic wastewater management" - Appendix G

Job No: J2201067
Client: Logos Property Group
Project: Proposed Warehouse and Office Facilities
Location: Hazelmere
Calc by: AM
Test Name: G05-B

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

Spreadsheet Legend

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

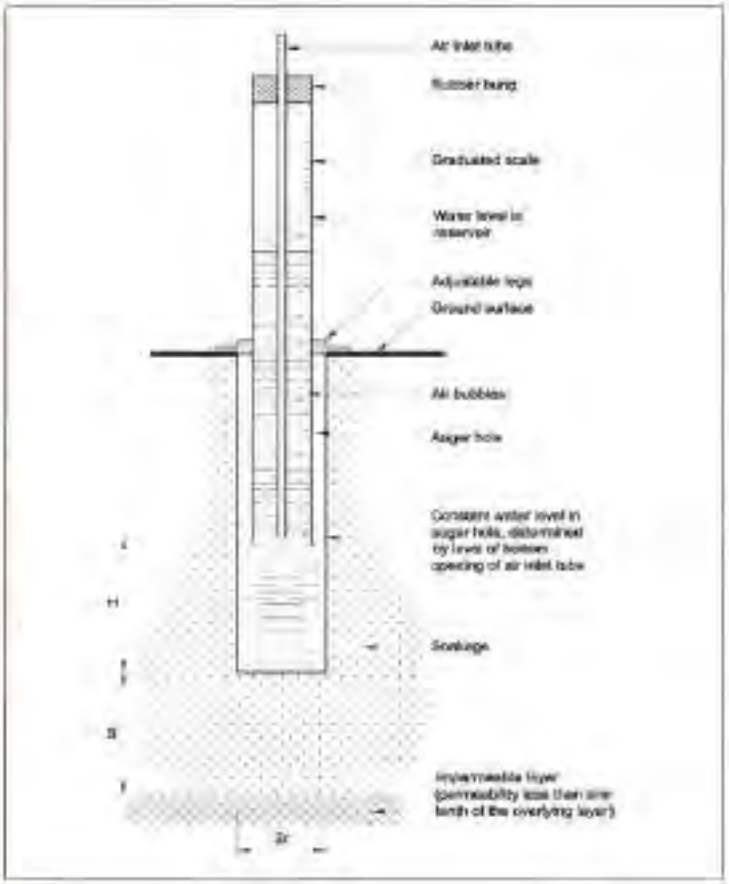
Parameter	Description	Value	Units
K_{sat}	Saturated hydraulic conductivity	X	cm/min
D	Depth of auger hole	75	cm
H	Head of water above base	35	cm
r	Radius of auger hole	5	cm
S	Depth to impermeable stratum		cm
Reservoir	Chosen Guelph reservoir (inner or outer)	Outer	
Area	Area of chosen reservoir	36.3	cm^2
F	Reading of water level in reservoir	X	cm

Test Results

Time (min)	F (cm)	ΔF (cm)	ΔF (cm)/min
0	56.5	X	X
1	53	3.50	3.50
2	50	3.00	3.00
3	46.5	3.50	3.50
4	44	2.50	2.50
5	40.5	3.50	3.50
6	38	2.50	2.50
7	35	3.00	3.00
8	31.5	3.50	3.50
9	28	3.50	3.50
10	24.5	3.50	3.50
11	22	2.50	2.50
12	19	3.00	3.00
13	16	3.00	3.00
14	12.5	3.50	3.50
AVERAGE - LAST 5 READINGS			3.10

Calculation

Steady State Flow	3.10	cm/min
Flow from reservoir (Q)	112.53	cm^3/min
K_{sat}	0.039	cm/min
K_{sat}	6.494E-06	m/s
K_{sat}	**0.56**	**m/day**



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

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Hydraulic Conductivity Calculation - Constant Head by Permeameter

Galt Geotechnics	Spreadsheet author:
Job No:	J2201067
Client:	Logos Property Group
Project:	Proposed Warehouse and Office Facilities
Location:	Hazelmere
Calc by:	AM
Test Name:	G05-A

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

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

Spreadsheet Legend

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

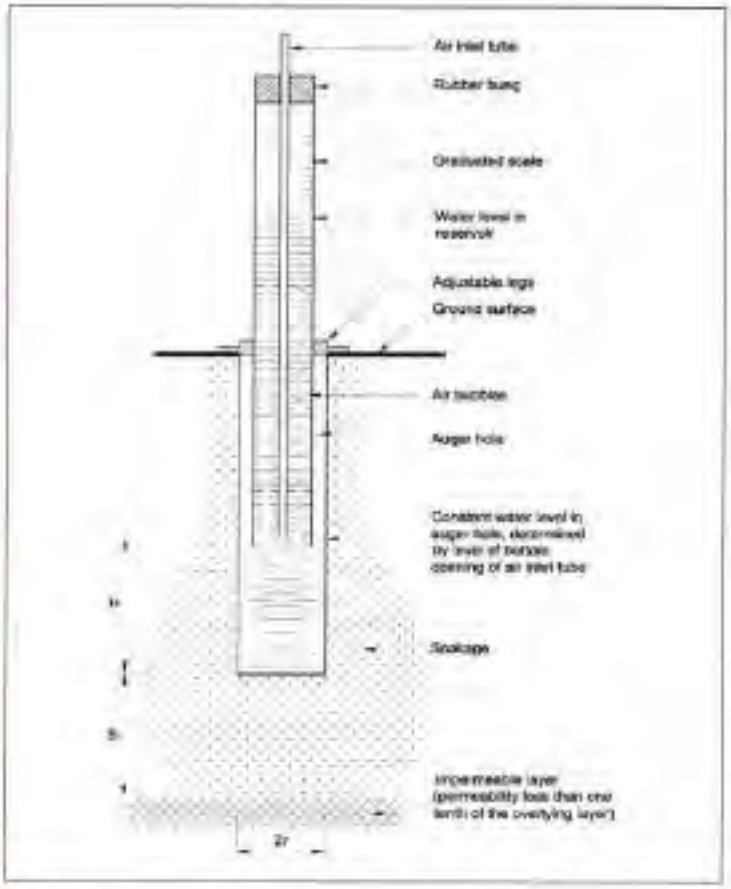
Parameter	Description	Value	Units
K_{sat}	Saturated hydraulic conductivity	X	cm/min
D	Depth of auger hole	75	cm
H	Head of water above base	35	cm
r	Radius of auger hole	5	cm
S	Depth to impermeable stratum		cm
Reservoir	Chosen Guelph reservoir (inner or outer)	Outer	
Area	Area of chosen reservoir	36.3	cm^2
F	Reading of water level in reservoir	X	cm

Test Results

Time (min)	F (cm)	ΔF (cm)	ΔF (cm)/min
0	74	X	X
1	70	4.00	4.00
2	64	6.00	6.00
3	58	6.00	6.00
4	53.5	4.50	4.50
5	49.5	4.00	4.00
6	46.3	3.20	3.20
7	43	3.30	3.30
8	39.5	3.50	3.50
9	35	4.50	4.50
10	32.4	2.60	2.60
11	29.5	2.90	2.90
12	26.3	3.20	3.20
13	23	3.30	3.30
14	20	3.00	3.00
15	17	3.00	3.00
AVERAGE - LAST 5 READINGS			3.08

Calculation

Steady State Flow	3.08	cm/min
Flow from reservoir (Q)	111.80	cm^3/min
K_{sat}	0.039	cm/min
K_{sat}	6.452E-06	m/s
K_{sat}	**0.56**	**m/day**



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

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Hydraulic Conductivity Calculation - Constant Head by Permeameter

Galt Geotechnics

Spreadsheet author:

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

Job No: J2201067
Client: Logos Property Group
Project: Proposed Warehouse and Office Facilities
Location: Hazelmere
Calc by: AM
Test Name: G04

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

Spreadsheet Legend

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

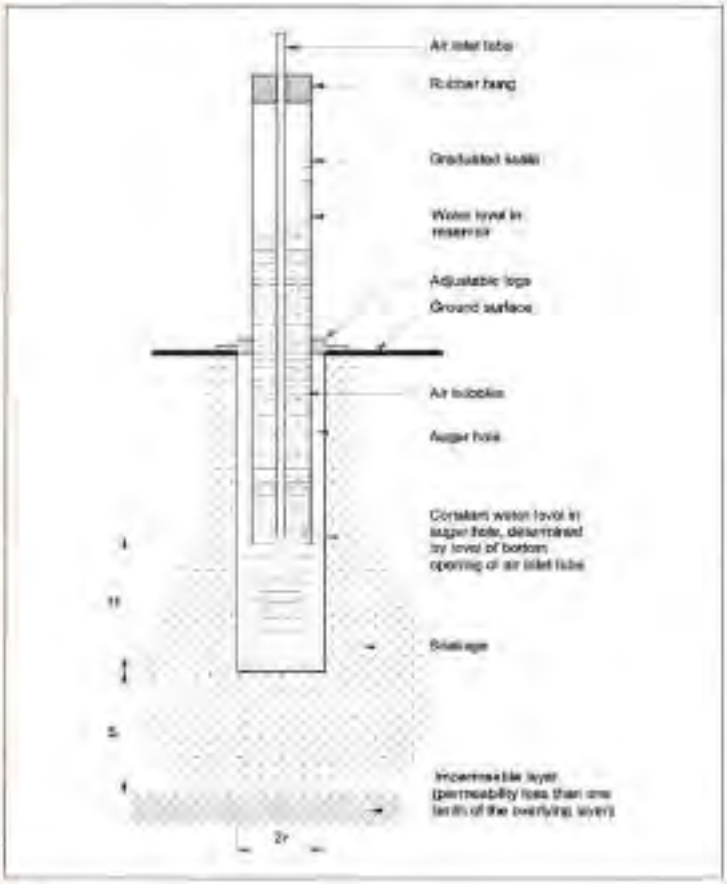
Parameter	Description	Value	Units
K_{sat}	Saturated hydraulic conductivity	X	cm/min
D	Depth of auger hole	50	cm
H	Head of water above base	10	cm
r	Radius of auger hole	5	cm
S	Depth to impermeable stratum		cm
Reservoir	Chosen Guelph reservoir (inner or outer)	Outer	
Area	Area of chosen reservoir	36.3	cm^2
F	Reading of water level in reservoir	X	cm

Test Results

Time (min)	F (cm)	ΔF (cm)	ΔF (cm)/min
0	53.5	X	X
1	53.5	0.00	0.00
2	53.5	0.00	0.00
3	53.5	0.00	0.00
4	52.3	1.20	1.20
5	52.3	0.00	0.00
6	51.4	0.90	0.90
7	50.4	1.00	1.00
8	50.4	0.00	0.00
9	49.5	0.90	0.90
10	49.5	0.00	0.00
11	48.6	0.90	0.90
12	48.6	0.00	0.00
13	47.9	0.70	0.70
14	47.9	0.00	0.00
15	47	0.90	0.90
16	47	0.00	0.00
17	46	1.00	1.00
18	46	0.00	0.0
19	45.2	0.80	0.8
20	45.2	0.00	0.0
21	44.6	0.60	0.6
22	44.6	0.00	0.0
23	43.6	1.00	1.0
AVERAGE - LAST 5 READINGS			0.48

Calculation

Steady State Flow	0.48	cm/min
Flow from reservoir (Q)	17.42	cm^3/min
K_{sat}	0.029	cm/min
K_{sat}	4.750E-06	m/s
K_{sat}	**0.41**	**m/day**



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

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Hydraulic Conductivity Calculation - Constant Head by Permeameter

Galt Geotechnics

Spreadsheet author:

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

Job No: J2201067
Client: Logos Property Group
Project: Proposed Warehouse and Office Facilities
Location: Hazelmere
Calc by: AM
Test Name: G03-B

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

Spreadsheet Legend

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

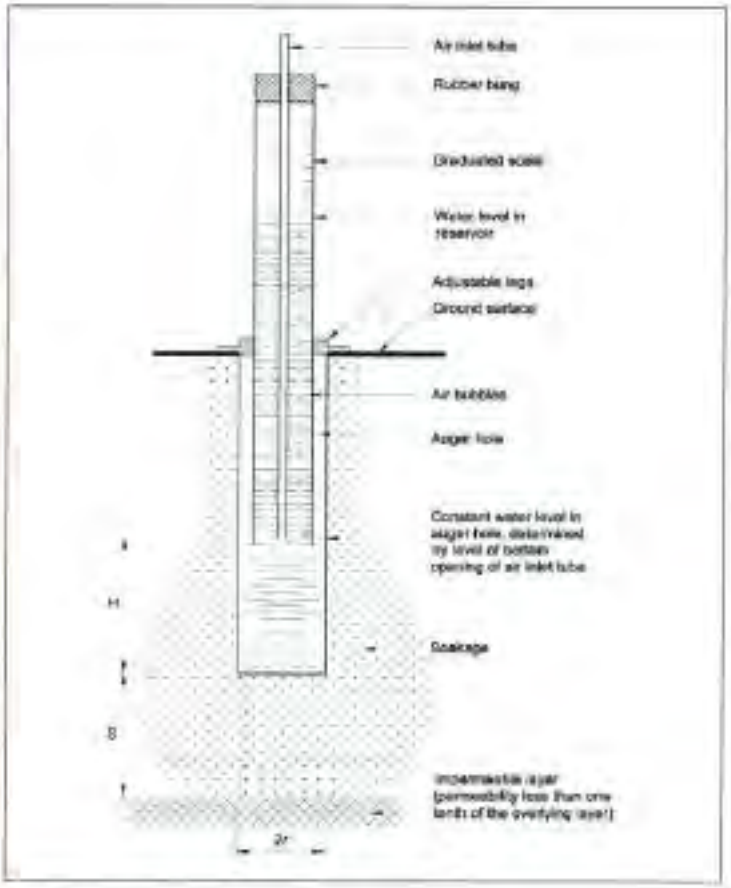
Parameter	Description	Value	Units
K_{sat}	Saturated hydraulic conductivity	X	cm/min
D	Depth of auger hole	50	cm
H	Head of water above base	10	cm
r	Radius of auger hole	5	cm
S	Depth to impermeable stratum		cm
Reservoir	Chosen Guelph reservoir (inner or outer)	Outer	
Area	Area of chosen reservoir	36.3	cm^2
F	Reading of water level in reservoir	X	cm

Test Results

Time (min)	F (cm)	ΔF (cm)	ΔF (cm)/min
0	76	X	X
1	68.5	7.50	7.50
2	60	8.50	8.50
3	53	7.00	7.00
4	45	8.00	8.00
5	37.5	7.50	7.50
6	30	7.50	7.50
7	21.5	8.50	8.50
8	14	7.50	7.50
9	6.5	7.50	7.50
AVERAGE - LAST 5 READINGS			7.70

Calculation

Steady State Flow	7.70	cm/min
Flow from reservoir (Q)	279.51	cm^3/min
K_{sat}	0.457	cm/min
K_{sat}	7.620E-05	m/s
K_{sat}	6.58	m/day



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

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Hydraulic Conductivity Calculation - Constant Head by Permeameter

Galt Geotechnics | Spreadsheet author:

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

Job No: J2201067
Client: Logos Property Group
Project: Proposed Warehouse and Office Facilities
Location: Hazelmere
Calc by: AM
Test Name: G03-A

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

Spreadsheet Legend

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

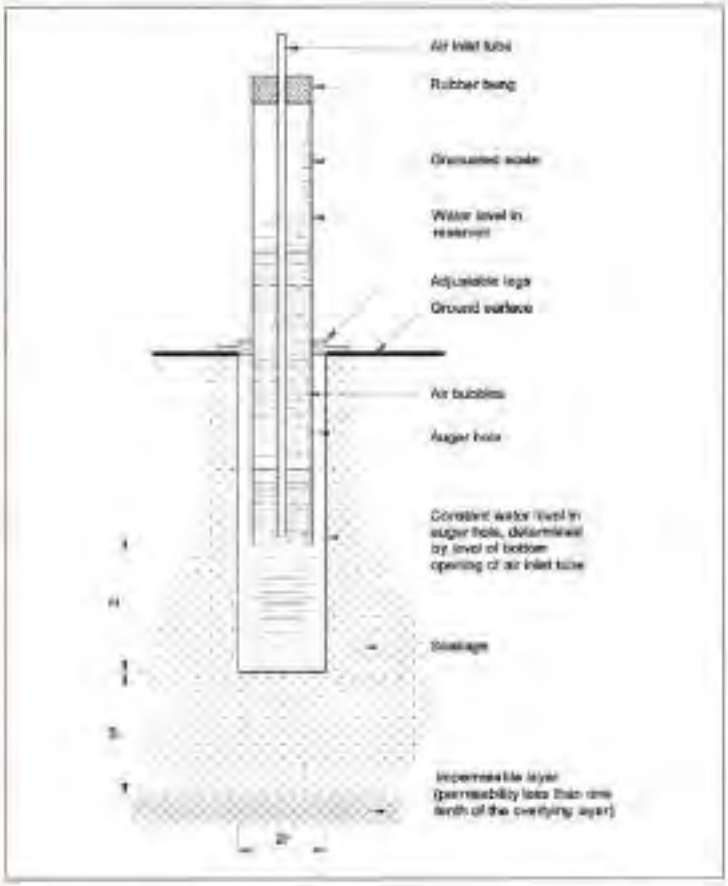
Parameter	Description	Value	Units
K_{sat}	Saturated hydraulic conductivity	X	cm/min
D	Depth of auger hole	50	cm
H	Head of water above base	10	cm
r	Radius of auger hole	5	cm
S	Depth to impermeable stratum		cm
Reservoir	Chosen Guelph reservoir (inner or outer)	Outer	
Area	Area of chosen reservoir	36.3	cm^2
F	Reading of water level in reservoir	X	cm

Test Results

Time (min)	F (cm)	ΔF (cm)	ΔF (cm)/min
0	64	X	X
1	52	12.00	12.00
2	43.5	8.50	8.50
3	35	8.50	8.50
4	28.5	6.50	6.50
5	19	9.50	9.50
6	12	7.00	7.00
7	4	8.00	8.00
AVERAGE - LAST 5 READINGS			7.90

Calculation

Steady State Flow	7.90	cm/min
Flow from reservoir (Q)	286.77	cm^3/min
K_{sat}	0.469	cm/min
K_{sat}	7.818E-05	m/s
K_{sat}	**6.75**	**m/day**



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

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Hydraulic Conductivity Calculation - Constant Head by Permeameter

Gait Geotechnics

Spreadsheet author:

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

Job No: J2201067
Client: Logos Property Group
Project: Proposed Warehouse and Office Facilities
Location: Hazelmere
Calc by: AM
Test Name: G02-B

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

Spreadsheet Legend

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

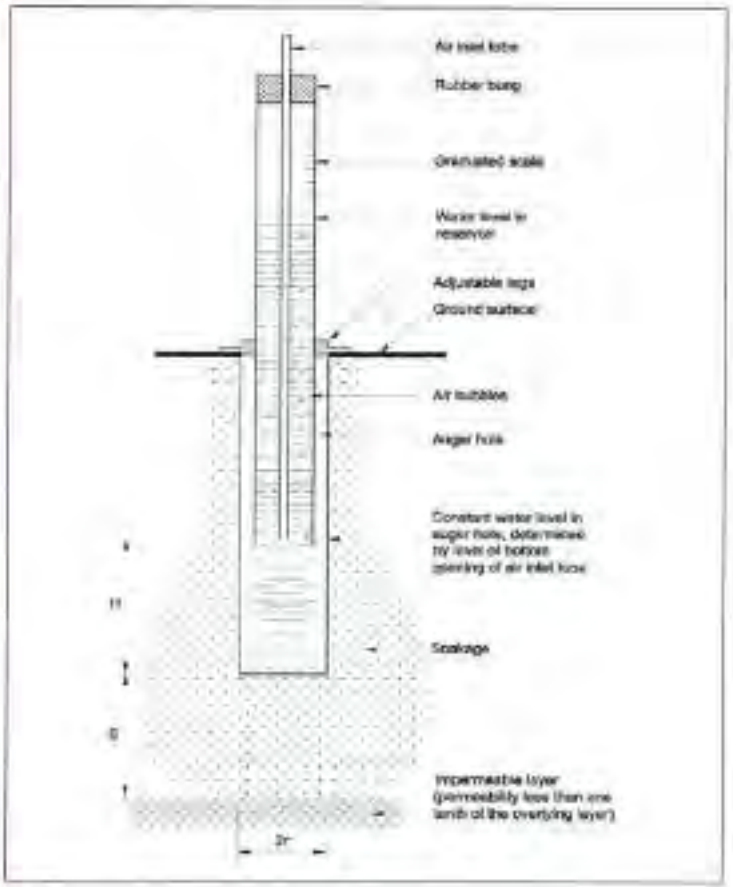
Parameter	Description	Value	Units
K_{sat}	Saturated hydraulic conductivity	X	cm/min
D	Depth of auger hole	50	cm
H	Head of water above base	10	cm
r	Radius of auger hole	5	cm
S	Depth to impermeable stratum		cm
Reservoir	Chosen Guelph reservoir (inner or outer)	Outer	
Area	Area of chosen reservoir	36.3	cm^2
F	Reading of water level in reservoir	X	cm

Test Results

Time (min)	F (cm)	ΔF (cm)	ΔF (cm)/min
0	70	X	X
1	68	2.00	2.00
2	66.5	1.50	1.50
3	64.5	2.00	2.00
4	62.5	2.00	2.00
5	61	1.50	1.50
6	59	2.00	2.00
7	57	2.00	2.00
8	55.5	1.50	1.50
9	54	1.50	1.50
10	52.5	1.50	1.50
11	51	1.50	1.50
12	49.5	1.50	1.50
13	47	2.50	2.50
14	46	1.00	1.00
15	44.5	1.50	1.50
AVERAGE - LAST 5 READINGS			1.60

Calculation

Steady State Flow	1.60	cm/min
Flow from reservoir (Q)	58.08	cm^3/min
K_{sat}	0.095	cm/min
K_{sat}	1.583E-05	m/s
K_{sat}	1.37	m/day



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

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Hydraulic Conductivity Calculation - Constant Head by Permeameter

Galt Geotechnics	Spreadsheet author:
Job No.	J2201067
Client:	Logos Property Group
Project:	Proposed Warehouse and Office Facilities
Location:	Hazelmere
Calc by:	AM
Test Name	G02-A

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

$$K = \frac{4AQ\left[0.5\sinh^{-1}\left(\frac{H}{2r}\right) - \sqrt{\left(\frac{r}{H}\right)^2 + 0.25} + \frac{r}{H}\right]}{2\pi H^2}$$

Spreadsheet Legend

	Required input
	Calculated field
	Comment field
	Field not used
	Fixed field

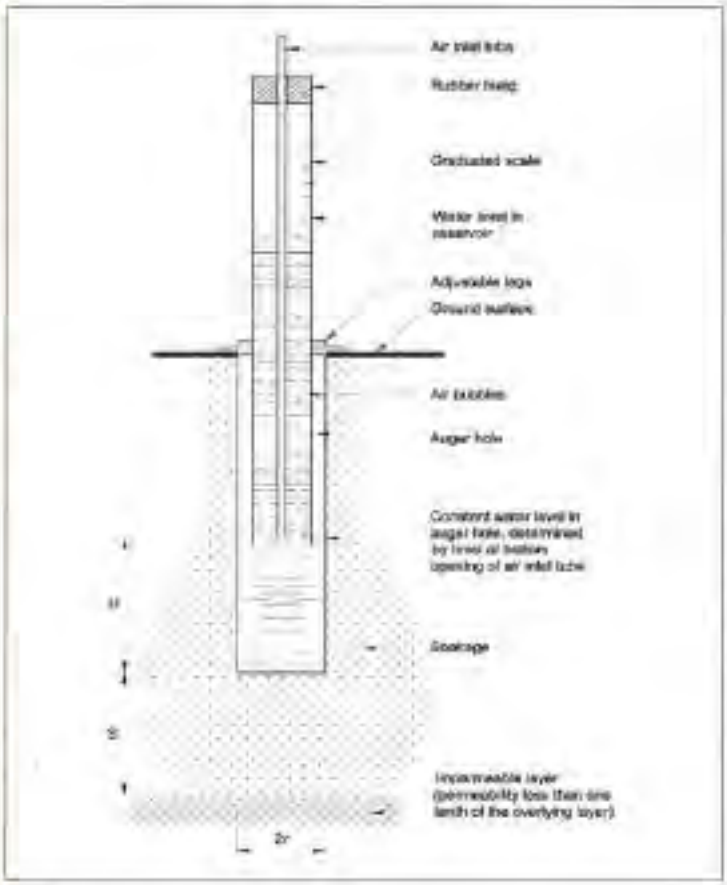
Parameter	Description	Value	Units
K_{sat}	Saturated hydraulic conductivity		cm/min
D	Depth of auger hole	50	cm
H	Head of water above base	10	cm
r	Radius of auger hole	5	cm
S	Depth to impermeable stratum		cm
Reservoir	Chosen Guelph reservoir (inner or outer)	Outer	
Area	Area of chosen reservoir	36.3	cm^2
F	Reading of water level in reservoir		cm

Test Results

Time (min)	F (cm)	ΔF (cm)	ΔF (cm)/min
0	63		
1	61	2.00	2.00
2	59	2.00	2.00
3	56.7	2.30	2.30
4	55.7	1.00	1.00
5	53	2.70	2.70
6	51.7	1.30	1.30
7	50	1.70	1.70
8	48	2.00	2.00
9	46.5	1.50	1.50
10	45	1.50	1.50
11	42	3.00	3.00
12	40.5	1.50	1.50
13	39	1.50	1.50
14	37	2.00	2.00
15	35	2.00	2.00
16	33.5	1.50	1.50
17	31	2.50	2.50
18	29.5	1.50	1.5
19	27	2.50	2.5
AVERAGE - LAST 5 READINGS			2.00

Calculation

Steady State Flow	2.00	cm/min
Flow from reservoir (Q)	72.60	cm^3/min
K_{sat}	0.119	cm/min
K_{sat}	1.979E-05	m/s
K_{sat}	**1.71**	**m/day**



where

H = depth of water in test hole

S = the depth to an underlying impermeable layer

r = radius of the test hole

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Hydraulic Conductivity Calculation - Constant Head by Permeameter

Gait Geotechnics | Spreadsheet author:

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

Job No: J2201067
Client: Logos Property Group
Project: Proposed Warehouse and Office Facilities
Location: Hazelmere
Calc by: AM
Test Name: G01-B

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

Spreadsheet Legend

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

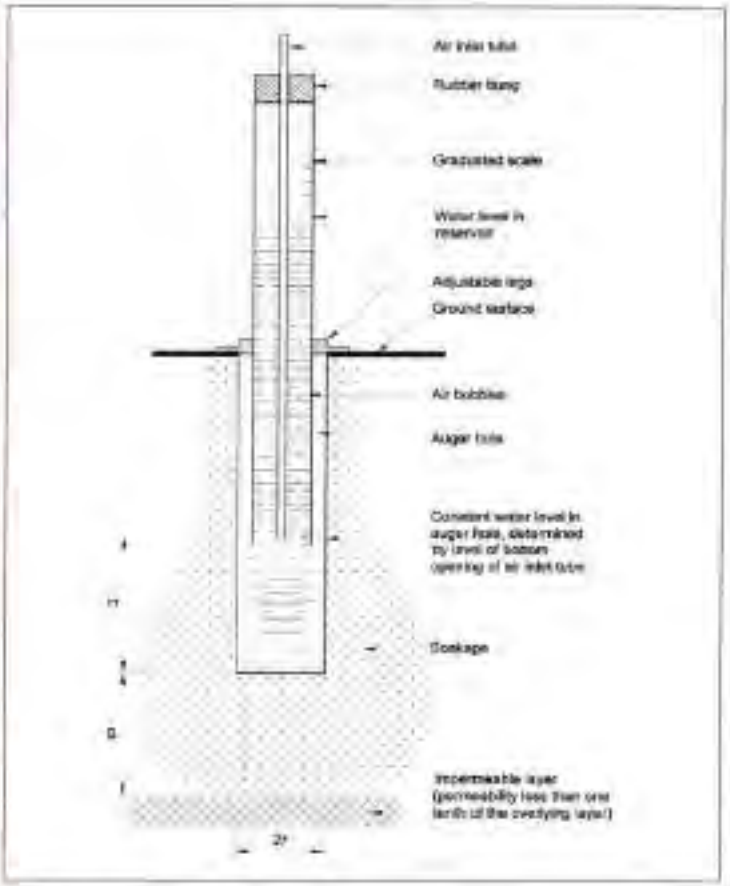
Parameter	Description	Value	Units
K_{sat}	Saturated hydraulic conductivity	X	cm/min
D	Depth of auger hole	50	cm
H	Head of water above base	10	cm
r	Radius of auger hole	5	cm
S	Depth to impermeable stratum		cm
Reservoir	Chosen Guelph reservoir (inner or outer)	Outer	
Area	Area of chosen reservoir	36.3	cm^2
F	Reading of water level in reservoir	X	cm

Test Results

Time (min)	F (cm)	ΔF (cm)	ΔF (cm)/min
0	50	X	X
1	48.5	1.50	1.50
2	47	1.50	1.50
3	46	1.00	1.00
4	44.5	1.50	1.50
5	43	1.50	1.50
6	42	1.00	1.00
7	40.5	1.50	1.50
8	39.5	1.00	1.00
9	38.5	1.00	1.00
10	37	1.50	1.50
11	36	1.00	1.00
12	34.5	1.50	1.50
13	33	1.50	1.50
14	31.5	1.50	1.50
15	31	0.50	0.50
AVERAGE - LAST 5 READINGS			1.20

Calculation

Steady State Flow	1.20	cm/min
Flow from reservoir (Q)	43.56	cm^3/min
K_{sat}	0.071	cm/min
K_{sat}	1.188E-05	m/s
K_{sat}	**1.03**	**m/day**



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

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Hydraulic Conductivity Calculation - Constant Head by Permeameter

Galt Geotechnics	Spreadsheet author:
Job No:	J2201067
Client:	Logos Property Group
Project:	Proposed Warehouse and Office Facilities
Location:	Hazelmere
Calc by:	AM
Test Name:	G01-A

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

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

Spreadsheet Legend

	Required input
	Calculated field
	Comment field
	Field not used
	Fixed field

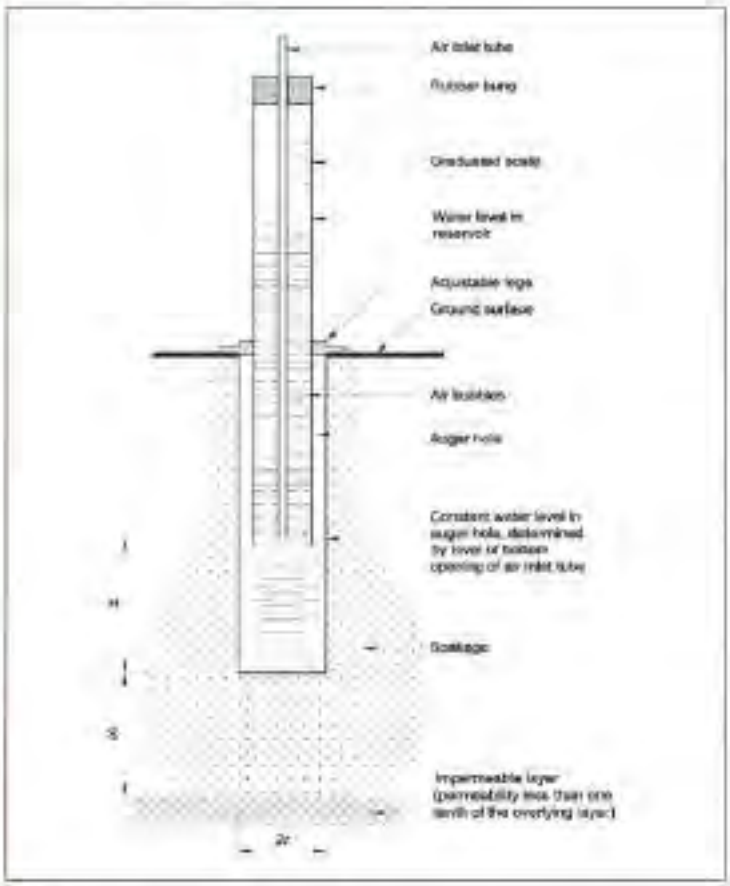
Parameter	Description	Value	Units
K_{sat}	Saturated hydraulic conductivity		cm/min
D	Depth of auger hole	50	cm
H	Head of water above base	10	cm
r	Radius of auger hole	5	cm
S	Depth to impermeable stratum		cm
Reservoir	Chosen Guelph reservoir (inner or outer)	Outer	
Area	Area of chosen reservoir	36.3	cm^2
F	Reading of water level in reservoir		cm

Test Results

Time (min)	F (cm)	ΔF (cm)	ΔF (cm)/min
0	71		
1	70	1.00	1.00
2	68.5	1.50	1.50
3	67	1.50	1.50
4	66	1.00	1.00
5	65	1.00	1.00
6	63.5	1.50	1.50
7	62	1.50	1.50
8	61	1.00	1.00
9	59.5	1.50	1.50
10	58.5	1.00	1.00
11	57	1.50	1.50
12	56	1.00	1.00
13	55	1.00	1.00
14	53.5	1.50	1.50
15	52.5	1.00	1.00
AVERAGE - LAST 5 READINGS			1.20

Calculation

Steady State Flow	1.20	cm/min
Flow from reservoir (Q)	43.56	cm^3/min
K_{sat}	0.071	cm/min
K_{sat}	1.188E-05	m/s
K_{sat}	**1.03**	**m/day**



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Appendix H: Constant Head Permeability Test Results

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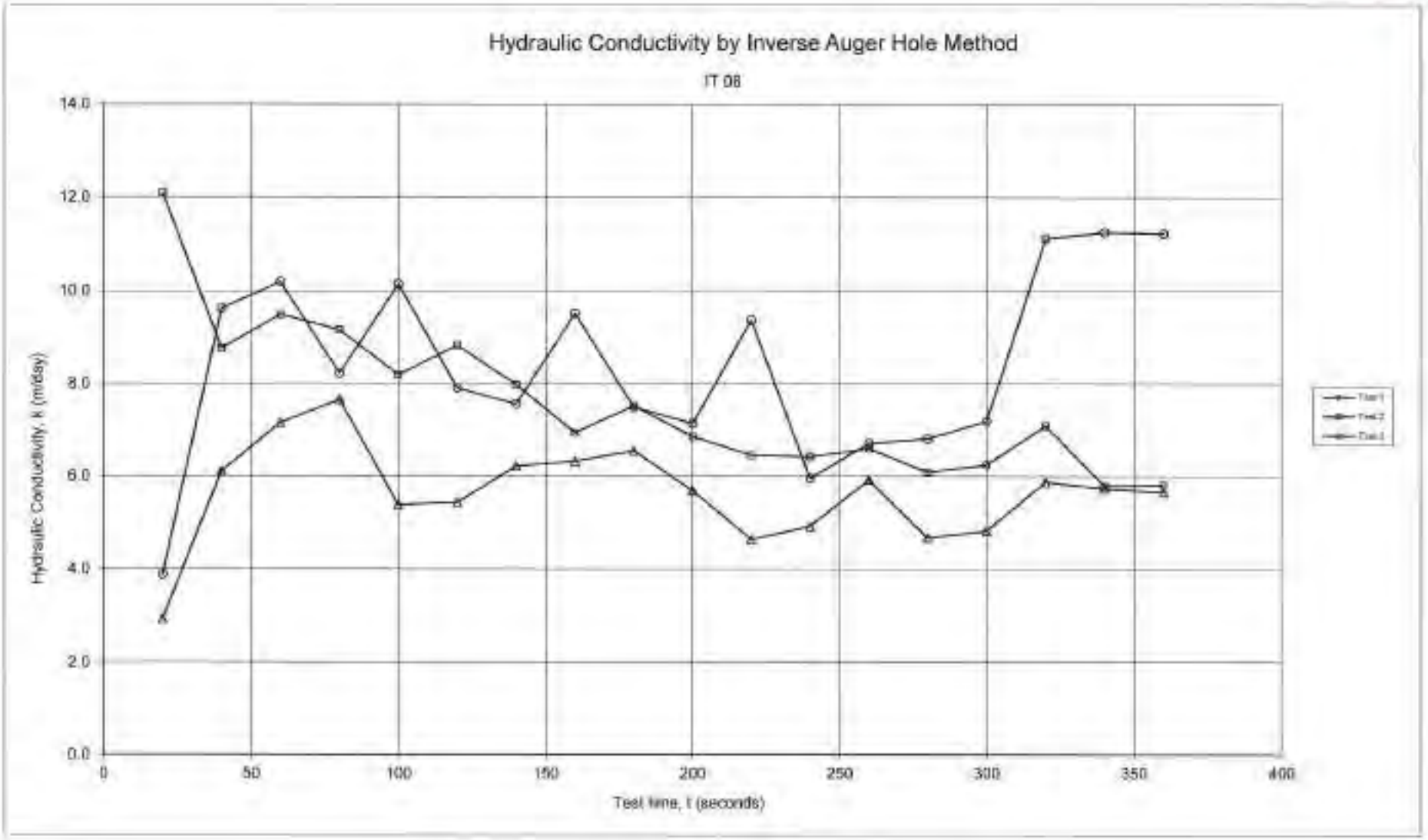

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Hydraulic Conductivity Calculation - Inverse Auger Hole Method

Galt Geotechnics

Spreadsheet author:	ORW	17-Oct-09

Job No: J2201067
Client: Logos Property Group
Project: Warehouse
Location: Hazelmere
Calc by: AM
BH Name: IT 08
Test Depth: 1.50 m

$$K = 1.15r\,\frac{\log_{10}(h_0 + \frac{1}{2}r) - \log_{10}(h_t + \frac{1}{2}r)}{t - t_0}$$

REFERENCE: Cocks, G. *Disposal of Stormwater Runoff by Soakage in Perth Western Australia*. Journal and News of the Australian Geomechanics Society. Volume 42 No 3 September 2007. pp101-114

Spreadsheet Legend

	Required input
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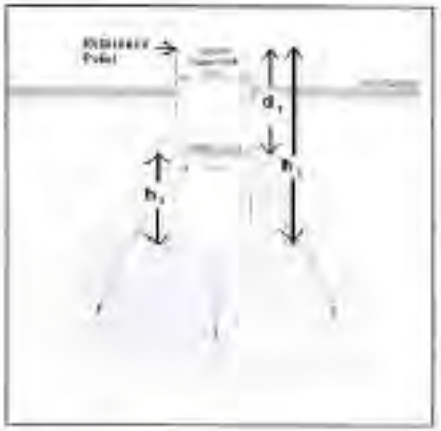
	Comment field
X	Field not used
	Fixed field

Parameter	Description	Value	Units
K	Hydraulic Conductivity	X	m/s
r	radius of test hole	0.05	m
t	time since start of measurement	X	s
h_0	reference point height above base	2.1	m
d_t	depth from reference point to water at time t	X	m
h_t	Water column height at time t	X	m
h_0	h_t at t=0	X	m



Test 1

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.813	0.287	X	X
20	1.824	0.276	4.5E-05	3.9
40	1.864	0.236	1.1E-04	9.6
60	1.890	0.210	1.2E-04	10.2
80	1.895	0.205	9.5E-05	8.2
100	1.930	0.170	1.2E-04	10.1
120	1.924	0.176	9.2E-05	7.9
140	1.934	0.166	8.8E-05	7.6
160	1.971	0.129	1.1E-04	9.5
180	1.958	0.142	8.7E-05	7.5
200	1.964	0.136	8.3E-05	7.1
220	2.005	0.095	1.1E-04	9.4
240	1.964	0.136	6.9E-05	5.9
260	1.986	0.114	7.8E-05	6.7
280	1.996	0.104	7.9E-05	6.8
300	2.010	0.090	8.3E-05	7.2
320	2.065	0.035	1.3E-04	11.1
340	2.072	0.028	1.3E-04	11.2
360	2.077	0.023	1.3E-04	11.2
		AVERAGE	9.7E-05	8.4

Test 2

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.525	0.475	X	X
20	1.678	0.422	1.4E-04	12.1
40	1.700	0.400	1.0E-04	8.8
60	1.741	0.359	1.1E-04	9.5
80	1.769	0.331	1.1E-04	9.2
100	1.783	0.317	9.5E-05	8.2
120	1.819	0.281	1.0E-04	8.8
140	1.827	0.273	9.2E-05	8.0
160	1.826	0.274	8.0E-05	6.9
180	1.858	0.242	8.7E-05	7.5
200	1.860	0.240	7.9E-05	6.8
220	1.866	0.234	7.5E-05	6.5
240	1.880	0.220	7.4E-05	6.4
260	1.899	0.201	7.6E-05	6.6
280	1.898	0.202	7.0E-05	6.1
300	1.915	0.185	7.2E-05	6.2
320	1.950	0.150	8.2E-05	7.1
340	1.924	0.176	6.7E-05	5.8
360	1.935	0.165	6.7E-05	5.8
		AVERAGE	8.8E-05	7.6

Test 3

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.676	0.424	X	X
20	1.688	0.412	3.4E-05	2.9
40	1.724	0.376	7.1E-05	6.1
60	1.757	0.343	8.3E-05	7.2
80	1.787	0.313	8.9E-05	7.7
100	1.775	0.325	6.2E-05	5.4
120	1.793	0.307	6.3E-05	5.4
140	1.825	0.275	7.2E-05	6.2
160	1.844	0.256	7.3E-05	6.3
180	1.865	0.235	7.6E-05	6.5
200	1.860	0.240	6.6E-05	5.7
220	1.845	0.255	5.4E-05	4.6
240	1.865	0.235	5.7E-05	4.9
260	1.905	0.195	6.9E-05	5.9
280	1.880	0.220	5.4E-05	4.7
300	1.895	0.205	5.6E-05	4.8
320	1.937	0.163	6.8E-05	5.9
340	1.943	0.157	6.6E-05	5.7
360	1.95	0.15	6.5E-05	5.6
		AVERAGE	6.5E-05	5.6

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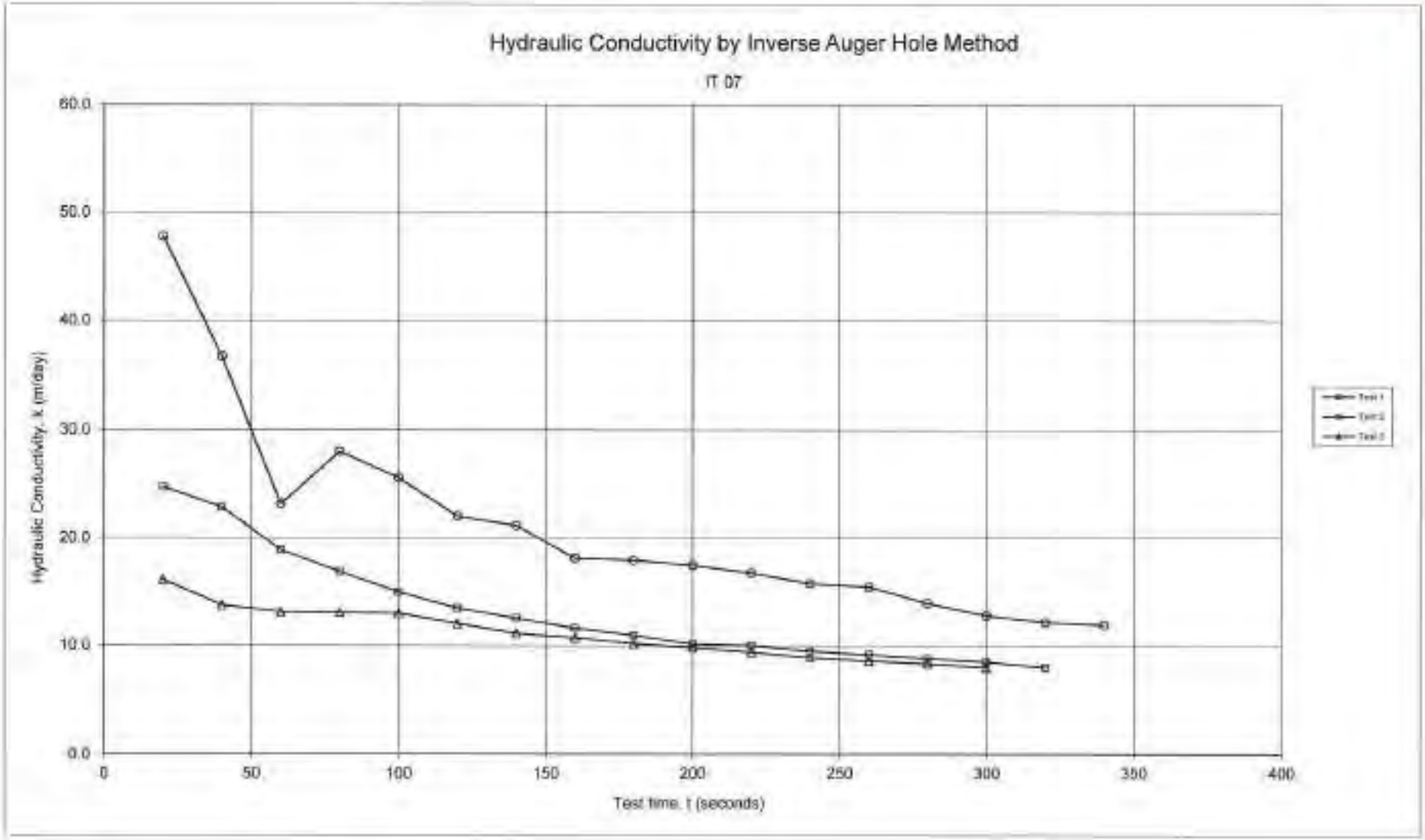

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Hydraulic Conductivity Calculation - Inverse Auger Hole Method

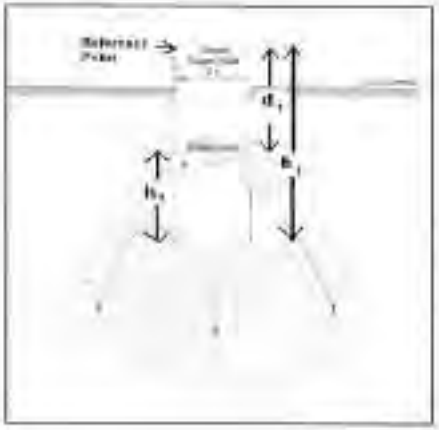
Galt Geotechnics

Spreadsheet author:	ORW	17-Oct-09

Job No:	J2201067
Client:	Logos Property Group
Project:	Warehouse
Location:	Hazelmere
Calc by:	AM
BH Name:	IT 07
Test Depth:	1.44 m

$$K = 1.15r\frac{\log_{10}(h_0 + \frac{1}{2}r) - \log_{10}(h_t + \frac{1}{2}r)}{t - t_0}$$

REFERENCE: Cocks, G. *Disposal of Stormwater Runoff by Soakage in Perth Western Australia*, Journal and News of the Australian Geomechanics Society, Volume 42 No 3 September 2007, pp101-114.



