Metro Outer Development Assessment Panel Agenda

Meeting Date and Time: Tuesday, 26 November 2024; 9:30am
Meeting Number: MODAP/49
Meeting Venue: 140 William Street, Perth

A live stream will be available at the time of the meeting, via the following link:
MODAP/49 – 26 November 2024 – City of Swan – City of Mandurah

PART A – INTRODUCTION

1. Opening of Meeting, Welcome and Acknowledgement
2. Apologies
3. Members on Leave of Absence
4. Noting of Minutes

PART B – CITY OF SWAN

1. Declarations of Due Consideration
2. Disclosure of Interests
3. Form 1 DAP Applications
   - 3.1 Lot 119 & Lot 808 (No.54) Lakes Road, Hazelmere – Proposed Warehouse & Incidental Office – DAP/24/02754
4. Form 2 DAP Applications
5. Section 31 SAT Reconsiderations

PART C – CITY OF MANDURAH

1. Declarations of Due Consideration
2. Disclosure of Interests
3. Form 1 DAP Applications
   - 3.1 Lots 187 & 186 (2 & 4) Third Avenue, Mandurah – Proposed Child Care Premises – DAP/24/02741
4. Form 2 DAP Applications
5. Section 31 SAT Reconsiderations

PART D – OTHER BUSINESS

1. State Administrative Tribunal Applications and Supreme Court Appeals
2. Meeting Closure

Please note, presentations for each item will be invited prior to the items noted on the agenda and the presentation details will be contained within the related information documentation

ATTENDANCE

DAP Members

Eugene Koltasz (Presiding Member)
Dale Page (Deputy Presiding Member)
Mike Mouritz (Specialist Member)

Part B – City of Swan
Cr Jennifer Catalano (Local Government DAP Member, City of Swan)
Cr Rod Henderson (Local Government DAP Member, City of Swan)

Part C – City of Mandurah
Mayor Rhys Williams (Local Government DAP Member, City of Mandurah)
Cr Caroline Knight (Local Government DAP Member, City of Mandurah)

Minute Secretary

Claire Ortlepp (DAP Secretariat)

Officers in Attendance

Ashlee Kelly (DAP Secretariat)

PART A – INTRODUCTION

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3.1 Lot 119 & Lot 808 (No.54) Lakes Road, Hazelmere – Proposed Warehouse & Incidental Office – DAP/24/02754

4. Form 2 DAP Applications

Nil.

5. Section 31 SAT Reconsiderations

Nil.

Part B – Item 3.1 – LOT 119 & LOT 808 (NO.54) LAKES ROAD, HAZELMERE – PROPOSED WAREHOUSE & INCIDENTAL OFFICE

Form 1 – Responsible Authority Report
(Regulation 12)

DAP Name:	Metro Outer Development Assessment Panel
Local Government Area:	City of Swan
Applicant:	Taylor Burrell Barnett Town Planning and Design (Jarrod Ross)
Owner:	HIF 54LR Pty Ltd
Value of Development:	$33.22 million
Responsible Authority:	City of Swan
Authorising Officer:	Philip Russell – Manager Statutory Planning
LG Reference:	DA-610/2024
DAP File No:	DAP/24/02754
Application Received Date:	16 August 2024
Report Due Date:	14 November 2024
Application Statutory Process Timeframe:	90 Days
Attachment(s):	1. Location Plan 2. Accompanying Plans: a) Locality Plan – Dwg No.2411-169-DA-020, Rev C; b) Detail Survey – Job No.102557, Plan No.007, Rev C; c) Site Plan – Dwg No.2411-169-DA-021, Rev H; d) Pedestrian Access Plan – Dwg No.2411-169-DA-022, Rev C; e) Warehouse Roof Plan – Dwg No.2411-169-DA-023, Rev C; f) Shadow Diagrams – Dwg No.2411-169-DA-024, Rev B; g) Indicative Racking Layout Plan – Dwg No.2411-169-DA-025, Rev D; h) Office Plans – Dwg No.2411-169-DA-100, Rev E; i) Warehouse Sections – Dwg No.2411-169-DA-200, Rev D; j) Warehouse Elevations – Dwg No.2411-169-DA-201, Rev C; k) Office Elevations – Dwg No.2411-169-DA-202, Rev C; l) Indicative Perspectives – Dwg No.2411-169-DA-203, Rev C; m) ATU Details – Dwg No.2411-169-DA-300, Rev B.

	Supplementary Information not subject to approval: 3. Design Review Panel Comments – 03 Sep 2024; 4. Design Review Panel Comments – 30 Sep 2024; 5. MRWA Response to Council – Oct 2024; 6. Planning Report – Aug 2024; 7. Sustainability Strategy – received 7 Nov 2024; 8. Transport Impact Assessment – Aug 2024; 9. Site and Soil Evaluation – Jul 2024; 10. Stormwater Management Plan – Aug 2024; 11. Stormwater Drainage & Site Design Levels – Aug 2024 12. Environmental Noise Impact Assessment – Aug 2024; 13. Landscape Masterplan – Aug 2024. 14. Bushfire Attack Level Contour Plan – 2021 15. Noise Fence Mural Typical Detail – Dwg No.2411-169-DA-301; 16. Design Review Memorandum – 5 Nov, 2024.

Responsible Authority Recommendation

That the Metro Outer Development Assessment Panel resolves to:

Approve DAP Application reference DAP/24/02754 and Accompanying Plans in accordance with Clause 68 of Schedule No.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, together with any requirements and annotations detailed thereon 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 'Warehouse' as defined in the City of Swan's Local Planning Scheme No.17 and the subject land may not be used for any other use without the prior approval of the City of Swan.

3. **Prior to occupation or use of the development**, 169 vehicle parking bays must be provided on the lot in accordance with the approved plans. The design of vehicle parking must comply with AS/NZ 2890.1 (as amended). Accessible parking bays must comply with AS/NZ 2890.6 (as amended).

4. 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.

5. **Prior to occupation of the development,** arrangements must be made to the satisfaction of the City of Swan for the amalgamation of Lot 119 and Lot 808 Lakes Road, Hazelmere into one (1) lot.

6. **Prior to a building approval 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.

7. 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.

8. 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.

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 the development.

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

11. **Prior to the occupation of the development**, the Landowner must contribute a sum of 1% of the total development construction value towards Public Art in accordance with the City of Swan's Local Planning Policy for the Provision of Public Art (POL-LP-1.10), by either:

    a) Payment to the City of Swan of a cash-in-lieu amount equal to the sum of the contribution amount of $282,370.00 (being 1% of the total development construction less the applicable 15% discount). 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 ($332,200.00). 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 Artwork 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.

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

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

14. **Prior to occupation or use of the development**, the owner of the land is to construct a solid metal sheet fence to a height of 3m in accordance with the approved plans and Environmental Noise Assessment prepared by SLR Consulting Australia Pty Ltd (dated 12 August 2024). The noise wall is to be implemented for the life of the development to the satisfaction of the City of Swan.

15. The colours, materials and finishes of the development shall be in accordance with the details and annotations as indicated on the approved plans/ approved schedule of materials and colours which form part of this approval.

16. **Prior to the occupation or use of the development** for the proposed Warehouse the subject of this application, a Notification pursuant to Section 70A of the *Transfer of Land Act 1893* must be placed on the certificate of title of the subject lot advising current and future land owners that the property is located in a Bushfire Prone Area.

17. External lighting shall comply with the requirements of AS4282 – Control of Obtrusive Effects of Outdoor Lighting.

18. **Prior to a building approval being issued**, a detailed landscaping and reticulation plan for the subject site and adjoining road verges of Lakes Road and Vale Road fronting the site must be submitted to, and approved to, the satisfaction of the City of Swan, and must include the following:

    a. The location, number and type of proposed trees and shrubs including planter and /or tree pit sizes and planting density;

    b. Tree and shrub species selected shall seek to include corymbia calophylla and eucalyptus torquate (where appropriate) and spaced in accordance with the City of Swan's tree planting guidelines;

    c. Any lawns to be established;

    d. Any existing vegetation and/or landscaped areas to be retained;

    e. Any verge treatments; and

    f. Evidence that the proposed landscaping will not, at maturity, negatively impact the development and adjoining properties.

19. The approved landscaping plan must be implemented within the first available planting season after the initial occupation of the development, and maintained thereafter by the owner of the land, to the satisfaction of the City of Swan. Any species that fail 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.

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

21. The premises shall be kept in a neat and tidy condition at all times to the satisfaction of the City of Swan.

Advice Notes

1. The subject property is not located on a Main Roads WA approved Restricted Access Vehicle (RAV) route. Only as-of-right vehicles can access the subject property at this time. Future RAV access to the site will require approval by Main Roads for the RAV network.

2. Any changes to Restricted Access Vehicles to service the development will be subject to further support and approval from the City of Swan and Main Roads WA. Such approval may be subject to any necessary intersection upgrades being undertaken at the Applicant's expense to the satisfaction of Main Roads WA.

   The Applicant is advised to contact Main Roads WA's Heavy Vehicle Services Branch to ascertain any approval requirements. Information can also be found on the Heavy Access Requirements in WA section of the Main Roads WA website.

3. The Great Eastern Highway Bypass Interchanges Project is at the construction stage and is currently on hold until Main Roads WA secure the approvals required to deliver the works. The project is within Main Roads WA's current 4-year forward estimated construction program. Please be aware timing information is subject to change and that Main Roads WA assumes no liability for the information provided.

   The project involves changes to the State Road network in the subject locality, including but not limited to the upgrade of the Abernethy Road, Lloyd Street and Great Eastern Highway Bypass Interchange and closure of the road between the Great Eastern Highway Bypass and Stirling Crescent.

4. The carrying on of the development must not cause a dust nuisance to neighbours. Where appropriate, such measures as installation of sprinklers, use of water tanks, mulching or other land measures shall be installed or implemented within the time and in a manner directed by the City of Swan's Manager Health and Building Services if it is considered that a dust nuisance exists.

5. 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.

6. This approval does not constitute approval for signage on the premises. The Applicant/Owner is advised that signage that does not meet the exemption criteria set out in Schedule 5A of the City of Swan's Local Planning Scheme No.17 will require a separate development approval and possibly a building permit.

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	Light Industrial
Structure Plan/Precinct Plan	Hazelmere Enterprise Area Structure Plan (2011)
Structure Plan/Precinct Plan - Land Use Designation	Light Industrial
Use Class and permissibility:	Warehouse 'P' use and Incidental Office
Lot Size:	7.87ha
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	Yes
Swan River Trust Area	No

Proposal:

Taylor Burrell Barnett, on behalf of Hesperia who is the Development Manager on behalf of the Landowner, has applied for the approval of a Warehouse with an Ancillary Office area.

The Development Application report provided by Taylor Burrell Barnett specifies that the two (2) adjoining Warehouses will be leased to a common tenant who is an experienced national logistics tenant who will headquarter their Western Australian business at this site. The Warehouse will store various, typically non-perishable, products in customised racking and facilitate the distribution of goods.

The development will span across two (2) adjacent lots (Lot 119 and Lot 808 Lakes Road, Hazelmere) and comprise the following:

- A main two-level office of 1,000m^2 adjoining the north-western side of Warehouse No.1;
- Car parking for 169 vehicles, including two (2) ACROD spaces and eight (8) electric vehicle charging spaces;
- The proposed Warehouse tenancies include:
    - Warehouse No.1, which will comprise of 22,330m^2 warehouse floor space and a 100m^2 single storey dock office adjoining the eastern side; and
    - Warehouse No.2, which will comprise of 14,940m^2 warehouse floor space and a 100m^2 single storey dock office adjoining the eastern side.
- A dedicated heavy duty concrete hardstand of 11,900m^2 to the east of the warehouses used for general freight storage including but not limited to pallets and sea containers;
- A maximum of 130 staff will operate from the proposed facility with 10 visitors per day;
- 'Access No.1 and No.3' Heavy vehicle circulation will be provided along Lakes Road, with the entry point at the eastern end and the exit point at the western end, towards the intersection of Lakes Road and Vale Road; and
- 'Access No.2' for cars and light vehicles to the car park will be along Lakes Road, in between the two (2) access points for heavy vehicles.

Background:

The subject site is located within the Hazelmere Industrial Area and is bound by an existing industrial development to the south, Lakes Road to the north and Vale Road to the east. Also to the north, the site abuts a portion of the Planning Control Area 163 for Lloyd Street (Great Eastern Highway Bypass to Workshops Avenue) and to the east across from Vale Road there are rural residential lots with existing dwellings.

An application has been submitted to the Western Australian Planning Commission for the amalgamation of the two (2) lots comprising the subject site, it has not been determined as yet. Amalgamation would form a condition of approval, should the Panel be supportive of the application.

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

State Government Policies

State Planning Policy 3.7 – Planning in Bushfire Prone Areas
State Planning Policy 4.1 – Industrial Interface
State Planning Policy 7.0 – Design of the Built Environment

Structure Plans/Activity Centre Plans

Hazelmere Enterprise Area Structure Plan (2011)

Local Planning Policies

POL-TP-129 Vehicle Parking Standards
POL-TP-124 Building and Development Standard – Industrial Zones
POL-LP-1.10 Provision of Public Art
POL-LP-1.13 Design Review

Consultation:

Public Consultation

Consultation was undertaken in the following manner:

Duration: 14 days between 11 September and 25 September 2024.

Method: Letters to 32 adjoining and surrounding landowners fronting Vale Road, Lakes Road and Hazelmere Circus and notice on the City of Swan's website.

Submissions received: At the close of advertising, one (1) objection and two (2) conditional support submissions were received.

Concerns were raised regarding the adequacy of stormwater management and treatment system, the requirement for the widening of Lakes Road to accommodate additional traffic and the potential noise from the cool room facility.

These matters will be discussed further in the report.

Referrals/consultation with Government/Service Agencies

The subject development site does not abut any Other Regional Road Reservations or Primary Regional Road Reservations. Lot 808 abuts the Planning Control Area for Lloyd Street (Great Eastern Highway Bypass to Workshops Avenue). All agency referrals conducted as part of this assessment are discretionary.

Referral was undertaken to Main Roads WA and the Department of Planning, Lands and Heritage. Main Roads WA supports the proposal subject to conditions. These are discussed in the Planning Assessment section of this report. No response was received by the Department of Planning, Lands and Heritage.

Design Review Panel Advice

In accordance with State Planning Policy 7.0 – Design of the Built Environment, the proposal was presented to the City of Swan's Design Review Panel, to undertake a

design review of the proposed development. This is discussed in the Planning Assessment section of this report.

Other Advice

The application was referred to the following City of Swan internal business units for comment:

- Environmental Health; and
- Asset Management.

Planning Assessment:

Zoning and Use Class Permissibility

The lots are zoned 'Urban' under the Metropolitan Region Scheme and 'Light Industrial' under the City of Swan's Local Planning Scheme No.17 with a Restricted Use designation.

Pursuant to Schedule No.3 – Restricted Use No.15 of the City of Swan's Local Planning Scheme No.17, a 'Warehouse' is a 'P' use within the Light Industrial zone, meaning that the use is permitted provided the use complies with the relevant development standards and the requirements of the Scheme.

Restricted Use No.15

The development site is designated as 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.15 provides direction on stormwater and effluent disposal, and the requirements for contamination and acid sulphate investigation.

With regard to this application, the pertinent conditions for Restricted Use No.15 are listed below:

1. Unless development on the site is connected to a 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 2,000m^2 of site area.
2. A Wastewater Management Plan shall be submitted with each development application to demonstrate that Condition No.1 can be achieved to the satisfaction of the local government.

Of note, developments are to comply with the definition of 'Dry Industry' which is a development of a type which is predicted to generate waste water intended for disposal on site at a daily volume not exceeding 540 litres per 2,000m^2 of site area.

City of Swan staff confirm that the proposed development will not exceed an amount of 540 litres per 2,000m^2 of site area and that the subject site is not connected to the Water Corporation's Sewer Network.

The ATU (STS) system proposed for the development is suitable for these two (2) lots once amalgamated and the submitted Site and Soil Evaluation is in accordance with AS/NZS1547.2012.

With regards to the proposed ATU system, an application to install an onsite effluent disposal system is to be submitted to City of Swan Health Services and forwarded to the Department of Health for approval. This has been recommended to be imposed as a condition.

City of Swan staff recommend a condition be imposed requiring a detailed drainage design at the time of lodgement of a Building Permit application.

State Planning Policy 7.0 – Design of the Built Environment

A design review is required pursuant to cl.3.1 (e) of the City of Swan's Local Planning Policy POL-LP-1.13 Design Review against the 10 principles of good design outlined in State Planning Policy 7.0.

The development was presented at the City of Swan's Design Review Panel meeting on the 3rd of September and again on the 30th of September 2024. A further Chair Review was undertaken on the 5th of November. It was requested by the Chair that should the Applicant reissue a collated Sustainability Strategy then the principle could be supported. Subsequently, the Applicant provided the information and as a result, nine (9) of the 10 design principles are supported. The remaining principle, Principle 10 – Aesthetics required further attention in the form of detailed design and location of signage. It is recommended, should the panel be supportive of the proposal that any signage intended for the site is subject to separate planning approval.

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

The City of Swan's 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. The proposal has been assessed against this policy and is found to comply with plot ratio, site coverage, façade treatments, and building setbacks and complies with the provision for a minimum of 10% of the site to be landscaped. Where the application seeks to vary the policy is along Vale Road where a portion of the frontage (83.9%) does not contain a 3m wide landscaping strip adjoining the street boundary.

This area between the building line and the boundary contains the vehicle access route and the noise wall. The requirement to noise attenuate the site from sensitive receptors on the opposite side of Vale Road renders this requirement for landscaping adjoining the street to be superfluous given the 3m high noise wall would screen any landscaping strip, if provided for.

Notwithstanding the above, when considering this variation along this street frontage, it is noted that the Applicant has proposed verge landscaping along Vale Road to achieve the full minimum landscaping strip of 3m which includes the following:

- Planting 98 trees in the verge consisting of 57 small trees (>3m diameter) and 41 medium trees (>5m diameter).

The opportunity to appropriately revegetate and landscape the frontage to the property in this manner is supported by City of Swan staff and will assist to screen the noise wall and supports the landscaping intent of the policy. The formulation of a detailed Landscaping Plan to the satisfaction of the City of Swan is recommended as a condition should the application be approved.

Local Planning Policy POL-TP-129 Vehicle Parking Standards

The City of Swan's policy POL-TP-129 Vehicle Parking Standards sets out car parking rates for various types of land uses including Warehouse.

The parking rate for Warehouse is two (2) spaces per 100m^2 of GLA or two (2) spaces per person employed, or a minimum of six (6) spaces whichever is the greater. The proposed 38,505m^2 of GLA equates to a requirement for 770.1~771 bays resulting in a parking shortfall of 602 bays based on 169 car bays provided.

Hesperia has engaged a tenant for the site who will occupy both Warehouse No.1 and No.2, as confirmed by the Applicant. The Applicant has provided further information following submission of the application confirming up to 130 staff will operate from the proposed facility with 10 visitors at any time.

The Applicant with respect to clause 77D of the *Planning and Development (Local Planning Scheme) Regulations 2015* has stated the following:

"I confirm that in the preparation of the development design we did seek to maximise onsite parking to meet the City of Swan's standard. Further parking beyond this would ultimately compromise the function of the site and the requirements for the safe access, circulation and egress of heavy vehicles from the site.

Safety and efficiency are of paramount importance in developments like this, and operationally the tenant cannot mix heavy vehicles with onsite parking for employees and visitors. We have designed the site to ensure that all parking is within a secure and safe location separated from the heavy vehicle circulation and allows employees and visitors to navigate the site without direct contact with heavy vehicle circulation areas. This has also allowed us to provide a high quality of landscaping throughout the parking areas and improve amenity for the employees and visitors to the site.

We confirm that:

- *The parking spaces provided are more than adequate for the demand generated by the proposed development and have been specifically catered to meet the needs of the tenant for whom the development is designed, as outlined above.*
- *Whilst there are no off-site parking facilities for use within the locality, we anticipate a condition which restricts the parking of vehicles within the adjacent street verge and are proposing extensive landscaping within verges so will seek to restrict any parking occurring within the verge in any event.*

- *We anticipate that staff will seek out alternative means of transport, as employees are anticipated to make use of ride sharing and e-transportation in the short-term and will ideally make greater use of public transport at the point that frequency and accessibility within the Hazelmere area improves.*

It should also be noted that:

- *The demand for parking within industrial areas is commonly far lower than that required under local planning schemes within Western Australia, and significantly lower than the ratio required for 'Warehouse' uses within the City of Swan.*
- *The terms of lease agreement for the tenant will clearly outline the number of parking bays provided for use of employees and visitors onsite.*
- *We anticipate that the City of Swan will apply a condition of approval which restricts parking to occur only within designated bays and restricts the parking of vehicles within adjacent verge areas.*
- *Parking demand in industrial areas is highly likely to diminish in the coming years, as industrial processes become more automated and facilities such as this employ less people."*

It is accepted that the parking standard is relatively high for this type of development, and it is accepted that based on the number of staff and visitors and the nature of the tenant's operations, the parking provided will be ample. Should an additional tenant occupy the site in the future, there is 11,900m^2 of hardstand area which, if not being utilised as storage, could be retrofitted as additional parking. In this regard, it is considered that this variation is capable of approval.

Traffic Generation and Access

The application as submitted proposes:

- One (1) ingress/egress point via a 6.2m wide crossover. This access is intended for C-Class vehicles into the secured carpark only; and
- Two (2) Heavy Vehicle Access points:
    - One (1) entry only point located against the boundary to Lakes Road with a 12.2m wide crossover at the lot boundary; and
    - One (1) exit only point located on the western end of the Lakes Road West boundary measuring 14m in width.

The Applicant has provided a Transport Impact Assessment that estimates the amount of traffic generated by the development and its impact on the road network.

The Transport Impact Assessment contends:

- The development is expected to have a total trip generation of approximately 80 vehicle trips in the AM and 68 vehicle trips in the PM peak hours and that this level of traffic generation is moderate and considered typical for this land use. It is anticipated to have no material impact on the surrounding road network.
- Swept path analysis indicates that the development and access points can accommodate the largest intended service vehicles being 19m semi-trailer and

27.5m B-Double (RAV 4). The car and truck swept paths show that no issues are anticipated in the ingresses and all internal parking spaces within the site.

City of Swan staff note that the swept paths that they have demonstrated through the Traffic Impact Assessment rely on road widths appropriate for the accommodation of RAV4 vehicles. Based on the advice from Main Roads WA, the subject property is not located on a Main Roads WA approved Restricted Access Vehicle (RAV) route. Main Roads WA have advised that only as-of-right vehicles can access the property at this time. The proponent intends to independently seek approval from Main Roads WA to extend the RAV4 network to include the portion of Lakes Road fronting the site and for a portion of Lloyd Street to facilitate the use of RAV4 vehicles.

City of Swan staff however, are satisfied that the projected vehicle movements associated with the proposed development can be accommodated by the existing road network for as-of-right vehicles.

Main Roads WA have supported the proposal subject to a condition which restricts vehicle access to entry-only for 'Access 3' fronting Lakes Road from land within Planning Control Area No.163. This is demonstrated on the plans for approval.

Noise

The Applicant has provided an Environmental Noise Assessment prepared by SLR Consulting which identifies three (3) sensitive receptors at Lot 120 Lakes Road, Lot 121 and Lot 300 Vale Road, opposite the subject site to the west. The assessment demonstrates that the operation of the facility, on a 24 hour basis, will not generate levels of noise that would adversely impact these nearby residences and would comply with the *Environmental Protection (Noise) Regulations 1997* at all times subject to a 3m high sheet metal fencing noise wall being constructed along the western side of the site.

City of Swan staff concur with the assessment and the requirement for the 3m high sheet metal noise wall to the extent as referenced on the plans and in the report is recommended as a condition of any approval.

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 on-site, should the development be approved. The Policy aims to ensure that certain developments in excess of $2.52 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 $33.22 million. The construction cost requires either a cash-in-lieu contribution of $282,370 (being 1% of the construction cost less the applicable 15% discount) or the provision of public art onsite (as approved by the City of Swan) to the value of $332,200. 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.

Bushfire Prone Planning

A minor portion of the subject site is within a designated Bushfire Prone Area. The proposed development is located outside of the bushfire prone area and the development does not need to address State Planning Policy 3.7 or the Guidelines.

Conclusion:

The application is considered capable of support for the following reasons:

- The proposed development is consistent with the intent of the zone and the Hazelmere Enterprise Area Structure Plan;
- The proposed development has adequately demonstrated compliance with the conditions of Restricted Use No.15; and
- The proposed development is generally consistent with the relevant Local and State Government Planning Policies.

city of swan

DISCLAIMER: Information shown here on 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.

Attachment 1

10/09/2024

1:9000

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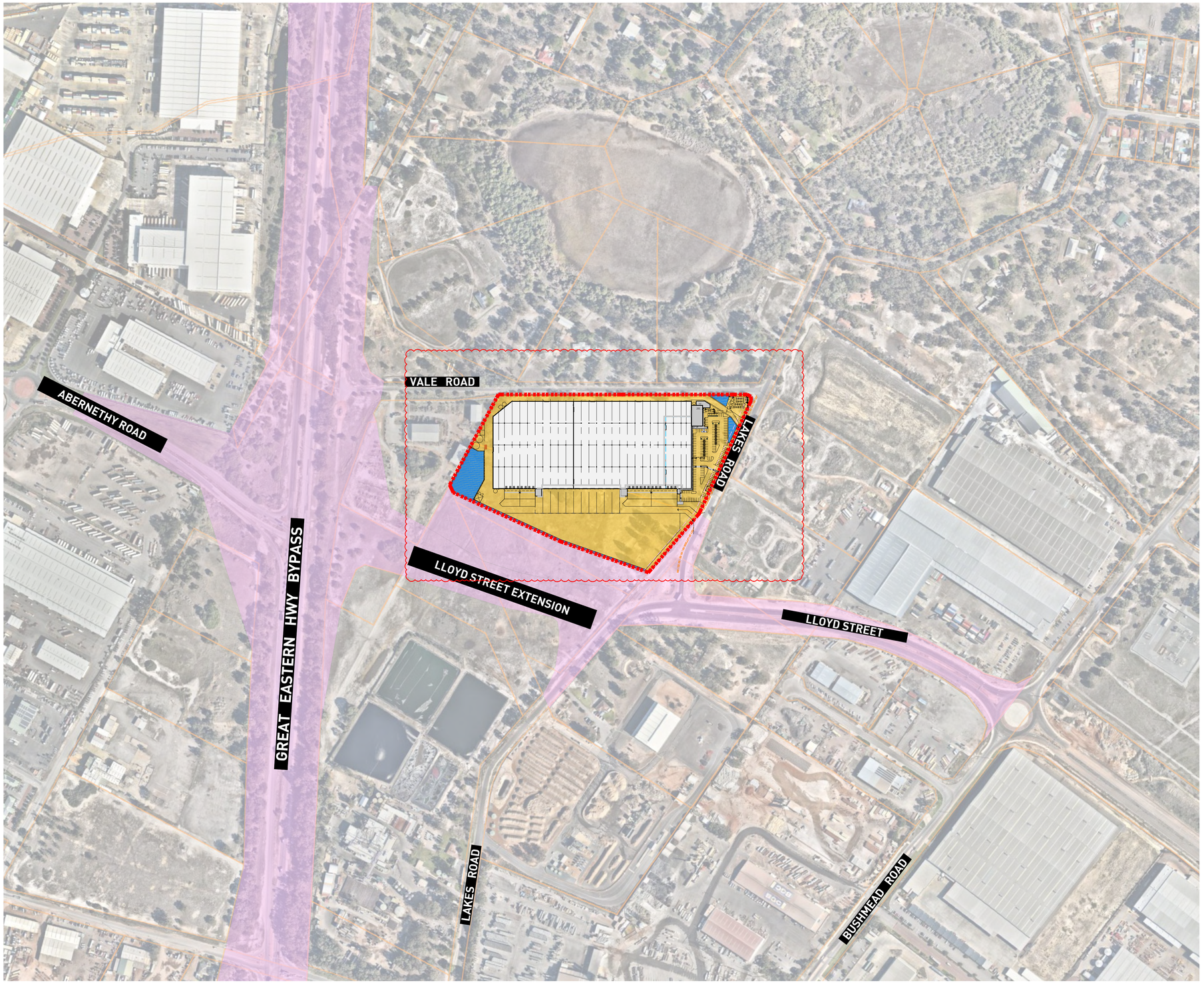
Attachment 2a

FOR DEVELOPMENT APPLICATION ONLY
SUBJECT TO STATUTORY APPROVAL



SUBJECT SITE

PROPOSED ROAD UPGRADES

EXTENT OF DRAINAGE AREA

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CLIENT:
HESPERIA

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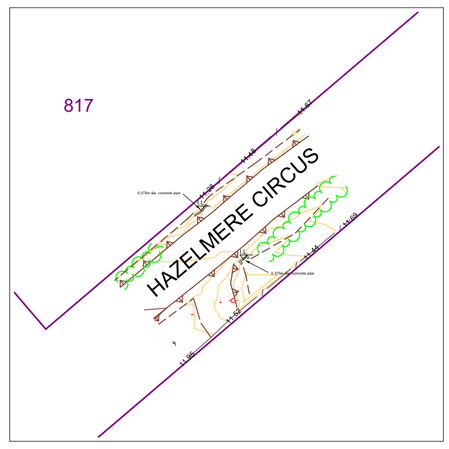
PROPOSED DEVELOPMENT

LOTS 119 & 808, LAKES ROAD, HAZELMERE WA

LOCALITY PLAN

DRAWING TYPE: DEVELOPMENT APPLICATION
DRAWING NUMBER: 2411-169-DA-020
REVISION: C
DATE: 17.09.2024
SCALE: 1:3000 @ A1 / 1:6000 @ A3
0 150 300
SCALE BAR @ A1

Attachment 2b



HAZELMERE CIRCUS
DRAIN LOCATION SKETCH
SCALE 1:750

LAKES ROAD
VALE ROAD
VALE ROAD
LAKES ROAD
DRAINAGE BASIN
Sewer Easement Doc F246681
Easement Doc O190904
Easement DOC D751545
Contaminated Sites Easement Doc L470579
4 x 1200x450 CONC. BOX
Ø 300mm POLY
Ø 450mm CONC.
IL = 11.91
IL = 11.97
IL = 11.13
IL = 11.22
IL = 11.30
IL = 11.43
0.3m dia. concrete pipe
119
808
807
810
812
815
816
817
267975
267900
267825
267750
267675
267600
267525
67200
67275
67350
67425
67500
67575

Existing boundaries have been extracted from Landgate's Spatial Cadastral Database, which is only a model of the cadastre. The depicted boundary locations are a graphical representation only and as they have not been re-established by survey. MNG does not guaranteed the position unless stated otherwise.
Re-establishment of lot boundaries by a Licensed Surveyor is recommended for any works on or about a boundary.
This note is an integral part of this plan

Surface features and levels have been surveyed to meet the requested scope of works accuracy. The surface may be contoured to depict topography or defined only by spot heights. For clarity on hard copy some level information is not shown, refer to 3D digital file.
Above ground indicators (markers) of underground services are located where visible.
Third parties utilising this information should confirm the capture accuracies meet requirements prior to use.
This note is an integral part of this plan.

This survey has been completed to CLASS 2/3 Accuracy
Hard Stand Areas are to Class 2 Accuracy
Horizontal Accuracy ± 20mm
Vertical Accuracy ± 20mm
All other Areas are to Class 3 Accuracy
Horizontal Accuracy ± 30mm
Vertical Accuracy ± 50mm
This note is an integral part of this plan

Rev.	Description	Drawn	Date	Checked
C	Add site levels, new Vale Road verge and updated verge survey since previous survey	TGM	18/07/2024	TAV
B	Add updated boundaries & easements	MJ	6/09/2022	TAV
A	Initial Issue	DRD	20/08/2021	TAV

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Surveyor:- RGA
Survey Date:- 10/08/2021
Precal/Cad:- SCDB

N

DETAIL SURVEY
LOTS 119 & 808 LAKES ROAD
HAZELMERE

CLIENT:
HESPERIA PROPERTY GROUP PTY LTD

The contents of this plan are current and correct as of the date stated within the revision panel. All consultants and persons wishing to utilise this data should satisfy themselves of this plans currency by contacting the McMullen Nolan Group.

SCALE 1:750 @ A1
0 25 50 75
ALL DISTANCES ARE IN METRES
For a true to scale reproduction of this plan, plot it to A1 with the Paging Scaling set to None.

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, encumbrance or interest 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 on or near existing boundaries.

MCMULLEN NOLAN GROUP
Level 1, 2 Sabre Crescent
Jandakot, W.A. 6164
PO Box 3526, Success
W.A. 6964, Australia
Offices in: Perth | Melbourne | Kimberley| South West WA
Tel: (08) 6436 1599
Fax: (08) 6436 1500
info@mngsurvey.com.au
www.mngsurvey.com.au
ABN 90 009 363 311

Project Mngr.	Trevor Veen	Datum	PCG94 / AHD

102557 - DE - 007 - C
Job Number | Type | Plan Number | Revision

FOR DEVELOPMENT APPLICATION ONLY
SUBJECT TO STATUTORY APPROVAL

DEVELOPMENT SUMMARY

SITE AREA	78,702	sqm. approx.
Total Drainage Basin & Swale Area	3,844	sqm. approx.
Total Dry Landscape Area	4,491	sqm. approx.
Total Pedestrian & Outdoor Paving Area	510	sqm. approx.
Net Developable Site Area	69,857	sqm. approx.
Warehouse 1 (Incl. Cold Room)	22,330	sqm.
Main Office 1 (2 Levels)	1,000	sqm.
Dock Office 1	100	sqm.
Plant Room	35	sqm.
Warehouse 2	14,940	sqm.
Dock Office 2	100	sqm.
TOTAL BUILDING AREA	38,505	sqm.
Total Heavy Duty Paving Area (Concrete)	15,380	sqm. approx.
Total Dedicated Heavy Duty Hardstand Area (Concrete)	11,900	sqm. approx.
Total Light Duty Paving Area	4,470	sqm. approx.
Total Cantilever Awning Area (3m)	360	sqm. approx.
Total Super Awning Area (36m)	4,480	sqm. approx.
Total Cantilever Awning Area (2m)	240	sqm. approx.
Total Car Parking Provided	169	spaces

EXTENT OF HEAVY DUTY PAVING AREA

EXTENT OF HEAVY DUTY DEDICATED CONCRETE HARDSTAND

EXTENT OF LIGHT DUTY PAVING AREA (RED ASPHALT)

EXTENT OF LANDSCAPE AREA

EXTENT OF AWNING AREA

EXTENT OF DRAINAGE BASING & SWALE AREA

TREE WELL AT 2.3m x 1.75m (250mm CONCRETE FLUSH KERB) TO BE PROVIDED TO CARPARKING

FENCING

EXTENT OF NOISE FENCE

KS — KERB STOP

EXISTING PRIVATE SEWER RISING MAIN TO BE RELOCATED

FUTURE PATH BY CITY OF SWAN

ESTATE SIGNAGE

CROSS VENTILATION

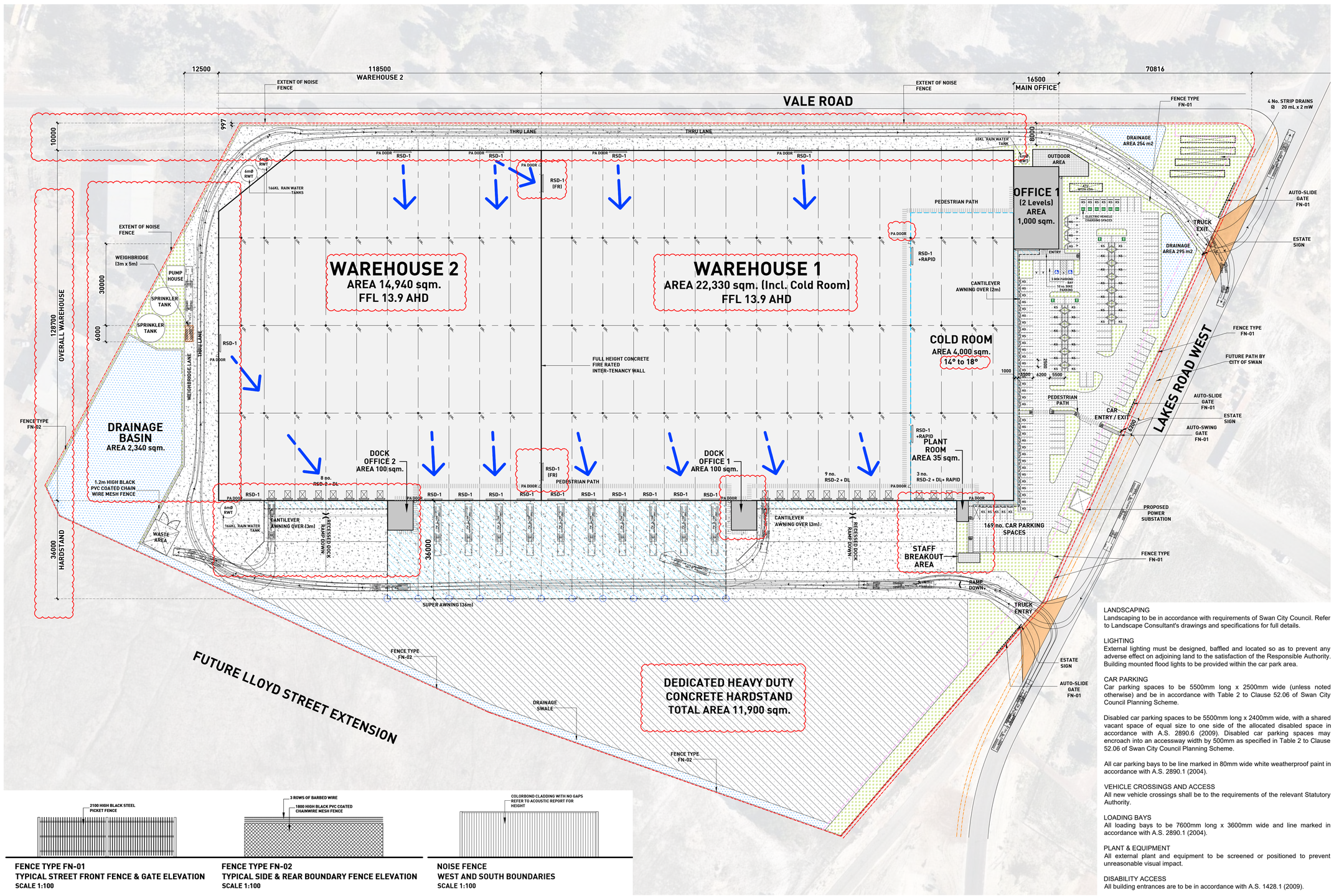
RSD-1 — ROLLER SHUTTER DOOR 6mW x 6mH

RSD-1 +RAPID — ROLLER SHUTTER DOOR 6mW x 6mH + SAME SIZE RAPID ROLL DOOR

RSD-1 (FR) — 2 HOUR FIRE RATED ROLLER SHUTTER DOOR 6mW x 6mH

RSD-2+DL — ROLLER SHUTTER DOOR 3.050mW x 3.3mH + DOCK LEVELLER

RSD-2+DL +RAPID — ROLLER SHUTTER DOOR 2.7mW x 3.3mH + DOCK LEVELLER + SAME SIZE RAPID ROLL DOOR



FENCE TYPE FN-01
TYPICAL STREET FRONT FENCE & GATE ELEVATION
SCALE 1:100

FENCE TYPE FN-02
TYPICAL SIDE & REAR BOUNDARY FENCE ELEVATION
SCALE 1:100

NOISE FENCE
WEST AND SOUTH BOUNDARIES
SCALE 1:100

LANDSCAPING
Landscaping to be in accordance with requirements of Swan City Council. Refer to Landscape Consultant's drawings and specifications for full details.

LIGHTING
External lighting must be designed, baffled and located so as to prevent any adverse effect on adjoining land to the satisfaction of the Responsible Authority. Building mounted flood lights to be provided within the car park area.

CAR PARKING
Car parking spaces to be 5500mm long x 2500mm wide (unless noted otherwise) and be in accordance with Table 2 to Clause 52.06 of Swan City Council Planning Scheme.

Disabled car parking spaces to be 5500mm long x 2400mm wide, with a shared vacant space of equal size to one side of the allocated disabled space in accordance with A.S. 2890.6 (2009). Disabled car parking spaces may encroach into an accessway width by 500mm as specified in Table 2 to Clause 52.06 of Swan City Council Planning Scheme.

All car parking bays to be line marked in 80mm wide white weatherproof paint in accordance with A.S. 2890.1 (2004).

VEHICLE CROSSINGS AND ACCESS
All new vehicle crossings shall be to the requirements of the relevant Statutory Authority.

LOADING BAYS
All loading bays to be 7600mm long x 3600mm wide and line marked in accordance with A.S. 2890.1 (2004).

PLANT & EQUIPMENT
All external plant and equipment to be screened or positioned to prevent unreasonable visual impact.

DISABILITY ACCESS
All building entrances are to be in accordance with A.S. 1428.1 (2009).