Spreadsheet Legend

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Parameter	Description	Value	Units
K	Hydraulic Conductivity	X	m/s
r	radius of test hole	0.05	m
t	time since start of measurement	X	s
h_0	reference point height above base	2.1	m
d_t	depth from reference point to water at time t	X	m
h_t	Water column height at time t	X	m
h_0	h_t at t=0	X	m

Test 1

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.278	0.822	X	X
20	1.581	0.519	5.5E-04	47.8
40	1.696	0.404	4.2E-04	36.7
60	1.680	0.420	2.7E-04	23.1
80	1.825	0.275	3.2E-04	28.0
100	1.866	0.234	3.0E-04	25.6
120	1.876	0.224	2.5E-04	22.0
140	1.910	0.190	2.4E-04	21.1
160	1.904	0.196	2.1E-04	18.1
180	1.935	0.165	2.1E-04	17.9
200	1.957	0.143	2.0E-04	17.5
220	1.971	0.129	1.9E-04	16.7
240	1.978	0.122	1.8E-04	15.7
260	1.993	0.107	1.8E-04	15.4
280	1.986	0.114	1.6E-04	13.9
300	1.981	0.119	1.5E-04	12.7
320	1.985	0.115	1.4E-04	12.1
340	1.995	0.105	1.4E-04	11.9
		AVERAGE	2.4E-04	21.0

Test 2

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.119	0.981	X	X
20	1.325	0.775	2.9E-04	24.7
40	1.466	0.634	2.6E-04	22.6
60	1.530	0.570	2.2E-04	18.9
80	1.587	0.513	2.0E-04	16.9
100	1.622	0.478	1.7E-04	15.0
120	1.649	0.451	1.6E-04	13.5
140	1.679	0.421	1.5E-04	12.5
160	1.700	0.400	1.3E-04	11.6
180	1.721	0.379	1.3E-04	10.9
200	1.732	0.368	1.2E-04	10.1
220	1.762	0.338	1.2E-04	10.0
240	1.774	0.326	1.1E-04	9.5
260	1.791	0.309	1.1E-04	9.1
280	1.804	0.296	1.0E-04	8.8
300	1.816	0.284	9.8E-05	8.5
320	1.817	0.283	9.2E-05	8.0
			AVERAGE	1.5E-04	13.2

Test 3

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	0.999	1.101	X	X
20	1.155	0.945	1.9E-04	16.1
40	1.252	0.848	1.6E-04	13.7
60	1.343	0.757	1.5E-04	13.1
80	1.431	0.669	1.5E-04	13.1
100	1.508	0.592	1.5E-04	13.0
120	1.548	0.552	1.4E-04	12.0
140	1.578	0.522	1.3E-04	11.1
160	1.616	0.484	1.2E-04	10.7
180	1.643	0.457	1.2E-04	10.2
200	1.672	0.428	1.1E-04	9.8
220	1.693	0.407	1.1E-04	9.4
240	1.706	0.394	1.0E-04	8.9
260	1.724	0.376	9.9E-05	8.6
280	1.743	0.357	9.6E-05	8.3
300	1.754	0.346	9.2E-05	8.0
			AVERAGE	1.3E-04	11.1

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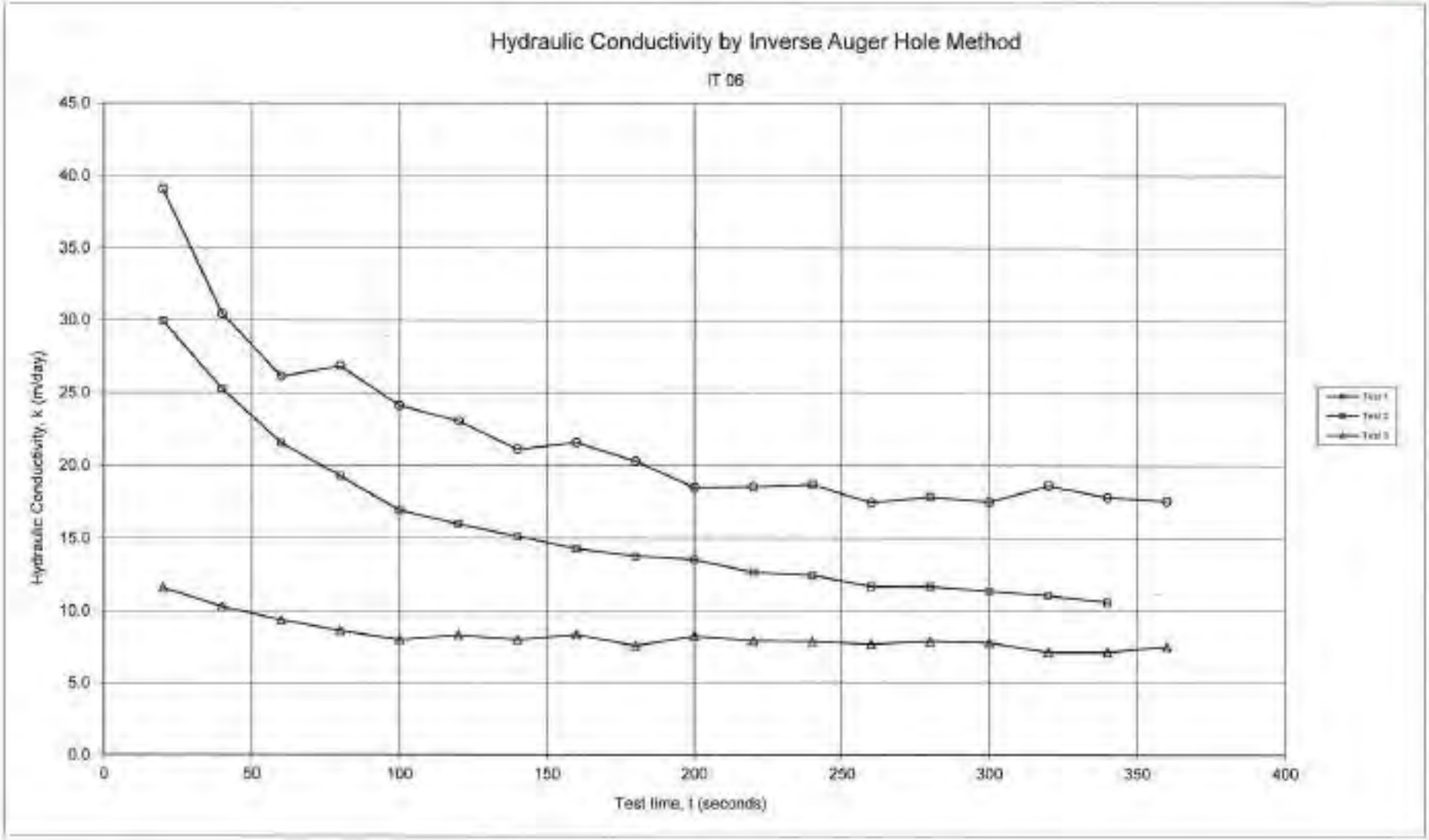

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Hydraulic Conductivity Calculation - Inverse Auger Hole Method

Gall Geotechnics

Job No:	J2201067
Client:	Logos Property Group
Project:	Warehouse
Location:	Hazelmere
Calc by:	AM
BH Name:	IT 08
Test Depth:	1.60 m

Spreadsheet author:	CRW	17-Oct-09

$$K = 1.15r\,\frac{\log_{10}(h_0 + \frac{1}{2}r) - \log_{10}(h_t + \frac{1}{2}r)}{t - t_0}$$

REFERENCE: Cocks, G. *Disposal of Stormwater Runoff by Soakage in Perth Western Australia*, Journal and News of the Australian Geomechanics Society, Volume 42 No 3 September 2007, pp101-114

Spreadsheet Legend

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	Calculated field
	Comment field
	Field not used
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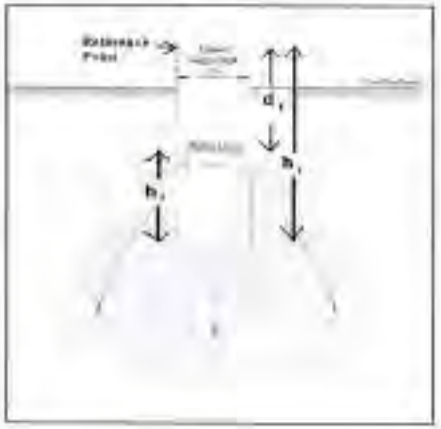
Parameter	Description	Value	Units
K	Hydraulic Conductivity		m/s
r	radius of test hole	0.05	m
t	time since start of measurement		s
h_r	reference point height above base	2.1	m
d_t	depth from reference point to water at time t		m
h_t	Water column height at time t		m
h_0	h_t at t=0		m



Test 1

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.397	0.703		
20	1.618	0.482	4.5E-04	39.0
40	1.711	0.389	3.5E-04	30.4
60	1.773	0.327	3.0E-04	26.1
80	1.856	0.244	3.1E-04	26.9
100	1.887	0.213	2.8E-04	24.1
120	1.923	0.177	2.7E-04	23.1
140	1.940	0.160	2.4E-04	21.1
160	1.978	0.122	2.5E-04	21.6
180	1.991	0.109	2.3E-04	20.3
200	1.994	0.106	2.1E-04	18.5
220	2.015	0.085	2.1E-04	18.5
240	2.034	0.066	2.2E-04	18.7
260	2.036	0.064	2.0E-04	17.4
280	2.053	0.047	2.1E-04	17.8
300	2.061	0.039	2.0E-04	17.5
320	2.079	0.021	2.2E-04	18.6
340	2.081	0.019	2.1E-04	17.6
360	2.086	0.014	2.0E-04	17.5
		AVERAGE	2.5E-04	21.9

Test 2

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.015	1.085		
20	1.284	0.816	3.5E-04	29.8
40	1.430	0.670	2.9E-04	25.3
60	1.515	0.585	2.5E-04	21.5
80	1.582	0.518	2.2E-04	19.3
100	1.618	0.482	2.0E-04	16.9
120	1.668	0.432	1.8E-04	16.0
140	1.709	0.391	1.8E-04	15.1
160	1.740	0.360	1.7E-04	14.3
180	1.773	0.327	1.6E-04	13.8
200	1.808	0.292	1.5E-04	13.5
220	1.820	0.280	1.5E-04	12.7
240	1.847	0.253	1.4E-04	12.4
260	1.854	0.246	1.4E-04	11.7
280	1.882	0.218	1.4E-04	11.7
300	1.897	0.203	1.3E-04	11.4
320	1.910	0.190	1.3E-04	11.1
340	1.917	0.183	1.2E-04	10.6
		AVERAGE	1.8E-04	15.7

Test 3

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.370	0.730		
20	1.447	0.653	1.3E-04	11.6
40	1.501	0.599	1.2E-04	10.3
60	1.543	0.557	1.1E-04	9.4
80	1.577	0.523	1.0E-04	8.6
100	1.604	0.496	9.3E-05	8.0
120	1.650	0.450	9.6E-05	8.3
140	1.676	0.424	9.3E-05	8.0
160	1.719	0.381	9.7E-05	8.4
180	1.724	0.376	8.8E-05	7.6
200	1.774	0.326	9.6E-05	8.3
220	1.789	0.311	9.2E-05	7.9
240	1.811	0.289	9.1E-05	7.9
260	1.826	0.274	8.9E-05	7.7
280	1.854	0.246	9.1E-05	7.9
300	1.870	0.230	9.0E-05	7.8
320	1.863	0.237	8.3E-05	7.1
340	1.881	0.219	8.3E-05	7.2
360	1.91	0.19	8.7E-05	7.5
		AVERAGE	9.6E-05	8.3

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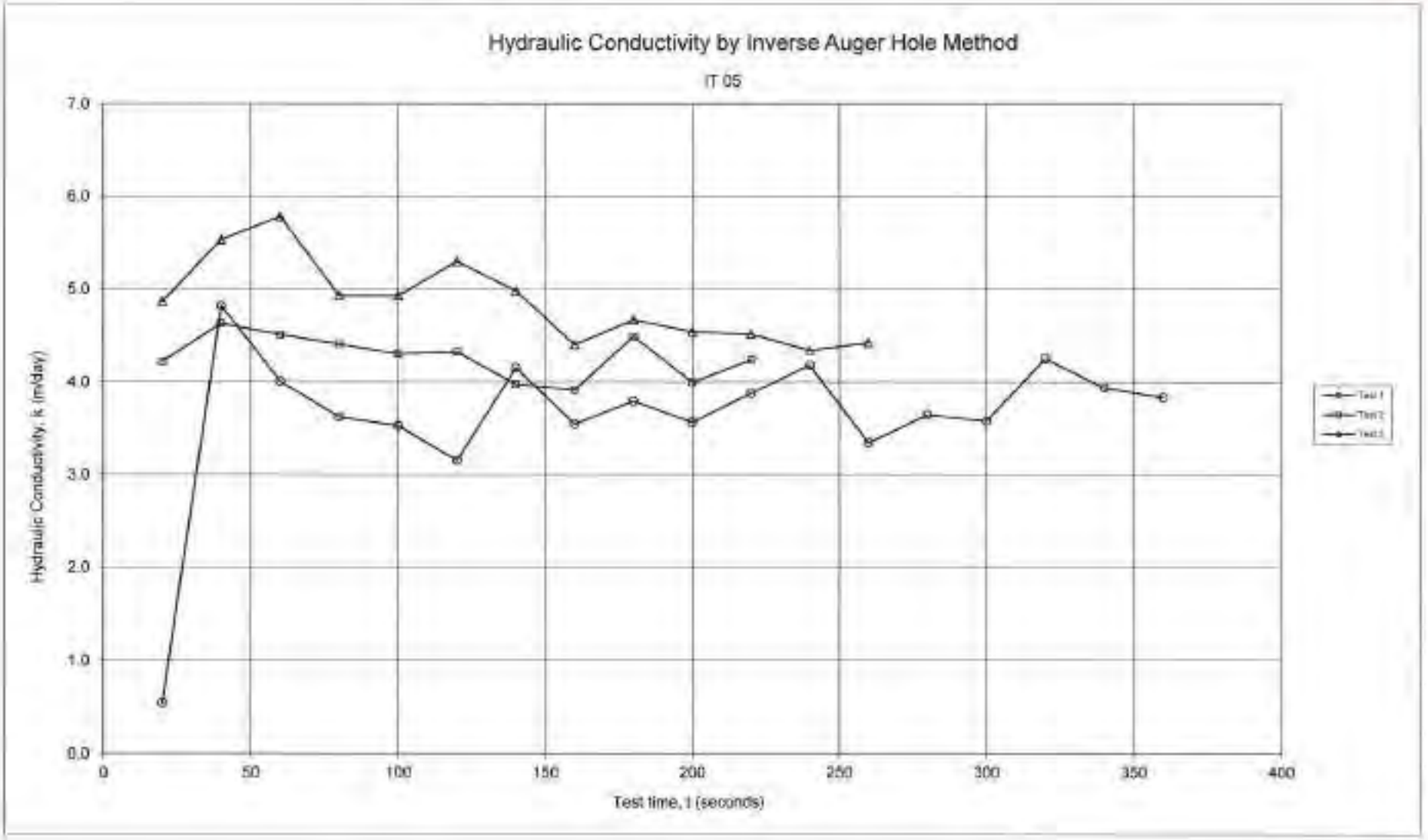

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Photograph 7: View to east at Location 4



Photograph 8: View to south-east at Location 4

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Photograph 9: View to south at Location 5



Photograph 10: View to south-west at Location 5

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Photograph 11: View to west at Location 6



Photograph 12: View to north at Location 7

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Photograph 13: View to west at Location 8



Photograph 14: View to south at Location 8

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Photograph 15: View to south-east at Location 9



Photograph 16: View to east at Location 10

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Photograph 17: View to east at Location 11



Photograph 18: View to south-east at Location 12

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Photograph 19: View to north-east at Location 13



Photograph 20: View to north-west at Location 14

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Appendix C: Cone Penetration Test Results

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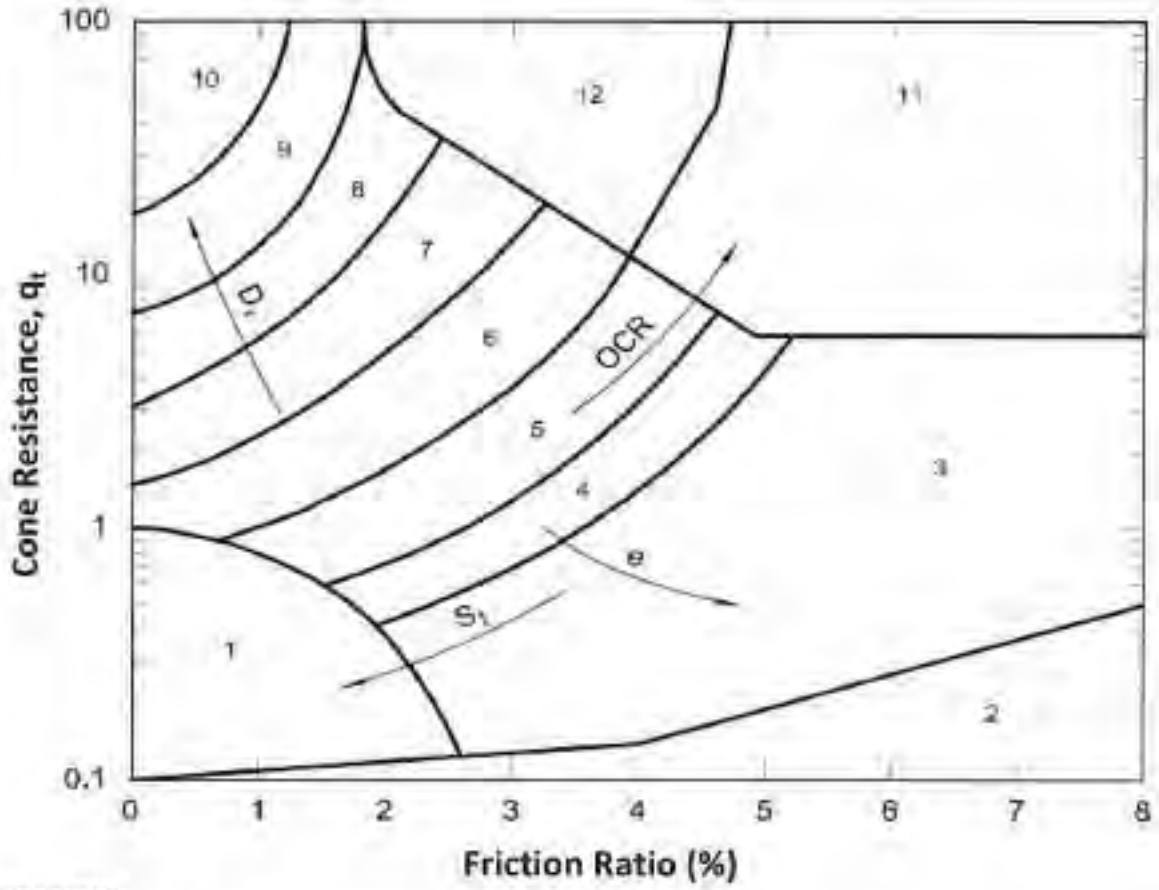

DEFINITIONS

q_t : Cone tip resistance corrected for pore water pressure
S_t : Sensitivity
e : Void ratio
D_r : Relative density
OCR : Overconsolidation ratio
OC : Overconsolidated

SOIL BEHAVIOUR TYPE ZONES

1. Sensitive fine grained
2. Organic material
3. Clay
4. Silty clay to clay
5. Clayey silt to silty clay
6. Sandy silt to clayey silt
7. Silty sand to sandy silt
8. Sand to silty sand
9. Sand
10. Gravelly sand to sand
11. Very stiff fine grained material (OC/cemented)
12. Sand to clayey sand (OC/cemented)

NOTES

A. Some overlap in type zones is expected
B. Local correlations are preferred and may indicate soil type boundaries that are different from those shown above

Reference: Robertson, P.K., Campanella, R.G., Gillespie, D. and Grieg, J. (1986) "Use of Piezometer Cone Data", Proceedings of the ASCE Specialty Conference In Situ 86: Use of In Situ Tests in Geotechnical Engineering, Blacksburg, pp 1263-80, American Society of Civil Engineers (ASCE)

Galt GEOTECHNICS

CONE PENETRATION TESTING (CPT) SOIL TYPE INTERPRETATION

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Version: 10, Version Date: 17/11/2022

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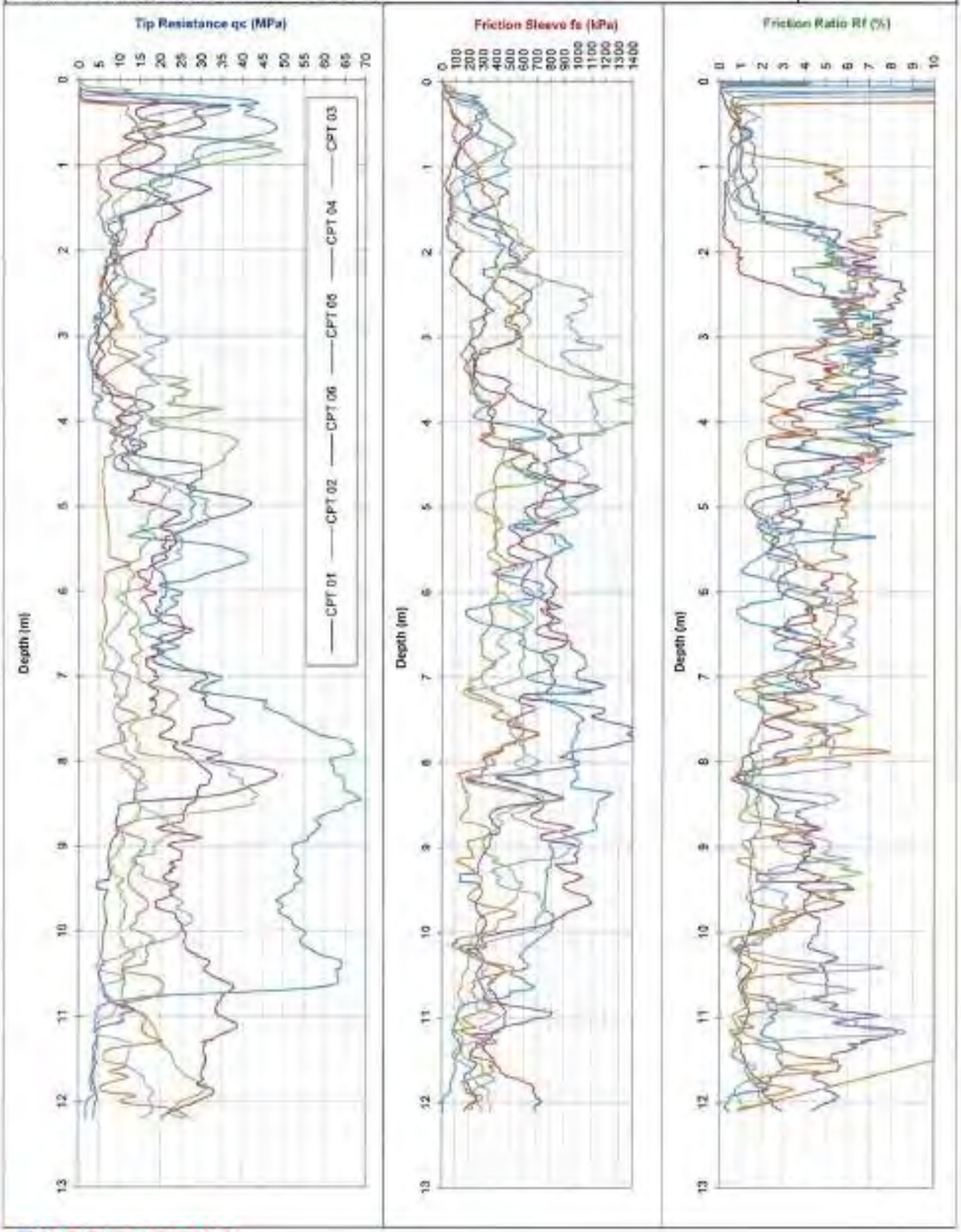
ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Logos Property Group
Job No.: J2201067
PROJECT: Proposed Warehouses and Office Facilities
Date/s: 10/Mar/2022
LOCATION: Part of Lot 150 Talbot Road Hazelmere

ALL DATA



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Rig Type: 25t truck (RFW)

Document Set ID: 7363023
Version: 10, Version Date: 17/11/2022

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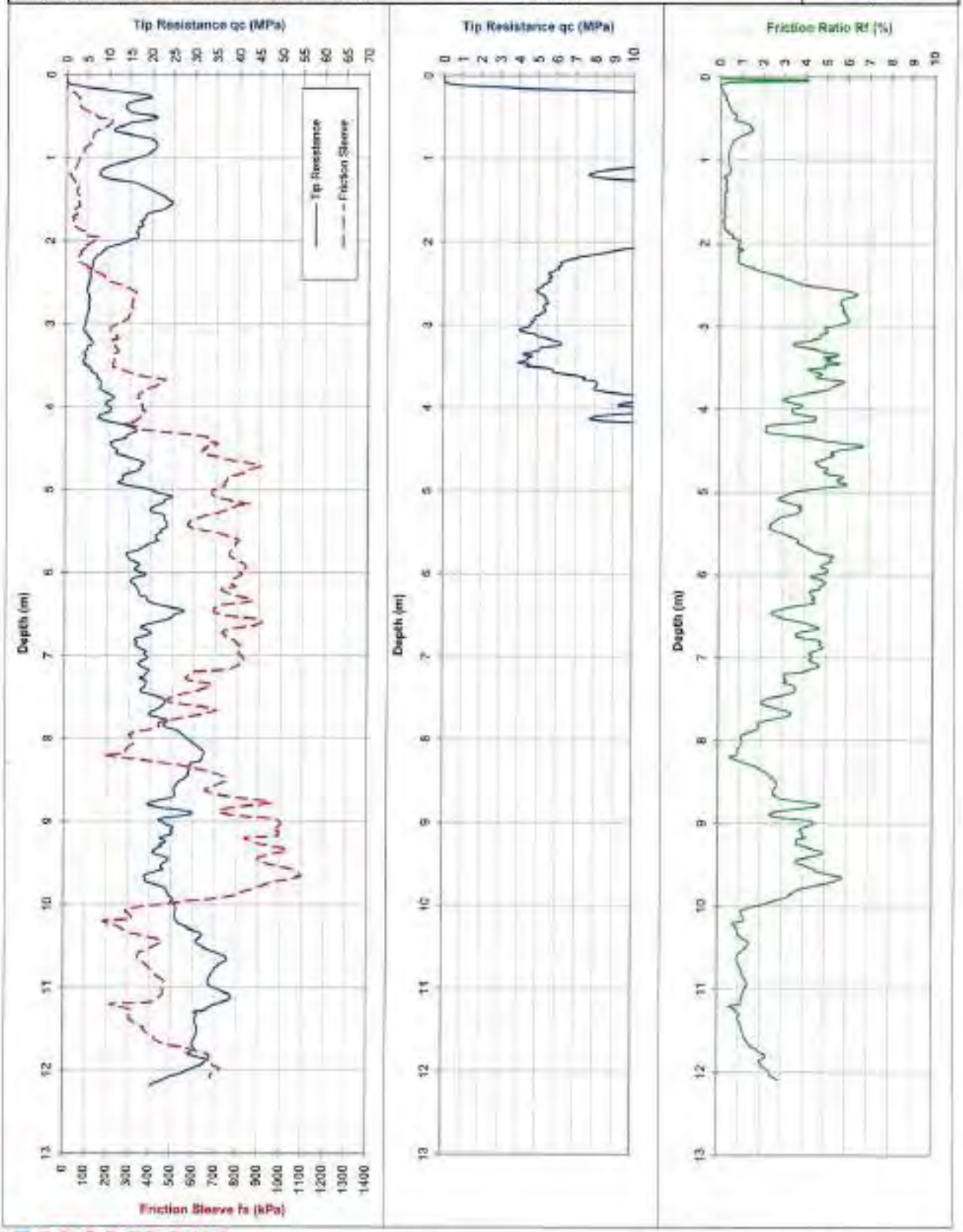
ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Logos Property Group	Job No.: J2201067	Probe I.D
PROJECT: Proposed Warehouses and Office Facilities	RL (m):	**CPT 01**
LOCATION: Part of Lot 150 Talbot Road Hazelmere	Co-ords:	10-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): Dry to 4.5

Dummy probe to (m): 0.3

Refusal:

Cone I.D.: EC07

File: GL0985R

Rig Type: 251 truck (RFW)

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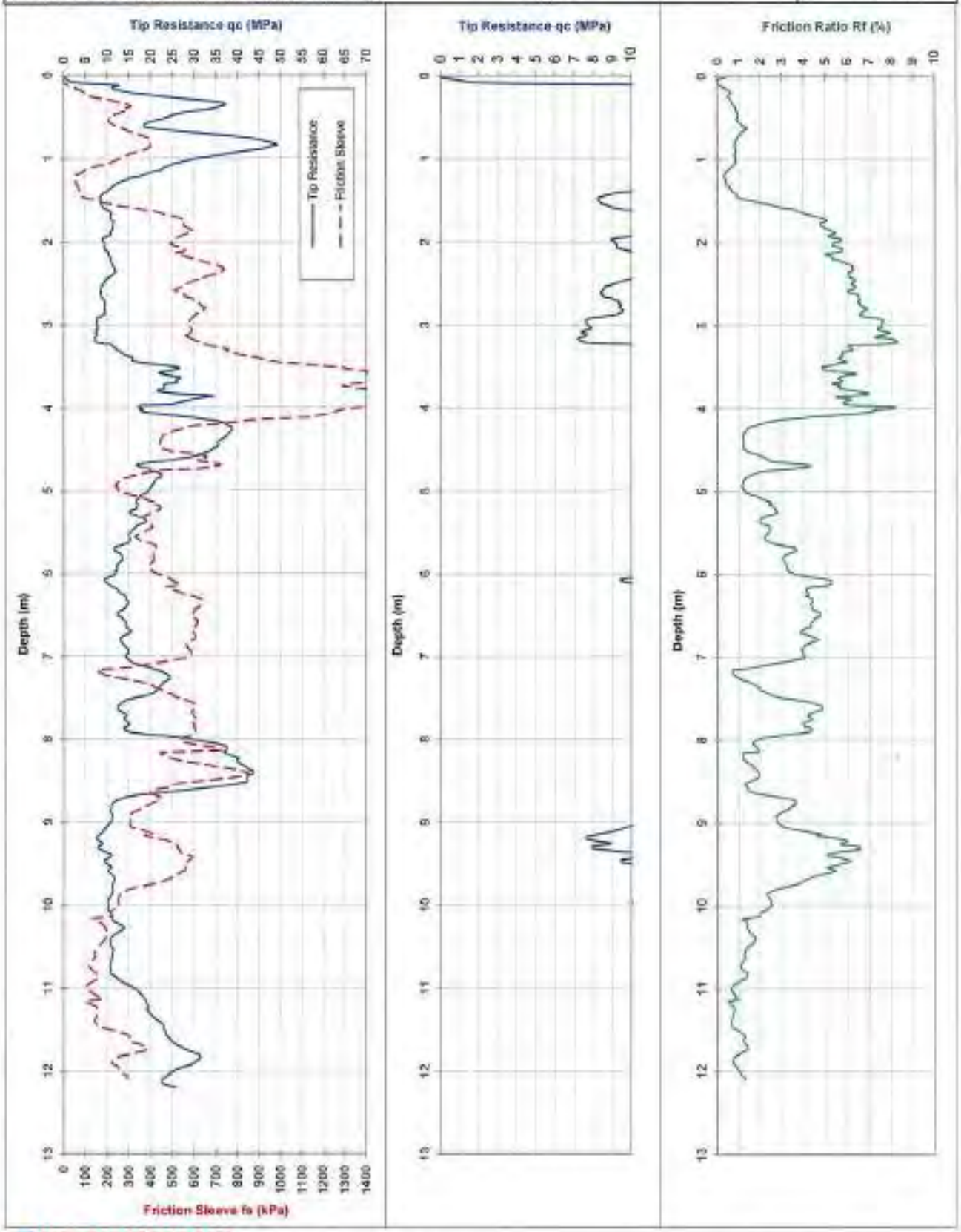
ELECTRIC FRICTION-CONE PENETROMETER

CLIENT:	Logos Property Group	Job No.: J2201067	Probe I.D
PROJECT:	Proposed Warehouses and Office Facilities	RL (m):	CPT 02
LOCATION:	Part of Lot 150 Talbot Road Hazelmere	Co-ords:	10-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): Dry to 6.5

Dummy probe to (m):

Refusal:

Cone I.D.: EC07

File: GL0966R

Rig Type: 25t truck (RFW)

Document Set ID: 7363023
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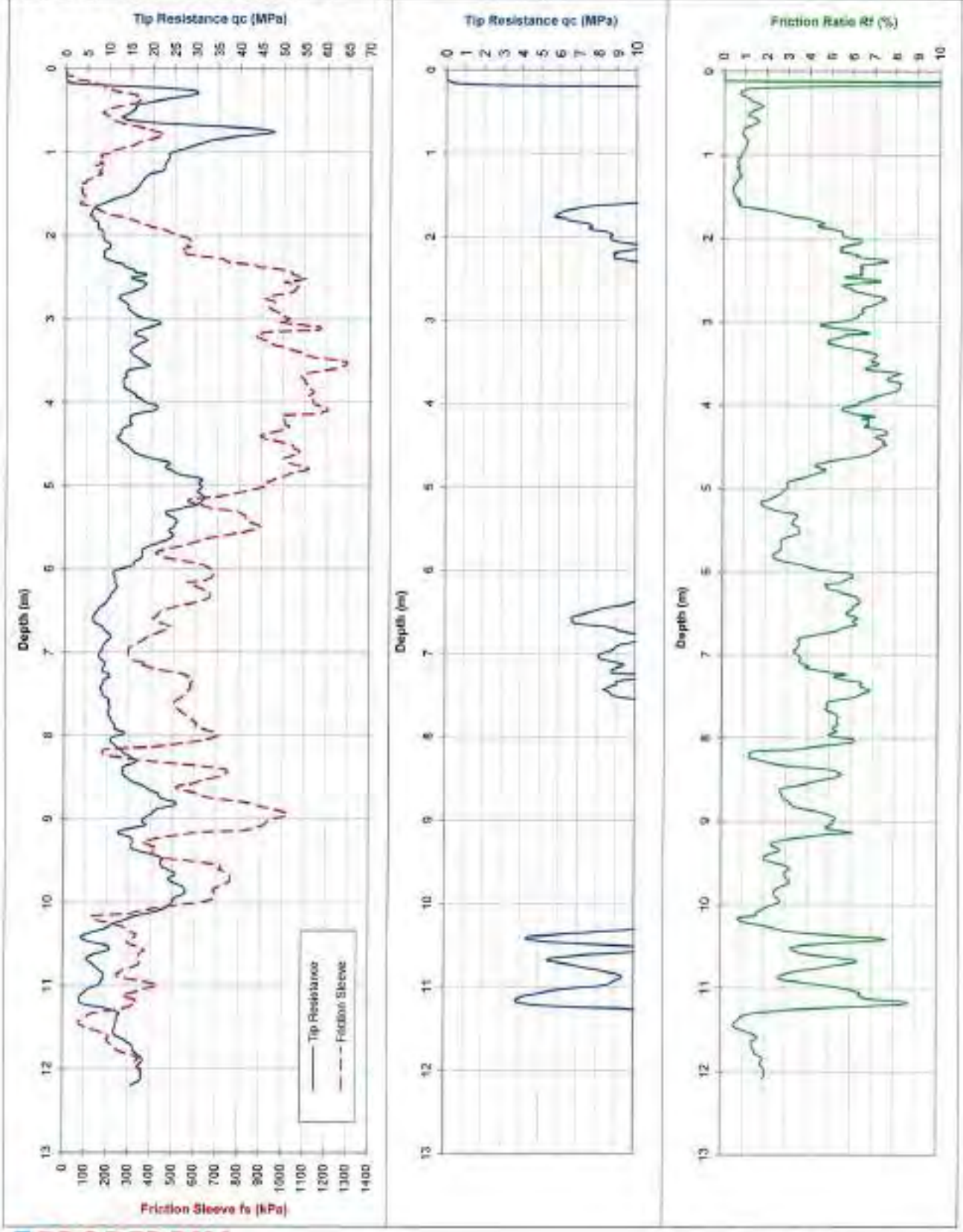
ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Logos Property Group	Job No.: J2201067	Probe I.D
PROJECT: Proposed Warehouses and Office Facilities	RL (m):	**CPT 03**
LOCATION: Part of Lot 150 Talbot Road Hazelmere	Co-ords:	10-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and ISTP 2001 for friction reducer

Approx. water (m): 6.4

Dummy probe to (m): 0.3

Refusal:

Cone I.D.: EC07

File: GL0990R

Rig Type: 25t truck (RFW)

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Version: 10, Version Date: 17/11/2022

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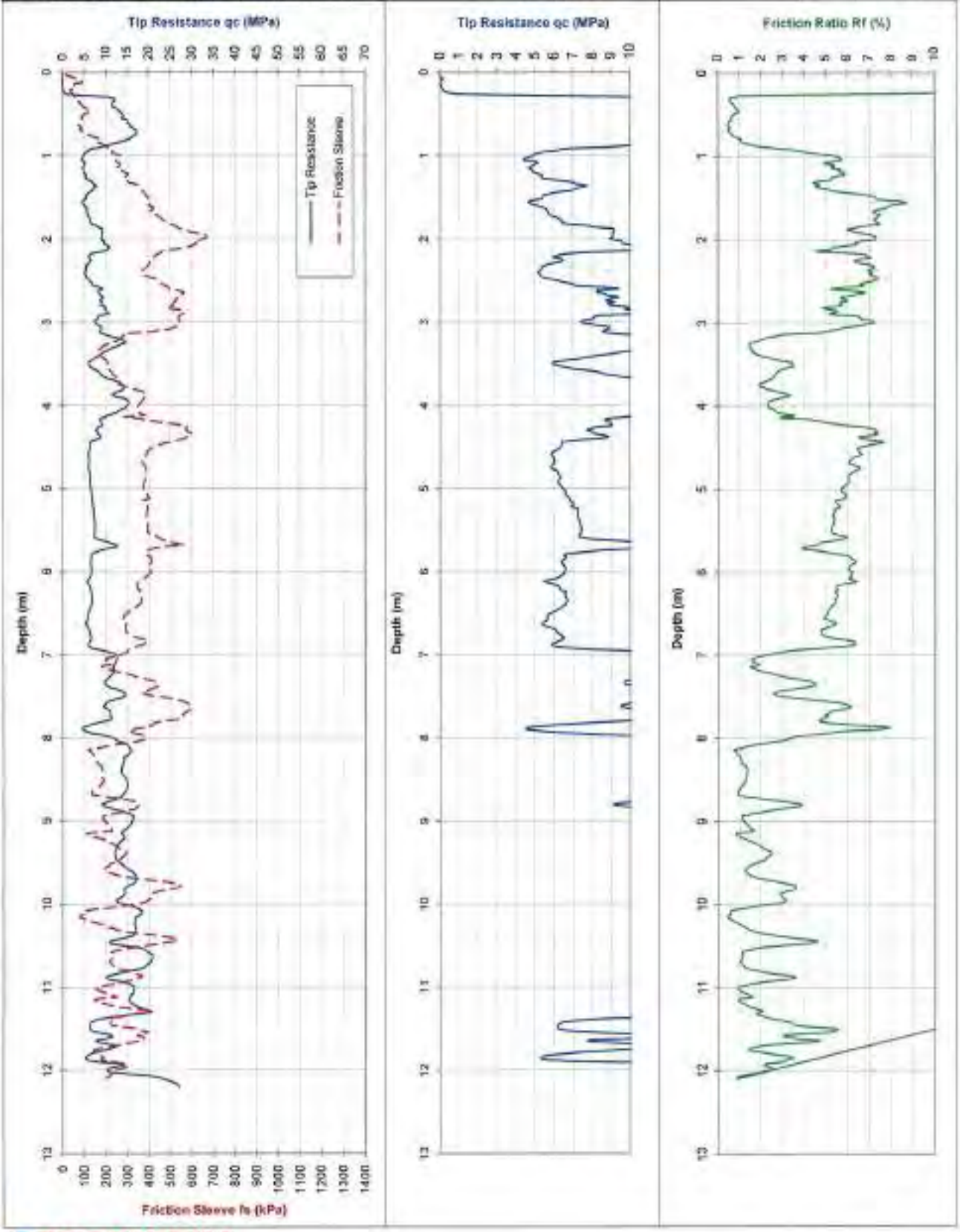
ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Logos Property Group	Job No.: J2201087	Probe I.D
PROJECT: Proposed Warehouses and Office Facilities	RL (m):	CPT 04
LOCATION: Part of Lot 150 Talbot Road Hazelmere	Co-ords:	10-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1998 and IRTP 2001 for friction reducer

Approx. water (m): 5.8

Dummy probe to (m): 0.3

Refusal

Cone I.D.: EC07

File: GL0988R

Rig Type: 25t truck (RFW)

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Version: 10, Version Date: 17/11/2022

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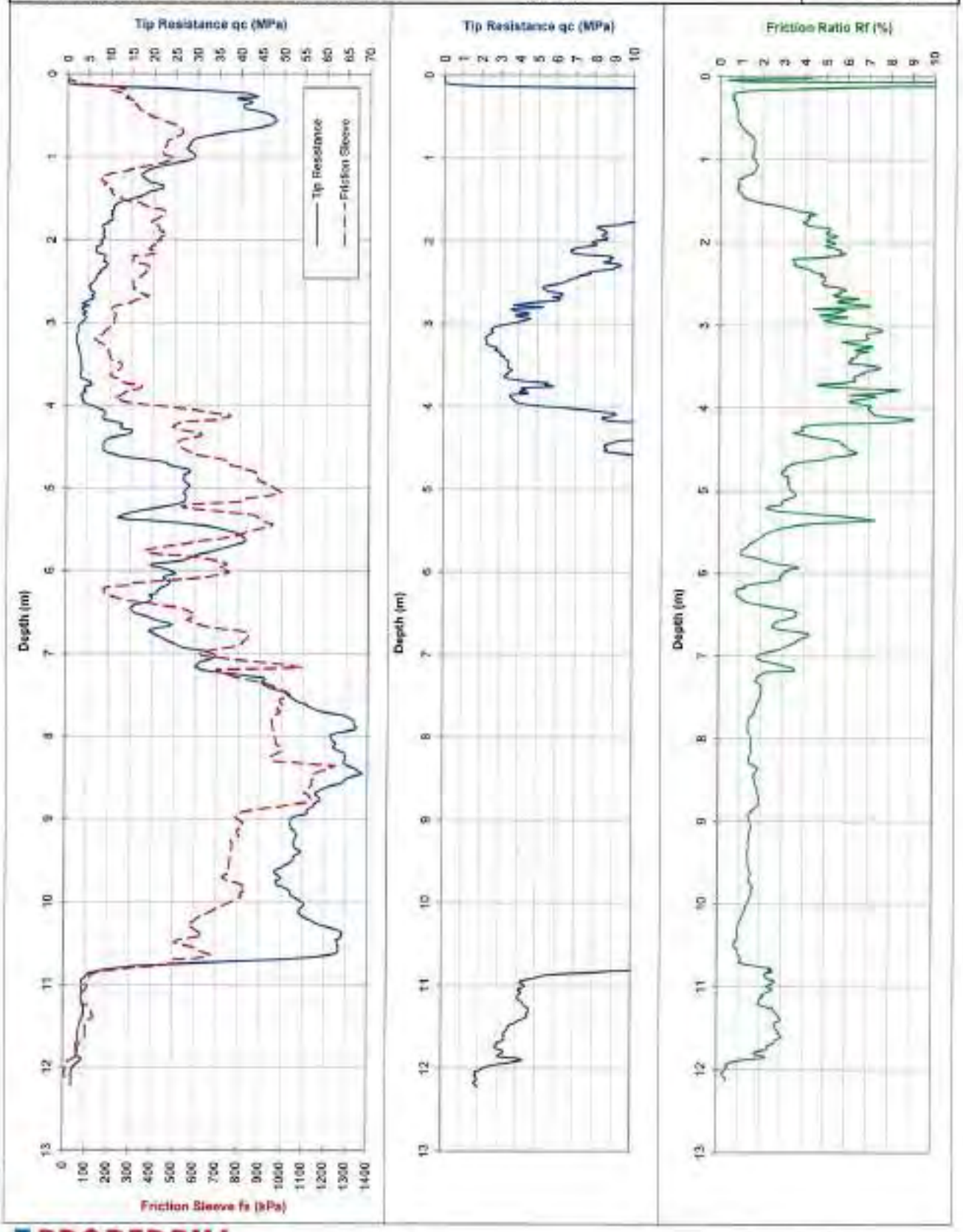
ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Logos Property Group	Job No.: J2201067	Probe I.D
PROJECT: Proposed Warehouses and Office Facilities	RL (m):	CPT 05
LOCATION: Part of Lot 150 Talbot Road Hazelmere	Co-ords:	10-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): 4.6

Dummy probe to (m): 0.3

Refusal

Cone I.D.: EC07

File: GL0988R

Rig Type: 25t truck (RFW)

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ELECTRIC FRICTION-CONE PENETROMETER

CLIENT: Logos Property Group

PROJECT: Proposed Warehouses and Office Facilities

LOCATION: Part of Lot 150 Talbot Road Hazelmere

Job No.: J2201067

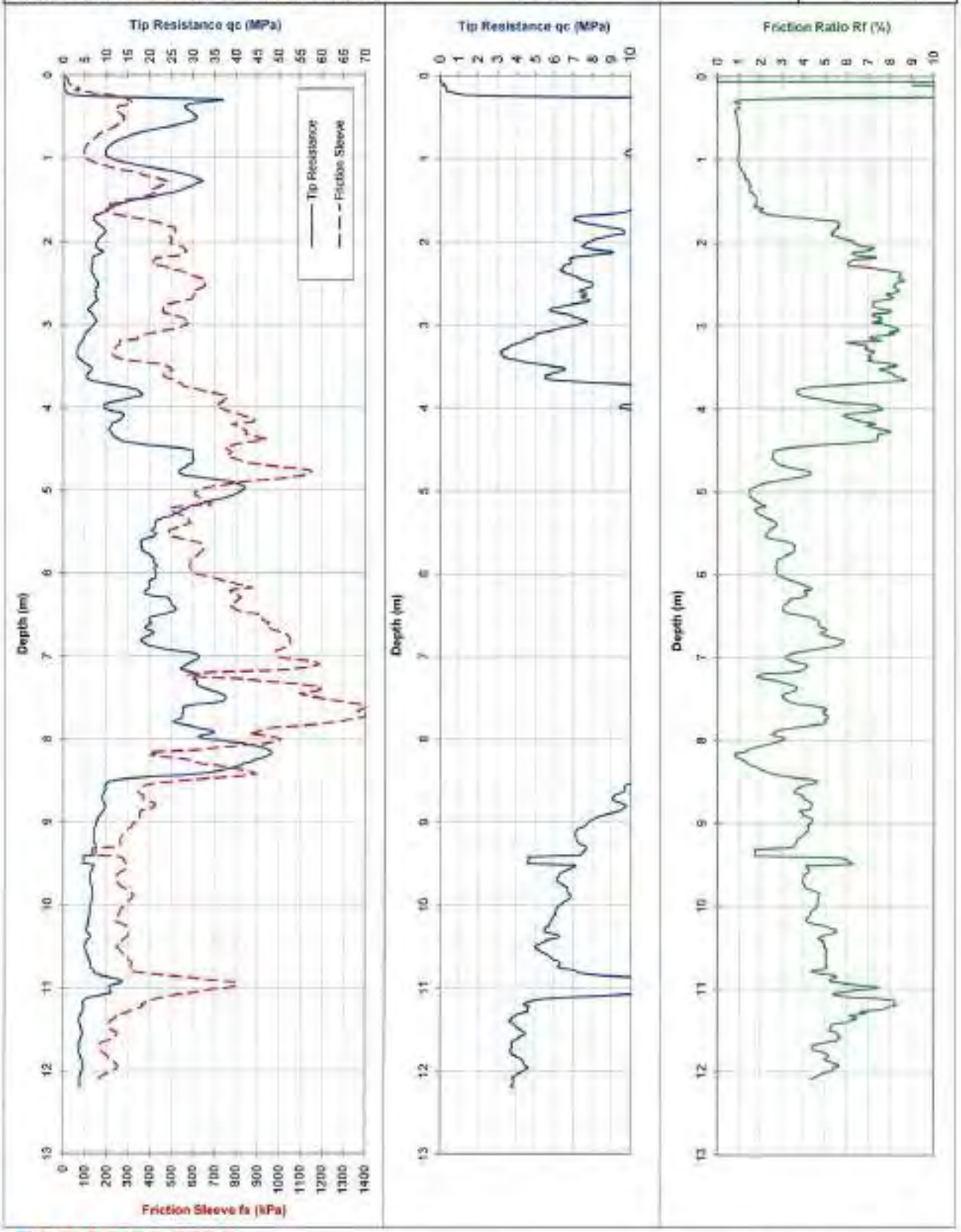
RL (m):

Co-ords:

Probe I.D

CPT 06

10-Mar-22



PROBEDRILL GEOTECHNICAL SURVEY

Tested in accordance with AS 1289.6.5.1-1999 and IRTP 2001 for friction reducer

Approx. water (m): 4.6

Dummy probe to (m): 0.3

Refusal:

Cone I.D.: EC07

File: GL0987R

Rig Type: 25t truck (RFW)

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Galt GEOTECHNICS

Appendix D: Machine Auger Borehole Reports

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EXPLANATORY NOTES TO BE READ WITH BOREHOLE AND TEST PIT REPORTS

Galt

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

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METHOD OF SOIL DESCRIPTION
BOREHOLE AND TEST PIT REPORTS

Galt

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%

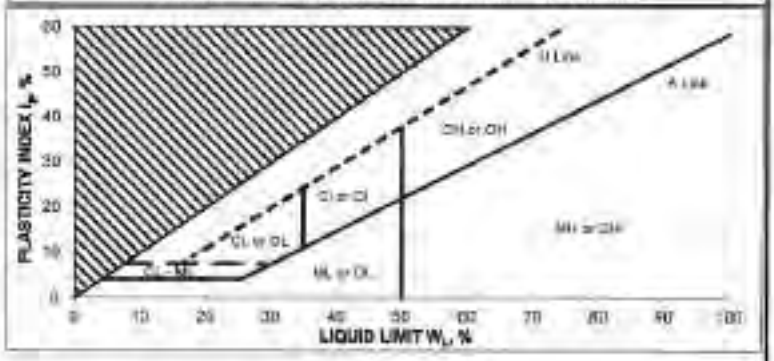
SOIL CLASSIFICATION AND INFERRED STRATIGRAPHY

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

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CITY OF SWAN
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BOREHOLE: MA01

Sheet 1 OF 1

Job Number:	J2201067	**Contractor:**	Galt	**Date:**	23/03/2022
Client:	Logos Property Group	**Drill Rig:**	Scout	**Logged:**	MDS
Project:	Proposed Warehouse and Office Facilities	**Inclination:**	-90°	**Checked Date:**	30/03/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/V			0.0					GP	FILL: Sandy GRAVEL, fine to coarse grained, sub-angular to angular, pale grey, with sand, trace fines	D		Hard stand
			0.5					SP	SAND: fine to coarse grained, sub-angular to sub-rounded, pale grey to off-white, trace fines	M	VD	
			1.0						Trace laterite gravel			
			1.5									
			2.0						Hole terminated at 2.00 m Target depth Groundwater not encountered			
			2.5									

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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BOREHOLE: MA02

Sheet 1 OF 1

Job Number:	J2201067	Contractor:	Galt	Date:	23/03/2022
Client:	Logos Property Group	Drill Rig:	Scout	Logged:	MDS
Project:	Proposed Warehouse and Office Facilities	Inclination:	-90°	Checked Date:	30/03/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			Checked By:	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV	F		0.0					GP	FILL: Sandy GRAVEL, fine to coarse grained, sub-angular to angular, pale grey, with sand, trace fines	D		
	E		0.5					SP	SAND: fine to coarse grained, sub-angular to sub-rounded, pale grey to off-white, trace fines	M	VD	
			1.0									
			1.5						Becoming pale brown			
			2.0						Hole terminated at 2.00 m Target depth Groundwater not encountered			
			2.5									

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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CITY OF CASEY
STATUTORY PLANNING
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Galt GEOTECHNICS

BOREHOLE: MA03

Sheet 1 OF 1

Job Number:	J2201067	**Contractor:**	Galt	**Date:**	23/03/2022
Client:	Logos Property Group	**Drill Rig:**	Scout	**Logged:**	MDS
Project:	Proposed Warehouse and Office Facilities	**Inclination:**	-90°	**Checked Date:**	30/03/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Drilling					Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV			0.0					SP	SAND: fine to medium grained, sub-angular to sub-rounded, pale yellow, trace fines	D	VD	
			0.5									
			1.0									
			1.5						Trace laterite gravel			
			2.0									
			2.5						Hole terminated at 2.45 m Target depth Groundwater not encountered			

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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CITY OF MARYBOROUGH
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BOREHOLE: MA04

Sheet 1 OF 1

Job Number:	J2201067	Contractor:	Galt	Date:	23/03/2022
Client:	Logos Property Group	Drill Rig:	Scout	Logged:	MDS
Project:	Proposed Warehouse and Office Facilities	Inclination:	-90°	Checked Date:	30/03/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			Checked By:	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV	E		0.0					SP	SAND: fine to medium grained, sub-angular to sub-rounded, pale grey to pale brown, trace gravel, trace fines	D	VD	
			0.5					GP	Sandy GRAVEL: fine to coarse grained, sub-angular to sub-rounded, brown/red, with sand, trace fines	M		
			1.0					CL-CI	Sandy CLAY: low to medium plasticity, brown, with sand, with laterite gravel			
			1.5									
			2.0						Hole terminated at 2.00 m Target depth Groundwater not encountered			
			2.5									

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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CITY OF SPRING
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Galt GEOTECHNICS

BOREHOLE: MA05

Job Number:	J2201067	**Contractor:**	Galt	**Date:**	23/03/2022
Client:	Logos Property Group	**Drill Rig:**	Scout	**Logged:**	MDS
Project:	Proposed Warehouse and Office Facilities	**Inclination:**	-90°	**Checked Date:**	30/03/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
NDV	H		0.0					GP-GM	FILL: Sandy GRAVEL, fine to coarse grained, sub-angular to sub-rounded, brown, with sand, with fines	D	VD	
			0.5					SP	SAND: fine to medium grained, sub-angular to sub-rounded, pale grey, trace gravel, trace fines	M		
			1.0									
			1.5					GP	Sandy GRAVEL: fine to coarse grained, sub-angular to sub-rounded, yellow-brown, laterite, with 30-50% fine to coarse grained sand, trace fines			
			2.0						Hole terminated at 2.00 m Target depth Groundwater not encountered			
			2.5									

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

CITY OF GOLD COAST DEVELOPMENT PLANNING
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BOREHOLE: MA06

Sheet 1 OF 1

Job Number:	J2201067	**Contractor:**	Galt	**Date:**	29/03/2022
Client:	Legos Property Group	**Drill Rig:**	Scout	**Logged:**	MDS
Project:	Proposed Warehouse and Office Facilities	**Inclination:**	-90°	**Checked Date:**	30/03/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AGW	m		0.0					SP-SM	FILL: SAND, fine to medium grained, sub-angular to sub-rounded, pale brown, with non-plastic fines, trace gravel			
			0.5					SP	SAND: fine to medium grained, sub-angular to sub-rounded brown, trace fines, trace gravel			
			1.0					SP	Gravelly SAND: fine to medium grained, sub-angular to sub-rounded, brown, with laterite gravel	D	D	
			1.5					GP	Sandy GRAVEL: fine to coarse grained, sub-rounded to rounded, brown, with sand, trace fines			
								CI	Gravelly CLAY: medium plasticity, brown, with fine to medium grained laterite gravel	M	H	
			2.0						Hole terminated at 2.00 m Target depth Groundwater not encountered			
			2.5									

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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BOREHOLE: MA07

Sheet 1 OF 1

Job Number:	J2201087	**Contractor:**	Galt	**Date:**	23/09/2022
Client:	Logos Property Group	**Drill Rig:**	Scout	**Logged:**	MDS
Project:	Proposed Warehouse and Office Facilities	**Inclination:**	-90°	**Checked Date:**	30/09/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV	F		0.0					GP	FILL: Sandy GRAVEL, fine to coarse grained, sub-rounded to angular pale grey to white, with sand, trace fines			
	F		0.5					SP	Gravelly SAND: fine to coarse grained, sub-angular to sub-rounded, pale brown, with laterite gravel, trace fines	D - M	D	
	F		1.0					GP	Sandy GRAVEL: fine to coarse grained, sub-rounded to rounded, laterite, with sand			
	F		1.5					GC-CH	Gravelly CLAY: medium to high plasticity, brown		H	
			2.0						Hole terminated at 2.00 m Target depth Groundwater not encountered			
			2.5									

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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BOREHOLE: MA08

Sheet 1 OF 1

Job Number:	J2201067	Contractor:	Galt	Date:	23/03/2022
Client:	Logos Property Group	Drill Rig:	Scout	Logged:	MDS
Project:	Proposed Warehouse and Office Facilities	Inclination:	-90°	Checked Date:	30/03/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			Checked By:	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV	F		0.0					GP	FILL: Sandy GRAVEL, fine to coarse grained, sub-rounded to angular, pale grey, with sand, trace fines	D		
			0.5					SP	Gravelly SAND: fine to coarse grained, pale grey to off-white, with sub-angular to sub-rounded gravel, trace fines	M	D - MD	
	m		1.0					GP	Sandy GRAVEL: fine to coarse grained, sub-rounded to rounded, pale brow, with sand, trace fines			
			1.5						Becoming brown			
			2.0						Hole terminated at 2.00 m Target depth Groundwater not encountered			
			2.5									

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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BOREHOLE: MA09

Sheet 1 OF 1

Job Number:	J2201097	**Contractor:**	Galt	**Date:**	23/09/2022
Client:	Logos Property Group	**Drill Rig:**	Scout	**Logged:**	MDS
Project:	Proposed Warehouse and Office Facilities	**Inclination:**	-90°	**Checked Date:**	30/09/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV	F E		0.0 0.5 1.0 1.5 2.0 2.5				GP GM SW GP CI CH		FILL: Sandy GRAVEL, fine to coarse grained, sub-angular to sub-rounded, brown, with sand, with fines SAND: fine to medium grained, brown to dark grey, trace gravel, trace fines Becoming pale grey Becoming brown to grey Sandy GRAVEL: fine to coarse grained, sub-angular to rounded, laterite, brown, with sand, trace fines Gravelly CLAY: medium to high plasticity, with laterite gravel, with sand Hole terminated at 2.00 m Target depth Groundwater not encountered	D M	D F	

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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BOREHOLE: MA10

Sheet 1 OF 1

Job Number:	J2201067	Contractor:	Galt	Date:	23/03/2022
Client:	Logos Property Group	Drill Rig:	Scout	Logged:	MDS
Project:	Proposed Warehouse and Office Facilities	Inclination:	-90°	Checked Date:	30/03/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			Checked By:	FAD

Drilling					Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/V	R		0.0					GP-GM	FILL: Sandy GRAVEL: fine to coarse grained, sub-angular to sub-rounded, brown, with sand, with low plasticity fines	D	D	
			0.5					SP	SAND: fine to medium grained, sub-angular to sub-rounded, pale grey to off-white, trace gravel, trace fines	M	D - MD	
	E		1.0					SP	Gravelly SAND: fine to medium grained, sub-angular to sub-rounded, dark grey, with laterite gravel, trace fines			
			1.5					GP	Sandy GRAVEL: fine to coarse grained, sub-rounded to rounded, laterite, dark brown, with sand, trace fines			
			2.0						Hole terminated at 2.00 m Target depth Groundwater not encountered			
			2.5									

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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BOREHOLE: MA11

Sheet 1 OF 1

Job Number:	J2201087	**Contractor:**	Galt	**Date:**	23/03/2022
Client:	Logos Property Group	**Drill Rig:**	Scout	**Logged:**	MDS
Project:	Proposed Warehouse and Office Facilities	**Inclination:**	-90°	**Checked Date:**	30/03/2022
Location:	Part of Lot 150 Talbot Road, Hazelmere			**Checked By:**	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY/ DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV			0.0					GP	FILL: Sandy GRAVEL: fine to coarse grained, sub-angular to angular, pale grey, with sand, trace fines	D		
			0.5					SP	SAND: fine to medium grained, sub-angular to sub-rounded, pale grey to pale brown, trace gravel, trace fines		D	
			1.0					SP	Gravelly SAND: fine to medium grained, sub-angular to sub-rounded, grey to pale brow, with laterite gravel, trace fines	M		
			1.5					CI-CH	Gravelly CLAY: medium to high plasticity, with laterite gravel, with sand		H	
			2.0						Hole terminated at 2.00 m Target depth Groundwater not encountered			
			2.5									

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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BOREHOLE: MA12

Sheet 1 OF 1

Job Number:	J2201067	**Contractor:**	Galt	**Date:**	23/03/2022
Client:	Logos Property Group	**Drill Rig:**	Scout	**Logged:**	MDS
Project:	Proposed Warehouse and Office Facilities	**Inclination:**	-90°	**Checked Date:**	30/03/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV	F		0.0					GP	FILL: Sandy GRAVEL, fine to coarse grained, sub-angular to angular, pale grey, with sand, trace non-plastic fines	D		
			0.5					SP	SAND: fine to medium grained, sub-angular to sub-rounded, pale grey becoming off-white, trace gravel, trace fines	M	D	
			1.0									
			1.5					SP	Gravelly SAND: fine to medium grained, sub-angular to sub-rounded, pale brown, with laterite gravel, trace fines			
			2.0						Hole terminated at 2.00 m Target depth Groundwater not encountered			
			2.5									

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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Appendix E: Direct Push Probe Borehole Reports

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EXPLANATORY NOTES TO BE READ WITH BOREHOLE AND TEST PIT REPORTS

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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

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METHOD OF SOIL DESCRIPTION
BOREHOLE AND TEST PIT REPORTS

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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%.

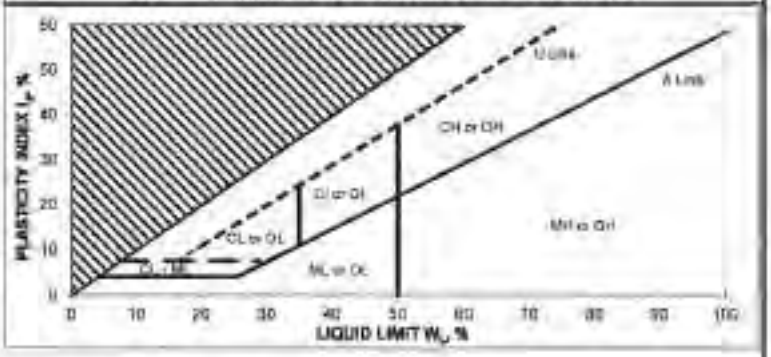
SOIL CLASSIFICATION AND INFERRED STRATIGRAPHY

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

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BOREHOLE: BH01

Sheet 1 OF 1

Job Number:	J2201067	**Contractor:**	DPP	**Date:**	17/03/2022
Client:	Logos Property Group	**Drill Rig:**	6620DT	**Logged:**	AM
Project:	Proposed Warehouses and Office Facilities	**Inclination:**	-90°	**Checked Date:**	12/04/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/V			0					SP	SAND: fine to medium grained, sub-angular to sub-rounded, pale brown, with gravel, trace fines			Moisture condition not observed
			1					GP	Sandy GRAVEL: fine to coarse grained, sub-angular to sub-rounded, grey, trace fines			
			2						Clayey SAND: fine to medium grained, sub-angular to sub-rounded, yellow, with gravel			
			3						Red/pale red, trace silt fines, trace gravel			
			4									
			5						Pale red			
			6					SC	Grey			
			7						Fine to medium grained, pale green, trace silt fines			
			8									
			9									
			10						Hole terminated at 10.00 m Target depth Groundwater encountered at 8.1 m			
			11									

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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BOREHOLE: BH02

Sheet 1 OF 1

Job Number:	J2201087	Contractor:	DPP	Date:	17/03/2022
Client:	Logos Property Group	Drill Rig:	6620DT	Logged:	AM
Project:	Proposed Warehouses and Office Facilities	Inclination:	-90°	Checked Date:	12/04/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			Checked By:	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AQW			0					SP	SAND: fine to medium grained, sub-angular to sub-rounded, yellow, trace fines, trace gravel. Brown-grey			Moisture condition not observed
			1					SP-SW	Gravelly SAND: fine to coarse grained, sub-angular to sub-rounded, pale brown, with fines			
			2					SC-SW	Clayey Gravelly SAND: fine to coarse grained, sub-angular to sub-rounded, pale brown			
			3					SC	Clayey SAND: fine to medium grained, sub-angular to sub-rounded, pale brown mottled red, 25-35% fines, trace gravel. Trace gravel			
			4						Clayey SAND: fine to medium grained, sub-angular to sub-rounded, grey, 20-30% fines			
			5									
			6									
			7					SC	Pale yellow			
			8						Fine to medium grained sand			
			9						Grey			
			10						Pale brown mottled grey, 20-35% fines			
			11						Hole terminated at 10.00 m Target depth Groundwater encountered at 7.38 m			

Sketch & Other Observations



Comments:

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BOREHOLE: BH03

Sheet 1 OF 1

Job Number:	J2201067	Contractor:	DPP	Date:	18/03/2022
Client:	Logos Property Group	Drill Rig:	8820DT	Logged:	AM
Project:	Proposed Warehouses and Office Facilities	Inclination:	-90°	Checked Date:	12/04/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			Checked By:	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV		▼	0					SP	SAND: fine to medium grained, sub-angular to sub-rounded, pale yellow, trace gravel, trace fines Yellow			Moisture condition not observed
			1						With gravel			
			2					SC	Clayey SAND: fine to coarse grained, sub-angular to sub-rounded, red, with fine to coarse grained gravel			
			3									
			4									
			5						Grey, trace gravel			
			6									
			7									
			8					CL	Sandy CLAY: medium to high plasticity, grey, fine to medium grained sand			
			9						Hole terminated at 9.00 m Target depth Groundwater encountered at 4.5 m			
			10									
			11									

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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BOREHOLE: BH04

Sheet 1 OF 1

Job Number:	J2201087	Contractor:	DPP	Date:	18/03/2022
Client:	Logos Property Group	Drill Rig:	6620DT	Logged:	AM
Project:	Proposed Warehouses and Office Facilities	Inclination:	-90°	Checked Date:	12/04/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			Checked By:	FAD

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	SOIL CLASS	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
ADV		▼	0					SP	SAND: fine to medium grained, sub-angular to sub-rounded, grey, with gravel, trace fines			Moisture condition not observed
			1						Pale grey, trace gravel			
									Brown, with fines			
			2					SP-SM	Gravelly SAND: fine to medium grained, sub-angular to sub-rounded, brown, with fines			
								GP	Sandy GRAVEL: fine to coarse grained, sub-angular to sub-rounded, pale red/brown, with fines			
			3					SC	Clayey SAND: fine to coarse grained, sub-angular to sub-rounded, pale red, approximately 25-35% fines, with gravel			
			4									
			5									
			6									
			7									
			8					CH	Sandy CLAY: medium to high plasticity, grey, fine to medium grained sand			
									Pale green mottled grey, with nodules of sandy clay			
			9					CI	Sandy CLAY: medium plasticity, red mottled pale grey Hole terminated at 9.00 m Target depth Groundwater encountered at 5.60 m			
			10									
			11									

Sketch & Other Observations



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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Appendix F: Groundwater Monitoring Well Construction Reports

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GROUNDWATER MONITORING BORE: MW01

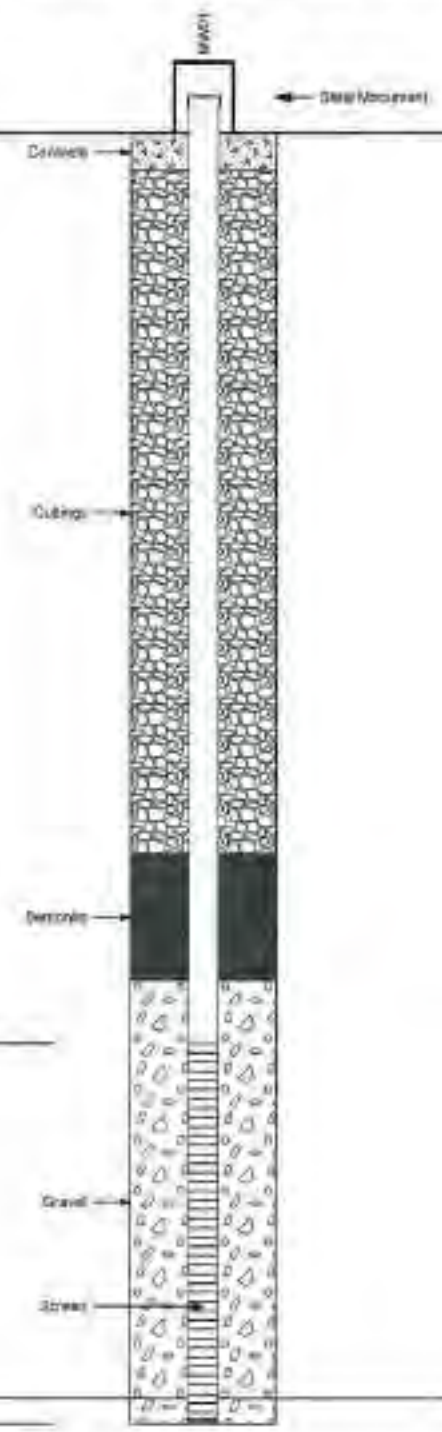
Sheet 1 OF 1

Job Number:	J2201067	Contractor:	DPP	Date:	17/03/2022
Client:	Logos Property Group	Drill Rig:	6620DT	Logged:	AM
Project:	Proposed Warehouses and Office Facilities	Inclination:	-90°	Checked Date:	12/04/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			Checked By:	FAD

Method	Ground Water	Depth (m)	Elevation (m AHD)	Graphic Log	Soil / Rock Description
AD/V		0			SAND: fine to medium grained, sub-angular to sub-rounded, pale brown, with gravel, trace fines
					Sandy GRAVEL: fine to coarse grained, sub-angular to sub-rounded, grey, trace fines
		2			Clayey SAND: fine to medium grained, sub-angular to sub-rounded, yellow, with gravel
					Red/pale red, trace silt fines, trace gravel
		4			Pale red
		6			Grey
		8			Fine to medium grained, pale green, trace silt fines
		10			Hole terminated at 10.02 m Target depth Groundwater encountered at 6.1 m

WELL INSTALLATION DETAILS

ID:	MW01	Stick Up & RL:	0.56 m
Type:	Standpipe	Tip Depth & RL:	10.20 m
Installation Date:	16/03/2022	Static Water Level:	NA



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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GROUNDWATER MONITORING BORE: MW02

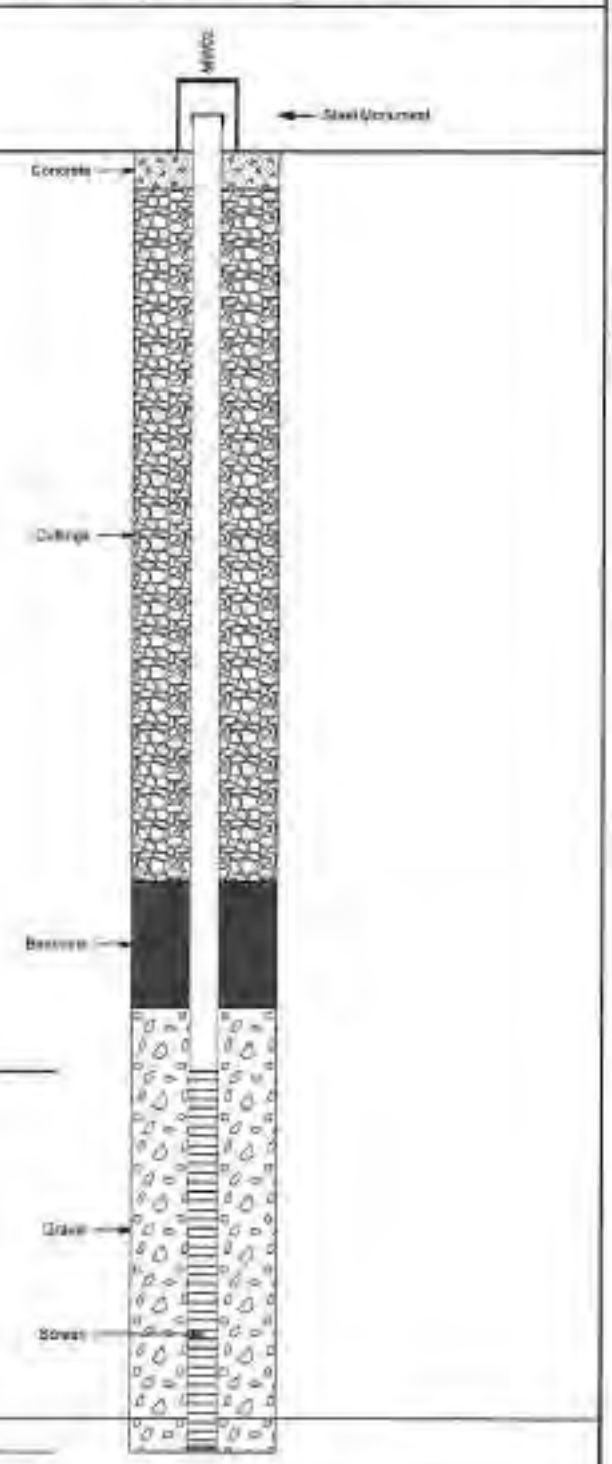
Sheet 1 OF 1

Job Number:	J2201067	Contractor:	DPP	Date:	17/03/2022
Client:	Logos Property Group	Drill Rig:	6620DT	Logged:	AM
Project:	Proposed Warehouses and Office Facilities	Inclination:	-90°	Checked Date:	12/04/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			Checked By:	FAD

Method	Ground Water	Depth (m)	Elevation (m AHD)	Graphic Log	Soil / Rock Description
AGV		0			SAND: fine to medium grained, sub-angular to sub-rounded, yellow, trace fines, trace gravel
					Brown-grey
		2			Gravelly SAND: fine to coarse grained, sub-angular to sub-rounded, pale brown, with fines
					Clayey Gravelly SAND: fine to coarse grained, sub-angular to sub-rounded, pale brown
		4			Clayey SAND: fine to medium grained, sub-angular to sub-rounded, pale brown mottled red, 25-35% fines, with gravel
					Trace gravel
		6			Clayey SAND: fine to medium grained, sub-angular to sub-rounded, grey, 20-30% fines
					Pale yellow
		8			Fine to medium grained sand
					Grey
		10			Pale brown/mottled grey, 20-35% fines
					Hole terminated at 10.00 m Target depth Groundwater encountered at 7.28 m

WELL INSTALLATION DETAILS

ID:	MW02	Stick Up & RL:	0.55 m
Type:	Standpipe	Tip Depth & RL:	10.28 m
Installation Date:	17/03/2022	Static Water Level:	NA



Comments:

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GROUNDWATER MONITORING BORE: MW03

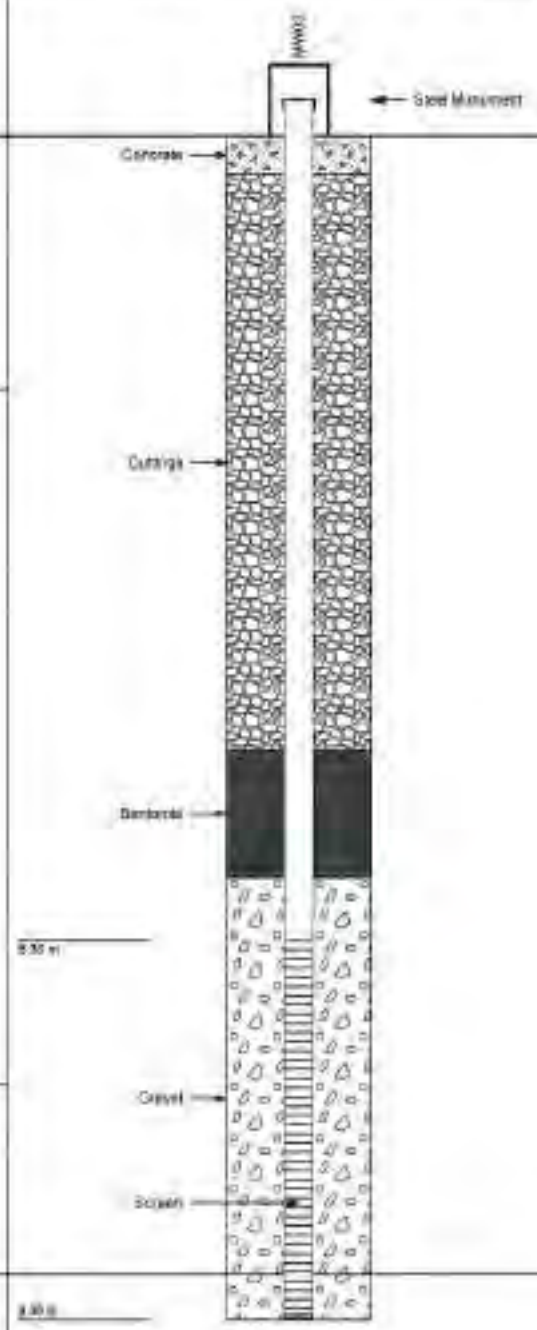
Sheet 1 OF 1

Job Number:	J2201067	Contractor:	DPP	Date:	16/03/2022
Client:	Logos Property Group	Drill Rig:	6620DT	Logged:	AM
Project:	Proposes Warehouses and Office Facilities	Inclination:	-90°	Checked Date:	12/04/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			Checked By:	FAD

Method	Ground Water	Depth (m)	Elevation (m AHD)	Graphic Log	Soil / Rock Description
AUW	K	0			SAND: fine to medium grained, sub-angular to sub-rounded, pale yellow, trace gravel, trace fines
					Yellow
					With gravel
		2			Clayey SAND: fine to coarse grained, sub-angular to sub-rounded, red, with fine to coarse grained gravel
		4			Grey, trace gravel
		6			
		8			Sandy CLAY: medium to high plasticity, grey, fine to medium grained sand
		10			Hole terminated at 9.00 m Target depth Groundwater encountered at 4.3 m

WELL INSTALLATION DETAILS

ID:	MW03	Stick Up & RL:	0.60 m
Type:	Standpipe	Tip Depth & RL:	9.36 m
Installation Date:	16/03/2022	Static Water Level:	NA



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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GROUNDWATER MONITORING BORE: MW04

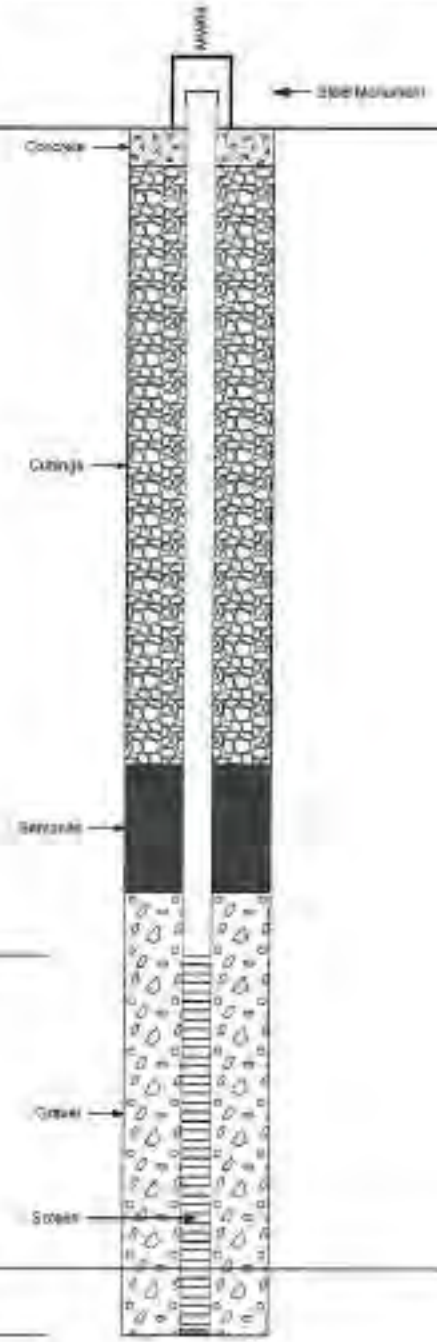
Sheet 1 OF 1

Job Number:	J2201087	**Contractor:**	DPP	**Date:**	18/03/2022
Client:	Logos Property Group	**Drill Rig:**	6620DT	**Logged:**	AM
Project:	Proposed Warehouses and Office Facilities	**Inclination:**	-90°	**Checked Date:**	12/04/2022
Location:	Part of Lot 153 Talbot Road, Hazelmere			**Checked By:**	FAD

Method	Ground Water	Depth (m)	Elevation (m AHD)	Graphic Log	Soil / Rock Description
ADV		0			SAND: fine to medium grained, sub-angular to sub-rounded, grey, with gravel, trace fines
					Pale grey, trace gravel
		2			Brown, with fines
					Gravelly SAND: fine to medium grained, sub-angular to sub-rounded, brown, with fines
		4			Sandy GRAVEL: fine to coarse grained, sub-angular to sub-rounded, pale red/brown, with fines
					Clayey SAND: fine to coarse grained, sub-angular to sub-rounded, pale red, approximately 20-30% fines, with gravel
		6			
		8			Sandy CLAY: medium to high plasticity, grey, fine to medium grained sand
					Pale green mottled grey, with nodules of sandy clay
					Sandy CLAY: medium plasticity, red mottled pale grey
		10			Hole terminated at 9.00 m Target depth Groundwater encountered at 5.63 m

WELL INSTALLATION DETAILS

ID:	MW04	**Stick Up & RL:**	0.63 m
Type:	Standpipe	**Tip Depth & RL:**	8.53 m
Installation Date:	18/03/2022	**Static Water Level:**	NA



Comments:

See Explanatory Notes and Method of Soil Description sheets for details of abbreviations and basis of descriptions

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Appendix G: Infiltration Test Results

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Hydraulic Conductivity Calculation - Inverse Auger Hole Method

Galt Geotechnics

Spreadsheet author:	ORW	17-Oct-09

Job No: J2201067
Client: Logos Property Group
Project: Warehouse
Location: Hazelmere
Calc by: AM
BH Name: IT 01
Test Depth: 1.54 m

$$K = 1.15r\,\frac{\log_{10}(h_0 + \frac{1}{2}r) - \log_{10}(h_t + \frac{1}{2}r)}{t - t_0}$$

REFERENCE: Gibbs, G. *Disposal of Stormwater Runoff by Soakage in Perth Western Australia*, Journal and News of the Australian Geomechanics Society, Volume 42 No 3 September 2007, pp101-114

Spreadsheet Legend

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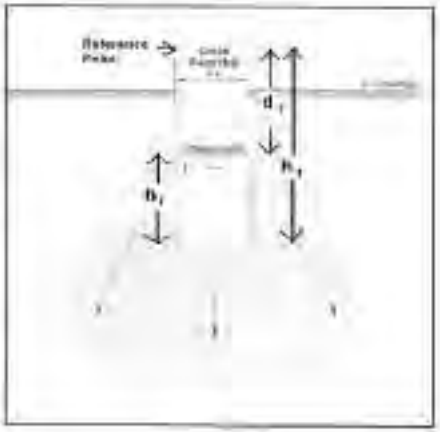
	Comment field
	Field not used
	Fixed field

Parameter	Description	Value	Units
K	Hydraulic Conductivity		m/s
r	radius of test hole	0.05	m
t	time since start of measurement		s
h_r	reference point height above base	2.1	m
d_t	depth from reference point to water at time t		m
h_t	Water column height at time t		m
h_0	h_t at t=0		m



Test 1

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	0.967	1.133		
10	1.125	0.975	3.7E-04	31.7
20	1.284	0.816	4.0E-04	34.5
30	1.421	0.679	4.1E-04	35.8
40	1.496	0.602	3.8E-04	33.1
50	1.520	0.580	3.2E-04	28.0
60	1.588	0.512	3.2E-04	27.6
70	1.602	0.498	2.8E-04	24.5
80	1.629	0.471	2.6E-04	22.9
90	1.660	0.440	2.5E-04	21.9
100	1.682	0.418	2.4E-04	20.7
110	1.707	0.393	2.3E-04	20.0
120	1.724	0.376	2.2E-04	19.1
130	1.754	0.346	2.2E-04	18.9
140	1.770	0.330	2.1E-04	18.2
150	1.789	0.311	2.1E-04	17.8
		AVERAGE	2.9E-04	25.0

Test 2

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.021	1.079		
20	1.241	0.859	2.8E-04	24.0
40	1.366	0.734	2.3E-04	20.2
60	1.448	0.652	2.0E-04	17.5
80	1.448	0.652	1.5E-04	13.2
100	1.484	0.616	1.4E-04	11.7
120	1.539	0.561	1.3E-04	11.4
140	1.554	0.546	1.2E-04	10.2
160	1.574	0.526	1.1E-04	9.4
180	1.582	0.518	9.8E-05	8.5
200	1.614	0.486	9.6E-05	8.3
220	1.631	0.469	9.1E-05	7.9
240	1.648	0.452	8.7E-05	7.5
260	1.645	0.455	8.0E-05	6.9
		AVERAGE	1.4E-04	12.1

Test 3

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.367	0.733		
20	1.417	0.683	8.5E-05	7.4
40	1.453	0.647	7.5E-05	6.5
60	1.515	0.585	9.0E-05	7.8
80	1.545	0.555	8.4E-05	7.2
100	1.544	0.556	6.6E-05	5.7
120	1.578	0.522	6.8E-05	5.9
140	1.594	0.506	6.3E-05	5.5
160	1.606	0.494	5.9E-05	5.1
180	1.616	0.484	5.5E-05	4.8
200	1.649	0.451	5.8E-05	5.0
220	1.661	0.439	5.6E-05	4.8
240	1.675	0.425	5.4E-05	4.7
260	1.696	0.404	5.5E-05	4.7
280	1.690	0.410	5.0E-05	4.3
300	1.701	0.399	4.8E-05	4.2
320	1.719	0.381	4.9E-05	4.2
340	1.726	0.374	4.7E-05	4.1
360	1.733	0.367	4.6E-05	4.0
		AVERAGE	6.2E-05	5.3

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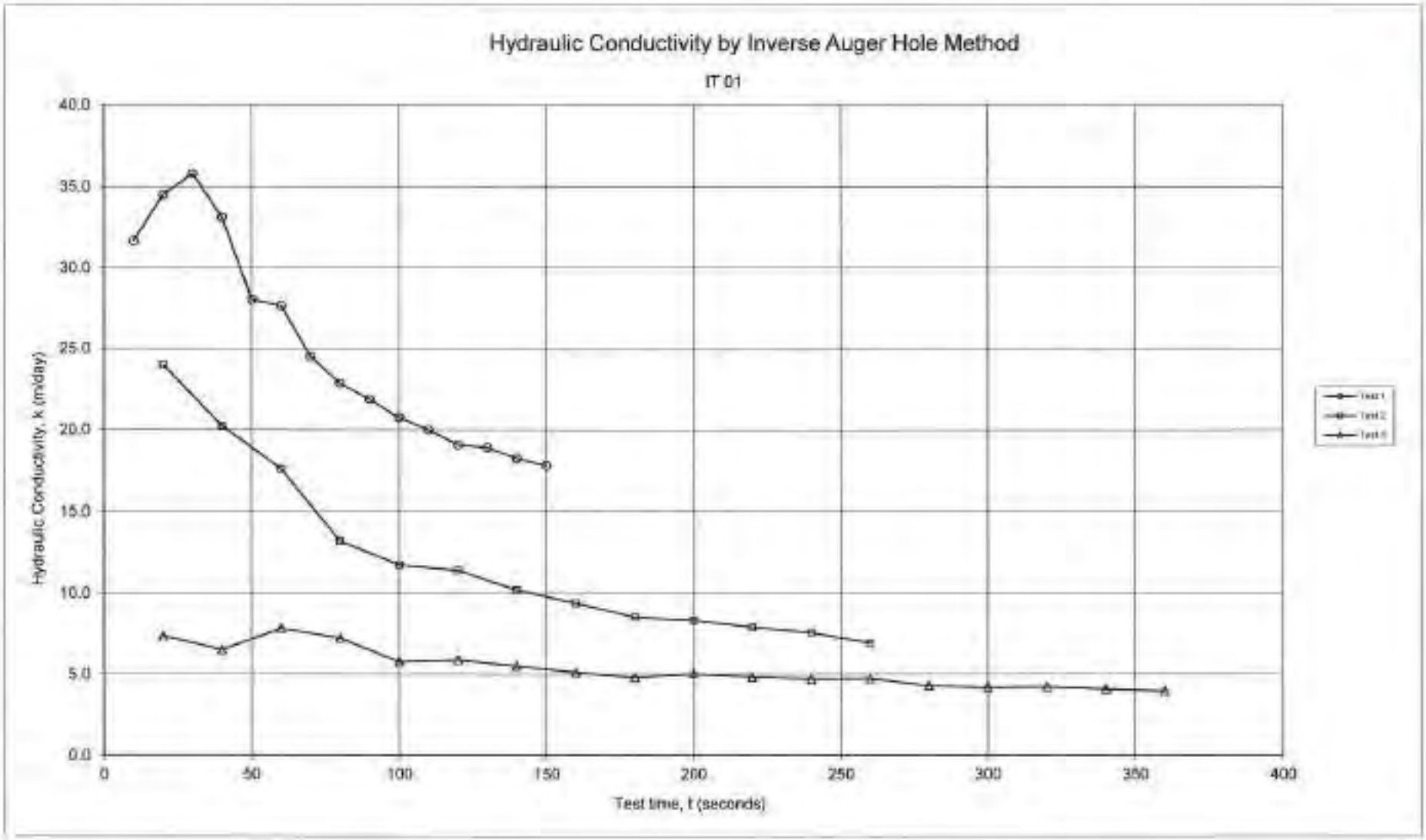

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Hydraulic Conductivity Calculation - Inverse Auger Hole Method

Galt Geotechnics

Job No:	J2201067
Client:	Logos Property Group
Project:	Warehouse
Location:	Hazelmere
Calc by:	AM
BH Name:	IT 02
Test Depth:	1.65 m

Spreadsheet author: ORW 17-Oct-09

$$K = 1.15r\,\frac{\log_{10}(h_0 + \frac{1}{2}r) - \log_{10}(h_t + \frac{1}{2}r)}{t - t_0}$$

REFERENCE: Cocks, G. *Disposal of Stormwater Runoff by Soakage in Perth Western Australia*, Journal and News of the Australian Geomechanics Society, Volume 42 No 3 September 2007, pp101-114

Spreadsheet Legend

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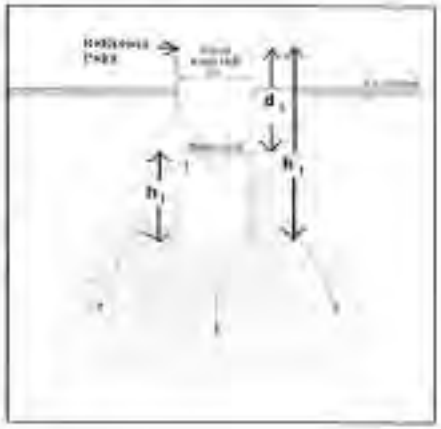
	Calculated field
	Comment field
	Field not used
	Fixed field

Parameter	Description	Value	Units
K	Hydraulic Conductivity		m/s
r	radius of test hole	0.05	m
t	time since start of measurement		s
h_t	reference point height above base	2.1	m
d_t	depth from reference point to water at time t		m
h_t	Water column height at time t		m
h_0	h_t at t=0		m



Test 1

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.047	1.053		
20	1.310	0.790	3.5E-04	30.2
40	1.547	0.553	3.9E-04	33.6
60	1.619	0.481	3.1E-04	27.2
80	1.738	0.362	3.2E-04	27.6
100	1.786	0.314	2.9E-04	25.0
120	1.824	0.276	2.7E-04	22.9
140	1.876	0.222	2.6E-04	22.7
160	1.918	0.182	2.6E-04	22.3
180	1.924	0.176	2.3E-04	20.1
200	1.949	0.151	2.3E-04	19.6
220	2.004	0.096	2.5E-04	21.4
240	2.012	0.088	2.3E-04	20.3
260	2.036	0.064	2.4E-04	20.7
280	2.051	0.049	2.4E-04	20.6
300	2.072	0.028	2.5E-04	21.7
320	2.076	0.024	2.4E-04	20.8
340	2.076	0.024	2.3E-04	19.5
360	2.097	0.003	2.5E-04	21.9
		AVERAGE	2.7E-04	23.2

Test 2

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.437	0.663		
20	1.508	0.592	1.4E-04	11.8
40	1.543	0.557	1.0E-04	9.0
60	1.586	0.514	1.0E-04	8.8
80	1.618	0.482	9.5E-05	8.2
100	1.647	0.453	9.1E-05	7.9
120	1.697	0.403	9.9E-05	8.5
140	1.713	0.387	9.1E-05	7.9
160	1.736	0.364	8.9E-05	7.7
180	1.756	0.344	8.6E-05	7.5
200	1.778	0.322	8.5E-05	7.4
220	1.796	0.304	8.4E-05	7.2
240	1.807	0.293	8.0E-05	6.9
260	1.818	0.282	7.8E-05	6.7
280	1.826	0.274	7.4E-05	6.4
300	1.838	0.262	7.3E-05	6.3
320	1.853	0.247	7.2E-05	6.3
340	1.867	0.233	7.2E-05	6.2
360	1.878	0.222	7.1E-05	6.1
		AVERAGE	8.8E-05	7.6

Test 3

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.011	1.089		
20	1.075	1.025	7.4E-05	6.4
40	1.079	1.021	3.9E-05	3.4
60	1.153	0.947	5.7E-05	4.9
80	1.186	0.914	5.3E-05	4.6
100	1.223	0.877	5.3E-05	4.6
120	1.260	0.840	5.3E-05	4.5
140	1.325	0.775	5.9E-05	5.1
160	1.346	0.754	5.6E-05	4.8
180	1.397	0.703	5.9E-05	5.1
200	1.420	0.680	5.7E-05	4.9
220	1.448	0.652	5.7E-05	4.9
240	1.463	0.637	5.4E-05	4.7
260	1.489	0.611	5.4E-05	4.7
280	1.507	0.593	5.3E-05	4.5
300	1.536	0.564	5.3E-05	4.6
320	1.558	0.542	5.3E-05	4.6
340	1.571	0.529	5.1E-05	4.4
360	1.592	0.508	5.1E-05	4.4
		AVERAGE	5.5E-05	4.7

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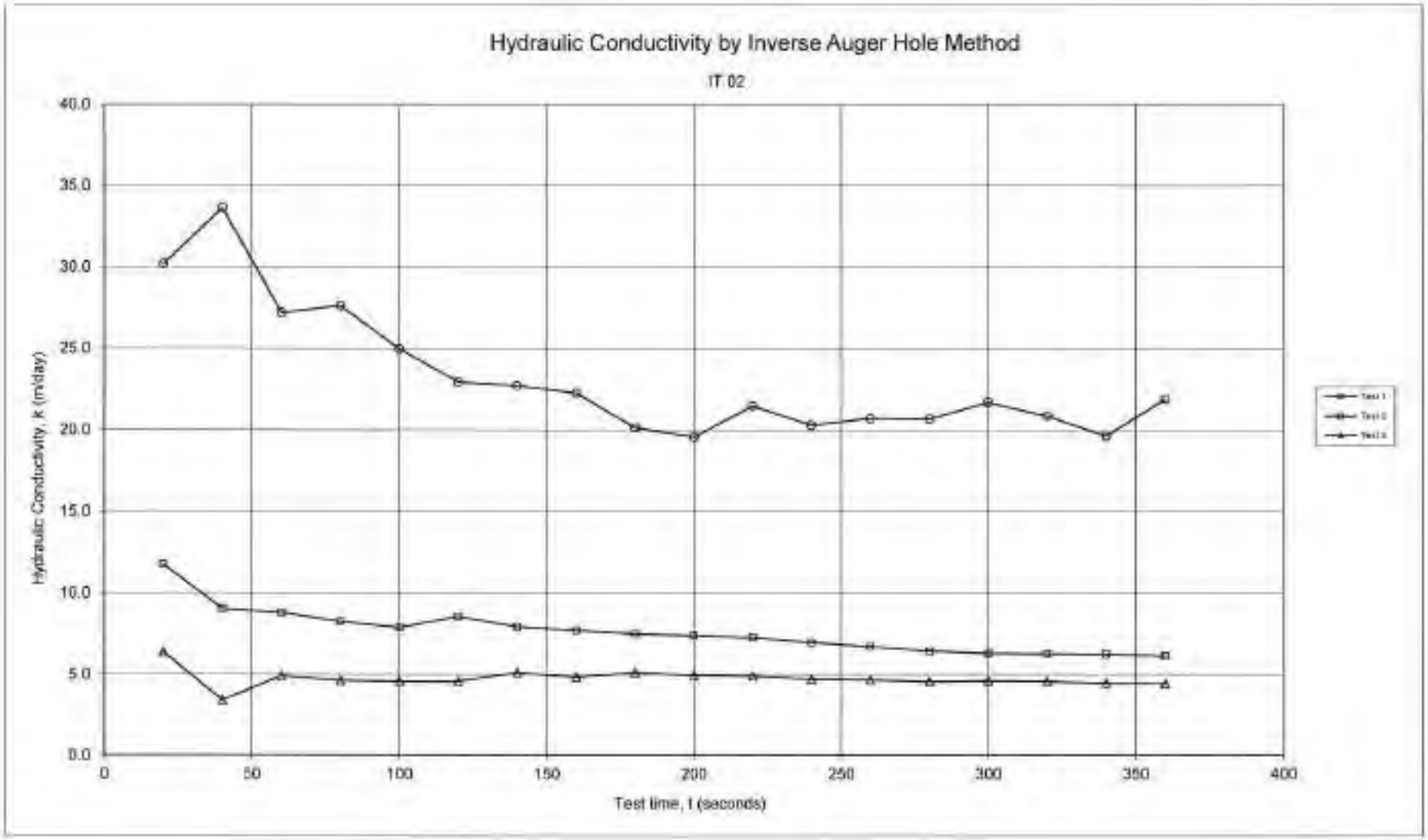

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Hydraulic Conductivity Calculation - Inverse Auger Hole Method

Galt Geotechnics

Job No:	J2201067
Client:	Logos Property Group
Project:	Warehouse
Location:	Hazelmere
Calc by:	AM
BH Name:	IT 03
Test Depth:	1.55 m

Spreadsheet author:	ORW	17-Oct-09

$$K = 1.15r\frac{\log_{10}(h_0 + \frac{1}{2}r) - \log_{10}(h_t + \frac{1}{2}r)}{t - t_0}$$

REFERENCE: Cocks, G. *Disposal of Stormwater Runoff by Soakage in Perth Western Australia*, Journal and News of the Australian Geomechanics Society, Volume 42 No 3 September 2007, pp101-114

Spreadsheet Legend

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	Comment field
	Field not used
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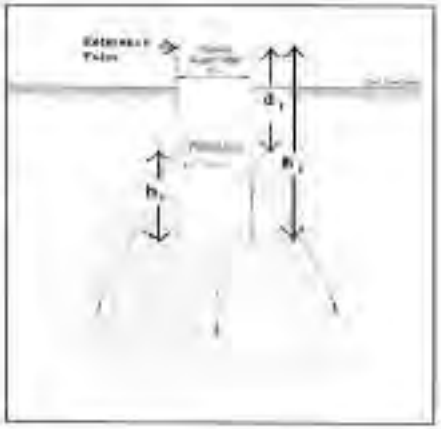
Parameter	Description	Value	Units
K	Hydraulic Conductivity		m/s
r	radius of test hole	0.05	m
t	time since start of measurement		s
h_t	reference point height above base	2.1	m
d_t	depth from reference point to water at time t		m
h_t	Water column height at time t		m
h_0	h_t at t=0		m



Test 1

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	0.975	1.125		
20	1.396	0.704	5.7E-04	49.2
40	1.538	0.562	4.2E-04	36.3
60	1.608	0.492	3.3E-04	28.7
80	1.651	0.449	2.6E-04	23.9
100	1.737	0.363	2.7E-04	23.4
120	1.782	0.318	2.5E-04	21.8
140	1.786	0.314	2.2E-04	18.8
160	1.824	0.276	2.1E-04	18.1
180	1.872	0.228	2.1E-04	18.1
200	1.917	0.183	2.1E-04	18.4
220	1.930	0.170	2.0E-04	17.4
		AVERAGE	2.9E-04	24.9

Test 2

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	0.929	1.171		
20	1.267	0.833	4.1E-04	35.8
40	1.459	0.641	3.7E-04	31.5
60	1.576	0.524	3.2E-04	28.0
80	1.607	0.493	2.6E-04	22.6
100	1.668	0.432	2.4E-04	20.8
120	1.719	0.381	2.2E-04	19.4
140	1.767	0.333	2.2E-04	18.6
160	1.817	0.283	2.1E-04	18.3
180	1.878	0.222	2.2E-04	18.9
200	1.880	0.220	2.0E-04	17.1
220	1.928	0.172	2.0E-04	17.7
240	1.928	0.172	1.9E-04	16.2
260	1.928	0.172	1.7E-04	15.0
280	1.989	0.111	1.9E-04	16.8
300	1.965	0.135	1.7E-04	14.5
		AVERAGE	2.4E-04	20.7

Test 3

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	0.957	1.143		
20	1.190	0.910	2.6E-04	24.0
40	1.361	0.739	2.7E-04	22.9
60	1.478	0.622	2.5E-04	21.2
80	1.586	0.512	2.4E-04	21.0
100	1.591	0.509	2.0E-04	16.9
120	1.666	0.434	1.9E-04	16.6
140	1.761	0.339	2.1E-04	18.0
160	1.767	0.333	1.8E-04	15.9
180	1.810	0.290	1.8E-04	15.7
200	1.873	0.227	1.9E-04	16.5
220	1.856	0.244	1.7E-04	14.4
240	1.863	0.237	1.6E-04	13.4
260	1.892	0.208	1.5E-04	13.4
280	2.033	0.067	2.3E-04	19.6
		AVERAGE	2.1E-04	17.8

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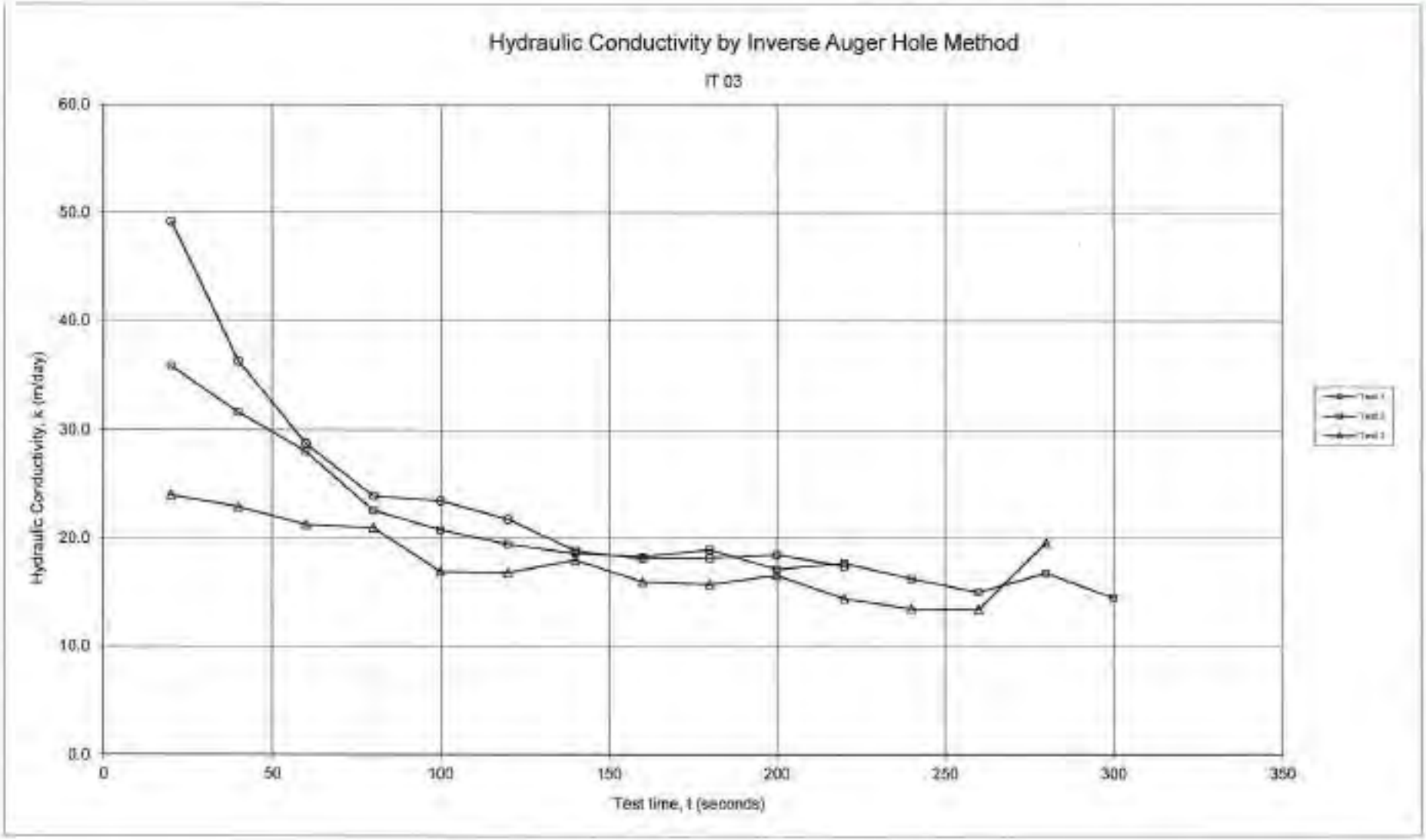

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Hydraulic Conductivity Calculation - Inverse Auger Hole Method

Galt Geotechnics

Spreadsheet author:	DRW	17-Oct-09	

Job No: J2201067
Client: Logos Property Group
Project: Warehouse
Location: Hazelmere
Calc by: AM
BH Name: IT 04
Test Depth: 1.70 m

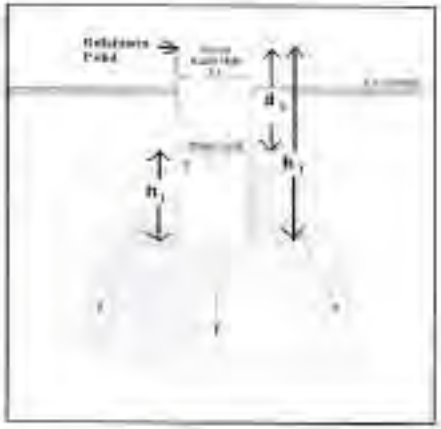
$$K = 1.15r \frac{\log_{10}(h_0 + \frac{1}{2}r) - \log_{10}(h_t + \frac{1}{2}r)}{t - t_0}$$

REFERENCE: Cocks, G. *Disposal of Stormwater Runoff by Soakage in Perth Western Australia*, Journal and News of the Australian Geomechanics Society, Volume 42 No 3 September 2007, pp101-114

Spreadsheet Legend

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

Parameter	Description	Value	Units
K	Hydraulic Conductivity	X	m/s
r	radius of test hole	0.05	m
t	time since start of measurement	X	s
h_r	reference point height above base	2.1	m
d_t	depth from reference point to water at time t	X	m
h_t	Water column height at time t	X	m
h_0	h_t at t=0	X	m



Test 1

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.623	0.477	X	X
20	1.780	0.320	4.7E-04	40.5
40	1.845	0.255	3.6E-04	31.5
60	1.885	0.215	3.1E-04	26.5
80	1.904	0.196	2.6E-04	22.1
100	1.924	0.176	2.3E-04	19.7
120	1.942	0.158	2.1E-04	18.1
140	1.956	0.144	1.9E-04	16.8
160	1.970	0.130	1.8E-04	15.8
180	1.978	0.122	1.7E-04	14.7
200	1.999	0.101	1.7E-04	14.9
220	2.015	0.085	1.7E-04	14.9
240	2.016	0.084	1.6E-04	13.7
260	2.031	0.069	1.6E-04	13.9
280	2.050	0.050	1.7E-04	14.6
300	2.061	0.039	1.7E-04	14.8
320	2.072	0.028	1.8E-04	15.2
340	2.081	0.019	1.8E-04	15.4
360	2.092	0.008	1.9E-04	16.3
		AVERAGE	2.2E-04	18.9

Test 2

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.294	0.806	X	X
20	1.464	0.636	2.9E-04	24.7
40	1.568	0.532	2.5E-04	21.6
60	1.628	0.472	2.1E-04	18.5
80	1.682	0.418	2.0E-04	17.0
100	1.694	0.406	1.6E-04	14.2
120	1.724	0.376	1.5E-04	13.1
140	1.745	0.355	1.4E-04	12.1
160	1.763	0.337	1.3E-04	11.2
180	1.776	0.324	1.2E-04	10.4
200	1.793	0.307	1.1E-04	9.9
220	1.801	0.299	1.1E-04	9.2
240	1.810	0.290	1.0E-04	8.7
260	1.821	0.279	9.7E-05	8.3
280	1.827	0.273	9.1E-05	7.9
		AVERAGE	1.3E-04	13.3

Test 3

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.636	0.464	X	X
20	1.660	0.440	6.3E-05	5.4
40	1.683	0.417	6.3E-05	5.5
60	1.702	0.398	6.0E-05	5.2
80	1.714	0.386	5.4E-05	4.7
100	1.728	0.371	5.3E-05	4.6
120	1.749	0.351	5.5E-05	4.7
140	1.774	0.326	5.9E-05	5.1
160	1.777	0.323	5.3E-05	4.6
180	1.782	0.318	4.9E-05	4.3
200	1.795	0.306	4.9E-05	4.2
220	1.809	0.291	5.0E-05	4.3
240	1.813	0.287	4.7E-05	4.0
260	1.822	0.278	4.6E-05	4.0
280	1.829	0.271	4.5E-05	3.9
300	1.844	0.256	4.6E-05	4.0
320	1.846	0.252	4.4E-05	3.8
340	1.849	0.251	4.2E-05	3.6
360	1.866	0.234	4.4E-05	3.8
		AVERAGE	5.1E-05	4.4

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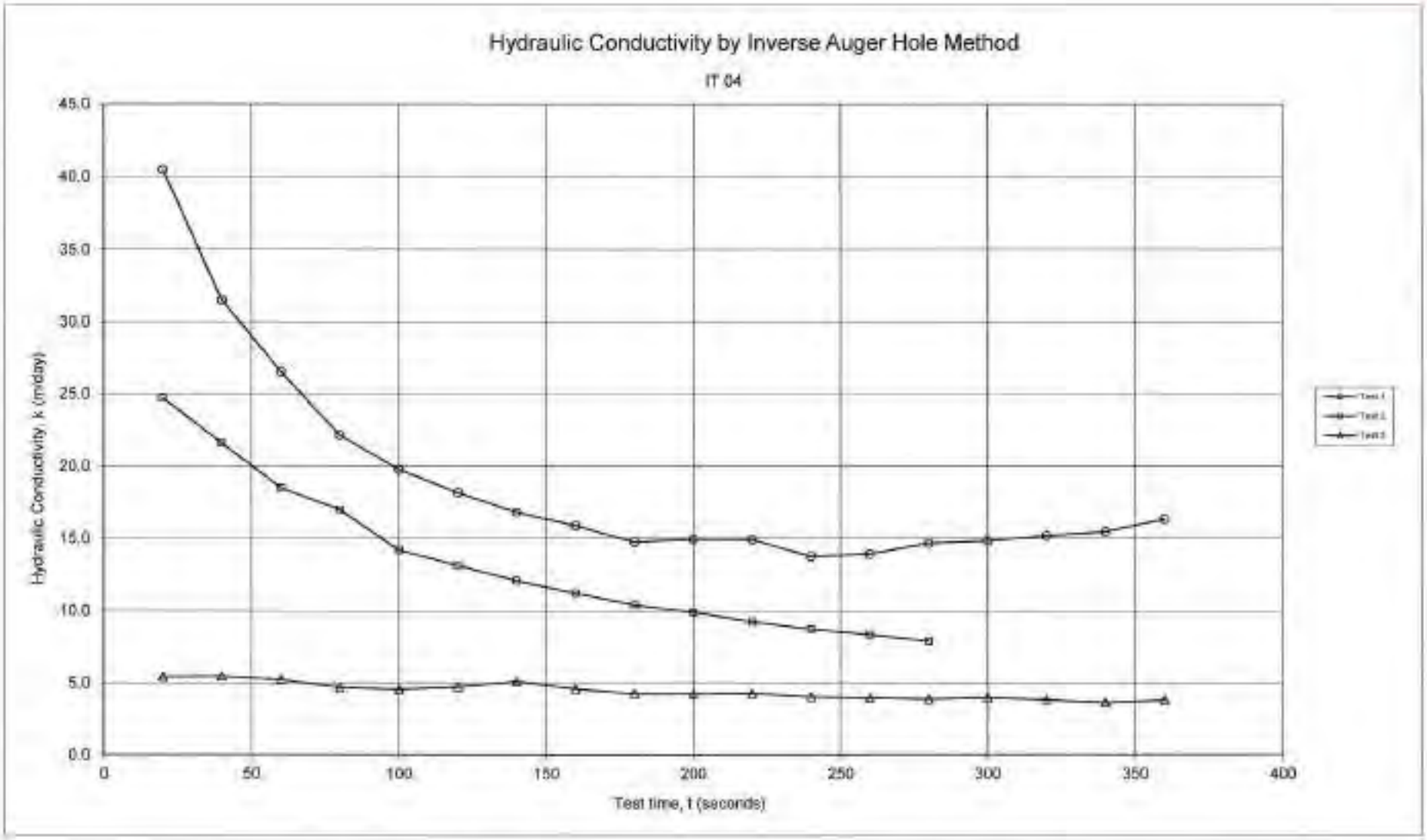

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Hydraulic Conductivity Calculation - Inverse Auger Hole Method

Galt Geotechnics

Spreadsheet author	ORW	17-Oct-09

$$K = 1.15r\frac{\log_{10}(h_0 + \frac{1}{2}r) - \log_{10}(h_t + \frac{1}{2}r)}{t - t_0}$$

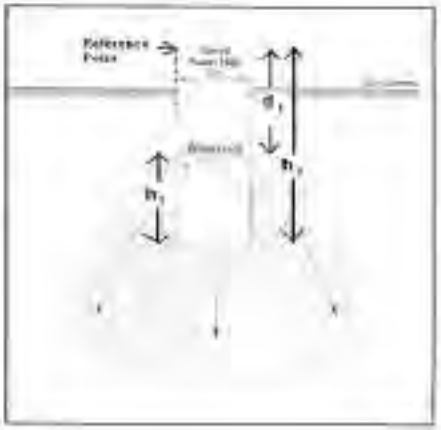
REFERENCE: Cocka, G. *Disposal of Stormwater Runoff by Soakage in Perth Western Australia*. Journal and News of the Australian Geomechanics Society. Volume 42 No 3 September 2007. pp101-114

Job No:	J2201067
Client:	Logos Property Group
Project:	Warehouse
Location:	Hazelmere
Calc by:	AM
BH Name:	IT 35
Test Depth:	1.35 m

Spreadsheet Legend

	Required input
	Calculated field
	Comment field
	Field not used
	Fixed field

Parameter	Description	Value	Units
K	Hydraulic Conductivity		m/s
r	radius of test hole	0.05	m
t	time since start of measurement		s
h_r	reference point height above base	2.1	m
d_t	depth from reference point to water at time t		m
h_t	Water column height at time t		m
h_0	h_t at t=0		m



Test 1

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.926	0.174		
20	1.927	0.173	8.3E-06	0.5
40	1.943	0.157	5.6E-05	4.8
60	1.947	0.153	4.6E-05	4.0
80	1.951	0.149	4.2E-05	3.6
100	1.956	0.144	4.1E-05	3.5
120	1.958	0.142	3.6E-05	3.2
140	1.973	0.127	4.8E-05	4.2
160	1.972	0.128	4.1E-05	3.5
180	1.980	0.120	4.4E-05	3.8
200	1.982	0.118	4.1E-05	3.6
220	1.991	0.109	4.5E-05	3.9
240	2.000	0.100	4.8E-05	4.2
260	1.992	0.108	3.9E-05	3.3
280	2.001	0.099	4.2E-05	3.6
300	2.004	0.096	4.1E-05	3.6
320	2.019	0.081	4.9E-05	4.2
340	2.018	0.082	4.6E-05	3.9
360	2.02	0.08	4.4E-05	3.8
		AVERAGE	4.2E-05	3.6