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Attachment 2c

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PROPOSED DEVELOPMENT

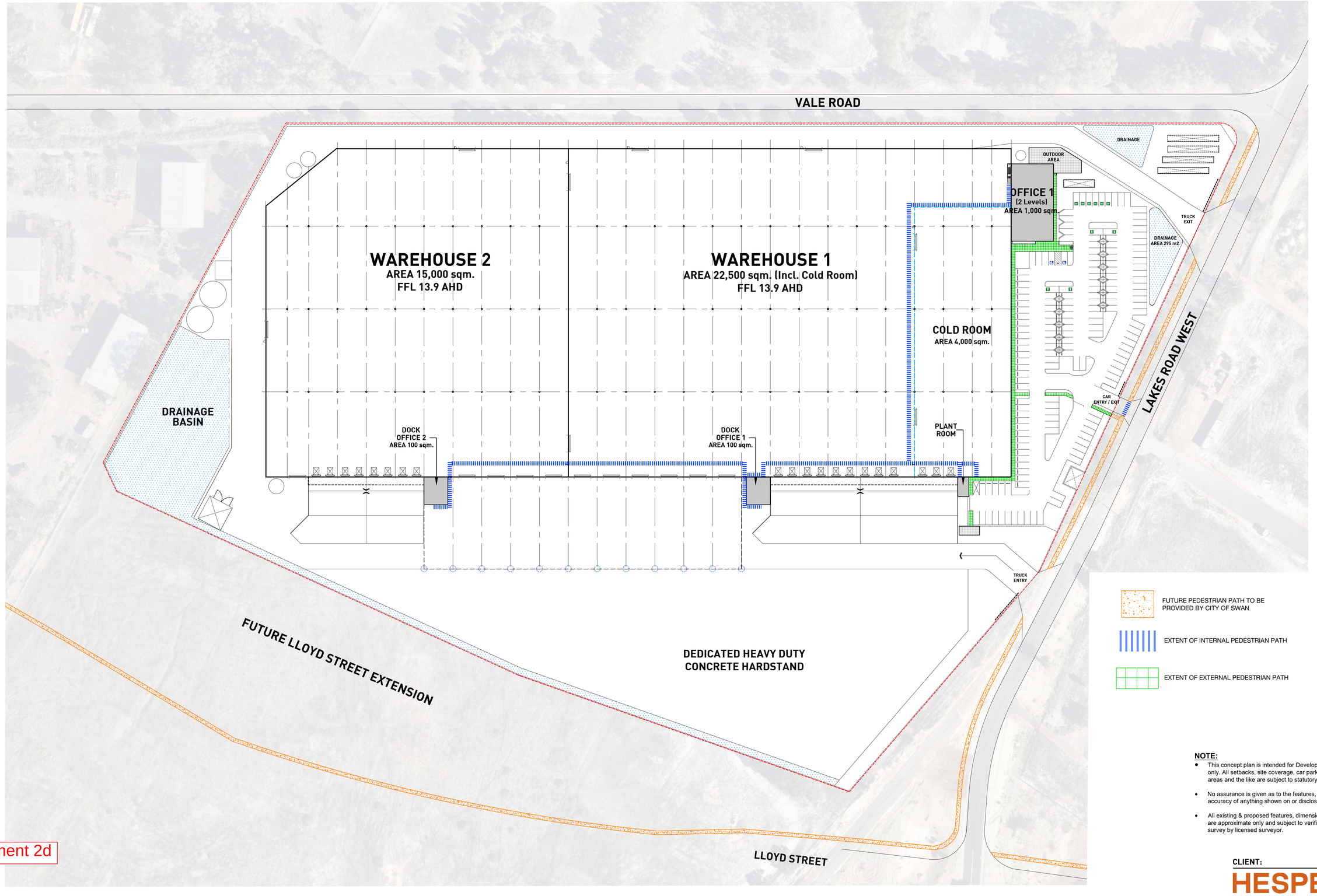
LOTS 119 & 808, LAKES ROAD, HAZELMERE WA

SITE PLAN

DRAWING TYPE: DEVELOPMENT APPLICATION
DRAWING NUMBER: 2411-169-DA-021
REVISION: H
DATE: 23.09.2024
SCALE: 1:700 @ A1 / 1:1400 @ A3
0 35 70
SCALE BAR @ A1

Document Set ID: 8331148
Version: 2, Version Date: 06/11/2024

FOR DEVELOPMENT APPLICATION ONLY
SUBJECT TO STATUTORY APPROVAL



FUTURE PEDESTRIAN PATH TO BE PROVIDED BY CITY OF SWAN

EXTENT OF INTERNAL PEDESTRIAN PATH

EXTENT OF EXTERNAL PEDESTRIAN PATH

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Attachment 2d

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PROPOSED DEVELOPMENT

LOTS 119 & 808, LAKES ROAD, HAZELMERE WA

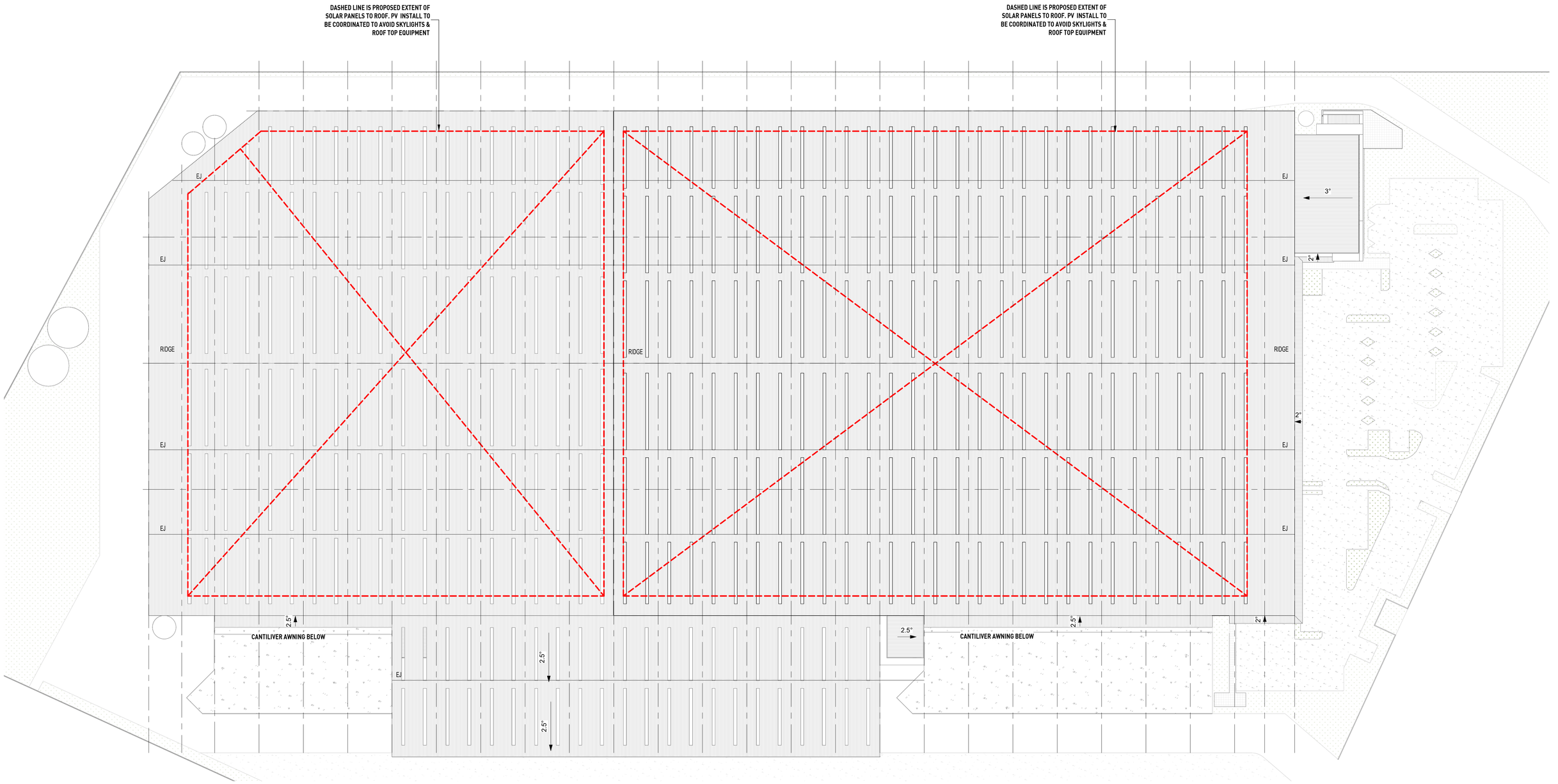
PEDESTRIAN ACCESS PLAN

DRAWING TYPE: DEVELOPMENT APPLICATION
DRAWING NUMBER: 2411-169-DA-022
REVISION: C

DATE: 17.09.2024
SCALE: 1:700 @ A1 / 1:1400 @ A3

0 35 70
SCALE BAR @ A1

FOR DEVELOPMENT APPLICATION ONLY
SUBJECT TO STATUTORY APPROVAL



Attachment 2e

TRANSLUCENT ROOF SHEETING TO APPROX. 10% OF TOTAL WAREHOUSE ROOF AREA

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PROPOSED DEVELOPMENT

LOTS 119 & 808, LAKES ROAD, HAZELMERE WA

WAREHOUSE ROOF PLAN

DRAWING TYPE: DEVELOPMENT APPLICATION
DRAWING NUMBER: 2411-169-DA-023
REVISION: C
DATE: 17.09.2024
SCALE: 1:500 @ A1 / 1:1000@ A3
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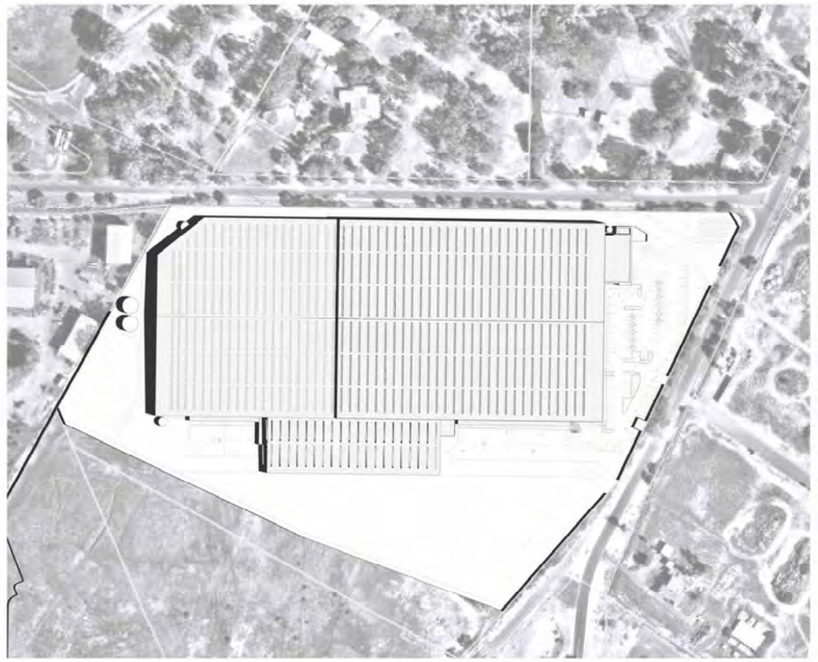
SCALE BAR @ A1

FOR DEVELOPMENT APPLICATION ONLY
SUBJECT TO STATUTORY APPROVAL

1 22 SEPTEMBER - 9 AM
1 : 2000



2 22 SEPTEMBER - 12 PM
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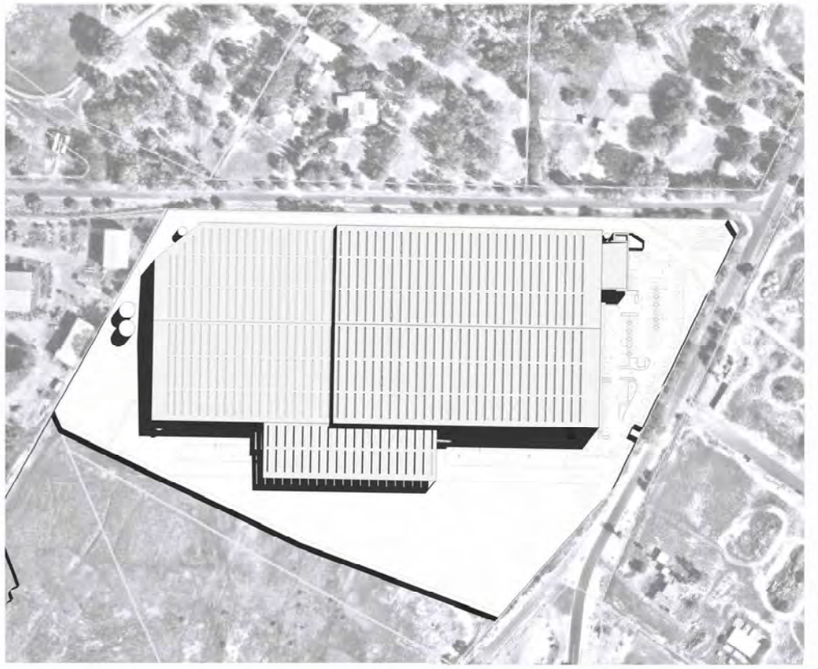

3 22 SEPTEMBER - 3 PM
1 : 2000

Attachment 2f

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PROPOSED DEVELOPMENT

LOTS 119 & 808, LAKES ROAD, HAZELMERE WA

SHADOW DIAGRAMS

DRAWING TYPE: DEVELOPMENT APPLICATION
DRAWING NUMBER: 2411-169-DA-024
REVISION: B
DATE: 19.09.2024
SCALE: 1:2000 @ A1
SCALE BAR @ A1: 0 100 200

FOR INFORMATION ONLY
SUBJECT TO STATUTORY APPROVAL

INDICATIVE PALLET CAPACITY WAREHOUSE:

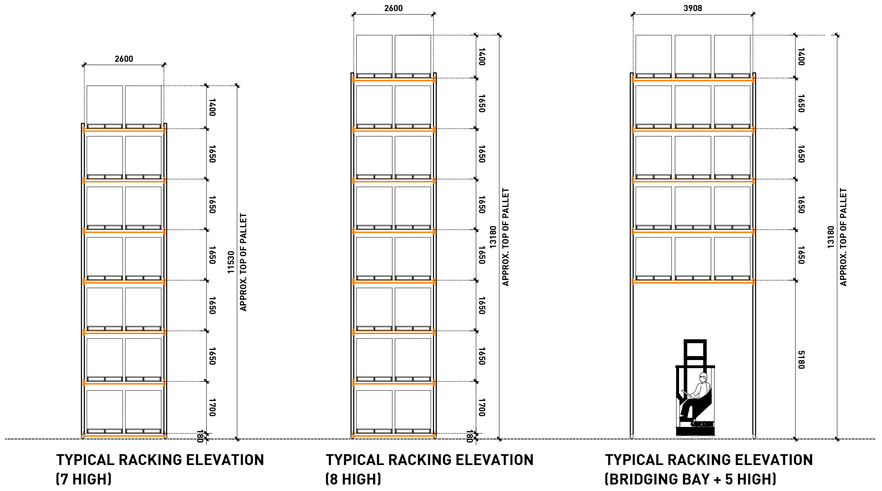
RACKING TYPE	BAYS	PALLETS PER BAY	TOTAL PALLETS
7 HIGH	698	14	9,772
8 HIGH	1,424	16	22,784
BRIDGING BAY	48	15	720
TOTAL			33,276

NOTE:
- Pallet layout & capacity indicative only and subject to final confirmation by racking contractor as well as assessment against fire egress pathways.

EXTENT OF 7 HIGH RACKING

EXTENT OF 8 HIGH RACKING

EXTENT OF ORDINARY RACKING (BRIDGING BAY)

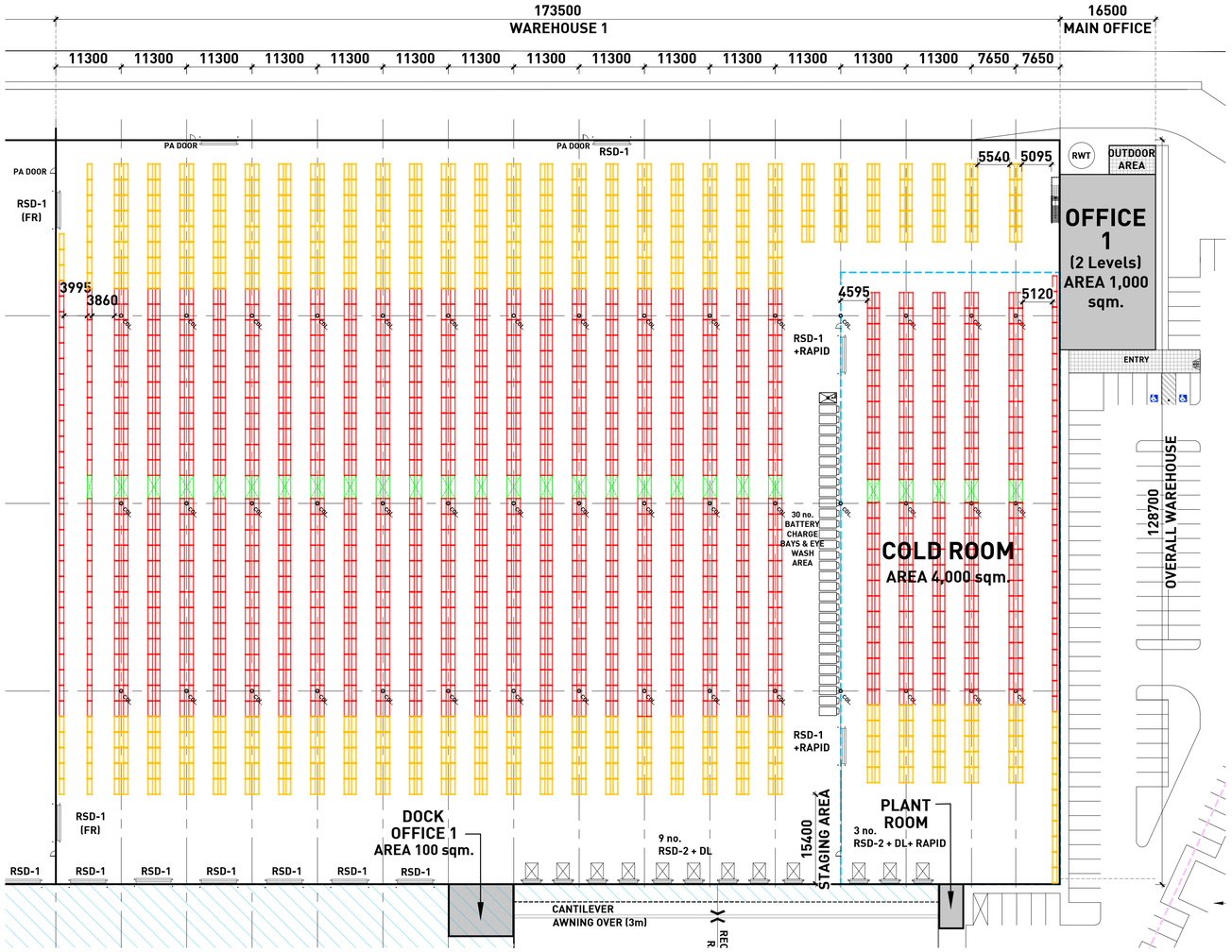


TYPICAL RACKING ELEVATION (7 HIGH)

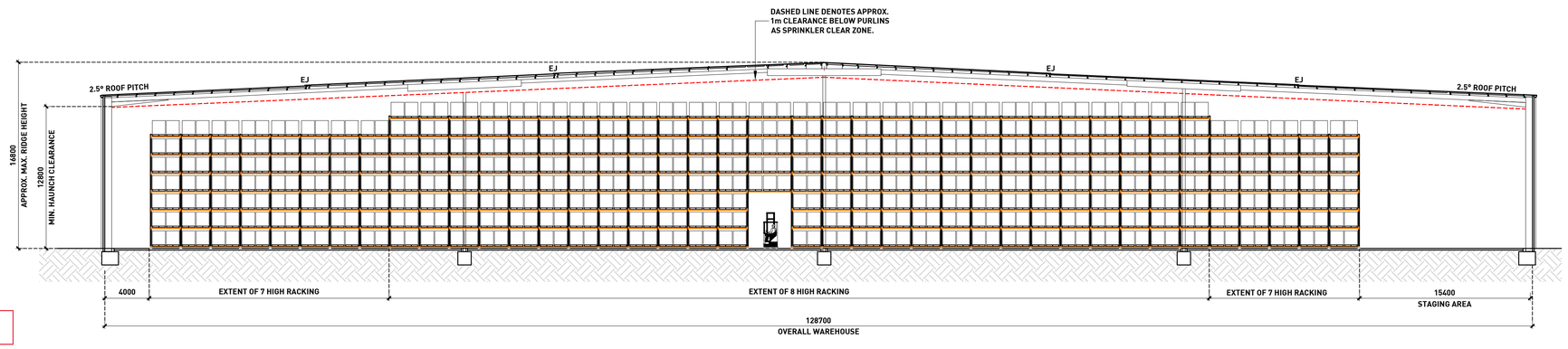
TYPICAL RACKING ELEVATION (8 HIGH)

TYPICAL RACKING ELEVATION (BRIDGING BAY + 5 HIGH)

01 - **INDICATIVE RACKING ELEVATIONS**
SCALE 1:100



02 - **INDICATIVE RACKING LAYOUT**
SCALE 1:500



Attachment 2g

03 - **INDICATIVE WAREHOUSE SECTION**
SCALE 1:250

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PROPOSED DEVELOPMENT

LOTS 119 & 808, LAKES ROAD, HAZELMERE WA

INDICATIVE RACKING LAYOUT PLAN

DRAWING TYPE: DEVELOPMENT APPLICATION
DRAWING NUMBER: 2411-169-DA-025
REVISION: D
DATE: 19.09.2024
SCALE: -
SCALE BAR @ A1

Document Set ID: 8331148
Version: 2, Version Date: 06/11/2024

FOR DEVELOPMENT APPLICATION ONLY
SUBJECT TO STATUTORY APPROVAL

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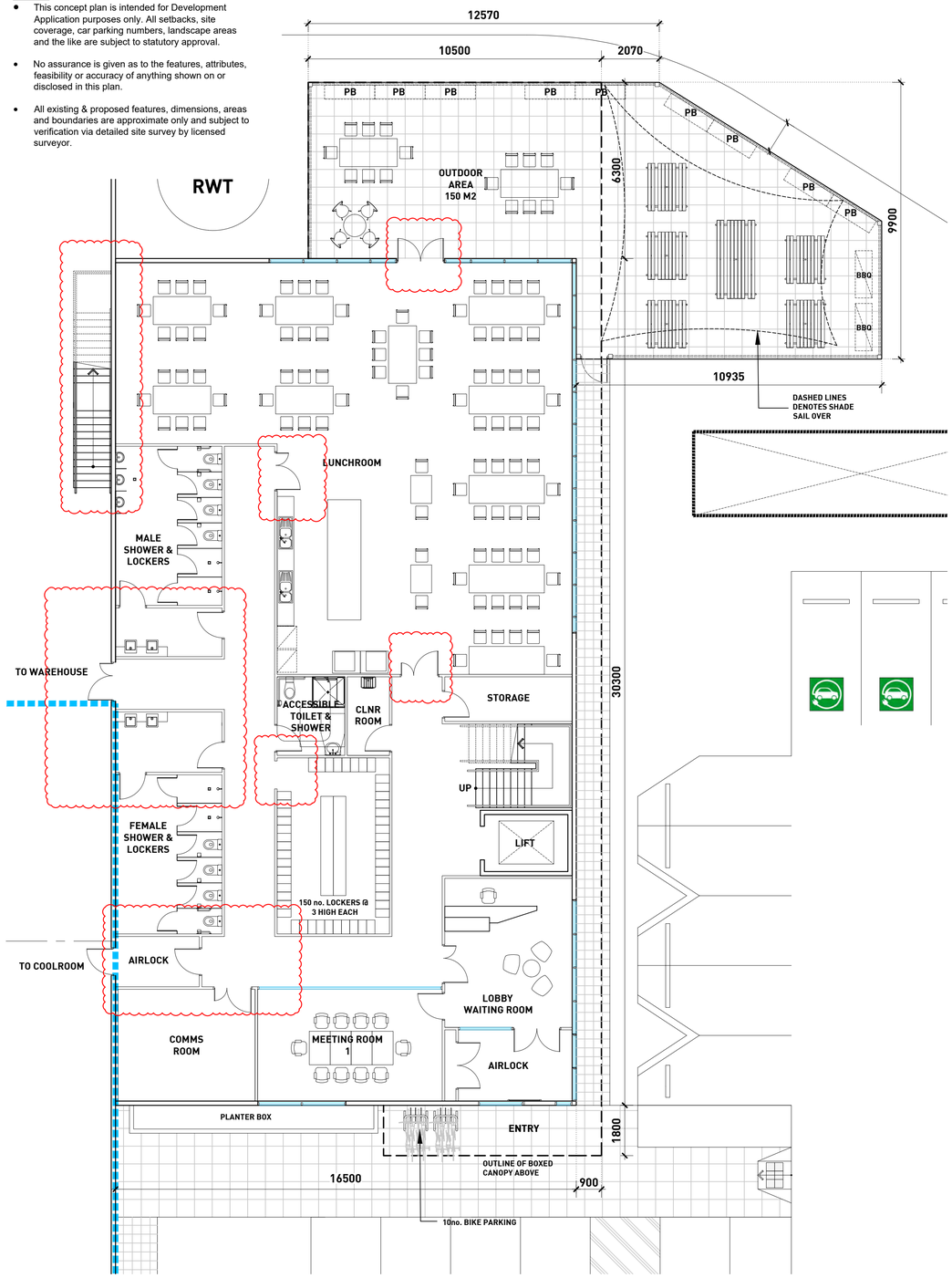
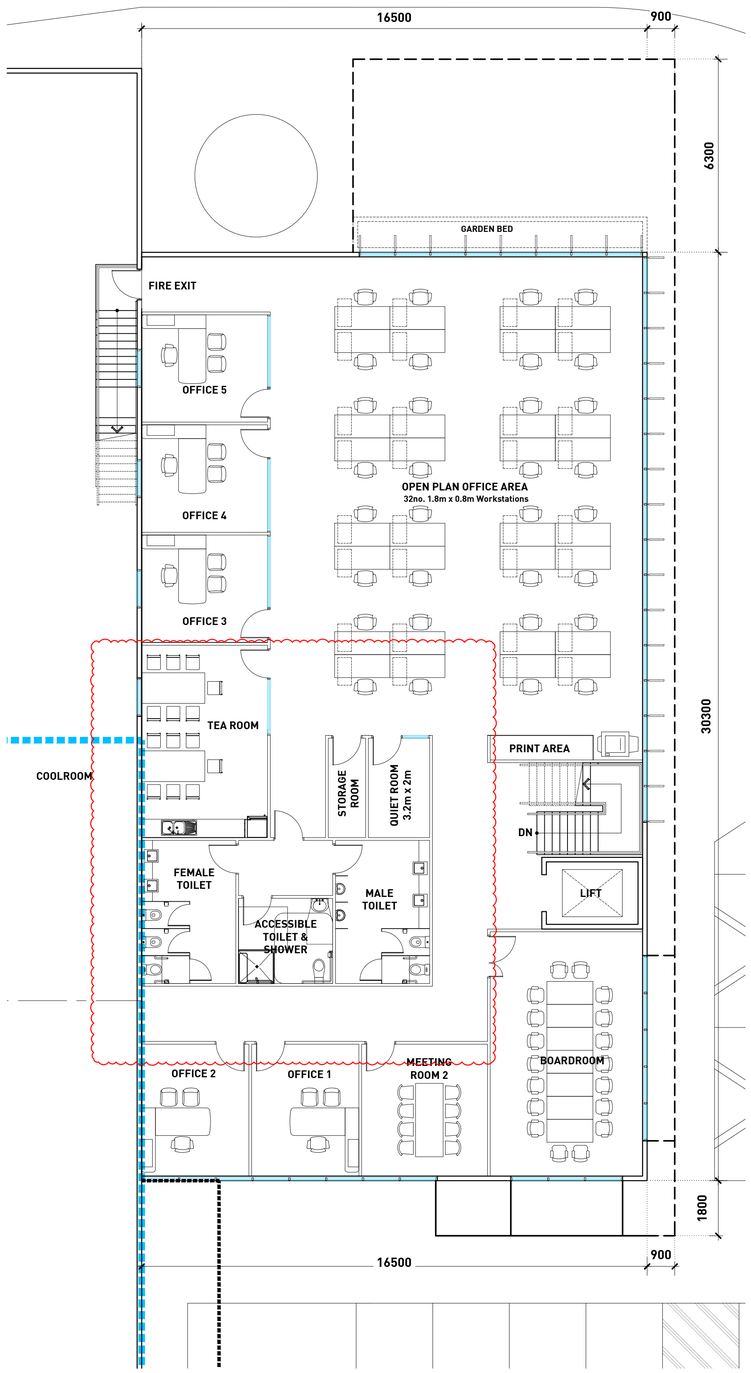
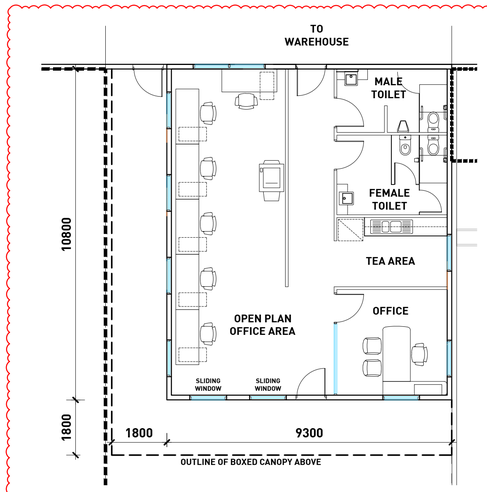


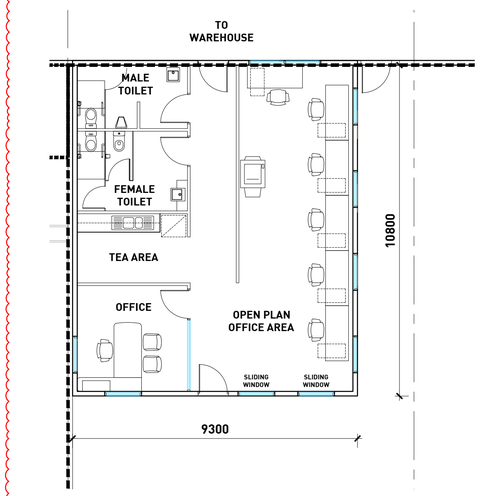
01 -- OFFICE GROUND FLOOR PLAN
SCALE 1:100



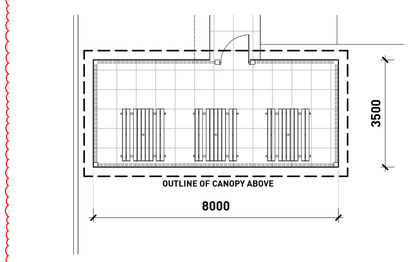
02 -- OFFICE FIRST FLOOR PLAN
SCALE 1:100



03 -- DOCK OFFICE 1 FLOOR PLAN
SCALE 1:100



04 -- DOCK OFFICE 2 FLOOR PLAN
SCALE 1:100



05 -- BREAKOUT AREA
SCALE 1:100

CLIENT:
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Attachment 2h

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PROPOSED DEVELOPMENT

LOTS 119 & 808, LAKES ROAD, HAZELMERE WA

OFFICE PLANS

DRAWING TYPE: DEVELOPMENT APPLICATION
DRAWING NUMBER: 2411-169-DA-100
REVISION: E
DATE: 17.09.2024
SCALE: 1:100 @ A1 / 1:200@ A3
SCALE BAR @ A1

FOR DEVELOPMENT APPLICATION ONLY
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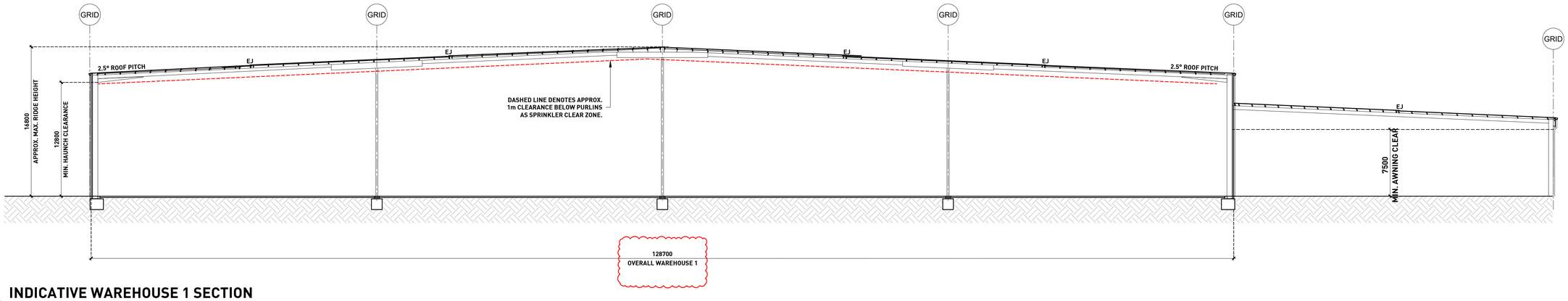
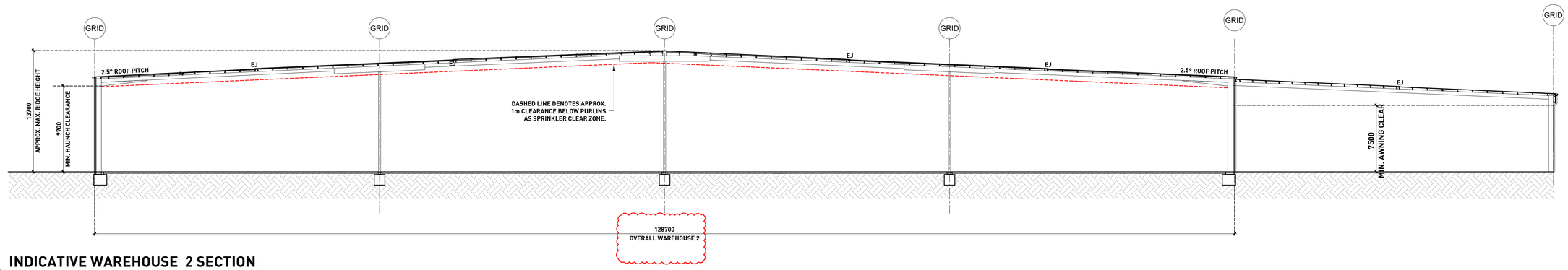
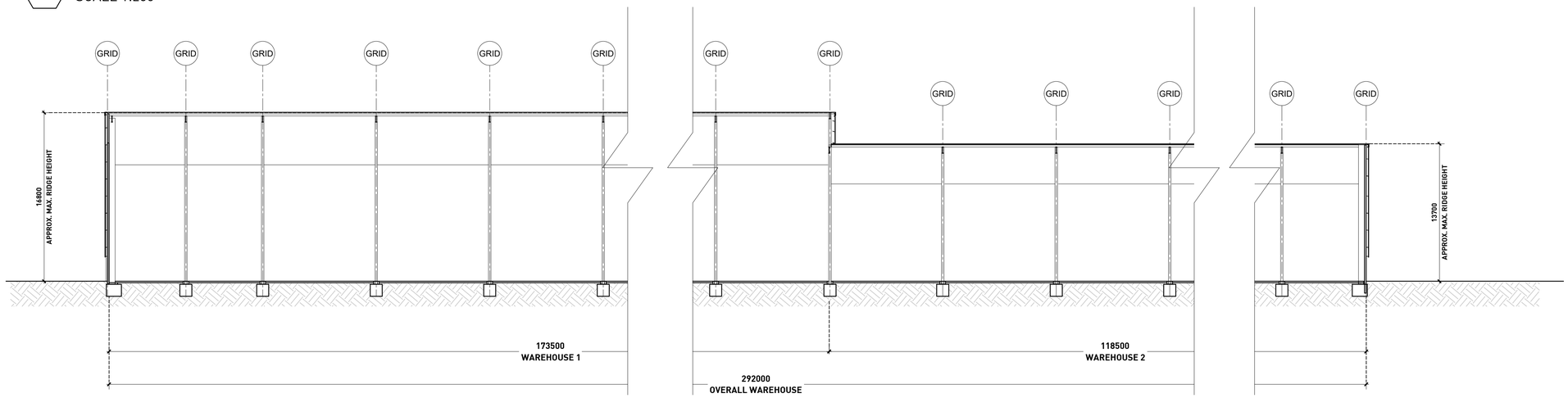


01 - INDICATIVE WAREHOUSE 1 SECTION
SCALE 1:250



02 - INDICATIVE WAREHOUSE 2 SECTION
SCALE 1:250



03 - INDICATIVE WAREHOUSE OVERALL SECTION
SCALE 1:250

Attachment 2i

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PROPOSED DEVELOPMENT
LOTS 119 & 808, LAKES ROAD, HAZELMERE WA

WAREHOUSE SECTIONS

DRAWING TYPE: DEVELOPMENT APPLICATION
DRAWING NUMBER: 2411-169-DA-200
REVISION: D
DATE: 17.09.2024
SCALE: 1:250 @ A1 / 1:500@ A3
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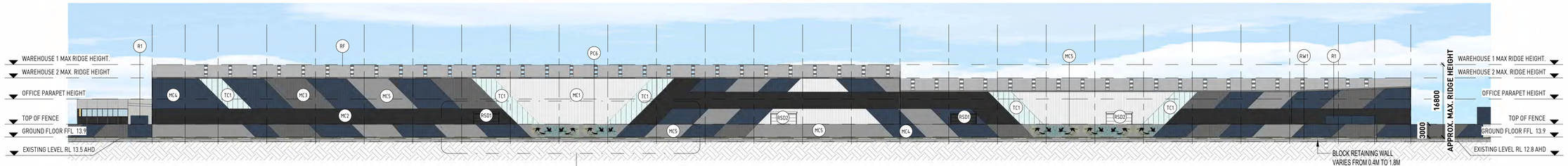
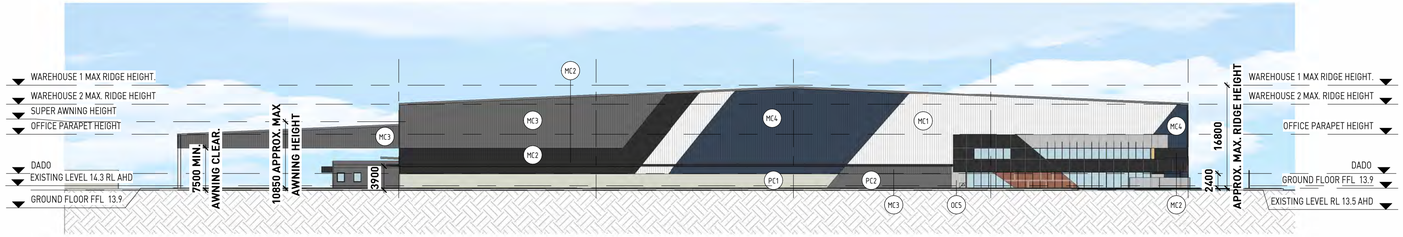
SCALE BAR @ A1

FOR DEVELOPMENT APPLICATION ONLY
SUBJECT TO STATUTORY APPROVAL

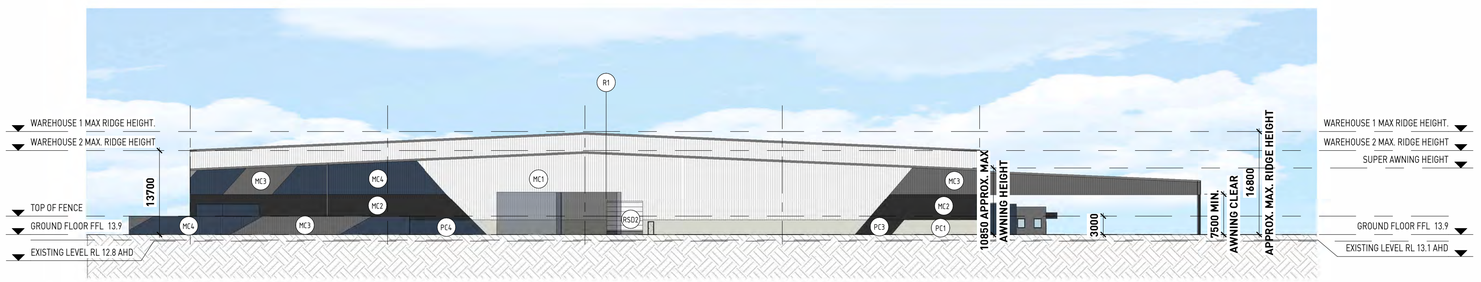


1 WAREHOUSE WEST ELEVATION
1 : 500

2 WAREHOUSE EAST ELEVATION
1 : 500



3 WAREHOUSE NORTH ELEVATION
1 : 500



4 WAREHOUSE SOUTH ELEVATION
1 : 500

MATERIAL AND COLOUR SCHEDULE			
Material :Code	ITEM/ LOCATION	MATERIAL DESCRIPTION	FINISHES
MC1	METAL WALL CLADDING (VERTICAL)	WAREHOUSE METAL WALL CLADDING IN COLORBOND 'SURFMIST' FINISH OR EQUIVALENT	
MC2	METAL WALL CLADDING (VERTICAL)	WAREHOUSE METAL WALL CLADDING IN COLORBOND 'MONUMENT' FINISH OR EQUIVALENT	
MC3	METAL WALL CLADDING (VERTICAL)	WAREHOUSE METAL WALL CLADDING IN COLORBOND 'BASALT' FINISH OR EQUIVALENT	
MC4	METAL WALL CLADDING (VERTICAL)	WAREHOUSE METAL WALL CLADDING IN COLORBOND 'DEEP OCEAN' FINISH OR EQUIVALENT	
MC5	METAL WALL CLADDING (VERTICAL)	WAREHOUSE METAL WALL CLADDING IN COLORBOND 'BLUEGUM' FINISH OR EQUIVALENT	
OC5	OFFICE WALL CLADDING - CEMENT FINISH	OFFICE WALL FIBER CEMENT CLADDING WITH VERTICAL GROOVE.	
PC1	PRECAST CONCRETE PANEL	PRECAST CONCRETE PANELS IN PAINT FINISH TO MATCH COLORBOND 'SURFMIST' OR EQUIVALENT.	
PC2	PRECAST CONCRETE PANEL	PRECAST CONCRETE PANELS IN PAINT FINISH TO MATCH COLORBOND 'BASALT' OR EQUIVALENT.	
PC3	PRECAST CONCRETE PANEL	PRECAST CONCRETE PANELS IN PAINT FINISH TO MATCH COLORBOND 'MONUMENT' OR EQUIVALENT.	

MATERIAL AND COLOUR SCHEDULE			
Material :Code	ITEM/ LOCATION	MATERIAL DESCRIPTION	FINISHES
PC4	METAL WALL CLADDING (VERTICAL)	WAREHOUSE METAL WALL CLADDING IN COLORBOND 'DEEP OCEAN' FINISH OR EQUIVALENT	
R1	RAINWATER TANK	WAREHOUSE METAL WALL CLADDING IN COLORBOND 'DEEP OCEAN' FINISH OR EQUIVALENT	
RF	METALLIC ROOF SHEETING	IN 'ZINCALUME' WITH TRANSLUCENT ROOF SHEETING TO APPROX. 10% OF ROOF AREA.	
RSD1	ROLLER SHUTTER DOOR	METAL ROLLER SHUTTER DOOR IN POWDERCOAT FINISH TO MATCH COLORBOND 'MONUMENT'	
RSD2	ROLLER SHUTTER DOOR	METAL ROLLER SHUTTER DOOR IN POWDERCOAT FINISH TO MATCH COLORBOND 'SURFMIST'	
RW1	RETAINING WALL	GREY RECONSTITUTED FACE BLOCKS WITH GREY MORTAR.	
TC1	WALL CLADDING (VERTICAL)	TRANSLUCENT WAREHOUSE WALL CLADDING	

Attachment 2j

NOTE:

- **This concept plan is intended for Development Application purposes only. All setbacks, site coverage, car parking numbers, landscape areas and the like are subject to statutory approval.**
- **No assurance is given as to the features, attributes, feasibility or accuracy of anything shown on or disclosed in this plan.**
- **All existing & proposed features, dimensions, areas and boundaries are approximate only and subject to verification via detailed site survey by licensed surveyor.**

CLIENT:
HESPERIA

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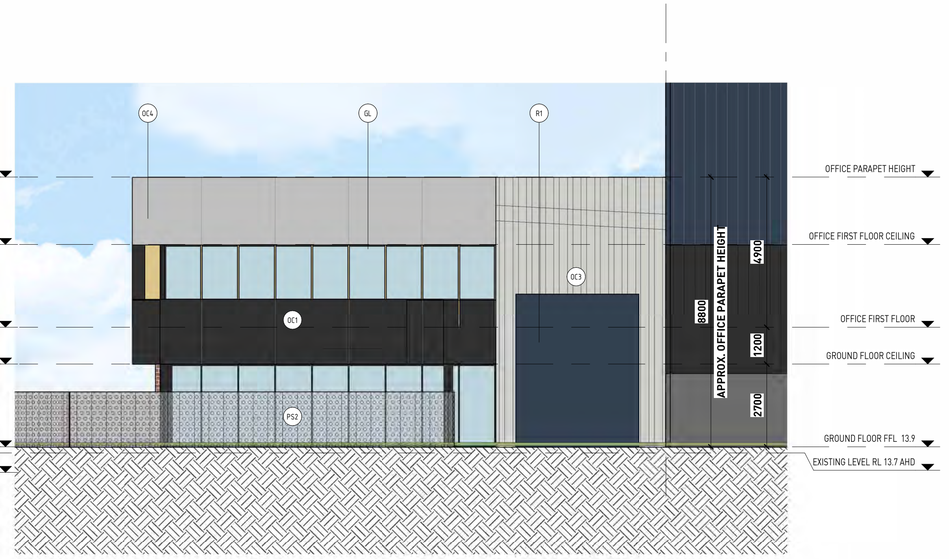
PROPOSED DEVELOPMENT
LOTS 119 & 808, LAKES ROAD, HAZELMERE WA

WAREHOUSE ELEVATIONS

DRAWING TYPE: DEVELOPMENT APPLICATION
DRAWING NUMBER: 2411-169-DA-201
REVISION: C
DATE: 23.09.2024
SCALE: 1:500 @ A1 / 1:1000@ A3
0 25 50
SCALE BAR @ A1

FOR DEVELOPMENT APPLICATION ONLY
SUBJECT TO STATUTORY APPROVAL

1 OFFICE EAST ELEVATION
1 : 100



2 OFFICE WEST ELEVATION
1 : 100

OFFICE MATERIAL AND COLOUR SCHEDULE			
Material: Code	ITEM/ LOCATION	MATERIAL DESCRIPTION	FINISHES
FN	OFFICE FEATURE FINS	FEATURE ALUMINIUM VERTICAL FINS. 500 x 50 POWDER COATED TIMBER LOOK FINISH FIXED TO GLAZING SUITE	
GL	GLAZING PANELS	ALUMINUM FRAMED OFFICE GLAZING SUITE IN BLACK POWDERCOAT FINISH	
OB	BRICK LOOK CLADDING	OFFICE WALL CLADDING FINISHED IN RED BRICK LOOK OR MANUFACTURERS EQUIVALENT	
OC1	OFFICE WALL CLADDING	LIGHTWEIGHT OFFICE CLADDING NON-COMBUSTIBLE METALLIC CLADDING IN COLORBOND 'MONUMENT' OR MANUFACTURER'S EQUIVALENT	
OC3	OFFICE WALL CLADDING - CEMENT FINISH	OFFICE WALL FIBER CEMENT CLADDING WITH VERTICAL GROOVE.	
OC4	OFFICE CLADDING	LIGHTWEIGHT OFFICE CLADDING NON-COMBUSTIBLE METALLIC CLADDING IN MANUFACTURER'S STANDARD LIGHT GREY FINISH	
PS2	PERFORATED SCREEN	PROPRIETARY GALVANISED PERFORATED MESH SYSTEM IN MANUFACTURER'S STANDARD GREY COLOUR FINISH	
SP	SPANDREL GLAZING SUITE	ALUMINUM FRAME IN BLACK POWDERCOAT FINISH	

3 OFFICE NORTH ELEVATION
1 : 100

4 OFFICE PERSPECTIVE

Attachment 2k

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PROPOSED DEVELOPMENT
LOTS 119 & 808, LAKES ROAD, HAZELMERE WA

OFFICE ELEVATIONS

DRAWING TYPE: DEVELOPMENT APPLICATION
DRAWING NUMBER: 2411-169-DA-202
REVISION: C
DATE: 17.09.2024
SCALE: 1:100 @ A1 / 1:200 @ A3
SCALE BAR @ A1: 0 5 10

Document Set ID: 8331148
Version: 2, Version Date: 06/11/2024

FOR DEVELOPMENT APPLICATION ONLY
SUBJECT TO STATUTORY APPROVAL

Attachment 2I

NOTE:

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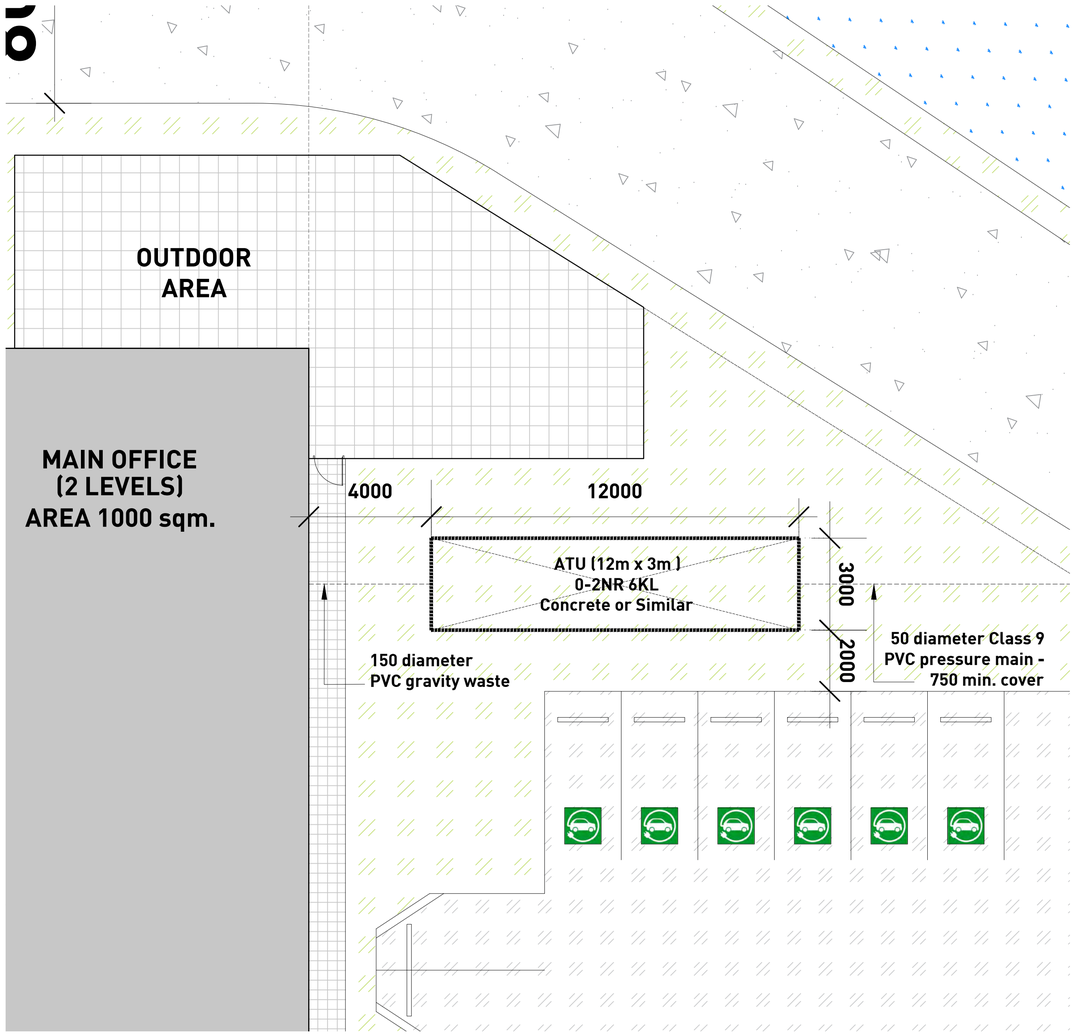
PROPOSED DEVELOPMENT

LOTS 119 & 808, LAKES ROAD, HAZELMERE WA

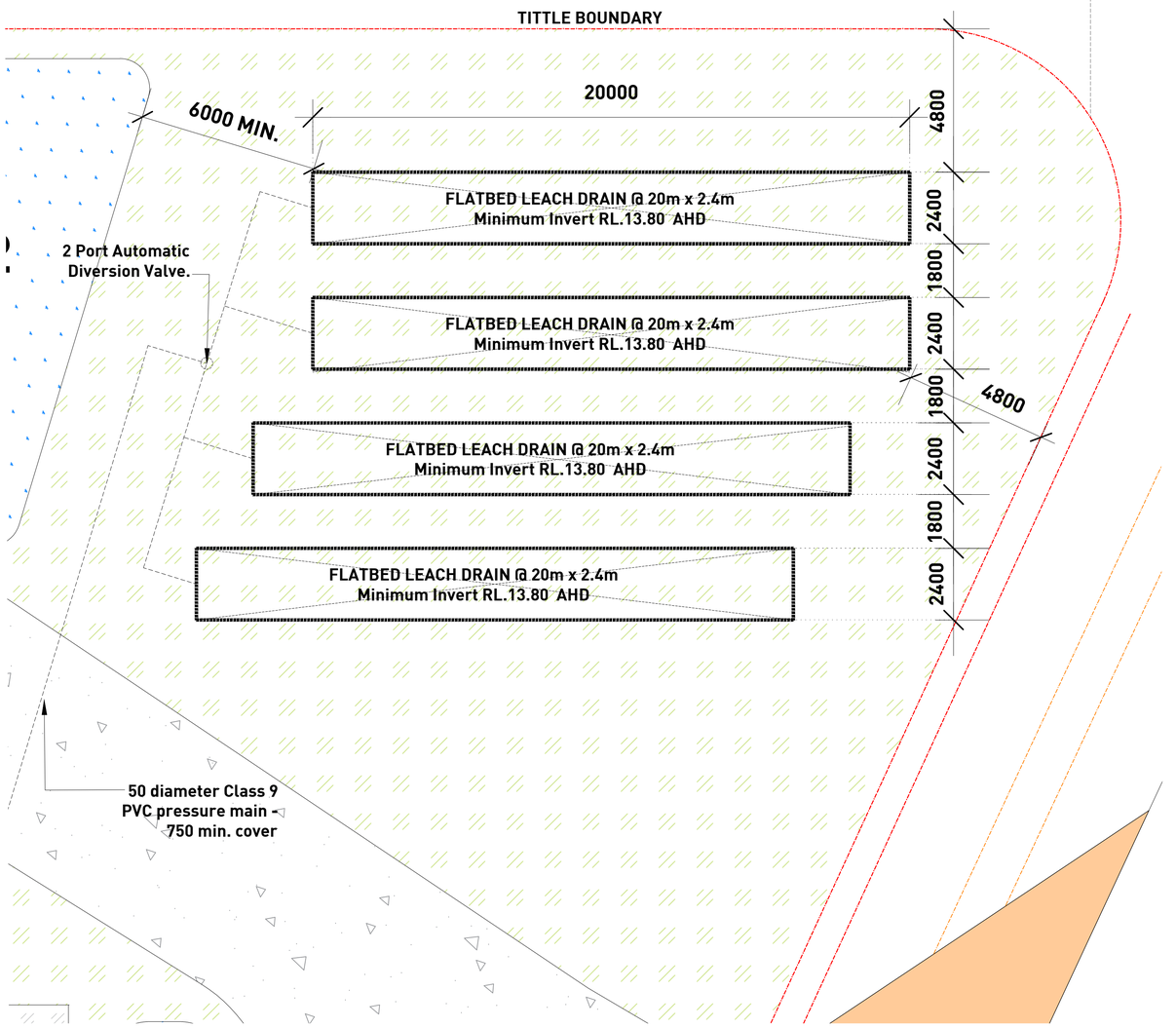
INDICATIVE PERSPECTIVES

DRAWING TYPE: DEVELOPMENT APPLICATION
DRAWING NUMBER: 2411-169-DA-203
REVISION: C
DATE: 25/09/2024
SCALE: 1:100 @ A1 / 1:200 @ A3
SCALE BAR @ A1: 0 5 10

FOR DEVELOPMENT APPLICATION ONLY
SUBJECT TO STATUTORY APPROVAL



01 -- DETAIL 01
SCALE 1:100



02 -- DETAIL 02
SCALE 1:100

Attachment 2m

NOTE:

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- All existing & proposed features, dimensions, areas and boundaries are approximate only and subject to verification via detailed site survey by licensed surveyor.

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PROPOSED DEVELOPMENT

LOTS 119 & 808, LAKES ROAD, HAZELMERE WA

ATU DETAILS

DRAWING TYPE: DEVELOPMENT APPLICATION
DRAWING NUMBER: 2411-169-DA-300
REVISION: B
DATE: 16.08.2024
SCALE: 1:100 @ A1 / 1:200 @ A3
0 5 10
SCALE BAR @ A1

Attachment 3

Design Review Report

Location / Venue: **City of Swan Council Chambers - Midland Town Hall - 312 Great Eastern Highway Midland**
Meeting Date: **Tuesday 3rd September 2024**
Meeting Time: **1pm**

Item 1 – Warehouse and Incidental Office – Lot 119 Lakes Road & Lot 808 (No.54) Lakes Road, HAZELMERE – DRP- 22/2024 & DA-610/2024 1st Meeting Post DA

Design Review Report	
Subject	Item 1 – Warehouse and Incidental Office – Lot 119 Lakes Road & Lot 808 (No.54) Lakes Road, HAZELMERE
Design Reviewers	Malcolm Mackay - Chairperson (Mackay Urban Design)
	Brett Wood-Gush – Deputy Chairperson (Insight Urbanism)
	Wayne Dufty – Panel Member (DNA Architects)
	Peter Damen - Panel Member (Level 5 Design)
Proponent & Project Team	Jarrod Ross - Taylor Burrell Barnett Town Planning & Design – Planning Consultant Brett Chivers – Hesperia – Proponents (Landowner) Matthew Christy – Concept Yu – Designer James Gilchrist - Taylor Burrell Barnett Town Planning & Design Jillian Bardos - Taylor Burrell Barnett Town Planning & Design Eric Yu – Concept Yu Daniel Gorjy - Hesperia
Declarations	None.

Design quality evaluation.		
Principle 1 **Context and character**		*Good design responds to and enhances the distinctive characteristics of a local area, contributing to a sense of place.*
Comments and Recommendation		**Strengths** a) The consistency of character with other similar developments generated some debate. Whilst positive, the consistency was seen as an issue if it extended to most of the development in the precinct. b) The relative generosity of the landscape interface to the western end of the frontage to Lakes Road.

		Areas for improvement c) The uniformity of the Vale interface is excessive – consider more variety in the boundary treatment and the grain of the patterning on the building façade. d) Ensure consistency of plan orientation. e) There was some discussion on whether trucks could enter the site from Vale at the southern end – However, whilst it might make more efficient use of the land, the impacts on the adjacent residential lots would be significant. ***Recommendations*** ***1. Review the boundary wall treatment along Vale and the scale of the architectural expression facing Vale.*** ***Note: Ensure consistency of plan orientation to assist with design review.***
Principle 2 **Landscape quality**		*Good design recognises that together landscape and buildings operate as an integrated and sustainable system, within a broader ecological context.*
Comments and Recommendation		**Strengths** a) There is some generosity of landscape for the typology of use. b) The focus on tree canopy that is highly visible and provides shade is positive. c) The inclusion of the staff courtyard is good but would benefit from more detail. d) The density of planting along the Vale verge is positive and helps to reduce the visual impact of the boundary wall. **Areas for improvement** e) Check tree species for SHB susceptibility. f) Confirm the compatibility of the trees and the detention swale. g) Include hardscape materials in the landscape concept. h) Screening of the large hardstand areas from Lloyd appears dependant on future MRWA planting – given the non-orthogonal geometry of the hardstand, better definition of the hardstand functionality might release more land along the Lloyd boundary. i) Ironically, the best landscape amenity is in areas that can't be used actively – e.g. detention basins and leach drains). ***Recommendations***

		1. Provide a more detailed landscape plan if the staff courtyard. ***2. Review the tree species for SHB susceptibility and compatibility with the detention swale.*** ***3. Include hardscape materials.*** ***4. Review the hardstand functionality with a view to releasing more of the Lloyd frontage for landscape screening on site.***
Principle 3 **Built form and scale**		*Good design ensures that the massing and height of development is appropriate to its setting and successfully negotiates between existing built form and the intended future character of the local area.*
Comments and Recommendation		**Strengths** a) The overall form and scale is consistent with the use and place. b) The bold and consistent expression of the office avoids it looking like an appendix to the main shed. **Areas for improvement** c) A finer grain of scale to the architectural expression on the Vale elevation would help to reduce the visual impact of the building bulk as perceived by the residents across the road. ***Recommendations*** ***1. Review the scale of the architectural expression facing Vale.***
Principle 4 **Functionality and build quality**		*Good design meets the needs of users efficiently and effectively, balancing functional requirements to perform well and deliver optimum benefit over the full life-cycle.*
Comments and Recommendation		**Strengths** a) The design appears to be generally functional, noting that functionality is only 10% of the design scorecard. b) The office layouts are clear and logical. **Areas for improvement** c) The lack of any visual relationship between office and warehouse is questionable. ***Recommendations*** ***1. Review whether there is any capacity for some visual connectivity between the office and warehouse.***
Principle 5 **Sustainability**		*Good design optimises the sustainability of the built environment, delivering positive environmental, social and economic outcomes.*

Comments and Recommendation		**Strengths** a) Good intent with strong commitments. b) Greenstar certification will ensure a rigour to the sustainability initiatives. c) The solar protection to the windows is good. d) The 500kW solar array is commendable. e) The inclusion of EoT is good. **Areas for improvement** f) Back up the good intent with a more detailed sustainability report. g) The dark façade material to the office will have a high solar absorbency reducing the thermal efficiency of the building. h) Consider optimising stormwater harvesting from such a large roof area. i) Review whether 10% translucency is sufficient. j) Provide solar penetration and natural ventilation diagrams to support the design intent. k) Provide ventilation to purge heat from ceiling voids in the office space. l) Review materials for embodied energy. m) Utilise LCC and green asphalt to reduce embodied energy. n) Utilise design initiative over off-setting to reduce the carbon footprint. o) Consider how the Vale noise wall could incorporate recycled material. p) Review the shade devices on the office to ensure winter sun access and summer shade. ***Recommendations*** ***1. Develop a detailed sustainability strategy to back up the expressed intent, noting the comments and advice provided above.***
Principle 6 **Amenity**		*Good design optimises internal and external amenity for occupants, visitors and neighbours, providing environments that are comfortable, productive and healthy.*
Comments and Recommendation		**Strengths** a) The occupant amenity to the office areas is good. **Areas for improvement** b) There is minimal contribution to streetscape amenity other than through landscape. c) Give more consideration to worker amenity for workers inside the main shed – for example, more openings for light, natural ventilation and visual awareness of the outside. d) Provide more shade to the pedestrian entry route from the street to the main entrance, either utilising

		trees or a canopy structure along the adjacent shed wall. e) Provide more landscape and detail on the design of the staff courtyard to demonstrate that a reasonable level of amenity is being provided. f) Consider the location of the boundary wall of the staff courtyard amend whether it could be move out to embrace more of the adjacent landscape. g) The first-floor tearoom has little amenity – consider relocating it against an external wall for natural light, ventilation, and outlook. ***Recommendations*** ***1. Review opportunities for more natural light and ventilation to work areas within the shed.*** ***2. Provide more shade and shelter to the main pedestrian route to the entrance.*** ***3. Review the extent of the staff courtyard and the capacity to embrace more landscaped area.*** ***4. Review the location of the first-floor tearoom.***
Principle 7 **Legibility**		*Good design results in buildings and places that are legible, with clear connections and easily identifiable elements to help people find their way around.*
Comments and Recommendation		**Strengths** a) The office is clearly visible from the street. b) Separating the car park entry from the truck entry/exits is positive. c) The truck circulation is clear. d) The car park circulation is clear. **Areas for improvement** e) There may be some merit in moving the pedestrian entry to the site closer to the office entry. ***Recommendations*** ***1. Review the relative merits of the current pedestrian entrance and moving it closer to the office.***
Principle 8 **Safety**		*Good design optimises safety and security, minimising the risk of personal harm and supporting safe behaviour and use.*
Comments and Recommendation		**Strengths** a) The design raises no major safety issues. b) The car and truck separation is commendable. **Areas for improvement** c) Add a pedestrian crossover treatment to all crossovers for consistency, rather than just to the car park entry.

		d) There was some discussion on the issue of pedestrian movement through the docking area of the shed. However, the Applicant advised that this is the most highly managed area of operations and, therefore, the safest. e) Review pedestrian routes in the context of the tendency for people to take shortcuts. f) Confirm through engineering advice, the appropriateness of the non-perpendicular truck entry and egress points. ***Recommendations*** ***1. Employ a consistent use of pedestrian treatments at crossovers.*** ***2. Review the pedestrian routes to reduce the capacity for shortcuts and associated risks.*** ***3. Check appropriateness of the non-perpendicular truck entry and egress points.***
Principle 9 **Community**		*Good design responds to local community needs as well as the wider social context, providing environments that support a diverse range of people and facilitate social interaction.*
Comments and Recommendation		**Strengths** a) The public art component it positive and the suggested intent extends the emerging theme in the precinct. b) There is some generosity of landscape treatment to the verges and setbacks. c) The staff break-out area is positive and, if well designed, would foster engagement in the staff community. **Areas for improvement** d) Consider whether the noise wall along Vale might be a better public art opportunity. ***Recommendations*** ***1. None.***
Principle 10 **Aesthetics**		*Good design is the product of a skilled, judicious design process that results in attractive and inviting buildings and places that engage the senses.*
Comments and Recommendation		**Strengths** a) It is noted the delivery of so many developments by one developer with the same stylistic approach both provides the potential for a consistent identity (but also the potential for monotony). The detail design, signage and public art will help to differentiate this development from the others.

		b) The colour palette is refined, noting the 'brown' version is preferred. c) The inclusion of translucent panels in the elevations is commendable and will improve amenity as well as enabling the building to glow and establish an after-dark aesthetic. d) The architectural expression of the office component is bold and well considered, even if all the fins are not strictly necessary for shading. e) The use of brickwork is positive, along with an architecture that goes beyond just "design with paint". **Areas for improvement** f)Consider how signage can be best integrated with the design rather than attached as an afterthought. g) Consider a finer grain of patterning to the Vale elevation and noise wall as a more effective form of 'urban camouflage'. ***Recommendations*** ***1. Review how signage can be integrated into the design.*** ***2. Review the grain of the architectural expression in the context of the Vale elevation and noise wall.***

Design Review progress	
	Supported
	Pending further attention
	Not yet supported
	Yet to be addressed

	DRP Meeting 1 03/09/24 Post DA	***DRP Meeting 2***	***DRP Meeting 3***	***DRP Meeting 4***
Principle 1 - **Context and character**				
Principle 2 - **Landscape quality**				
Principle 3 - **Built form and scale**				
Principle 4 - **Functionality and build quality**				
Principle 5 - **Sustainability**				

Principle 6 - **Amenity**				
Principle 7 - **Legibility**				
Principle 8 - **Safety**				
Principle 9 - **Community**				
Principle 10 - **Aesthetics**				

Concluding Remarks

Concluding comments

The Panel thanks the Applicant for bringing the design to the DRP. The Panel is broadly supportive of the proposed design, noting that it bears many similarities to other projects in the precinct, brought to the DRP by the Applicant. It appears that some of the feedback provided on the other projects has informed this design and, as such, it has got off to a good start.

The Panel is particularly impressed with the commitment to sustainability initiatives along with the early input of a landscape professional – two areas where applicants generally leave the detail to the end of the process.

Most comments by the Panel are matters of detail that will help to refine the design. However, the Panel still has concerns about the Vale interface and there is merit in refining this through a review of the noise wall treatment on the boundary and the scale of the patterning on the Vale elevation of the main shed.

Is the proposal required to go back to a future Design Review Panel Meeting?

Please tick one of the following:

√ **Yes – future full panel design review**

☐ **No – future chair review only**

☐ **No – supported – no further review required**

Is the proposal supported?

Please tick one of the following:

☐ **Yes - Supported**

√ **Yes - Supported – pending further attention and/or conditions to be imposed**

☐ **No - Not supported**

Design Review Report endorsement & DRP Recommendation	 Malcolm Mackay DRP Chair

Attachment 4

Design Review Report

Location / Venue: **City of Swan - via MS Teams (weblink)**
Meeting Date: **Tuesday 30th September 2024**
Meeting Time: **2pm**

Item 2 – Warehouse and Incidental Office - Lot 119 Lakes Road & Lot 808 (No.54) Lakes Road, HAZELMERE – DRP-22 / 2024 – DA-610 / 2024 – 2nd Meeting Post DA

Design Review Report	
Subject	Item 2 – Warehouse and Incidental Office – Lot 119 Lakes Road & Lot 808 (No.54) Lakes Road, HAZELMERE
Design Reviewers	Malcolm Mackay - Chairperson (Mackay Urban Design)
	Brett Wood-Gush – Deputy Chairperson (Insight Urbanism)
	Wayne Dufty – Panel Member (DNA Architects)
	Peter Damen - Panel Member (Level 5 Design)
Proponent & Project Team	Jarrod Ross – TBB Town Planning & Design Brett Chivers – Hesperia Daniel Gorjy – Hesperia Eric Yu – Concept Y Matthew Christy – Concept Y
Declarations	None.

Design quality evaluation.		
Principle 1 **Context and character**		*Good design responds to and enhances the distinctive characteristics of a local area, contributing to a sense of place.*
Comments and Recommendation		**Strengths** a) The consistency of character with other similar developments generated some debate. Whilst positive, the consistency was seen as an issue if it extended to most of the development in the precinct. b) The relative generosity of the landscape interface to the western end of the frontage to Lakes Road. c) The relatively fine grain of architectural expression, artwork and landscape as a response to the Vale interface. **Areas for improvement**

		d) None. ***Recommendations*** ***1. None.***
Principle 2 **Landscape quality**		*Good design recognises that together landscape and buildings operate as an integrated and sustainable system, within a broader ecological context.*
Comments and Recommendation		**Strengths** e) A generosity of landscape for the use typology. f) The focus on tree canopy that is highly visible and provides shade is positive. g) The inclusion of the staff courtyard is good but would benefit from more detail. h) The density of planting along the Vale verge is positive and helps to reduce the visual impact of the boundary wall. **Areas for improvement** i) Check at the detailed design stage that the selected trees are compatible with the periodic wetness in the detention basins and consider the potential to increase tree sizes wherever possible, particularly in boundary locations. j) Consider the potential to replant the existing deciduous trees near the eastern corner to provide shade to an employee break out area. ***Recommendations*** ***1. None.***
Principle 3 **Built form and scale**		*Good design ensures that the massing and height of development is appropriate to its setting and successfully negotiates between existing built form and the intended future character of the local area.*
Comments and Recommendation		**Strengths** a) The overall form and scale are consistent with the use and place. b) The bold and consistent expression of the office avoids it looking like an appendix to the main shed. c) The finer grain of detail to the building and fencing helps to reduce the perceived bulk across Vale Road. **Areas for improvement** d) None. ***Recommendations*** ***1. None.***

Principle 4 **Functionality and build quality**		*Good design meets the needs of users efficiently and effectively, balancing functional requirements to perform well and deliver optimum benefit over the full life-cycle.*
Comments and Recommendation		**Strengths** a) The design appears to be generally functional, noting that functionality is only 10% of the design scorecard. b) The office layouts are clear and logical. **Areas for improvement** c) None. ***Recommendations*** ***1. None.***
Principle 5 **Sustainability**		*Good design optimises the sustainability of the built environment, delivering positive environmental, social and economic outcomes.*
Comments and Recommendation		**Strengths** a) A demonstrated intent with strong commitments, that suggest sustainability has been an integral part of the design process. b) Greenstar certification will ensure a rigour to the sustainability initiatives and provides an extra level of confidence in the outcome. c) The solar protection to the windows is good. d) The 500kW solar array and associated battery provision is commendable. e) The inclusion of EoT is good. **Areas for improvement** f) Demonstrate, even with only a part plan, how the PV and the roof lights are coordinated. g) Back up the sustainability intent during the detailed design stage (noting that a more comprehensive sustainability report may be required as a condition of approval). ***Recommendations*** ***1. The City may wish to include a condition of approval that requires a detailed sustainability strategy prior to building permit to back up the expressed intent.*** ***2. Demonstrate how the PV and the roof lights are coordinated.***
Principle 6 **Amenity**		*Good design optimises internal and external amenity for occupants, visitors and neighbours, providing environments that are comfortable, productive and healthy.*

Comments and Recommendation		**Strengths** a) The occupant amenity to the office areas is good. b) The additional provision of ventilation to the warehouse doors and ridge will improve natural ventilation. c) The addition of a canopy to the footpath adjacent to the building is good. d) The provision of multiple staff break-out areas is supported. **Areas for improvement** e) None. ***Recommendations*** ***1. None.***
Principle 7 **Legibility**		*Good design results in buildings and places that are legible, with clear connections and easily identifiable elements to help people find their way around.*
Comments and Recommendation		**Strengths** a) The office is clearly visible from the street. b) Separating the car park entry from the truck entry/exits is positive. c) The truck circulation is clear. d) The car park circulation is clear. e) The marked pedestrian routes through the warehouse are clear and logical. **Areas for improvement** f) None. ***Recommendations*** ***1. None.***
Principle 8 **Safety**		*Good design optimises safety and security, minimising the risk of personal harm and supporting safe behaviour and use.*
Comments and Recommendation		**Strengths** a) The design raises no major safety issues. b) The car and truck separation is commendable. c) The marked designation of pedestrian crossing points is positive. d) The provisions for truck movement appears to be appropriate given the directions of travel. **Areas for improvement** e) None. ***Recommendations*** ***1. None.***

Principle 9 **Community**		*Good design responds to local community needs as well as the wider social context, providing environments that support a diverse range of people and facilitate social interaction.*
Comments and Recommendation		**Strengths** a) The public art component is positive, including the artwork on the Vale Road boundary, and the suggested intent extends the emerging theme in the precinct. b) There is some generosity of landscape treatment to the verges and setbacks. c) The staff break-out areas are positive and, can potentially foster engagement within the on-site community. **Areas for improvement** d) None. ***Recommendations*** ***1. None.***
Principle 10 **Aesthetics**		*Good design is the product of a skilled, judicious design process that results in attractive and inviting buildings and places that engage the senses.*
Comments and Recommendation		**Strengths** a) It is noted the delivery of so many developments by one developer with the same stylistic approach both provides the potential for a consistent identity (but also the potential for monotony). The detail design, signage and public art will help to differentiate this development from the others. b) The colour palette is refined. c) The inclusion of translucent panels in the elevations is commendable and will improve amenity as well as enabling the building to glow and establish an after-dark aesthetic. d) The architectural expression of the office component is bold and well considered, even if all the fins are not strictly necessary for shading. e) The use of brickwork is positive, along with an architecture that goes beyond just “design with paint”. **Areas for improvement** f) Whilst it is noted that the signage will be a separate DA, showing indicative signage locations on the elevations will enable an assessment of whether the preferred signage locations are appropriate along with the capacity for the signage to be integrated

		into the overall design. g) Include a set of elevations that include the fencing for completeness. h) Consider at the detailed design stage whether a 1.8m fence could still achieve the required level of security but with a less fortress like aesthetic. i) At the detailed design stage, consider how the visual impact of the sub-station can be mitigated. ***Recommendations*** ***1. Show indicative signage on the elevations/renders to identify the preferred signage locations and degree of integration with the design.*** ***2. Include a set of elevations that include the fencing for completeness.***

Design Review progress	
	Supported
	Pending further attention
	Not yet supported
	Yet to be addressed

	DRP Meeting 1 03/09/24 Post DA	***DRP Meeting 2 30/09/24 Post DA***	***DRP Meeting 3***	***DRP Meeting 4***
Principle 1 - **Context and character**				
Principle 2 - **Landscape quality**				
Principle 3 - **Built form and scale**				
Principle 4 - **Functionality and build quality**				
Principle 5 - **Sustainability**				
Principle 6 - **Amenity**				
Principle 7 - **Legibility**				
Principle 8 - **Safety**				
Principle 9 - **Community**				
Principle 10 - **Aesthetics**				

Concluding Remarks

The Panel thanks the Applicant for returning to the design to the DRP. The Panel acknowledges the updates to the design, the additional information and justification, which has resulted in strong support for the design in the context of the 10 design principles of SPP7. The Panel acknowledges that the detailed design process will reveal more opportunities to refine the sustainability initiatives. In this context, the Panel accepts that the response to the Sustainability principle is generally good for this stage of the process but recognises that there ought to be a more comprehensive sustainability commitment prior to construction. Whilst the Panel also acknowledges that the signage will be a separate DA, the Panel is keen to understand the general form and location of signage to assess its visual impact and the potential level of integration of the signage into the design – this can be assessed in a Chair review and does not require a return to the full DRP.
Is the proposal required to go back to a future Design Review Panel Meeting? Please tick one of the following: ☐ **Yes – future full panel design review** √ **No – future chair review only** ☐ **No – supported – no further review required** **Is the proposal supported?** Please tick one of the following: ☐ **Yes - Supported** √ **Yes - Supported – pending further attention and/or conditions to be imposed** ☐ **No - Not supported**

Design Review Report endorsement & DRP Recommendation	 Malcolm Mackay DRP Chair

Attachment 5

Enquiries: Anne Walsh on (08) 9323 4355
Our Ref: 24/7987 (D24#1250185)
Your Ref: DA-610/2024
DAP Ref: DAP/24/02754

14 October 2024

Chief Executive Officer
City of Swan
PO Box 196
MIDLAND WA 6936

Email: swan@swan.wa.gov.au (via email)

Dear Sir/Madam,

PROPOSED WAREHOUSE AND INCIDENTAL OFFICE – DA-610/2024 – DAP/24/02754 – LOT 119 AND LOT 808 (54) LAKES ROAD, HAZELMERE

In response to correspondence received on 06 September 2024, Main Roads supports the proposal and recommends that if development approval is granted, the following conditions are imposed:

Conditions

1. The eastern access (Access 3) on Lakes Road is to be restricted to entry only.

   Justification for Condition

   The development proposes an entry-only access for heavy vehicles from land within Planning Control Area No. 163 (extract enclosed). The condition confirms the access arrangement.

Advice

a) The subject property is not located on a Main Roads approved Restricted Access Vehicle (RAV) route. Only as-of-right vehicles can access the subject property at this time. Future RAV access to the site will require approval by Main Roads for the RAV network.

b) Any changes to Restricted Access Vehicles to service the development will be subject to further support and approval from the City of Swan and Main Roads. Such an approval may be subject to any necessary intersection upgrades being undertaken at the applicant's expense to the satisfaction of Main Roads.

   The applicant is advised to contact Main Roads' Heavy Vehicle Services branch to ascertain any approval requirements. Information can also be found on the Heavy Vehicles Access Requirements in WA section of the Main Roads website.

c) The Great Eastern Highway (GEH) Bypass Interchanges Project is at the construction stage and is currently on hold until Main Roads secure the approvals required to deliver the works. The project is within Main Roads current 4-year forward estimated

construction program. Please be aware timing information is subject to change and that Main Roads assumes no liability for the information provided.

The project involves changes to the State Road network in the subject locality, including but not limited to the upgrade of the Abernethy Road, Lloyd Street and GEH Bypass Interchange and closure of the road between GEH Bypass and Stirling Crescent.

A new unsignalised T-intersection with a left-in, left-out access only will be proposed at Lakes Road and Lloyd Street intersection. Further information can be found at https://www.mainroads.wa.gov.au/projects-initiatives/all-projects/metropolitan/Great-Eastern-Highway-Bypass-Interchanges/.

Main Roads encourages local government in liaising with applicants to promote and capitalise on our pre-lodgement consultation service, prior to lodgement of planning proposals, especially where development plans involve land adjacent to or have the potential to impact on the State road network.

Further information on the pre-lodgement consultation process can be found on Main Roads website at mainroads.wa.gov.au > Technical & Commercial > Planning & Development

Should the JDAP disagree with the above conditions or require further information please do not hesitate to contact Anne Walsh on (08) 9323 4355.

Please ensure a copy of the JDAP's final determination is sent to planninginfo@mainroads.wa.gov.au.

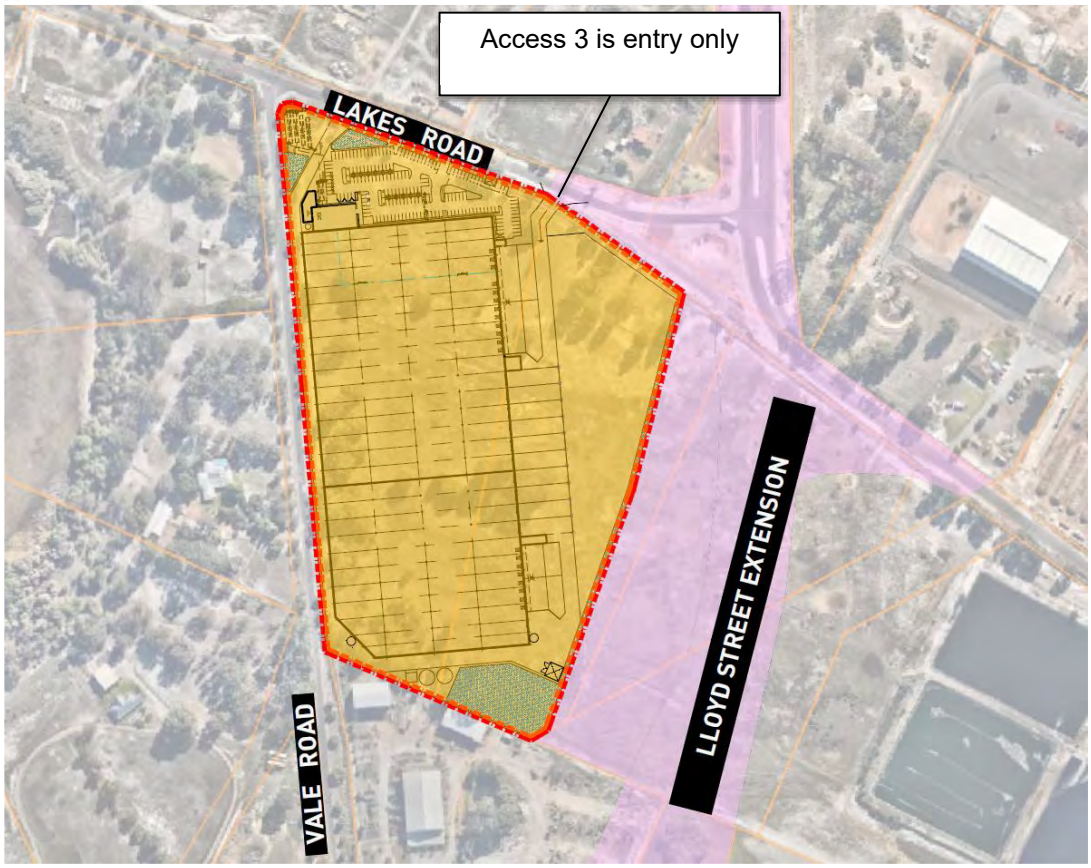
Yours sincerely

mthornely.

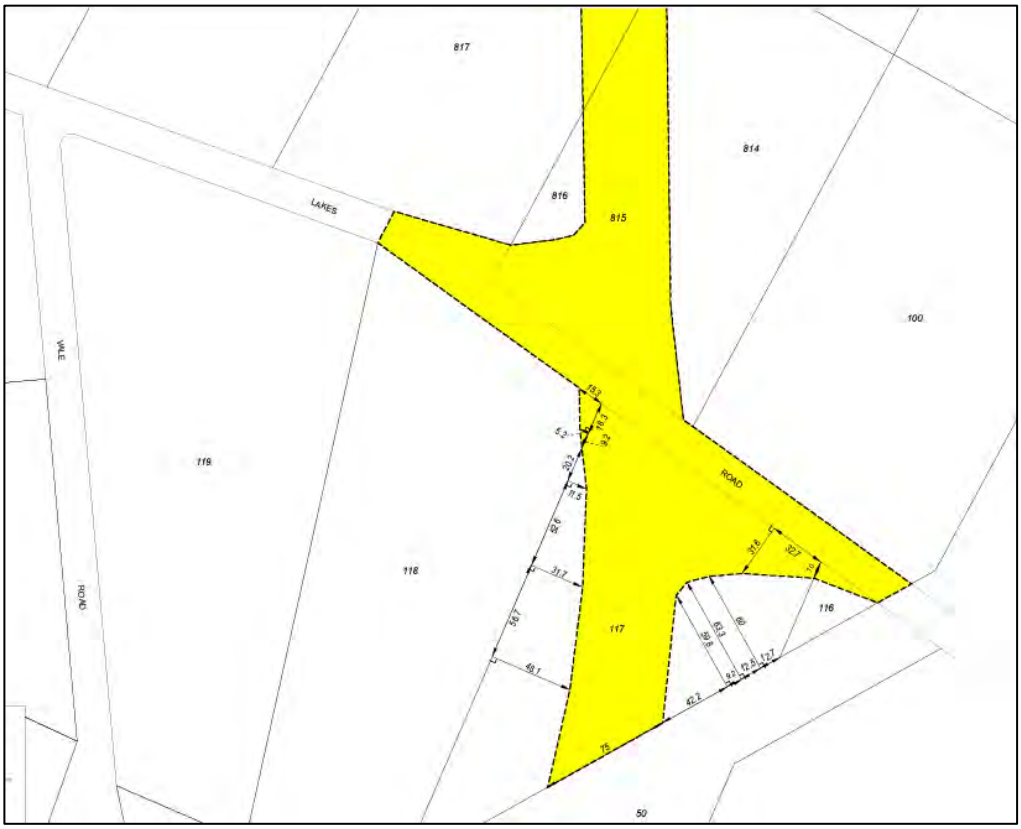
Maryanne Thornely
Road Access and Planning Manager

Enc.

1. Extract from planning report – Access 3 (entry only)
2. Extract of Planning Control Area No. 163 Plan 1.7988



Extract from planning report – Access 3 (entry only)



Extract of Planning Control Area No. 163 Plan 1.7988

Attachment 6

Development Application

Warehouse and Incidental Office

Lots 119 and 808 Lakes Road, Hazelmere

Prepared for determination of the Metro Outer Development Assessment Panel

24~073

August 2024

Taylor Burrell Barnett

Document Information

Development Application

Lots 119 and 808 Lakes Road, Hazelmere

Hesperia Property Pty Ltd

24~073

Prepared By: Taylor Burrell Barnett

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Doc ID: 24~073 DA Report - Lot 119 and Lot 808 Lakes Road, Hazelmere 1.2

Revision	Status	Author	Approved by	Date Issue
1.2	Final	Jillian Bardos	Jarrod Ross	16 Aug 2024

Table of Contents

1.0 Introduction

Taylor Burrell Barnett, acting on behalf of our client Hesperia, has prepared this report in support of an application for development approval for the use and development of Lots 119 and 808 Lakes Road, Hazelmere (the subject site) for the purpose of 'warehouse' tenancies, hardstand and incidental offices (**Appendix A**). The report is prepared in accordance with the provisions of the City of Swan *Local Planning Scheme No. 17* (LPS17).

The subject development is contained entirely within Lots 119 and 808 Lakes Road, Hazelmere. It will front Lakes Road, with the western side of the warehouse adjacent to Vale Road. The future Lloyd Street extension forms the eastern boundary.

An application for the amalgamation of the two lots is progressing concurrently with this development application.

Lots 119 and 808 are located in the Hazelmere industrial area, which is being progressively developed for industrial purposes in accordance with the vision established under the *Hazelmere Enterprise Area Structure Plan* (HEASP) (refer **Figure 1** below**).**

The development proposal includes two adjoining warehouses leased to a common tenant which will be accessed via the main entrances off of Lakes Road and an internal driveway along the western site boundary for the circulation of commercial vehicles. The warehouses will be serviced by three incidental office spaces, car parking and heavy duty concrete hardstand area.

The primary purpose of the development is the storage and distribution of goods, consistent with the use class of 'warehouse' under LPS17.

Construction of the facility is scheduled to commence following receipt of necessary planning and building permit approvals. Completion and occupation of the facility is estimated to occur by late 2025.

Figure 1: Subject site in the context of surrounding industrial and development sites within Hazelmere.

2.0 Site Context

2.1 Location

The subject site is located within the well-established Hazelmere Enterprise Area, an inter-regional transport hub that provides an outstanding opportunity for the development and operation of a broad range of general and light industrial uses.