Test 2

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.760	0.340		
20	1.774	0.326	4.9E-05	4.2
40	1.790	0.310	5.4E-05	4.6
60	1.803	0.297	5.2E-05	4.5
80	1.815	0.285	5.1E-05	4.4
100	1.826	0.274	5.0E-05	4.3
120	1.838	0.262	5.0E-05	4.3
140	1.843	0.257	4.6E-05	4.0
160	1.852	0.248	4.5E-05	3.9
180	1.874	0.226	5.2E-05	4.5
200	1.873	0.227	4.6E-05	4.0
220	1.888	0.212	4.9E-05	4.2
		AVERAGE	4.9E-05	4.3

Test 3

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.694	0.406		
20	1.713	0.387	5.6E-05	4.9
40	1.736	0.364	6.4E-05	5.6
60	1.758	0.342	6.7E-05	5.8
80	1.766	0.334	5.7E-05	4.9
100	1.782	0.318	5.7E-05	4.9
120	1.804	0.296	6.1E-05	5.3
140	1.813	0.287	5.8E-05	5.0
160	1.814	0.286	5.1E-05	4.4
180	1.833	0.267	5.4E-05	4.7
200	1.842	0.258	5.3E-05	4.5
220	1.853	0.247	5.2E-05	4.5
240	1.859	0.241	5.0E-05	4.3
260	1.872	0.228	5.1E-05	4.4
		AVERAGE	5.6E-05	4.9

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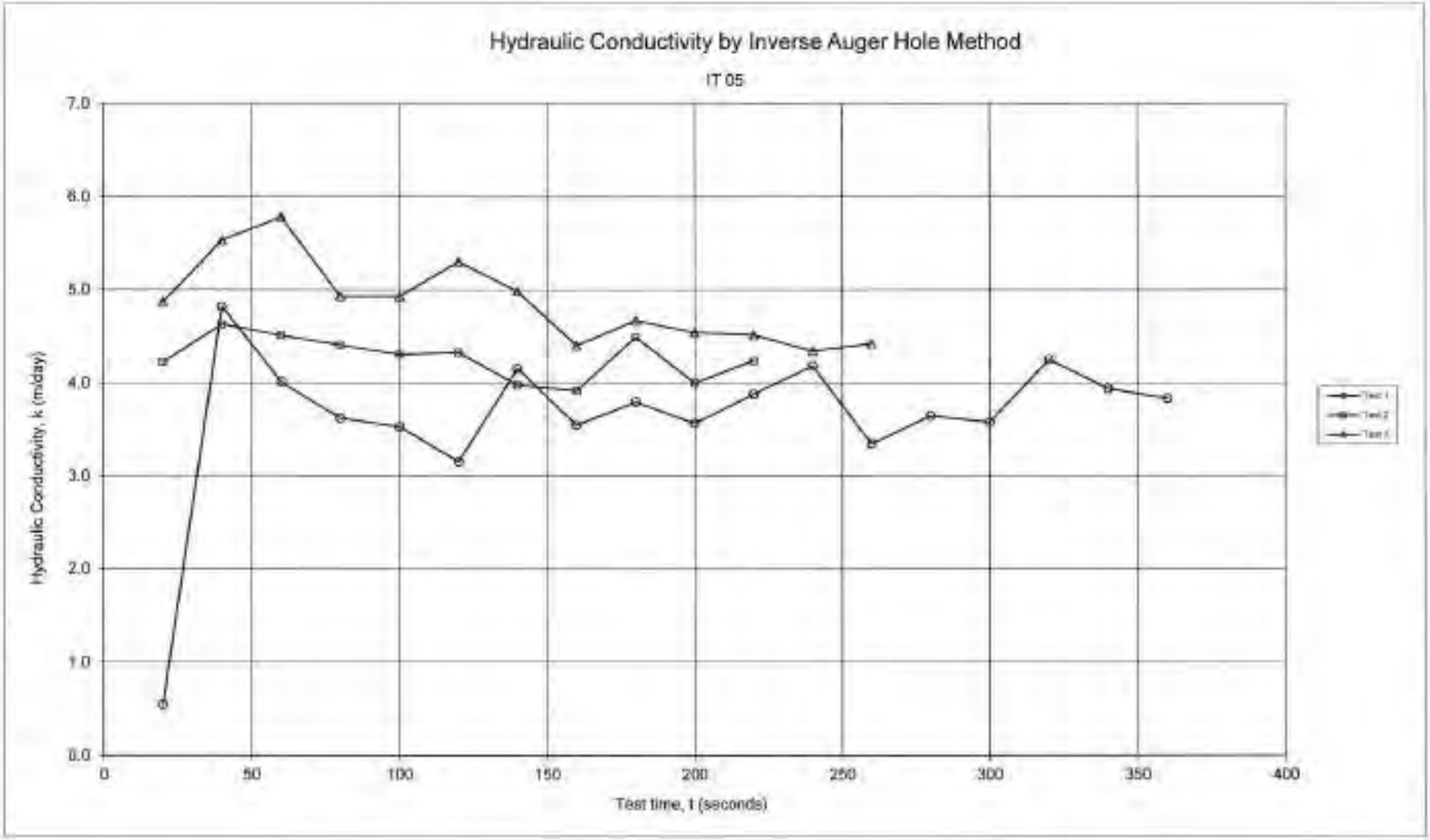

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Hydraulic Conductivity Calculation - Inverse Auger Hole Method

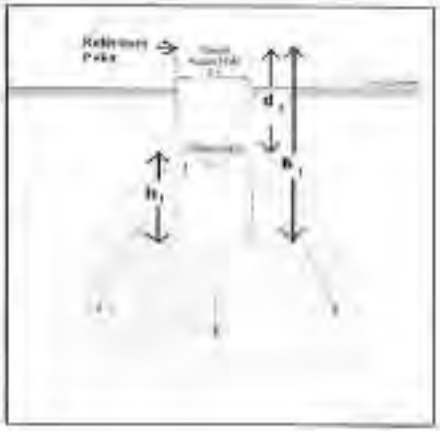
Galt Geotechnics

Job No:	J2201067
Client:	Logos Property Group
Project:	Warehouse
Location:	Hazelmere
Calc by:	AM
BH Name:	IT 06
Test Depth:	1.60 m

Spreadsheet author: ORW 17-Oct-09

$$K = 1.15r\frac{\log_{10}(h_0 + \frac{1}{2}r) - \log_{10}(h_t + \frac{1}{2}r)}{t - t_0}$$

REFERENCE: Cocks, G. *Disposal of Stormwater Runoff by Soakage in Perth Western Australia*, Journal and News of the Australian Geomechanics Society, Volume 42 No 3 September 2007, pp101-114



Spreadsheet Legend

	Required input
	Calculated field
	Comment field
X	Field not used
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Parameter	Description	Value	Units
K	Hydraulic Conductivity	X	m/s
r	radius of test hole	0.05	m
t	time since start of measurement	X	s
h_r	reference point height above base	2.1	m
d_t	depth from reference point to water at time t	X	m
h_t	Water column height at time t	X	m
h_0	h_t at t=0	X	m

Test 1

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.397	0.703	X	X
20	1.618	0.482	4.5E-04	39.0
40	1.711	0.389	3.5E-04	30.4
60	1.773	0.327	3.0E-04	26.1
80	1.856	0.244	3.1E-04	26.9
100	1.887	0.213	2.8E-04	24.1
120	1.923	0.177	2.7E-04	23.1
140	1.940	0.160	2.4E-04	21.1
160	1.975	0.122	2.5E-04	21.6
180	1.991	0.109	2.3E-04	20.3
200	1.994	0.106	2.1E-04	18.5
220	2.015	0.085	2.1E-04	18.5
240	2.034	0.066	2.2E-04	18.7
260	2.036	0.064	2.0E-04	17.4
280	2.053	0.047	2.1E-04	17.8
300	2.061	0.039	2.0E-04	17.5
320	2.079	0.021	2.2E-04	18.6
340	2.081	0.019	2.1E-04	17.8
360	2.086	0.014	2.0E-04	17.5
		AVERAGE	2.5E-04	21.9

Test 2

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.015	1.085	X	X
20	1.284	0.816	3.5E-04	29.8
40	1.430	0.670	2.9E-04	25.3
60	1.515	0.585	2.5E-04	21.5
80	1.582	0.518	2.2E-04	19.3
100	1.618	0.482	2.0E-04	16.9
120	1.668	0.432	1.8E-04	16.0
140	1.709	0.391	1.8E-04	15.1
160	1.740	0.360	1.7E-04	14.3
180	1.773	0.327	1.6E-04	13.8
200	1.808	0.292	1.6E-04	13.5
220	1.820	0.280	1.5E-04	12.7
240	1.847	0.253	1.4E-04	12.4
260	1.854	0.246	1.4E-04	11.7
280	1.882	0.218	1.4E-04	11.7
300	1.897	0.203	1.3E-04	11.4
320	1.910	0.190	1.3E-04	11.1
340	1.917	0.183	1.2E-04	10.6
		AVERAGE	1.8E-04	15.7

Test 3

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.370	0.730	X	X
20	1.447	0.653	1.3E-04	11.6
40	1.501	0.599	1.2E-04	10.3
60	1.543	0.557	1.1E-04	9.4
80	1.577	0.523	1.0E-04	8.6
100	1.604	0.496	9.3E-05	8.0
120	1.650	0.450	9.6E-05	8.3
140	1.676	0.424	9.3E-05	8.0
160	1.719	0.381	9.7E-05	8.4
180	1.724	0.376	8.8E-05	7.6
200	1.774	0.326	9.6E-05	8.3
220	1.789	0.311	9.2E-05	7.9
240	1.811	0.289	9.1E-05	7.9
260	1.826	0.274	8.9E-05	7.7
280	1.854	0.246	9.1E-05	7.9
300	1.870	0.230	9.0E-05	7.8
320	1.863	0.237	8.3E-05	7.1
340	1.881	0.219	8.3E-05	7.2
360	1.91	0.19	8.7E-05	7.5
		AVERAGE	9.6E-05	8.3

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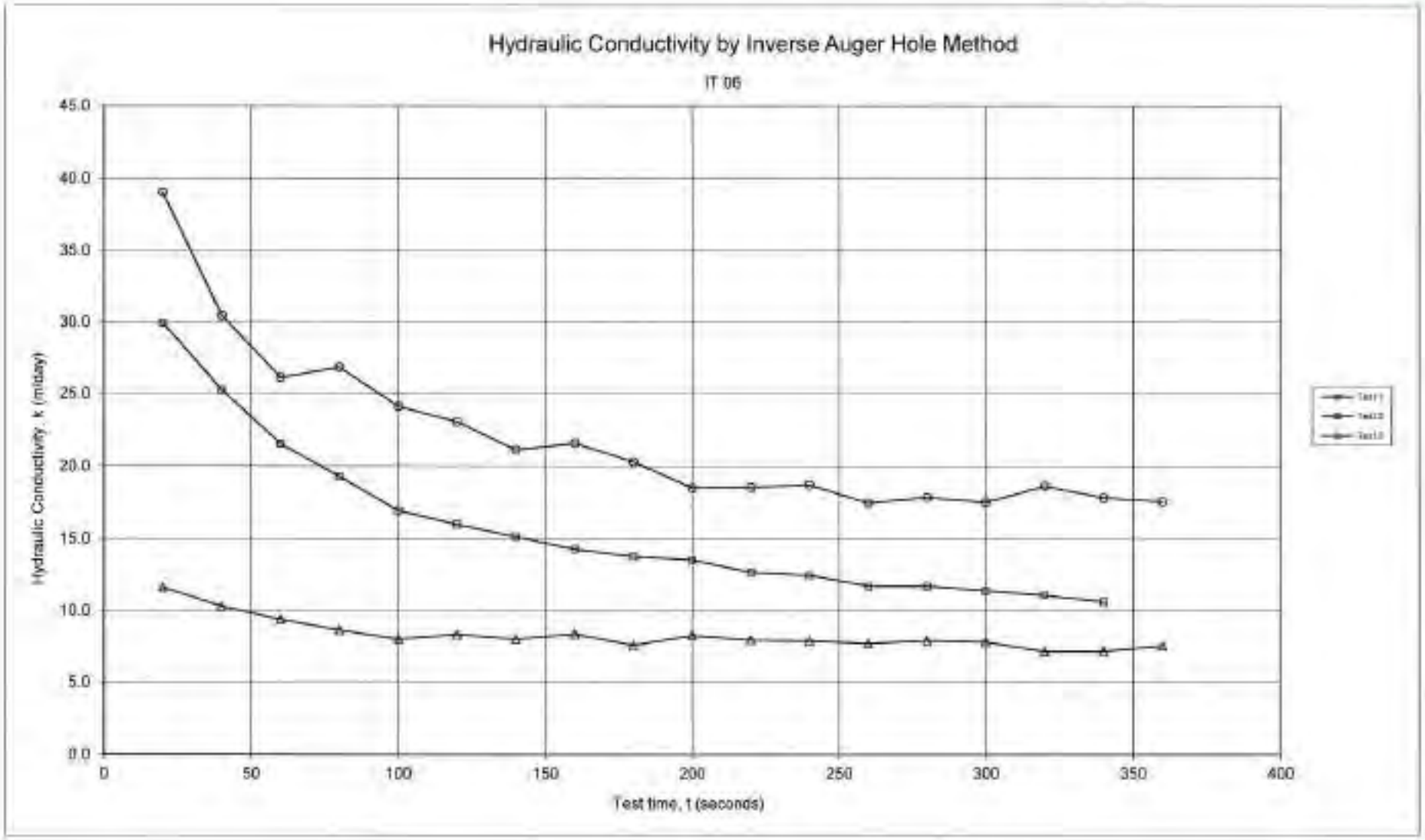

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Hydraulic Conductivity Calculation - Inverse Auger Hole Method

Galt Geotechnics

Job No:	J2201067
Client:	Logos Property Group
Project:	Warehouse
Location:	Hazelmere
Calc by:	AM
BH Name:	IT 07
Test Depth:	1.44 m

Spreadsheet author: ORW 17-Oct-09

$$K = 1.15r\frac{\log_{10}(h_0 + \frac{1}{2}r) - \log_{10}(h_t + \frac{1}{2}r)}{t - t_0}$$

REFERENCE: Cocks, G. *Disposal of Stormwater Runoff by Soakage in Perth Western Australia*, Journal and News of the Australian Geomechanics Society, Volume 42 No 3 September 2007, pp101-114

Spreadsheet Legend

	Required input
	Calculated field
	Comment field
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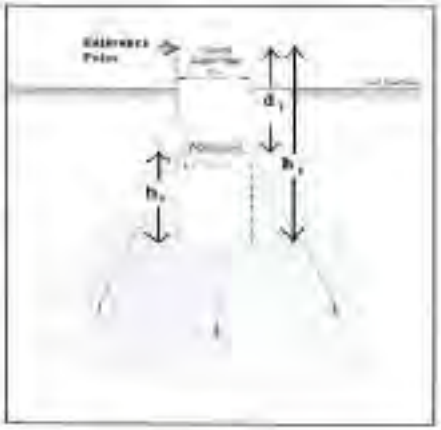
Parameter	Description	Value	Units
K	Hydraulic Conductivity		m/s
r	radius of test hole	0.05	m
t	time since start of measurement		s
h_0	reference point height above base	2.1	m
d_t	depth from reference point to water at time t		m
h_t	Water column height at time t		m
h_0	h_t at t=0		m



Test 1

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.278	0.822		
20	1.581	0.519	5.5E-04	47.8
40	1.696	0.404	4.2E-04	36.7
60	1.680	0.420	2.7E-04	23.1
80	1.825	0.275	3.2E-04	28.0
100	1.866	0.234	3.0E-04	25.6
120	1.876	0.224	2.5E-04	22.0
140	1.910	0.190	2.4E-04	21.1
160	1.904	0.196	2.1E-04	18.1
180	1.935	0.165	2.1E-04	17.9
200	1.957	0.143	2.0E-04	17.5
220	1.971	0.129	1.9E-04	16.7
240	1.978	0.122	1.8E-04	15.7
260	1.993	0.107	1.8E-04	15.4
280	1.986	0.114	1.6E-04	13.9
300	1.981	0.119	1.5E-04	12.7
320	1.985	0.115	1.4E-04	12.1
340	1.995	0.105	1.4E-04	11.9
		AVERAGE	2.4E-04	21.0

Test 2

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.119	0.981		
20	1.325	0.775	2.9E-04	24.7
40	1.466	0.634	2.6E-04	22.8
60	1.530	0.570	2.2E-04	18.9
80	1.587	0.513	2.0E-04	16.9
100	1.622	0.478	1.7E-04	15.0
120	1.649	0.451	1.6E-04	13.5
140	1.679	0.421	1.5E-04	12.5
160	1.700	0.400	1.3E-04	11.6
180	1.721	0.379	1.3E-04	10.9
200	1.732	0.368	1.2E-04	10.1
220	1.762	0.338	1.2E-04	10.0
240	1.774	0.326	1.1E-04	9.5
260	1.791	0.309	1.1E-04	9.1
280	1.804	0.296	1.0E-04	8.8
300	1.816	0.284	9.8E-05	8.5
320	1.817	0.283	9.2E-05	8.0
		AVERAGE	1.5E-04	13.2

Test 3

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	0.999	1.101		
20	1.155	0.945	1.9E-04	16.1
40	1.252	0.848	1.6E-04	13.7
60	1.343	0.757	1.5E-04	13.1
80	1.431	0.669	1.5E-04	13.1
100	1.508	0.592	1.5E-04	13.0
120	1.546	0.552	1.4E-04	12.0
140	1.578	0.522	1.3E-04	11.1
160	1.616	0.484	1.2E-04	10.7
180	1.643	0.457	1.2E-04	10.2
200	1.672	0.428	1.1E-04	9.8
220	1.693	0.407	1.1E-04	9.4
240	1.706	0.394	1.0E-04	8.9
260	1.724	0.376	9.9E-05	8.6
280	1.743	0.357	9.6E-05	8.3
300	1.754	0.346	9.2E-05	8.0
		AVERAGE	1.3E-04	11.1

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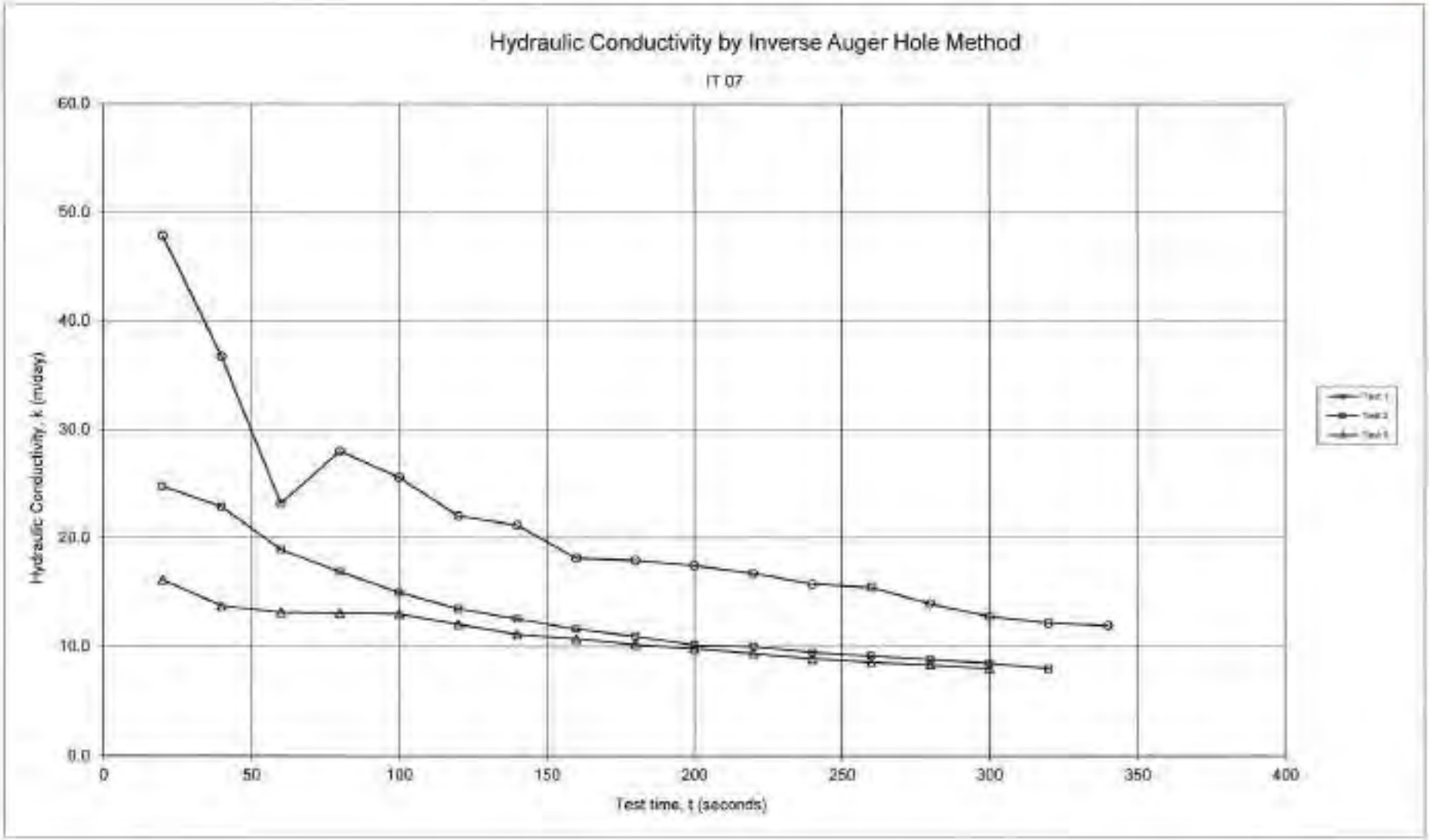

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Hydraulic Conductivity Calculation - Inverse Auger Hole Method

Galt Geotechnics	Spreadsheet author:	ORW	17-Oct-09

Job No:	J2201067
Client:	Logos Property Group
Project:	Warehouse
Location:	Hazelmere
Calc by:	AM
BH Name:	IT 09
Test Depth:	1.50 m

$$K = 1.15r\,\frac{\log_{10}(h_0 + \frac{1}{2}r) - \log_{10}(h_t + \frac{1}{2}r)}{t - t_0}$$

REFERENCE: Cooke, G. *Disposal of Stormwater Runoff by Soakage in Perth Western Australia*, Journal and News of the Australian Geomechanics Society, Volume 42 No 3 September 2007, pp101-114

Spreadsheet Legend

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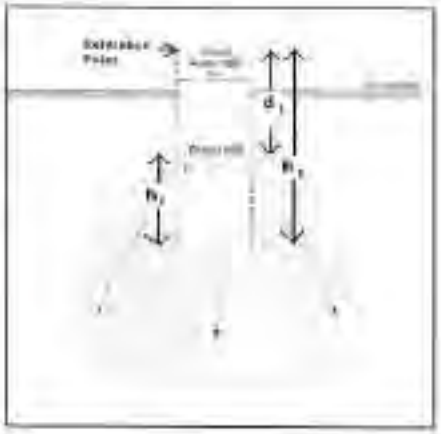
	Calculated field
	Comment field
X	Field not used
	Fixed field

Parameter	Description	Value	Units
K	Hydraulic Conductivity	X	m/s
r	radius of test hole	0.05	m
t	time since start of measurement	X	s
h_0	reference point height above base	2.1	m
d_t	depth from reference point to water at time t	X	m
h_t	Water column height at time t	X	m
h_0	h_t at t=0	X	m



Test 1

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.813	0.287	X	X
20	1.824	0.276	4.5E-05	3.9
40	1.864	0.236	1.1E-04	9.6
60	1.890	0.210	1.2E-04	10.2
80	1.895	0.205	9.5E-05	8.2
100	1.930	0.170	1.2E-04	10.1
120	1.924	0.176	9.2E-05	7.9
140	1.934	0.166	8.8E-05	7.6
160	1.971	0.129	1.1E-04	9.5
180	1.958	0.142	8.7E-05	7.5
200	1.964	0.136	8.3E-05	7.1
220	2.005	0.095	1.1E-04	9.4
240	1.964	0.136	6.9E-05	5.9
260	1.986	0.114	7.6E-05	6.7
280	1.996	0.104	7.9E-05	6.8
300	2.010	0.090	8.3E-05	7.2
320	2.085	0.035	1.3E-04	11.1
340	2.072	0.028	1.3E-04	11.2
360	2.077	0.023	1.3E-04	11.2
		AVERAGE	9.7E-05	8.4

Test 2

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.625	0.475	X	X
20	1.676	0.422	1.4E-04	12.1
40	1.700	0.400	1.0E-04	8.8
60	1.741	0.359	1.1E-04	9.5
80	1.769	0.331	1.1E-04	9.2
100	1.783	0.317	9.5E-05	8.2
120	1.819	0.281	1.0E-04	8.8
140	1.827	0.273	9.2E-05	8.0
160	1.826	0.274	8.0E-05	6.9
180	1.858	0.242	8.7E-05	7.5
200	1.860	0.240	7.9E-05	6.8
220	1.866	0.234	7.5E-05	6.5
240	1.880	0.220	7.4E-05	6.4
260	1.899	0.201	7.6E-05	6.6
280	1.898	0.202	7.0E-05	6.1
300	1.915	0.185	7.2E-05	6.2
320	1.950	0.150	8.2E-05	7.1
340	1.924	0.176	6.7E-05	5.8
360	1.935	0.165	6.7E-05	5.8
		AVERAGE	8.8E-05	7.6

Test 3

t (s)	d_w (m)	h_t (m)	K (m/s)	K (m/day)
0	1.676	0.424	X	X
20	1.688	0.412	3.4E-05	2.9
40	1.724	0.376	7.1E-05	6.1
60	1.757	0.343	8.3E-05	7.2
80	1.787	0.313	8.9E-05	7.7
100	1.775	0.325	6.2E-05	5.4
120	1.793	0.307	6.3E-05	5.4
140	1.825	0.275	7.2E-05	6.2
160	1.844	0.256	7.3E-05	6.3
180	1.865	0.235	7.6E-05	6.5
200	1.860	0.240	6.6E-05	5.7
220	1.845	0.255	5.4E-05	4.6
240	1.865	0.235	5.7E-05	4.9
260	1.905	0.195	6.9E-05	5.9
280	1.880	0.220	5.4E-05	4.7
300	1.895	0.205	5.6E-05	4.8
320	1.937	0.163	6.8E-05	5.9
340	1.943	0.157	6.6E-05	5.7
360	1.95	0.15	6.5E-05	5.6
		AVERAGE	6.5E-05	5.6

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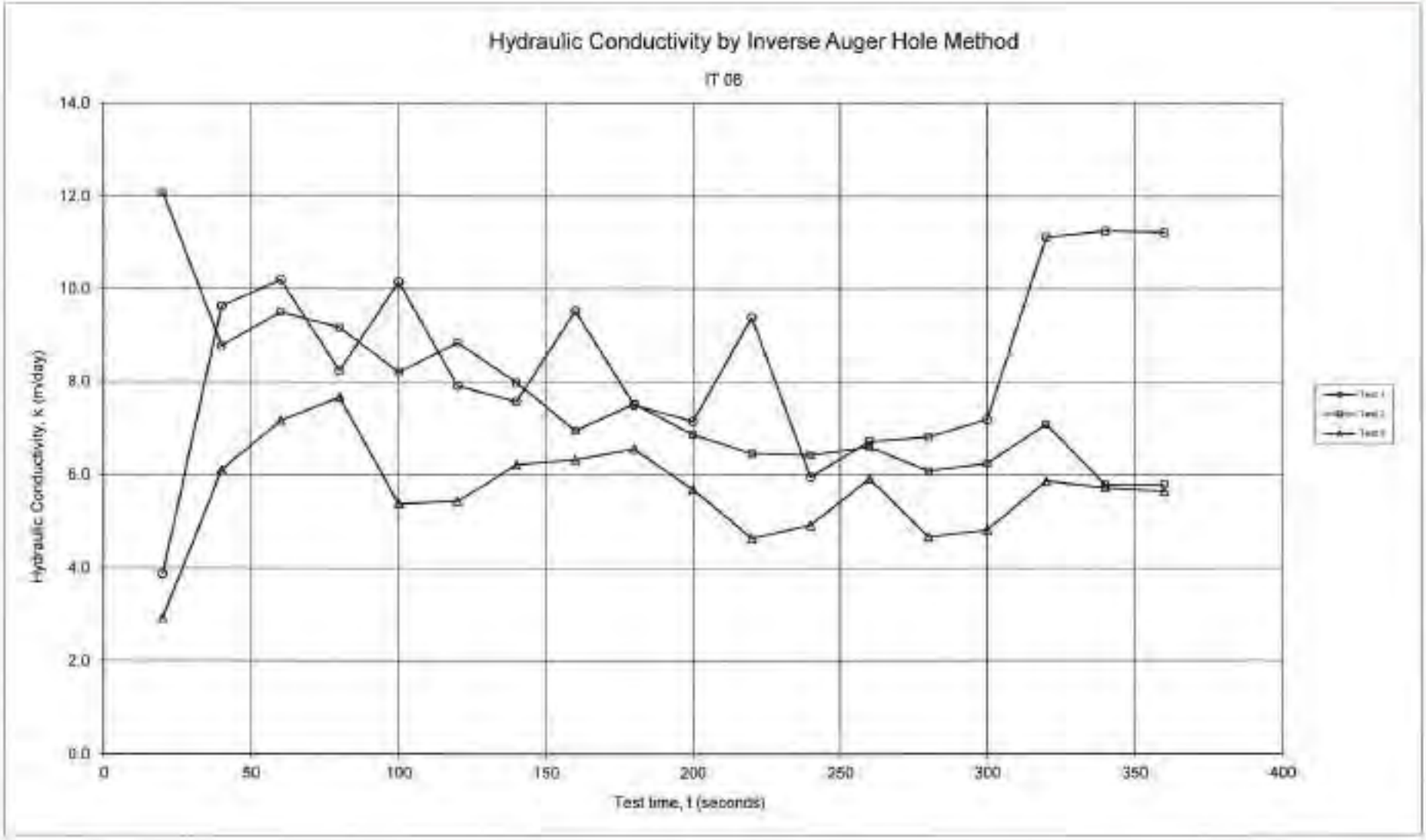

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Galt GEOTECHNICS

Appendix H: Constant Head Permeability Test Results

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Version: 10, Version Date: 17/11/2022

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Hydraulic Conductivity Calculation - Constant Head by Permeameter

Galt Geotechnics	Spreadsheet author:
Job No:	J2201067
Client:	Logos Property Group
Project:	Proposed Warehouse and Office Facilities
Location:	Hazelmere
Calc by:	AM
Test Name:	G01-A

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

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

Spreadsheet Legend

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

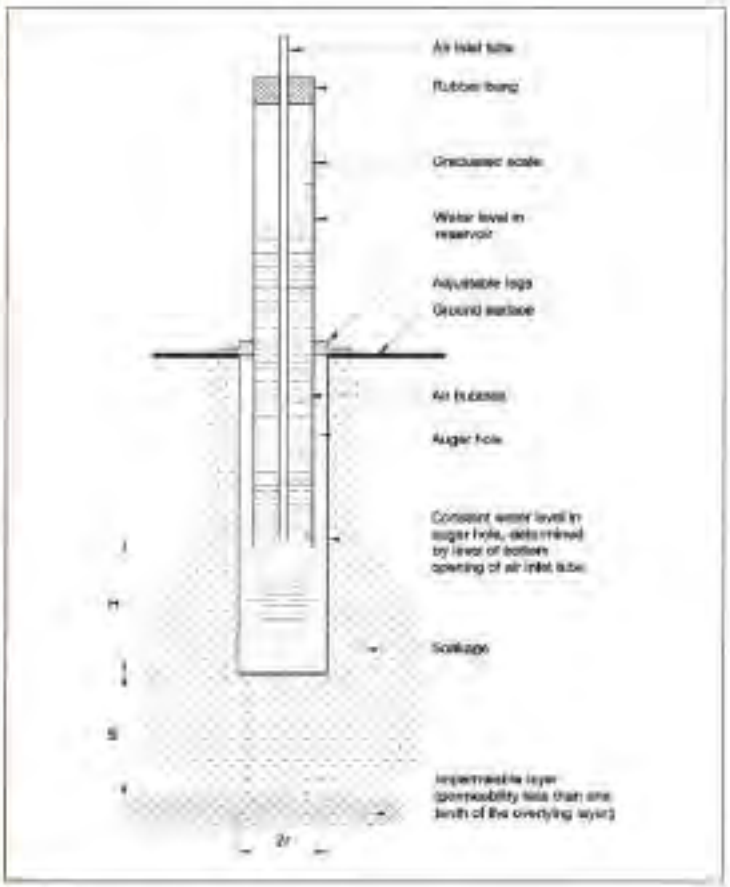
Parameter	Description	Value	Units
K_{sat}	Saturated hydraulic conductivity	X	cm/min
D	Depth of auger hole	50	cm
H	Head of water above base	10	cm
r	Radius of auger hole	5	cm
S	Depth to impermeable stratum		cm
Reservoir	Chosen Guelph reservoir (inner or outer)	Outer	
Area	Area of chosen reservoir	36.3	cm^2
F	Reading of water level in reservoir	X	cm

Test Results

Time (min)	F (cm)	ΔF (cm)	ΔF (cm)/min
0	71	X	X
1	70	1.00	1.00
2	68.5	1.50	1.50
3	67	1.50	1.50
4	66	1.00	1.00
5	65	1.00	1.00
6	63.5	1.50	1.50
7	62	1.50	1.50
8	61	1.00	1.00
9	59.5	1.50	1.50
10	58.5	1.00	1.00
11	57	1.50	1.50
12	56	1.00	1.00
13	55	1.00	1.00
14	53.5	1.50	1.50
15	52.5	1.00	1.00
AVERAGE - LAST 5 READINGS			1.20

Calculation

Steady State Flow	1.20	cm/min
Flow from reservoir (Q)	43.56	cm^3/min
K_{sat}	0.071	cm/min
K_{sat}	1.188E-05	m/s
K_{sat}	**1.03**	**m/day**



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

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Version: 10, Version Date: 17/11/2022

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Hydraulic Conductivity Calculation - Constant Head by Permeameter

Galt Geotechnics	Spreadsheet author:
Job No:	J2201067
Client:	Logos Property Group
Project:	Proposed Warehouse and Office Facilities
Location:	Hazelmere
Calc by:	AM
Test Name:	G01-B

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

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

Spreadsheet Legend

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

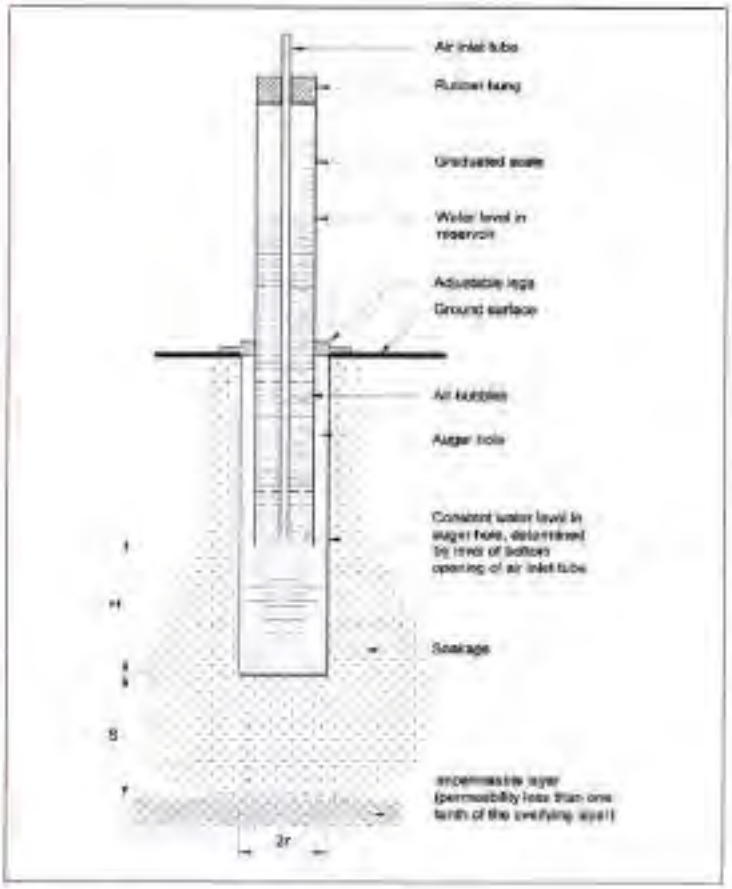
Parameter	Description	Value	Units
K_{sat}	Saturated hydraulic conductivity	X	cm/min
D	Depth of auger hole	50	cm
H	Head of water above base	10	cm
r	Radius of auger hole	5	cm
S	Depth to impermeable stratum		cm
Reservoir	Chosen Guelph reservoir (inner or outer)	Outer	
Area	Area of chosen reservoir	36.3	cm^2
F	Reading of water level in reservoir	X	cm

Test Results

Time (min)	F (cm)	ΔF (cm)	ΔF (cm)/min
0	50	X	X
1	48.5	1.50	1.50
2	47	1.50	1.50
3	46	1.00	1.00
4	44.5	1.50	1.50
5	43	1.50	1.50
6	42	1.00	1.00
7	40.5	1.50	1.50
8	39.5	1.00	1.00
9	38.5	1.00	1.00
10	37	1.50	1.50
11	36	1.00	1.00
12	34.5	1.50	1.50
13	33	1.50	1.50
14	31.5	1.50	1.50
15	31	0.50	0.50
AVERAGE - LAST 5 READINGS			1.20

Calculation

Steady State Flow	1.20	cm/min
Flow from reservoir (Q)	43.56	cm^3/min
K_{sat}	0.071	cm/min
K_{sat}	1.188E-05	m/s
K_{sat}	1.03	m/day



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

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Hydraulic Conductivity Calculation - Constant Head by Permeameter

Galt Geotechnics | Spreadsheet author:

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

Job No:	J2201067
Client:	Logos Property Group
Project:	Proposed Warehouse and Office Facilities
Location:	Hazelmere
Calc by:	AM
Test Name:	G02-A

Spreadsheet Legend

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

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

Parameter	Description	Value	Units
K_{sat}	Saturated hydraulic conductivity	X	cm/min
D	Depth of auger hole	50	cm
H	Head of water above base	10	cm
r	Radius of auger hole	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	X	cm

Test Results

Time (min)	F (cm)	ΔF (cm)	ΔF (cm)/min
0	63	X	X
1	61	2.00	2.00
2	59	2.00	2.00
3	56.7	2.30	2.30
4	55.7	1.00	1.00
5	53	2.70	2.70
6	51.7	1.30	1.30
7	50	1.70	1.70
8	48	2.00	2.00
9	46.5	1.50	1.50
10	45	1.50	1.50
11	42	3.00	3.00
12	40.5	1.50	1.50
13	39	1.50	1.50
14	37	2.00	2.00
15	35	2.00	2.00
16	33.5	1.50	1.50
17	31	2.50	2.50
18	29.5	1.50	1.5
19	27	2.50	2.5

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Hydraulic Conductivity Calculation - Constant Head by Permeameter

Galt Geotechnics | Spreadsheet author:

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

Job No:	J2201067
Client:	Logos Property Group
Project:	Proposed Warehouse and Office Facilities
Location:	Hazelmere
Calc by:	AM
Test Name	G02-B

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

Spreadsheet Legend

	Required input
	Calculated field
	Comment field
	Field not used
	Fixed field

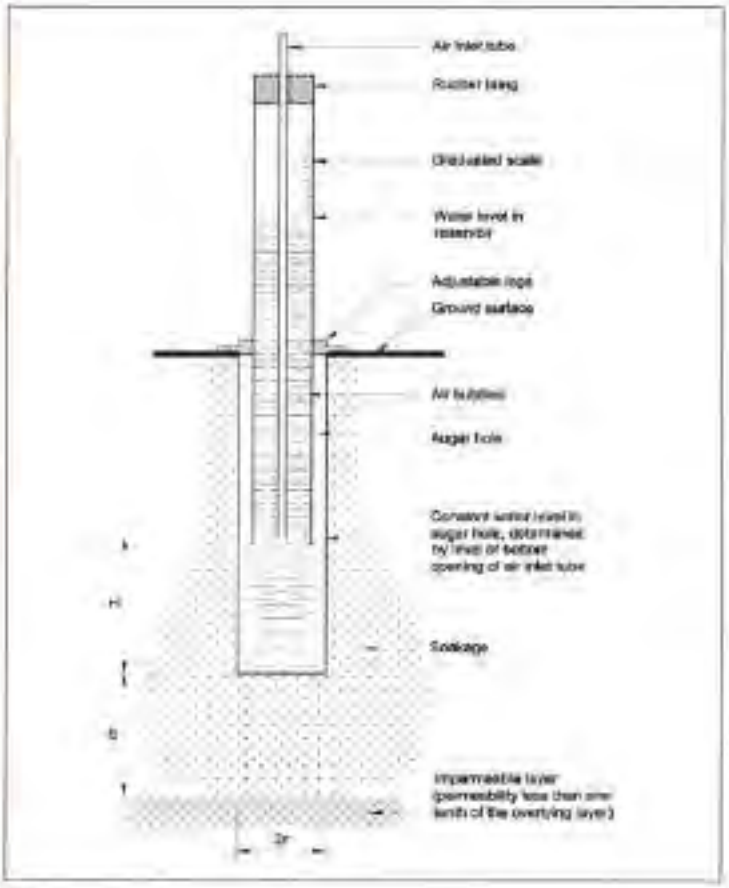
Parameter	Description	Value	Units
K_{sat}	Saturated hydraulic conductivity		cm/min
D	Depth of auger hole	50	cm
H	Head of water above base	10	cm
r	Radius of auger hole	5	cm
S	Depth to impermeable stratum		cm
Reservoir	Chosen Guelph reservoir (inner or outer)	Outer	
Area	Area of chosen reservoir	36.3	cm^2
F	Reading of water level in reservoir		cm

Test Results

Time (min)	F (cm)	ΔF (cm)	ΔF (cm)/min
0	70		
1	68	2.00	2.00
2	66.5	1.50	1.50
3	64.5	2.00	2.00
4	62.5	2.00	2.00
5	61	1.50	1.50
6	59	2.00	2.00
7	57	2.00	2.00
8	55.5	1.50	1.50
9	54	1.50	1.50
10	52.5	1.50	1.50
11	51	1.50	1.50
12	49.5	1.50	1.50
13	47	2.50	2.50
14	46	1.00	1.00
15	44.5	1.50	1.50
AVERAGE - LAST 5 READINGS			1.60

Calculation

Steady State Flow	1.60	cm/min
Flow from reservoir (Q)	58.08	cm^3/min
K_{sat}	0.095	cm/min
K_{sat}	1.583E-05	m/s
K_{sat}	**1.37**	**m/day**



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

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Galt Geotechnics	Spreadsheet author:		

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

Job No:	J2201067
Client:	Logos Property Group
Project:	Proposed Warehouse and Office Facilities
Location:	Hazelmere
Calc by:	AM
Test Name	G03-A

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

Spreadsheet Legend

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

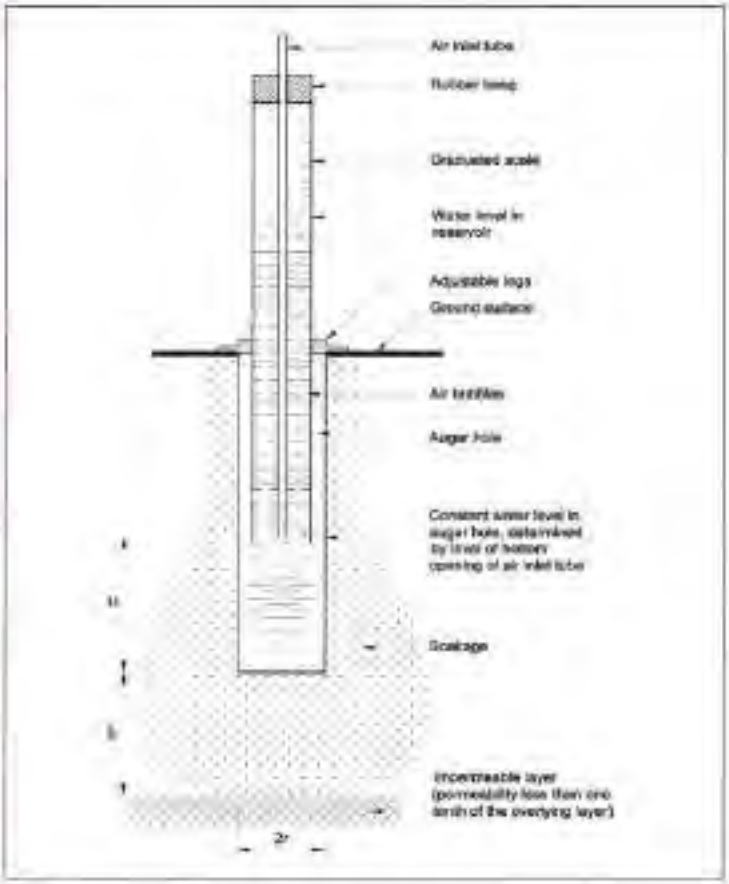
Parameter	Description	Value	Units
K_{sat}	Saturated hydraulic conductivity	X	cm/min
D	Depth of auger hole	50	cm
H	Head of water above base	10	cm
r	Radius of auger hole	5	cm
S	Depth to impermeable stratum		cm
Reservoir	Chosen Guelph reservoir (inner or outer)	Outer	
Area	Area of chosen reservoir	36.3	cm^2
F	Reading of water level in reservoir	X	cm

Test Results

Time (min)	F (cm)	ΔF (cm)	ΔF (cm)/min
0	64	X	X
1	52	12.00	12.00
2	43.5	8.50	8.50
3	35	8.50	8.50
4	28.5	6.50	6.50
5	19	9.50	9.50
6	12	7.00	7.00
7	4	8.00	8.00
AVERAGE - LAST 5 READINGS			7.90

Calculation

Steady State Flow	7.90	cm/min
Flow from reservoir (Q)	286.77	cm^3/min
K_{sat}	0.469	cm/min
K_{sat}	7.818E-05	m/s
K_{sat}	**6.75**	**m/day**



where

H = depth of water in test hole

S = the depth to an underlying impermeable layer

r = radius of the test hole

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Hydraulic Conductivity Calculation - Constant Head by Permeameter

Gait Geotechnics

Spreadsheet author:

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

Job No:	J2201067
Client:	Logos Property Group
Project:	Proposed Warehouse and Office Facilities
Location:	Hazelmere
Calc by:	AM
Test Name	G03 B

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

Spreadsheet Legend

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

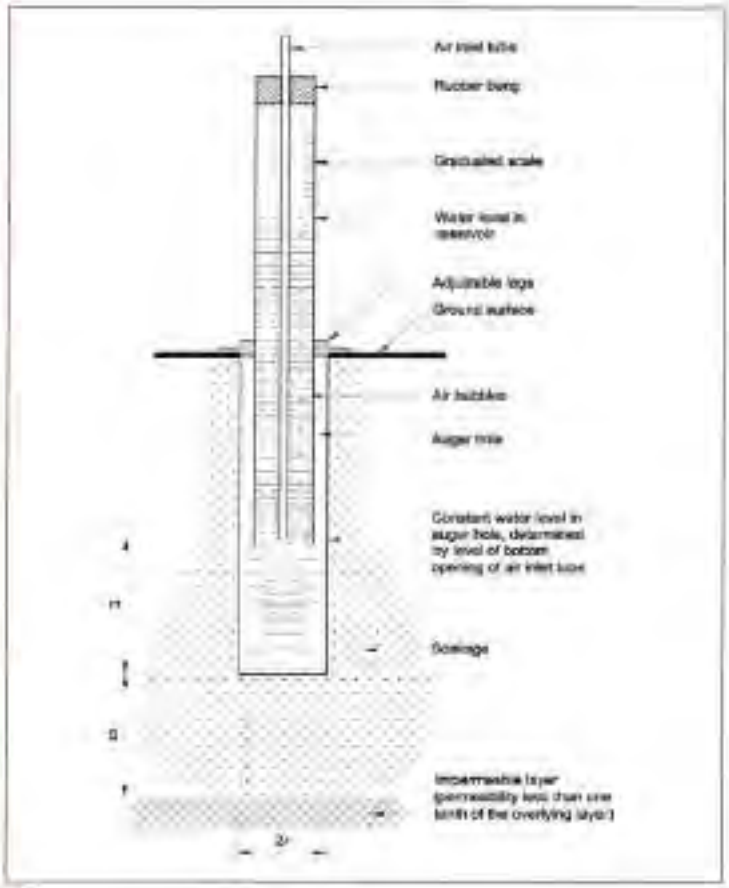
Parameter	Description	Value	Units
K_{sat}	Saturated hydraulic conductivity	X	cm/min
D	Depth of auger hole	50	cm
H	Head of water above base	10	cm
r	Radius of auger hole	5	cm
S	Depth to impermeable stratum		cm
Reservoir	Chosen Guelph reservoir (inner or outer)	Outer	
Area	Area of chosen reservoir	36.3	cm^2
F	Reading of water level in reservoir	X	cm

Test Results

Time (min)	F (cm)	ΔF (cm)	ΔF (cm)/min
0	76	X	X
1	68.5	7.50	7.50
2	60	8.50	8.50
3	53	7.00	7.00
4	45	8.00	8.00
5	37.5	7.50	7.50
6	30	7.50	7.50
7	21.5	8.50	8.50
8	14	7.50	7.50
9	6.5	7.50	7.50
AVERAGE - LAST 5 READINGS			7.70

Calculation

Steady State Flow	7.70	cm/min
Flow from reservoir (Q)	279.51	cm^3/min
K_{sat}	0.457	cm/min
K_{sat}	7.620E-05	m/s
K_{sat}	**6.58**	**m/day**



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Gait Geotechnics	Spreadsheet author:
Job No:	J2201067
Client:	Logos Property Group
Project:	Proposed Warehouse and Office Facilities
Location:	Hazelmere
Calc by:	AM
Test Name:	G04

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

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

Spreadsheet Legend

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

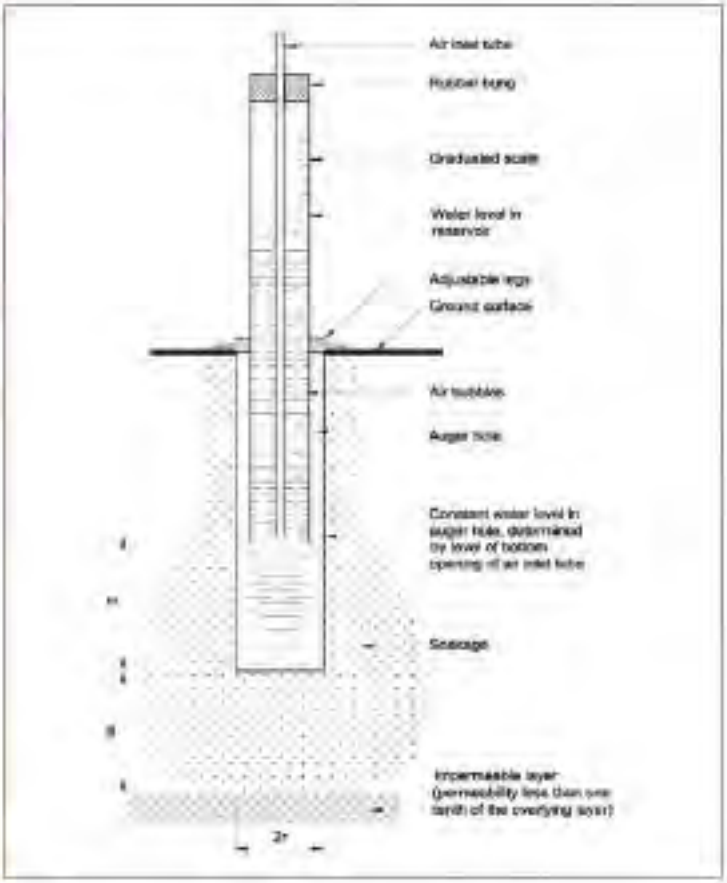
Parameter	Description	Value	Units
K_{sat}	Saturated hydraulic conductivity	X	cm/min
D	Depth of auger hole	50	cm
H	Head of water above base	10	cm
r	Radius of auger hole	5	cm
S	Depth to impermeable stratum		cm
Reservoir	Chosen Guelph reservoir (inner or outer)	Outer	
Area	Area of chosen reservoir	36.3	cm^2
F	Reading of water level in reservoir	X	cm

Test Results

Time (min)	F (cm)	ΔF (cm)	ΔF (cm)/min
0	53.5	X	X
1	53.5	0.00	0.00
2	53.5	0.00	0.00
3	53.5	0.00	0.00
4	52.3	1.20	1.20
5	52.3	0.00	0.00
6	51.4	0.90	0.90
7	50.4	1.00	1.00
8	50.4	0.00	0.00
9	49.5	0.90	0.90
10	49.5	0.00	0.00
11	48.6	0.90	0.90
12	48.6	0.00	0.00
13	47.9	0.70	0.70
14	47.9	0.00	0.00
15	47	0.90	0.90
16	47	0.00	0.00
17	46	1.00	1.00
18	46	0.00	0.0
19	45.2	0.80	0.8
20	45.2	0.00	0.0
21	44.6	0.60	0.6
22	44.6	0.00	0.0
23	43.6	1.00	1.0
AVERAGE - LAST 5 READINGS			0.48

Calculation

Steady State Flow	0.48	cm/min
Flow from reservoir (Q)	17.42	cm^3/min
K_{sat}	0.029	cm/min
K_{sat}	4.750E-06	m/s
K_{sat}	**0.41**	**m/day**



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Hydraulic Conductivity Calculation - Constant Head by Permeameter

Galt Geotechnics | Spreadsheet author:

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

Job No:	J2201067
Client:	Logos Property Group
Project:	Proposed Warehouse and Office Facilities
Location:	Hazelmere
Calc by:	AM
Test Name:	G05-A