The subject site is in close proximity to major freight routes (including Roe Highway, Great Eastern Highway Bypass and Abernethy Road), connecting the subject site to the wider Perth Metropolitan Region.

The area is nearby similar industrial areas including Forrestfield, Perth Airport, Bayswater and Kewdale/ Welshpool as depicted in **Figure 2** below.

The immediately surrounding area comprises a mix of land uses. This includes established industrial development to the north, south and east, and an existing rural residential estate to the west. Land for the proposed Lloyd Street Extension (connecting the wider Hazelmere Enterprise Area to the Great Eastern Highway) bounds the site to the east.

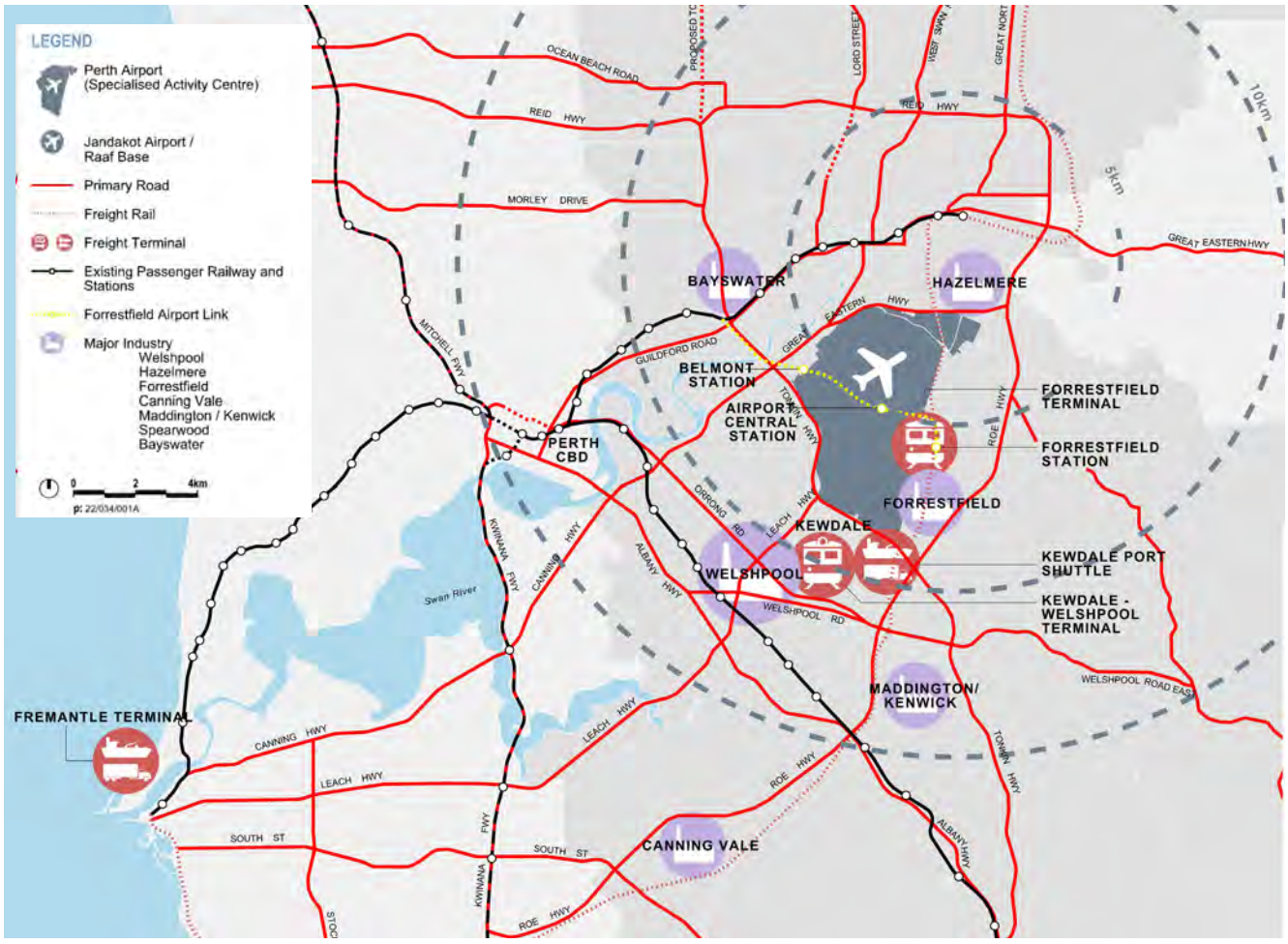

Figure 2: Metropolitan context for Hazelmere Industrial Estate

2.2 Subject Site

The subject site comprises of Lots 119 and 808 Lakes Road, Hazelmere and covers a combined area of 78,938m^2.

The site is currently being utilised as a storage facility for precast bridge beams by a PTA contractor (refer **Figure 3**). It has historically been used for rural land uses.

An application for the amalgamation of the two lots is progressing concurrently with this development application, and a new title will be created prior to occupation of the development.

The site has been subject to earthworks to facilitate the current use as a storage facility and is ready to accommodate industrial development.

2.3 Land Ownership

Lots 119 and 808 are both owned by HIF 54LR Pty Ltd (refer to **Table 1** below) as evidenced by the Certificate of Title included in **Appendix B.**

The landowners have authorised the development application via their signatures on the submitted application forms.

Table 1: Land Ownership Details

Address	Owner	Deposited Plan	Volume	Folio
Lot 119 Lakes Road, Hazelmere	HIF 54LR PTY LTD	004553 119	11	75A
Lot 808 Lakes Road, Hazelmere	HIF 54LR PTY LTD	422351	4018	489

Figure 3: Local Context Plan for Subject Site

3.0 Planning Framework

3.1 Metropolitan Region Scheme

The subject site is zoned 'Industrial' under the *Metropolitan Region Scheme* (MRS), as depicted in **Figure 4**.

The area to the north-east of the site is a Planning Control Area for the Lloyd Street Extension (yellow hatched), where it joins the Primary Regional Road reserve for the Great Eastern Highway (red). The area to the west is zoned Rural.

The proposed development is consistent with the intent of the Industrial zoning of the subject site under the MRS.

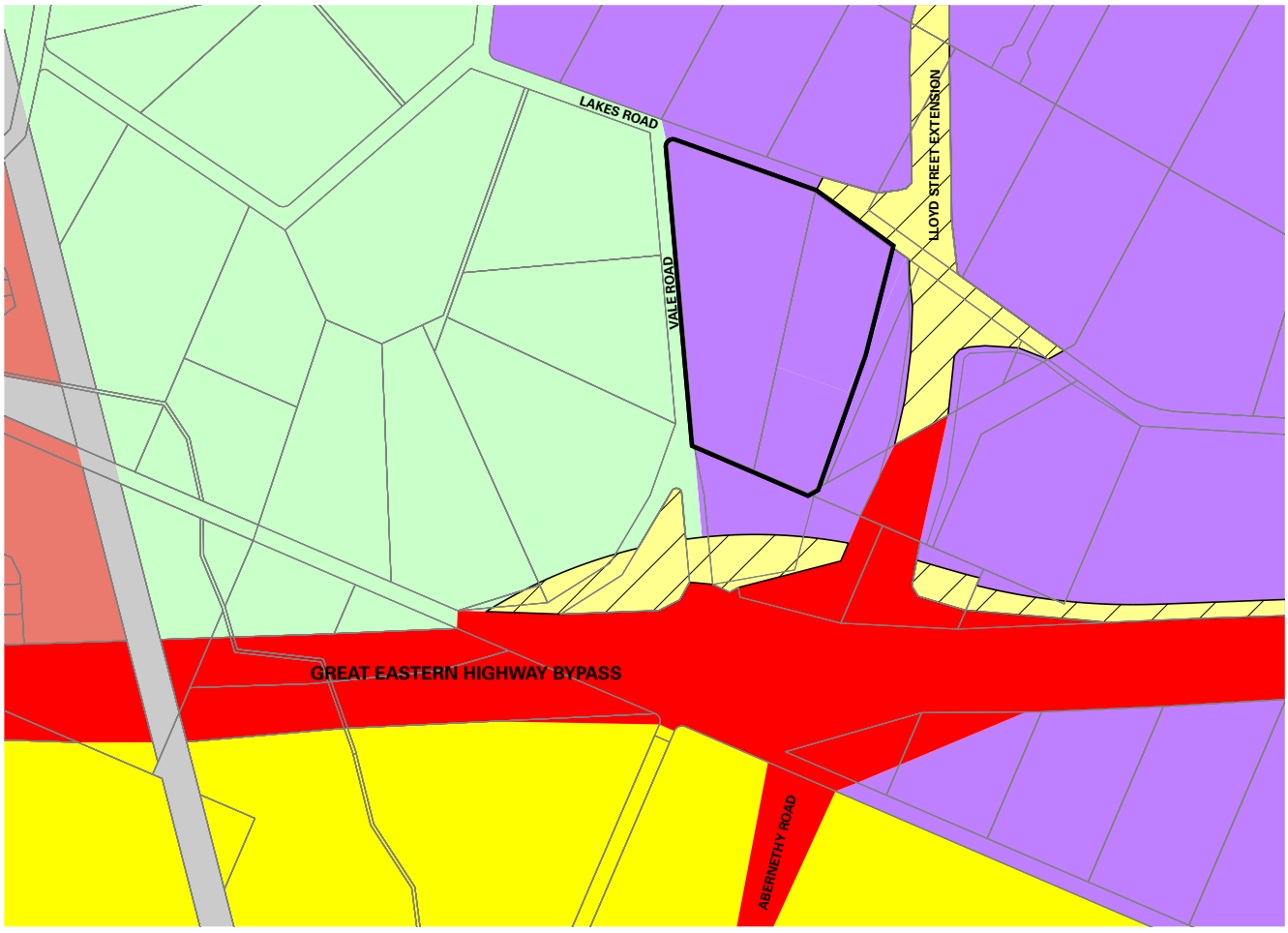

Figure 4: Metropolitan Region Scheme for the subject site and surrounds.

3.2 Local Planning Scheme No. 17

The subject site is zoned 'Light Industrial' under the City of Swan *Local Planning Scheme No. 17* (LPS17). Refer to **Figure 5** for a zoning map of the subject site under LPS17.

Under the provisions of LPS17, the subject site is within a Restricted Use designation (RU15), as set out in Schedule 3 of LPS17.

Whilst land use permissibility remains as per the Zoning Table, the RU15 conditions set out two additional requirements relevant to the proposed development, summarised and addressed in **Table 2**.

This application seeks approval for the use of **Warehouse**, defined under LPS17 as:

> *'a premises used to store or display goods and may include sale by wholesale.'*

The offices adjacent to each of the warehouse tenancies are classed as **incidental uses**, defined under LPS17 as:

> *'a use of premises which is ancillary and subordinate to the predominant use.'*

Under the Zoning Table of LPS17, the use of Warehouse is 'P' (permitted) within the Light Industrial zone.

Table 2: Restricted Use 15 provisions and assessment of the proposal

RU15 Condition	Comment
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 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.	The subject site is not connected to reticulated sewer. On site effluent disposal is proposed, with approval to be sought from the Department of Health. The development will not exceed an amount of 540 litres per 2,000m^2 of site area, in accordance with the LPS17 definition of 'dry industry'.
2. A Wastewater Management Plan shall be submitted with each development application to demonstrate that Condition 1 can be achieved to the satisfaction of local government.	Wastewater Management is proposed via connection to an Aerobic Treatment Unit (ATU) to treat effluent on site. The report contained in **Appendix E** outlines the suitability of the site for on site effluent disposal, and confirms acceptable groundwater depths exist.

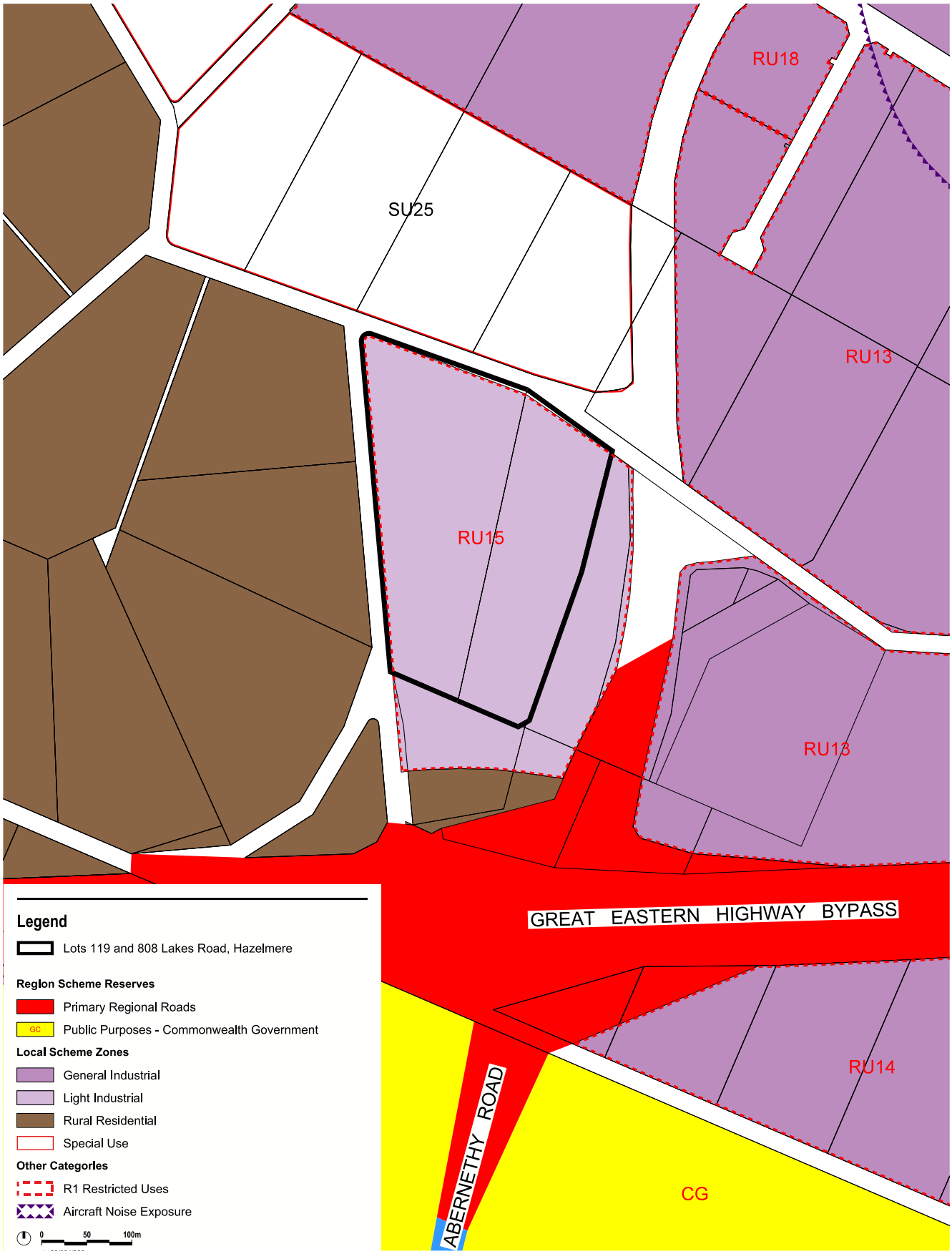

Figure 5: City of Swan Local Planning Scheme No. 17 zoning for subject site and surrounds.

3.3 Local Planning Policies

3.3.1 POL-TP-124 Building and Development Standards - Industrial Zones

The built form and development standards applicable to the proposed development are set out under POL-TP-124. The proposed development is broadly compliant with the relevant requirements.

An assessment of the proposal against the site requirements of the policy are provided in **Table 3** below.

Table 3: POL-TP-124 Building and Development Standards

Requirements	Proposal	Comment
Minimum 10% landscaping	10.6%	Compliant
Minimum frontage of 20m	298m	Compliant
Minimum front setback of 9m	23.7m	Compliant
Minimum side street setback of 6m	8m	Compliant
Nil minimum side setback	8.5m	Compliant

3.3.2 POL-TP-129 Vehicle Parking Standards

The vehicle parking requirements for the proposed development are set out under POL-TP-129. The proposed development broadly complies with the general and specific design requirements, as well as landscaping for off-street parking as set out under the policy.

Table 4 provides an assessment of the car parking required under POL-TP-129 for the warehouse land use, being:

> ***Warehouse****: 2 spaces per 100 square metres GLA; or*
> *2 spaces per person employed; or*
> *a minimum of 6 spaces;*
> *whichever is the greater*

The proposed development includes a total of 169 parking bays, including two ACROD bays. The proposed development has a total GLA of 38,735m², inclusive of the two warehouse tenancies and three incidental offices.

The proposed floorspace corresponds to a requirement for 798 parking bays. The proposed parking provision therefore represents a shortfall of 629 parking bays under the provisions of POL-TP-129.

Table 4: Car parking assessment

Assumption	Car Parking Requirement
Total 2 x (38,735m²/100m²) GLA (incl. two warehouse tenancies and three incidental offices)	798 bays
Total Bays Provided	169 bays
Proposed Shortfall	629 bays

The proposed shortfall is further addressed in **Section 4.6**.

3.3.3 POL-LP-1.10 Provision of Public Art

In accordance with the City's POL-LP-1.10 Provision of Public Art, an art contribution to a value equivalent of 1% of the estimated cost of development is to be provided on site or as a cash-in-lieu payment.

The contribution for public art will be further considered during the assessment phase and confirmed following approval, in accordance with the City's standard condition.

3.3.4 POL-C-070 Advertising Signs within Commercial and Industrial Zones

The proposal does not include signage as this will be progressed via a separate application following confirmation of the tenants signage needs.

4.0 Development Proposal

4.1 Proposal

The subject application comprises the following development:

- A main two-level office of 1,000m² adjoining the north-western side of Warehouse 1.
- Car parking for 169 vehicles, including two ACROD spaces and eight electric vehicle charging spaces.
- The proposed warehouse tenancies include:
    - Warehouse 1, which will comprise of 22,500m² warehouse floorspace and a 100m² single storey dock office adjoining the eastern side.
    - Warehouse 2, which will comprise of 15,000m² warehouse floorspace and a 100m² single storey dock office adjoining the eastern side.
- A dedicated heavy duty concrete hardstand of 12,160m² to the east of the warehouses.
- Heavy vehicle circulation will be provided along Lakes Road, with the entry point at the eastern end and exit point western end, towards the intersection of Lakes Road and Vale Road.
- Access for cars and light vehicles to the car park will be along Lakes Road, in between the two access points for heavy vehicles.

Refer to the development plans contained in **Appendix A.**

4.2 Land Use

Warehouse is defined by the City of Swan *Local Planning Scheme No. 17* as:

> ***'Warehouse'*** *means premises used to store or display goods and may include sale by wholesale.*

'Warehouse' is listed as a 'P' use under Table 1 - Zoning Table of LPS17, meaning the use is permitted.

Incidental use is defined by *LPS17* as:

> ***'Incidental Use'*** *means a use of premises which is ancillary and subordinate to the predominant use.*

The use of office would not ordinarily be permitted within the Light Industrial zone, but as the offices are clearly incidental to the predominant use of warehouse it is capable of approval.

4.3 Design Rationale

The proposed development, located within a visually prominent industrial precinct, is designed to balance industrial functionality with a thoughtful consideration of its immediate sensitive neighbouring interface, modern office aesthetics and detailed architectural articulation.

The warehouse serves as a critical structure that meets the demands of storage and distribution while being sensitive to its immediate surrounds. The design addresses its neighbouring interface through strategic landscaping and careful building articulation, ensuring that the warehouse integrates harmoniously with the local architecture and minimises its visual impact.

The landscape design plays a crucial role in this project, providing a sustainable interface between the industrial typology and its surroundings. Native plants and sustainable landscaping practices reduce water usage and maintenance while enhancing the visual appeal of the site.

The design incorporates appealing, elaborated elements that integrate seamlessly with the local architecture, ensuring that the warehouse complements the surrounding environment. Consideration of pedestrian access and safety is also key to the design, with well-planned pathways and green spaces that enhance usability and comfort for employees and visitors alike.

Efficient traffic flow is also a priority, with carefully designed vehicular access points and circulation paths that ensure smooth, safe operations and minimise congestion.

The architectural articulation of the warehouse is a defining feature of this project. Instead of presenting a monolithic industrial facade, the design incorporates varying materials, textures and colours that break up the building's mass, creating a visually appealing structure.

Corporate and estate colours are integral to the visual identity of the project. The building's exterior features a colour palette that reflects the corporate brand while harmonising with the neutral, earth-toned colours of the industrial estate. This creates a cohesive and aesthetically pleasing environment that is both professional and welcoming.

The office component of the project is designed as a modern and contemporary space that serves as a hub for administrative functions while also reflecting the corporate identity of the tenant.

The office design features clean lines and open spaces, providing a functional and comfortable workspace that promotes productivity and well-being. This modern design approach creates a seamless integration of the office within the overall warehouse layout, while still allowing the office to stand out as a focal point of the development with its contemporary facade.

Functionality is at the core of the entire design. The warehouse layout is optimised for efficient operations, with clearly defined zones for storage, loading, and office activities, ensuring smooth and uninterrupted workflows.

By focusing on both form and function, the proposed development stands as a model of sustainable and contemporary industrial design that respects its surrounding interface and meets the demands of modern business operations.

4.4 Built Form

The building layout has been configured in a manner to:

- Facilitate clockwise circulation of heavy vehicles, as this is mandatory for safe operation of reversing trucks
- Separate light vehicles from heavy vehicles/forklifts;
- Manage operational noise and traffic impacts on neighboring properties; and
- Provide a highly efficient logistics operation.

The finished floor level (FFL) is set to achieve separation to groundwater and to be able to store stormwater runoff on the site.

Location of drainage basins and on site storage is consistent with the natural fall of the land and the nominated drainage discharge location.

The warehouses will generally be used during day time periods however this application is for 24/7 operations.

The warehouses will store various, typically non-perishable, products in customized racking.

The site will be owned by the developer and leased to an experienced national logistics tenant who will head quarter their Western Australian business at this site.

Parking numbers have been specified by the tenant to allow for business growth should double shifts be warranted in the future.

The proponent has consulted with the three neighboring properties to the west and has received positive feedback for the decision to have operations on the east side of the subject site.

Figure 6: Render of development site facing south-east from Vale Road

4.4.1 Main Office (Office 1)

The main office is located to the north-west of Warehouse 1, and comprises two floors up to a total height of 8.8m.

The exterior of the office will comprise various feature elements, materials, textures and colours to provide a rich visual effect. A render of the proposed main office is shown in **Figure 6**.

The main entry for the office is along the eastern side. There is a provision for 8 bicycle racks and a large outdoor area.

4.4.2 Warehouse 1

Warehouse Building 1 will be constructed as a rectangular structure measuring an overall length of 173.5m and width of 129.7m, and built to a maximum ridge height of approximately 16.8m. The warehouse will have a total floor area of 22,500m^2 . The edge of the warehouse building is to be setback 88m from Lakes Road at the western corner and 23.7m boundary at the eastern corner (minimum setback).

Colorbond Metal wall cladding (with translucent high lights on the western elevation) will form the primary external wall material of the warehouse structure, with a 2.7m high precast concrete dado wall at the base. Colorbond wall cladding in surfmist, monument, shale grey and manor red are provided to the elevations of the warehouse.

A series of roller doors on the eastern elevation will provide access into the building for commercial vehicles, inclusive multiple recessed loading docks. Pedestrian access will be provided at the northern elevation of the building via the office and carpark with a direct link to Lakes Road.

Figure 7: Render of development facing south-west showing primary office and warehouse facade.

4.4.2.1 Dock Office 1

A small dock office approximately 100m² will be located in Warehouse 1 along the eastern side in between the loading docks. It will comprise an office area, tea area and male / female toilets.

4.4.3 Warehouse 2

Warehouse Building 2 will immediately adjoin Warehouse 1 to the south of the site. It will be constructed as a rectangular structure with an overall length of 118.5m and a width of 129.7m. It will be built to an overall maximum height of approximately 13.7m. The warehouse will have a total floor area of 15,000m².

The building is setback 8m from the western side boundary, and 10m from the rear (southern) boundary.

The composition of building materials is the same as for Warehouse 1.

A series of roller doors on the eastern elevation will provide access into the building for commercial vehicles, inclusive of numerous loading docks. Pedestrian access will be provided at the eastern elevation via the main office adjoining Warehouse 1.

4.4.3.1 Dock Office 2

A small dock office approximately 100m² will be located in Warehouse 2, along the eastern side in between loading docks. It will comprise an office area, tea area and male / female toilets.

4.4.4 Awnings

Awnings are provided on the eastern elevation to provide sheltered loading and unloading of trucks.

4.5 Sustainability Strategy

This project represents one in a series of developments by Hesperia in the area and continues the national excellence strategy which is a commitment of the precinct and Hesperia development policy in general.

The project has made a commitment to achieve a Green Star Buildings V1 5-Star Certification, representing Australian Excellence in Sustainable Design. The wider precinct has already been awarded 6 Leaf EnviroDevelopment certification, representing industry best practice in land development.

Hesperia are committed to working with tenants to minimise their environmental footprint, with Green Leasing considerations around finishes, performance reporting and waste minimisation.

These voluntary measures are further detailed in **Appendix C** and will be used as a guide for the project team in the implementation stages of the development including commitment to achieve:

- formal Green Star Certification by contractually obligating the Builder to construct to a 5-Star standard and receive certification.
- a minimum of 200kW of solar PV across the site.
- offsetting 100% of all upfront carbon generated during civil works and building construction.
- supplying only 100% renewable energy to tenants upon completion, via onsite solar generation and green power purchased from the grid.
- dual flush greywater system for all warehouses.
- a minimum of 10 EV chargers for staff parking with provision for expansion.

4.6 Access, Circulation and Parking

This application provides a comprehensive assessment of access, circulation and parking considerations, as detailed in the Traffic Impact Assessment contained in **Appendix D**.

4.6.1 Movement Network

The subject site is serviced by a number of key strategic freight routes as illustrated in **Figure 9**.

Lakes Road, which runs along the northern boundary of the subject site, provides a direct connection to Stirling Crescent which currently provides access to Great Eastern Highway (GEH) Bypass and the broader regional road network.

The final connection of Lloyd Street to the GEH Bypass is proposed to the east of the site, which will provide a less circuitous route for vehicles accessing and egressing the site via the regional road network.

4.6.2 Site Access

The subject site will be accessed via three access points to Lakes Road:

- **Access 1** (Lakes Road, western section) is the exit only for heavy vehicles.
- **Access 2** (Lakes Road, central section) will provide entry and exit only for light vehicles.
- **Access 3** (Lakes Road, eastern section) is the entry only for heavy vehicles.

The locations of these crossovers are shown in **Figure 8**, and further outlined in **Appendix D**.

Access onto Vale Road is not practically possible due to incompatible site levels and the need to manage noise. He proposed internal circulation avoids putting industrial traffic onto Vale Road.Access 3 has been tested for multiple scenarios for the future upgrade of Lakes and Lloyd Street intersection and has been determined as satisfactory in all case

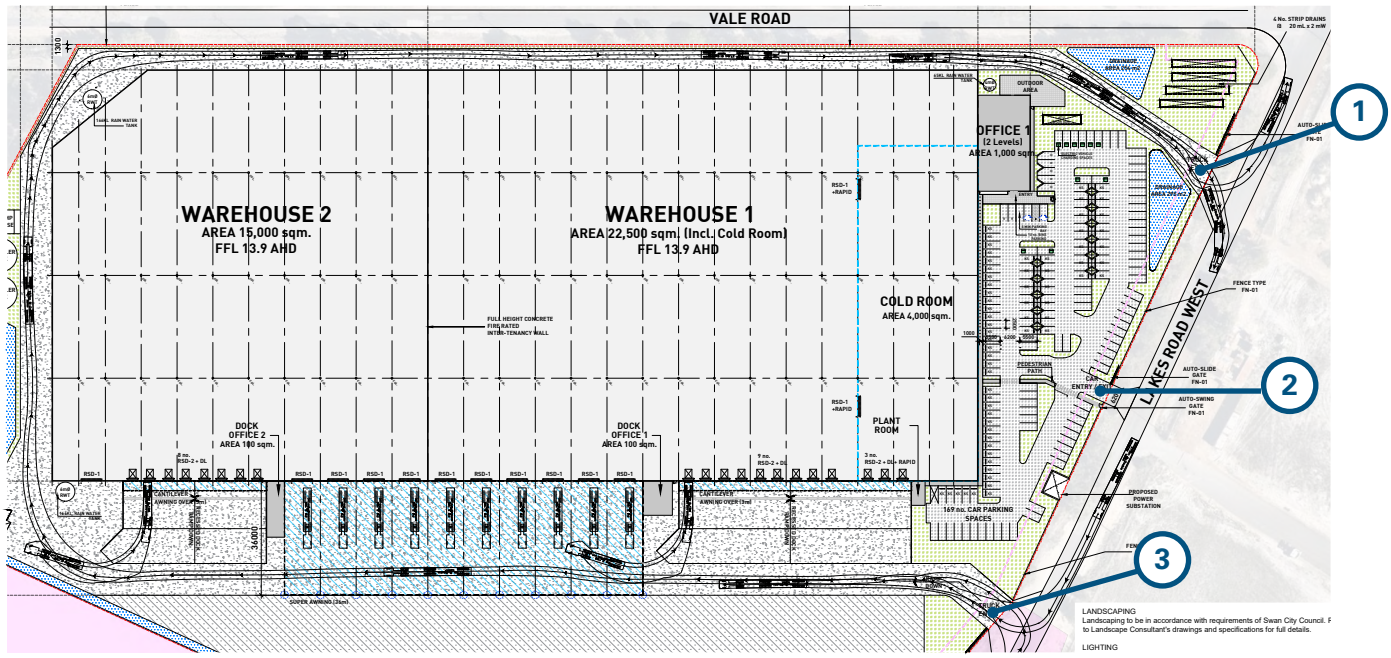

Figure 8: Site access locations

Figure 9: Access arrangements for the surrounding area noting access to regional road network.

4.6.3 Car Parking

As outlined in **Section 3.3.2**, the development proposal includes a total of 169 parking bays on site for use by employees and visitors. The City's Scheme standard, if applied to the development, requires a total of 798 parking bays, resulting in a proposed shortfall of 629 bays.

The parking rate for a warehouse at two spaces per person employed implies a visitor is present for every employee who is on the site. This results in an excessive number of parking bays when compared to the actual requirements of future tenants.

This application therefore proposes that a visitor parking demand of 10% of the employee's one space per employee demand is sufficient. This will allow for typical visitors such as service persons, couriers or clients to access the site.

An empirical parking rate of 1.1 space per employee is therefore proposed for consideration by the City of Swan. This is based on the rate adopted in other recent approvals issued by the DAP for similar developments in the Hazelmere area, and will provide for up to 154 staff to be accommodated onsite and up to 15 visitors at any one time.

It is anticipated and accepted that the City may apply a condition of development approval which requires that:

> *Parking of passenger/commuter vehicles is only permitted within the 169 designated bays and is not to occur elsewhere onsite or within the adjacent road verge.*

The proposed carparks are otherwise designed consistent with the requirements of POL-TP-129, inclusive of the access and circulation and provision of shade trees.

4.7 Essential Services

4.7.1 Water

The subject site has a direct access to an existing water main on Vale Road to suit the proposed development in accordance with separate approvals from the Water Corporation.

4.7.2 Wastewater

An assessment has been undertaken to demonstrate the suitability of the subject site for on-site wastewater disposal which is included as **Appendix D**. It determines that ground conditions at the site are suitable for effluent disposal using ATU and strip drains consistent with the requirements of LPS17.

The details of the ATU proposed is shown in **Appendix A** and further outlined in **Table 5** and **Figure 10**.

An application for the proposed ATU and leach drains is to be separately lodged with the City of Swan in anticipation of the development approval being granted.

Table 5: Wastewater Flow Rates

Source	Rate (Per person/per day	Total Volume (Litres per day)
130 Full Time Staff Members - Office and Warehouse (Non-Showering)	130 x 30L	3,900
10 Full Time Staff Members - Warehouse (Showering)	10 x 70L	700
20 Visitors	20 x 10L	200
Total		**4,800**
Apparatus Capacity (O-2NR 6KL)		**6,000**

4.7.3 Electricity

The subject site has an existing electricity connection which will upgraded as part of the development to suit the proposed current and future developments in accordance with separate approvals from Western Power.

4.7.4 Waste Management

A waste bin enclosure is included for the two tenancies and will be managed by the tenants.

Bins will be collected via private contractor engaged by the tenants.

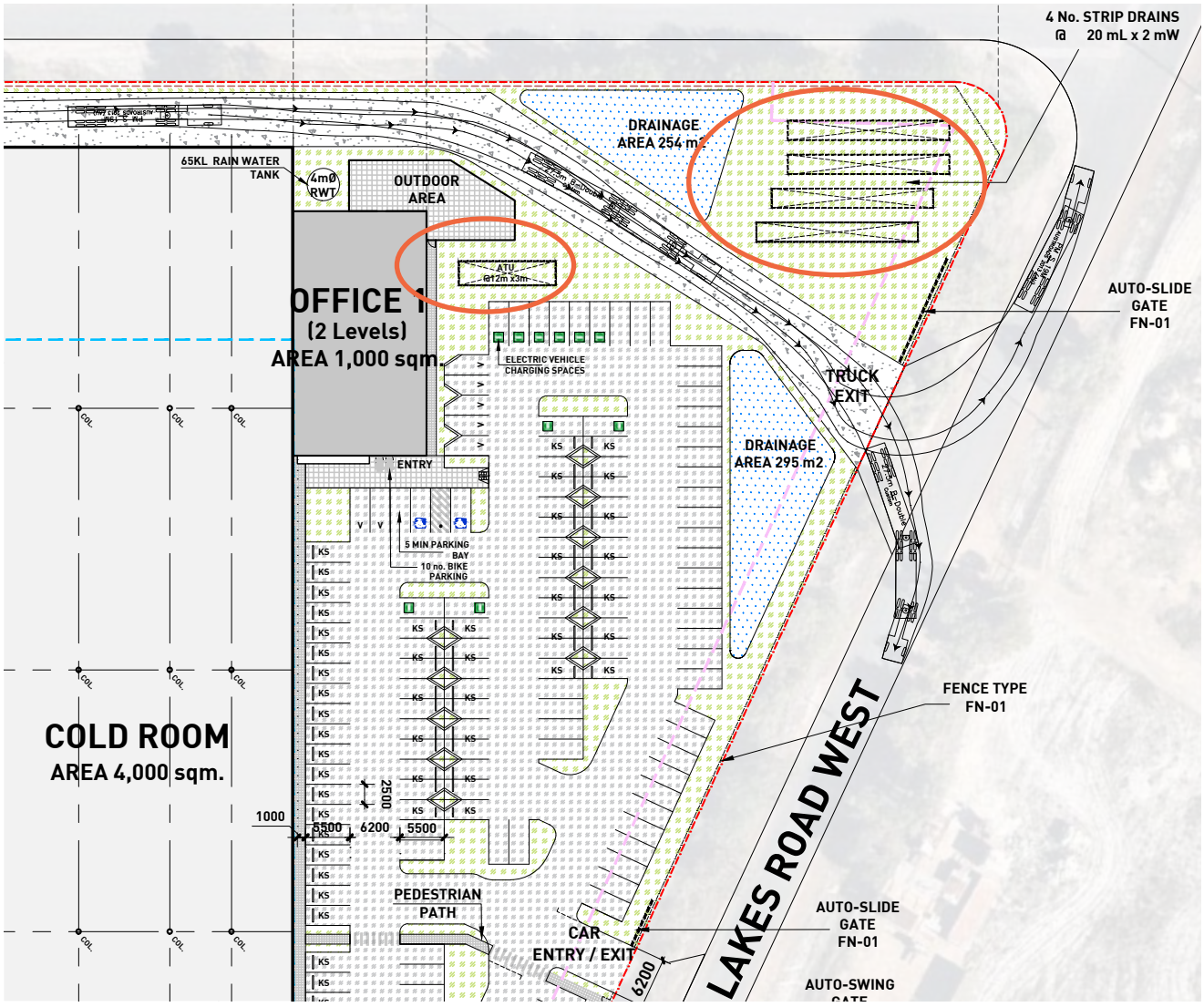

Figure 10: Identification of the location of the proposed ATU and Leach Drains fronting the primary office area.

4.8 Site Levels, Drainage and Landscaping

4.8.1 Site Levels

A site levels plan is included as **Appendix G**, and notes that the proposed development will include the construction of some retaining walls to achieve the necessary levels for drainage and safe operations. It should also be noted that the truck entry from Lakes Road into the site will grade down directly from the existing Lakes Road pavement to facilitate safe and expedient entry in to the site.

4.8.2 Site Drainage

The stormwater management for the subject site is outlined in detail within the Stormwater Management Plan (**Appendix F**) and Stormwater Drainage Plan **(Appendix G**).

The key elements of the stormwater management strategy for the site are as follows, consistent with City of Swan Design Specifications (2012) and Better Urban Water Management requirements as well as integrating principles of Water Sensitive Urban Design:

- Detention system with basins interconnected via pipework and a site outlet into Vale Road culvert with permissible discharge of 128 L/s.
- Flood storage on site sized to manage up to and inclusive of the 1% AEP event
- Retention of first flush 15mm of hardstand runoff within landscaped biofiltration areas.
- Treatment of roof runoff is not required but will flow through detention basins prior to discharge.
- 1.9m freeboard from FFL to the Hazelmere Lake South 1%AEP TWL.
- Internal freeboard of 600mm at 1% AEP event with overland flow path to prevent flooding in larger storms.
- Minor subsoil drainage included.

4.8.3 Landscaping

A Concept Landscape Plan has been prepared and is included as **Appendix H**.

A very high standard of landscaping will be achieved throughout and will ensure that all existing verge trees are retained, protected and enhanced with abutting verge landscaping.

The concept plan exceeds the relevant landscaping requirements, inclusive of the installation of landscaping within the primary and secondary street interfaces and within the light vehicle car park areas.

Extensive landscaping is also proposed along the northern site boundary along Lakes Road, and western boundary along Vale Road. Additionally, extensive planting is proposed around the southern drainage basin, along the eastern boundary and throughout the light vehicle parking / main office zone.

The City's Local Planning Policy POL-TP-124 Building and Development Standards - Industrial Zone, requires a minimum of 10% of the total site area as landscaping for developments in the industrial zone.

Staff amenity includes a massive 150m^2 dedicated outdoor area with shade, landscape and amenities such as a BBQ and outdoor seating.

The proposed development provides for 9,190m^2 of total landscape area, equating to 11.7% of the total site area, and meets the City's policy requirement of 10%.

The total canopy area at maturity is estimated at 6,052m^2 or 7.7% of the total lot area, providing a very high quality landscaped outcome (**Figure 11**).

Figure 11: Landscape Concept Plan extract outlining tree canopy at maturity for development fronting Lakes Road and Vale Road

4.9 Bushfire Hazard

A very small portion of the site measuring approximately 550m² (or 0.7% of the site area) along the western boundary is mapped as Bushfire Prone Area (BPA) as outlined in **Figure 12**. The BPA expands into the site by a maximum of 6m, and no portion of proposed building is impacted by the BPA as it is setback by 8m from the site boundary to Vale Road.

Whilst Bushfire Attack Level (BAL) ratings do not apply to industrial type buildings, it is established that industrial buildings should not be located within areas where BAL-29 is exceeded.

Emerge Associates have undertaken a BAL Contour Assessment (**Appendix J**) of the surrounding locality and confirmed that no portion of the built form is within a rating of BAL-29 or above, and as such is appropriately sited and complies with State Planning Policy 3.7.

It should be noted that the development will be connected to scheme water and will undergo an assessment at the building licence stage to ensure compliance with building regulations and related Australian Standards pertaining to fire suppression measures within the development.

Figure 12: Bushfire Prone Area mapping showing a very small portion of the western side of the site is within a Bushfire Prone Area.

4.10 Acoustic Assessment

Acoustic modelling and assessment of the proposed development has been undertaken as outlined in **Appendix I.** The most sensitive receptors are three residential dwellings to the west of the site, as shown in **Figure 13**.

The acoustic modelling predicts noise emissions will be compliant to all receptors with the installation of a 3m high acoustic barrier wall along the western side of the lot. This fence will shield the neighbouring residential dwellings from truck engine noises.

The noise emissions from the proposed development are consistent with the land use zoning and consistent with surrounding industrial developments.

Figure 13: Outcome of Environmental Noise Assessment, noting proposed noise wall and local sensitive receptors.

5.0 Conclusion

This application seeks approval to develop a high quality warehouse facility, which is strategically located and ideally suited for its intended purpose.

The development provides an opportunity to service a growing demand for freight and logistics facilities in the Hazelmere Enterprise Area.

As outlined in this report, the proposed development meets or exceeds the applicable planning framework.

We submit that the proposal should be supported by the City of Swan and approved by the Development Assessment Panel on the following grounds:

- The proposed development demonstrates compliance with the City of Swan *Local Planning Scheme No. 17* and the State and Local Planning Policies applicable to the site and the proposed form of development.
- The development is of a very high standard, and will provide further precedent for high quality, sustainability focused industrial development within the City of Swan.
- In keeping with Hesperia's developments within Hazelmere and the broader metropolitan area, the development will achieve a level of national excellence in sustainability, which is of substantial benefit to the local area and broader environment.
- The proposed warehouses are suitable for this site and with the internal and verge landscaping provide an important aesthetic improvement to the surrounding industrial area.
- The development is of very high quality and will
- The site is accessible, with key freight routes located within close proximity.
- The warehouses will not have any adverse impacts on adjoining land uses. Specialist reports and assessments have been undertaken to ensure that the development has no adverse impacts on surrounding land use, particularly with regards to drainage, noise, waste and traffic generation.

We look forward to working with the City of Swan to achieve approval for the proposed development.

Attachment 7

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MEMORANDUM

Subject	DRP22/2024 – City of Swan DA610/2024 (Lot 119 Lakes Road and Lot 808 Lakes Road, Hazelmere
Date	7 November 2024
Reference	24~073
To	Laura O'Shea, Senior Planning Officer, City of Swan
From	Jarrod Ross, Principal, Taylor Burrell Barnett

Dear Ms. O'Shea,

In response to the feedback provided by the Design Review Panel in their further Chair review of the above application on 5 November 2024 we have prepared a single summary document of the sustainability commitments made with respect to the proposed development of Lot 119 and 808 Lakes Road, Hazelmere.

Please find as part of this package the following:

- Appendix A – Sustainability Strategy - Full Circle Design Services (FCDS)
- Appendix B – Excerpt of agreement between applicant and tenant
- Appendix C – Builder Specification ESD
- Appendix D – DRP Response (24 September 2024) including Greenstar Submission Planner
- Appendix E – Sustainability Strategy – Response to DRP (011124)

We trust that this is sufficient to close out the request of the DRP Chair and provide the City with confidence of our sustainability commitments moving forward.

Kind Regards,

Jarrod Ross
Principal

Toddville Prospecting Pty Ltd (ACN 008 735 153)
ATF The Taylor & Burrell Unit Trust trading as Taylor Burrell Barnett (ABN 74 831 437 925)

Office address:
Level 7
160 St Georges Terrace
Perth WA 6000

Postal address:
PO Box 7130
Cloisters Square
Perth WA 6850

Appendix A

Sustainability Strategy – Full Circle Design Services

Sustainability Strategy

Full Circle Design Services

Unit 303 26 Charles St
South Perth WA 6151

PO Box 5636
St Georges Terrace
WA 6831

Ph: +61 (0) 412 475 819
E: graham.agar@fcds.com.au
www.fullcircledesign.com.au
ACN: 163 742 890

Project:	Lot 119 & 808 Lakes Road – Hazelmere
Service:	Sustainable Design
Subject:	DA Sustainability Strategy
Revision:	B
Date:	14th August 2024
Author:	Graham Agar

FCDS have been commissioned to assist Hesperia in developing and delivering the sustainable design strategy for the proposed industrial development at Lot 119 & 808 Lakes Road – part of the Hazelmere development.