Spreadsheet Legend

	Required input
	Calculated field
	Comment field
	Field not used
	Fixed field

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

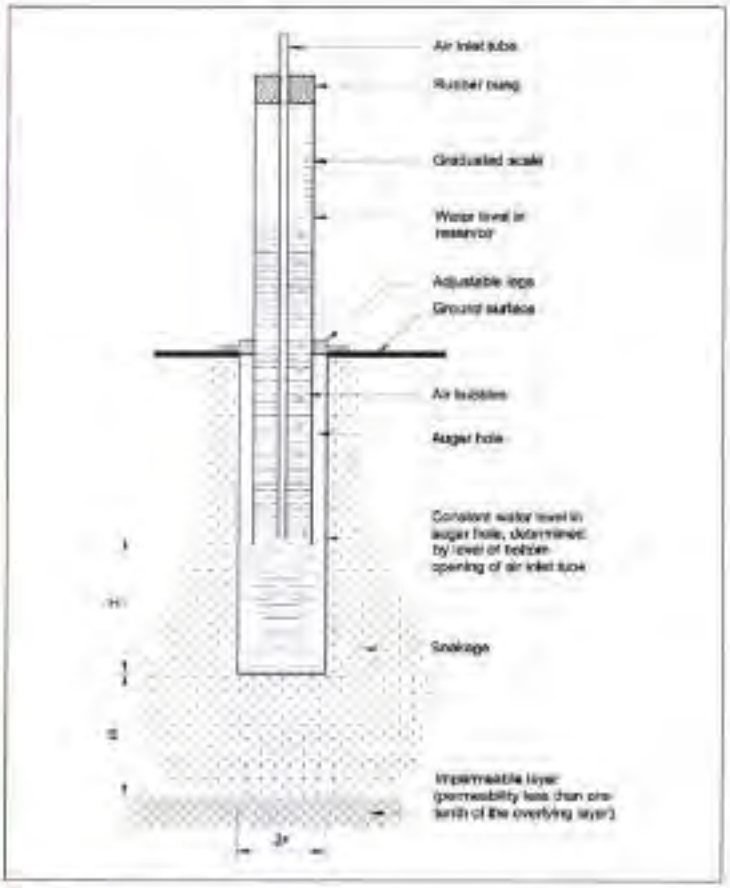
Parameter	Description	Value	Units
K_{sat}	Saturated hydraulic conductivity		cm/min
D	Depth of auger hole	75	cm
H	Head of water above base	35	cm
r	Radius of auger hole	5	cm
S	Depth to impermeable stratum		cm
Reservoir	Chosen Guelph reservoir (inner or outer)	Outer	
Area	Area of chosen reservoir	36.3	cm^2
F	Reading of water level in reservoir		cm

Test Results

Time (min)	F (cm)	ΔF (cm)	ΔF (cm)/min
0	74		
1	70	4.00	4.00
2	64	6.00	6.00
3	58	6.00	6.00
4	53.5	4.50	4.50
5	49.5	4.00	4.00
6	46.3	3.20	3.20
7	43	3.30	3.30
8	39.5	3.50	3.50
9	35	4.50	4.50
10	32.4	2.60	2.60
11	29.5	2.90	2.90
12	26.3	3.20	3.20
13	23	3.30	3.30
14	20	3.00	3.00
15	17	3.00	3.00
AVERAGE - LAST 5 READINGS			3.08

Calculation

Steady State Flow	3.08	cm/min
Flow from reservoir (Q)	111.80	cm^3/min
K_{sat}	0.039	cm/min
K_{sat}	6.452E-08	m/s
K_{sat}	**0.56**	**m/day**



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

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Hydraulic Conductivity Calculation - Constant Head by Permeameter

Galt Geotechnics	Spreadsheet author:
Job No:	J2201067
Client:	Logos Property Group
Project:	Proposed Warehouse and Office Facilities
Location:	Hazelmere
Calc by:	AM
Test Name	G05-B

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

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

Spreadsheet Legend

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

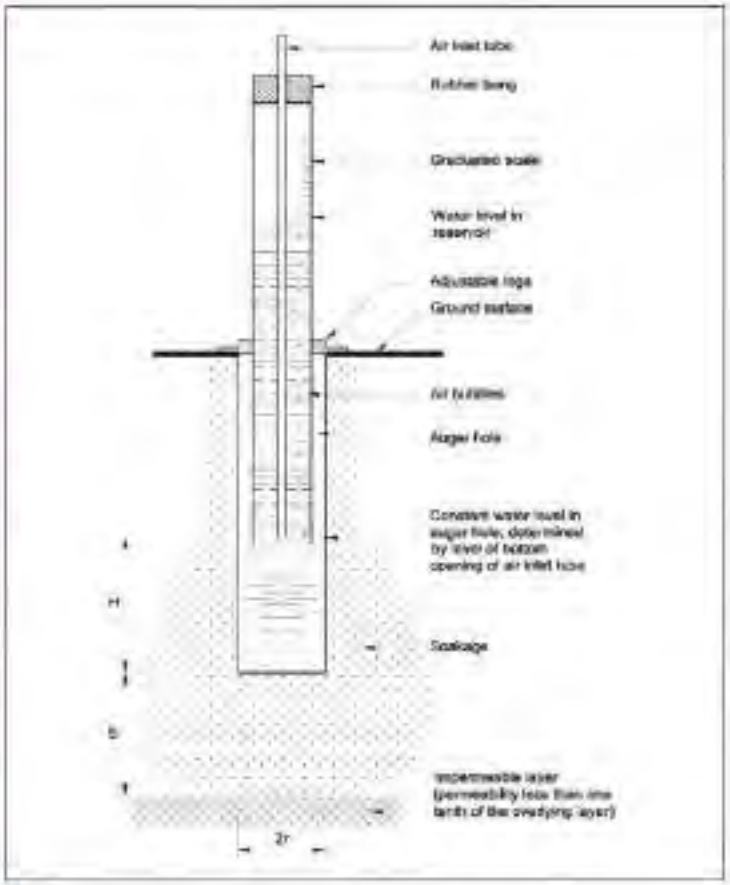
Parameter	Description	Value	Units
K_{sat}	Saturated hydraulic conductivity	X	cm/min
D	Depth of auger hole	75	cm
H	Head of water above base	35	cm
r	Radius of auger hole	5	cm
S	Depth to impermeable stratum		cm
Reservoir	Chosen Guelph reservoir (inner or outer)	Outer	
Area	Area of chosen reservoir	36.3	cm^2
F	Reading of water level in reservoir	X	cm

Test Results

Time (min)	F (cm)	ΔF (cm)	ΔF (cm)/min
0	56.5	X	X
1	53	3.50	3.50
2	50	3.00	3.00
3	46.5	3.50	3.50
4	44	2.50	2.50
5	40.5	3.50	3.50
6	38	2.50	2.50
7	35	3.00	3.00
8	31.5	3.50	3.50
9	28	3.50	3.50
10	24.5	3.50	3.50
11	22	2.50	2.50
12	19	3.00	3.00
13	16	3.00	3.00
14	12.5	3.50	3.50
AVERAGE - LAST 5 READINGS			3.10

Calculation

Steady State Flow	3.10	cm/min
Flow from reservoir (Q)	112.53	cm^3/min
K_{sat}	0.039	cm/min
K_{sat}	6.494E-06	m/s
K_{sat}	**0.56**	**m/day**



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Hydraulic Conductivity Calculation - Constant Head by Permeameter

Galt Geotechnics | Spreadsheet author:

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

Job No: J2201067
Client: Logos Property Group
Project: Proposed Warehouse and Office Facilities
Location: Hazelmere
Calc by: AM
Test Name: G06-A

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

Spreadsheet Legend

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

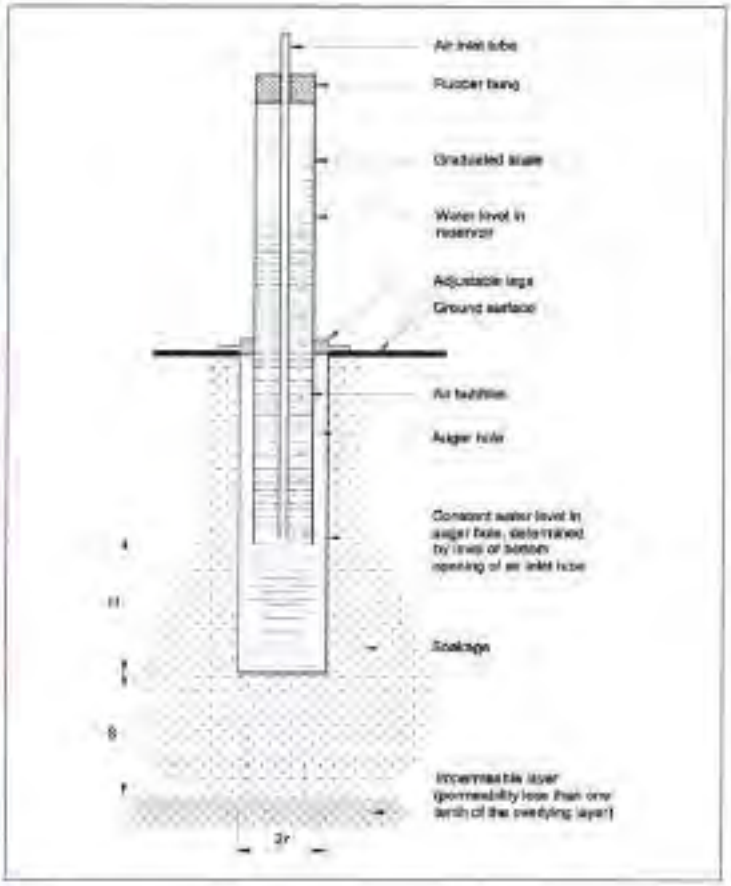
Parameter	Description	Value	Units
K_{sat}	Saturated hydraulic conductivity	X	cm/min
D	Depth of auger hole	50	cm
H	Head of water above base	10	cm
r	Radius of auger hole	5	cm
S	Depth to impermeable stratum		cm
Reservoir	Chosen Guelph reservoir (inner or outer)	Outer	
Area	Area of chosen reservoir	36.3	cm^2
F	Reading of water level in reservoir	X	cm

Test Results

Time (min)	F (cm)	ΔF (cm)	ΔF (cm)/min
0	48.5	X	X
1	48.5	0.00	0.00
2	48.5	0.00	0.00
3	48.5	0.00	0.00
4	46	2.50	2.50
5	44.5	1.50	1.50
6	43	1.50	1.50
7	41.5	1.50	1.50
8	40	1.50	1.50
9	39	1.00	1.00
10	37.5	1.50	1.50
11	35.7	1.80	1.80
12	33.8	1.90	1.90
13	32	1.80	1.80
14	30.8	1.20	1.20
15	29.5	1.30	1.30
16	27	2.50	2.50
17	27	0.00	0.00
18	24.5	2.50	2.5
19	23	1.50	1.5
20	21.5	1.50	1.5
AVERAGE - LAST 5 READINGS			1.60

Calculation

Steady State Flow	1.60	cm/min
Flow from reservoir (Q)	58.08	cm^3/min
K_{sat}	0.095	cm/min
K_{sat}	1.583E-05	m/s
K_{sat}	1.37	m/day



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Hydraulic Conductivity Calculation - Constant Head by Permeameter

Galt Geotechnics

Spreadsheet author:

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

Job No:	J2201067
Client:	Logos Property Group
Project:	Proposed Warehouse and Office Facilities
Location:	Hazelmere
Calc by:	AM
Test Name:	G09-B

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

Spreadsheet Legend

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

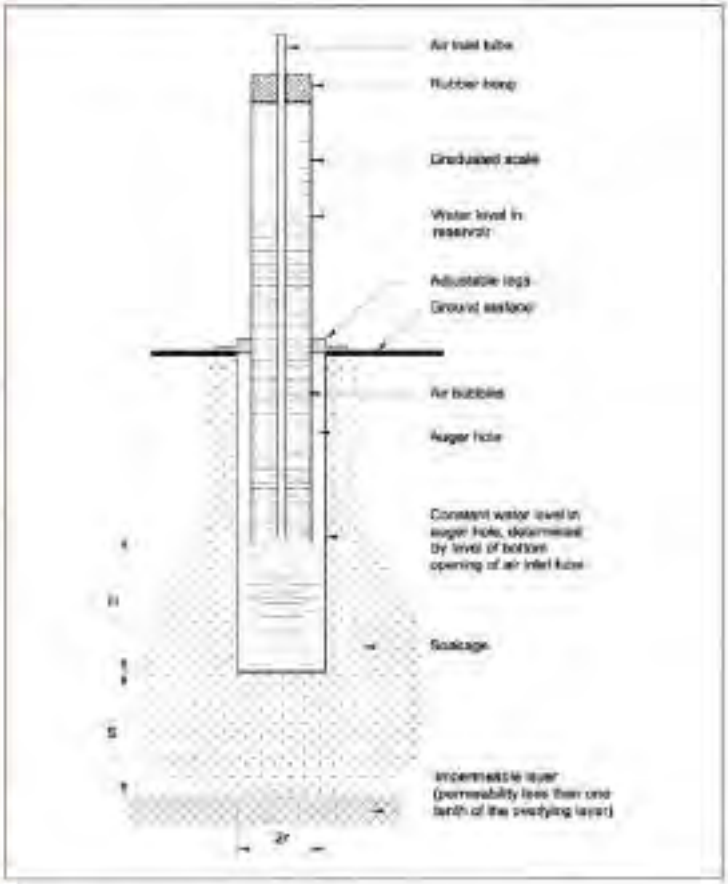
Parameter	Description	Value	Units
K_{sat}	Saturated hydraulic conductivity	X	cm/min
D	Depth of auger hole	50	cm
H	Head of water above base	10	cm
r	Radius of auger hole	5	cm
S	Depth to impermeable stratum		cm
Reservoir	Chosen Guelph reservoir (inner or outer)	Outer	
Area	Area of chosen reservoir	36.3	cm^2
F	Reading of water level in reservoir	X	cm

Test Results

Time (min)	F (cm)	ΔF (cm)	ΔF (cm)/min
0	56	X	X
1	54	2.00	2.00
2	52.5	1.50	1.50
3	51	1.50	1.50
4	50	1.00	1.00
5	49	1.00	1.00
6	47.5	1.50	1.50
7	46	1.50	1.50
8	44.5	1.50	1.50
9	43	1.50	1.50
10	41.5	1.50	1.50
11	40	1.50	1.50
12	39	1.00	1.00
13	37.5	1.50	1.50
14	36	1.50	1.50
15	35	1.00	1.00
16	33.5	1.50	1.50
17	32	1.50	1.50
18	31	1.00	1.0
19	29.5	1.50	1.5
20	28	1.50	1.5
AVERAGE - LAST 5 READINGS			1.40

Calculation

Steady State Flow	1.40	cm/min
Flow from reservoir (Q)	50.82	cm^3/min
K_{sat}	0.083	cm/min
K_{sat}	1.385E-05	m/s
K_{sat}	1.20	m/day



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

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Appendix I: Understanding Your Report

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UNDERSTANDING YOUR REPORT

GALT FORM PMP11 Rev3

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.

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3. SOIL LOGS

Our reports often include logs of intrusive and non-intrusive investigation techniques. 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.

4. 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.

5. 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.

6. 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.

7. 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.

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6. WASTEWATER AND STORMWATER MANAGEMENT PLAN

Tadros Engineering

(SITE doc ref: PT181C - Building 6 Spec Build Stormwater and Wastewater Management Plan Rev 0)

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tadros engineering
CIVIL | HYDRAULIC | STRUCTURAL

TADROS ENGINEERING
ABN: 75 609 684 700
PO Box 4062
Woodlands WA 6018

CITY OF SWAN
PO Box 196
Midland, WA, 6936

TE Reference Number: PT181C
Revision 0

Attention: City of Swan Assessing Officer

1 September 2022

BUILDING 6 SPEC BUILD
PART OF LOT 153 TALBOT ROAD, HAZELMERE

STORMWATER AND WASTEWATER MANAGEMENT PLAN

1 INTRODUCTION

Tadros Engineering Pty Ltd **(TE)** has been requested by Logos to prepare a Stormwater and Wastewater Management Report to support a Development Application (**DA**) for proposed warehouses and offices on part of Lot 153 Talbot Road, Hazelmere (**The Site**)

The proposed development is indicatively presented below in Figure 1

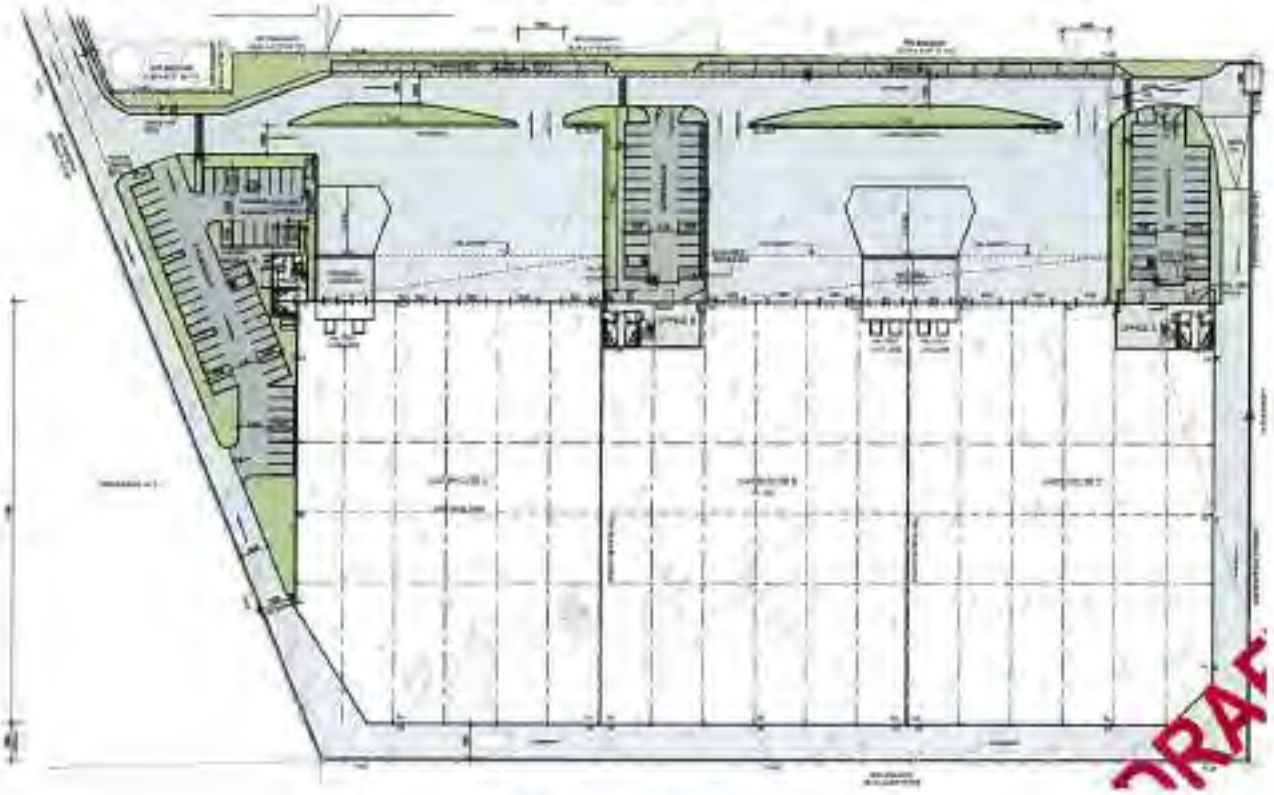

Figure 1 – Proposed Development

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2 REFERENCE MATERIAL

1. Australian Standards – 1547:2012 (**AS1547**)
2. Government Sewerage Policy September 2019 (**Government Sewerage Policy**)
3. Health Act 1911 – Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974, Version 06-d000 (**Health Act**)
4. Supplement to Regulation 29 and Schedule 9 – Wastewater system loading rates
5. Geotechnical Report: J2201067 001 R Rev0 (**Galt's Geotechnical Report**)
6. Site and Soil Evaluation: J2201067 002 R Rev1, dated 01 September 2022 (**Galt's SSE Report**)

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3 APPENDICES & ELECTRONIC FILES

Appendix A – TE Documentation

- TE drawings:

  PT181-CI-DRG-E-01 Civil Pavement Earthworks & Retaining Plan Sheet 1 Rev A
  PT181-CI-DRG-E-02 Civil Pavement Earthworks & Retaining Plan Sheet 2 Rev A
  PT181-CI-DRG-E-03 Civil Earthworks Sections Rev A
  PT181-CI-DRG-S-01 Civil Stormwater Management Plan Sheet 1 Rev A
  PT181-CI-DRG-S-02 Civil Stormwater Management Plan Sheet 2 Rev A
  PT181-HY-DRG-S-01 Hydraulic Effluent Disposal Plan Rev A

- Electronic File (XPSWMM Model File) PT181C.xp along with

  CAD Reference DWG: PT181C – Architectural Layout.dwg
  Level and Feature Survey DWG: 10143DE-009A.dwg

Appendix B – External Documentation

- FUJI Clean CE 12000 ATU Details and Schematic
- Rein Leach Drain Brochure Information

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4 EXISTING CONDITIONS

4.1 GROUNDWATER

An extract from <Section 6.3> **of Galt's Geotechnical Report** describes ground water conditions across **the Site.**

> *"The Perth Groundwater Atlas (2004) shows the seasonal minimum groundwater level to be around RL 13 m AHD. This is about 12 m below the current ground surface.*
>
> *The levels used to interpolate the groundwater contours in this edition of the atlas are levels recorded in May 2003 following a long dry period. These levels are generally considered to reflect minimum groundwater levels. Groundwater levels can be expected to be significantly higher than shown in the 2004 atlas.*
>
> *Groundwater was measured in the monitoring wells on 15 March 2022 at the following depths:"*

Test Location	*Depth to Groundwater (m) (March 2022)*
MW01	*8.1*
MW02	*7.38*
MW03	*4.5*
MW04	*5.63*

An extract from <Section 6.10> **Galt's SSE Report** describes the possible rise of groundwater during wetter months.

> *"The depth to groundwater recorded in the monitoring wells on 13 April 2022 (end of summer) ranged from 4.5 m to 8.1 m. We expect these levels to rise by no more than about 2 m during the winter months. Even with the rise the groundwater would still be about 3 m below the ground surface"*

Perched Groundwater

<Section 6.3> of **Galt's Geotechnical Report**, provides the following commentary with regards to **perched** ground water:

> *"Shallower perched groundwater is expected to develop on top of the hard/cemented clayey stratum during the wetter times of the year.."*

Furthermore, Galt advises within <Section 7.9> that:

> *The bases of soak wells must be at least 0.5 m above the impermeable clay as we expect perched groundwater to develop on top of the clay. We further note that the soak wells must be designed to overflow into the council drainage system (subject to local regulations).*

Based on the proposed stormwater and effluent design incorporated within this DA Application, we do not believe that groundwater levels will adversely impact the performance of either system. Notwithstanding, with regards to perched groundwater, we have proposed the stormwater system in a location that is likely to be sufficiently above the hard/cemented clayey stratum, based on the geotechnical investigation that has already been conducted by Galt. Notwithstanding, we note that there is considerable variation of the underlying soil material throughout the site, as such we believe that further geotechnical testing is required during detailed design, at the time that the location and depth of the stormwater system is confirmed. The geotechnical testing will confirm the location of the hard/cemented clayey stratum at the location of the proposed stormwater system.

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5 STORMWATER SYSTEM PROPOSAL

5.1 STORMWATER BASIS OF DESIGN

a. Finished floor levels (**FFL**) for all building elements are to be no less than 300mm above the level of the 1% AEP flood event.

b. Stormwater from **The Development** is to be detained via underground storage, attributable to the 1% AEP storm event for the critical duration within a 72 hr period.

c. A stormwater flood route to Talbot Road must be demonstrated for events over the 1% AEP.

d. The proposed pavement of the development will be utilized as a flood route to Talbot Rd for events greater than the 1% AEP for the adjacent site that is currently tenanted by Fisher and Paykel.

e. Landscaping and / or underground devices will be utilized to cater for the aforementioned stormwater events.

f. Design infiltration rates are based on an average of 3 m/day as the invert of the stormwater system is proposed to be within the in situ granular soil.

g. Due to the variability of soil conditions presented within Galt's report, further geotechnical testing in the areas of the proposed stormwater disposal areas will be required during the detailed design phase to confirm permeability rates at the invert levels of the proposed stormwater devices.

h. Minimum clearance of 500mm from the cemented clayey soils to the invert of any proposed stormwater disposal system is required to assist with the conveyance of stormwater both in a vertical and transverse direction through the underlying soil profile. Minimum clearance may be reduced to 300mm subject to geotechnical engineer confirmation during the detailed design phase.

i. A connection to the City's stormwater system within Talbot Rd will be required. Outflow is to be limited to 5 L/s/ha for up to the 10% AEP storm event. Connection point to be negotiated with the City of Swan during building license phase.

j. Interconnected stormwater pipe systems are to be graded towards underground storage devices within **The Development's** area in accordance with the below criteria:

   i. for the 5% AEP storm event, generally without the hydraulic grade line increasing above pipe obvert levels
   ii. for the 1% AEP storm event under hydraulic head conditions.

k. Subsoil Drainage –

   i. it is anticipated that permanent subsoil drainage will not be required, notwithstanding confirmation will be acquired during the building license phase via liaison with Galt Geotechnics.

5.2 DESIGN INFILTRATION RATES

Galt has recommended the following site design infiltration rates for stormwater disposal within <Section 7.9> of their geotechnical report:

- *Western boundary (depth of granular soil – 2.0 m to > 2.3 m)*

  SAND – 3.0 m/day
  Gravelly CLAY/Clayey SAND – impermeable.

- *North-east part (depth of granular soil - 1.6 m to > 2.0 m)*

  SAND – 4.0 m/day
  Gravelly SAND/Clayey GRAVEL – 4.0 m/day
  Gravelly CLAY/Clayey SAND – impermeable.

- *South-west boundary (depth of granular soil - 1.6 m and >2.0 m)*

  SAND – 3.0 m/day
  Sandy GRAVEL – 3.0 m/day
  Gravelly CLAY/Clayey SAND – impermeable

Based on the proposed location of the stormwater cells and design infiltration rates provided by Galt, we have adopted a design infiltration rate of 3m/day for the design of the stormwater system. Notwithstanding, we

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recommend confirmation of this design infiltration rate by the geotechnical engineer at the time of detailed design when depth and location of stormwater drainage infrastructure have been finalised.

5.3 STORMWATER SYSTEM CALCULATIONS

Underground stormwater detention requirements utilizing Stormtech 740 system are indicated within Figure 2 below.

Preliminary pipes sizes have been conducted via the program 'XPSWMM'. The electronic file is provided with this report.

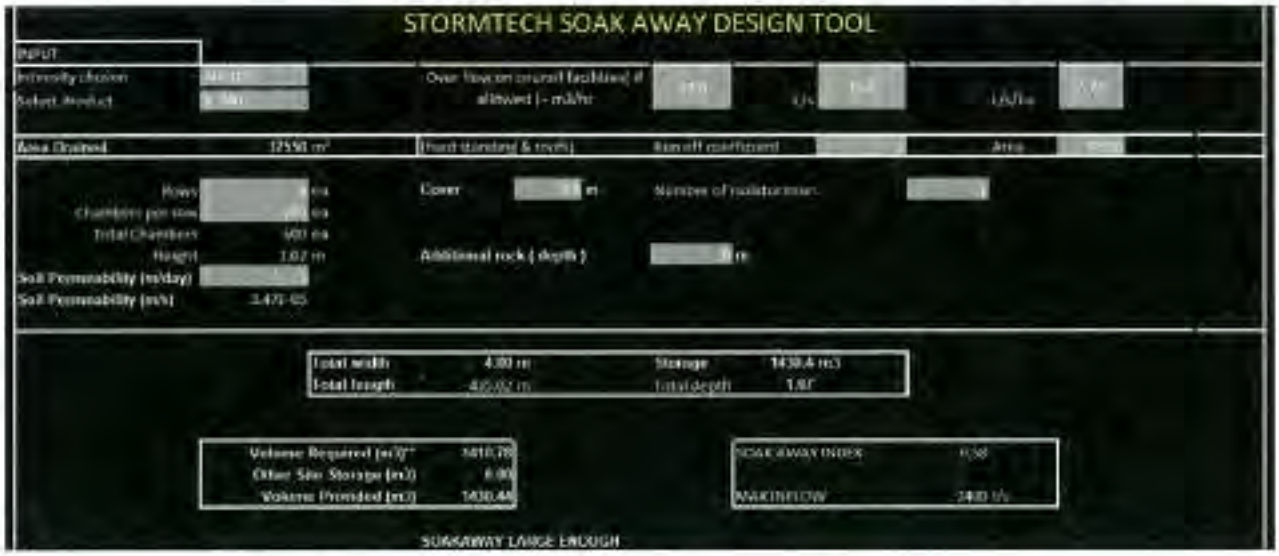

Figure 2 – Underground stormwater detention requirements from Stormtech 740

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6 WASTEWATER SYSTEM PROPOSAL

6.1 WASTEWATER BASIS OF DESIGN

i. The site is within the sewage sensitive area 'estuary catchments on the Swan and Scott Coastal Plains'

ii. **General Effluent (Office etc..)** - It is proposed that an Aerated Treatment Unit (**ATU**) and leach drains will be utilized to treat and dispose of the wastewater effluent, respectively. An **ATU** is proposed rather than a primary treatment system, such as a septic tank, to provide a comparatively higher level of effluent treatment. The ATU will be a Fujiclean CE 12000 or Department of Health approved similar unit, this will be confirmed during detailed design / building license phase. Refer to Appendix B for further information with regards to the ATU system(s).

iii. Location of the effluent disposal system proposed in this **DA** is within an area where the depth of insitu granular material is 2.0m (BH01), >2.0m (MA02, MA08), 1.6m (MA07) and 1.5m (MA11) and classified as *'Soil Category 3 – Loams -weakly structured for G01, G02, G04 to G06'* as reported within **Galt's Geotechnical Report.**

iv. Effluent must be equally distributed throughout the leach drain system. **The distribution of flow proportionally to each area shall be achieved via the hydraulic design of the pressure main(s) and valve system(s).**

v. Nominated leach drain is Reln Plastics Jumbo, please refer to Appendix B for further information

vi. Landscaping areas will be proposed to be utilized for effluent disposal, concept positioning as per Figure 3 below (leach drains depicted in green). Note available length in landscaping areas for leach drains of 240 linear metres (58.5 + 12 + 12 + 34.5 + 37.5 + 51 + 34.5 = 240 lm).



Figure 3 - Proposed landscaping areas for leach drain positioning with approximate lengths shown (see Appendix A drawing PT161-HY-DRG-S-01)

vii. Minimum setback requirements:

Leach Drain - 1.2m from pathways and driveways
Leach Drain - 1.8m from boundaries – unless noted otherwise on drawings

viii. Minimum separation from sides walls of leach drain to adjacent leach drains is to be 1m which is in accordance with the below table, extracted from AS 1547:2012

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TABLE L2
TYPICAL DIMENSIONS OF CONVENTIONAL TRENCHES AND BEDS

	Typical dimensions (mm)	Maximum (mm)	Minimum (mm)
Trench dimensions			
Width	300 – 450	600	200
Depth of aggregate	200 – 400	400	200
Depth of topsoil	100 – 150	150	100
Spacing between adjacent trenches (sidewall to sidewall)	–	N/A	1000
Bed dimensions			
Width	1000 – 4000	4000	1000
Depth of aggregate	300 – 600	600	300
Depth of topsoil	100 – 150	150	100
Spacing between adjacent beds (sidewall to sidewall)	–	N/A	1000

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6.2 WASTEWATER SYSTEM CALCULATIONS

Calculations in line with the DoH regulations have been completed based on a total of 134 occupants (i.e. 102 permanent staff and 32 visitors) as indicated below. A total of 190 linear metres of the nominated Reln Jumbo leach drain is required to satisfy the expected peak effluent flows for occupancy numbers given. As shown above in Figure 3, this total length can be achieved on site (total available length in landscaping areas = approximately 240 linear metres of leach drain).

WASTEWATER SYSTEM LOADING RATES (SUPPLEMENT TO REGULATION 29 AND SCHEDULE 9)

Type of Premises (Regulation 29)	Expected Peak Persons/per day	Equivalent Use	Combined Flow (L/person/day)	Expected peak flow L/day
Factories & Shops	102	Office Staff	70	7140
Similar to 'Public Building' (infrequent use)	32	Visitors	10	320
			Total peak flow L/day	7460

ALLOWABLE QUANTITY OF ON-SITE EFFLUENT DISPOSAL IN ACCORDANCE WITH 'GOVERNMENT SEWERAGE POLICY'

Total Site Area	37,500.00	m^2		
Single Residential equivalent (SRE) - 540L of wastewater water output per day per 2,000m2	10.139	L/day		

GENERAL USE - Effluent Disposal Preliminary Calculations & Assumptions

Expected peak flow L/day	7460
Soil Type adopted from Geotechnical Report	Category 3 <AS 1547 - 2012 - Table L1 >
Loading Factor (trench and bed -secondary treated effluent) mm/day <AS 1547 - 2012 - Table L1 > based on soil type	30
Required Infiltration area (m^2)	249

GENERAL USE - Required Infrastructure

Item	Unit	Quantity
Reln Jumbo Leach Drain System (meters required) within Landscaping Area	metres	190
Suitably Nominated Aerated Treatment Unit (ATU) to cater for stated flows, pump to effluent disposal areas	No.	1

Manufacturer	Model	Infiltrative area (m^2/m)	Module length (m)
Reln Plastics PL Galvin Engineering Pty Ltd 8249 5900	Jumbo	1.31	1.517

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6.3 WATER BALANCE CALCULATIONS

WA Site & Soil Evaluation

Irrigation area sizing

Please read the attached notes before using this spreadsheet

Water Balance for Zero Storage

Site Address:	**Part of Lot 153 Talbot Rd, Hazelmere**		
Date:	Monday, 29 August 2022	**Assessor:**	

INPUT DATA

Design Wastewater Flow	Q	7.460	L/day	Based on maximum potential occupancy and derived from the Supplement to Regulation 29 and Schedule 9 - "Estimated wastewater flow rates"
Design Irrigation Rate	DIR	30.0	mm/day	Based on soil texture class/permeability and derived from Table M1 of AS/NZS 1547:2012
Minimum Land Application Area	L	#N/A	m²	[1]
Crop Factor	C	0.6-1.0	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	Perth Airport (009021)			BoM Station and number
Mean Monthly Pan Evaporation Data	Perth Airport (009021)			BoM Station and number or data from the Evaporation Data for Western Australia Report

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	10.1	15	16.2	39.6	97.8	154.5	155.5	117.8	72.2	43.5	26	10.9	758.6
Evaporation	E		mm/month	316.2	259.8	238.7	153	93	66	65.1	80.6	111	161.4	228	282.1	2089.3
Crop Factor	C		unitless	1.04	1.08	0.90	0.90	0.86	0.86	0.90	0.90	0.90	1.00	1.00	1.04	
OUTPUTS																
Evapotranspiration	ET	ExC	mm/month	329	280	215	138	64	57	59	84	100	161	228	292	1945.98
Percolation	D	DIRxD	mm/month	930.0	840	930.0	900.0	930.0	900.0	930.0	930.0	900.0	930.0	900.0	930.0	10950.0
Outputs		ET+D	mm/month	1259.2	1120.0	1144.8	1038.0	1004.4	957.0	989.1	1014.0	1000.0	1091.4	1128.0	1222.1	12895.8
INPUTS																
Retained Rainfall	RR	RxRF	mm/month	10.1	15	16.2	39.6	97.8	154.5	155.5	117.8	72.2	43.5	26	10.9	758.6
Applied Effluent	IE	(QxD)/L	mm/month	823.9	743.2	823.0	796.4	823.0	796.4	823.0	823.0	796.4	823.0	796.4	823.0	9869.9
Inputs		RR+IE	mm/month	833.7	758.2	839.2	836.0	920.8	950.9	978.6	940.5	868.6	866.3	822.4	833.9	10628.6
STORAGE CALCULATION																
Storage remaining from previous month			mm/month	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Storage for the month	S	(RR+IE)-ET-IE)	mm/month	-415.5	-362.8	-305.6	-199.0	-93.6	-1.5	-10.5	03.7	131.3	-225.1	-305.6	-379.2	
Cumulative Storage	U		mm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Maximum Storage for nominated area	A		mm	0.00												
	V	UxL	L	0												
LAND AREA REQUIRED FOR ZERO STORAGE			m²	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	
MINIMUM AREA REQUIRED FOR ZERO STORAGE:				281	m²											

CELLS

	Please enter data in blue cells
#N/A	Error: available Land Application Area
0.0	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

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7 CONCLUSION

We trust that this document provides the City of Swan and the Department of Health with sufficient information to support the Development Application for **The Development** regarding stormwater and wastewater management. Notwithstanding, please do not hesitate to contact the undersigned on 0402 134 187 if you have any queries.

Yours faithfully,

Tim Tadros

Principal Engineer
BEng, MIEAust CPEng, RPEQ, NER

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Version: 10, Version Date: 17/11/2022

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APPENDIX A - TE DOCUMENTATION

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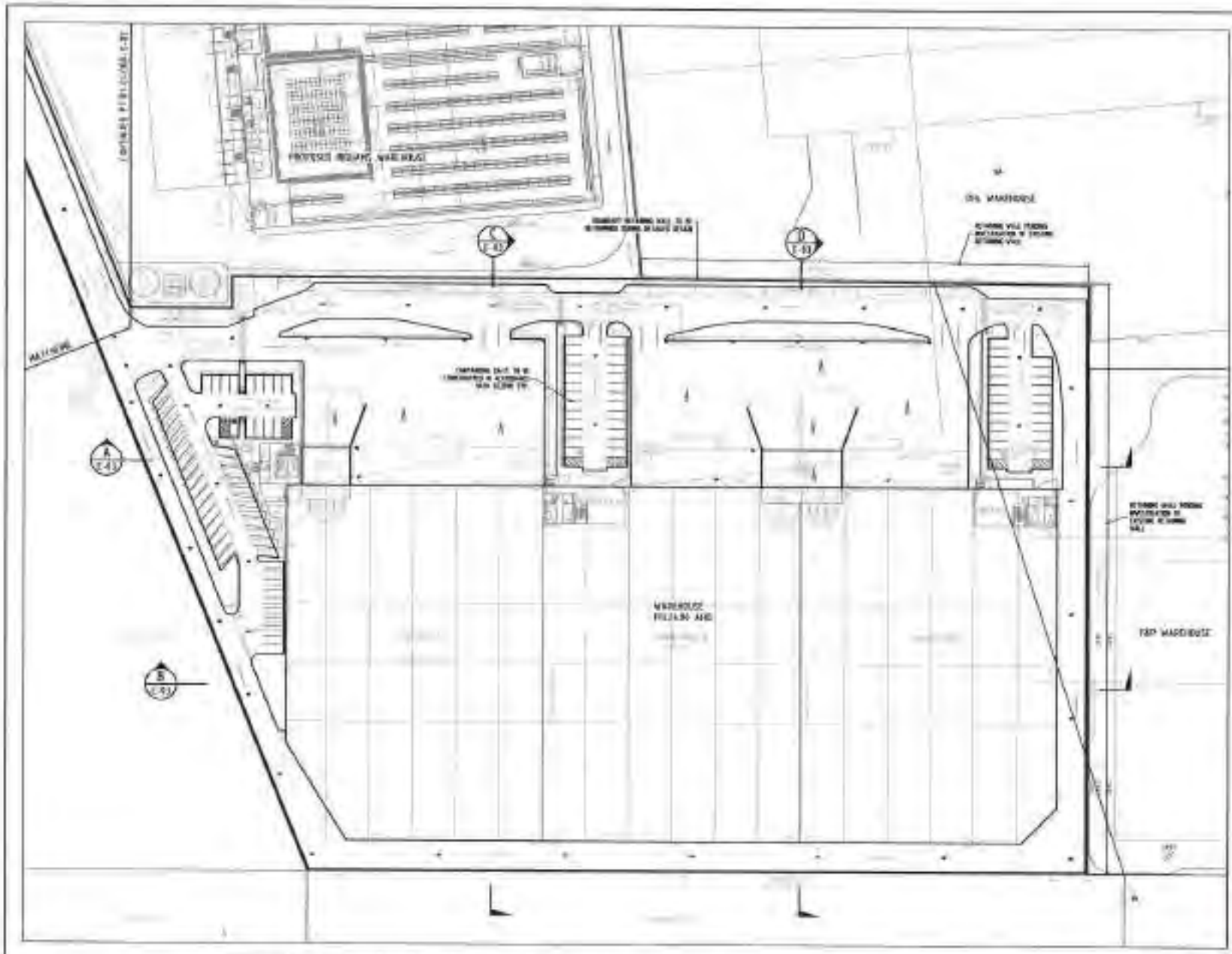

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SCALE OF METRES 1:500

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TE tadros engineering
CIVIL | HYDRAULIC | STRUCTURAL

CLIENT
LOGOS

LOCATION
LOT 151
FAIRAY ROAD
HAZELMERE WA

ENGINEERS SIGNATURE

SCALE 1:500
CO-ORD PCS94
SHT SIZE A1

NORTH

PROJECT
PT181 - WAREHOUSE & HAZELMERE

TITLE
CIVIL PAVEMENT EARTHWORKS
& RETAINING PLAN SHEET 1

SHT No. 1 of 2
DRG No. PT181-CI-DRG-E-01
A

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CIVIL | HYDRAULIC | STRUCTURAL

LOGOS

LOCATION
LOT 153
TALBOT ROAD
HAZELMERE WA

ENGINEERS SIGNATURE

SCALE: 1:500
CO-ORD REGN.
SHT SIZE: A1

NORTH

PROJECT
PT181 - WAREHOUSE & HAZELMERE

TITLE
CIVIL PAVEMENT EARTHWORKS
& RETAINING PLAN SHEET 2

SHT No. 2 OF 2 | DRG No. PT181-CI-DRG-E-02 | A

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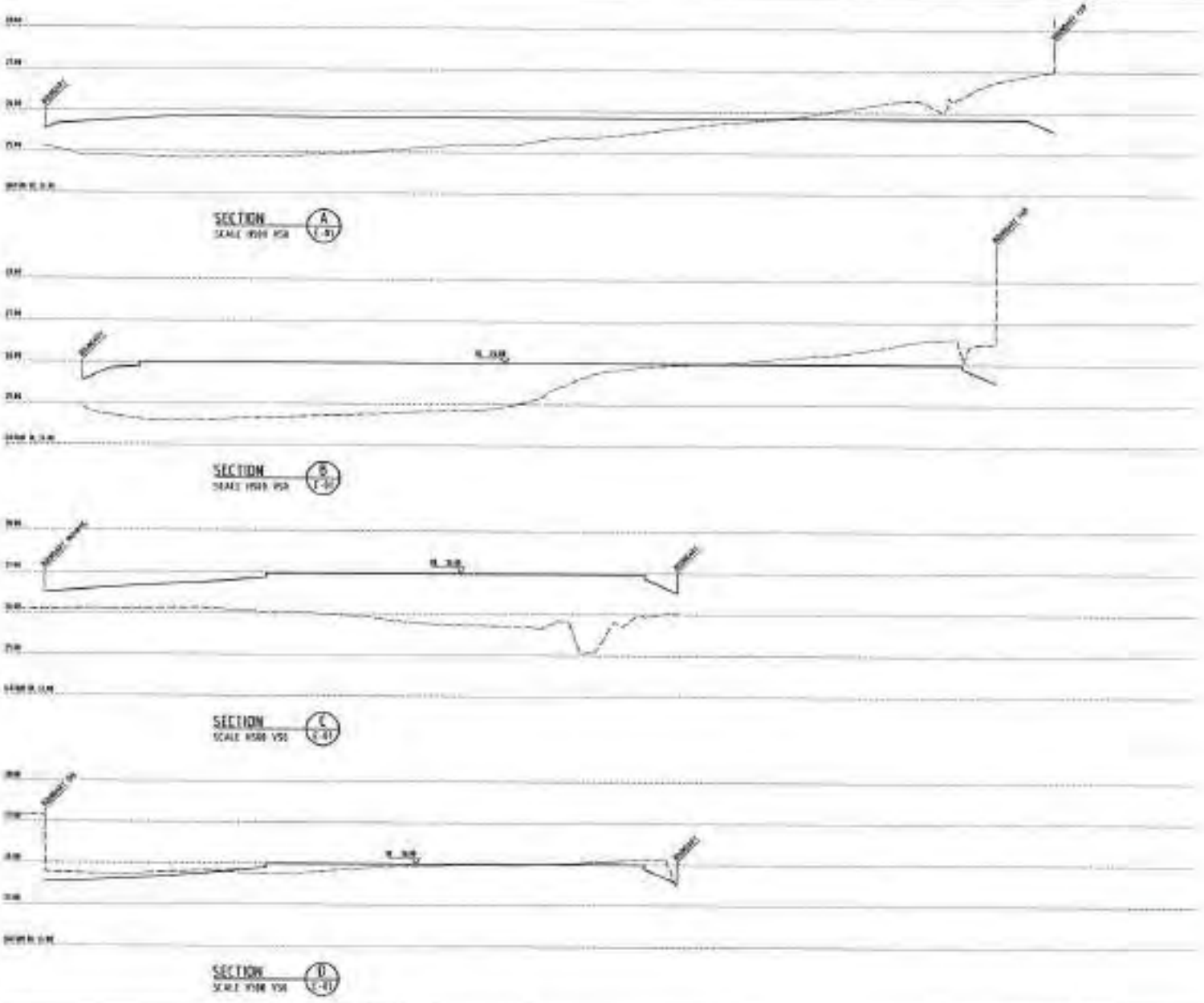

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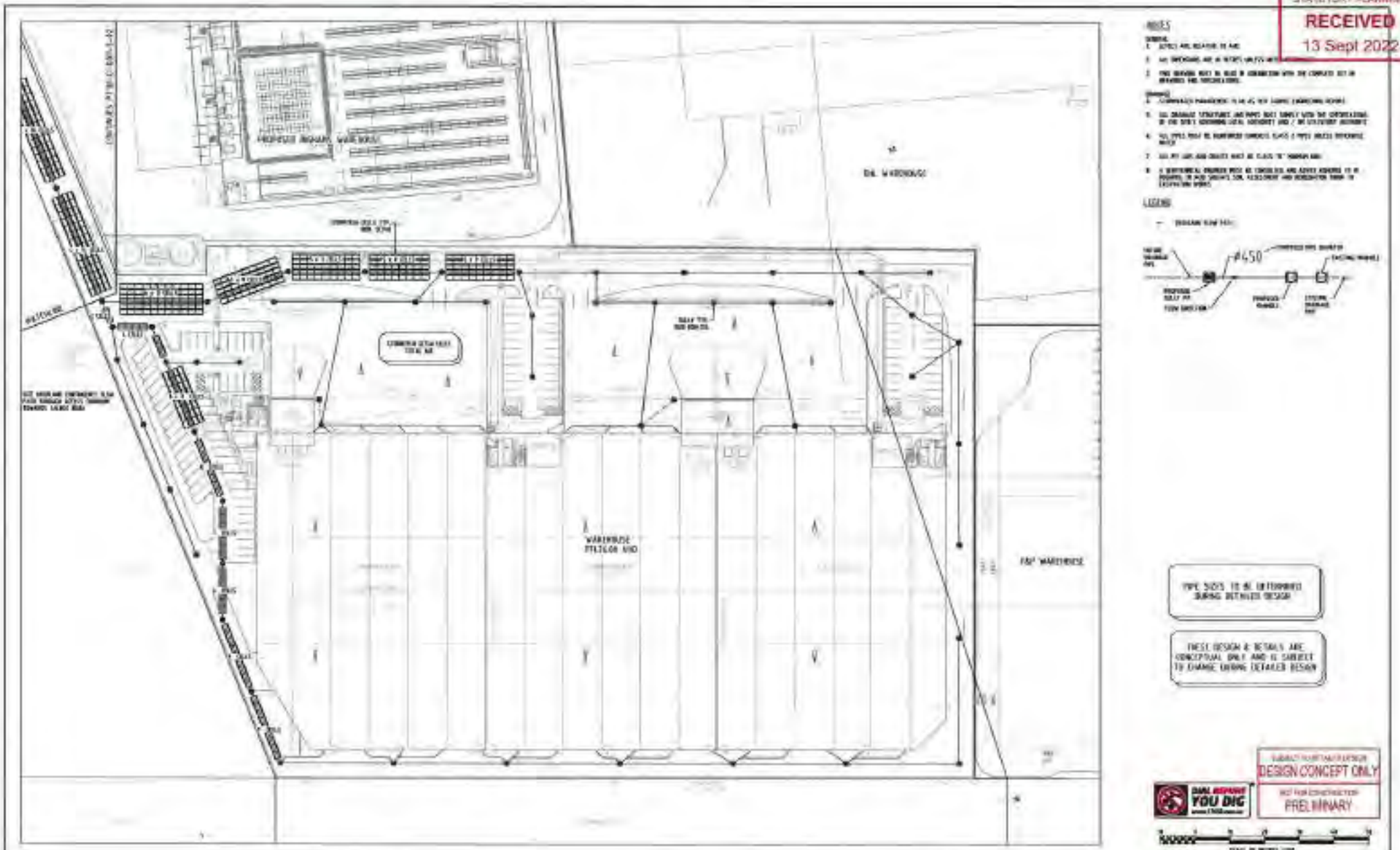

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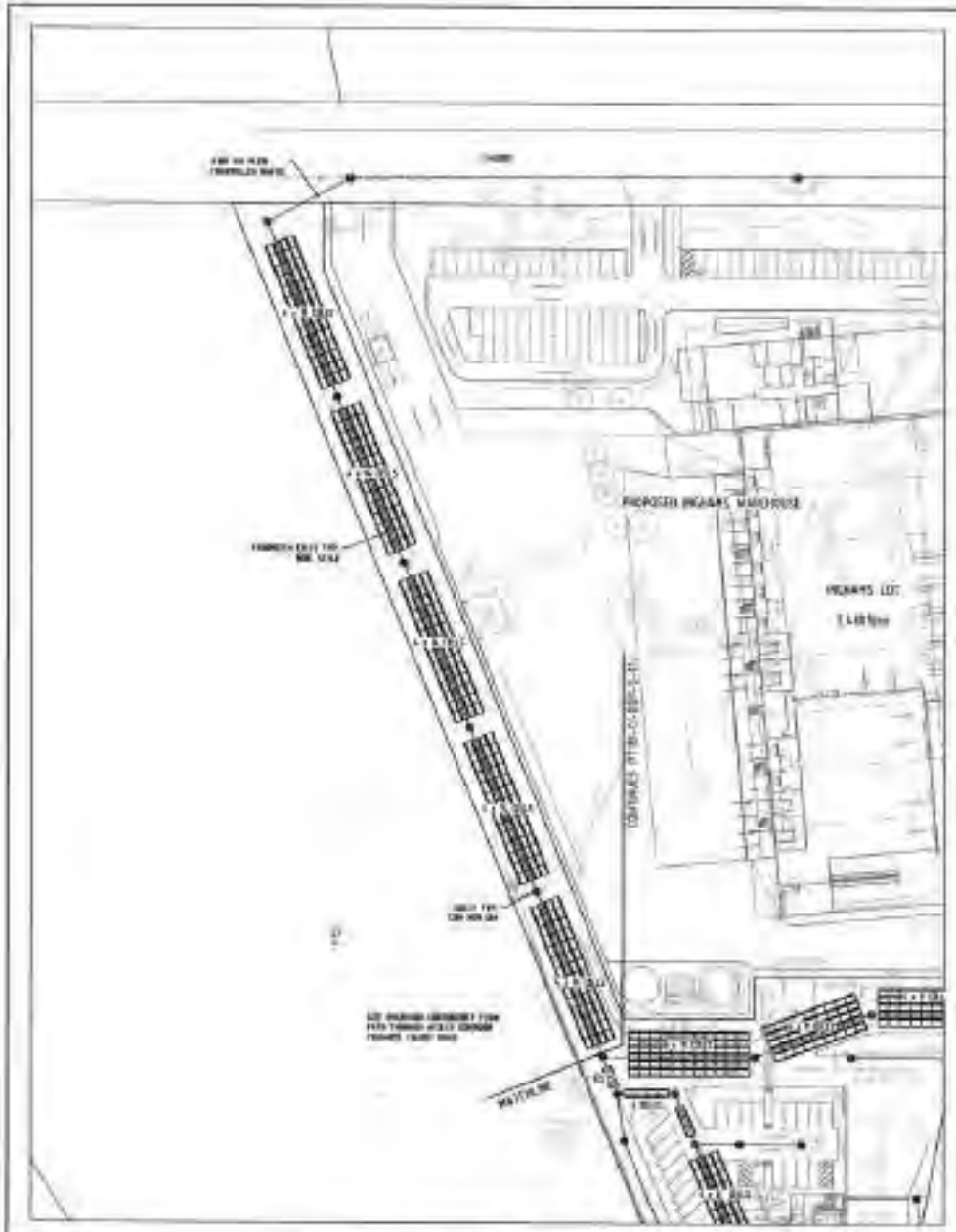

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CIVIL | HYDRAULIC | STRUCTURAL