This project represents one in a series of developments by Hesperia in the area and continues the strong sustainability strategy which is a commitment of the precinct and Hesperia development policy in general.

Hesperia is a certified B Corporation and since 2021 has been certified as a Carbon Neutral Organisation by Climate Active. Hesperia has also signed up to the World Green Building Council (WGBC) net-zero by 2030 commitment, agreeing to operate all buildings that Hesperia controls as net zero, design all buildings to be capable of net zero operation by 2030, and maximise embodied carbon reductions throughout construction and offset residual emissions by 2030.

The following document outlines the current intent for the development team to deliver an Australian leading sustainable design outcome for the project and the surrounding community.

Key Features

The design team are committed to:

- **Formal 5 Star Green Star** Certification to Green Star Buildings
- **200kW Peak Solar PV** Offset more than 200 Tonnes of CO_2 annually
- **Upfront Net Zero**, 100% offset of construction civil and building works.
- **Operational Net Zero Energy**, 100% Green Power procurement for operational energy
- **Non-Potable Water** and dual flush for warehouses
- **Electric Vehicle Chargers**, 10 bays initially, potential for expansion

In addition, the project has already **achieved 6-Leaf Enviro-Development** certification, representing industry best practice in land development.

Hesperia is also committed to working with tenants to minimise their environmental footprint, with Green Leasing considerations around finishes, end of life, procurement, performance reporting and waste minimisation.

Further details on features and strategies are presented in the following pages.

enviro DEVELOPMENT™

Full Circle Design Services

Carbon Footprint

Minimising carbon footprint associated with building construction and operations is critical for all projects if climate targets are to be met. The development at Lot 119 & 808 Lakes Road continues Hesperia's commitment in this space.

All upfront carbon from civil works and construction of the building will be measured and offset, using predominately nature-based, re-vegetation offsets.

The building will allow for future installation of a rooftop solar PV system, which will enable the tenant to significantly reduce their demand for grid electricity, reduce costs and directly reduce their carbon footprint. An agreement will be reached with the tenant to procure 100% of their operational energy from renewable sources, which will include rooftop solar PV, Green Power, and no connected gas to the building.

The design will target improved energy efficiency above National Construction Code (NCC) requirements, by incorporating good orientation, shading devices, efficient lighting, and high performing envelope and Heating, Ventilation and Air Conditioning (HVAC) systems.

In addition, the design has the potential for future connection of batteries and an energy management system which will allow a greater proportion of generated electricity to be consumed on site, as well as providing crucial peak load management and grid resilience benefits.

The building will operate as 'Fossil Fuel Free' and through the provision of EV parking bays will assist occupants and visitors in reducing their transport carbon footprint.

Material Selection

The project is targeting a significant reduction in carbon emissions, which will be assessed and certified by an independently reviewed Life Cycle Assessment.

Lower carbon materials will be procured to help reduce upfront carbon emissions, including low carbon concrete, steel and aluminium.

Where possible, low Global Warming Potential (GWP) refrigerants, will be used in air conditioning systems. The remaining carbon footprint associated with air conditioning will be offset.

Procurement of materials in the finishes, structure and envelope will target suppliers who have certifications attesting to the sustainability of the manufacturing process, this will be guided by a Responsible Procurement Plan, aligned to ISO 20400.

Occupant Health and Wellbeing

The occupied spaces of the development are targeting best practice outcomes for staff and visitors, supporting a healthy working environment and also encouraging active living and social engagement.

The building is provided with staff amenities including outdoor areas for interaction and relaxation.

Indoor air quality will be preserved by ensuring low toxicity materials are used in internal finishes.

Cycling or active living is facilitated through provision of secure bike parking and lockers.

Within the conditioned space, noise levels will be controlled and separated from noisy activities on site. Outside air rates will be increased above minimum NCC requirements and will be monitored and controlled to maintain good air quality.

Performance will be verified at completion through air quality and building envelope pressure testing, helping to ensure that design intent is achieved in operation.

Full Circle Design Services

Future Resilience

The development is intended to be a productive asset for Hesperia and the local community for at least the next 50 years and, as such, has considered future operations and resilience in the design and project planning.

The precinct has undertaken detailed grid and climate change risk reviews, with designers to address and mitigate anything considered a high or extreme risk, including changing temperature profiles, increased solar radiation and worsening storm intensity.

The design includes for EV charging in priority parking bays.

Social and Community Outcomes

The project is also aiming to deliver outcomes beyond its site.

The project budget includes for public art, contributing to the positive effect of the built form. The urban heat island effect will be reduced through the use of light colours on building roofs.

The design also includes a drainage bioswale which will assist with recharging local groundwater levels.

Water Sensitivity

The achievement of a 6 Leaf Enviro-Development certification qualifies the land development to achieve a Water Wise endorsement from Water Corporation. In ongoing design, water use will be minimised in sanitary fixtures, drought tolerant landscaping and rainwater tanks used for toilet flushing and irrigation.

Water Sensitive Urban Design (WSUD) principles will be a feature of the landscaping design, including the use of biofiltration swales to improve stormwater quality leaving the site.

Responsible Waste Management

The builder will target a 90% landfill diversion rate of construction and demolition waste by appropriately managing waste on-site. The design will also incorporate a dedicated waste management space, assisting tenants in having enough space to adequately sort their waste into various recycling schemes.

Summary

This project is taking a robust approach to sustainability with highlights including Green Star 5 Star and Net Zero. Hesperia has built a reputation for delivering on sustainability commitments and sees this project as an opportunity to model best practice industrial development.

Appendix B

Agreement between Applicant and Tenant

1. General

1.1 Scope of Works

[redacted]

1.3 Regulations and Standards

[redacted]

1.4 Sustainability

The design and construction of this building will consider ecological sustainability design features. The facility to be designed and constructed to target 5 Star Green Star Rating. The following ESD initiatives are to be included by the Developer as a minimum

- 500kw solar PV installation with 200kw battery capacity.
- 10 EV charging bays in car park
- Solar hot water system
- Rainwater collection and reuse through toilet flushing
- High efficiency HVAC systems
- Low VOC paints, carpets and sealants
- Water efficient bathroom fixtures
- LED lighting through the facility

1.5 Consistency of Documents

[redacted]

Appendix C

Builder Specification ESD

54 Lakes Road, Hazelmere

ESD - Selected Builders Specification Clauses

1.1 Green Star and Sustainability

The Builders obligations and requirements for Sustainability, Greenstar and related ESD matters are outlined in Annexure G of the PPR and elsewhere in this PPR.

Unless specifically noted otherwise all costs with complying with the requirements in Annexure G and this PPR are included in the Builders Lump Sum.

The Builder is responsible to achieve formal certification for a 5 Star Green Star Buildings rating for the building.

The Builder will engage an experienced Consultant to fulfil the Green Star Accredited Professional role. Graham Agar from Full Circle Design Services (0412 475 819 graham.agar@fcds.com.au) is strongly preferred. The use of an alternative Green Star Accredited Professional is subject to written approval by the Principal.

1.1.1 Waste Management

The Builder will ensure not less than 90% (measured by weight) of construction and demolition waste is diverted from landfill. The waste contractors and waste facilities must comply with the Green Star Construction and Demolition Waste Reporting Criteria.

1.1.2 Carbon Mitigation - Lifecycle Assessment (LCA)

The Builder, through an LCA Consultant, shall undertake an LCA to compare the proposed building to a reference building.

The reduction in life cycle impacts must be demonstrated through a whole-of-building, whole-of-life (cradle to grave) comparative LCA, as defined by EN 15978. All EN 15978 modules (A to D) must be included in the assessment.

The Builder shall convene a carbon mitigation workshop prior to starting construction, that includes relevant designers, to review opportunities to incorporate low carbon initiatives within the builder to reduce the upfront carbon emissions and life cycle impacts. These initiatives might include the following:

- Low carbon concrete;
- Incorporating structural timber, where appropriate;
- Third-party certification schemes;
- Low GWP refrigerants;
- ‘Green’ steel;
- Carbon Neutral Certified products;
- Renewable energy and storage systems; and
- Products holding EPD’s demonstrating reductions in carbon emissions.

Carbon footprint for all steel, aluminium, glass, concrete and refrigerants shall be included in tender returns by relevant trades to enable effective comparative analysis.

Additional LCA reporting requirements are detailed in Annexure G.

HESPERIA

Annexure G – Sustainability Requirements

CEVA Warehouses and Offices

54 Lakes Road , Hazelmere

Rev. A 26 July 2024

POTENTIAL IN PLACE

1. Green Star

1.1 Overview

Unless otherwise specified or agreed, the Builder is solely responsible for:

1) designing and constructing the buildings to achieve formal 5-Star Green Star Buildings Certification from the Green Building Council of Australia (GBCA); and
2) preparing a compliant submission package, coordinating with consultants, overseeing documentation and evidence gathering, and facilitating all communications and follow-ups with the GBCA to ensure certification is achieved; and
3) attaining the exact credits listed in the Mandatory Points Schedule.

Unless otherwise specified or agreed, the contract sum is deemed to be inclusive of all costs required by the Builder to fulfil the obligations listed above.

1.2 Mandatory Points Schedule

Reference	Category	Description	Mandatory Achievement	Points Achieved
MP1	Resilient	Climate Change Resilience	Credit Achievement	1
MP2	Positive	Upfront Carbon Emissions	Credit Achievement	3
MP3	Positive	Energy Use	Credit Achievement	3
MP4	Positive	Energy Source	Exceptional Performance	6
MP5	Positive	Other Carbon Emissions	Credit Achievement	2
MP6	Positive	Life Cycle Impacts	Credit Achievement	2
Total Mandatory Points (Rev. A)				**17**

1.3 Principal's Supplementary Responsibilities

This section refers to required inputs or actions by the Principal that are essential for the Builder to meet certain Mandatory Points. If supporting documentation is required from the Principal, the Builder remains responsible for reviewing and validating information provided to ensure a compliant submission.

Reference	Mandatory Point	Responsibility
PSR1	Upfront Carbon Emissions	Provide all relevant documentation on file relating to prior works on the site, generally earthworks and demolition. Upon receiving carbon calculations from the Builder relating to prior works, Principal to fund carbon offsets and provide receipts to Builder.
PSR2	Energy Source	Provide Builder with the contracts / agreements with Energy Supplier or other suitable documentation to demonstrate commitment to 100% renewable energy source. For the purposes of Green Star scoring, the Principal will be responsible for the supply and install (except for works included in the PPR by the Builder) of a 500kW maximum size PV solar panel array and 200kWhr battery.

Reference	Mandatory Point	Responsibility
PSR3	Other Carbon Emissions	Upon receiving refrigerant carbon calculations from Builder, Principal to fund carbon offsets and provide offset retirement certificate to Builder.

1.4 Builder's Supplementary Responsibilities

This section refers additional tasks, standards or deliverables the Builder must deliver for certain Mandatory Points, which may go beyond what is required to achieve the Mandatory Points.

Reference	Mandatory Point	Responsibility
BSR1	Life Cycle Impacts	Provide the Principal with list of the top five materials construction items by carbon emission impact. The list must include the estimated emissions for the proposed design and for a Green Star compliant reference case. Provide the Principal with a Life Cycle Assessment (LCA) of the project. The LCA requirement is regardless of any requirement for an LCA for the Green Star process but does not require an additional, separate LCA. The following are required within three months of practical completion: • LCA Deliverable 1: The resulting LCA report in full • LCA Deliverable 2: Project Net Zero Carbon Report using Hesperia's template (available on request). In order to meet performance requirements, the builder should allow for: • 30% reduction in cement content, on average, across all concrete mixes on site • Fibre reinforced slab for all high load industrial floor slabs • Utilise sustainable steel – Infrabuild or equivalent
BSR2	Data Collection	**Materials Quantities** Provide the Principal with the inventory of data used as input to the LCA. A template is available (on request) as a guide for gathering and reporting this data. **Monthly Monitoring Reports** Provide the Principal with monthly reporting on metrics to ensure that data is being gathered. A monthly reporting template is available on request. The following must be provided monthly: ▪ Site energy consumption (electricity and gas) ▪ Fuel consumption – transport (separate ULP and diesel) OR Truck movements, truck types and destination or distance information to enable the estimation of transport fuel use where actual figures are not available. ▪ Fuel consumption – site machinery ▪ Fuel consumption – stationary machinery (generators etc.) ▪ Water consumption (potable and non-potable) Waste Stream Reporting (volume, weight and percentage recycled or composted): – Clean Fill exported to other sites – Hazardous waste removed – Organic material removed to composting – Construction and Demolition waste – General waste – Wastewater emissions (e.g., site toilet effluent removal quantities)
BSR3	Climate Resilience	In order to meet the requirements of the Climate Change Adaptation and Resilience credit the Builder must ensure that the design: - Exceeds BCA minimum requirements by 10% for building envelope

Reference	Mandatory Point	Responsibility
		- Includes mechanical heat rejection sized for ambient conditions of 38.6°C - Includes plumbing within toilets to cater for future non-potable water supply -Caters for 1:100 Year storm event for stormwater systems without office or warehouse flooding

2. Baseline Sustainability Standards

This section contains the baseline sustainability requirements for this building, to be read alongside the main Principal's Project Requirements (PPR) document. This section does not replace the PPR but supplements it, focusing on the Principal's minimum and targeted sustainability standards.

2.1 Minimum Requirements

Where a greater commitment/requirement is specified in the PPR then the PPR takes precedence,

Reference	Discipline	Minimum Requirement
MR1	Civil	Minimum 15KL rainwater harvesting tank to each tenancy. The tank is to be plumbed into the roof to collect water from a suitable catchment area. Ensure it has overflow connected to on-site drainage system and is plumbed to the end-use specified in the PPR.
MR2	Electrical	Provide infrastructure and capacity for future EV charge points to a minimum of 4 bays or 15% of all car bays, whichever is greater. Infrastructure and capacity to suit a 7.5kW electrical vehicle charger. Include space and conduit for future load management hardware to share capacity and manage peak demand.
MR3	Electrical	Builder to provide all necessary provisions for a future connection of a Battery Energy Storage System (BESS) pre-configured for direct integration by others. Location to be nominated by Builder and approved by Principal. Builder not to rely upon BESS being installed by the Principal or others for Green Star Credits. Subject to Principal approval, the Builder may install a BESS, at their own expense, in order to attain relevant Green Star Credits.
MR4	Architecture	Builder to provide a summary of how design has incorporated Crime Prevention Through Environmental Design (CPTED) principles.
MR5	HVAC	All air conditioning units used must have an Annual Coefficient of Performance (ACOP) and Annual Energy Efficiency Ratio (AERR) of 4.0 for both heating and cooling as defined in AS/NZS 3823. Refrigerant used must be R32 or substituted for a product with an equal or lower Global Warming Potential (GWP). This requirement applies to office spaces or equivalent, but excludes freezers, cold-storage, or temperature-controlled areas.
MR6	Structural	All structural timber to be sustainable forestry certified under FSC, PEFC, or equivalent.
MR7	Electrical	Lighting design within the office (excl. warehouse, workshops and similar) areas to meet 'Best Practice Artificial Lighting' and 'Best Practice Access to Daylight' as defined under Credit 11 – Light Quality within Green Star Buildings Submission Guidelines (v1 Rev.C). All light fittings shall meet minimum requirements as advised within the Green Star Buildings Credit 11.

Reference	Discipline	Minimum Requirement
MR8	Acoustics	Acoustic comfort for building occupants is defined in Credit 12 Acoustic Comfort – Credit Achievement - Green Star Buildings (v1 Rev C). The applicable requirements for benchmarking purposes refer to achieving *Maximum Internal Noise Levels*, *Minimum Internal Noise Levels* and *Reverberation Control*. This credit does not need to be included within the Green Star submission.

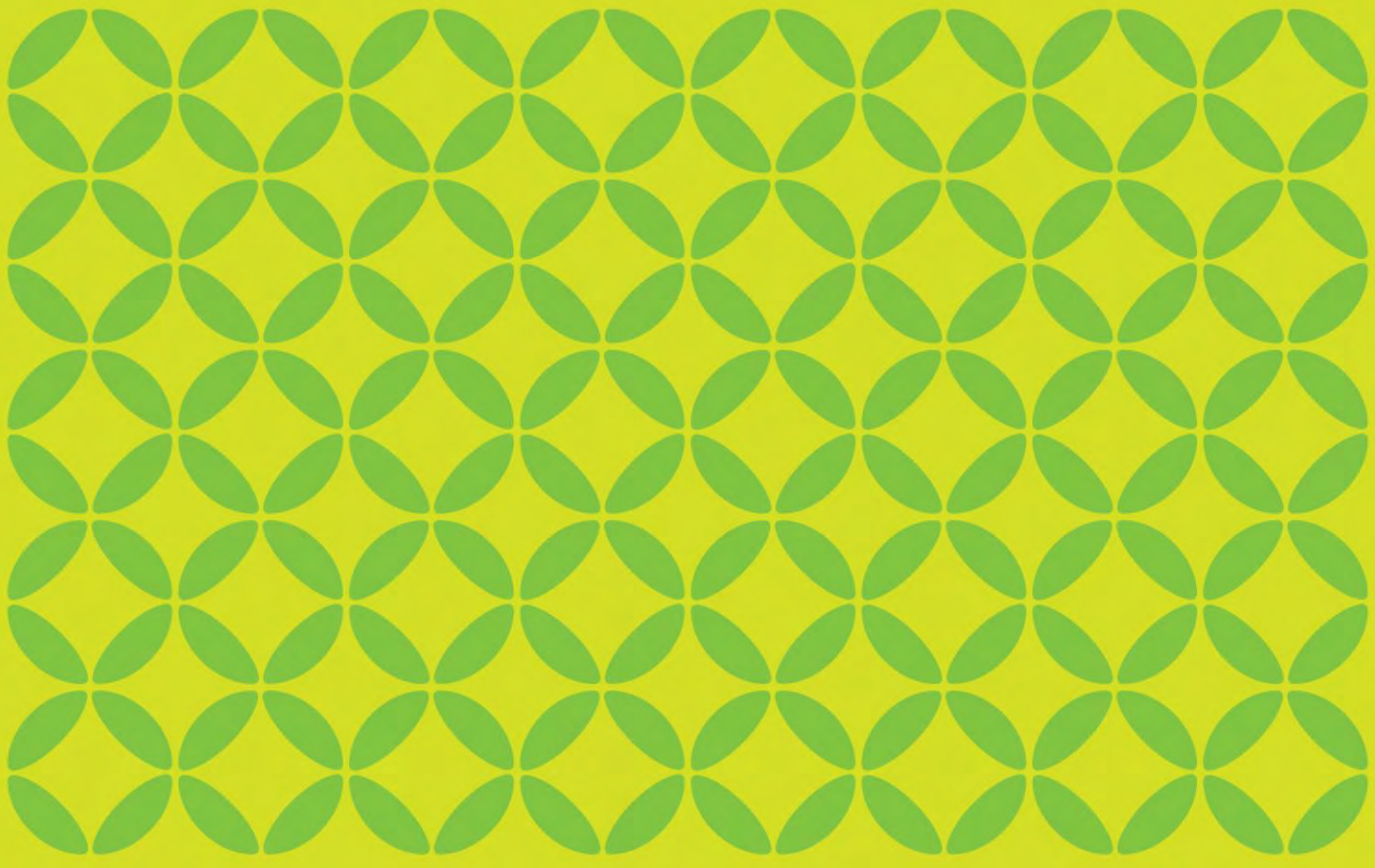
2.2 Targeted Outcomes

This section contains desired sustainability and performance objectives that, while not mandatory, are strongly encouraged to be incorporated into the design and construction phases of the building. The resolution of these items will be documented as part of the project deliverables, allowing for flexibility in approach while still aiming for the highest possible sustainability and performance standards.

Reference	Discipline	Minimum Requirement
TO1	Procurement	Seek to involve Aboriginal consultants and suppliers throughout design and construction. The Principal has Supply Nation and Noongar Chamber of Commerce membership and is willing to assist the Builder with finding potential suppliers. Target minimum of 500 man-days worked on the project by local aboriginal people and that a minimum of $250,000 excl GST is expended by the Builder on local aboriginal enterprises (that have majority aboriginal ownership).
TO2	Construction	Seek to achieve 90% construction and demolition recycling rate.
TO3	Construction	Seek to use recycled road base as a part of heavy-duty pavement works.
TO4	Construction	Seek to optimise civil plans to reduce imported fill.

greenstar

Construction & demolition waste reporting criteria



Version 2

13 April 2022

Green Building Council Australia

Building a sustainable future

Introduction

Version control

Version	Date	Description
1	30/06/2013	Initial release
2	03/08/2021	Minor updates released in conjunction with Green Star Buildings – Maintenance Version. - Replaced RABQSA with Exemplar Global. - Minor Formatting throughout. Adopted from *Green Star – Design & As Built v1.3*

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Table of contents

Executive Summary

This document details the reporting criteria and auditor requirements which accompany the Construction and Demolition Waste credit in Green Star rating tools released in June 2013.

The Green Star Construction and Demolition Waste Reference Group, which was comprised of experts in the waste management industry from 47 organisations across the country, including 24 GBCA members, has contributed advice and expertise to the development of the construction and demolition waste management 'Reporting Criteria' and has helped to inform the functionality of the new 'Construction and Demolition Waste' credit.

All Green Star rating tools include a Construction and Demolition Waste credit which aims to encourage and reward management practices that minimise the amount of construction and demolition waste from base building and/or interior fitout works that is disposed to landfill. The credit requires the use of waste contractors and waste processing facilities that have been independently verified for compliance with minimum standards of reporting. The introduction of such compliance standards and checks aims to ensure contractors and facilities are operating with environmentally responsible due diligence on behalf of Green Star projects.

Verification of compliance with these reporting criteria would be carried out by 'Suitably Qualified Auditors' who are engaged directly by a Green Star project applicant's waste contractor/s and waste processing facilities.

An auditor's report is to be provided to Green Star projects by the waste contractor as supporting evidence to demonstrate compliance with the relevant credit and rating tool.

Only waste reports that have been generated by waste contractors whose compliance has been verified will be accepted.

About the Green Building Council of Australia and Green Star

The Green Building Council of Australia (GBCA) is the nation's authority on sustainable buildings and communities. Our mission is to accelerate the transformation of Australia's built environment into one that is healthy, liveable, productive, resilient and sustainable. We work together with industry and government to encourage policies and programs that support our mission. We educate thousands of people each year on how to design and deliver sustainable outcomes for our buildings and communities. And we operate Australia's only national, voluntary, holistic rating system for sustainable buildings and communities - Green Star.

Green Star was developed for the property industry in order to:

- Establish a common language
- Set a standard of measurement for green buildings
- Promote integrated, whole-building design
- Recognise environmental leadership
- Identify building life-cycle impacts
- Raise awareness of green building benefits

Please refer to the links below to:

- Understand the development process undertaken by the GBCA with waste industry stakeholders
- Use the resources portal to download the latest copy of the:
  - Disclosure statement – waste contractor
  - Disclosure statement – waste processing facility

Definitions

The following definitions apply to the Green Star 'Construction and Demolition Waste' credit and the Green Star construction and demolition waste management 'Reporting Criteria' (this document):

Applicant

Refers to the waste contractor and/or waste processing facility commissioning an evaluation by an auditor.

Construction and demolition waste

The waste material produced during the construction, renovation, demolition or deconstruction of buildings and their infrastructure. Construction and demolition waste materials typically include concrete, wood, metals, plasterboard, cardboard, plastics, asphalt, and mixed site debris like soil and rocks and excludes spoil/fill and hazardous and prescribed materials.

Compliance Verification Summary

A signed and dated document issued by a 'Suitably Qualified Auditor' that verifies and summarises the waste contractor's or waste processing facility's (auditee's) compliance with the Green Star 'Reporting Criteria'. A Compliance Verification Summary is valid for 12 months from the date of issue and must be current for the duration of the time that an auditee provides waste services and waste reports to a Green Star project.

Environmental Management Systems (EMS) Auditor

The Environmental Management System (EMS) auditor certification program has been developed by Exemplar Global to provide international recognition for auditors who conduct environmental management system audits based on the ISO 14001:2015 environmental management system standard.

Further information regarding the Environmental management Systems Auditor certification provided by Exemplar Global can be found here: https://exemplarglobal.org/certification/environmental-systems/environmental-management-system-ems-auditor/

Green Star Construction and Demolition (C&D) Waste Management Reporting Criteria

Are criteria that establish the minimum acceptable standard of operations and reporting for waste contractors and waste processing facilities that provide services and reports to Green Star projects. Waste contractors and waste processing facilities that provide waste management and reporting services to Green Star projects must achieve independent verification of their compliance with the criteria. Such verification of compliance is a prerequisite for the recognition and acceptance of the waste reports that are provided within Green Star 'Construction and Demolition Waste' credit submissions. The Reporting criteria are detailed in sections three, four and five of this document.

Landfill

Refers to a site where waste materials are disposed of by way of burial between layers of soil.

Residual Waste

Refers to the material remaining after the resource recovery process has taken place. In accordance with waste hierarchy principles, this remaining material has no other viable fate than to be used as fuel for energy recovery or committed to landfill.

Suitably Qualified Auditor

Refers to an auditor who has the relevant knowledge, skills and experience necessary to provide advice to applicants on the issues addressed in the Reporting Criteria. It does not refer to 'Appointed Auditors' as defined under various State Environment Protection Acts. Auditors must be independent with a particular focus on how they manage conflicts of interest with applicants (i.e. they must be an external, independent, third-party auditor). They must also provide evidence of their qualifications as defined in this document. See section seven of this document for further information.

Waste Contractor

Refers to the company or person(s) engaged by a builder, developer or owner of a structure to manage the containerisation, collection and transportation of construction and demolition waste from a construction site to recyclers or waste processing facilities. Waste contractors must provide their customers with reports on the contents, dates, volumes or weights of construction and demolition waste, as well as the waste processing facility destinations and registration numbers of the vehicles transporting waste from the site to processing facilities.

Waste Processing Facility

Is a lawfully operating facility that receives construction and demolition waste for processing. The facility recovers recyclable materials from the waste stream, including for energy, thereby minimising the amount of residual waste committed to landfill. Waste processing

facilities include resource recovery facilities, transfer stations and waste-to-energy facilities where waste is sorted. Reprocessing facilities are also included in this definition. 'Reprocessing facility' refers to businesses that trade in specific waste material types for the purpose of transforming (recycling) it into new products. Examples include metal, concrete, paper and plastic recyclers. Any of the above listed facilities operating on the same site as a landfill are included under this definition, however landfill itself is not.

Application

The below table is a summary of different credits where the 'Compliance verification summary' and the 'Disclosure Statement' can be used to demonstrate compliance across the different Green Star Rating Tools

Rating tool	Compliance verification summary	Disclosure statement
Green Star Buildings	Minimum Expectation Credit Achievement	Minimum Expectation
Green Star – Design & As Built v1, v1.1	22 Reduction of Construction and Demolition waste	22 Reduction of Construction and Demolition waste
Green Star – Design & As Built v1.2, v1.3	22.0 Reporting Accuracy	22.0 Reporting Accuracy
Green Star – Interiors v1, v1.1	22 Construction and Demolition Waste	22 Construction and Demolition Waste
Green Star – Interiors v1.2, v1.3	22.0 Reporting Accuracy	22.0 Reporting Accuracy
Green Star – Railways v1, v1.1	26.0 Reporting Accuracy	26.0 Reporting Accuracy

Reporting criteria

The reporting criteria outlined in this document support the Green Star 'Construction and Demolition Waste' credit, and attempt to provide additional assurance to Green Star customers, by creating auditable pathways to ensure:

- Waste contractors (transport and handlers) servicing Green Star projects:
  - Provide accurate reporting on waste collection and diversion from landfill
  - Take all of a project's construction and demolition waste to waste processing facilities that meet the Reporting Criteria
- Waste processing facilities that accept Green Star project construction and demolition waste:
  - Operate legally with approved Development Approvals (DAs), and the relevant environmental licenses, etc
  - Have auditable systems in place to prepare accurate reports on inbound and outbound waste
  - Undertake annual reporting of the independently verified gross diversion rates of waste from landfill, and the percentage of residual waste committed to landfill from their operations

The following criteria are included:

- Waste contractors
- Waste processing facilities
  - Criterion 1
  - Criterion 2

- Criterion 3

Interim period

A 12 month interim period for establishing compliance with the Reporting Criteria commenced with the release of the revised Green Star 'Construction and Demolition Waste' credit and this Reporting Criteria. Allowances for interim measures are **provided for some, but not all criteria**. The Reporting Criteria list which components are subject to such allowances.

During the 12-month interim period, non-conformities and corrective actions issued by the auditor in relation to the compliance requirement of some criteria will be accepted on the basis of a signed 'Interim Measure Declaration' from the applicant containing the following:

- Where reporting systems are insufficient or non-existent, but where equipment certification or enough historical data exist to carry out thorough evaluation of compliance with a criterion, the auditor may issue a corrective action to resolve the situation. The criterion will assume the status of 'Interim Period Pending Compliance' and be stated as such on the applicant's Compliance Verification Summary during the interim period. Interim Measure Declarations must be provided on official company letterhead, be signed by a company director and containing the following:
  - Each non-conformance and corrective action, as issued by the auditor;
  - A statement that the non-conformances and corrective actions are understood by the applicant and that the corrective actions must be effected before the end of the interim period;
  - The steps the applicant commits to undertake in order to institute the corrective action(s);
  - The timeframe in which the corrective actions will be implemented and confirmed through a re-audit of the outstanding matter; and
  - A confirmation that the applicant understands that the consequences of not implementing all corrective actions, and the verification of such, by way of a re-audit before the end of the interim period, will be a ruling of non-compliance with the reporting criteria, meaning green star projects may no longer use their services.
- During the interim period, and while corrective actions remain outstanding, the applicant's Interim Measure Declaration must be attached to the Compliance Verification Summary that they provide to Green Star customers.

Waste contractors

Aim

To ensure that the waste contractors that service Green Star projects provide accurate reports on both the amount of construction and demolition waste removed from the site and where such waste is disposed.

Requirements

Important Note:

- For the purposes of Green Star Buildings, Responsible Construction - *Minimum Expectation*, a diversion rate of 80% must be met.
- For the purposes of Green Star Buildings, Responsible Construction - *Credit Achievement*, a diversion rate of 90% must be met.
- A disclosure statement **cannot** be used to demonstrate compliance with Responsible Construction - *Credit Achievement.*

The waste contractor must provide accurate monthly and cumulative waste reports that detail both the total weight of waste removed from their customers' construction sites, as well as the waste processing facilities where all loads are disposed. Reporting accuracy must be within an average five per cent margin of error.

Interim measure

There are no interim measures available for this criterion.

Auditor verification guidance

Auditors should verify compliance by sampling customer records for at least three medium to large size job sites (select Green Star projects if available). The two-part methodology set out below should be used to determine the accuracy of a waste contractor's reporting practices. Worked examples of the calculation methodology to determine reporting accuracy are provided for parts I and II. It is the Waste Contractor's responsibility to collate and present all inbound waste dockets forwarded by waste processing facilities.

In order to award compliance with the criterion, the average percentage variation findings for both Part I and Part II must be within a five per cent margin of error.

Collecting audit documentation:

- Choose a three month sample operating period or 50 records covering a continuous period where less than 50 records have been generated in any continuous three months period, for each job site;
- Obtain copies of waste contractor's waste reports to customer for sample periods;
- Obtain waste contractor's disposal docket records for sample jobs over sample periods;
- Obtain copies of the corresponding inbound waste dockets from the waste processing facilities for sample jobs over sample periods; and
- Where the contractor waste report provides waste disposal figures in volume, but disposal dockets are reported in weight, the auditor must convert results to mass using the same volume-to-mass conversion factors applied by the contractor or receiving facility.

Part I: Comparing customers' waste reports with waste contractors' disposal dockets

- Compare the waste disposal weight totals stated in the waste reports issued to customers against the waste contractor's disposal docket weight totals for each sample job
- Check that the waste processing facilities stated in the waste reports correspond with the waste processing facilities used by the waste contractor(s), as evidenced by the disposal dockets. Also check that the amounts disposed correspond with the amounts stated in the customer's waste report
- Record variations in the respective totals for each sampled job as a percentage of the difference to the total reported to the customer. Average the percentages and state if the variation in reporting for each sample job complies with the five per cent margin of error allowance. Where major discrepancies in the reporting arise (for example where dockets show waste disposed at facilities not reported to customer or no disposal dockets are provided to support figures in customer waste reports) then the discrepant amount should be carried forward as a whole and added to the totals component of the 'Kg Variation in Comparison of Records' column. This figure will be used in the percentage variation calculation for that sample job (see example below for clarification)

Sample job 1	Sample period reported total waste disposed	Sample period disposal dockets totals	Variation in comparison of records	Percentage variation in total reported to docket records
Waste Processing Facility 1	2500 kg	1800 kg	-700 kg	-38.89%
Concrete & Brick Recycler	4000 kg	2950 kg	-1050 kg	-35.60%
Waste Processing Facility 2	3166 kg	2800 kg	-366 kg	-13.1%
Back Yard Boys Waste Disposal	not reported	2616 kg	2616 kg	100%
Plasterboard Recycler	2500 kg	2000 kg	-500 kg	-25%
TOTAL DISPOSED	**12166 kg**	**12166 kg**	**0 kg** **2616 kg**	**0%** **-21.5%**
Percentage variation between reported totals and disposal records of corresponding totals				**0%** **-21.5%**

Non-Compliant reporting issue! See guidance item Part I (c) for protocol

Non-Compliant reporting accuracy margin of error

Sample job 2	Sample period reported total waste disposed	Sample period disposal dockets totals	Variation in comparison of records	Percentage variation in total reported to docket records
Waste Processing Facility 1	3000 kg	2900 kg	-100 kg	-3.45%
Concrete Recycler	3000 kg	3000 kg	0 kg	0%
Waste Processing Facility 2	3000 kg	2850 kg	-150 kg	-5.26%
Metal Recycler	1000 kg	900 kg	-100 kg	-11%
TOTAL DISPOSED	**10000 kg**	**9650 kg**	**-350 kg**	**-3.63**
Percentage variation between reported totals and disposal records of corresponding totals				**-3.63%**

Compliant reporting accuracy margin of error

Sample job 3	Sample period reported total waste disposed	Sample period disposal dockets totals	Variation in comparison of records	Percentage variation in total reported to docket records
Waste Processing Facility 1	2122 kg	2000 kg	-122 kg	-6.1%
Concrete Recycler	500 kg	600 kg	100 kg	16.67%
Waste Processing Facility 2	3500 kg	2900 kg	-600 kg	-23.1%
TOTAL DISPOSED	**6122 kg**	**5500 kg**	**-622 kg**	**-11.31%**
Percentage variation between reported totals and disposal records of corresponding totals				**-11.31%**

Non-Compliant reporting accuracy margin of error

- Take the average percentage variations in reporting from each sample job and state whether or not the average variation of all sampled jobs complies with the five per cent margin of error allowance. This figure determines the applicant's compliance with part II of the criterion.

Sample job	Sample period reported total waste disposed	Sample period disposal dockets totals	Variation in comparison of records	Percentage variation in total reported to docket records
Sample job 1	12166 kg	9550 kg	-2616 kg	-27.39%
Sample job 2	10000 kg	9650 kg	-350 kg	-3.63%
Sample job 3	6122 kg	5500 kg	-622 kg	-11.31%
Average variation between reported totals and disposal records of corresponding totals				**-14.11%**

Non-Compliant reporting accuracy margin of error

Part II: Comparing waste contractor's disposal dockets with waste processing facility records

- Compare the waste contractor's disposal docket weight totals for each sample job against the corresponding inbound waste dockets from the waste processing facilities for the sample jobs over the sample periods
- Record variations in the respective totals for each sampled job as a percentage of the difference to the total waste received as reported in the waste processing facilities records
- Average the percentages and state if the variation complies with the five per cent margin of error allowance. Where major discrepancies in the reporting arise (for example where waste processing facility records do not exist or cannot be obtained to support a waste contractor's docket) then the discrepant amount shall be carried forward as a whole and added to the totals component of the 'Kg variation in WC Dockets and WPF Records' column. This figure will be used in the percentage variation calculation for that sample job (see the example calculation for Sample Job 1 below for clarification)

Sample job 1	Sample period reported total waste disposed	Sample period disposal dockets totals	Variation in comparison of records	Percentage variation in total reported to docket records
Waste Processing Facility 1	1800 kg	1800 kg	0 kg	0%
Concrete & Brick Recycler	2950 kg	2950 kg	0 kg	0%
Waste Processing Facility 2	2800 kg	2800 kg	0 kg	0%
Back Yard Boys Waste Disposal	2616 kg	no record	-2616 kg	100%
Plasterboard Recycler	2000 kg	2000 kg	0 kg	0%
TOTAL DISPOSED	12166 kg	9550 kg	-2616 kg	-27.39%
Percentage variation between reported totals and disposal records of corresponding totals				**-27.39%**

Non-Compliant reporting issue! See guidance item Part II (b) for protocol

Non-Compliant reporting accuracy margin of error

Sample job 2	Sample period reported total waste disposed	Sample period disposal dockets totals	Variation in comparison of records	Percentage variation in total reported to docket records
Waste Processing Facility 1	2900 kg	2900 kg	0 kg	0%
Concrete Recycler	3000 kg	3000 kg	0 kg	0%
Waste Processing Facility 2	2850 kg	2500 kg	-350 kg	-14%
Metal Recycler	900 kg	900 kg	0 kg	0%
TOTAL DISPOSED	9650 kg	9300 kg	-350 kg	-3.76%
Percentage variation between reported totals and disposal records of corresponding totals				**-3.76%**

Compliant reporting accuracy margin of error

Sample job 3	Sample period reported total waste disposed	Sample period disposal dockets totals	Variation in comparison of records	Percentage variation in total reported to docket records
Waste Processing Facility 1	2000 kg	2000 kg	0 kg	0%
Concrete Recycler	600 kg	600 kg	0 kg	0%
Waste Processing Facility 2	2900 kg	2900 kg	0 kg	0%
TOTAL DISPOSED	**5500 kg**	**5500 kg**	**0 kg**	**0%**
Percentage variation between reported totals and disposal records of corresponding totals				**0%**

Compliant reporting accuracy margin of error

- Take the average percentage variations in reporting from each sample job and state whether or not the average variation of all sampled jobs complies with the five per cent margin of error allowance. This figure below determines the applicant's compliance with Part II of the criterion.

Sample job	Sample period reported total waste disposed	Sample period disposal dockets totals	Variation in comparison of records	Percentage variation in total reported to docket records
Sample Job 1	12166 kg	9550 kg	-2616 kg	-27.39%
Sample Job 2	10000 kg	9650 kg	-350 kg	-3.76%
Sample Job 3	5500 kg	5500 kg	0 kg	0%
Average variation between reported totals and disposal records of corresponding totals				**-10.38%**

Non-Compliant reporting accuracy margin of error

Summarising findings from reporting accuracy audit and awarding criterion compliance

In order to award compliance with the criterion, the average percentage variation findings for both Part I and Part II must be within the five per cent margin of error allowance.

In the example calculation, the applicant's records for the audited sample jobs and periods were found to exceed the five per cent error margin allowance. Therefore, in this example, the applicant is non-compliant with the criterion.

Part I	Part II
Average Percentage Variation in Reporting Accuracy between Customers' Waste Reports and Waste Contractor's Disposal Dockets	Average Percentage Variation in Reporting Waste Contractor's Disposal Dockets and Waste Processing Facility Receiving Records
-14.11%	-10.38%

Waste processing facilities

Criterion 1

For the purposes of Green Star Buildings, Responsible Construction - *Credit Achievement*, all requirements as per criterion 1 must be met. A disclosure statement **cannot** be used to demonstrate compliance with Responsible Construction - *Credit Achievement*

Aim

To ensure that waste processing facilities servicing Green projects are legitimately operating businesses that are recognised by the relevant regulatory authorities.

Requirements

Important Note:

- For the purposes of Green Star Buildings, Responsible Construction - *Credit Achievement*, all requirements as per criterion 1 must be met in full.
- A disclosure statement **cannot** be used to demonstrate compliance with Responsible Construction - *Credit Achievement.*

The waste processing facility must hold current licenses or development consent for the activities it undertakes (for example storage, handling, transfer or processing of construction and demolition waste) by the appropriate regulatory authorities. This may include approved Development Applications (DAs) and Environment Protection Agency licenses.

Interim measure

There are no interim measures available for this criterion.

Auditor verification guidance

Compliance should be verified by undertaking the following steps:

- Sight the facility's licenses or development consent approvals; and
- Confirm the development consent approval is current and conditions are complied with to the extent relevant to resource recovery.

Non-conformances for this criterion are not permitted. Corrective actions may be issued by the auditor but shall result in criterion non-compliance until the corrective action has been verified by the auditor.

In some areas specific licensing for the storage, handling, transfer and processing of construction and demolition waste may not be required. The auditor should seek independent confirmation that such licensing requirements do not exist.

Criterion 2

Aim

To ensure that waste processing facilities servicing Green Star building sites have the capacity to prepare accurate reports on the source and fate of all inbound waste received as well as all outbound waste diverted from and to landfill.

Requirements

Important Note:

- For the purposes of Green Star Buildings, Responsible Construction - *Credit Achievement*, all requirements as per criterion 2 must be met in full.
- A disclosure statement cannot be used to demonstrate compliance with Responsible Construction - *Credit Achievement.*

All of the following requirements to support auditable and accurate reporting systems must be met to comply with this criterion:

Requirement 1 - Clear separation of waste processing facility from landfill:

Waste processing facilities must operate as a separate facility to landfill. Where the waste processing facility is located on the same site as a landfill then access between the waste processing facility and landfill must be clearly separated (for example by controlled road access, fences or weighbridges). This separation ensures all waste input, as well as recyclables and residual waste outputs, are clearly traceable to and from the waste processing facility and reported separately from general solid waste landfill inputs not passing through the waste processing facility's resource recovery process.

Requirement 2 - Clear tracking system to separate residual waste from recyclables (weighbridge):

The waste processing facility must have at least one weighbridge to quantify and provide an auditable trail for weights of inbound waste as well as weights of outbound recyclables and residuals. If the waste processing facility is located on the same site as a landfill then it must have separate weighbridge receipts. If the auditor cannot verify to their satisfaction that there is clear separation of recycling from residual, compliance with this criterion cannot be awarded.

Requirement 3 - Certified weighbridge and operational procedures:

The waste processing facility must hold a current weighbridge maintenance certificate (certified annually) for the use of an appropriate weighbridge ensuring the weighbridge is fit for purpose and regularly maintained. The facility must also have weighbridge operational procedures in place to create and maintain weighbridge records on the following information for waste materials received, outgoing recyclables and residual waste:

- vehicle registration and date and time received;
- weight of vehicle and material incoming;
- source of material incoming (for example customer numbers);
- weight of vehicle and material outgoing;
- fate of material outgoing (by product type, including residual waste to energy recovery or landfill and the entity/customer removing it); and
- any rejected loads.

Requirement 4 -Source and fate of inbound and outbound waste:

The waste processing facilities must be able to account for the source of all inbound waste and fate of all outbound recyclables and residual waste.

Interim measure

Interim measure allowances are provided for Requirements 2 and 3 of Criterion Two, on the basis that they are major infrastructure and system requirements upon which all other subsequent reporting and performance measures associated with the reporting criteria rely.

Facilities that comply with Requirements 1 and 2, but not with Requirements 3 and 4 of Criteria Two could still provide services to Green Star projects during the interim period. Waste processing facilities failing to comply with Requirements 1 and 2 may implement corrective actions and undergo re-audits during the interim.

Please refer to the 'Interim Measure' section of this document for full details of what is required of the applicant and auditor to claim interim measure allowances.

Guidance

The key issue that this criterion attempts to address is assurance of a clear and quantifiable percentage of diversion of waste from landfill back to productive reuse. Paramount to this outcome is clear separation and accountability for the weights of outbound recyclables and residuals. The transparency of reports generated by a single weighbridge that is shared between a waste processing facility and landfill operation is questionable and difficult to audit thereby potentially compromising the accuracy of a waste processing facility's waste diversion rate claims.

Where a waste processing facility is located on a landfill site, best practice operation includes the separation of weighbridges and access points for the respective landfill and recycling facilities. However, there are operational protocols and computer systems that can be implemented to better control separation and produce separable weighbridge receipts from a single weighbridge that is shared between landfill and waste processing facilities.

Figure 1. below provides an illustrated example of best practice operation of a waste processing facility which operates on a landfill site, as well as the intent of this criterion's guidance on the source and fate of waste inputs and recycled/residual outputs described in the compliance requirements.

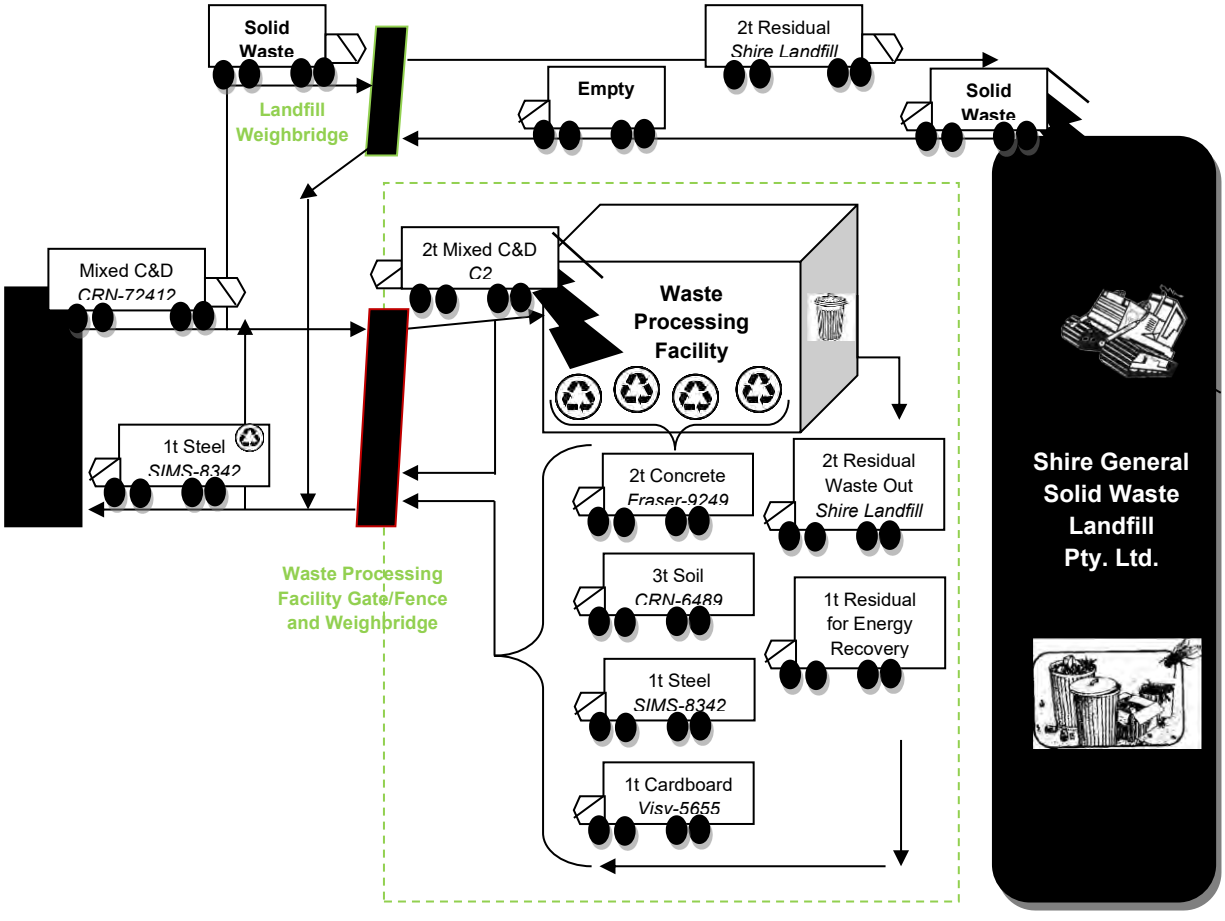


Figure 1. Separately operating waste processing facility on a shared landfill site with clear tracking of waste inputs and recycled / residual outputs by source and fate.

Auditor verification guidance

Compliance should be verified by undertaking the following steps (see notes on non-conformance allowances in 'Interim Measures' section):

- Ensure there is clear separation of waste processing facility from landfill:
  - Verify that the applicant waste processing facility operates as a 'separate facility' from adjacent landfill operations in accordance with the intent of Requirement 1 of Criterion Two.
- Ensure there is a clear tracking system to separate residual waste from recyclables (weighbridge):
  - To award compliance with this component of the criterion, the auditor must verify that there is clear separation of recycling from residual as follows:
    - Verify that the applicant has at least one weighbridge
    - Verify that the applicant is able to quantify and provide an auditable trail for weights of waste into as well as recyclables and residuals out of the waste processing facility
  - If the site includes a landfill, in addition to the above, the auditor must verify that the applicant has the capability to:
    - Produce separate weighbridge receipts for landfill and recycling operations by having separate weighbridges in place and in operation

      or
    - Effectively control the separation of recyclables and residual waste through existing operational protocols and technologies which enable the production of separate weighbridge receipts where a single weighbridge is shared between the waste processing facility and landfill
- Verify the certification of weighbridge and operational procedures:
  - Sight the applicant's weighbridge maintenance certificate(s)
  - Ensure that the certificate is current and valid and that there is evidence of annual maintenance certification
  - Verify that the applicant has weighbridge operational procedure(s) in place that address, at a minimum, the weighbridge operational procedures listed in Requirement 2 of Criterion Two
- Verify the Source and Fate of Inbound and Outbound Waste
  - Where applicants are awarded compliance with requirement of Requirement 3 of Criterion Two, then compliance with Requirement 4 of Criterion Two can be fulfilled on a deemed-to-satisfy basis at the auditor's discretion
  - Deemed-to-satisfy compliance shall be awarded on the basis that the weighbridge operational procedures outlined in Requirement 3 of Criterion Two establish sufficient record keeping protocols to facilitate the production of detailed reporting on the source and fate of the waste processing facilities' inbound and outbound waste. Where the auditor deems that this is not the case, they may issue corrective actions as they see fit to ensure that the intent of the criterion is satisfied.

Criterion 3

Aim

To encourage waste processing facilities that service Green Star building sites to provide independently verified publicly available reports on the percentages of gross waste diversion from landfill and residual waste committed to landfill on an annual basis.

Requirements

Important Note:

- For the purposes of Green Star Buildings, Responsible Construction - *Credit Achievement*, all requirements as per criterion 3 must be met in full.
- A disclosure statement cannot be used to demonstrate compliance with Responsible Construction - *Credit Achievement.*

Requirement 1

The waste processing facility must undergo an independent annual facility-wide audit to establish and verify its:

- Gross diversion rates of input waste from landfill
- Percentage of residual waste output that is committed to landfill

Requirement 2

The waste processing facility must make these performance figures publicly available or, at a minimum, make them easily available upon request from Green Star customers or waste contractors acting on behalf of Green Star projects.

Interim measure

An interim measure allowance is available for compliance Requirement 1 in this criterion, but only for reprocessing facility applicants (for example metal, concrete, paper and plastic recyclers). This interim measure is provided on the basis that some of these operators may not have sufficient systems in place to produce reliable waste balance reports because they have never before been required to generate such reports on a regular basis.

Where data or reporting procedures are insufficient to determine a reprocessing facility's annual percentage of residual waste output committed to landfill, then a default value of 50 per cent waste diversion to landfill may be awarded until the end of the interim period, or until the applicant can provide at least six months of operational waste balance data to the auditor for a re-audit of the criterion.

Please refer to the 'Interim Measures' section for full details of what is required of the applicant and auditor to claim this interim measure allowance.

Guidance

General note

This criterion directly supports Green Star 'Construction and Demolition Waste' credit submission claims by providing builders, head contractors and Green Star Accredited Professionals (GSAPs) with publicly available and independently verified data regarding the diversion rates and residual waste contributions to landfill from specific waste processing facilities.

Waste-to-Energy

Residual waste diverted from landfill for the purposes of energy recovery is a valid recycling pathway. However, for the purposes of these Reporting Criteria, a waste processing facility's diversion of waste for energy recovery is limited to 50 percent of the facility's total input.

This 50 percent cap is based on the GBCA's position that energy recovery from construction and demolition waste streams is not an acceptable substitution for recycling in its own right, but rather a complementary management solution for wastes that would

otherwise go to landfill. As a consequence, waste processing facilities that divert waste streams for the production of non-standard fuels for waste-to-energy purposes should not rely on this waste diversion pathway for the majority of their recycling output.

Figure 2. provides an example of residual waste diversion from landfill to illustrate the 30 per cent limit for waste-to-energy purposes described above.

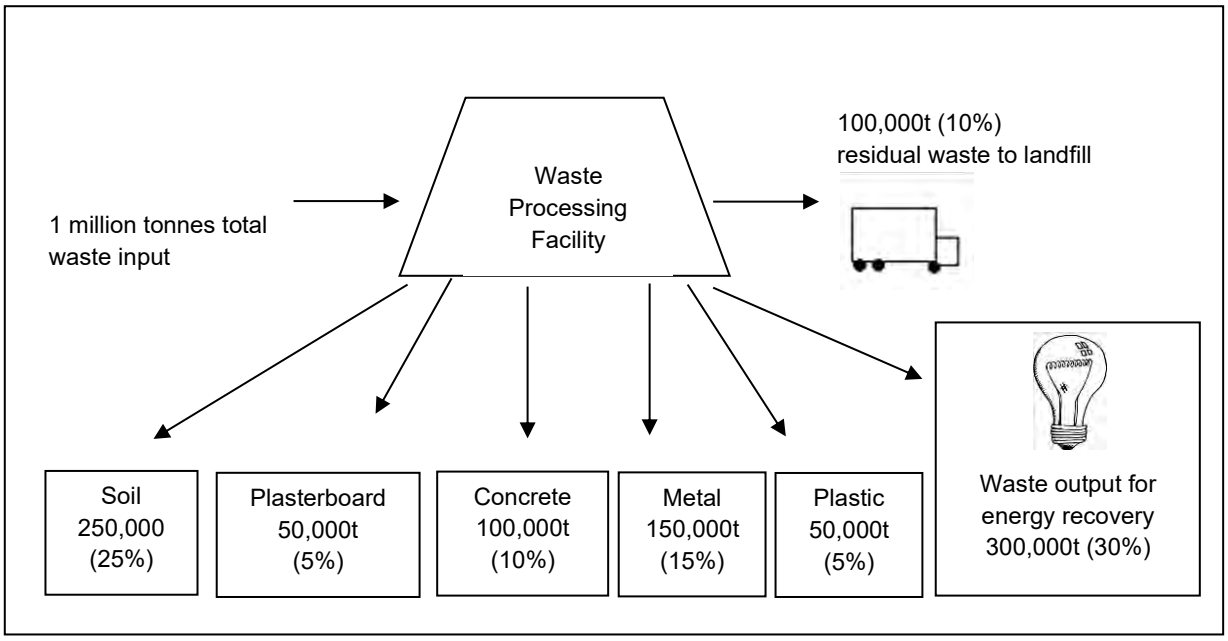


Figure 2: Example meeting the 50% Limit on Residual Waste Diversion for Waste to Energy Purposes

Auditor verification guidance

Auditors must determine a facility's annual gross diversion rate of input waste from landfill and annual percentage of residual waste output committed to landfill by examining the applicant's cumulative waste balance reports. Assess these reports by cross checking:

- The quantities of inbound material
- The quantities of recovered/reprocessed/recycled materials diverted from landfill
- The quantities of outbound residual waste sent to landfill

Compliance with this criterion cannot be awarded where insufficient data or reporting procedures exist to determine the facility's annual gross diversion rates of input waste from landfill and annual percentage of residual waste output committed to landfill.

Scheduled review of reporting criteria

The GBCA aims to review policy initiatives like the reporting criteria that support Green Star rating tools every 18-24 months. Such reviews typically take into consideration the uptake of the initiatives by the affected industries and seek to measure the benefits and costs to participating industries, GBCA members and Green Star users. These reviews aim to update criteria to improve their applicability towards best practice and usually involve the adjustment of criteria benchmarks.

Notice of Intent to Introduce ISO 14001 Certified Environmental Management Systems in Future Revision:

Future versions of these reporting criteria may include an additional requirement for waste processing facilities to hold current ISO 14001 certification for their environmental management system (EMS).

In the initial development of the reporting criteria the GBCA agreed to postpone the introduction of this criterion based on feedback from industry stakeholders asserting that this measure would prove too restrictive in the short term.

It is the intent of the GBCA to introduce ISO 14001 certification as a criterion in the reporting criteria when the criteria are next reviewed and updated. Waste processing facilities are therefore encouraged to plan for and implement ISO 14001 certified EMS in their operations as soon as possible.

Auditor competencies and responsibilities

Auditor qualifications

Verification of compliance with the Reporting Criteria must be carried out by Suitably Qualified Auditors who are engaged directly by the waste contractors and waste processing facilities (Applicants).

Suitably Qualified Auditor – refers to an auditor who has the relevant knowledge, skills and experience to provide advice to applicants on the issues addressed in these Reporting Criteria. It does not refer to 'Appointed Auditors' as defined under various State Environment Protection Acts. Auditors must be independent from and have no conflicts of interest with applicants (i.e. they must be an external, independent, third-party auditor). They must also provide evidence of their qualifications in one of the following ways:

- Certification
- Qualification statement

Certification

- The auditor must be an Exemplar Global Certified – Environmental Management System Auditor with 'Auditor Grade' status or above and hold current valid certification at the time of audit
- The auditor must be able to demonstrate a minimum of three years' experience in the waste management sector in a brief CV or have the '01. Environmental Management Audit' and '06. Waste Auditing' included in their Certification with Exemplar Global

Qualification statement

- The auditor must demonstrate their professional skills, knowledge and experience in waste management in a 'Qualifications Statement' that provides affirmative responses to all of the questions listed below.
- The auditors' responses to the following questions shall be used by the applicant and, in some cases Green Star Certified Assessors, to determine the suitability of their qualifications for the purposes of carrying out audits against the Reporting Criteria:
  - Knowledge: Can the person demonstrate they have relevant knowledge in waste management or environmental compliance auditing in a related field through the completion of a qualification? If no formal qualifications exist, can the person, through alternate means, establish that they understand the current state of knowledge on the criteria, best practice waste management principles and legislation?
  - Industry experience: Has the person worked in the waste management industry, with waste processing facilities of like size and structure or dealt with similar issues as those addressed in the criteria?
  - Professional activity: Can the person demonstrate recent professional activity in the field of waste management in which they intend to provide advice? How long has the person been professionally active?
  - Reputation: Is the person reputable and able to provide referees who can attest to the quality and utility of their work?
  - Professional association: Is the person a member of a professional association that relates to environmental or waste management, that requires the attainment and continuing development of knowledge, skills and experience?
  - Communication skills: Is the person able to explain to clients what they need to do to achieve compliance with the criteria and write reports that are easy to understand?
  - Legislative understanding: Is the person familiar with local waste legislation?

(Adapted from WorkSafe Victoria 2008)

Several items of feedback from the Construction and Demolition Waste Reference Group indicated concern over accepting non-RABQSA certified auditors, even those with significant demonstrated industry experience, to undertake audits for applicants. These concerns centre around the lack of accountability (to a professional body like RABQSA) of uncertified auditors in the instance of unethical behaviour, and the greater potential for fraudulent outcomes that might result.

Conflicts of interest

The auditor must have no conflicts of interest with applicant companies. Any issues that may be construed as a potential conflict of interest must be disclosed in the audit report and Compliance Verification Summary. An explanation must also be provided that clearly demonstrates the independence of the services provided by the auditor for the compliance verification job.

Previous and existing independent external auditing business relationships (i.e. ISO 14001 auditing and certification services) are not regarded as a conflict of interest, however, the auditor must disclose all such auditing relationships in the Compliance Verification Summary.

Compliance verification summary

The Compliance Verification Summary is the auditor's primary deliverable to the applicant. This document is issued by a Suitably Qualified Auditor and verifies and summarises the applicant waste contractor or waste processing facility's compliance with these Reporting Criteria. It is valid for 12 months from the date of issue and must be current for the duration of the time that the applicant provides waste services and waste reports to a Green Star project. Compliance Verification Summaries must:

- State the applicant's compliance or non-conformance with each of the criteria
- Provide a summary of the corrective action(s) required of the applicant in cases where non-conformance is identified
- Be signed and dated by the auditor
- Include a copy of the auditor's exemplar global certification and cv or qualification statement

Applicant's responsibilities

Appointing an auditor

It is the responsibility of the applicant to ensure that the auditor they appoint complies with the definition of Suitably Qualified Auditor, as provided in the 'Auditor Qualifications' section above.

Prior to appointing an auditor, the applicant should obtain a copy of the auditor's certification and brief CV demonstrating that individual's experience in the waste sector, or Qualification Statement, and make an assessment of the auditor's qualifications against the Auditor Competency and Responsibilities requirements.

Auditors must be given access to any records, facilities and staff that they deem necessary to carry out the audit and audits must be conducted at every 12 months as a minimum.

It is appropriate to ensure relevant auditor competencies via clauses in waste contracts.

Waste contractor responsibility

Waste contractors hired to provide waste management and reporting services to a Green Star project must provide the head contractor or Green Star consultant with a copy of their Compliance Verification Summary. They must also ensure that the waste processing facilities they plan to use for disposal of the construction and demolition waste from the Green Star building's construction site hold current valid Compliance Verification Summaries.

The GBCA recommends that waste contractors keep a record of all Compliance Verification Summaries from all waste processing facilities used for the Green Star project they are engaged to service and that these records are provided to the head contractor or Green Star consultant as early as possible after engagement by the project.

Compliance Verification Summaries will be used by Green Star project teams, along with regular waste reports from the waste contractor, as supporting evidence for the project's 'Construction and Demolition Waste' credit claim. Only waste reports generated by compliant waste contractors and waste processing facilities will be accepted.

GBCA involvement with auditor selection or audit process

In order to maintain transparency, the GBCA will not provide confirmation that an auditor is suitably qualified. The GBCA must have no direct involvement in the auditing process against the reporting criteria.

Responsibility of applicant and green star building contractor / green star consultant

During the assessment of a Green Star building's 'Construction and Demolition Waste' credit, Green Star Certified Assessors will review the auditors' qualifications as attached to the applicants' Compliance Verification Summaries in order to confirm that they meet the definition of Suitably Qualified Auditor.

Appendix D

DRP Response on Sustainability – including Greenstar Submission Planner

HESPERIA

Memorandum

Response to DRP Comments – Lot 119 & 808

Project	Hazelmere
Regarding	Hazelmere Interchange – Lot 119 & 808 Development Application
To	City of Swan Design Review Panel
From	Tristan Curthoys – Sustainability Advisor – Hesperia Sustainability Group
Date	24 September 2024

1. Design Review Panel Response

1.1 Summary

This document has been prepared in response to the Design Review Panel (DRP) comments for the Development Application for Lot 119 & 808 at Hazelmere Interchange. The overarching comment noted from the DRP refers to the desire for a more detailed sustainability report to support the Development Application. Whilst Hesperia would be content to share this, it is however not the appropriate time to provide a detailed report speaking to the sustainability credentials of the building. At this stage of the project, only a concept design has been developed to support the Development Application, with detailed design to progress subject to Development Approval. It is in this phase that details around the sustainability credentials of the building can be reported on, including for example modelled reductions in upfront carbon, energy use, and water use.

Hesperia however, would like to provide greater confidence that the intent communicated in the Development Application will be delivered upon. Hesperia is responsible for achieving the first two 6 Star Green Star Design & As-built certifications for industrial buildings in WA. Moreover, Hesperia has registered Lot 1499 at Hazelmere Interchange to achieve a 5 Star Green Star Buildings certification, which may be the first industrial Green Star Buildings rating in WA (practical completion was recently achieved). To communicate greater detail as to what the Green Star submission for Lot 119 & 808 will likely include, an attachment has been provided (Section 2). Within this submission planner, 39 of the 35 points are targeted, however an additional 7 points will be targeted via Green Star credits specific to industrial projects, which include signing a 'Green Lease' agreement with the tenant for 100% of their energy needs to be met by renewable sources.

1.2 Specific Response to DRP Comments

DRP Comment	Hesperia Response
Back up intent with a more detailed sustainability report	This document has been prepared in response to this comment. A detailed sustainability report can not be provided until further design work is undertaken (e.g. energy and daylight modelling) to provide specific parameters.
The dark façade material to the office will have a high solar absorbency reducing the thermal efficiency of the building	Whilst solar absorbency is a factor determining the overall thermal efficiency of the building, it is not the most important factor. Insulation will have a greater bearing on the thermal efficiency of the office. The building will also be designed to achieve a 20% improvement in energy efficiency beyond NCC Code requirements, this will require high performance insulation, glass and frames to be used to improve thermal efficiency. Another consideration with having a lighter material for the facade, is excessive glare directed towards the carpark, which is an undesirable outcome.
Consider optimising stormwater harvesting from such large roof area	As the rainwater tank will only be used for toilet flushing (as rainwater use for irrigation is not optimal in WA due to rainfall patterns), the size of the rainwater tank is considered optimal for the highest value use. However, the size of the rainwater tank will be optimised further in detailed design.

DRP Comment	Hesperia Response
Review whether 10% translucency is sufficient	10% is considered sufficient at this stage of design to achieve an optimal balance between natural daylight and thermal efficiency of the building.
Provide solar penetration and natural ventilation diagrams to support the design intent	Solar penetration will be modelled using a daylight model during detailed design. A natural ventilation diagram has been provided in Section 2.
Provide ventilation to purge heat from ceiling voids in the office space	The building will be designed to achieve a 20% improvement in energy efficiency beyond NCC 2022 Code requirements, this will include optimisation of heating and cooling ventilation, and façade.
Review materials for embodied energy	The building will achieve a minimum 20% reduction in upfront carbon, which will involve selection of low carbon materials.
Utilise LCC and green asphalt to reduce embodied energy	The building will achieve a minimum 20% reduction in upfront carbon, which will involve selection of low carbon materials.
Utilise design initiative over off-setting to reduce the carbon footprint	The advantage of offsetting all upfront carbon is placing a price on carbon for the project, which becomes an important consideration in value engineering. A minimum 20% reduction in upfront carbon will also be achieved for the project.
Consider how the Vale noise wall could incorporate recycled material	This will be reviewed as part of the process to achieve a minimum 20% reduction in upfront carbon.
Review the shade devices on the office to ensure winter sun access and summer shade	An energy model will be developed during detailed design which will inform the optimal size of the shade devices in the office to ensure winter solar access and summer shade.

Tristan Curthoys – Sustainable Projects Lead

Mark Taylor – Sustainability Manager

2. Attachments

Hazelmere Interchange – Lot 119 & 808 Likely Green Star submission

Natural Ventilation Diagram – Lot 119 & 808

greenstar Buildings

Submission planner

Summary

Climate Positive Pathway

Registering from / certified	2023 onwards	Desired Green Star rating	5 Star

Green Star rating

Core points targeted	38	Minimum expectations met	Yes
Leadership points targeted	1	Green Star rating targeted	5 Star
Total points targeted	39	Climate Positive Pathway met	Yes

	Credit	Minimum Expectation	Credit Achievement	Exceptional Performance	Total points available	Targeted performance level	Total points targeted	Comments
Responsible					**17**			
1	Industry Development		1		**1**	Credit Achievement	**1**	
2	Responsible Construction	•	1		**1**	Credit Achievement	**1**	
3	Verification and Handover	•	1		**1**	Credit Achievement	**1**	The Builder is required to appoint a qualified Independent Commisioning Agent.
4	Operational Waste	•			**0**	Minimum Expectation	•	
5	Responsible Procurement		1		**1**	Credit Achievement	**1**	The Principle runs a workshop with the Builder and documents the outcomes in a project specific Responsible Procurement Plan, with specific outcomes listed in the Builder requirements.
6	Responsible Structure		3	2	**5**	Credit Achievement	**3**	Concrete will likely be 'low carbon' and sourced from suppliers like Boral and Holcim, who have the required certifications to achieve this credit.
7	Responsible Envelope		2	2	**4**		**0**	
8	Responsible Systems		1	1	**2**		**0**	
9	Responsible Finishes		1	1	**2**	Credit Achievement	**1**	
						Total	**8**	
Healthy					**14**			
10	Clean Air	•	2		**2**	Minimum Expectation	•	
11	Light Quality	•	2	2	**4**	Credit Achievement	**2**	
12	Acoustic Comfort	•	2		**2**	Credit Achievement	**2**	
13	Exposure to Toxins	•	2		**2**	Credit Achievement	**2**	
14	Amenity and Comfort		2		**2**		**0**	
15	Connection to Nature		1	1	**2**		**0**	
						Total	**6**	
Resilient					**8**			
16	Climate Change Resilience	•	1		**1**	Credit Achievement	**1**	The Principle runs a workshop with the Builder and documents the outcomes in a project specific Climate Change Risk & Adpatation Assessment, with specific outcomes listed in the Builder requirements.
17	Operations Resilience		2		**2**	Credit Achievement	**2**	
18	Community Resilience		1		**1**		**0**	
19	Heat Resilience		1		**1**		**0**	
20	Grid Resilience		3		**3**		**0**	
						Total	**3**	
Positive					**30**			
21	Upfront Carbon Emissions	•	3	3	**6**	Credit Achievement	**3**	The Builder is required to provide the top five most carbon intensive materials and provide modelling demonstrating how a 20% reduction in upfront carbon compared to an NCC compliant building will be achieved.
22	Energy Use	•	3	3	**6**	Credit Achievement	**3**	
23	Energy Source	•	3	3	**6**	Exceptional Performance	**6**	The Principle has agreed with the tenant for 100% of their electricity to be procured as Green Power.
24	Other Carbon Emissions		2	2	**4**	Exceptional Performance	**4**	The Principle will offset 100% of residual upfront carbon.
25	Water Use	•	3	3	**6**	Credit Achievement	**3**	
26	Life Cycle Impacts		2		**2**	Credit Achievement	**2**	
						Total	**21**	
Places					**8**			
27	Movement and Place	•	3		**3**	Minimum Expectation	•	
28	Enjoyable Places		2		**2**		**0**	
29	Contribution to Place		2		**2**		**0**	
30	Culture, Heritage and Identity		1		**1**		**0**	
						Total	**0**	
People					**9**			
31	Inclusive Construction Practices	•	1		**1**	Minimum Expectation	•	
32	Indigenous Inclusion		2		**2**		**0**	
33	Procurement and Workforce Inclusion		2	1	**3**		**0**	
34	Design for Inclusion		2	1	**3**		**0**	
						Total	**0**	
Nature					**14**			
35	Impacts to Nature	•	2		**2**	Minimum Expectation	•	
36	Biodiversity Enhancement		2	2	**4**		**0**	
37	Nature Connectivity		2		**2**		**0**	
38	Nature Stewardship		2		**2**		**0**	
39	Waterway Protection		2	2	**4**		**0**	
						Total	**0**	
Leadership					**0**			
40	Market Transformation				**0**		**0**	
41	Leadership Challenges				**0**		**1**	
						Total	**1**	

FOR DEVELOPMENT APPLICATION ONLY
SUBJECT TO STATUTORY APPROVAL

DEVELOPMENT SUMMARY

SITE AREA	78,702	sqm. approx.
Total Drainage Basin & Swale Area	3,844	sqm. approx.
Total Dry Landscape Area	4,491	sqm. approx.
Total Pedestrian & Outdoor Paving Area	510	sqm. approx.
Net Developable Site Area	69,857	sqm. approx.
Warehouse 1 (Incl. Cold Room)	22,330	sqm.
Main Office 1 (2 Levels)	1,000	sqm.
Dock Office 1	100	sqm.
Plant Room	35	sqm.
Warehouse 2	14,940	sqm.
Dock Office 2	100	sqm.
TOTAL BUILDING AREA	38,505	sqm.
Total Heavy Duty Paving Area (Concrete)	15,380	sqm. approx.
Total Dedicated Heavy Duty Hardstand Area (Concrete)	11,900	sqm. approx.
Total Light Duty Paving Area	4,470	sqm. approx.
Total Cantilever Awning Area (3m)	360	sqm. approx.
Total Super Awning Area (36m)	4,480	sqm. approx.
Total Cantilever Awning Area (2m)	240	sqm. approx.
Total Car Parking Provided	169	spaces

EXTENT OF HEAVY DUTY PAVING AREA

EXTENT OF HEAVY DUTY DEDICATED CONCRETE HARDSTAND

EXTENT OF LIGHT DUTY PAVING AREA (RED ASPHALT)

EXTENT OF LANDSCAPE AREA

EXTENT OF AWNING AREA

EXTENT OF DRAINAGE BASING & SWALE AREA

TREE WELL AT 2.3m x 1.75m (250mm CONCRETE FLUSH KERB) TO BE PROVIDED TO CARPARKING

FENCING

EXTENT OF NOISE FENCE

KS — KERB STOP

EXISTING PRIVATE SEWER RISING MAIN TO BE RELOCATED

FUTURE PATH BY CITY OF SWAN

ESTATE SIGNAGE

CROSS VENTILATION

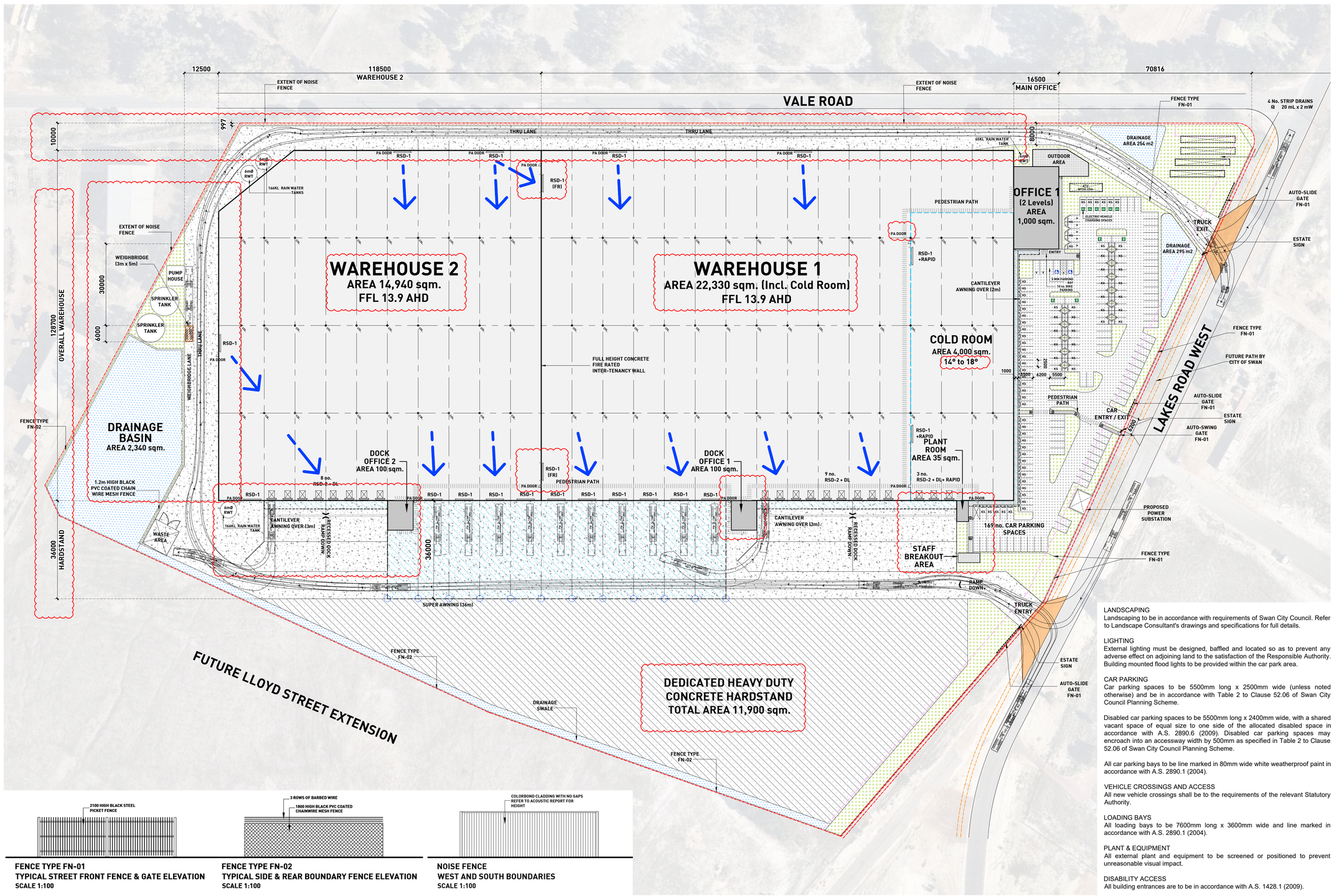
RSD-1 — ROLLER SHUTTER DOOR 6mW x 6mH

RSD-1 +RAPID — ROLLER SHUTTER DOOR 6mW x 6mH + SAME SIZE RAPID ROLL DOOR

RSD-1 (FR) — 2 HOUR FIRE RATED ROLLER SHUTTER DOOR 6mW x 6mH

RSD-2+DL — ROLLER SHUTTER DOOR 3.050mW x 3.3mH + DOCK LEVELLER

RSD-2+DL +RAPID — ROLLER SHUTTER DOOR 2.7mW x 3.3mH + DOCK LEVELLER + SAME SIZE RAPID ROLL DOOR



FENCE TYPE FN-01
TYPICAL STREET FRONT FENCE & GATE ELEVATION
SCALE 1:100

FENCE TYPE FN-02
TYPICAL SIDE & REAR BOUNDARY FENCE ELEVATION
SCALE 1:100

NOISE FENCE
WEST AND SOUTH BOUNDARIES
SCALE 1:100

LANDSCAPING
Landscaping to be in accordance with requirements of Swan City Council. Refer to Landscape Consultant's drawings and specifications for full details.

LIGHTING
External lighting must be designed, baffled and located so as to prevent any adverse effect on adjoining land to the satisfaction of the Responsible Authority. Building mounted flood lights to be provided within the car park area.

CAR PARKING
Car parking spaces to be 5500mm long x 2500mm wide (unless noted otherwise) and be in accordance with Table 2 to Clause 52.06 of Swan City Council Planning Scheme.

Disabled car parking spaces to be 5500mm long x 2400mm wide, with a shared vacant space of equal size to one side of the allocated disabled space in accordance with A.S. 2890.6 (2009). Disabled car parking spaces may encroach into an accessway width by 500mm as specified in Table 2 to Clause 52.06 of Swan City Council Planning Scheme.

All car parking bays to be line marked in 80mm wide white weatherproof paint in accordance with A.S. 2890.1 (2004).

VEHICLE CROSSINGS AND ACCESS
All new vehicle crossings shall be to the requirements of the relevant Statutory Authority.

LOADING BAYS
All loading bays to be 7600mm long x 3600mm wide and line marked in accordance with A.S. 2890.1 (2004).

PLANT & EQUIPMENT
All external plant and equipment to be screened or positioned to prevent unreasonable visual impact.

DISABILITY ACCESS
All building entrances are to be in accordance with A.S. 1428.1 (2009).

NOTE:

- This concept plan is intended for Development Application purposes only. All setbacks, site coverage, car parking numbers, landscape areas and the like are subject to statutory approval.
- No assurance is given as to the features, attributes, feasibility or accuracy of anything shown on or disclosed in this plan.
- All existing & proposed features, dimensions, areas and boundaries are approximate only and subject to verification via detailed site survey by licensed surveyor.

CLIENT:
HESPERIA

concept
Suite 307
546 Collins Street
Melbourne VIC 3000
t: (03) 9978 9888
e: architect@concepty.com.au

PROPOSED DEVELOPMENT

LOTS 119 & 808, LAKES ROAD, HAZELMERE WA

SITE PLAN

DRAWING TYPE: DEVELOPMENT APPLICATION
DRAWING NUMBER: 2411-169-DA-021
REVISION: H
DATE: 23.09.2024
SCALE: 1:700 @ A1 / 1:1400 @ A3
0 35 70
SCALE BAR @ A1

Appendix E

Response to DRP – Sustainability Strategy

Sustainability Strategy – Response to DRP

To	City of Swan and Design Review Panel
From	Hesperia on behalf of the Landowner
Re.	Warehouse and Incidental Office – Lots 119 & 808 Lakes Road, Hazelmere
Date	7 November 2024

Sustainability Strategy Commitments

The Applicant has made the following **commitments** to the DRP:

- **Formal 5-Star Green Star Certification** under Green Building Council of Australia (GBCA)
- **500kW Peak Solar PV** offsetting more than 200 tonnes of CO_2 annually
- **Upfront Net Zero**, 100% offset of construction and building works.
- **Operational Net Zero Energy**, 100% Green Power procurement for operational energy
- **Non-Potable Water** and dual flush for warehouses
- **Electric Vehicle Chargers**, 10 bays initially with provision for expansion

The Proposed Development is a purpose-built facility for a NASDAQ-listed global logistics company. The Applicant will be **legally and commercially** bound to achieve these commitments, through the Agreements for Lease with the Tenant. An excerpt of this agreement has been provided as **Attachment 2**.

The Applicant has already tendered the Proposed Development to a panel of four contractors. The Sustainability Annexure is included as a part of the tender package. All Contractors are required to achieve the specifications within the Sustainability **Attachment 3**. Upon Contract Award this annexure will form part of the Build Contract and will be **legally and commercially** binding.

Several of the Applicant's commitments relating to the Proposed Development are **publicly available online:**

- Refer to 2.3 Hesperia Project and Property Map of the FY23 Sustainability Performance Report. Available to view here.
- Refer to Hazelmere Interchange Website. Available to view here.

In summary:

- The Applicant is committed to the Sustainability Strategy provided to the DRP.
- The Applicant will be legally and commercially bound to these commitments by the Tenant.
- The Builder will be legally and commercially bound to construct Proposed Development in accordance with these commitments.
- The Applicant has publicly committed to key sustainability commitments, making it crucial to deliver on them as any failure to do so would significantly impact their reputation.

Green Star Certification

Third party certification is the most effective means to provide validation that sustainability initiatives have truly been implemented on projects and have led to improved outcomes.

Buildings cannot achieve a 5-Star Green Star rating unless the below is implemented and independently validated by the GBCA. Given the Applicant has committed to 5-Star Green Star to the DRP, it has by extension committed to all the items listed below. Below are examples of the bare-minimum requirements for 5-Star Green Star.

- Energy Use
  - The building's energy use is at least 20% less than a reference building.
- Upfront Carbon Emissions
  - The building's upfront carbon emissions are at least 20% less than those of a reference building.
- Energy Source
  - 100% of the building's energy comes from renewables.
- Credit 24 – Other Carbon Emissions
  - All emissions from refrigerants are offset.
- Credit 11 – Light Quality
  - The development shall offer excellent lighting levels suitable for the typical tasks in each space are available while providing ample levels of daylight while minimising glare.
- Credit 12 – Acoustic Comfort
  - The development shall implement an Acoustic Comfort Strategy which facilitates the quiet enjoyment of spaces, enhances the functional use of spaces, aids in minimising intrusive levels of noise and noise transfer while enhancing privacy.
- Credit 2 – Responsible Construction
  - Divert at least 80% of construction & demolition waste from landfill.

Green Star Certification Process & Timeline

1. Full Circle Design Services (FCDS) has already completed a draft certification pathway. This has been provided to the DRP.
2. Registration for the project will be undertaken once the Design & Construct (D&C) Contractor is appointed and the design begins to process.
3. Prior to construction, documentation will be assessed by FCDS for compliance in preparation for the GBCA Design Review. Energy and life cycle modelling will be complete 2-3 months after construction commencement.
4. Round 1 Design Reviews will commence with GBCA 3-4 months after construction commencement.
5. As Built Submission will be complete 2-3 months after practical completion.
6. Formal Certification is awarded 6-12 months after practical completion.

Track Record of Performance

The Applicant is committed to achieving 5 Star Green Star for all buildings and 6 Leaf EnviroDevelopment for all land development. These certifications recognise projects for achieving Australian excellence in embedding sustainability into project delivery.

The Applicant is consistently achieving these certifications, including:

- EnviroDevelopment
  - Hazelmere Interchange [6 Leaf]
  - Rivermark [6 Leaf]
- Green Star
  - Sandvik [6 Star, first industrial building in WA to achieve 6 Stars]
  - Silk K2 [6 Star, second industrial building in WA to achieve 6 Stars]
  - Murdoch Square [6 Star Design Review, pending final certification]
  - 140 & 160 Adelaide Street, Hazelmere [5 Star Green Star registered, pending final certification]
  - Orthonova Orthopaedic Hospital [5 Star Green Star registered, pending final certification]

We are committed to measuring and reporting on the implementation of our Sustainability Strategy annually with our Sustainability Performance Report. The report includes annual disclosure of our performance across operations and projects against sustainability metrics which were defined according to our ESG focus areas.

Our FY22 and FY23 reports are publicly available on our website.

Public Commitments

The Applicant has committed to:

- Certified B Corporation (re-certified in 2024).
- Certified Carbon Neutral by Climate Active for our operations.
- Signatory of the World Green Building Council's Net Zero Carbon Buildings Commitment, where we are required to annually disclose our carbon emissions from construction and operations across our portfolio.
- Reconciliation Action Plan endorsed by Reconciliation Australia.