CLIENT: LOGOS

LOCATION: LOT 150 FAIRBY ROAD HAZELMERE WA

ENGINEERS SIGNATURE

SCALE: 1:500
CD AND ACTIVE
SHT SIZE: A1

PROJECT: PT181 - WAREHOUSE & HAZELMERE

TITLE: CIVIL STORMWATER MANAGEMENT PLAN SHEET 2

SHT No. 2 of 2 | DWG No. PT181-CI-DRG-S-02 | A

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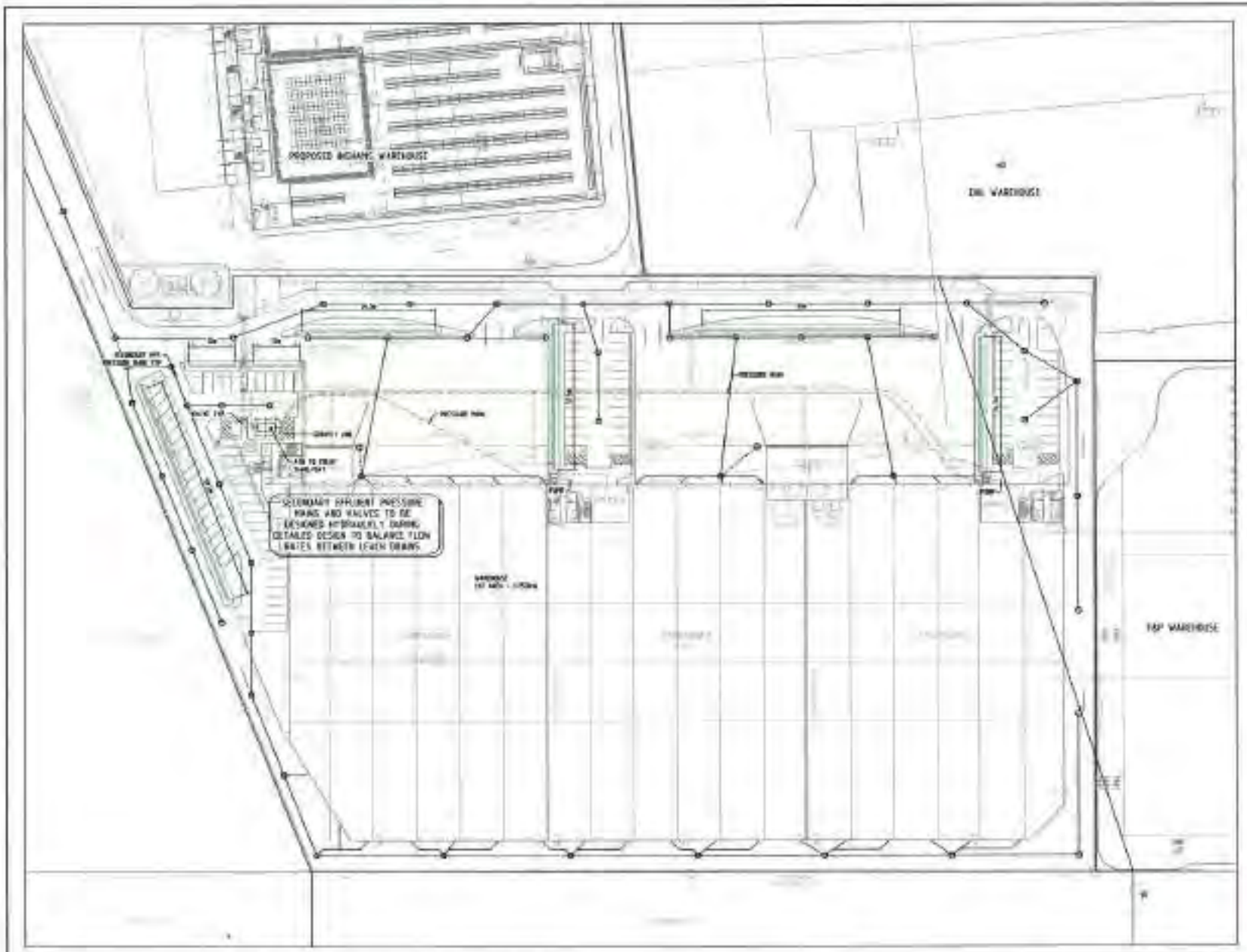

EFFLUENT DISPOSAL MANAGEMENT PLAN

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]

IRRIGATION AREA REQUIRED	
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
REQUIRED IRRIGATION AREA (m²)	[illegible]

LEGEND

[illegible]

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CIVIL | HYDRAULIC | STRUCTURAL

CLIENT: LOGOS

LOCATION: LOT 151, TALBOT ROAD, HAZELMERE WA

ENGINEERS SIGNATURE

SCALE: 1:500
CO-ORD: PT1/1
SHT SIZE: A1

NORTH

PROJECT: PT181 - WAREHOUSE & HAZELMERE

TITLE: HYDRAULIC EFFLUENT DISPOSAL PLAN

SHT No. 1 of 1 | DWG No. PT181-HY-DRG-S-01 | A

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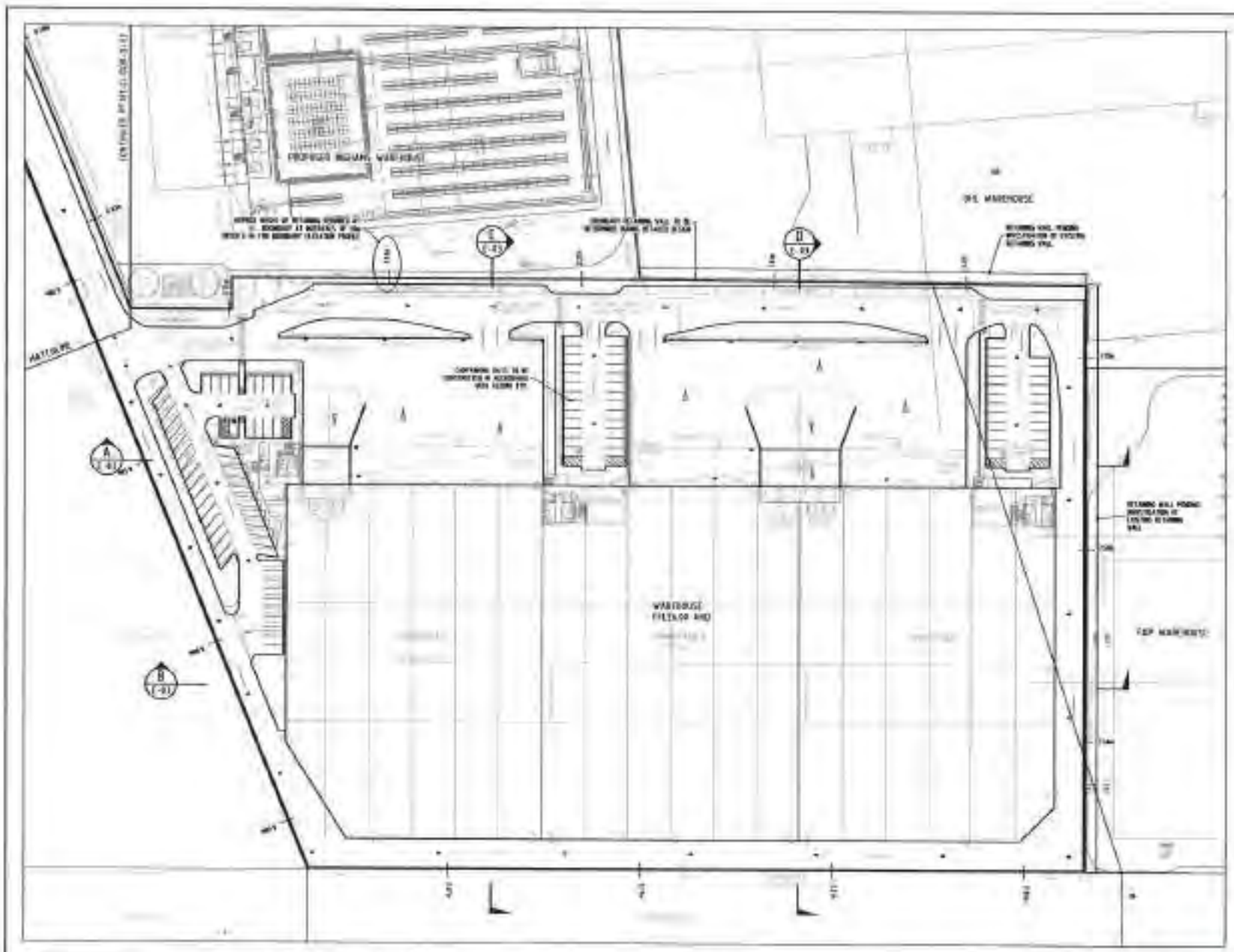

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CIVIL | HYDRAULIC | STRUCTURAL

CLIENT: LOGOS

LOCATION: LOT 153 TALBOT ROAD HAZELMERE WA

ENGINEERS SIGNATURE

SCALE: 1:500
CD-DRG PCDN
SHT SIZE: A1

NORTH

PROJECT: PT181 - WAREHOUSE & HAZELMERE

TITLE: CIVIL PAVEMENT EARTHWORKS & RETAINING PLAN SHEET 1

SHT No: 1 of 2 | DRG No: PT181-CI-DRG-E-01 | B

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CLIENT
LOGOS

LOCATION
LOT 151
TALBOT ROAD
HAZELMERE WA

ENGINEERS SIGNATURE

SCALE 1:500
CD-DRG-PC214
SHT SIZE: A1

NORTH

PROJECT
PT181 - WAREHOUSE & HAZELMERE

TITLE
CIVIL PAVEMENT EARTHWORKS
& RETAINING PLAN SHEET 2

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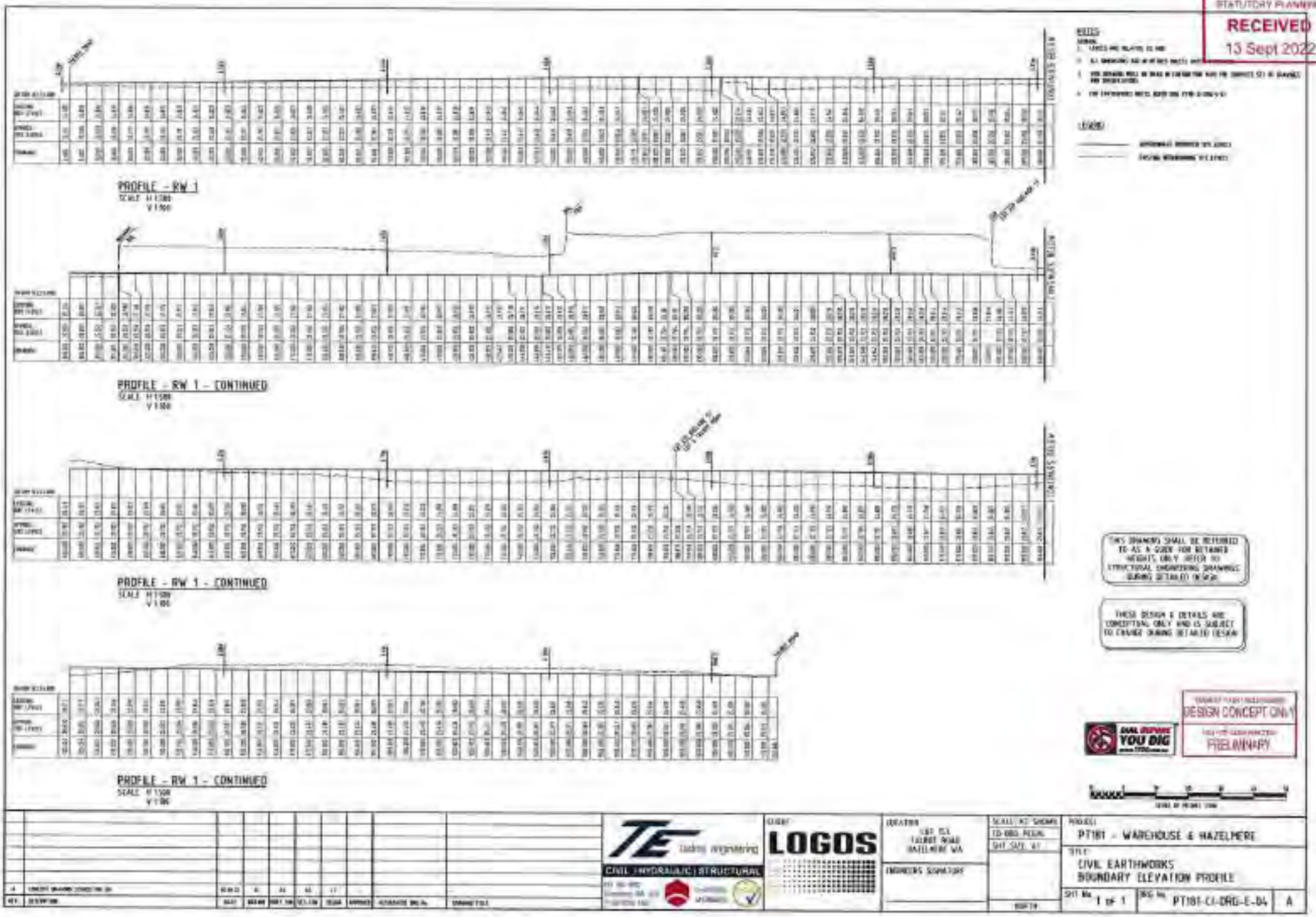

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APPENDIX B – EXTERNAL DOCUMENTATION

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Ecowater WA
Water Recycling Systems

FujiClean

Fuji Clean CE 12000Commercial System Specifications

CE 12000	Treatment capacity 12 kl/day
Installation	Subsurface
Configuration	2 x CE6000 with 11000lt buffer and 4000lt TET tank
Dimensions (L x W x H)	10000mm x 6000mm x 2215mm
CE 6000 Sedimentation chamber volume	4520
CE 6000 Anaerobic chamber volume	4511
CE 6000 Aerobic chamber volume	2006
CE 6000 Storage chamber	1009
CE 6000 Disinfection chamber	64
Expected Influent Quality*	BOD 200mg/L, TS 160mg/L, TN 45mg/L, TP 24mg/L
Treated Water Quality	
Biological Oxygen Demand	<10mg/L
Suspended Solids (SS)	<20mg/L
Thermal tolerant Coliforms	<10 CFU/ml
Total Phoshphorus	<10mg/L
Total Nitrogen	<20mg/L
Power Supply	240V Mains 16amp RCD
Blower Type	2 x MAC200N
Blower Power Supply	AC 240V,1.5A
Blower Power Usage	160W x 2
Daily Power Usage	7.6 kW-h
Effluent Pump	2 x Lowara vortex (80L/min)
Pump Power Consumption	750W x 2
Alarm type	Audio Visual/Strobe light
Maintenance	Quarterly
Estimated System Pumpout Frequency (Max load)	3-5 years

***Treated water quality parameters are conservatively based using high concentration commercial flows. Improved treated water quality can be expected at lower effluent concentrations.**

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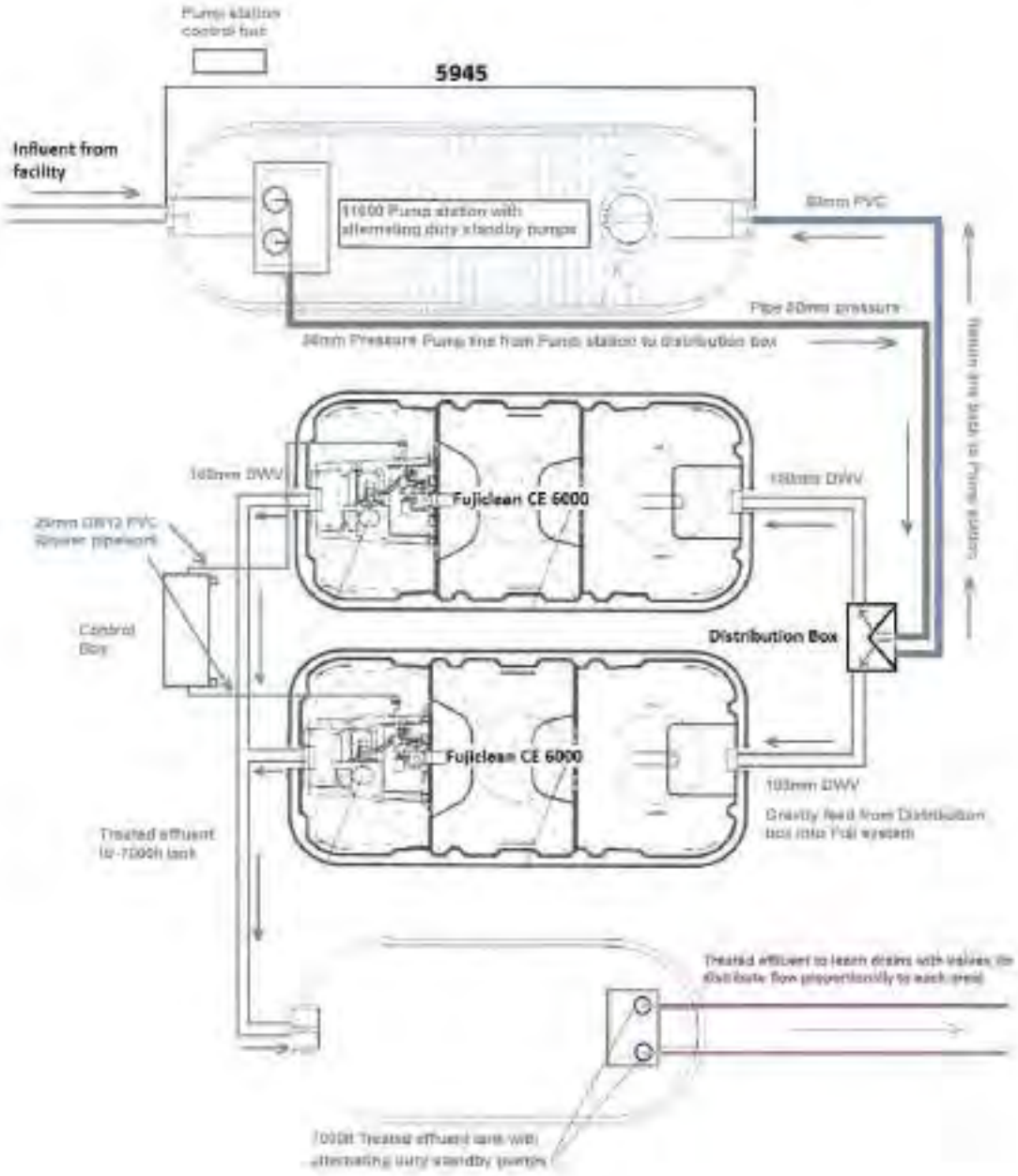
CE 12000 with 11000lt Pump station and 4000lt Treated Effluent tank



RELN >blackwater

THE ORIGINAL RAIN DRAIN TRENCHING. STILL THE BEST.



Jumbo
H: 410 W: 540 L: 1520mm Long

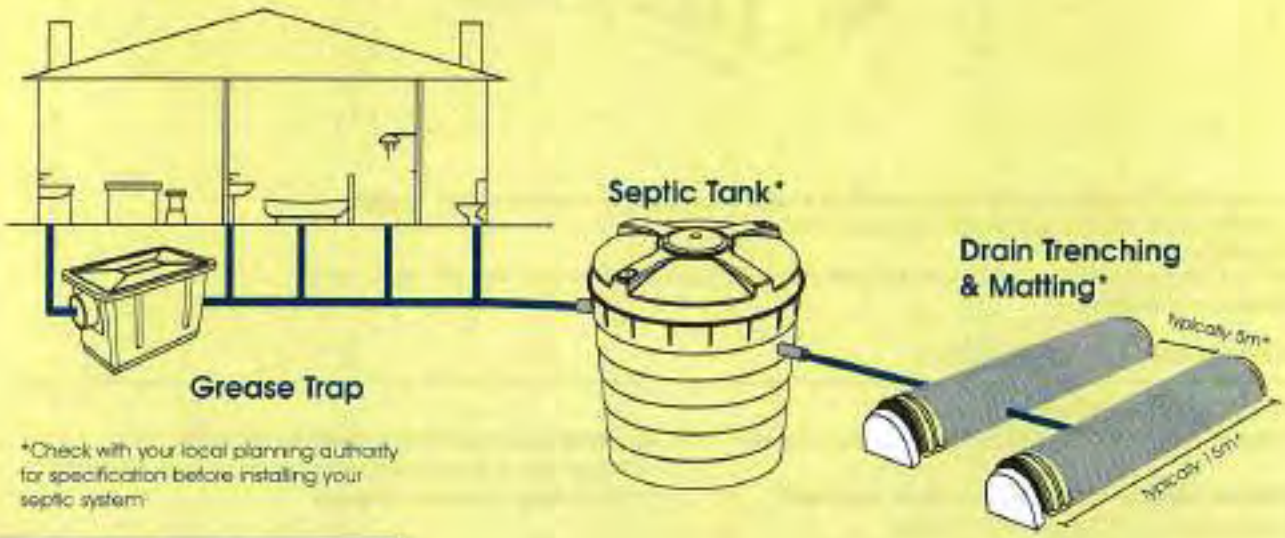
Large
H: 350 W: 535 L: 1520mm Long

Standard
H: 230 W: 515 L: 1520mm Long

RELN Drain Trenching

- S1547 Disposal Method Approved by health authorities in all Australian States and New Zealand
- Ideal for septic effluent, sullage waste or stormwater
- End caps for each size
- Australian Made out of tough, durable recycled plastic
- AS1547 requires RELN Drain Matting to be used when installing RELN Drain Trenching with RELN Septic Tanks

Longest Length in the market



*Check with your local planning authority for specification before installing your septic system

F Foundation L Landscape Y Yard

Blackwater Products

RELN.com.au

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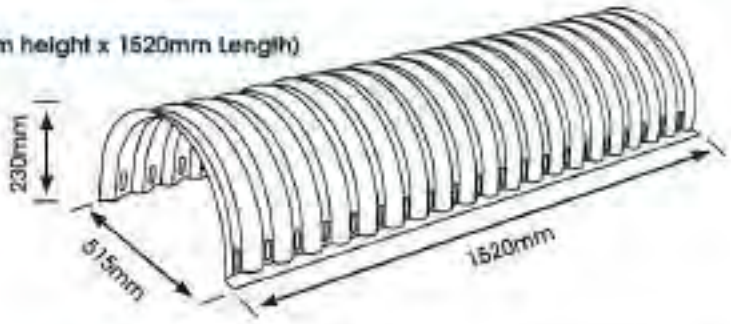
RELN >blackwater

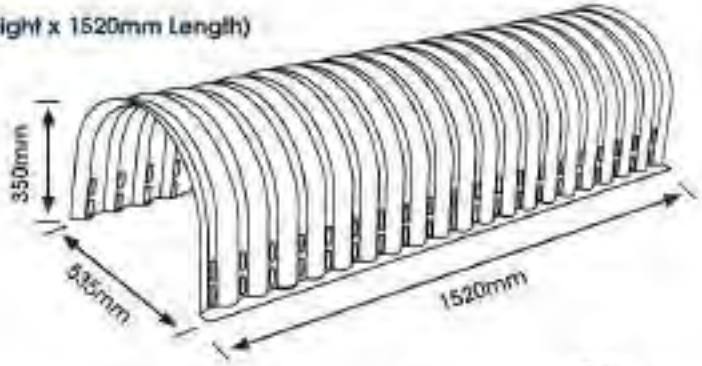
RELN Drain Trenching

RELN Drain Trenching was launched in 1968, and represented a breakthrough in trenching. The current range is made in Australia from strong and durable recycled plastic, and is available in three sizes, to suit every soil type. Ideal for septic effluent, sullage waste or stormwater.

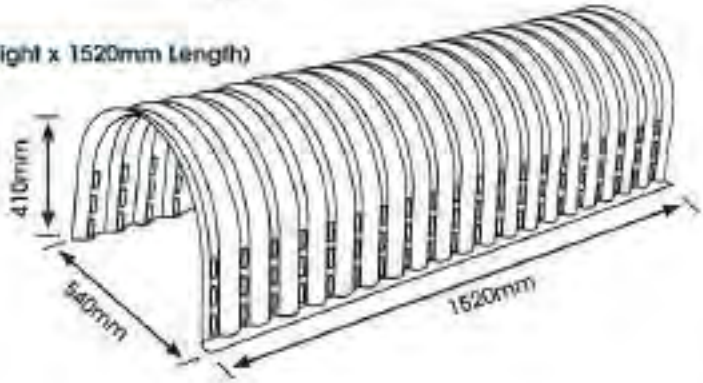
> Standard
(515mm width x 230mm height x 1520mm Length)



> Large
(535mm width x 350mm height x 1520mm Length)



> Jumbo
(540mm width x 410mm height x 1520mm Length)



- AS1547 Disposal Method Approved by health authorities in all Australian States and New Zealand
- Ideal for septic effluent, sullage waste or stormwater
- End caps for each size
- AS 1547 requires RELN Drain Matting to be used when installing RELN Drain Trenching with Septic Tanks

Display: Flyer Available

>Frequently Asked Questions

Q1. What size RELN Trenches do you have?
A. Standard 230mm, Large 350mm and Jumbo 410mm

Q2. What accessories can I get for RELN Trenches?
A. End caps and A12 glade drain matting

Q3. How much trench will I need for my job?
A. Please ask for guidance from your local council, especially when working with effluent disposal

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Standard, Large and Jumbo

Standard Drain - 230mm

Product Code: 000877

Weight: 2.6kg



9 319022 008774

Standard Drain - End Caps - 230mm

Product Code: 000891

Weight: 0.2kg



9 319022 008910

Large Drain - 350mm

Product Code: 000884

Weight: 3.8kg



9 319022 008842

Large Drain - End Caps - 350mm

Product Code: 000907

Weight: 0.5kg



9 319022 009078

Jumbo Drain - 410mm

Product Code: 000890

Weight: 4.5kg



9 319022 008903

Jumbo Drain - End Caps - 410mm

Product Code: 000895

Weight: 0.6kg



9 319022 008958

The Original Reln Drain Trenching. Still the best.

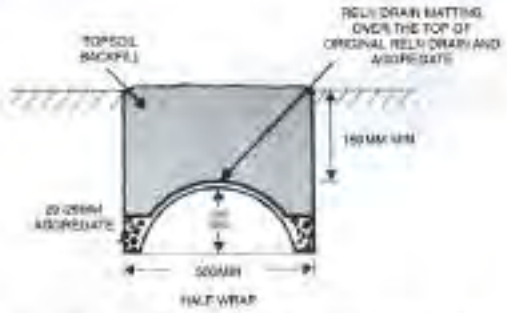


Blackwater Products

1300 137 356

RELN

Method of Installations





1. Dig trenches to suit your Rein Drain installation. Trenches should be level along the contour of the land to provide a uniform loading of liquid to the soil. Trenches must be at least 150 mm deeper than the top of the Rein Drain and deep enough to allow the required fall for pipework. On sloping land the first trench of Rein Drain should be fully utilised before overflowing into the next Rein Drain trench.

2. Where required, cut an inlet hole suitable to accept the 100mm effluent inlet pipe in the top of the Rein Drain.

3. Completely wrap Rein Drain in Rein Drain Matting (2m x 6m pack) and lay Rein Drain in trench. Ensure each length of Rein Drain overlaps to join. (Alternatively Rein Drain can be layed straight into the base of the trench). 20mm - 40mm size aggregate laid along outside edge of drain to cover drainage slots then half wrap with Rein Drain Matting (600mm x 6m pack).

4. Fit Rein Drain End Caps at each end. Cover End Caps with Rein Drain Matting.

5. Install inlet pipe to Rein Drain.

6. Cover trench with topsoil making suitable allowance for settlement.

7. Rein Drain Matting makes trench or slot drains impervious to external fines. Therefore Rein Drain Matting can extend the life of your effluent drainage system.

8. Saves time and money, when Original Rein Drain is completely wrapped in Rein Drain Matting, aggregate/blue metal ***is not*** required.

Always consult your local authorities when installing drainage systems.
Australian Standards 1547 requires matting is used on all effluent disposal systems.
Do not subject to vehicular traffic.

Technical Specifications. Approximate sizes:

	Jumbo (410mm)	Large Drain (350mm)	Standard Drain (230mm)
Height	410mm	350mm	230mm
Length	1520mm	1520mm	1520mm
External Width	550mm	594mm	515mm
Internal Width	460mm	533mm	460mm
Storage Capacity	260 Litres	227Litres	120Litres
Weight	21kg per bundle of 5	19kg per bundle of 5	22kg per bundle of 10
	Large End Cap	**Large End Cap**	**Standard End Cap**
Height	425mm	365mm	230mm
Width	585mm	585mm	545mm

Visit us @ www.reln.com.au

Rein Plastics 14B Williamson Road, Ingleburn, NSW 2565
Telephone 02 9605 9999 Fax 02 9605 9222.

RELN >blackwater

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7. BUSHFIRE ATTACK LEVEL ASSESSMENT

Modus Compliance

(SITE doc ref: 220912 Modus BAL-BMS - C22-1059 - Lot 153 Talbot)

Document Set ID: 7363023
Version: 10, Version Date: 17/11/2022

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STRATEGIC PLANNING
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AS 3959 Bushfire Attack Level Assessment

modus compliance pty ltd

Site Details

Prepared for:	Logos
Address:	Lot 152 & 153 Talbot Road, Hazelmere
Local Government Area:	City of Swan
Description of Building Works:	Class 5/7B Office/Warehouse

Report Details

Modus Ref:	C22-1059
Report Revision:	1
Report Date:	02/09/2022

Assessment Details

Assessment Date:	02/09/2022
Indicative BAL Rating:	29
Applicable Construction:	AS 3959-2018 Section 3 & 7, construction requirements listed in Appendix 5 of this document
BAL Exposure Level:	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing heat flux

Unit 13
127 Herdsman Parade
Wembley
WA 6014
PO Box 222
Como WA 6952
t 08 9444 5922
w www.modcom.net.au
e info@modcom.net.au

Certified By

Matthew Sobelik
BPAD – Level 1
Accreditation No BPAD36534

BMS Reviewed & Checked By

Rene Hutter
Xero Fire
BPAD - Level 2
Accreditation No BPAD38247

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East Savings 2015

2013 INDUSTRY AWARD
AIBS
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Modus Compliance Pty Ltd
ABN 86 144 967 920
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Disclaimer, Exclusions and Limitations

The purpose of this Bushfire Attack Level (BAL) Assessment is to analyse the bush fire risk and threat level of the proposed development and to detail the required construction methods under AS 3959-2018 Construction of Buildings in Bushfire Prone Areas (as amended). BAL Assessment is calculated in accordance with AS 3959.

AS 3959-2018 Methodology One (1) was used for the determination of the assessment. It is expressly stated that MODUS and the writer do not guarantee that if such standards are complied with or if a property owner exercises prudence, that a building or property will not be damaged of that lives will not be lost in a bush fire. All surveys, forecasts, projections and recommendations made in this assessment associated with the proposal are made in good faith based on information available to MODUS at the time.

Fire is an extremely unpredictable force of nature. Changing climatic factors (whether predictable or otherwise) either before or at the time of a fire can also significantly affect the nature of a fire and in a bushfire prone area it is not possible to completely guard against a bushfire.

Further, the growth, planting or removal of vegetation; poor maintenance of any fire prevention measures; addition of temporary or permanent structures, vehicles or other combustible fuel sources not included in this report; or other activity can and will change the bushfire threat to all structures detailed in the report. Further, the achievement of the level of implementation of fire precautions will depend on the actions of the landowner or occupiers of the land, over which Modus Compliance has no control.

If the client becomes concerned about changing factors then a new Bushfire Attack Level assessment should be requested.

To the maximum extent permitted by the law, Modus Compliance, its employees, officers, agents and the writer ("Modus Compliance") excludes all liability whatsoever for:

1. Claim, damage, loss or injury to any property and any person caused by fire or as a result of fire or indeed howsoever caused;
2. Errors or omissions in this report except where grossly negligent; and

By engaging Modus Compliance Pty Ltd to undertake a BAL assessment the client acknowledges that they have been made aware of these exclusions and that such exclusions of liability are reasonable in all circumstances.

Modus Compliance maintains professional indemnity insurance. Should Modus Compliance be notified of a claim against the company, or notified of an event that could potentially give rise to a claim against the company, Modus is required to notify the company's insurers for instructions.

This BAL assessment is not a Bushfire Management Plan. Should a Bushfire Management Plan

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be required a separate report is required. This BAL assessment in no way certifies that the dwelling has been constructed in accordance with the required BAL rating. Should the nature of vegetation and other threats within 100m of the site change following assessment, this assessment will become invalid and a new assessment is required.

In submitting this report, the client acknowledges they understand, accept, and will comply with all requirements to maintain the critical required separation distances detailed in this report. Further the client acknowledges and accepts all responsibility for ongoing maintenance of the required asset protection zone noted in appendix 6 and building protection zone to maintain a low fuel state as defined in AS 3959:2018 s2.2.3.2(f).

This report is valid for a period of **12 months only** from the date of assessment.

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Site Assessment

The assessment of this site / development was undertaken on Day / Month / Year by a BPAD Accredited Practitioner for the purpose of determining the Bushfire Attack Level in accordance with AS 3959-2018 Simplified Procedure (Method 1).



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Vegetation Classification

All vegetation within 100m of the site / proposed development was classified in accordance with Clause 2.2.3 of AS 3959-2018. Each distinguishable vegetation plot with the potential to determine the Bushfire Attack Level is identified below.

Plot	A	Classification or Exclusion Clause	Class B Woodland

Description / Justification for Classification

Trees 10-30m high, foliage cover up to 30%, understorey contains grasses, shrubs other smaller trees



Photo ID: 1



Photo ID: 2

Plot	B	Classification or Exclusion Clause	Class G Grassland

Description / Justification for Classification

Grass over 100mm high, overstorey foliage less than 10%



Photo ID: 3



Photo ID: 4

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Plot	B	Classification or Exclusion Clause	Class G Grassland

Description / Justification for Classification

Grass over 100mm high, overstorey foliage less than 10%



Photo ID: 5



Photo ID: 6

Plot	C	Classification or Exclusion Clause	Class G Grassland

Description / Justification for Classification

Grass over 100mm high, overstorey foliage less than 10%



Photo ID: 7



Photo ID: 8

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Relevant Fire Danger Index

The fire danger index for this site has been determined in accordance with Table 2.1 or otherwise determined in accordance with a jurisdictional variation applicable to the site

Fire Danger Index			
FDI 100 ☐	FDI 80 ☑	FDI 50 ☐	FDI 40 ☐
Table 2.4	Table 2.5	Table 2.6	Table 2.7

Potential Bushfire Impacts

The potential bushfire impact to the site / proposed development from each of the identified vegetation plots are identified below

Plot	Vegetation Classification	Effective Slope	Separation (m)	BAL
A	Class B Woodland	All Upslopes and Flat Land	22.9	**19**
B	Class G Grassland	All Upslopes and Flat Land	8.0	**29**
C	Class G Grassland	All Upslopes and Flat Land	8.0	**29**

Table 1: BAL Analysis

Indicative Bushfire Attack Level (BAL)

The indicative bushfire attack level (highest BAL) for the site/proposed development has been determined in accordance with clause 2.2.6 of AS 3959-2018 using the above analysis and the Bushfire Management Statement in appendix 6 of this report.

Indicative Bushfire Attack Level	**BAL 29**

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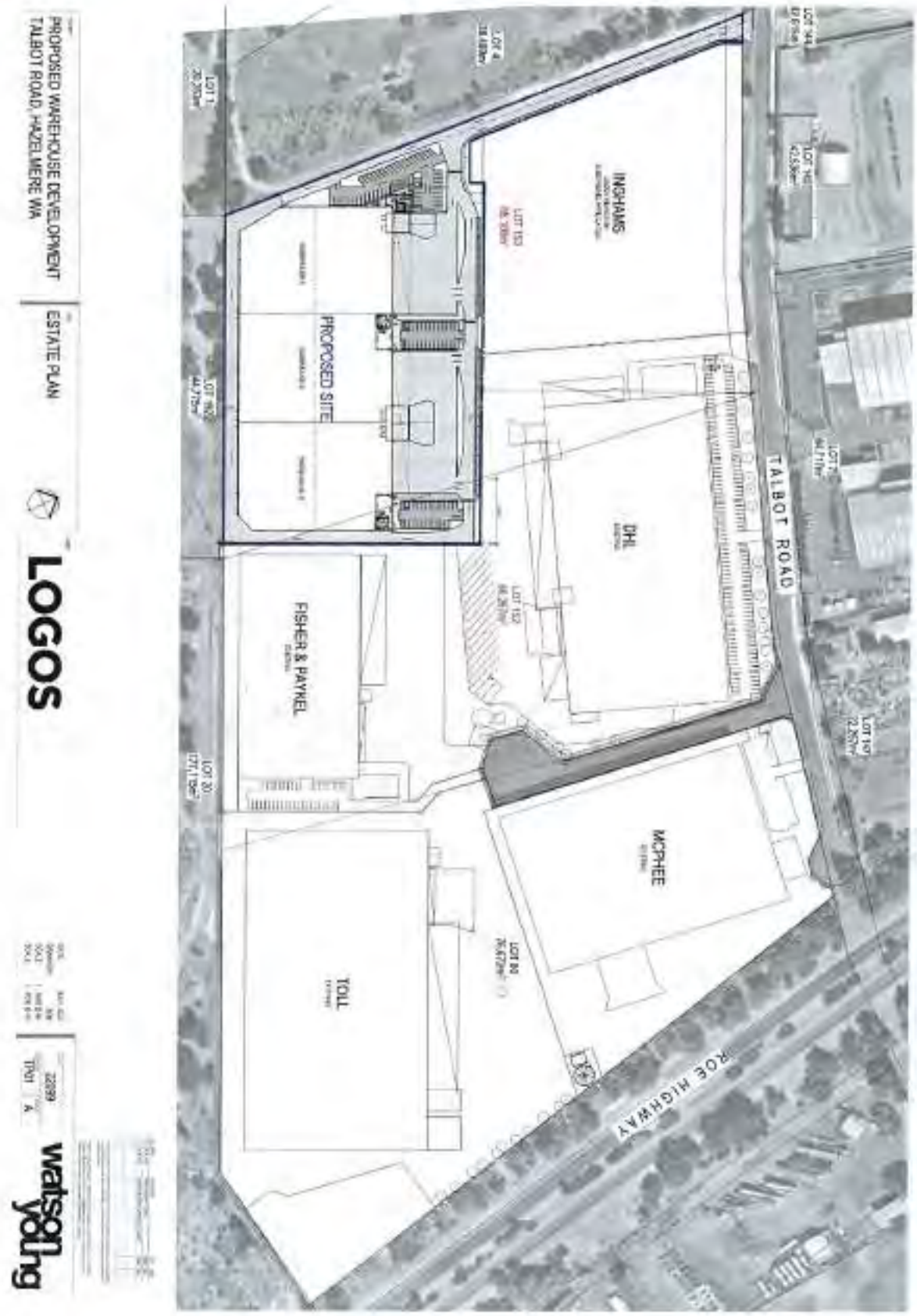
Appendix 1 - Proposed Works



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Appendix 2 - Additional Information/Advisory Notes

Vegetation Classification

Vegetation shall be classified in accordance with Table 2.3 and Figures 2.4(A) to 2.4(G). Where there is more than one vegetation type, each type shall be classified separately with the worst case scenario (predominant vegetation is not necessarily the worst case scenario) applied.

2.2.3.2 *Exclusions - Low threat vegetation and non-vegetated areas*

The Bushfire Attack Level shall be classified BAL - LOW where the vegetation is one or a combination of any of the following:

(a) Vegetation of any type that is more than 100m from the site

(b) Single areas of vegetation less than 1ha in area and not within 100m of other areas of vegetation being classified

(c) Multiple areas of vegetation less than 0.25ha in area and not within 20m of the site, or each other

(d) Strips of vegetation less than 20m in width regardless of length and not within 20m of the site, or each other, or other areas of vegetation being classified

(e) Non-vegetated areas, including waterways, roads, footpaths, buildings and rocky outcrops

(f) Low threat vegetation, including grassland managed in a minimal fuel condition, maintained lawns, golf courses, maintained public reserves, vineyards, orchards, cultivated gardens, commercial nurseries, nature strips and windbreaks

Table 2.3 Classification of Vegetation

Vegetation Classification	Vegetation Type	Description
A Forest	Tall open forest Tall woodland	Trees over 30m high; 30-70% foliage cover. Found in areas of high reliable rainfall. Typically dominated by eucalyptus
	Open forest Low open forest	Trees 10-30m high; 30-70% foliage cover. Typically dominated by eucalyptus
	Pine Plantation	Trees 10-30m in height at maturity, generally compromising Pinus species or other softwood pieces, planted as a singled species
B Woodland	Woodland Open Woodland	Tress 10-30m high; 10-30% foliage cover dominated by eucalyptus; understorey or low trees to tall shrubs
	Low woodland Low open woodland Open shrubland	Low trees and shrubs 2-10m high; foliage cover less than 10%. Dominated by eucalyptus and Acacias. Often have a grassy understorey or low shrubs
C Shrubland	Closed heath Open heath	Found in wet areas and/or areas affected by poor soil fertility or shallow soils. Shrubs 1-2m high
	Low shrubland	Shrubs <2m high; greater than 30% foliage cover. Understorey may contain grasses

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D Scrub	Closed scrub	Found in wet areas and/or areas affected by poor soil fertility or shallow soils; >30% foliage cover. Shrubs >2m high
	Open scrub	Shrubs greater than 2m high; 10-30% foliage cover with a mixed species composition
E Mallee/ Mulga	Tall shrubland	Vegetation dominated by shrubs with a multi-stemmed habit; usually greater than 2m in height; <30% foliage cover. Understorey of widespread to dense low shrubs or sparse grasses
F Rainforest	Tall closed forest Closed forest Low closed forest	Trees 10-40m in height; >90% foliage cover; understorey may contain a large number of species with a variety of heights
G Grassland	Low open shrubland Tussock grassland Hummock grassland Herbfield	All forms, including situations with shrubs and trees, if the overstorey foliage cover is less than 10%

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Appendix 3 - Additional Information/Advisory Notes

Bushfire Attack Level Assessment Explained

A Bushfire Attack Level (BAL) Assessment is a means of measuring the severity of a buildings potential exposure to ember attack, radiant heat and direct flam contact in a bushfire event, and thereby determining the construction measures required for the dwelling.

The methodology used for the determination of the BAL rating, and the subsequent building construction standards, are directly referenced from Australian Standard AS 3959-2018 Construction of buildings in bushfire prone areas.

The BAL rating is determined through identification and assessment of the following parameters:

- Fire Danger Index (FDI) rating; assumed to be FDI-80 for WA;
- All classified vegetation within 100m of the subject building;
- Separation distance between the building and the classified vegetation source/s; and
- Slope of the land under the classified vegetation.

AS 3959-2018 has six (6) levels of BAL, based on the radiant heat flux exposure to the building, and also identifies the relevant sections for building construction, as detailed below:

Bushfire Attack Level (BAL)	Heat flux exposure thresholds	Description of predicted bushfire attack and levels of exposure	Construction Section (within AS 3959)
BAL Low	See clause 2.2.3.2	There is insufficient risk to warrant specific construction requirements	4
BAL 12.5	≤ 12.5kW/m²	Ember attack	3 & 5
BAL 19	> 12.5kW/m² ≤ 19kW/m²	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing heat flux	3 & 6
BAL 29	> 19kW/m² ≤ 29kW/m²	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing heat flux	3 & 7
BAL 40	>29kW/m² ≤ 40kW/m²	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing heat flux with the increased likelihood of exposure to flames	3 & 8
BAL FZ	> 40kW/m²	Direct exposure to flames from the front in addition to heat flux and ember attack	3 & 9

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Appendix 4 - Separation Information

Required Separations To Reduce BAL Rating

The BAL rating for this property has been assessed as a BAL 29. There may be an opportunity to reduce the BAL rating either through repositioning of the house on the site or additional clearing of vegetation. Clearing of vegetation may require council approval, it is advised that you check with your local authority before any clearing takes place.

The table below contains the minimum separations required for the stated BAL ratings. Each vegetation plot must meet the minimum separation listed to achieve the stated BAL. For example for the property to achieve a BAL of 19 the following separations would need to be maintained; Plot A 20.0m, Plot B 12.0m, Plot C 12.0m. To confirm the reduced BAL Modus Compliance would need to receive an amended site plan confirming the change in location of the house, or re-visit the site to confirm the required clearing has taken place.

Plot	Vegetation Classification	Current Separation (m)	BAL	Required Separations for Reduced BAL (m)		
				19	12.5	Low
A	Class B Woodland	22.9	**19**	20.0	29.0	100.0
B	Class G Grassland	8.0	**29**	12.0	17.0	50.0
C	Class G Grassland	8.0	**29**	12.0	17.0	50.0

Additionally the shielding provisions set out in Section 3.5 of AS 3959-2018 can be applied to the building to reduce the BAL requirements of an elevation which is not exposed to the source of bushfire attack. An elevation is deemed to not be exposed to the source of bushfire attack if all of the straight lines between the elevation and source of bushfire attack are obstructed by another part of the building. Only the construction requirements of the next lower BAL can be applied to that elevation, if a building has a BAL of 12.5 then a shielded elevation cannot be reduced to BAL Low.

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Appendix 5 - Construction Requirements

Section 7 BAL - 29

7.1 GENERAL

A building assessed in section 2 as being BAL-29 shall conform with section 3 and clauses 7.2 to 7.8

Any element of construction or system that satisfies the test criteria of AS 1530.8.1 may be used in lieu of the applicable requirements contained in clauses 7.2 to 7.8 (see clause 3.8)

7.2 SUB-FLOOR SUPPORTS

This standard does not provide construction requirements for subfloor supports where the subfloor space is enclosed with -

(a) A wall that conforms with clause 7.4, except that sarking is not required where specified in clause 7.4.1(c); or

(b) A mesh or perforated sheet with a maximum aperture of 2mm, made of corrosion-resistant steel, bronze or aluminium; or

(c) A combination of items (a) and (b)

Where the subfloor space is unenclosed, the support posts, columns, stumps, piers and poles shall be -

(i) Of non-combustible material; or

(ii) Of bushfire-resisting timber (see Appendix F); or

(iii) A combination of items (i) and (ii)

7.3 FLOORS

7.3.1 General

This standard does not provide construction requirements for concrete slabs on the ground

7.3.2 Elevated floors

7.3.2.1 *Enclosed subfloor space*

This standard does not provide construction requirements for elevated floors, including bearers, joists and flooring, where the subfloor space is enclosed with -

(a) A wall that conforms with clause 7.4; except that sarking is not required where specified in clause 7.4.1(c); or

(b) A mesh or perforated sheet with a maximum aperture of 2mm, made of corrosion-resistant steel, bronze or aluminium; or

(c) A combination of items (a) and (b)

7.3.2.2 *Unenclosed subfloor space*

Where the subfloor space is unenclosed, the bearers, joists and flooring, less than 400mm above finished ground level, shall be one of the following:

(a) Materials that conform with the following:

(i) Bearers and joists shall be -

(A) Non-combustible; or

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(B) Bushfire-resisting timber (see Appendix F); or
(C) A combinations of items (A) and (B)

(ii) Flooring shall be -
(A) Non-combustible; or
(B) Bushfire-resisting timber (see Appendix F); or
(C) Timber (other than bushfire-resisting timber), particleboard or plywood flooring where the underside is lined with sarking-type material or mineral wool insulation; or
(D) A combination of any of items (A), (B) or (C); or

(b) A system conforming with AS 1530.8.1

This standard does not provide construction requirements for elements of elevated floors, including bearers, joists and flooring, if the underside of the element is 400mm or more above finished ground level

7.4 WALLS

7.4.1 General

The exposed components of external walls shall be as follows:

(a) Non-combustible material including the following provided with minimum thickness is 90mm:
(i) Full masonry or masonry veneer walls with an outer leaf of clay, concrete, calcium silicate or natural stone
(ii) Precast or in situ walls of concrete or aerated concrete
(iii) Earth wall including mud brick; or

(b) Timber logs of a species with a density of 680kg/m^3 or greater at a 12% moisture content; of a minimum nominal overall thickness of 90mm and a minimum thickness of 70mm (see clause 3.11); and gauge planed; or

(c) Cladding that is fixed externally to a timber-framed or a steel-framed wall that is sarked on the outside of the frame, and is -
(i) Fibre-cement a minimum of 6mm in thickness; or
(ii) Steel sheet; or
(iii) Bushfire-resisting timber (see Appendix F); or
(iv) A combination of any of items (i), (ii) or (iii)

(d) A combination of any of items (a), (b) or (c) above

7.4.2 Joints

All joints in the external surface material of walls shall be covered, sealed, overlapped, backed or butt-jointed

7.4.3 Vents and weepholes

Except for exclusions provided in clause 3.6, vents and weepholes in external walls shall be screened with a mesh made of corrosion-resistant steel, bronze or aluminium

7.5 EXTERNAL GLAZED ELEMENTS, ASSEMBLIES AND DOORS

7.5.1 Bushfire shutters

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Where fitted, bushfire shutters shall conform with clause 3.7 and be made from –

(a) Non-combustible material; or
(b) Bushfire-resisting timber (see Appendix F); or
(c) A combination of any of items (a) and (b)

7.5.2 Screens for windows and doors

Where fitted, screens for windows and doors shall have a mesh or perforated sheet made of corrosion-resistant steel, bronze or aluminium

The frame supporting the mesh or perforated sheet shall be made from -

(a) Metal; or
(b) Bushfire-resisting timber (see Appendix F)

Screen assemblies shall be attached using metal fixings

7.5.3 Windows and sidelights

Windows assemblies shall:

(a) Be completely protected by a bushfire shutter conforming with clause 3.7 and clause 7.5.1; or
(b) Conform with the following:
    (i) *Frame material* Window frames and window joinery shall be made from –
        (A) Bushfire-resisting timber (see Appendix F); or
        (B) Metal; or
        (C) Metal-reinforced uPVC. The reinforcing members shall be made from aluminium, stainless steel, or corrosion-resistant steel
    (ii) *Hardware* Externally fitted hardware that supports the sash in its functions of opening and closing shall be metal

    Trims or other components may use material other than metal
    (iii) *Glazing* Glazing shall be toughened glass a minimum of 5mm thickness or glass blocks with no restriction on glazing methods
    (iv) *Seals and weather strips* There are no specific requirements for seals and weather strips at this BAL level
    (v) *Screens* Where glazing is less than 400mm from the ground or less than 400mm above decks, carport doors, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110mm in width from the window frame, the glazing shall be screened externally with a screen that conforms with clause 3.6 and clause 7.5.2
    (vi) *In all other cases except for Clause 7.5.3(b)(v)* The openable portions of windows shall be screened internally or externally with screens that conform with clause 3.6 and clause 7.5.2

7.5.4 Doors – Side-hung external doors (including french doors, panel fold and bi-fold doors)

Side-hung external doors, including french doors, panel fold and bi-fold doors, shall –

(a) Be completely protected by bushfire shutters that conform with clause 3.7 and clause 7.5.1; or

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(b) Be completely protected externally by screens that conform with clause 3.6 and clause 7.5.2; or

(c) Conform with the following:

(i) *Door panel material* Materials shall be -

(A) Non-combustible; or

(B) A solid timber, laminated timber or reconstituted timber door, having a minimum thickness of 35mm for the first 400mm above the threshold; or

(C) For fully framed glazed door panels, the framing shall be made from metal or from bushfire-resisting timber (see Appendix F) or uPVC

(ii) *Door frame material* Door frame materials shall be -

(A) Bushfire-resisting timber (see Appendix F); or

(B) Metal; or

(C) Metal-reinforced uPVC. The reinforcing members shall be made from aluminium, stainless steel, or corrosion-resistant steel

(iii) *Hardware* Externally fitted hardware that supports the panel in its functions of opening and closing shall be metal

(iv) *Glazing* Where doors incorporate glazing, the glazing shall be toughened glass a minimum of 6mm in thickness

(v) *Seals and weather strips* Weather strips, draught excluders or draught seals shall be installed

(vi) *Screens* There is no requirement to screen the openable part of the door at this BAL level

(vii) Doors shall be tight-fitting to the door frame and to an abutting door, if applicable

7.5.5 Doors - Sliding doors

Sliding doors shall -

(a) Be completely protected by a bushfire shutter that conforms with clause 3.7 and clause 7.5.1; or

(b) Be completely protected externally by screens that conform with clause 3.6 and clause 7.5.2; or

(c) Conform with the following:

(i) *Frame material* The material for door frames, including fully framed glazed doors shall be -

(A) Bushfire-resisting timber (see Appendix F); or

(B) Metal; or

(C) Metal-reinforced uPVC. The reinforcing members shall be made from aluminium, stainless steel, or corrosion-resistant steel

(ii) *Hardware* Externally fitted hardware that supports the panel in its functions of opening and closing shall be metal

(iii) *Glazing* Where doors incorporate glazing, the glazing shall be toughened glass a minimum of 6mm in thickness

(iv) *Seals and weather strips* There are no specific requirements for seals and weather strips at this BAL level

(v) *Screens* There is no requirement to screen the openable part of the sliding door at

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this BAL level

(vi) *Sliding panels* Sliding panels shall be tight-fitting in the frames

7.5.6 Doors – Vehicle access doors (garage doors)

The following applies to vehicle access doors:

(a) Vehicle access doors shall be made from -
  (i) Non-combustible material; or
  (ii) Bushfire-resisting timber (see Appendix F); or
  (iii) Fibre-cement sheet a minimum of 6mm in thickness; or
  (iv) A combination of any of items (i), (ii) or (iii)

(b) All vehicle access doors shall be protected with suitable weather strips, draught excluders, draught seals or brushes. Door assemblies fitted with guide tracks do not need edge gap protection

(c) Weather strips, draught excluders, draught seals or brushes to protect edge gaps or thresholds shall be manufactured from materials having a flammability index not exceeding five

(d) Vehicle access doors with ventilation slots shall be protected in accordance with clause 3.6

7.6 ROOFS (INCLUDING PENETRATIONS, EAVES, FASCIAS AND GABLES, AND GUTTERS AND DOWNPIPES)

7.6.1 General

The following applies to all types of roofs and roofing systems:

(a) Roof tiles, roof sheets and roof-covering accessories shall be non-combustible

(b) The roof/wall and roof/roof junction shall be sealed or otherwise protected in accordance with clause 3.6

(c) Roof ventilation openings, such as gable and roof vents, shall be fitted with ember guards made of non-combustible material or a mesh or perforated sheet conforming with clause 3.6 and made of corrosion-resistant steel, bronze or aluminium

(d) Only evaporative coolers manufactured in accordance with AS/NZS 60335.2.98 shall be used. Evaporative coolers with an internal damper to prevent the entry of embers into the roof space need not be screened externally

7.6.2 Tiled roofs

Tiled roofs shall be fully sarked. The sarking shall -

(a) Be located on top of the roof framing, except that the roof battens may be fixed above the sarking;

(b) Cover the entire roof area, including ridges and hips; and

(c) Extend into gutters and valleys

7.6.3 Sheet roofs

Sheet roofs shall -

(a) Be fully sarked in accordance with clause 7.6.2, except that foil-backed insulation blankets may be installed over the battens; or

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(b) Have any gaps sealed at the fascia or wall line, hips and ridges by -
  (i) A mesh or perforated sheet that conforms with clause 3.6 and that is made of corrosion-resistant steel, bronze or aluminium; or
  (ii) Mineral wool; or
  (iii) Other non-combustible material; or
  (iv) A combination of any items (i), (ii) or (iii)

7.6.4 Veranda, carport and awning roof

The following applies to veranda, carport and awning roofs:

(a) A veranda, carport or awning roof forming part of the main roof space shall meet all the requirements for the main roof, as specified in clauses 7.6.1 to 7.6.6

(b) A veranda, carport or awning roof separated from the main roof space by an external wall conforming with clause 7.4 shall have a non-combustible roof covering and the complete support structure shall be -
  (i) Of non-combustible material; or
  (ii) Bushfire-resisting timber (see Appendix F); or
  (iii) Timber rafters lined on the underside with fibre-cement sheeting a minimum of 6mm in thickness, or with material conforming with AS 1530.8.1; or
  (iv) A combination of any items (i), (ii) or (iii)

7.6.5 Roof penetrations

The following applies to roof penetrations:

(a) Roof penetrations, including roof lights, roof ventilators, roof-mounted evaporative cooling units, aerials, vent pipes and supports for solar collectors or the like, shall be sealed. The material used to seal the penetration shall be non-combustible

(b) Openings in vented roof lights, roof ventilators or vent pipes shall conform with clause 3.6 and be made of corrosion-resistant steel, bronze or aluminium

  This requirement does not apply to a room sealed gas appliance

  In the case of gas appliance flues, ember guards shall not be fitted

(c) All overhead glazing shall be Grade A safety glass complying with AS 1288

(d) Glazed elements in roof lights and skylights may be of polymer provided a Grade A safety glass diffuser, complying with AS 1288, is installed under the glazing. Where glazing is an insulating glazing unit (IGU), Grade A toughened safety glass of minimum 4mm thickness shall be used in outer pane of the IGU

(e) Flashing elements of tubular skylights shall be non-combustible. However, they may be of an alternate material, provided the integrity of the roof covering is maintained by an under flashing made of non-combustible material

(f) Evaporative cooling units shall be fitted with non-combustible butterfly closers as close as practicable to the roof level, or the unit shall be fitted with non-combustible covers with a mesh or perforated sheet with a maximum aperture of 2mm, made of corrosion-resistant steel, bronze or aluminium

(g) Eaves lighting shall be adequately sealed and not compromise the performance of the element

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7.6.6 Eaves, linings, fascias and gables

The following apply to eaves lining, fascias and gables:

(a) Gables shall comply with clause 7.4

(b) Fascias and bargeboards shall -
  (i) Where timber is used, be made from bushfire-resisting timber (see Appendix F); or
  (ii) Where made from metal, be fixed at 450mm centres; or
  (iii) Be a combination of items (i) and (ii)

(c) Eaves linings shall be -
  (i) Fibre-cement sheet, a minimum of 4.5mm in thickness; or
  (ii) Bushfire-resisting timber (see Appendix F); or
  (iii) A combination of items (i) and (ii)

(d) Eave penetrations shall be protected as for roof penetrations as specified in clause 7.6.5

(e) Eaves ventilation openings shall be fitted with ember guards in accordance with clause 3.6 and made of corrosion-resistant steel, bronze or aluminium

(f) Joints in eaves linings, fascias and gables may be sealed with plastic joining strips or timber storm moulds

7.6.7 Gutters and downpipes

This standard does not provide requirements for downpipes

If installed, gutter and valley leaf guards shall be non-combustible

With the exception of box gutters, gutters shall be metal or uPVC

Box gutters shall be non-combustible and flashed at the junction with the roof with non-combustible materials

7.7 VERANDAS, DECKS, STEPS AND LANDINGS

7.7.1 General

Decking may be spaced

There is no requirement to enclose the subfloor spaces of verandas, decks, steps, ramps or landings

7.7.2 Enclosed subfloor spaces of verandas, decks, steps, ramps and landings

7.7.2.1 *Materials to enclose a subfloor space*

The subfloor spaces of verandas, decks, steps, ramps and landings are deemed to be 'enclosed' when -

(a) The material used to enclose the subfloor space conforms with clause 7.4, except that sarking is not required where specified in clause 7.4.1(c); and

(b) All openings are protected in accordance with clause 3.6 and made of corrosion-resistant steel, bronze or aluminium

7.7.2.2 *Supports*

This standard does not provide construction requirements for support posts, columns, stumps, stringers, piers and poles

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7.7.2.3 *Framing*
This standard does not provide construction requirements for the framing of verandas, pergolas, decks, ramps or landings (i.e. bearers and joists)

7.7.2.4 *Decking, stair treads and the trafficable surfaces of ramps and landings*
Decking, stair treads and the trafficable surfaces of ramps and landing shall be -
(a) Non-combustible material; or
(b) Bushfire-resisting timber (see Appendix F); or
(c) A combination of any of items (a) and (b)

7.7.3 Unenclosed subfloor spaces of verandas, decks, steps, ramps and landings
7.7.3.1 *Supports*
Support posts, columns, stumps, stringers, piers and poles shall be -
(a) Of non-combustible material; or
(b) Of bushfire-resisting timber (see Appendix F); or
(c) A combination of items (a) and (b)

7.7.3.2 *Framing*
Framing of verandas, decks, ramps or landings (i.e. bearers and joists) shall be -
(a) Of non-combustible material; or
(b) Of bushfire-resisting timber (see Appendix F); or
(c) A combination of items (a) and (b)

7.7.3.3 *Decking, stair treads and trafficable surfaces of ramps and landings*
Decking, stair treads and the trafficable surfaces of ramps and landings shall be -
(a) Of non-combustible material; or
(b) Of bushfire-resisting timber (see Appendix F); or
(c) A combination of items (a) and (b)

7.7.4 Balustrades, handrails or other barriers
Those parts of the handrails and balustrades less than 125mm from any glazing or any combustible wall shall be -
(a) Of non-combustible material; or
(b) Of bushfire-resisting timber (see Appendix F); or
(c) A combination of items (a) and (b)
Those parts of the handrails and balustrades that are 125mm or more from the building have no requirements

7.7.5 Veranda posts
Shall be made from -
(a) Of non-combustible material; or
(b) Of bushfire-resisting timber (see Appendix F); or
(c) A combination of items (a) and (b)

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7.8 WATER AND GAS SUPPLY PIPES

Above-ground, exposed water supply pipes shall be metal

External gas pipes and fittings above ground shall be of steel or copper construction having a minimum wall thickness in accordance with gas regulations or 0.9mm whichever is the greater. The metal pipe shall extend a minimum of 400mm within the building and 100mm below ground

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Section 3 GENERAL

3.1 GENERAL

This section specifies general requirements for the construction of buildings for all Bushfire Attack Levels (BALs)

3.2 CONSTRUCTION REQUIREMENTS FOR SPECIFIC STRUCTURES

3.2.1 Attached structures and structures sharing a common roof space

Where any part of a garage, carport, veranda, cabana, studio, storage area or similar roofed structure is attached to, or shares a common roof space with, a building required to conform with this standard, the entire garage, carport, veranda or similar roofed structure shall conform with the construction requirements of this standard, as applicable to the subject building

Alternatively, the structure shall be separated from the subject building by a wall that extends to the underside of a non-combustible roof covering, and that conforms with one of the following:

(a) The wall shall have an FRL of not less than 60/60/60 for loadbearing walls and -/60/60 for non-loadbearing walls when tested from the attached structure side and shall have openings protected as follows:

  (i) *Doorways* - By self-closing fire doors with an FRL of -/60/30, conforming with AS 1905.1 and tested in accordance with AS 1530.4

  (ii) *Windows* - By fire windows with an FRL of -/60/- when tested in accordance with AS 1530.4 and permanently fixed in the closed position

  (iii) *Other openings* - By construction with an FRL of not less than -/60/- when tested in accordance with AS 1530.4; or

(b) The wall shall be of masonry, earth or masonry-veneer construction with the masonry leaf of not less than 90mm in thickness and shall have openings protected as follows:

  (i) *Doorways* - By self-closing fire doors with an FRL of -/60/30, conforming with AS 1905.1 and tested in accordance with AS 1530.4

  (ii) *Windows* - By fire windows with an FRL of -/60/- when tested in accordance with AS 1530.4 and permanently fixed in the closed position

  (iii) *Other openings* - By construction with an FRL of not less than -/60/- when tested in accordance with AS 1530.4

3.2.2 Garages and carports beneath the subject building

Where a garage or carport is beneath a building required to comply with this standard, it shall conform with the construction requirements of this standard, as applicable to the subject building

Alternatively, any construction separating the garage or carport (including walls and flooring systems) from the remainder of the building shall conform with one of the following:

(a) The separating construction shall have an FRL of not less than 60/60/60 for loadbearing construction and -/60/60 for non-loadbearing construction when tested from the garage or carport side and shall have openings protected in accordance with the following:

  (i) *Doorways* - By self-closing fire doors with an FRL of -/60/30, conforming with AS 1905.1 and tested in accordance with AS 1530.4

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(ii) *Windows* - By fire windows with an FRL of -/60/- when tested in accordance with AS 1530.4 and permanently fixed in the closed position

(iii) *Other openings* - By construction with an FRL of not less than -/60/- when tested in accordance with AS 1530.4*; or*

(b) Where part of all of the separating construction is a wall, the wall need not conform with item (a) above, provided the wall is of masonry, earth or masonry-veneer construction with the masonry leaf of not less than 90mm in thickness and the wall has openings protected in accordance with the following:

(i) *Doorways* - By self-closing fire doors with an FRL of -/60/30, conforming with AS 1905.1 and tested in accordance with AS 1530.4

(ii) *Windows* - By fire windows with an FRL of -/60/- when tested in accordance with AS 1530.4 and permanently fixed in the closed position

(iii) *Other openings* - By construction with an FRL of not less than -/60/- when tested in accordance with AS 1530.4

3.2.3 Adjacent structures on the subject allotment

Where any garage, carport, or similar roofed structure on the subject allotment is not attached to a building required to conform with this standard, that structure shall conform with the construction requirements of this standard

Alternatively, the adjacent structure shall be separated from the subject building by one of the following:

(a) A distance of not less than 6m from the building required to conform with this standard. This distance is measured as any of the horizontal straight lines from the adjacent structure to the subject building; or

(b) A wall of the building required to conform that extends to the underside of a non-combustible roof covering and has an FRL of not less than 60/60/60 for loadbearing walls and -/60/60 for non-loadbearing walls when tested from the outside. Any openings in the wall shall be protected in accordance with the following:

(i) *Doorways* - By self-closing fire doors with an FRL of -/60/30, conforming with AS 1905.1 and tested in accordance with AS 1530.4

(ii) *Windows* - By fire windows with an FRL of -/60/- when tested in accordance with AS 1530.4 and permanently fixed in the closed position

(iii) *Other openings* - By construction with an FRL of not less than -/60/- when tested in accordance with AS 1530.4*; or*

(c) A wall of the building required to conform that extends to the underside of a non-combustible roof covering and is of masonry, earth or masonry-veneer construction with the masonry leaf of not less than 90mm in thickness. Any openings in the wall shall be protected in accordance with the following:

(I) *Doorways* - By self-closing fire doors with an FRL of -/60/30, conforming with AS 1905.1 and tested in accordance with AS 1530.4

(ii) *Windows* - By fire windows with an FRL of -/60/- when tested in accordance with AS 1530.4 and permanently fixed in the closed position

(iii) *Other openings* - By construction with an FRL of not less than -/60/- when tested in accordance with AS 1530.4*; or*

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3.3 EXTERNAL MOULDINGS

Unless otherwise required in clause 3.6.1 and sections 5 to 9, combustible external mouldings, jointing strips, trims and sealants may be used for decorative purposes or to cover joints between sheeting material

3.4 HIGHER LEVELS OF CONSTRUCTION

The construction requirements specified for a particular BAL shall be acceptable for a lower level

3.5 REDUCTION IN CONSTRUCTION REQUIREMENTS DUE TO SHIELDING

Where an elevation is not exposed to the source of bushfire attack, then the construction requirements for that elevation can reduce to the next lower BAL. However it shall not reduce to below BAL-12.5

An elevation is deemed to be not exposed to the source of bushfire attack if all of the straight lines between that elevation and the source of bushfire attack are obstructed by another part of the same building. However it shall not reduce to below BAL 12.5

The shielding of an elevation shall apply to all the elements of the wall, including openings, but shall not apply to subfloors or roofs

3.6 VENTS, WEEPHOLES, GAPS AND SCREENING MATERIALS

3.6.1 Vents, weepholes, joints and the like

All gaps including vents, weepholes and the like shall be screened, except for weepholes to the sills of windows and doors

All joints shall be suitably backed with a breathable sarking or mesh, except as permitted by Clause 3.3.

The maximum allowable aperture size of any mesh or perforated material used as a screen shall be 2mm.

3.6.2 Gaps to door and window openings

Where screens are fitted to door openings for ember protection, they shall have a maximum aperture of 2.0mm and be tight fitting to the frame in the closed position.

Gaps between doors including jambs, heads or sills (thresholds) shall be protected using draught seals and excluders of the like.

Windows conformant with AS 2047 will satisfy the requirements for gap protection. Screens fitted to window openings shall have a maximum aperture of 2.0mm and these shall be tight fitting to the frames.

3.7 BUSHFIRE SHUTTERS

Bushfire shutters shall -

(a) Protect the entire window assembly including framing, glazing, sash and sill;
(b) Protect the entire door assembly including framing, glazing, sill and hardware;
(c) Consist of materials specified in Clauses 5.5.1, 6.5.1, 7.5.1, 8.5.1 and 9.5.1 for the relevant BAL;
(d) Be fixed to the building and be non-removable;

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(e) Be capable of being closed manually from either inside or outside or motorised shutter systems, where they are not reliant on mains power to close;

(f) When in the closed position, have no gap greater than 2mm between the shutter and the wall, frame or sill; and

(g) Where perforated, have uniformly distributed perforations with a maximum aperture of 2mm and a perforated area no greater than 20% of the shutter.

If bushfire shutters are fitted to all external doors then at least one of those shutters shall be operable from inside to facilitate safe egress from the building.

3.8 TESTING OF MATERIALS, ELEMENTS OF CONSTRUCTION AND SYSTEMS TO THE AS 1530.8 SERIES

Unless otherwise specified, elements of construction and systems satisfy this Standard when tested in accordance with the AS 1530.8 series for the relevant BAL level and Crib Class in Table 3.2.

Elements of construction or systems tested in accordance with AS 1530.8.1-2007 with Crib Class A prior to the issue of this Standard are acceptable.

TABLE 3.2
TESTING OF MATERIALS, ELEMENTS OF CONSTRUCTION AND SYSTEMS

Acceptable test criteria	Relevant allowable BAL level	Crib class
AS 1530.8.1	BAL-12.5 to BAL-40	AA
AS 1530.8.2	BAL-FZ	Not applicable

Where any element of construction or system satisfies the test criteria in the AS 1530.8 series without screening for ember protection, the requirements of this Standard for screening of openable parts of windows shall still apply.

Where a window protected with a shutter satisfies the test criteria of the AS 1530.8 series, the additional requirements of this Standard for screening of openable parts of windows do not apply.

3.9 GLAZING

Glazing requirements shall be in accordance with Sections 5 to 9 of this Standard.

3.10 SARKING

Where sarking is required in Sections 5 to 9, the flammability index shall not exceed five when tested to AS 1530.2.

3.11 TIMBER LOG WALLS

Where the thickness of a timber log wall is specified in Sections 5, 6 and 7, two criteria are nominated as follows:

(a) The nominal overall thickness is the overall thickness of the wall.

(b) The minimum thickness is the thickness of the wall at the interface of two logs in the

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wall.

For most log profiles, the thickness of the log at the interface with an adjacent log is less than the overall thickness of the wall.

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Appendix 6 – Bushfire Management Statement

In accordance with City of Swan requirements, the following bushfire management statement (BMS) has been prepared to identify the onogoing measures to reduce bushfire risk.

The BMS comprises of an assessment against the bushfire protection criteria as per the Guidelines for the Planning in Bushire Prone Areas shown in table 1.

The information used to prepare this BMS is contained in the existing BAL report for the subject site prepared by Modus Compliance, dated 02/09/22.

Table 1: Compliance with bushfire protection criteria elements

Bushfire Protection Criteria	Intent Acceptable Solutions	Proposed Bushfire Management Strategy	Compliance Achieved
Element 1: Location	Intent: To ensure that strategic planning approvals, subdivision and development applications are located in areas with the least possible risk of bushfire to facilitate the protection of people, property and infrastructure		
	A1.1 Development Location	The BAL report demonstrates that the proposed development will be located in an area of low risk on the subject site.	Yes
		The BAL assessment demonstatrates that the maximum BAL that the dwelling will be subject to is BAL 29.	
Element 2: Siting and design of development	Intent: To ensure that the siting and design of the development minimises the level of bushfire impact.		
	A2.1 Asset Protection Zone (APZ)	The site shall incorporate an APZ of a minimum 8m in width measured from the external walls of the building as shown on the site assessment.	Yes
		Vegetated areas within the APZ shall be maintained as low threat areas in accordance with the standards for an APZ, see figure 1a & 1b.	
Element 3: Vehicular access	Intent: To ensure that the vehicular access serving a subdivision/development is available and safe during a bushfire even		
	A3.1 Public roads	All public roads which provide access and egress to the site are existing.	Yes

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Bushfire Protection Criteria	Intent Acceptable Solutions	Proposed Bushfire Management Strategy	Compliance Achieved
Element 3: Vehicular access	A3.2a Multiple access routes	Proposed development located on a no through road. Lot boundary is more than 200m from Stirling Crescent which provides travel in 2 different directions, however, travel to Stirling Crescent along Talbot Road is not deemed bushfire prone.	Yes
	A3.2b Emergency access way	The following requirements are to be achieved:	n/a
	A3.3 Through-roads	The following requirements are to be achieved:	n/a
	A3.4a Perimeter roads	The following requirements are to be achieved:	n/a
	A3.4b Fire service access route	The following requirements are to be achieved:	n/a
	A3.5 Battle-axe access legs	The following requirements are to be achieved:	n/a
	A3.6 Private driveways	The following requirements are to be achieved: Based on size of buildings, hydrant will be provided on site	n/a
Element 4: Water	Intent: To ensure that water is available to enable prople, property and infrastructure to be defended from a bushfire		
	A4.1 Identification of future water supply	Evidence that a reticulated or sufficient non-reticulated water supply for bushfire fighting can be provided	n/a
	A4.2 Provision of water for firefighting purposes	Based on size of buildings, hydrant will be provided on site	Yes

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SCHEDULE 1: STANDARDS FOR ASSET PROTECTION ZONES

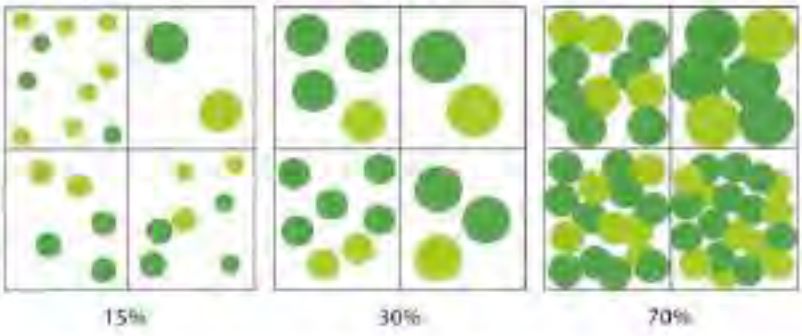
OBJECT	REQUIREMENT
Fences within the APZ	• Should be constructed from noncombustible materials (for example, iron, brick, limestone, metal post and wire, or bushfireresisting timber referenced in Appendix F of AS 3959).
Fine fuel load (Combustible, dead vegetation matter <6 millimetres in thickness)	• Should be managed and removed on a regular basis to maintain a low threat state. • Should be maintained at <2 tonnes per hectare (on average). • Mulches should be noncombustible such as stone, gravel or crushed mineral earth or wood mulch >6 millimetres in thickness.
Trees* (>6 metres in height)	• Trunks at maturity should be a minimum distance of six metres from all elevations of the building. • Branches at maturity should not touch or overhang a building or powerline. • Lower branches and loose bark should be removed to a height of two metres above the ground and/or surface vegetation. • Canopy cover within the APZ should be <15 per cent of the total APZ area. • Tree canopies at maturity should be at least five metres apart to avoid forming a continuous canopy. Stands of existing mature trees with interlocking canopies may be treated as an individual canopy provided that the total canopy cover within the APZ will not exceed 15 per cent and are not connected to the tree canopy outside the APZ. **Figure 19:** Tree canopy cover – ranging from 15 to 70 per cent at maturity 
Shrub* and scrub* (0.5 metres to six metres in height). Shrub and scrub >6 metres in height are to be treated as trees.	• Should not be located under trees or within three metres of buildings. • Should not be planted in clumps >5 square metres in area. • Clumps should be separated from each other and any exposed window or door by at least 10 metres.
Ground covers* (<0.5 metres in height. Ground covers >0.5 metres in height are to be treated as shrubs)	• Can be planted under trees but must be maintained to remove dead plant material, as prescribed in 'Fine fuel load' above. • Can be located within two metres of a structure, but three metres from windows or doors if >100 millimetres in height.

Figure 1a

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SCHEDULE 1: STANDARDS FOR ASSET PROTECTION ZONES

OBJECT	REQUIREMENT
Grass	• Grass should be maintained at a height of 100 millimetres or less, at all times. • Wherever possible, perennial grasses should be used and well-hydrated with regular application of wetting agents and efficient irrigation.
Defendable space	• Within three metres of each wall or supporting post of a habitable building, the area is kept free from vegetation, but can include ground covers, grass and non-combustible mulches as prescribed above.
LP Gas Cylinders	• Should be located on the side of a building furthest from the likely direction of a bushfire or on the side of a building where surrounding classified vegetation is upslope, at least one metre from vulnerable parts of a building. • The pressure relief valve should point away from the house. • No flammable material within six metres from the front of the valve. • Must sit on a firm, level and non-combustible base and be secured to a solid structure.

** Plant flammability, landscaping design and maintenance should be considered – refer to explanatory notes*

Figure 1b

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8. TRANSPORT IMPACT STATEMENT

Stantec

(SITE doc ref: 220902_rpt_3972_hazelmere_logistics_estate_tis_final_1_combined)

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Stantec

HAZELMERE LOGISTICS ESTATE

Traffic Impact Statement

02 September 2022

Prepared for:
LOGOS Property Group

Prepared by:
Cameron Steel

Project Number
300303542

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Revision	Description	Author	Date	Quality Check	Date	Independent Review	Date
A	Preliminary Draft	CS	24/08/22	SH	24/08/22		
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1	Final	CS	02/09/22	RD	02/09/22	RD	02/09/22

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1 Introduction

1.1 Background

Two separate Development Applications (DA) are being sought within the Hazelmere Logistics Estate at 157 Talbot Road, Hazelmere. The land use for both sites is primarily to be used for warehousing. The proposal is for a front site (24,646m²) is to be occupied by Inghams as a distribution centre. This report focuses on the rear site (37,550m²) which is also proposed to have direct access to Talbot Road via a private laneway. The location of each site is shown in Figure 1-1.

Figure 1-1: 157 Talbot Rd Development Application Sites



(Source: Nearmap)

Stantec has been engaged by LOGOS Property Group (LOGOS) to prepare a Traffic Impact Statement for the proposed development. Stantec has also prepared a Traffic Impact Assessment for the front site.

1.2 Purpose of this Report

Western Australian Planning Commission Transport Assessment Guidelines (WAPC Guidelines) provide direction on the level of assessment which is necessary to be carried out with respect to the likely traffic impact of a development proposal. Typically, any development which is expected to have a 'high' traffic impact, that is, generating more than 100 trips in the peak hour is satisfied by a Traffic Impact Assessment (TIA). Any development which is expected to generate less than 100 trips in the peak hour requires a Transport Impact Statement (TIS) to be undertaken. Both types of assessment

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consider the operation and layout of the site, but they differ in their assessment of external traffic impact.

In the context of this proposal, it is estimated there will be less than 100 trips generated for this site in any given peak hour based on the expected staffing levels as well as the assessment based on industry standard generation rates per 100m². This TIS outlines the transport aspects surrounding the proposed development. The intent of a TIS, as per the WAPC Guidelines, is to provide the approving authority with sufficient transport information to confirm that the Applicant has adequately considered the transport aspects of the proposed development and that it would not have an adverse transport impact on the surrounding area.

In accordance with the WAPC Guidelines, this TIS outlines:

- Existing transport conditions proximate to the site
- Suitability of the proposed parking provision within the site
- The adequacy of the proposed site layout
- The traffic generating characteristics of the proposed development
- The anticipated impact of the proposed development on the surrounding movement network

1.3 References

In preparing this report, reference has been made to the following:

- City of Swan Local Planning Scheme No. 17
- WAPC Transport Assessment Guidelines for Individual Developments
- Australian Standard/New Zealand Stand, Parking Facilities, Part 1: Off-Street Car Parking AS/NZS 2890.1:2004
- Australian Standard, Parking Facilities, Part 2: Off-Street Commercial Vehicle Facilities AS 2890.2:2018
- Australian Standard / New Zealand Standard, Parking Facilities, Part 6: Off-Street Parking for People with Disabilities AS/NZS 2890.6:2009
- Plans for the proposed development prepared/provided by Watson Young Architects Pty Ltd dated July 2022
- Various technical data as referenced in this report.

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2 Proposed Development

2.1 Existing Land Uses

The subject site is located primarily on Lot 153 Talbot Road, Hazelmere and is currently used for truck storage as shown in Figure 2-1.

Figure 2-1: Existing Land Uses



(Source: Nearmap)

The subject site is zoned as "General Industrial" within the City of Swan Local Planning Scheme No.17 as shown in Figure 2-2.

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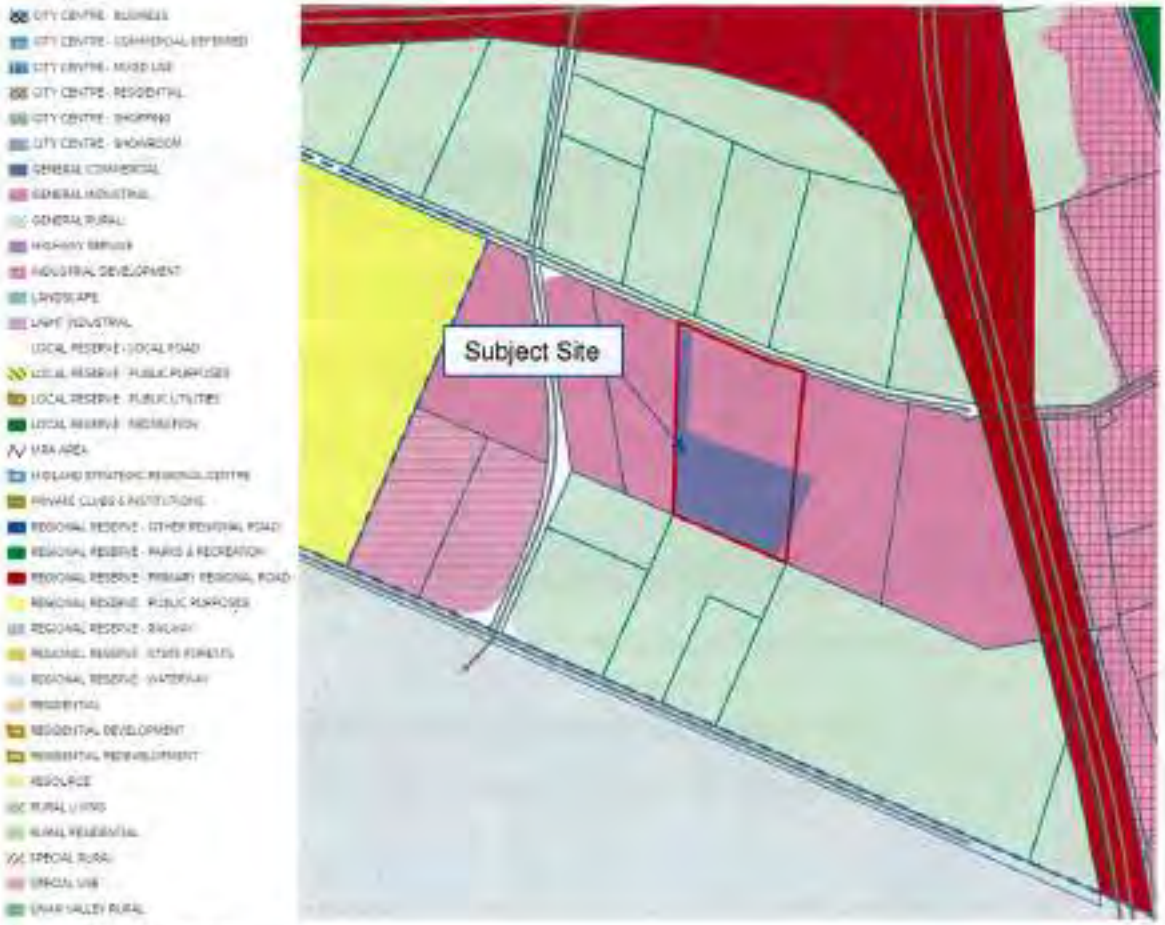
Figure 2-2: Land Zoning



(Source: City of Swan Intramap)

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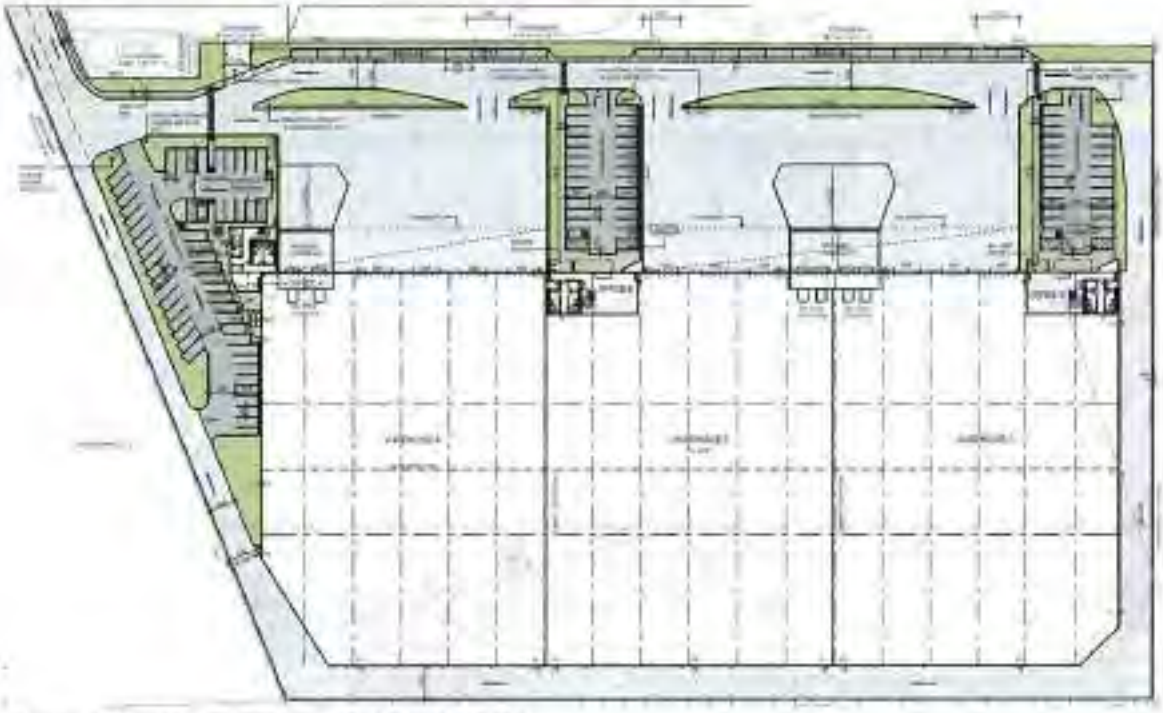
2.2 Proposed Land Uses

The proposed land uses within the 37,550 m² site are outlined in Table 2-1 and shown in Figure 2-3.

Table 2-1: Proposed Land Uses

Proposed Land Use	Gross Leasable Area (GLA)
Warehouse A	5,930 m²
Office A – Ground Floor	145 m²
Office A – First Floor	199 m²
Warehouse B	6,050 m²
Office B – Ground Floor	60 m²
Office B – First Floor	200 m²
Warehouse C	6,030 m²
Office C – Ground Floor	60 m²
Office C – First Floor	200 m²
Total	**18, 874 m²**

Figure 2-3: Proposed Warehouse Development



(Source: Watson Young Site Plan – TP02 P4 – July 2022)

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2.3 Context with Surrounds

The site is located within the Hazelmere industrial area, surrounded by other logistics and distribution centres as shown in Figure 2-4. Previously, Stantec prepared a Traffic Impact Assessment for the front site which is proposed to be the WA distribution centre for Inghams.

Figure 2-4: Surrounding Land Uses



(Source: Google Maps)

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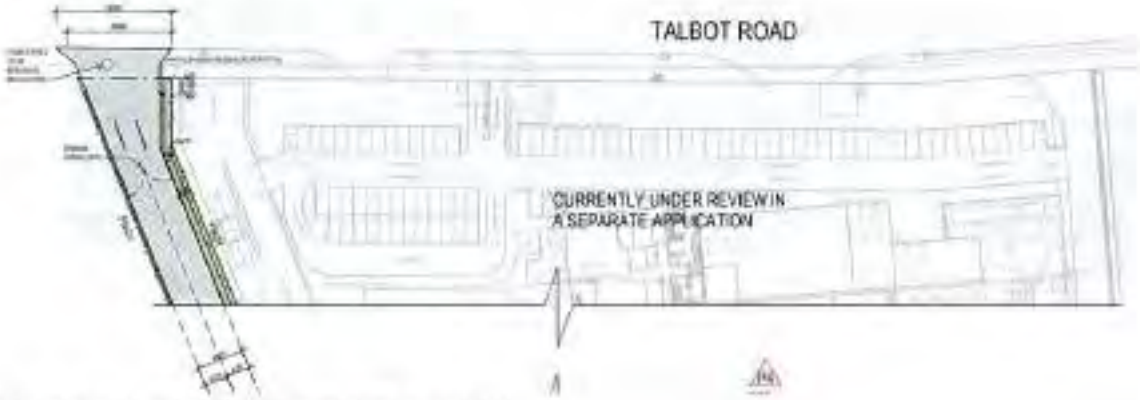
3 Vehicular Access and Parking

3.1 Access Arrangements

The proposed access is via the laneway from Talbot Road as shown in Figure 3-1.

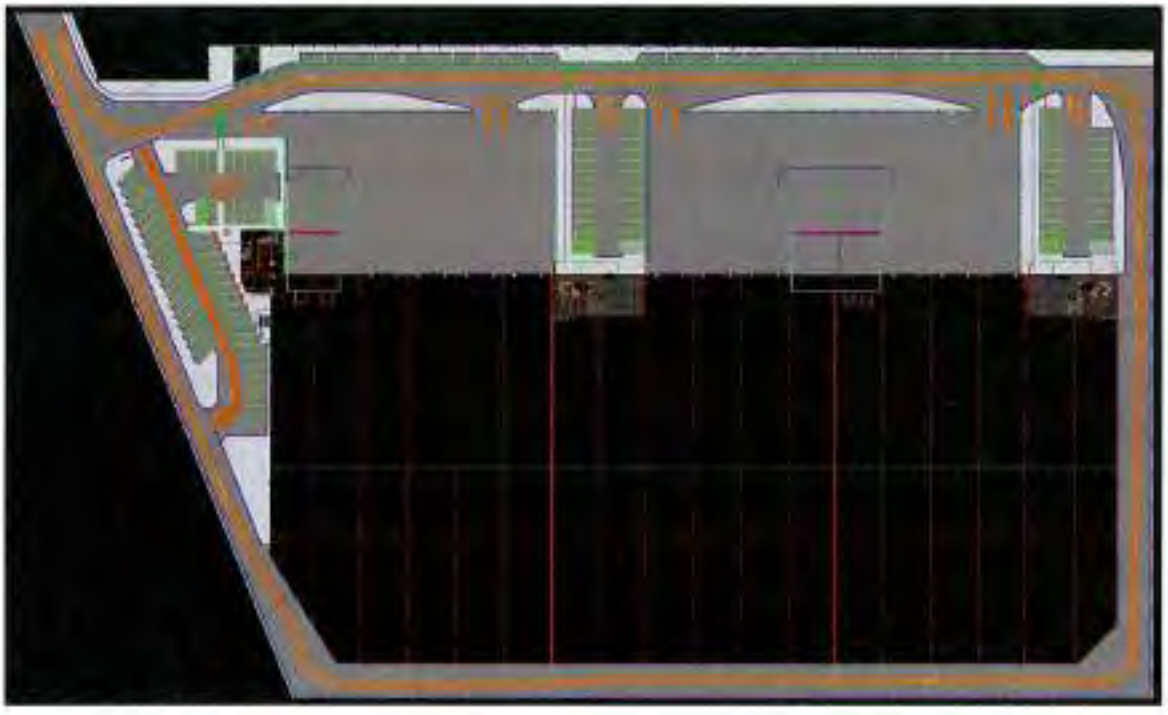
Figure 3-1: Proposed Site Access



(Source: Watson Young Site Plan – TP02.P4 – July 2022)

There are provisions for circulation of the site to provide vehicles to exit via the same laneway as shown in Figure 3-2.

Figure 3-2: Vehicle Circulation within Site Layout



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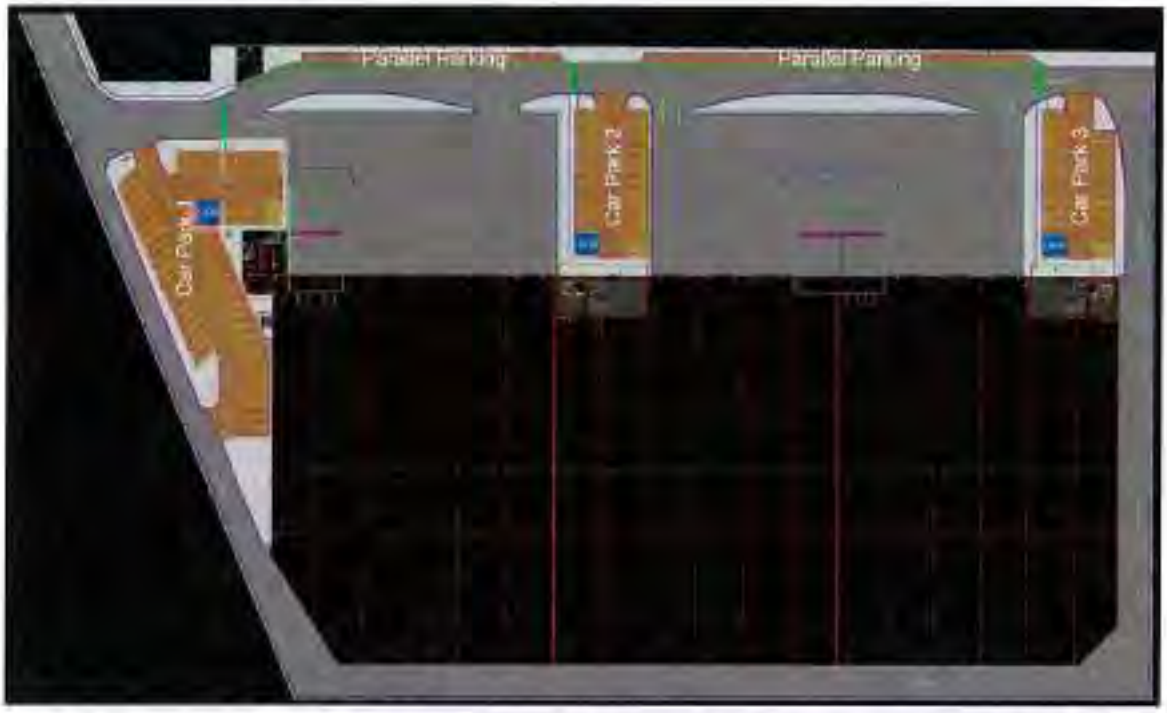
3.2 Public, Private, Disabled Parking, Set Down/Pick Up

The on-site parking consists of three separate car parks and two parallel parking zones as shown in Figure 3-3.

Figure 3-3: Parking Layout



There is a provision for a total of 127 bays within the development. These are split into 52 bays in car park 1 (including 1 ACROD bay), 26 bays in car park 2 (including 1 ACROD bay) and 24 bays in car park 3. Additionally, 25 parallel parking bays are proposed on the northern boundary. Furthermore, a total of 14 bike racks are provided (six in car park 1 and four in car park 2 and 3).

A review of the proposal against the parking requirements in the City of Swan Local Planning Scheme No. 17, as well as considering other 'typical' parking rates for similar uses from a number of resources and surrounding local councils as shown in Table 3-1.

Table 3-1: Parking Requirements

	Rate per 100m² GLA/NFA	Parking Requirement
City of Swan LPS No.17	2	376
Stantec Internal Database	0.86	162
Victoria Planning Scheme	1.5 + 2/development	230 (282 + 2)
RTA Guide	0.33	62
City of Canning LPS No.42	0.5	94
City of Belmont LPS No.15	1 + 1/100m² of open space for warehousing purpose	188

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The Stantec internal database collates several resources to provide an average rate for the use type. As such, the total requirement lies fairly central to the minimum and maximum as calculated from the RTA Guide to Traffic Generating Developments and City of Swan rates respectively. The City of Swan (CoS) parking rates are the highest, requiring approximately 1.5 x the number of spaces the next highest (Victorian Planning Scheme), double that of the City of Belmont and almost triple that of the City of Canning.

The City of Canning rates have been reviewed due to the Canning Local Government Area (LGA) encompassing the industrial area of Welshpool. Welshpool is placed near the airport with connections to high order road networks (Tonkin Highway and Roe Highway), similar to the Hazelmere site. The City of Canning LPS No.42 provides a rate of 1/200m² NLA (or 0.5/100m² NLA) for warehouse use. This is closely aligned with the Stantec database and would equate to a requirement of 94 spaces.

A review of some sites near to the proposed subject site indicates that the parking rates applied to those sites are also less than the CoS Planning Scheme requires. For example, 152 Talbot Road building areas (across 4 buildings) encompass about 70,000m² with approximately 300 car parking spaces. This equates to approximately 1 car parking space for every 230m². The subject site requiring 391 spaces equates to an overall parking rate for the site of approximately 1 space per 48m². It should be noted that the land use allocated to 152 Talbot Road is unknown and the values provided are based on a visual assessment of an aerial image.

The above does not take into consideration any service vehicle bays and bicycle parking which should be provided over and above the car parking space provision.

In terms of what the 'actual' requirement is, while the Stantec database requirement of 162 is averaged for the uses across a number of sites, the 94 as per the Canning rates would be suitable to the area.

Based on the above, it is considered that the provision of 127 bays (midway between the lower City of Canning requirement, and the Stantec database-based requirement) will be suitable for the proposed development and site.

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4 Provision for Service Vehicles

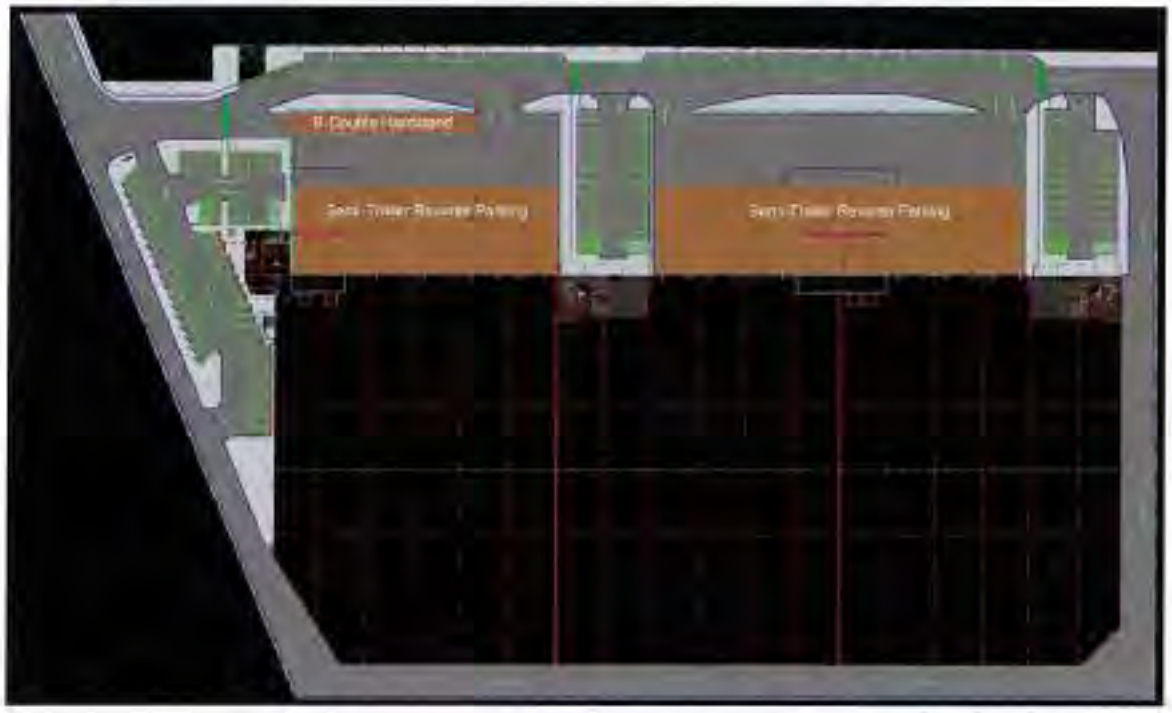
4.1 Access Arrangements

A swept path analysis of the entry, exit and manoeuvre through site for the design vehicles is shown in Appendix B. All tested movements are achievable including reverse entry of a semi-trailer between two already parked semi-trailers..

4.2 On/Off-Site Loading Facilities

The site is designed to accommodate B-Doubles up to 27.5m and Semi-Trailers up to 19m long with proposed loading facilities as shown in Figure 4-1. The swept path analysis undertaken and provided in Appendix B demonstrates that each of the loading bays is accessible by the nominated service vehicles.

Figure 4-1: On/Off-Site Loading Facilities



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5 Hours of Operation

While the site is a "spec" build and the tenants at this stage are unknown, it is anticipated that the hours of operation could be 24 hours a day, 7 days a week, 365 days per year.

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6 Traffic Volumes

6.1 Daily or Peak Traffic Volumes

The available trip generation rates for warehouses are shown in Table 6-1 with the expected traffic volumes produced by the development (18,874m²).

Table 6-1: Trip Generation Rates

Source	Trip Generation Rate		Trip Generation	
	Daily	AM Peak	Daily	AM Peak
RTA Guidelines	4 trips per 100m² GFA	0.5 trips per 100m² GFA	755 trips	94 trips
ITE Guidelines	3.28 trips per 100m² GFA*	0.28 trips per 100m² GFA*	619 trips	52 trips
Average	**3.6 trips per 100m² GFA**	**0.39 trips per 100m² GFA**	**687 trips**	**73 trips**

*Converted from 3.56 and 0.30 trips per 1000 square feet

Given Talbot Road is a no-through road and Stirling Crescent has traffic volumes of 449 in both direction in the AM peak, the additional traffic (approx. 16%) generated from the development is considered to have no major impacts on the performance of the surrounding road network.

6.1.1 COMBINED EFFECTS OF FRONT AND REAR SITE

Stantec previously undertook a Traffic Impact Assessment (TIA) for the front site which is proposed to be used as Inghams Distribution Centre in which the staffing levels were provided by Inghams. As this is a "spec" build and the tenants/staffing levels are unknown, the best practice would be to adopt the average trip generation of 73 trips (in and out) of the site. The previous assessment adopted a percentage split in the AM of 88% inbound trips and 12% outbound trips which equates to 64 trips in and 9 trips out in the AM peak. Considering both sites will occupy the same site, further modelling has been undertaken with the additional trips of the rear site to determine to effects of both sites post build-out.

The additional trips were added to the following modelling scenarios:

- With development at opening year (2023)
- With development and 10-years in the future (2033) – with no connection to Great Eastern Highway Bypass (GEHB)

A comparison between the intersection volumes at Talbot Road and Stirling Crescent with the front site only and the additional movements from the rear site are shown in Table 6-2 and Table 6-3 for 2023 and 2033, respectively.

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Table 6-2: With Development at Opening Year (2023) Modelling Comparison

	Front Site Only			Front Site + Rear Site		
Approach	DoS	Average Delay (sec) / LOS	95th Percentile Queue (m/veh)	DoS	Average Delay (sec) / LOS	95th Percentile Queue (m/veh)
Stirling Cres (S)	0.20	2s	6m	0.22	3s	7m
Talbot Rd (E)	0.42	26s / D	28m	0.47	27s / D	31m
Stirling Cres (N)	0.19	3s	2m	0.21	3s	2m
Talbot Rd (W)	0.09	22s / C	4m	0.10	23s / C	5m
Intersection	**0.42**	**7s**	**28m**	**0.47**	**8s**	**31m**

Ass shown the intersection of Talbot Road and Stirling Crescent still operates within requirements (refer to Section 0) with the additional traffic from the rear site.

Table 6-3: With Development and 10-Years in the Future (2033) – With No Connection to GEHB Modelling Comparison

	Front Site Only			Front Site + Rear Site		
Approach	DoS	Average Delay (sec) / LOS	95th Percentile Queue (m/veh)	DoS	Average Delay (sec) / LOS	95th Percentile Queue (m/veh)
Stirling Cres (S)	0.24	5s	16m	0.26	5s	16m
Talbot Rd (E)	0.17	14s / B	10m	0.19	14s / B	11m
Stirling Cres (N)	0.09	0s	0m	0.12	2s	0m
Talbot Rd (W)	0.10	23s / C	5m	0.11	25s / C	5m
Intersection	**0.24**	**7s**	**15m**	**0.26**	**8s**	**16m**

With no connection to GEHB, the intersection performance improves with minimal changes from the additional traffic of the rear site.

As a result, the rear site is anticipated to have minimal further impacts on the surrounding network with only 1-2s delays being added to the approach legs from the Inghams front site.

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6.1.2 INTERSECTION PERFORMANCE TERMINOLOGY

The commonly used measure of intersection performance is referred to as the Degree of Saturation (DoS). The DOS represents the flow-to-capacity ratio for the most critical movement on each leg of the intersection. For signalised intersections, a DoS of around 0.95 has been typically considered the 'ideal' limit, beyond which queues, and delays increase disproportionately. For unsignalised intersections and roundabouts, this value of DoS is 0.90. SIDRA INTERSECTION adopts the following criteria for Level of Service assessment in Table 6-4.

Table 6-4: SIDRA LOS and DoS Outline

Level of Service		Intersection Degree of Saturation (DoS)	
		Unsignalised Intersection	Signalised Intersection
A	Excellent	<=0.50	<=0.60
B	Very Good	0.50-0.70	0.60-0.75
C	Good	0.70-0.80	0.75-0.90
D	Acceptable	0.80-0.90	0.90-0.95
E	Poor	0.90-1.00	0.95-1.00

The level of service concept describes the quality of traffic service in terms of six levels, designated A to F, with level of service A (LOS A) representing the best operating condition (i.e., at or close to free flow), and level of service F (LOS F) the worst (i.e., forced flow). More specifically:

- LOS A (DOS < 0.50 for unsignalised, <0.60 for signalised intersections): Primarily free flow operations at average travel speeds, usually about 90% of the FFS (free flow speed) for the given street class. Vehicles are completely unimpeded in their ability to manoeuvre within the traffic stream. Control delay at signalised intersections is less than 10 seconds. At non-signalised movements at intersections the average control delay is less than 10 seconds;
- LOS B (DoS 0.50-0.70/0.60-0.75): Reasonably unimpeded operations at average travel speeds, usually about 70% of the FFS for the street class. The ability to manoeuvre within the traffic stream is only slightly restricted, and control delays at signalised intersections are between 10 and 20 seconds. At non-signalised movements at intersections the average control delay is between 10 and 15 seconds;
- LOS C (DoS 0.70-0.80/0.75-0.90): Stable operations; however, ability to manoeuvre and change lanes in mid-block locations may be more restricted than at LOS B, and longer queues, adverse signal coordination, or both may contribute to lower average travel speeds of about 50% of the FFS for the street class. Signalised intersection delays are between 20 and 35 seconds. At non-signalised movements at intersections the average control delay is between 15 and 25 seconds;
- LOS D (DoS 0.80-0.90/0.90-0.95): A range in which small increases in flow may cause substantial increases in delay and decreases in travel speed. LOS D may be due to adverse signal progression, inappropriate signal timing, high volumes, or a combination of these factors. Average travel speeds are about 40% of FFS. Signalised intersection delays are between 35 and 55 seconds. At non-signalised movements at intersections the average control delay is between 25 and 35 seconds;

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- LOS E (DoS 0.90-1.00/0.95-1.00): Characterised by significant delays and average travel speeds of 33% of the FFS or less. Such operations are caused by a combination of adverse progression, high signal density, high volumes, extensive delays at critical intersections (between 55 and 80 seconds), and inappropriate signal timing. At non-signalised movements at intersections the average control delay is between 35 and 50 seconds; and,
- LOS F (DoS >1.00): Characterised by urban street flow at extremely low speeds, typically 25% to 33% of the FFS. Intersection congestion is likely at critical signalised locations, with high delays (more than 80 seconds), high volumes, and extensive queuing. At non-signalised movements at intersections the average control delay is greater than 50 seconds.

In addition to the above:

- Average Delay: is the average of all travel time delays for vehicles through the intersection
- Queue: is the queue length below which 95% of all observed queue lengths fall.

6.2 Type of Vehicles

The vehicle types accessing the site are primarily B85 and B99 passenger cars, 19m long semi-trailer trucks and B-Double trucks.

A swept path analysis of these vehicles is shown in Appendix B.

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7 Traffic Management on Frontage Streets

Talbot Road is an undivided unmarked two-lane, two-way road with lane widths of approximately 4.5m and a 20m wide road reserve. Talbot Road is also a no-through road to the east, classified as an Access Road under the Main Roads WA functional road hierarchy and has a speed limit of 50km/h (based on the default built-up area speed limit). There is a 2.5m wide dual-use path located to the north of the road. The path starts approximately 50m to the east of the intersection of Stirling Crescent / Talbot Road, continue to the east until the cul-de-sac. The road is under the care and control of the City of Swan and listed as a RAV 4 Network Road.

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8 Public Transport Access

8.1 Nearest Bus/Train Routes

The bus stands and routes closest to the subject site are shown in Figure 8-1 and Table 8-1.