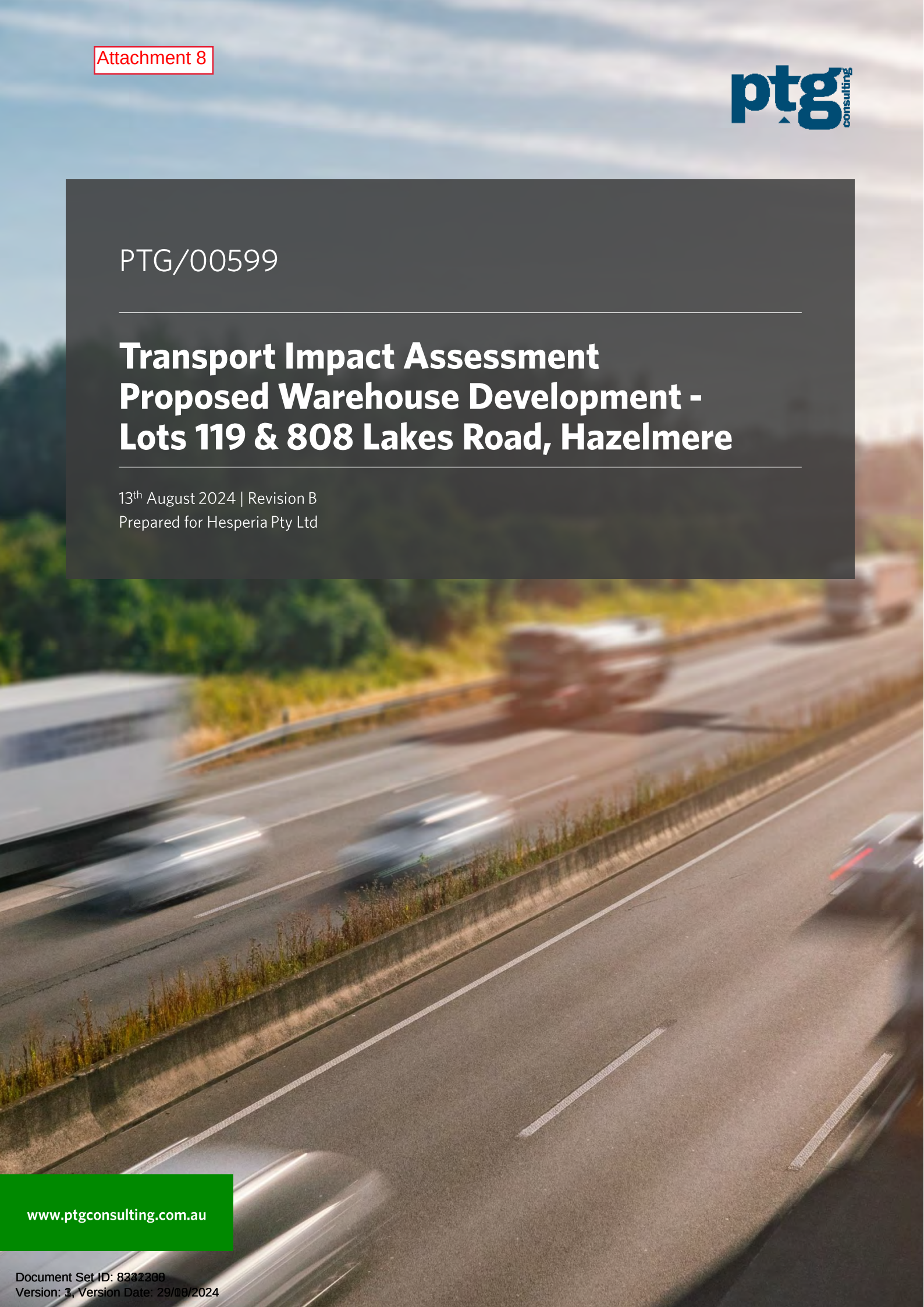
Attachment 8

PTG/00599

Transport Impact Assessment Proposed Warehouse Development - Lots 119 & 808 Lakes Road, Hazelmere

13th August 2024 | Revision B

Prepared for Hesperia Pty Ltd



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CONTENTS

CONTENTS

REPORT DETAILS

Unique Document Identification

Document Title	Transport Impact Assessment – Lots 119 & 808 Lakes Road, Hazelmere
Project Number	PTG/00599
Document ID	Rev B
Client	Hesperia Pty Ltd

PTG Consulting Office Details

Location	Perth, WA
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Revision Details

Revision No.	Date	Comments	Prepared By	Approved By
A	09/08/2024	Draft	EH	SGL
B	13/08/2024	Final	EH	SGL

1 INTRODUCTION

1.1 Background

PTG Consulting WA (PTG) has been commissioned by Hesperia Pty Ltd ('the Client') to prepare a Transport Impact Assessment (TIA) for a proposed warehouse development located at Lots 119 & 808 Lakes Road, Hazelmere within the City of Swan.

This report aims to assess the impact of the development on the adjacent road network. The report will focus on traffic operations, circulation, and car parking requirements.

This TIA has been prepared in accordance with the Western Australian Planning Commission (WAPC) Transport Impact Assessment Guidelines for Developments: Volume 4 – Individual Developments (2016). A copy of the checklist is included at Appendix A.

2 EXISTING SITUATION

2.1 Existing Site Use

The Site is located at Lots 119 & 808 Lakes Road, Hazelmere, City of Swan. **Figure 1** shows the location of the proposed warehouse development.

The Site is bounded by Lakes Road to the north, Vale Road to the west and other general industrial businesses to the east and south.

The Site **was until recently used by the Metronet** as a laydown/hardstand area for bridge beams required for major construction projects.

Figure 1 – Site Location

Source: Nearmap

2.2 Existing Parking and Demand

The Site is currently used as a laydown/hardstand area for bridge beams, generating minimal demand for vehicle parking.

2.3 Existing Access Arrangements

The site currently has two unsealed crossovers to Lakes Road as shown on **Figure 2** below.

Figure 2 – Existing Access Arrangement

Source: Nearmap

2.4 Existing Site Traffic

The Site is currently used as a laydown/hardstand area for bridge beams, generating minimal traffic movements.

2.5 Existing Road Network and Traffic Management

Road Classifications are defined in the Main Roads Functional Hierarchy as follows:

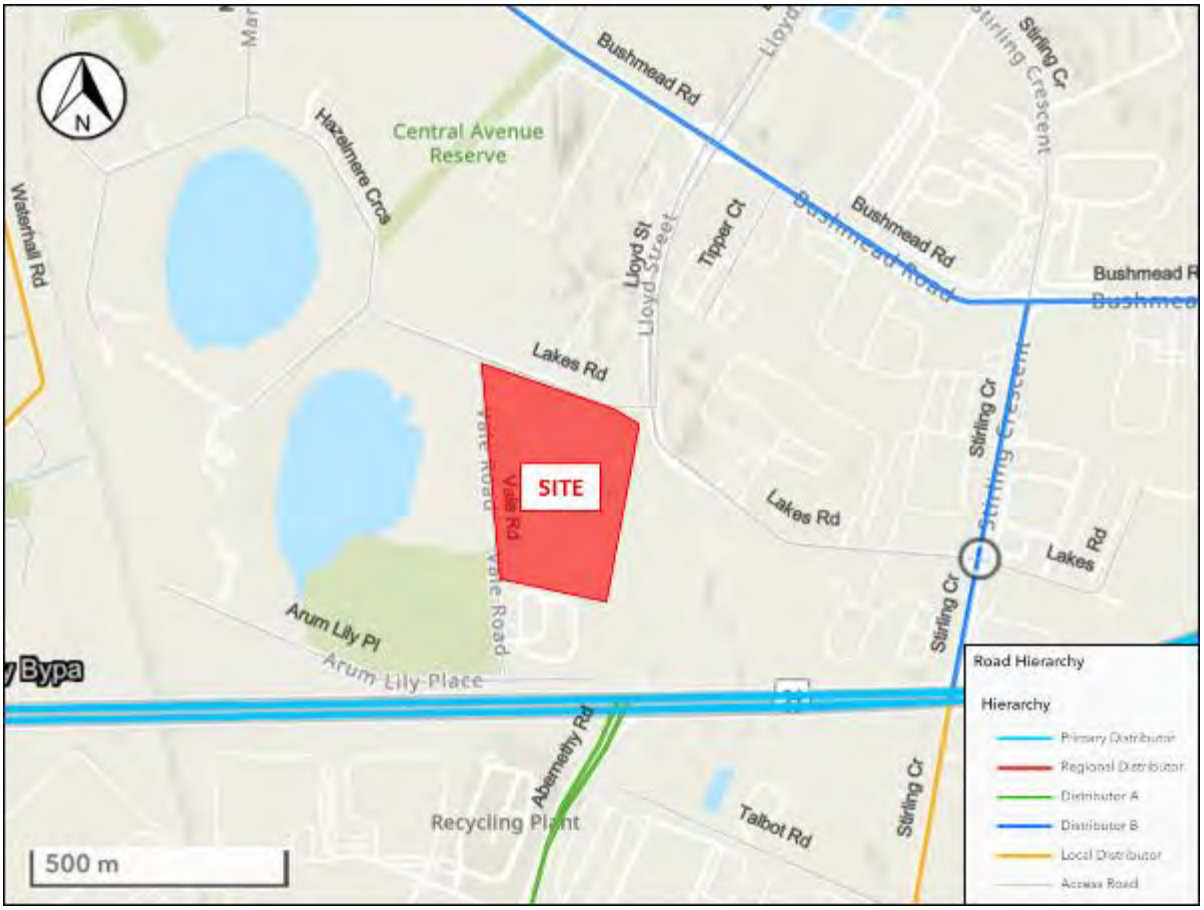
- **Primary Distributors (light blue):** Form the regional and inter-regional grid of Main Roads WA traffic routes and carry large volumes of fast-moving traffic. Some are strategic freight routes, and all are National or State roads. Primary Distributors are managed by Main Roads Western Australia.
- **Regional Distributors (red):** Roads that are not Primary Distributors but link significant destinations and are designed for efficient movement of people and goods within and beyond regional areas and are managed by the Local Government.
- **District Distributor A (green):** These carry traffic between industrial, commercial, and residential areas and connect to Primary Distributors. These are likely to be truck routes and provide only limited access to adjoining properties and are managed by the Local Government.
- **District Distributor B (dark blue):** Perform a similar function to District Distributor A but with reduced capacity due to flow restrictions from access to and roadside parking alongside adjoining property.

These are often older roads with traffic demand in excess of that originally intended. **District Distributor A and B roads** run between land-use cells and not through them, forming a grid that would ideally be around 1.5 kilometres apart and are managed by the Local Government.

- **Local Distributors (orange):** Carry traffic within a cell and link District Distributors at the boundary to access roads. The route of the Local Distributor discourages through traffic so that the cell formed by the grid of District Distributors only carries traffic belonging to or serving the area. These roads should accommodate buses but discourage trucks and are managed by the Local Government
- **Access Roads (grey):** Provide access to abutting properties with amenity, safety and aesthetic aspects having priority over the vehicle movement function. These roads are bicycle and pedestrian-friendly and are managed by the Local Government.

Figure 3 shows the surrounding area road hierarchy and the characteristics of the surrounding road network are discussed in **Table 1**.

Figure 3 – Road Hierarchy



Source: Main Roads WA ***Road Information Mapping System***

Table 1 – Road Network Classification

Road Name	Hierarchy	Jurisdiction	No. of Lanes	No. of Footpaths	Width (m)	Speed Limit (km/h)
Lakes Road	Access Road	Local Government	2	0	6.0	50

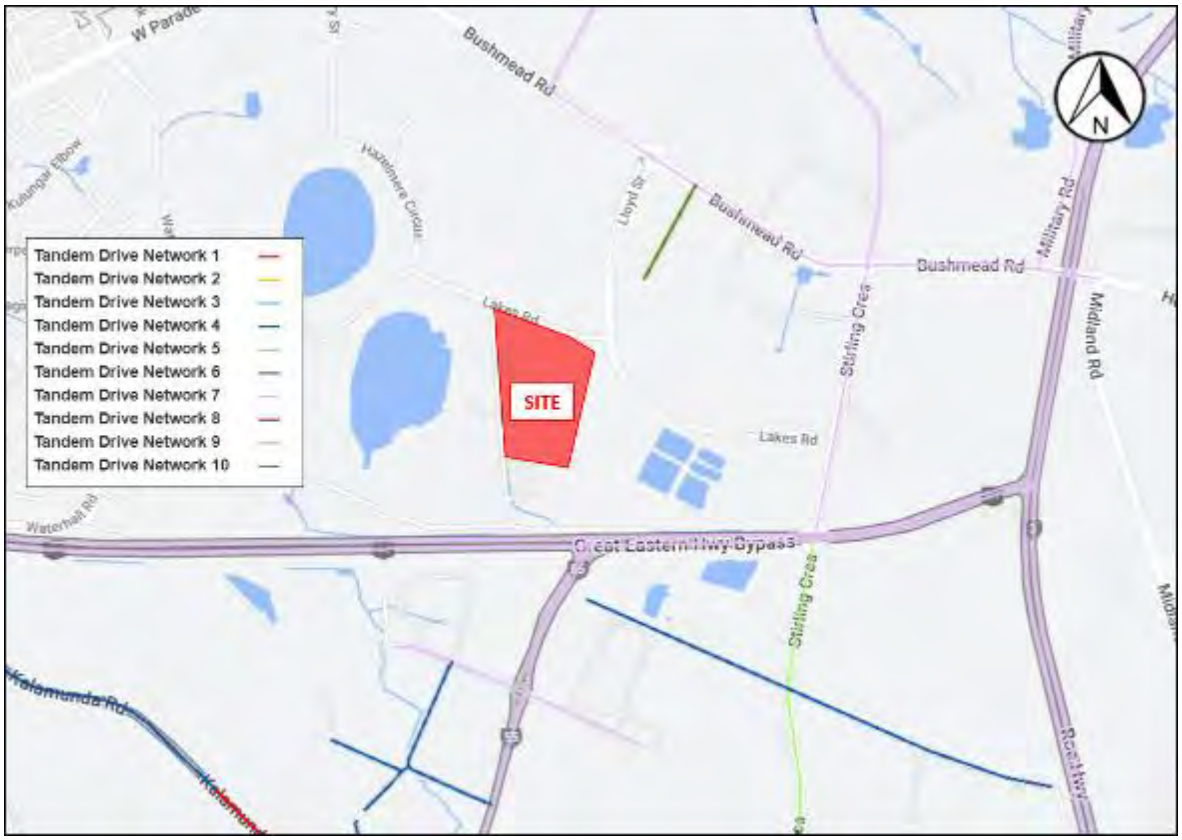
Vale Road	Access Road	Local Government	2	0	~5.8	50

2.6 Existing Restricted Access Vehicle (RAV) Network

The existing RAV network is shown in **Figure 4**. Both frontage roads (Vale Road and Lakes Road) are currently not part of the RAV network. However, there are several roads within the surrounding area such as Great Eastern Highway Bypass, Stirling Crescent and Bushmead Road which are classified for RAV 7 access.

"The proponent intends to independently seek approval from MRWA to extend the RAV4 network to include the portion of Lakes Road fronting the site and for a portion of Lloyd Street"

Figure 4 – Existing RAV Network



Source: HVS Network Map – Main Roads WA

2.7 Traffic Flows on Surrounding Roads and Intersection

Daily traffic volumes were obtained from the Main Roads WA's Traffic Map database and the City of Kalamunda. These are summarised and presented in **Table 2**.

Table 2 – Existing Traffic Volumes

Road Name	Date	Source	AM Peak	PM Peak	Average Daily Traffic Volume (vpd)
Great Eastern Highway Bypass *West of Stirling Crescent*	2021/22	Main Roads WA	1,617	1,984	23,800 (HV – 18.6%)
Stirling Crescent *North of Great Eastern Highway Bypass*	2021/22	Main Roads WA	861	1,078	13,116 (HV – 25.5%)
Lloyd Street *South of Bushmead Road*	2022	Main Roads WA	40	47	517 (HV - 17.8%)
Bushmead Road *East of Lloyd Street*	2022	Main Roads WA	636	701	7,129 (HV – 11.6%)

2.8 Operation of Surrounding Intersections

The current operation of surrounding intersections has not been assessed as part of this TIA. Existing traffic volumes along Lloyd Street and Lakes Road are very low and no current capacity or operational issues are likely within the vicinity of the Site.

2.9 Existing Pedestrian / Cycle Networks

Figure 5 shows the walking and cycling infrastructure within the surrounding area of the Site. Lakes Road and Vale Road is classified as a good road riding environment. Overall, the pedestrian/cycling amenity within the surrounding area is considered to be poor. While DoT's cycle map shows Vale Road and Lakes Road as good road riding environments, the development of industrial land uses and associated heavy vehicle volumes are not conducive to commuting by bicycle.

No footpaths are presently provided on Lakes Road, Vale Road or Lloyd Street.

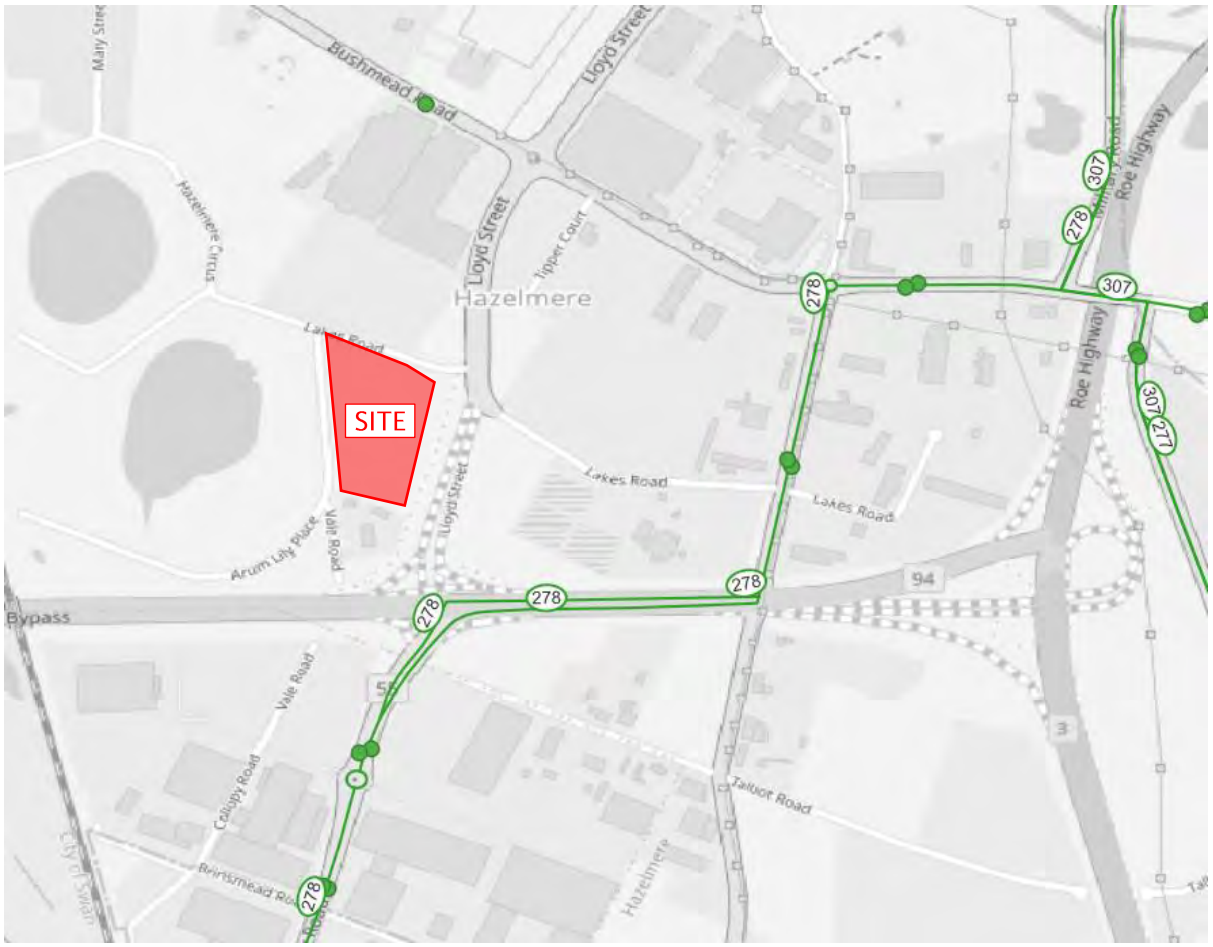
Figure 5 – Existing Pedestrian/Cycling Facilities

Source: Department of Transport

2.10 Existing Public Transport Services

The nearest existing bus stops and routes near the Site are shown in **Figure 6** (in light green dots). The nearest bus stop is approximately 1.2km east of the proposed development and provides access to route 278. Overall, the public transport amenity within the surrounding area is considered to be poor due to the nearest bus stop is located around 1.2km from the site which is beyond what is typically considered to be a comfortable walking distance. Furthermore, there are no footpaths leading to/from the bus stop.

Figure 6 – Nearest Public Transport Facilities



Source: Public Transport Authority

The bus stops nearest to the Site are serviced by Transperth route 278 which links High Wycombe Train Station and Midland. The location of the bus route is shown in **Figure 6** with the service frequency summarised in **Table 3.**

Table 3 – Existing Bus Services and Frequencies

Bus Route	Route Description	Service Frequencies		
		Weekdays	*Saturdays*	*Sundays & Public Holidays*
278	High Wycombe Station – Midland Station via Wittenoom Rd & Abernethy Rd	30 minutes	60 minutes	60 minutes

2.11 Crash Data

A crash assessment of the Site's surrounding road network was conducted using MRWA's Crash Reporting Centre database which covers all recorded crashes between January 2019 to December 2023. The following road sections and intersections were identified:

- Vale Road [no crashes]
- Lakes Road (between Vale Road and Stirling Crescent) [no crashes]
- Lloyd Street (between Lakes Road and Bushmead Road) [no crashes]
- Lakes Road/Vale Road intersection [no crashes]
- Lakes Road/Lloyd Street intersection [no crashes]

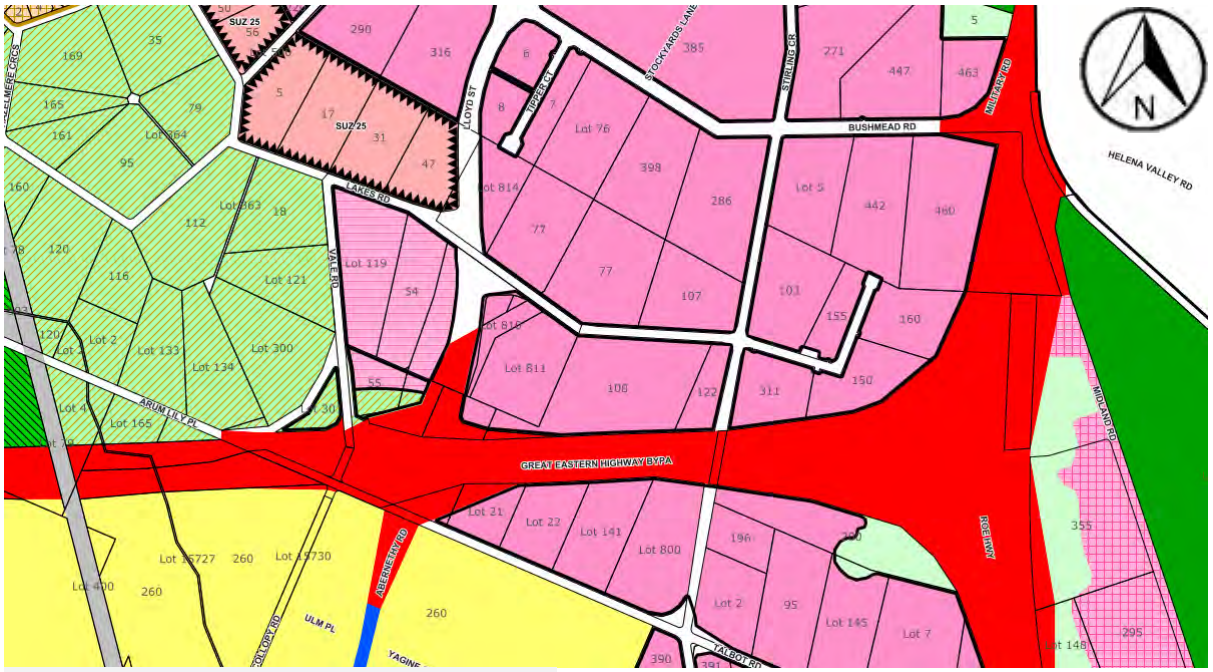
Overall, no crashes were identified on the above roads and intersections.

3 PROPOSED DEVELOPMENT

3.1 Regional Context

The Site is located within the Hazelmere Enterprise Area (HEA) and is zoned as 'Light Industrial' under the City of Swan's Town Planning Scheme No. 17. **Figure 7** illustrates the Site and the surrounding land uses in a zoning map.

Figure 7 – Zoning Map



LEGEND

- CITY CENTRE - BUSINESS
- CITY CENTRE - COMMERCIAL DEFERRED
- CITY CENTRE - MIXED USE
- CITY CENTRE - RESIDENTIAL
- CITY CENTRE - SHOPPING
- CITY CENTRE - SHOWROOM
- GENERAL COMMERCIAL
- GENERAL INDUSTRIAL
- GENERAL RURAL
- HIGHWAY SERVICE
- INDUSTRIAL DEVELOPMENT
- LANDSCAPE
- LIGHT INDUSTRIAL
- LOCAL RESERVE - LOCAL ROAD
- LOCAL RESERVE - PUBLIC PURPOSES
- LOCAL RESERVE - PUBLIC UTILITIES
- LOCAL RESERVE - RECREATION
- MRA AREA
- MIDLAND STRATEGIC REGIONAL CENTRE
- PRIVATE CLUBS & INSTITUTIONS
- REGIONAL RESERVE - OTHER REGIONAL ROAD
- REGIONAL RESERVE - PARKS & RECREATION
- REGIONAL RESERVE - PRIMARY REGIONAL ROAD
- REGIONAL RESERVE - PUBLIC PURPOSES
- REGIONAL RESERVE - RAILWAY
- REGIONAL RESERVE - STATE FORESTS
- REGIONAL RESERVE - WATERWAY
- RESIDENTIAL
- RESIDENTIAL DEVELOPMENT
- RESIDENTIAL REDEVELOPMENT
- RESOURCE
- RURAL LIVING
- RURAL RESIDENTIAL
- SPECIAL RURAL
- SPECIAL USE
- SWAN VALLEY RURAL

Source: City of Swan's Town Planning Scheme No. 17

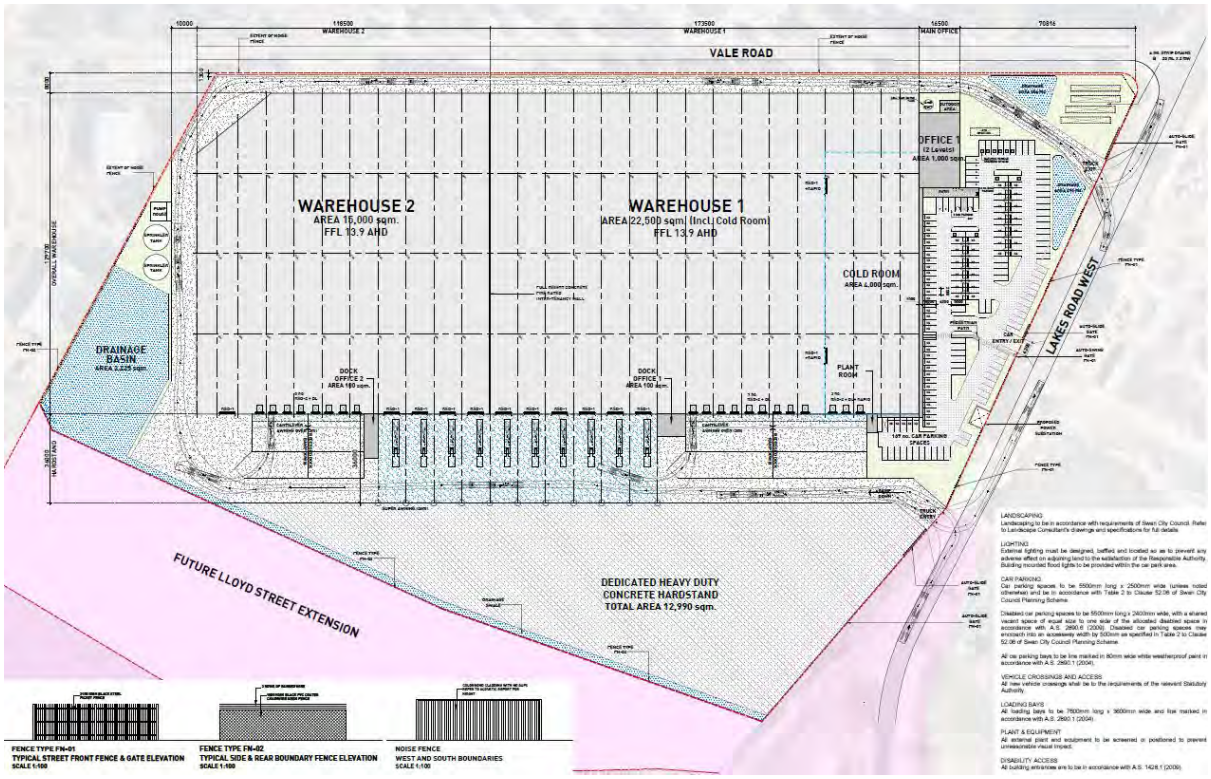
3.2 Proposed Land Use

The proposed development has a total site area of approximately 38,735m^2 and consists of two (2) warehouses, details of which are provided below:

- Warehouse 1 – 22,500m^2
- Warehouse 2 – 15,000m^2
- Office (2 levels) – 1,000m^2
- 169 car parking spaces
- 30 loading docks

Figure 8 shows the development plan of the Site. A larger version of this plan is provided in **Appendix B**.

Figure 8 – Site Development Plan



Source: Concept Y

The internal access arrangement and circulation is informed by the following requirements:

1. Trucks must reverse into docks "right hand down" so that they can use the driver's side mirror to direct themselves into a dock location. This is a fundamental requirement for safe docking of larger vehicles. This dictates for this proposal that circulation is clockwise.
2. Access to Vale Road cannot be achieved due to a signification level difference and, most significantly, to ensure compliance with the EPA Noise Regulations.

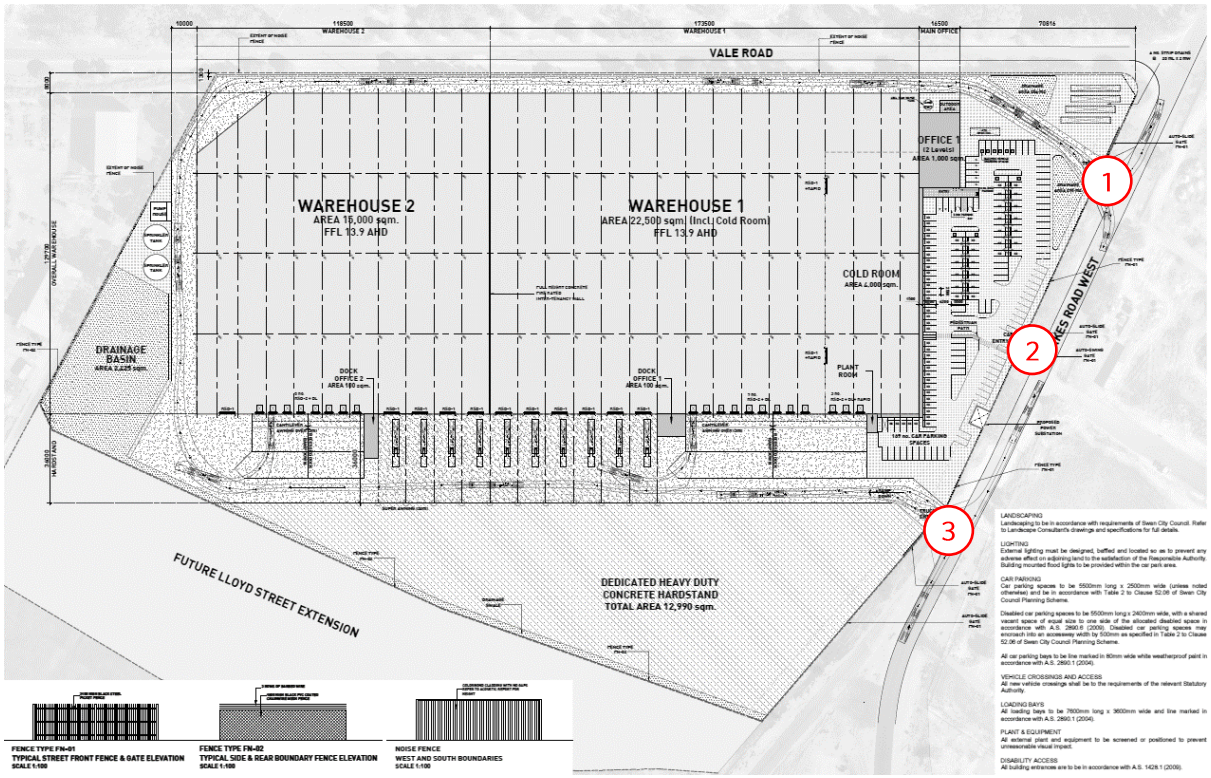
3.3 Access Arrangements

Vehicular access to/from the Site is proposed via the proposed via a total of 3 crossovers along Lakes Road as shown in **Figure 9**.

The intended function and design vehicle for each of the crossovers is summarised as follows:

- Access 1 – exit only for heavy vehicles
- Access 2 – entry and exit for light vehicles
- Access 3 – entry only for heavy vehicles

Figure 9 – Proposed Access Arrangements



3.4 Servicing

A swept path analysis was conducted to show the vehicle circulation routes for the following design vehicles:

- 19m Semi-trailer
- 27.5m B-double (RAV4)

The swept path analysis concluded that the proposed development can adequately accommodate all relevant movements, and movements to/from the external roads are lane correct.

It is anticipated that Lloyd Street (Great Eastern Highway Bypass to Bushmead Road) and Lakes Road will be approved for use by up to RAV7 vehicles (36.5m B-triples) in the future and therefore the RAV4 movements generated by the development will be accommodated on this network.

High-resolution swept path plans are included in **Appendix C**.

Figure 10 – 19m Semi-trailer Swept Path

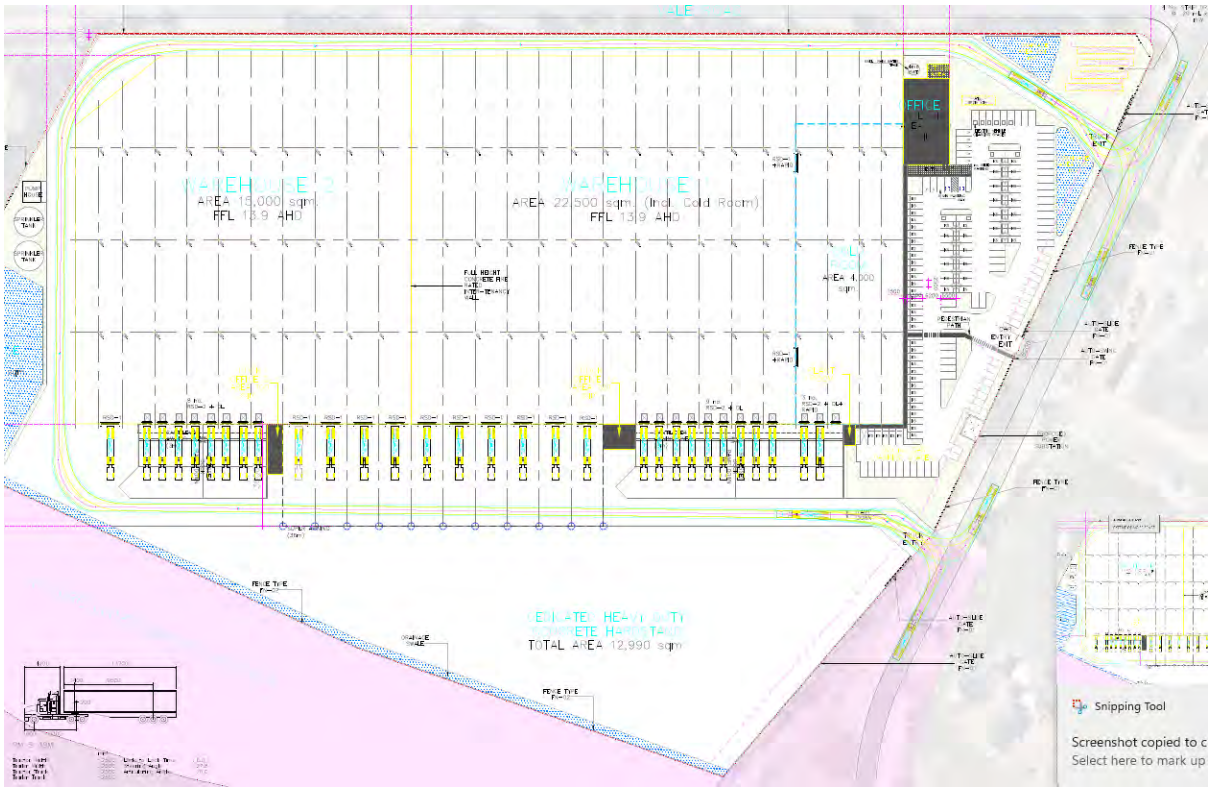
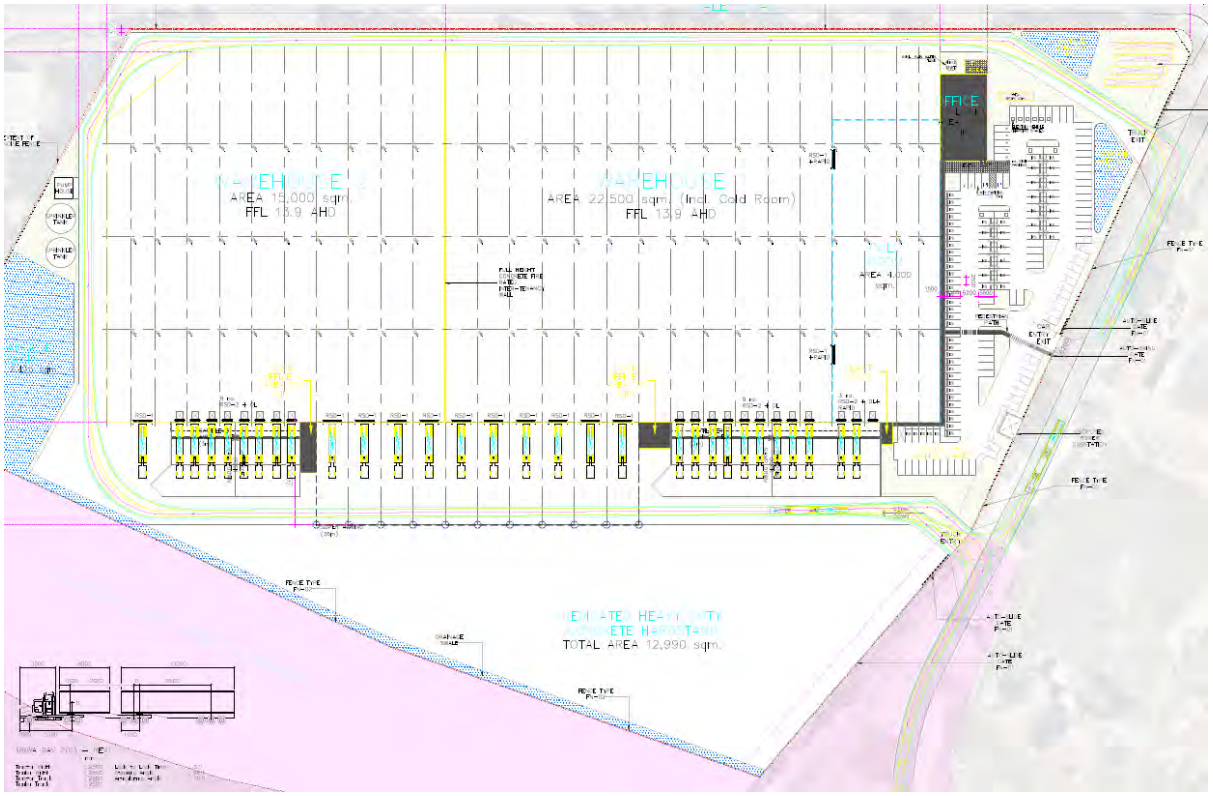


Figure 11 – 27.5m B-double Swept Path



3.5 Parking Provision

3.5.1 City of Swan Parking Requirements

The statutory car parking requirements for the proposed warehouse developments are set out in the *City of Swan's Local Planning Policy POL-TP-129 - Vehicle Parking Standards*. The parking provisions for each warehouse in the proposed development are summarised in **Figure 12.**

Figure 12 – Car Parking Provision and Requirements

Land Use	Yield (sqm)	Proposed Land Use	Rate	Requirement	Provided	Surplus / Shortfall
Warehouse *(including office)*	37,500	Warehouse	2 spaces per 100 sqm GLA	750	169	-629
	1,200	Office	4 spaces per 100 sqm GLA	48		
Total				798	169	-629

Based on the City of Swan's parking requirements, a total of 798 car parking bays are required for the proposed development. In contrast, only 169 car parking bays are provided, resulting in a parking shortfall of 629 spaces.

3.5.2 Empirical Assessment of Car Parking Demand

Information from the client revealed that the actual parking demand in light industrial developments are in the range of 1 space per 400 square metres gross floor area (GFA) for warehouse/light industrial and 1 space per 20 square metres GFA for office. Based on these rates, the required parking spaces within the development have been calculated and presented in **Table 4**.

Table 4 – Car Parking Provision and Expected Demand

Land Use	Yield (sqm)	Proposed Land Use	Rate	Requirement	Provided	Surplus / Shortfall
Warehouse *(including office)*	37,500	Warehouse	1 space per 400 sqm GLA	94	169	+12
	1,200	Office	1 space per 20 sqm GLA	60		
Total				154	169	+12

The above shows that the development is anticipated to provide sufficient parking supply to meet the parking demands.

3.5.3 Adequacy of Car Parking Supply

When assessed against City of Swan's statutory parking requirements, the results show that a significant number of parking bays would be required leading to a substantial shortfall when compared with the proposed supply. It should be noted that modern warehouses are mostly automated and are less reliant on floor staff to operate facilities. As such, it is anticipated that the parking supply within the proposed development is sufficient for the anticipated demand.

3.5.4 End of Trip Facilities

The parking requirements for bicycles are not provided within the City of Swan Local Planning Policy POL-TP-129 - Vehicle Parking Standards. As such, on-site provision of these parking spaces will fall under the Client's discretion. 10 bike parking bays are proposed near the office entrance.

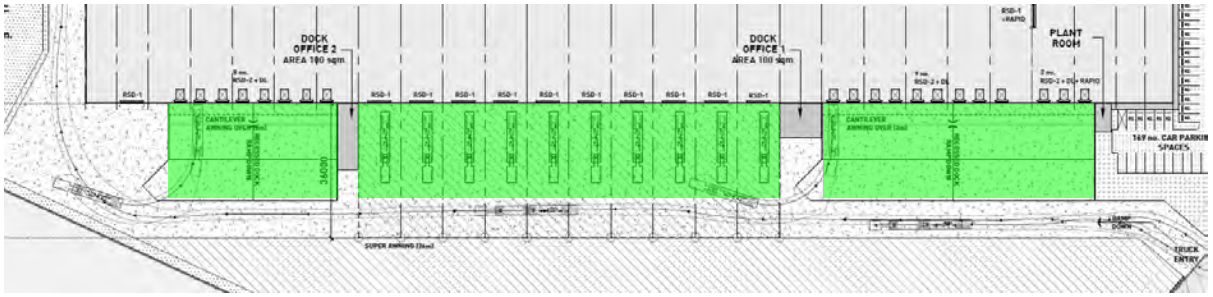
3.5.5 On-site Parking Allocation

A total of 169 car parking bays are proposed for the Site. **Figure 13** and **Figure 14** illustrates the proposed parking arrangement provided on-site along with the purpose of each bay summarise below.

- Staff Parking Bays – BLUE – 149 bays
- ACROD Bays – YELLOW – 2 bays
- Electric Vehicle Charging Bays – GREEN – 10 bays
- 5 Minute Parking Bay – RED – 1 bay
- Visitor Bays – PURPLE – 7 bays
- Semi-trailer Loading Area – LIGHT GREEN – 30 bays
- Bicycle Parking – PINK – 10 bays
- Turnaround Bay – ORANGE – 1 bay

Figure 13 – Car Park Provision and Allocation

Figure 14 – Loading Dock Area



4 INTERGRATION WITH SURROUNDING AREA

4.1 Surrounding Major Attractors / Generators

The Site is located within the HEA and industrial land uses are the predominant surrounding land use. To the west of the Site are existing residential areas which will remain.