Figure 8-1: Nearest Bus Routes



(Source: Transperth Network Map Sheet 6)

Table 8-1: Nearest Bus Stops per Route

Service	Route	Route Description	Distance to Nearest Stop	Frequency On/Off Peak
Bus	294	Midland – Cannington via Forrestfield & High Wycombe	2.2km	15 min on / 60 min off
Bus	295	Perth – Walliston	2.0km	15 min on / 60 min off
Bus	296	Perth – Kalamunda via Gooseberry Hill Rd	2.0km	15 min on / 60 min off
Bus	299	Perth – Walliston via Kalamunda Rd	2.0km	15 min on / 60 min off

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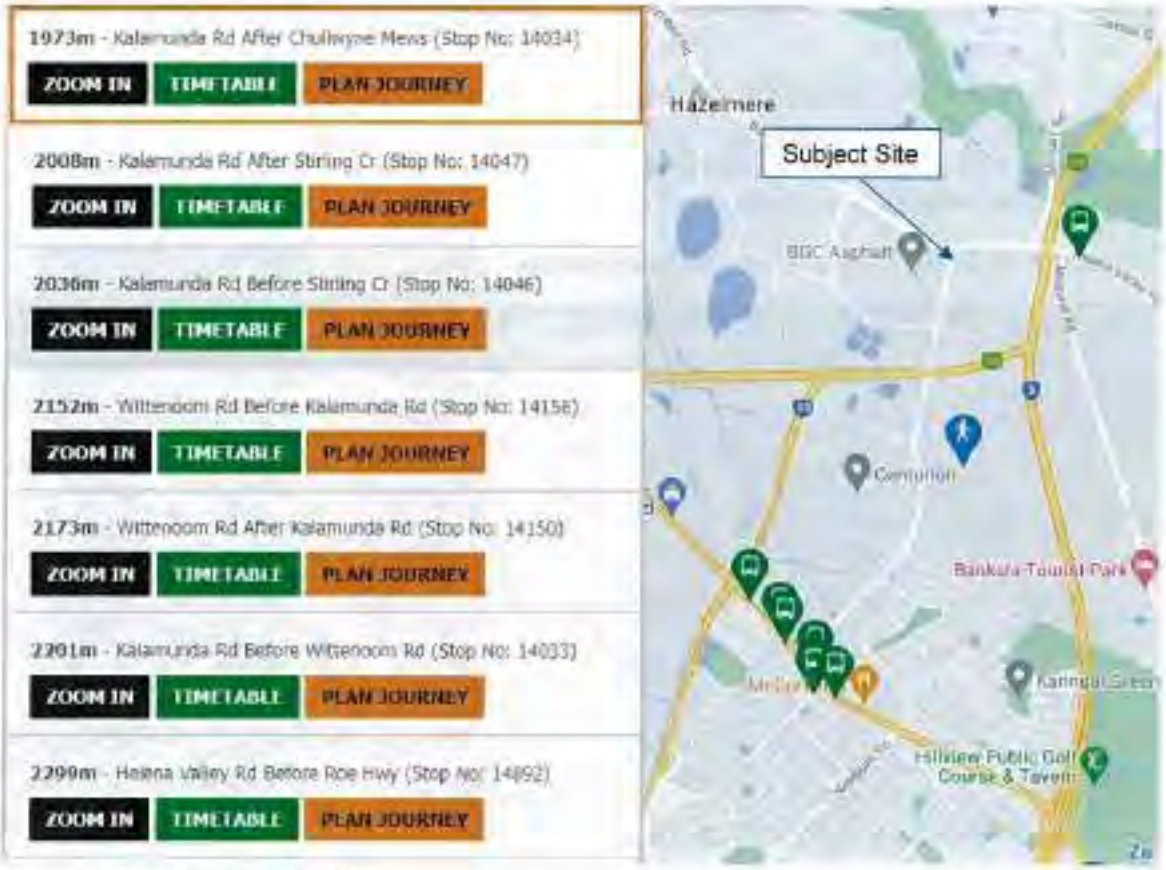
8.2 Nearest Bus Stops/Train Stations

The nearest bus stops to the subject site are approximately 2.0km away (18pprox.. 25 mins walk) as shown in Figure 8-2 with respect to the subject site location.

Figure 8-2: Nearest Bus Stops



(Source: Transperth Bus Stops Near Me)

8.3 Pedestrian/Cycle Links to Bus Stops/Train Station

The nearest bus station is in Kalamunda which is approximately 10km away (~50 mins by bike at an incline) and the nearest train station is in Midland which is approximately 5km away (~20 mins by bike).

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9 Pedestrian Access/Facilities

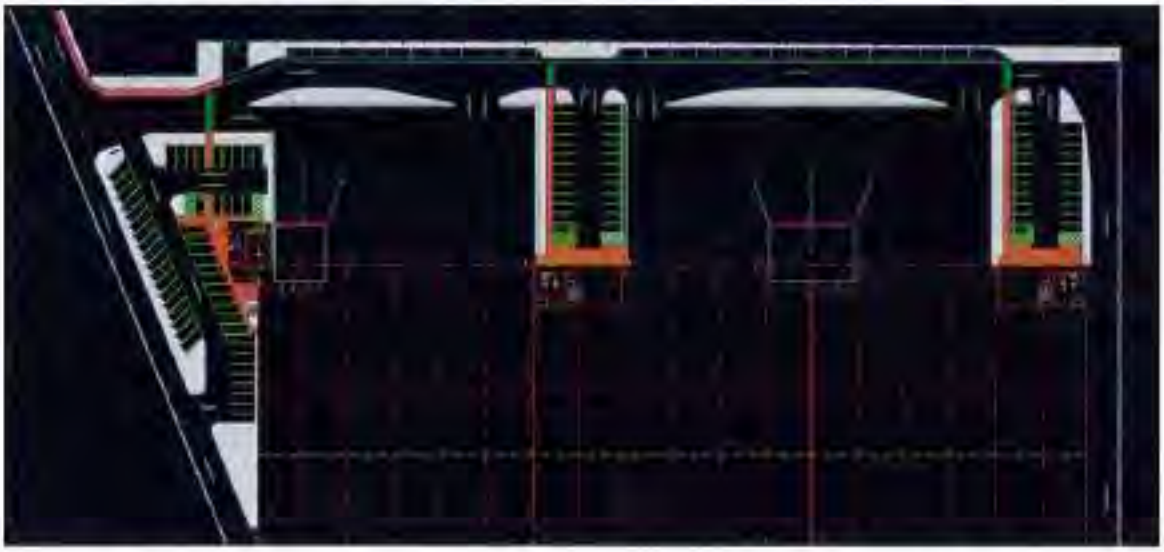
9.1 Existing Pedestrian Facilities within the Development

There are no existing pedestrian facilities within the development site due to the site being vacant land.

9.2 Proposed Pedestrian Facilities within the Development

The development proposes a path network connecting each warehouse and the private laneway from Talbot Road as shown by the orange fill in Figure 9-1.

Figure 9-1: Pedestrian Paths within the Development



9.3 Existing Pedestrian Facilities on Surrounding Roads

Footpaths are currently present on Talbot Road to the east of Stirling Crescent. However, footpaths are not present on the portion of Stirling Crescent to the north of Adelaide Street. Dual-use paths are present on Adelaide Street (to the east of Stirling Crescent) and the portion of Stirling Crescent to the south of Adelaide Street where there is residential development. These existing paths provide access to bus stops on Kalamunda Road. Given the nature of the land use within the buildings, the majority of the patrons are expected to travel in private vehicles (carpooling should be encouraged where possible).

The site has a Walk Score of 0/100 which suggest that the site is mostly accessible by cars only as shown in Figure 9-2.

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Figure 9-2: Subject Site Walking Score



(Source: Walkscore.com)

9.4 Proposals to Improve Pedestrian Access

There are no proposals to improve pedestrian access to the development site.

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10 Cycle Access/Facilities

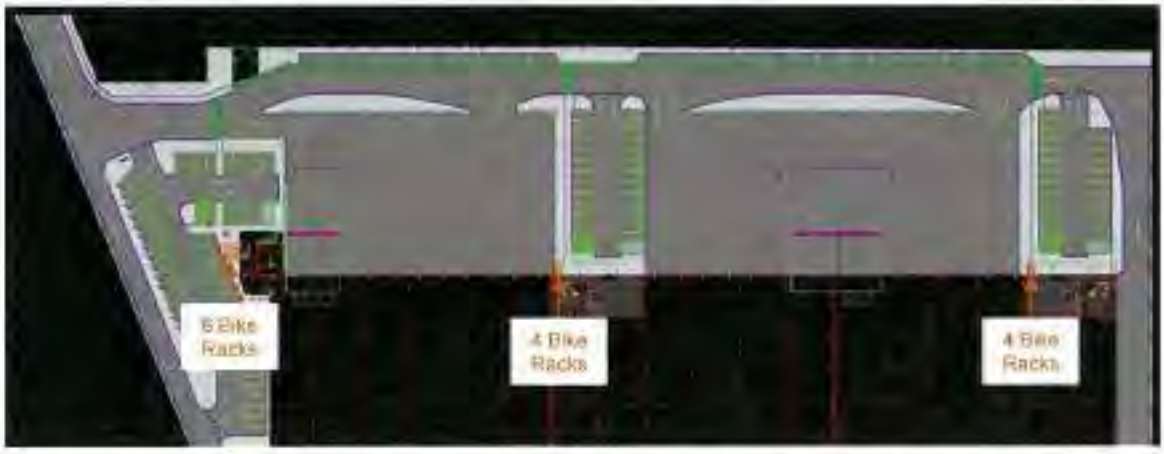
10.1 Existing Cycle Facilities within the Development

There are currently no cycle facilities within the development.

10.2 Proposed Cycle Facilities within the Development

14 bike racks are proposed within the development.

Figure 10-1: Proposed Bicycle Racks within the Development



10.3 Existing Cycle Facilities on Surrounding Roads

There are no direct cycle facilities adjacent to the site other than the bike friendly roads on Stirling Crescent and Roe Highway as shown in Figure 10-2.

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Figure 10-2: Existing Cycle Network



10.4 Proposals to Improve Cycle Access

The Department of Transport (DoT) Long-Term Cycle Network (LTCN) outlines Abernethy Road (south of GEH), the Great Eastern Highway (GEH) Bypass and Roe Highway as Primary Routes, Abernethy Road (north of GEH) and Kalamunda Road as Secondary Routes and Foxton Boulevard, Talbot Road (east of Roe Highway) and Midland Road as Local Routes as shown in Figure 10-3.

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Figure 10-3: DoT Long-Term Cycle Network



(Source: DoT Long-Term Cycle Network for Perth and Peel Map)

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11 Site Specific Issues

The B-Double hardstand requires the B-Double to align the front of the vehicle with the two-way entry and exit at warehouse 1 to allow for entry of semi-trailers. In addition, the exit of a B-Double would require the vehicle to reverse before manoeuvring out as shown in Appendix B.3.

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12 Safety Issues

12.1 Identified Issues

In the five-year period up to 31/12/2021, there has been no recorded crash recorded along Talbot Road. There was one (1) recorded crash along Stirling Crescent to the south of Talbot Road. The recorded crash was a sideswipe from the same direction and involved hospitalisation.

Based on the above, the increase in traffic flows from the proposed development is not expected to lead to an increase in the number of crashes. No remedial measures are therefore required nor proposed.

12.2 Remedial Issues

Not applicable

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13 Conclusion

Based on the analysis and discussions presented within this report, the following conclusions are made:

- The proposed development generates a statutory parking requirement of 376 spaces, but an assessment of other industry guides indicates a requirement as low as 62. Therefore, the provision of 127 spaces is considered appropriate based on the business operation of a warehouse.
- The proposed parking layout is consistent with the dimensional requirements as set out in Australian/New Zealand Standard for Off-Street Car Parking (AS/NZS2890.1:2004).
- There is provision for bicycle facilities and pedestrian facilities within the development.
- The provision of loading area is appropriate with the swept path analysis carried out for 19m semi-trailers and 27.5m B-doubles.
- The site is expected to generate around 73 vehicle trips (inbound and outbound) in the AM peak hour.
- There is adequate capacity in the surrounding road network to cater for the traffic generated by the proposed development.
- There is expected to be no adverse traffic effects from the land use proposal on road safety.

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APPENDICES

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SHEET LIST

TP00	COVER SHEET
TP01	ESTATE PLAN
TP02	SITE PLAN
TP03	OFFICE A PLANS
TP04	OFFICE B PLANS
TP05	OFFICE C PLANS
TP06	ROOF PLAN
TP07	OVERALL ELEVATIONS 1
TP08	OVERALL ELEVATIONS 2
TP09	OFFICE A ELEVATIONS
TP10	OFFICE B & C ELEVATIONS
TP11	TYPICAL SECTION
TP12	3D VIEWS DETAILS
TP13	3D VIEWS SHEET 2
TP14	SIGNAGE DETAILS - BUILDING SIGNAGE
TP15	SIGNAGE DETAILS - PYLON SIGN
TP16	SIGNAGE DETAILS - ENTRANCE SIGN
TP17	SIGNAGE DETAILS - DIRECTIONAL SIGNAGE



ARTISTS IMPRESSION ONLY
SCALE: NTS

PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

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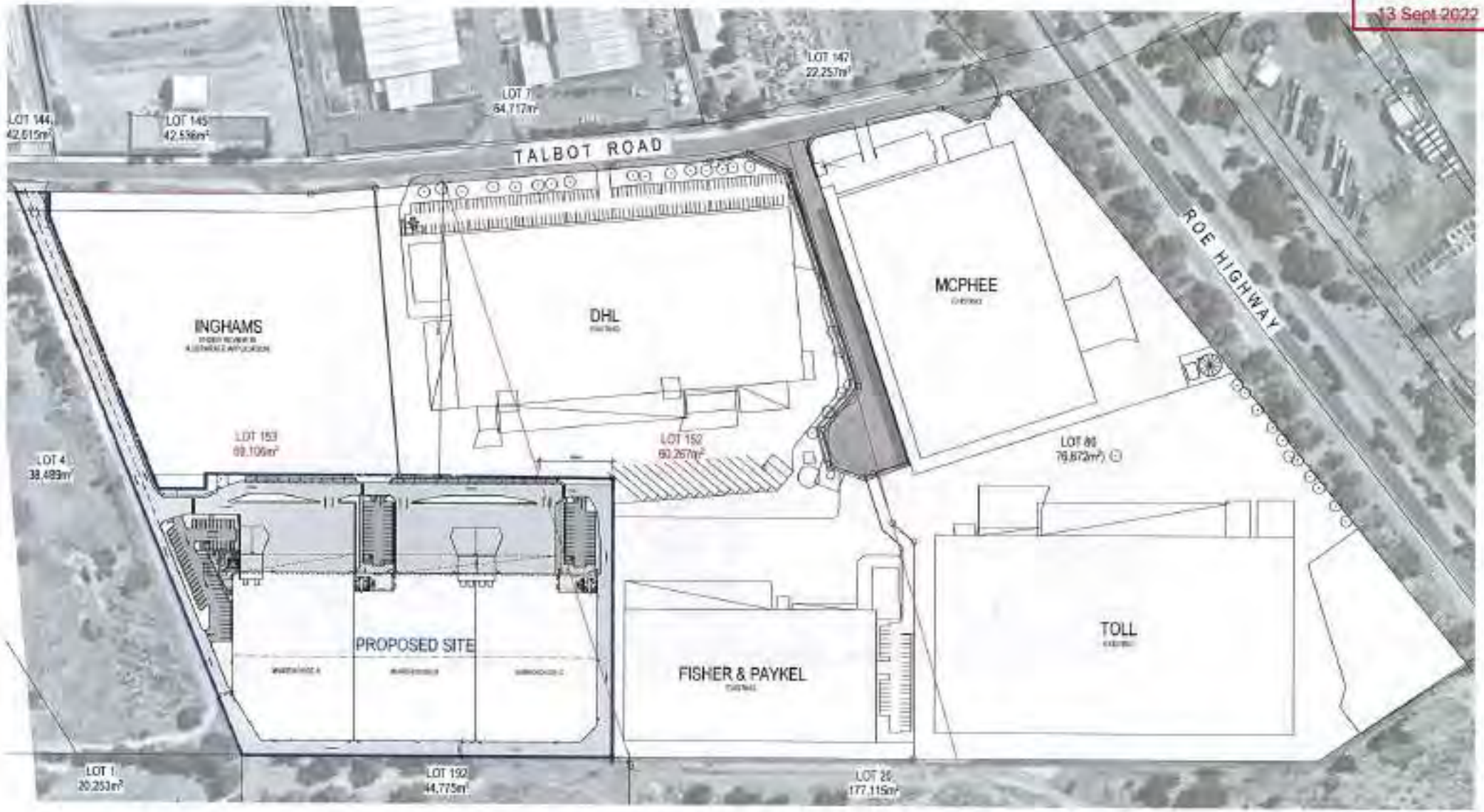

PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

ESTATE PLAN

LOGOS

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TP01 | A

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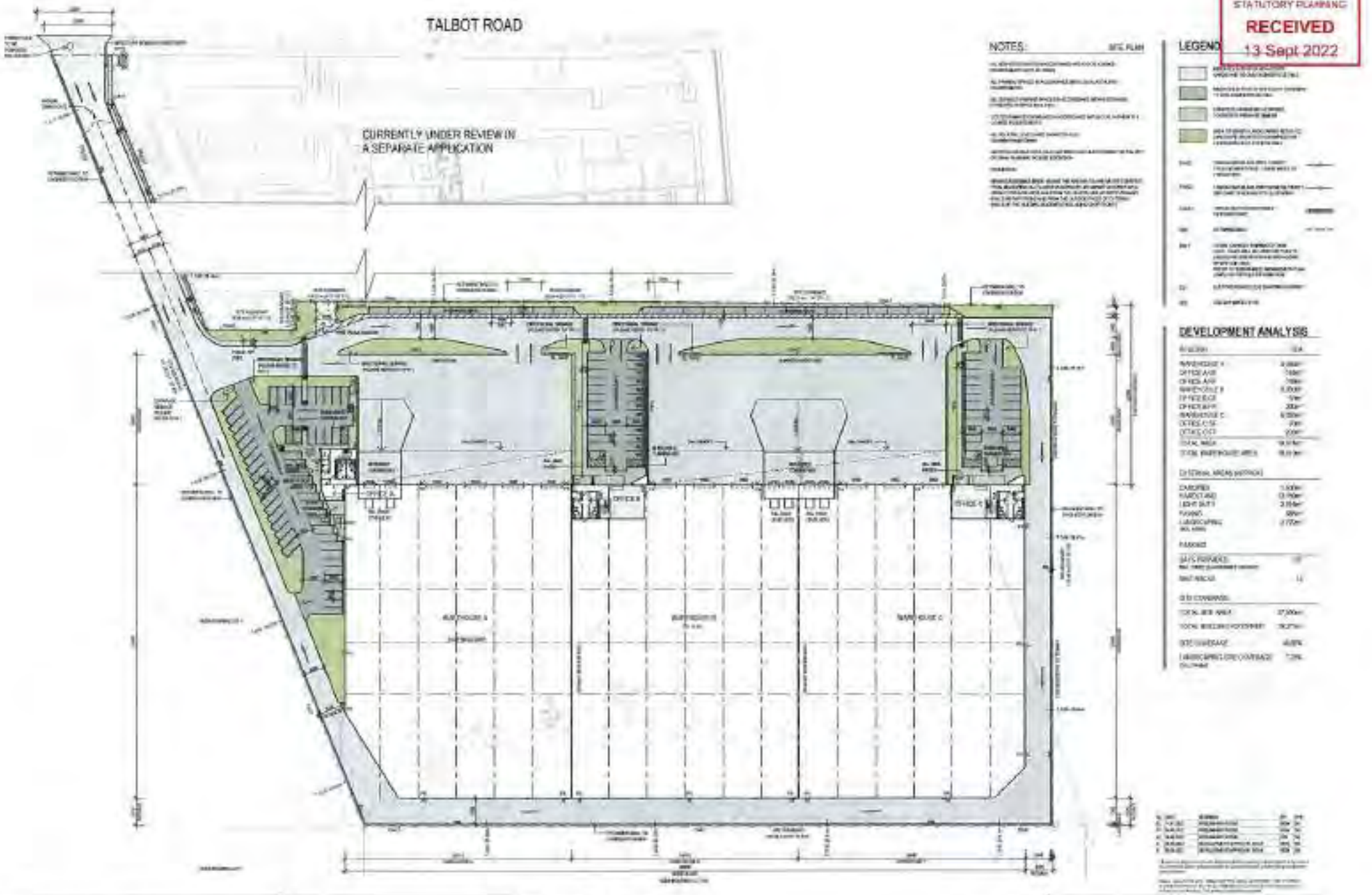

PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

SITE PLAN

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TP02 B

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OFFICE A GROUND FLOOR



OFFICE A FIRST FLOOR

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TALBOT ROAD, HAZELMERE WA

OFFICE A PLANS

LOGOS

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OFFICE B GROUND FLOOR



OFFICE B FIRST FLOOR

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TALBOT ROAD, HAZELMERE WA

OFFICE B PLANS

LOGOS

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TP04

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100_OFFICE C GROUND FLOOR



100_OFFICE C FIRST FLOOR

PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

OFFICE C PLANS

LOGOS

22059
TP05 A

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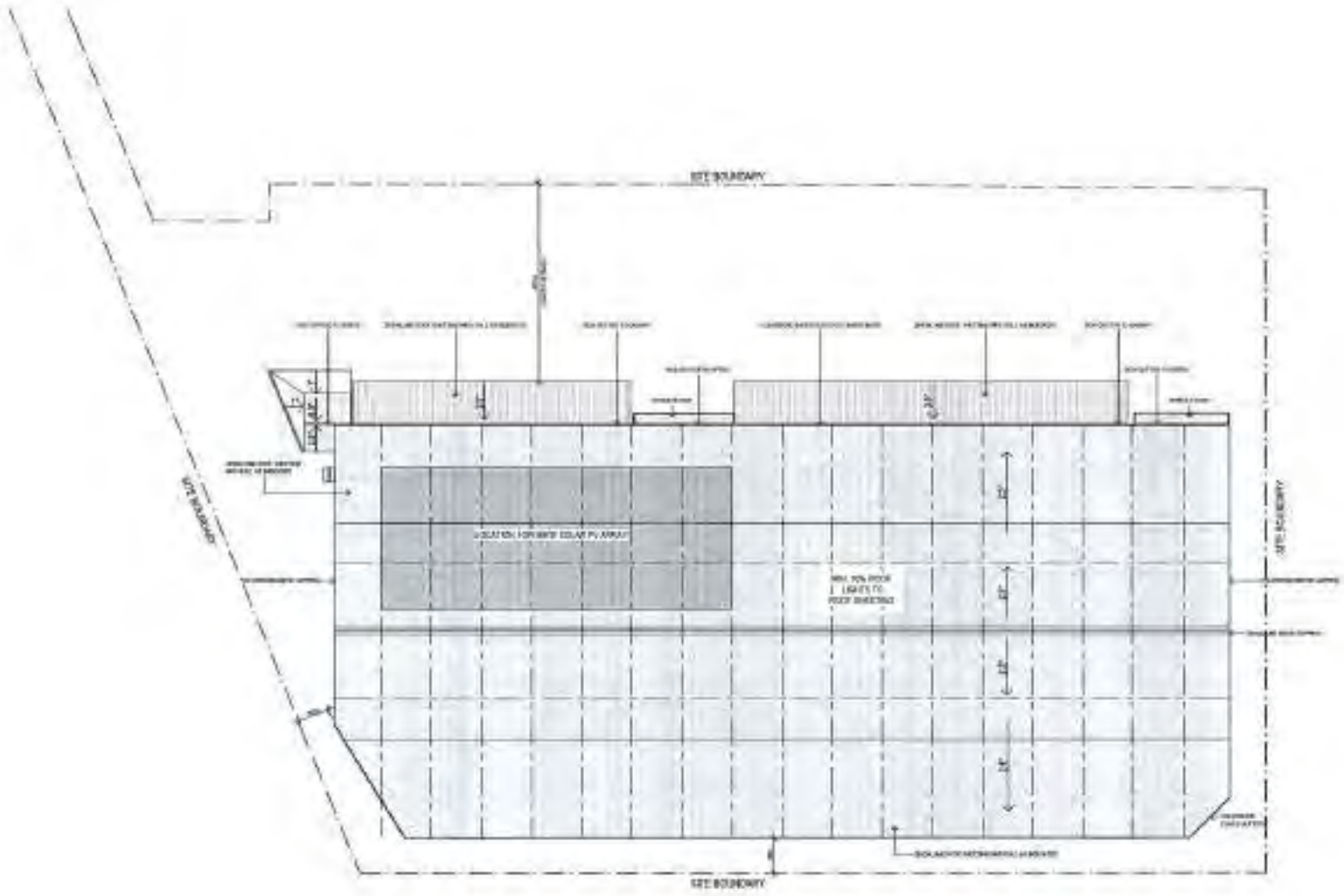

PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

ROOF PLAN

LOGOS

22099

TP08 A

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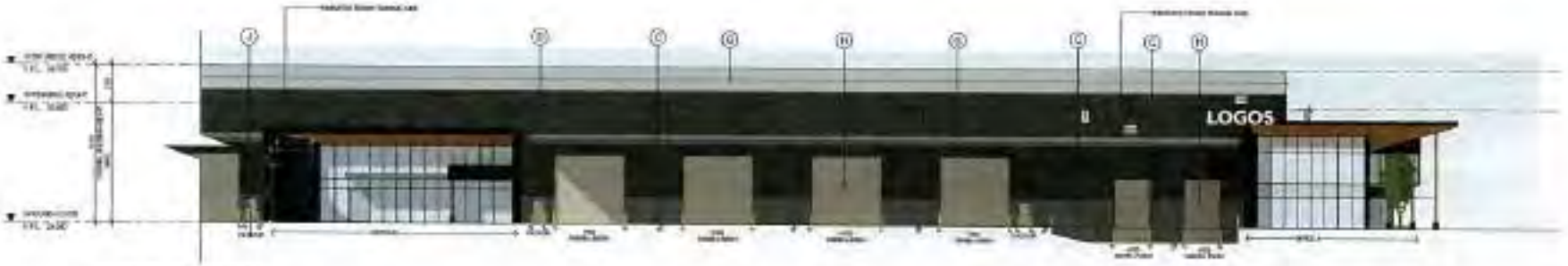
EAST ELEVATION



NORTH ELEVATION PART 1



NORTH ELEVATION PART 2

EXTERNAL FINISHES

A	[illegible]	GREY
B	PRECAST CONCRETE ELEMENT, TEXTURED	LIGHT GREY
C	PRECAST CONCRETE PANEL	BASALT
D	COLORBOND METAL CLADDING	COLORBOND MONUMENT
E	COLORBOND METAL CLADDING	COLORBOND WINDSPRAY
F	[illegible]	COPPER
G	ROOF CLADDING	ZINCALUME
H	ROLLER SHUTTER DOOR CLADDING TO DOORS	COLORBOND SURFMIST
J	SIGNAGE TO CANOPIES	COLORBOND WINDSPRAY
K	BOLLARDS	SMOOTH YELLOW
L	ALUMINIUM CLADDING	COPPER METALLIC
M	TEXTURED CONCRETE	BLACK
N	ALUMINIUM FRAMES COLORBOND CLADDING	GREY
O	POWDERCOAT	BLACK
P	ALUMINIUM CLADDING	BLACK

P1	13/09/22	[illegible]	SW
P2	12/08/22	[illegible]	SW
P3	11/07/22	[illegible]	SW
P4	13/06/22	[illegible]	SW
P5	17/05/22	[illegible]	SW

PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

OVERALL ELEVATIONS 1

LOGOS

DATE	13.9.2022
DRAWN BY	BCW
SCALE	1:100 @ A1
SCALE	1:200 @ A3

22099
TP07
A

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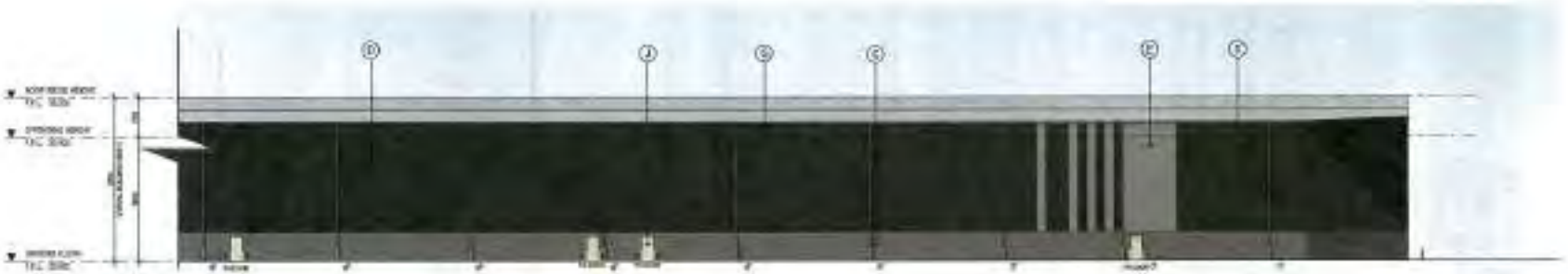
SOUTH ELEVATION PART 1



SOUTH ELEVATION PART 2



WEST ELEVATION

EXTERNAL FINISHES

A	ALUMINIUM CHANNEL GLAZING	GREY
B	PRECAST CONCRETE PANEL FORMLINER	LIGHT GREY
C	PRECAST CONCRETE PANEL	BASALT
D	COLORBOND WALL CLADDING	COLORBOND MONUMENT
E	COLORBOND WALL CLADDING	COLORBOND WINDSPRAY
F	BATTENS / COLUMNS	COPPER
G	ROOF CLADDING	ZINCALUME
H	ROLLER SHUTTER DOOR CLADDING FIX (LOUVRE)	COLORBOND SURFMIST
J	GUTTERS / DOWNPIPES / CAPPINGS	COLORBOND WINDSPRAY
K	BOLLARDS	SAFETY YELLOW
L	ALUMINIUM CLADDING	COPPER METALLIC
M	PVC COATED CHAINWIRE FENCING	BLACK
N	ALUMINIUM FRAMED COLORBOND GLAZING	GREY
O	PERGOLA	BLACK
P	ALUMINIUM CLADDING	BLACK

No.	MTG	REMARK	DR	CK
01	01.06.2022	DEVELOPMENT APPROVAL	MW	JK
02	15.06.2022	PRELIMINARY ISSUE	MW	JK
03	12.08.2022	PRELIMINARY ISSUE	MW	JK
04	13.09.2022	DEVELOPMENT APPROVAL (CCC)	MW	JK

PROJECT
PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TITLE
OVERALL ELEVATIONS 2

CLIENT
LOGOS

DATE 01.06.2022
DRAWN BY MW
SCALE 1:100@A1
SCALE 1:200@A3

JOB NO. 22099
DRAWING NO. TP08
REVISION A

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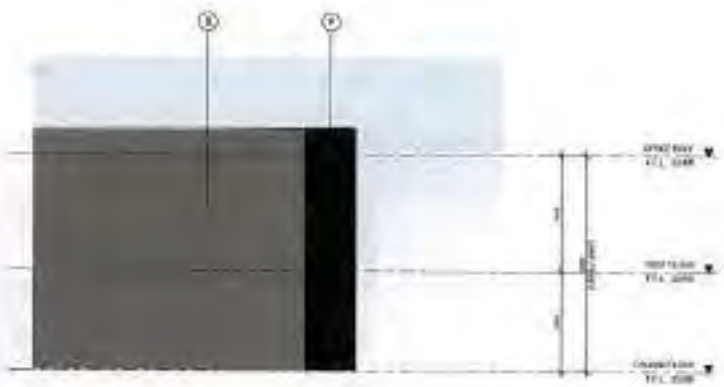
OFFICE A - NORTH ELEVATION



OFFICE A - EAST ELEVATION



OFFICE A - SOUTH ELEVATION



OFFICE A - WEST ELEVATION

EXTERNAL FINISHES

A	ALUMINIUM FRAMED GLAZING	GREY
B	PRECAST CONCRETE PANEL FORMLINER	LIGHT GREY
C	PRECAST CONCRETE PANEL	SMOKE
D	COLORBOND WALL CLADDING	COLORBOND WINDSPRAY
E	COLORBOND WALL CLADDING	COLORBOND WINDSPRAY
F	BATTERIES / COLORING	COPPER
G	ROOF CLADDING	ZINCALUME
H	ROLLER SHUTTER DOOR CLADDING FA DOORS	COLORBOND SUPERIOR
J	DOWNPIPES / CAPPINGS	COLORBOND WINDSPRAY
K	BOLLARDS	SAFETY YELLOW
L	ALUMINIUM CLADDING	COPPER METALLIC
M	PERFORATED SUNDERING	BLACK
N	ALUMINIUM FRAMED COLOURWACK GLAZING	GREY
O	POWDERCOAT	BLACK
P	ALUMINIUM CLADDING	BLACK

PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

OFFICE A ELEVATIONS

LOGOS

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TP09 A

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OFFICE B - WEST ELEVATION

OFFICE B - NORTH ELEVATION

OFFICE B - EAST ELEVATION



OFFICE C - WEST ELEVATION

OFFICE C - NORTH ELEVATION

OFFICE C - EAST ELEVATION

EXTERNAL FINISHES

A	ALUMINIUM PRIMED GLAZING	GREY
B	PRECAST CONCRETE PANEL COMBINED	LIGHT GREY
C	PRECAST CONCRETE PANEL	SMALT
D	COLORBONE WALL CLADDING	COLORBONE MONUMENT
E	COLORBONE WALL CLADDING	COLORBONE WINDSPRAY
F	WATTING / COLORBONE	COPPER
G	ROOF CLADDING	ZINCALUME
H	ROLLER SHUTTER DOOR CLADDING/TA DOWN	COLORBONE SATANAY
J	SCHAMPFER / CAPPING	COLORBONE WINDSPRAY
K	BOLLARDS	SAFETY YELLOW
L	ALUMINIUM CLADDING	COPPER METALLIC
M	PERFORATED SCREENING	BLACK
N	ALUMINIUM PRIMED COLOURBANK GLAZING	GREY
O	POWDERCOAT	BLACK
P	ALUMINIUM CLADDING	BLACK

PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

OFFICE B & C ELEVATIONS

LOGOS

22099
TP10 A

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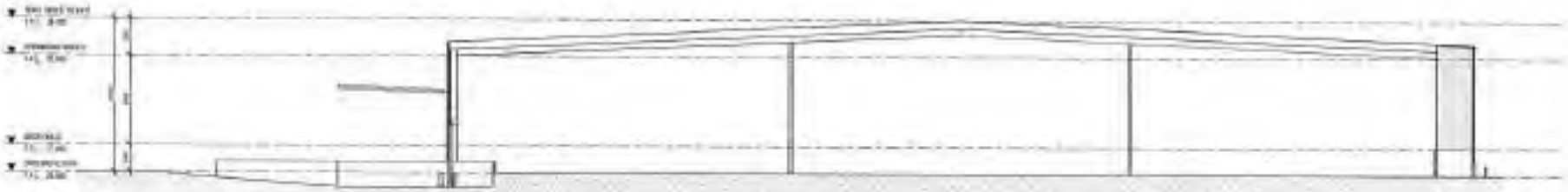

PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

TYPICAL SECTION

LOGOS

22099

TP11 | A

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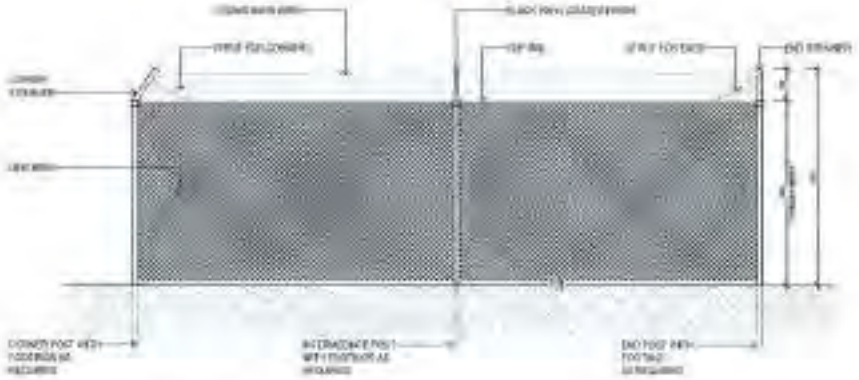
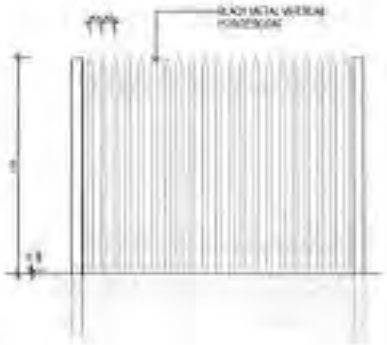
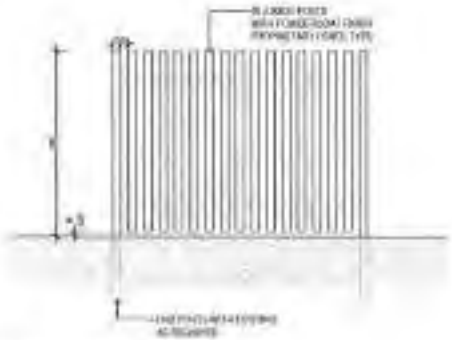


1 FN-1 FENCE DETAIL



2 FN-2 FENCE DETAIL



3 FN-3 FENCE DETAIL

PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

FENCE DETAILS

LOGOS

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TP12 | A

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PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

3D VISUALISATION

LOGOS

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TP13 | A

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Sign Designs

Estate Identification



PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

SIGNAGE DETAILS-
BUILDING SIGNAGE

LOGOS

22099

TP14 | A

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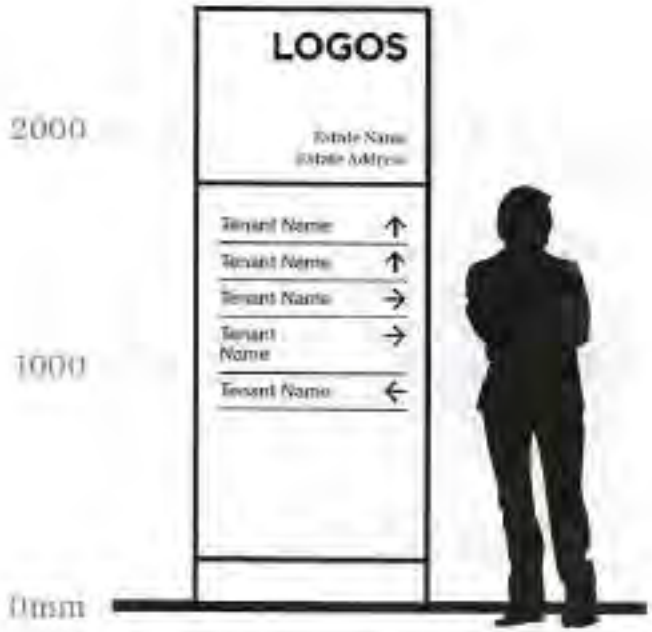

Directory Board

Directory Boards identify the site at a secondary level and provides direction.

PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

SIGNAGE DETAILS -
DIRECTORY BOARD

LOGOS

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TP15 | 8

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Sign Designs

Entrance Sign Free-standing



Issue A / March 2019

PROPOSED WAREHOUSE DEVELOPMENT
TALBOT ROAD, HAZELMERE WA

SIGNAGE DETAILS -
ENTRANCE SIGN

LOGOS

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Sign Designs

Directional Free-standing



Issue A / March 2019

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TALBOT ROAD, HAZELMERE WA

SIGNAGE DETAILS-
DIRECTIONAL SIGNAGE

LOGOS

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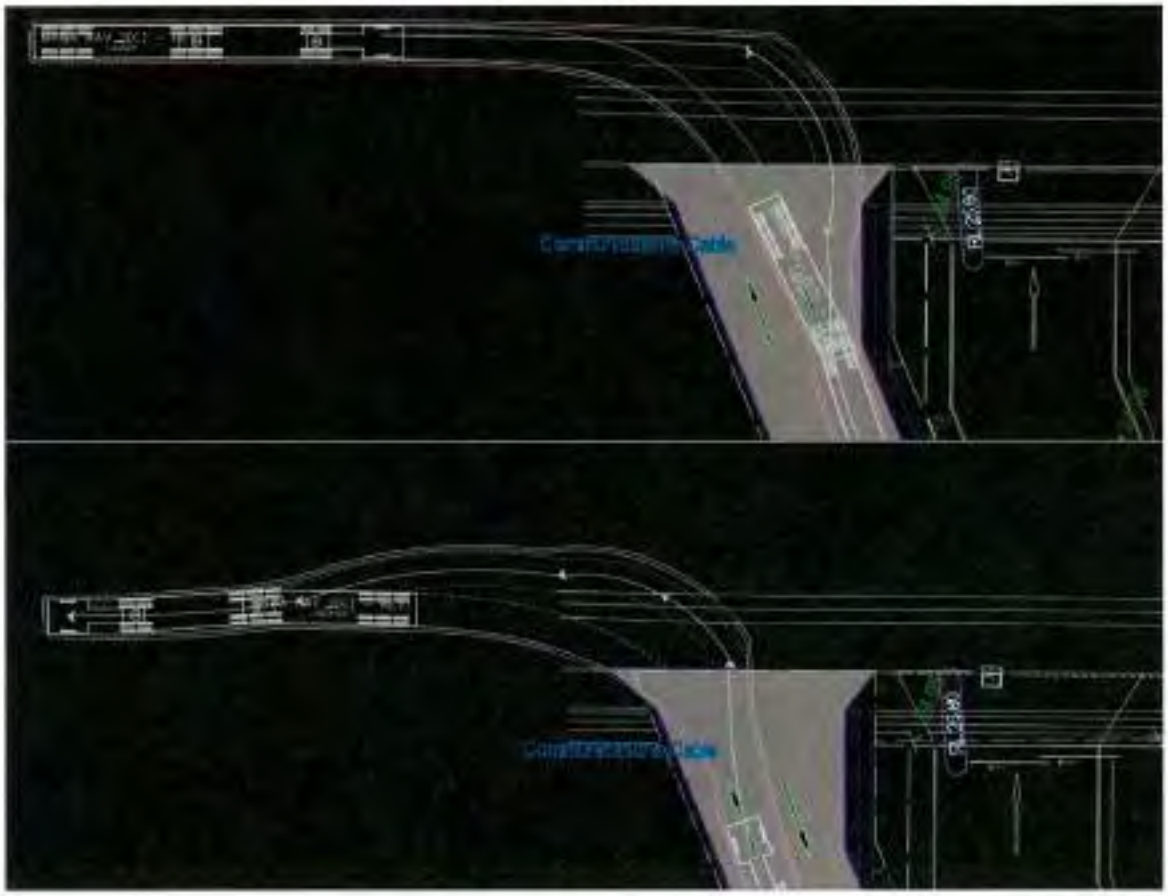
Appendix B Swept Path Analysis

B.1 B-Double (27.5m) Site Entry and Exit



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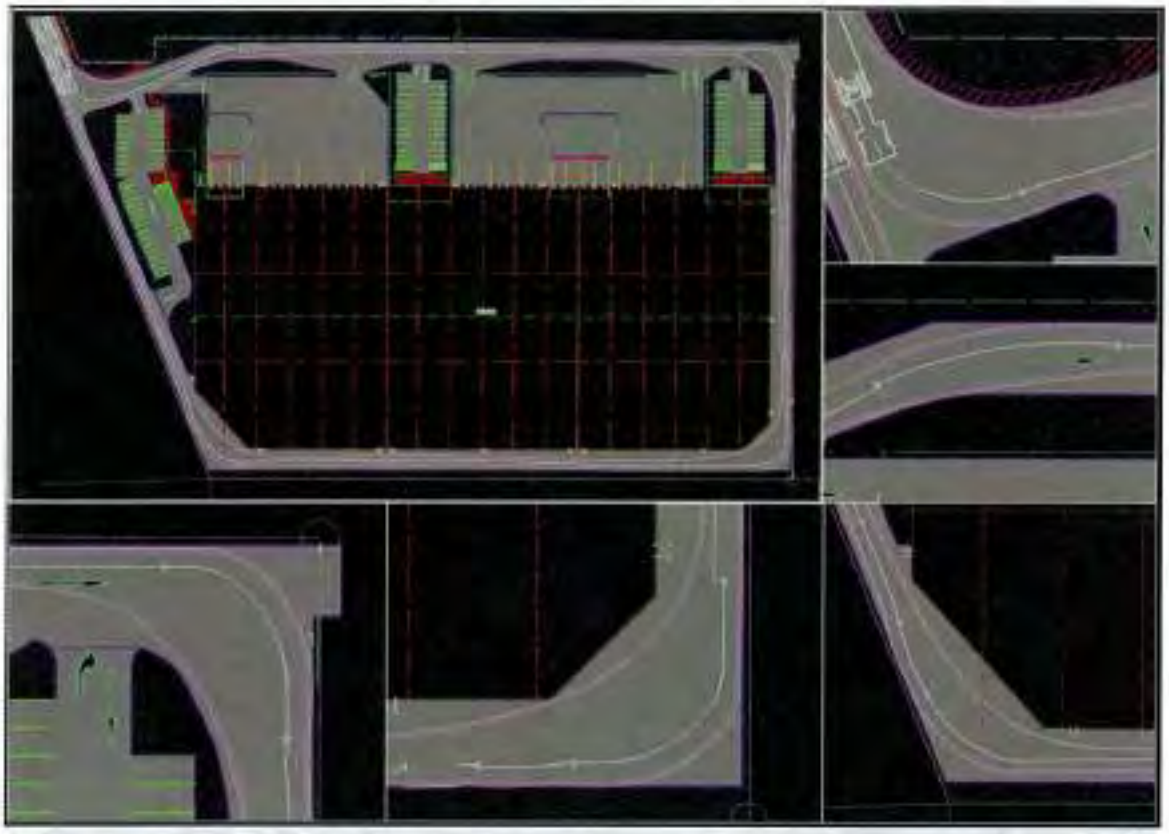
B.2 B-Double (27.5m) Site Circulation



B.3 B-Double (27.5m) Hardstand Entry and Exit



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B.4 Semi-Trailer (19m) Load Dock Reverse Entry



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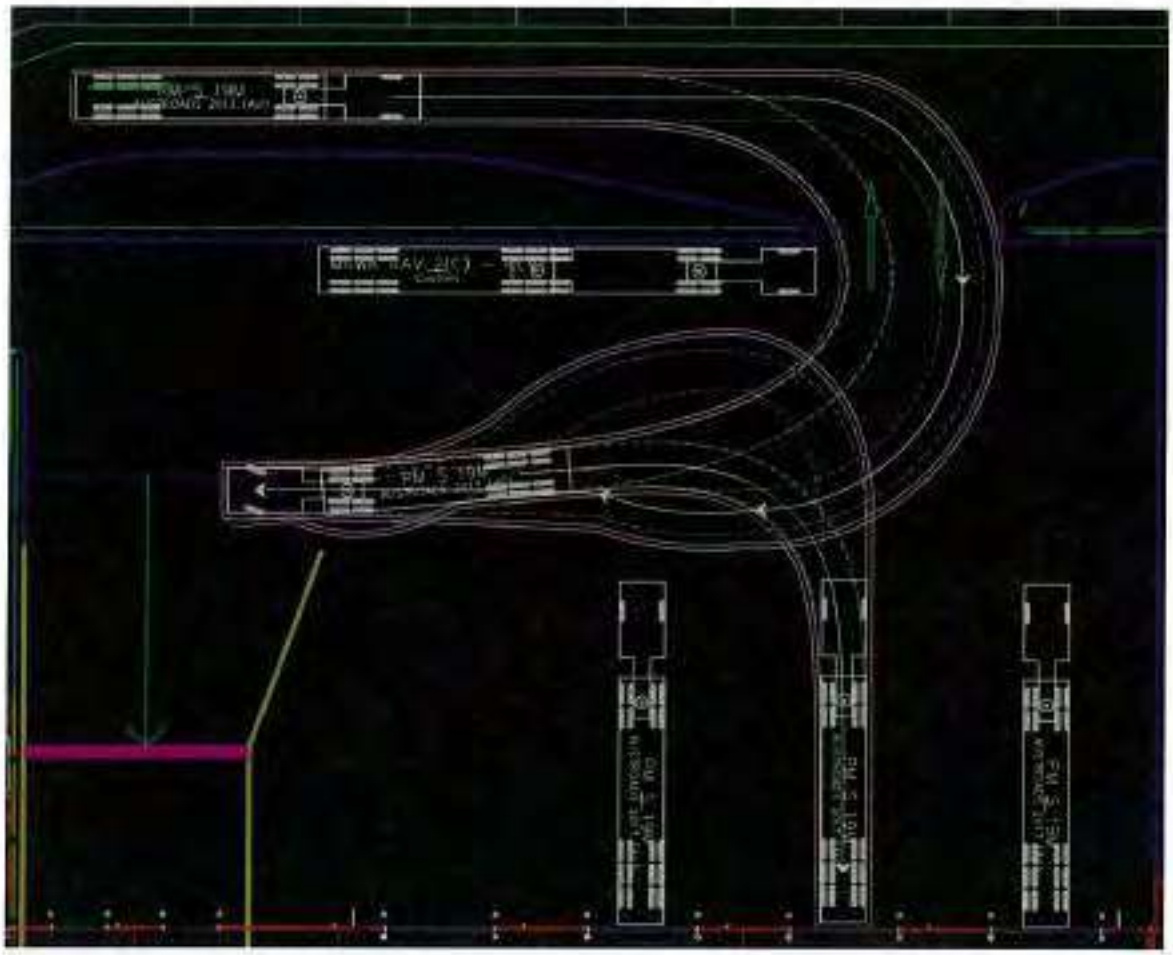
Hazelmere Logistics Estate
Swept Path Analysis



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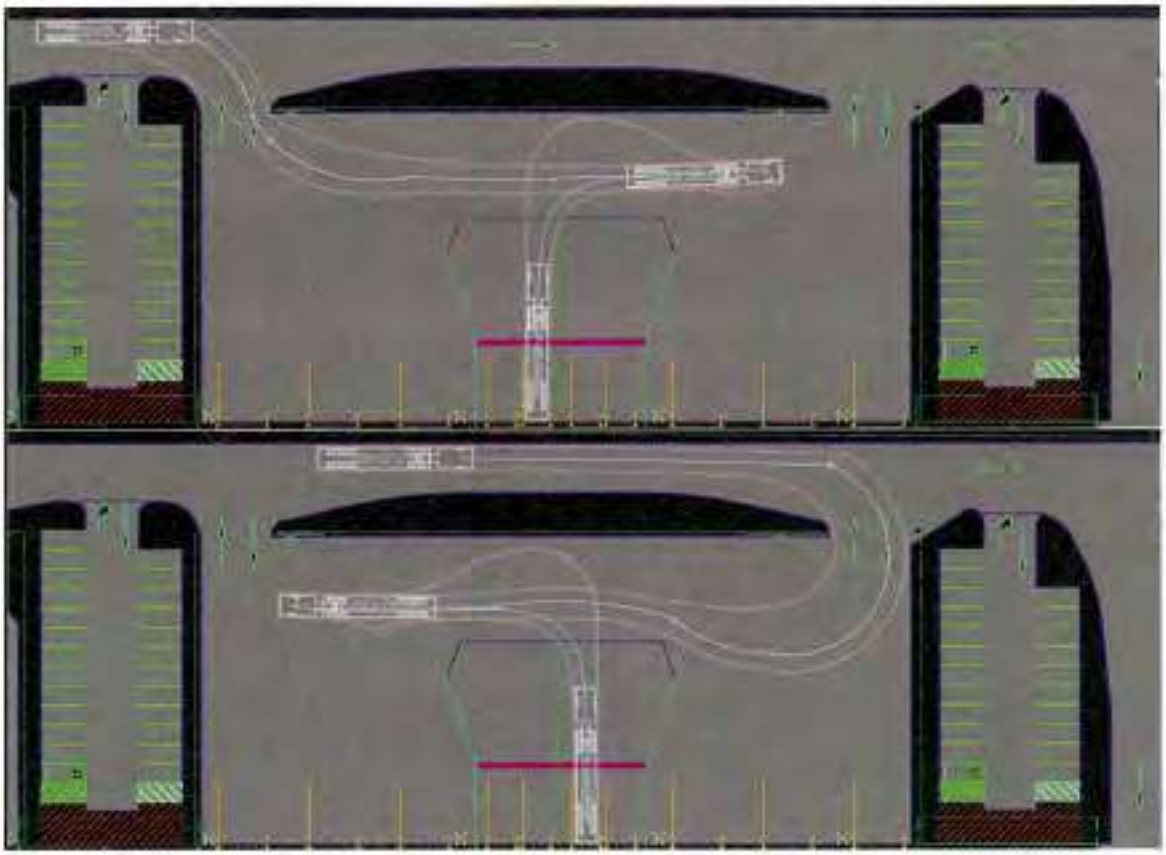
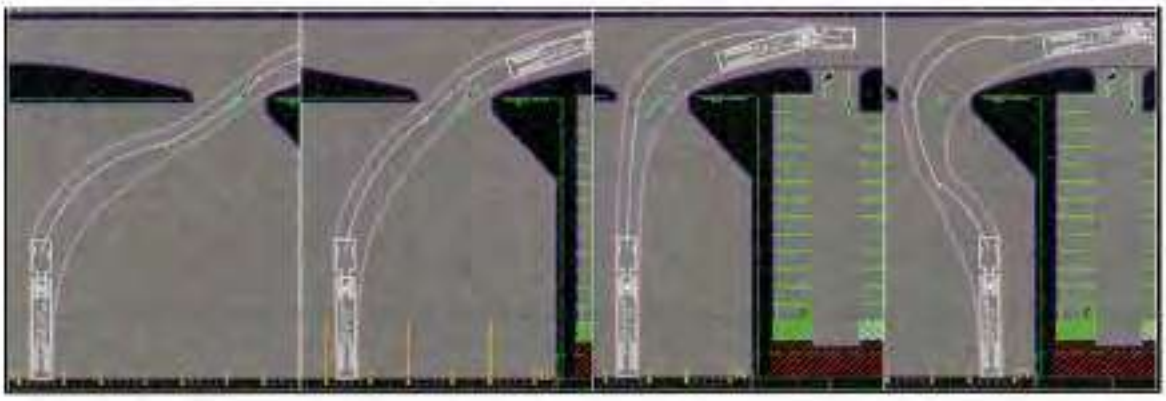


B.5 Semi-Trailer (19m) Loading Dock Exit



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Appendix C WAPC Checklist

Item	Provided	Comments/Proposals
Proposed Development	✓	
Existing Land Uses	✓	
Proposed Land Uses	✓	
Context with Surrounds	✓	
Vehicular Access and Parking	✓	
Access Arrangements	✓	
Public, Private, Disabled Parking, Set Down/Pick Up	✓	
Service Vehicles (Non-Residential)	✓	
Access Arrangements	✓	
On/Off-Site Loading Facilities	✓	
Hours of Operation	✓	
Traffic Volumes	✓	
Daily or Peak Traffic Volumes	✓	
Type of Vehicles	✓	
Traffic Management on Frontage Streets	✓	
Public Transport Access	✓	
Nearest Bus/Train Routes	✓	
Nearest Bus Stops/Train Stations	✓	
Pedestrian/Cycle Links to Bus Stops/Train Station	✓	
Pedestrian Access/Facilities	✓	
Existing Pedestrian Facilities within the Development	✓	
Proposed Pedestrian Facilities within the Development	✓	
Existing Pedestrian Facilities on Surrounding Roads	✓	
Proposals to Improve Pedestrian Access	✓	
Cycle Access/Facilities	✓	
Existing Cycle Facilities within the Development	✓	
Proposed Cycle Facilities within the Development	✓	
Existing Cycle Facilities on Surrounding Roads	✓	
Proposals to Improve Cycle Access	✓	
Site Specific Issues	✓	
Safety Issues	✓	
Identified Issues	✓	
Remedial Issues	✓	

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