These attractors/generators include the following:

- Perth Airport
- Midland Town Centre

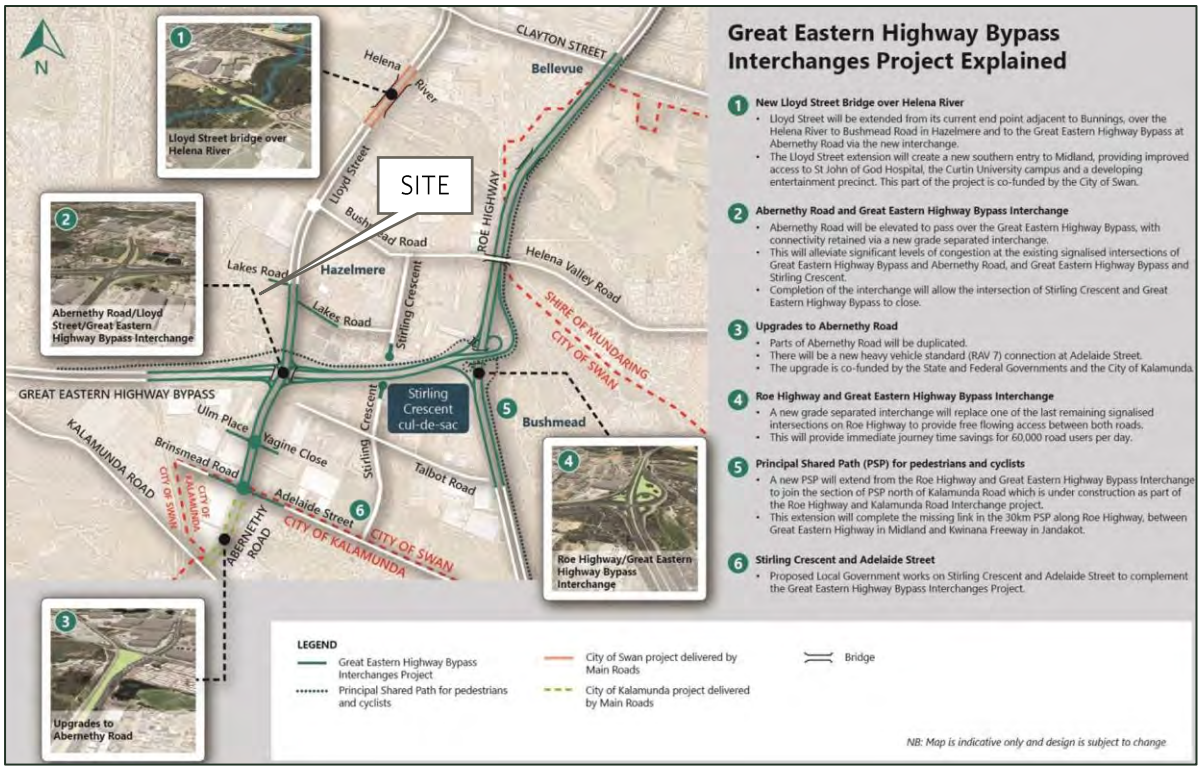
Figure 15 – Surrounding Attractors / Generators

4.2 Committed Developments and Transport Proposals

Main Roads WA has completed pre-construction works associated with the Great Eastern Bypass Interchanges (GEHBI) Project, with construction of the interchanges expected to recommence in 2025-26. This project will upgrade the existing interchanges at Roe Highway and Abernethy Road/Lloyd Street as depicted in **Figure 16** with the proposed modifications described below:

- An extension of Lloyd Street from its current end point to the south of Clayton Street to the Great Eastern Highway Bypass, including a new bridge over the Helena River.
- The Great Eastern Highway/Stirling Crescent intersection will be removed with a cul-de-sac to be constructed on both sides of the bypass to prevent direct access onto Stirling Crescent.
- Various upgrades to parts of Abernethy Road and Roe Highway.
- The construction of new roundabouts at Stirling Crescent and Talbot Road, as well as Stirling Crescent and Adelaide Street.

Figure 16 – Great Eastern Highway Bypass Interchange Project Information Sheet



Source: Main Roads WA

According to the Main Roads WA's Local Design Update Document (published in August and September 2021), the City of Swan will be undertaking the following local upgrade works:

- Construction of a staggered-t intersection between Lakes Road and Lloyd Street with the movements on the eastern and western approaches being restricted to left in, left out only as shown in **Figure 17**.
- Realignment of Arum Lily Place linking to Vale Road (completed).

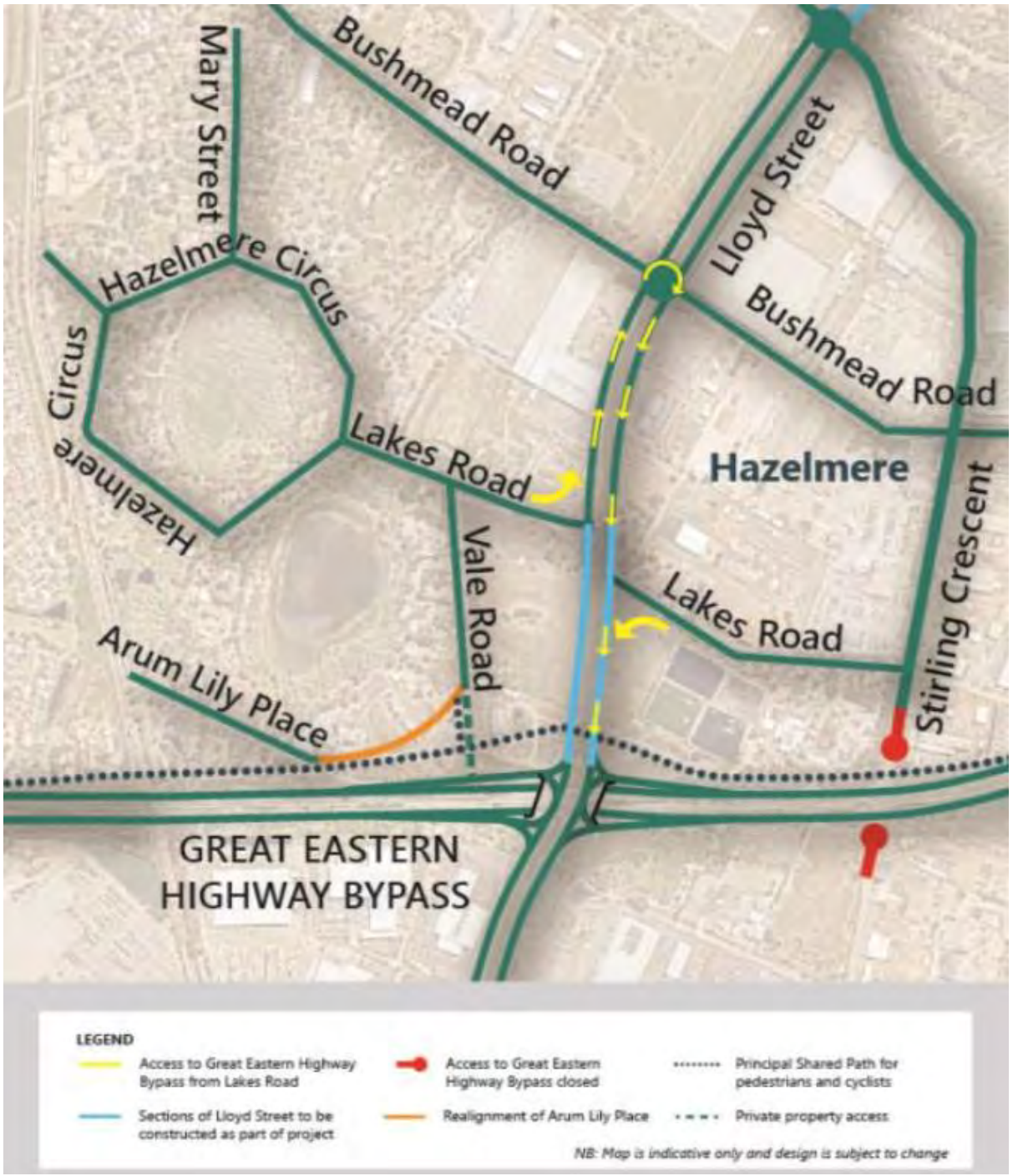
It is noted by the Proponent that the proposed LILO is a relatively new proposal and was not the intended road layout in the original approved scheme.

The LILO proposal has resulted in considerable consternation among the four abutting landholders (Hesperia, CTI Logistics, EMRC and Talloman) over the past 3 years most recently culminating in discussions between Department of Transport, Main Roads WA and the City of Swan in a bid to reach an agreeable configuration of the Lloyd Street/Lakes Road intersection. Part of the discussions have included the abutting landowners preference for a three-leg roundabout to provide access to/from Lakes Road west. There is not definitive timing for the upgrade works at the intersections of Lakes Road and Lloyd Street.

It would appear that the proposed development access arrangements will need to be flexible enough to cater for 3 likely scenarios as listed in Section 5.1 below.

In addition, it is understood that Lloyd Street and Lakes Road will be approved for use by up to RAV7 vehicles following completion of the works.

Figure 17 – Great Eastern Highway Bypass Interchange Project – proposed Lloyd St and Lakes Rd Intersection and Arum Lily Pl Realignment – pending ongoing review of Lake/Lloyd intersection



Source: Main Roads WA

4.3 Public Transport Network and Facilities

PTG staff have previously contacted the Public Transport Authority (PTA) and understands that there are no short to medium term structural changes proposed. The long term plan following completion of the Lloyd Street bridge and Lloyd Street connection to Abernethy Road is to run Route 278 along Lloyd Street which will operate closer to the Site.

4.4 Pedestrian/Cycling Network and Facilities

The GEHBI project includes the construction of new Principal Shared Paths along Roe Highway and the Great Eastern Highway Bypass:

- The new Roe Highway Principal Shared Path (PSP) will connect the Roe Highway and Great Eastern Highway interchange to the section of PSP north of Kalamunda Road built as part of the Roe Highway and Kalamunda Road Interchange project. This extension will complete the 30km PSP between the Great Eastern Highway in Midland and the Kwinana Freeway in Jandakot.
- A new PSP will also be built along the northern side of the Great Eastern Highway Bypass, from Roe Highway to the west of the existing railway bridge, to connect with the Waterhall Road local footpath network.

In addition, the GEHBI project also includes:

- A shared path on Abernethy Road's western side between the Great Eastern Highway Bypass and Kalamunda Road. An underpass will connect this shared path to the new PSP on the Bypass.
- A shared path running along the western side of Lloyd Street between the Great Eastern Highway Bypass and the Midland roundabout next to Bunnings Warehouse.

It is expected that completion of the path along Lloyd Street will occur as part of the interchange project. Upon completion, the new shared paths will provide pedestrians and cyclists with a safe, comfortable, and continuous journey between Midland and Jandakot, as well as better connectivity to the surrounding local path network.

It is anticipated that at least one footpath will be provided by the City of Swan along Lakes Road when it is upgraded to a typical sealed, kerbed and drained industrial subdivision road.

5 ANALYSIS OF TRANSPORT NETWORK

5.1 Assessment Years and Time Periods

The network peak periods as per Main Roads WA Traffic Map are as follows:

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

The WAPC Transport Assessment Guidelines Volume 4 specifies the following years for assessment:

- Opening year of the proposed development
- 10 years after the opening of the proposed development

For this Site, the anticipated opening year for the proposed development is 2026 and the 10 year horizon assessment will be for 2036.

As outlined above this TIA needs to consider the likely Lloyd/Lakes intersections treatments that might be expected. These assessment scenarios are listed as follows:

- Scenario 1 – Background 2026 including development traffic
- Scenario 2 – Background 2036 including development traffic (LILO Option)
- Scenario 3 – Background 2036 including development traffic (Roundabout Option)

It is understood that the GEHBI project is likely to recommence in 2025-26 and be completed by 2031. If the GEHBI project is delayed for a further period time (e.g. not completed until 2037) then Scenario 1 will be representative of a 2036 forecast year. The significant increase in background traffic volumes for Lloyd Street (refer to **Section 5.4**) only occurs once Lloyd Street has been connected to GEH Bypass and extended across the Helena River to Midland. In the absence of this project, volumes on Lloyd Street in the vicinity of Lakes Road will remain very low.

5.2 Development Trip Generation and Distribution

The traffic generation rates used to calculate the traffic generated by the proposed development were obtained from the following sources:

- RMS Trip Generation Surveys, Business Parks and Industrial Estates - Data Report.
- RTA Guide to Traffic Generating Developments Version 2.2

Specifically, the warehouse trip generation rate was based on the surveys conducted for the Wonderland Business Park in Riverwood NSW which was selected as the site shared similar characteristics (in terms of size, land use and density) to the proposed development. A summary of the Wonderland Business Park are as follows:

- Total number of occupied lots: 22 (20 warehouses and 2 manufacturers).
- Gross floor area of occupied lots: 406,000m^2.
- Average area of each warehouse/manufacturer: 18,455m^2.

For comparison, the proposed development contains 2 warehouses with a total area of 37,500m^2 giving an average warehouse area of 18,750m^2.

Table 5 shows the trip generation rates for the proposed land uses, **Table 6** shows the directional distribution and **Table 7** shows the total traffic generated by the Site.

Table 5 – Trip Generation Rates

Land Use	Source	Yield	AM Peak	PM Peak
Warehouse	RMS	37,500m^2	0.202 trips per 100m^2	*0.202 trips per 100m^2
Office	RTA	1,200m^2	**2 trips per 100m^2	2 trips per 100m^2

**The RMS Trip Generation Surveys, Business Parks and Industrial Estates - Data Report does not provide a trip generation rate for the PM peak (as the trip generation rate is only provided for the highest peak which occurred in the AM peak period) Therefore, the AM peak rate was used for the purpose of a robust assessment.*

*** The RTA Guide to Traffic Generating Developments does not provide a trip generation rate for the AM peak (as the trip generation rate is only provided for the highest peak which occurred in the PM peak period). Therefore, the PM peak rate was used for the purpose of a robust assessment.*

Table 6 – Trip Distribution

Land Use	AM Peak		PM Peak	
	IN	OUT	IN	OUT
Warehouse	76%	24%	37%	63%
Office	88%	12%	17%	83%

The inbound and outbound trip distribution is also based on the surveys conducted for the Wonderland Business Park.

Table 7 – Trip Generation Summary

Land Use	AM Peak		PM Peak	
	IN	OUT	IN	OUT
Warehouse	58	19	29	48
Office	22	3	5	20
Total	**80**	**22**	**34**	**68**

The volume of traffic generated by the proposed development traffic is estimated to be 102 trips in both the AM and PM peak periods.

The assignment of traffic across the surrounding road network considers the current and future network arrangement as a result of the ongoing GEHBI road and intersection upgrades which are summarised as follows:

- 20% of traffic will be travelling to/from the west on Lakes Road – i.e. to/from Hazelmere Circus
- 80% of traffic will be travelling to/from the east on Lakes Road – i.e. to/from Lloyd Street

Distribution of development traffic at the Lloyd Street / Lakes Road was assumed to match the distribution of turning movements in the traffic data provided by Main Roads WA (refer to Section 0).

Figure 18 through **Figure 21** illustrates the turning movement distribution within the surrounding road network for all scenarios.

Figure 18 – External Traffic Distribution for Scenario 1 and 3 (Inbound)

Figure 19 – External Traffic Distribution for Scenario 1 and 3 (Outbound)

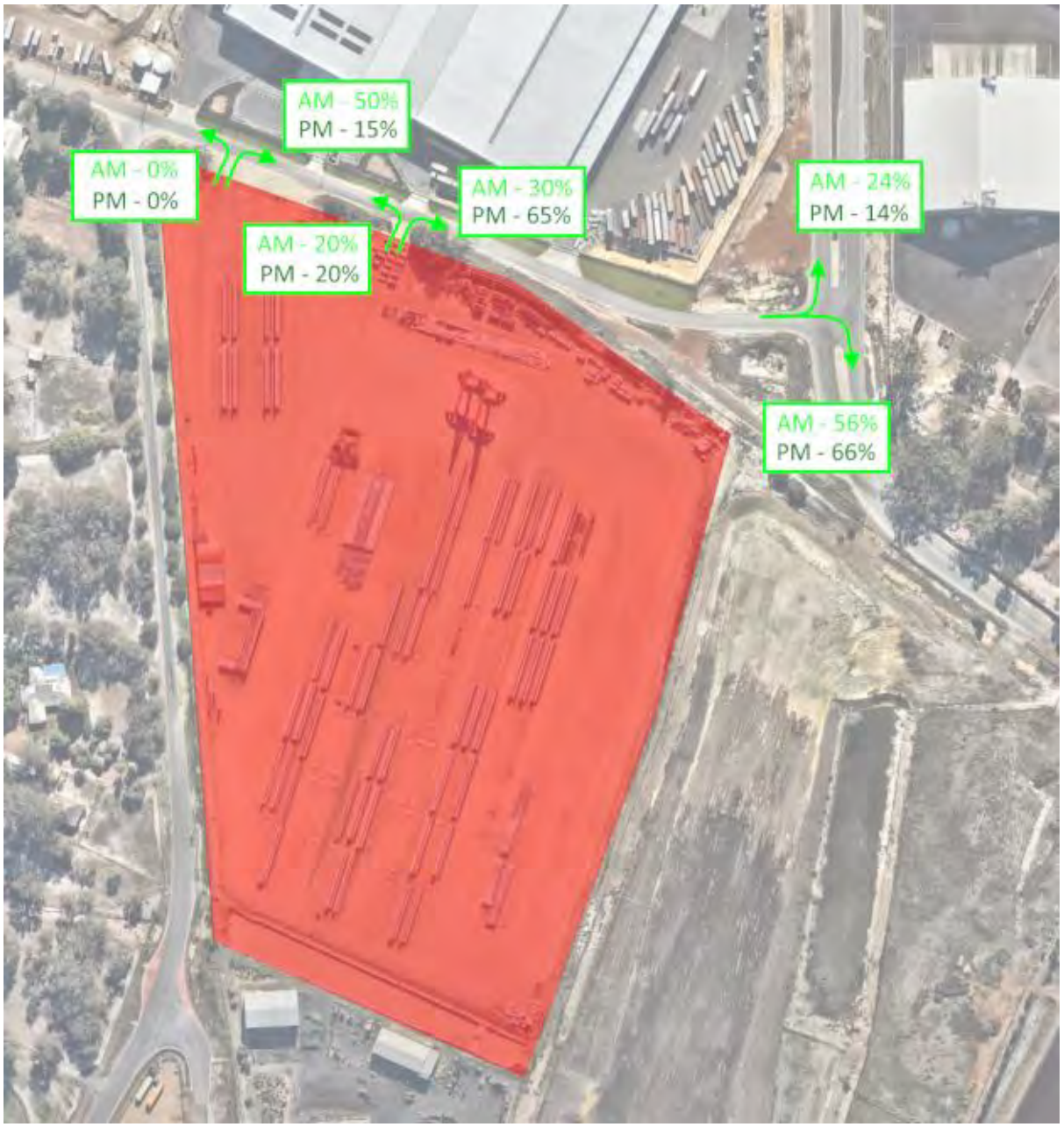


Figure 20 – External Traffic Distribution for Scenario 2 (Inbound)

Figure 21 – External Traffic Distribution for Scenario 2 (Outbound)

For Scenario 2, as a result of the left in, left out restriction, vehicles heading south on Lloyd Street will need to take the following route (and illustrated in **Figure 22**):

- Turn left to head north at the Lloyd Street/Lakes Road intersection
- Perform a u-turn at the Bushmead Road/Lloyd Street roundabout
- Continue travelling south along Lloyd Street

Figure 22 – Scenario 2 Outbound Detour Route.

Vehicles arriving from the north will need to circulate via Bushmead Road (west), West Parade, Mary Street, Hazelmere Circus, and Lakes Road (west) to reach the Site as shown in **Figure 23**.

Figure 23 – Scenario 2 Inbound Detour Route

5.3 Development Traffic Volumes

Figure 24 shows the traffic generated by the proposed development for Scenarios 1 and 3 whereas **Figure 25** shows the traffic generated by Scenario 2.

Figure 24 – Development Generated Traffic – Scenario 1 and 3

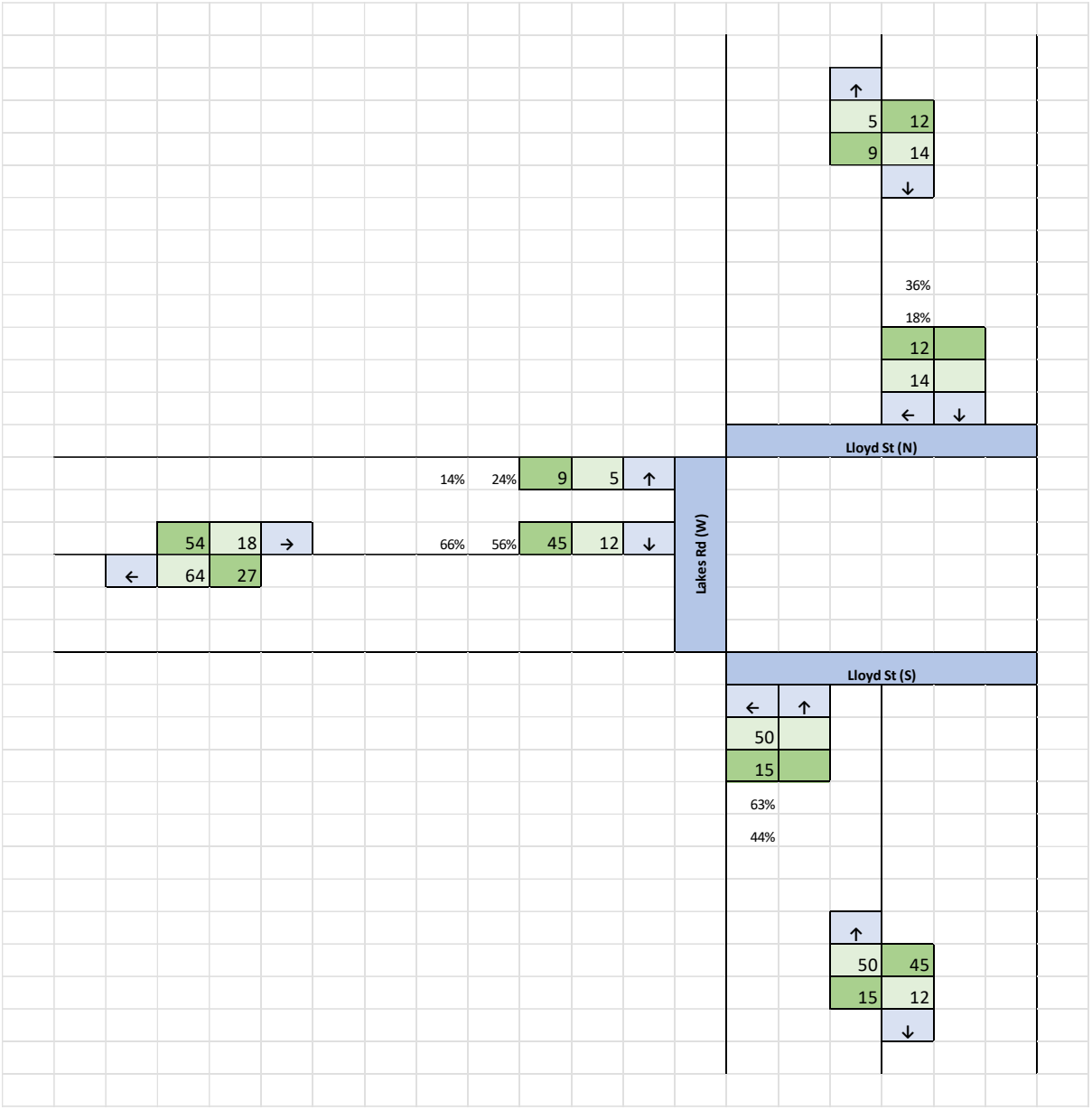
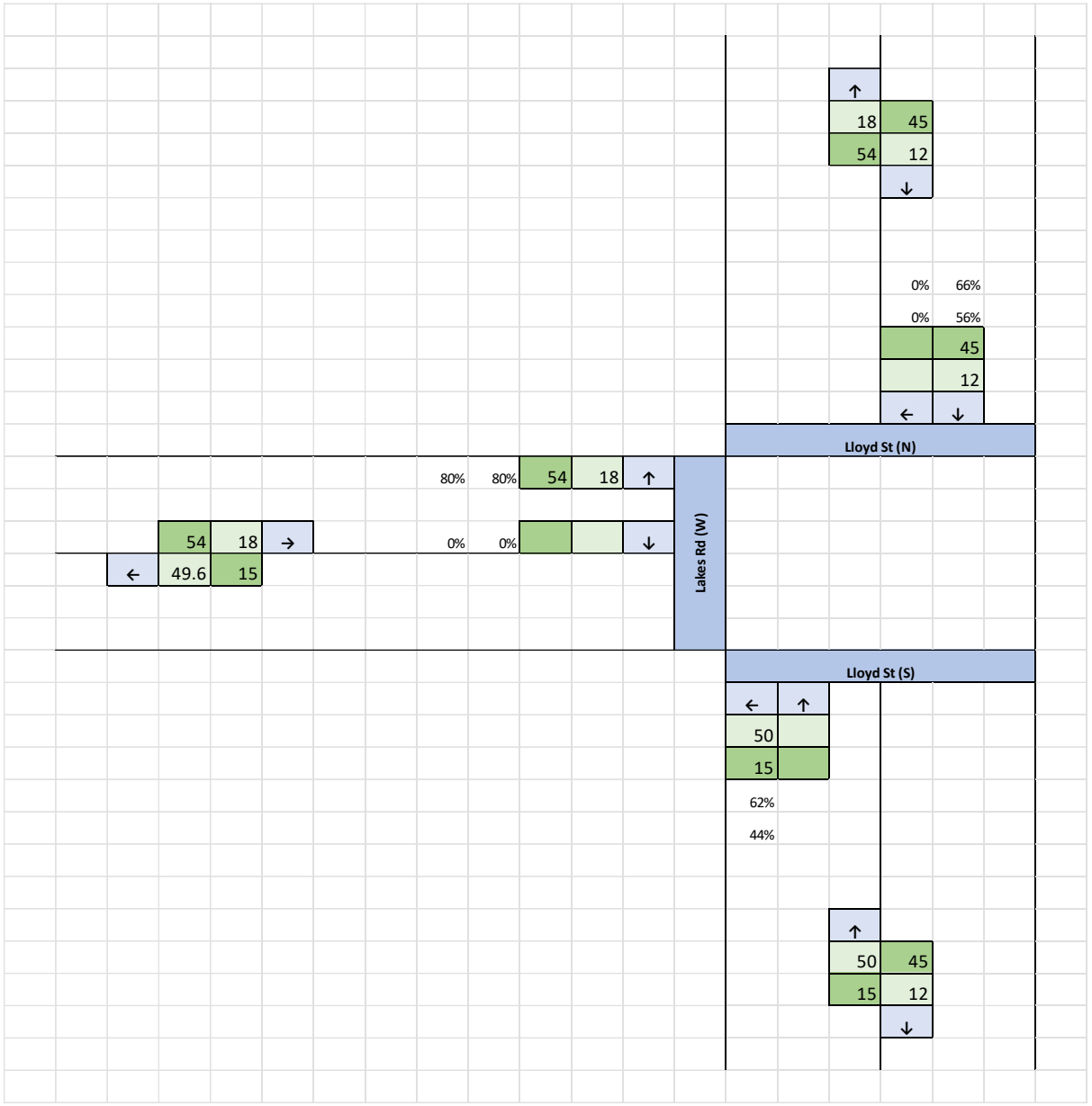


Figure 25 – Development Generated Traffic – Scenario 2



5.4 Background Traffic Flows

The background traffic flows for all three scenarios are provided in **Figure 26**, **Figure 27** and **Figure 28**.

Figure 26 – Scenario 1 Background 2026 Volumes

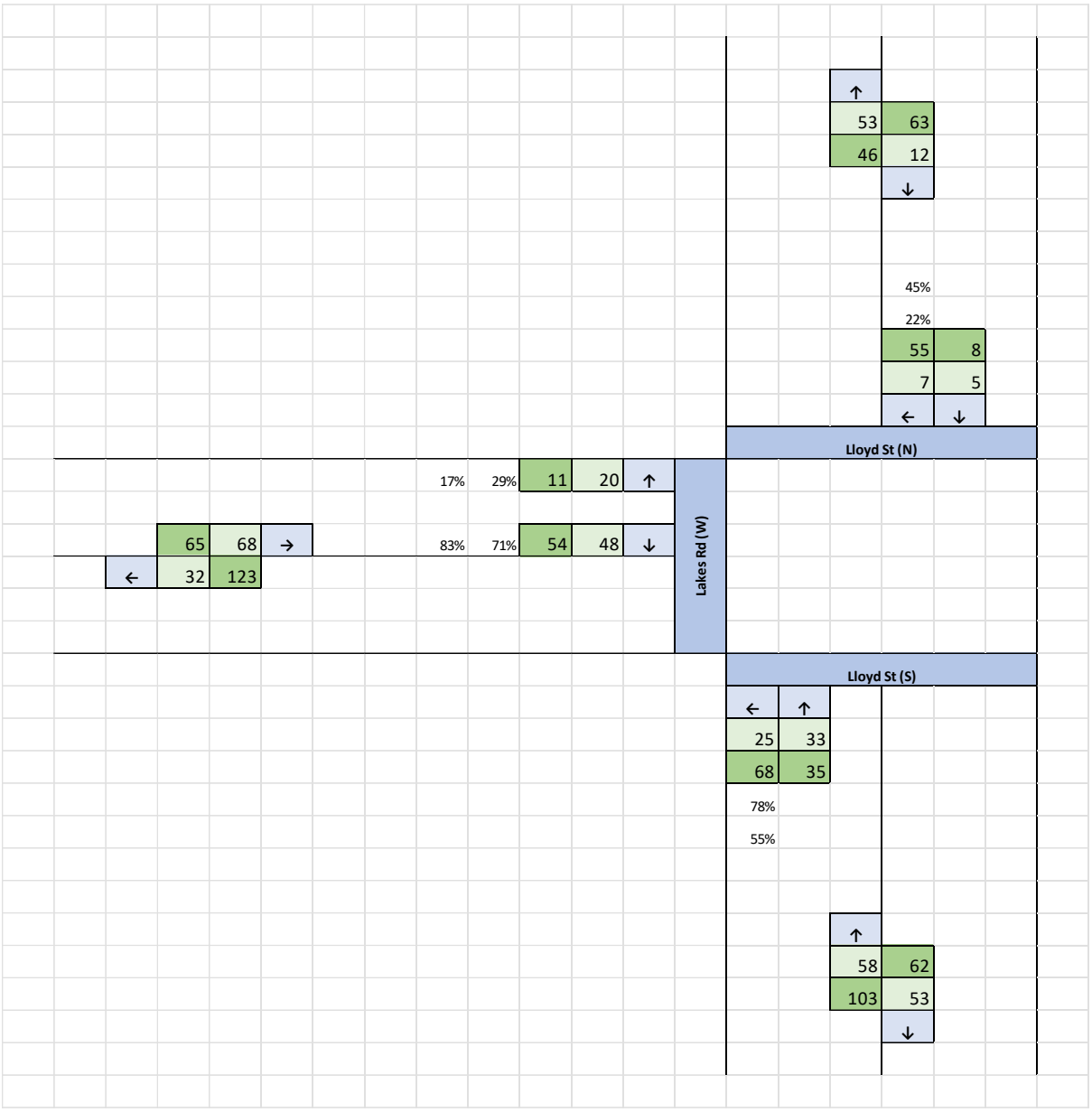


Figure 27 – Scenario 2 Background 2036 Volumes

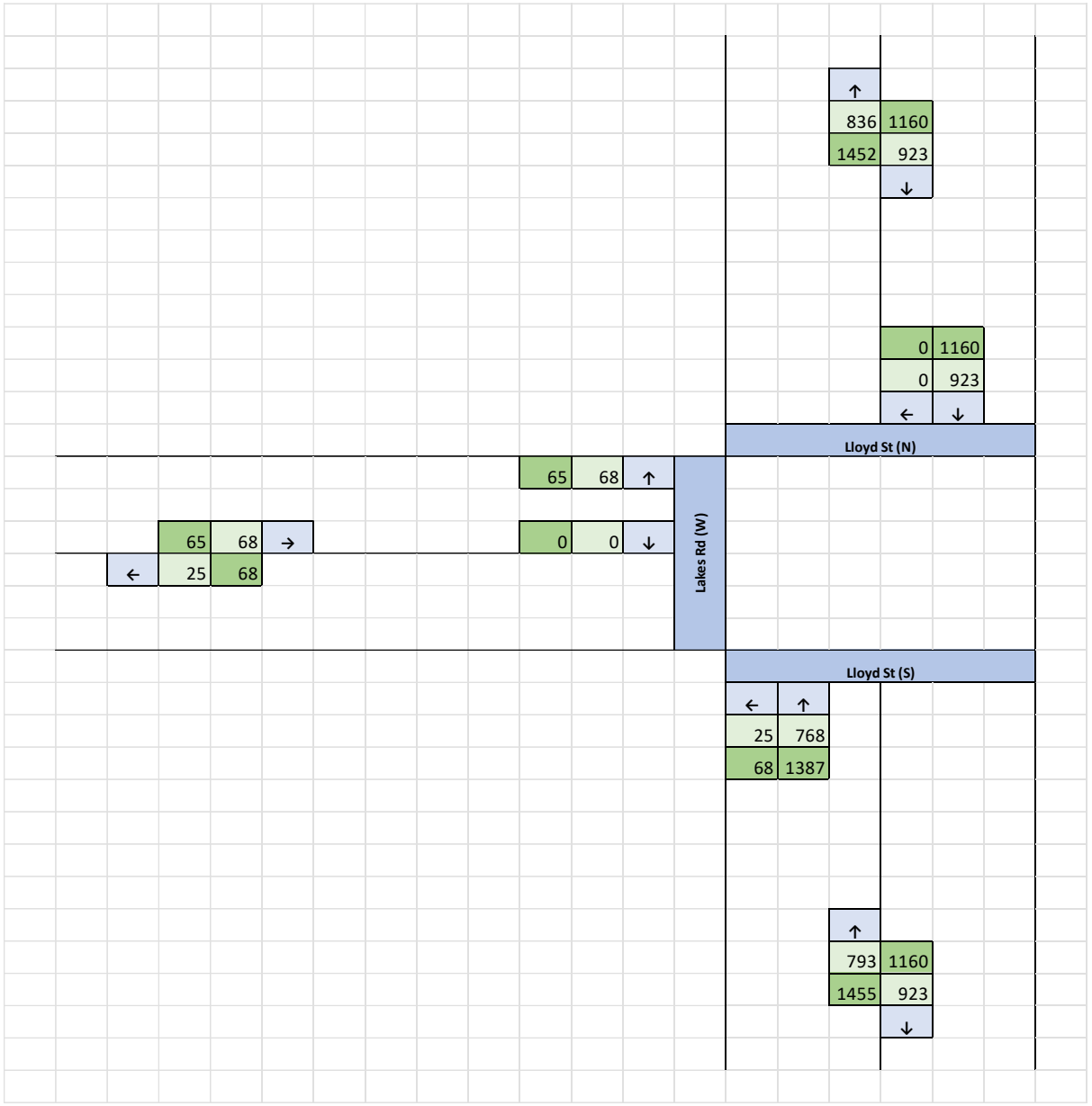
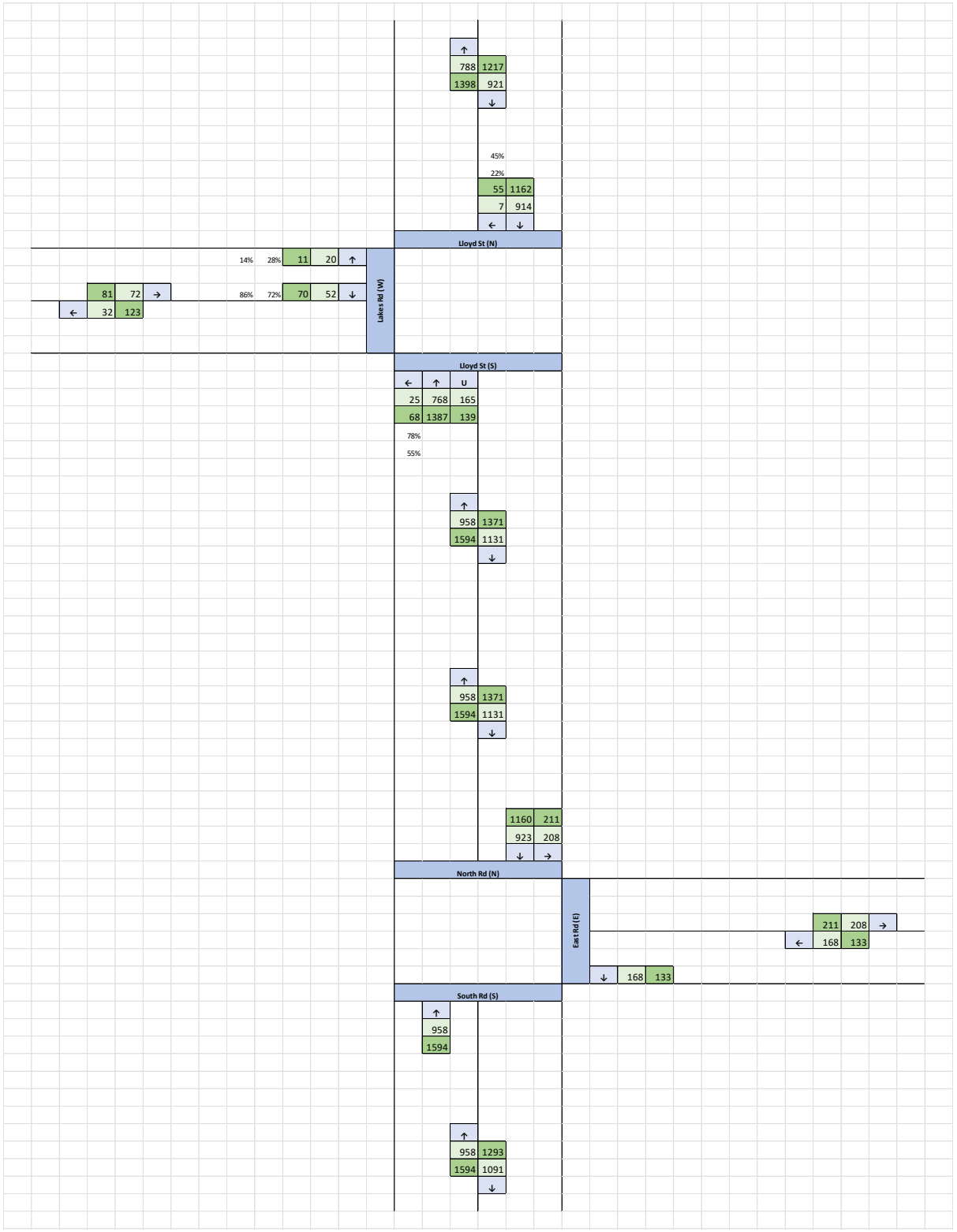


Figure 28 – Scenario 3 Background 2036 Volumes



5.5 Background and 'With Development' Traffic Flows

Figure 29, Figure 30 and Figure 31 shows the background volumes with the inclusion of development traffic for all three scenarios.

Figure 29 – Scenario 1: Background 2026 with Development

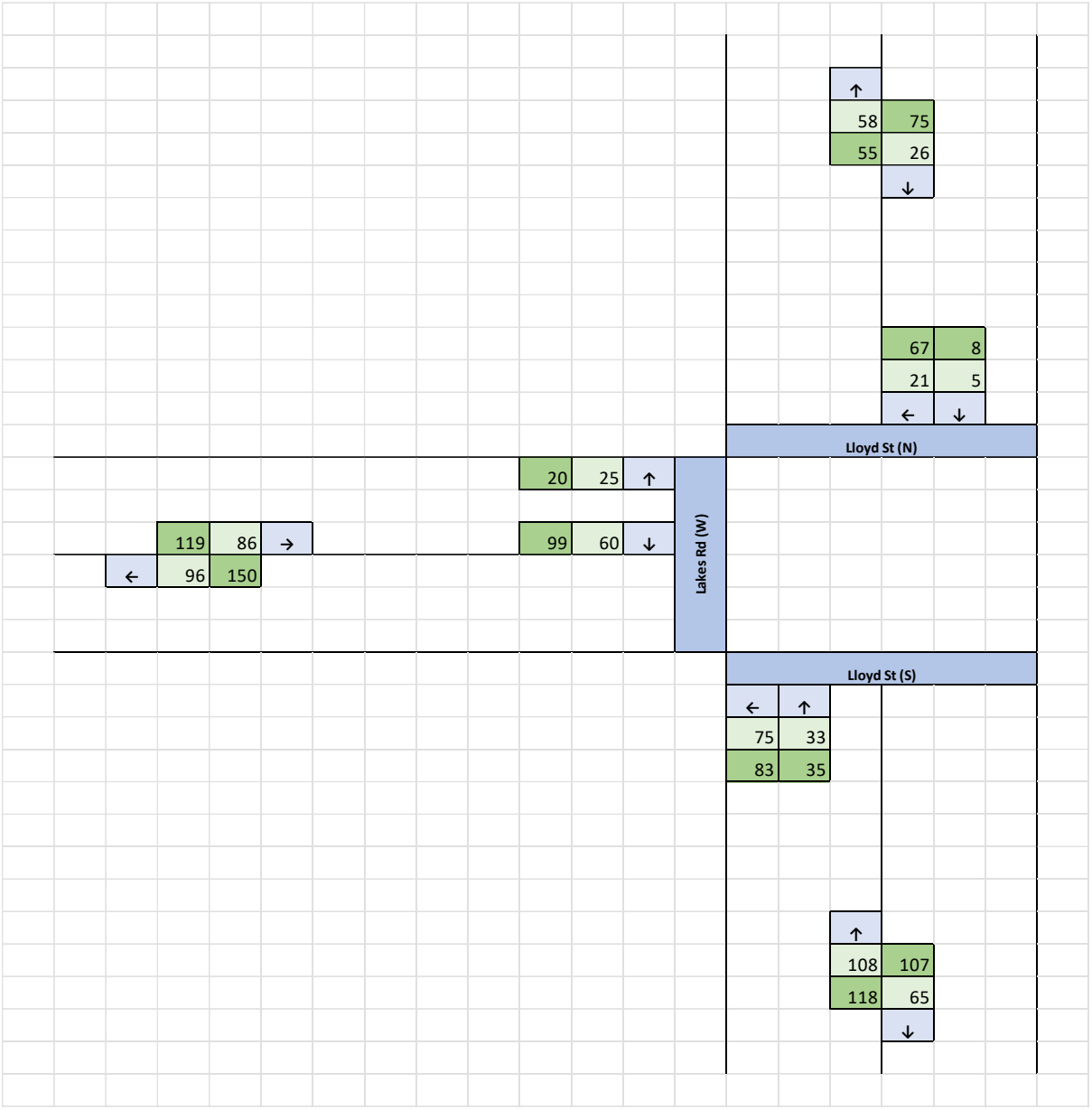


Figure 30 – Scenario 2: Background 2036 with Development

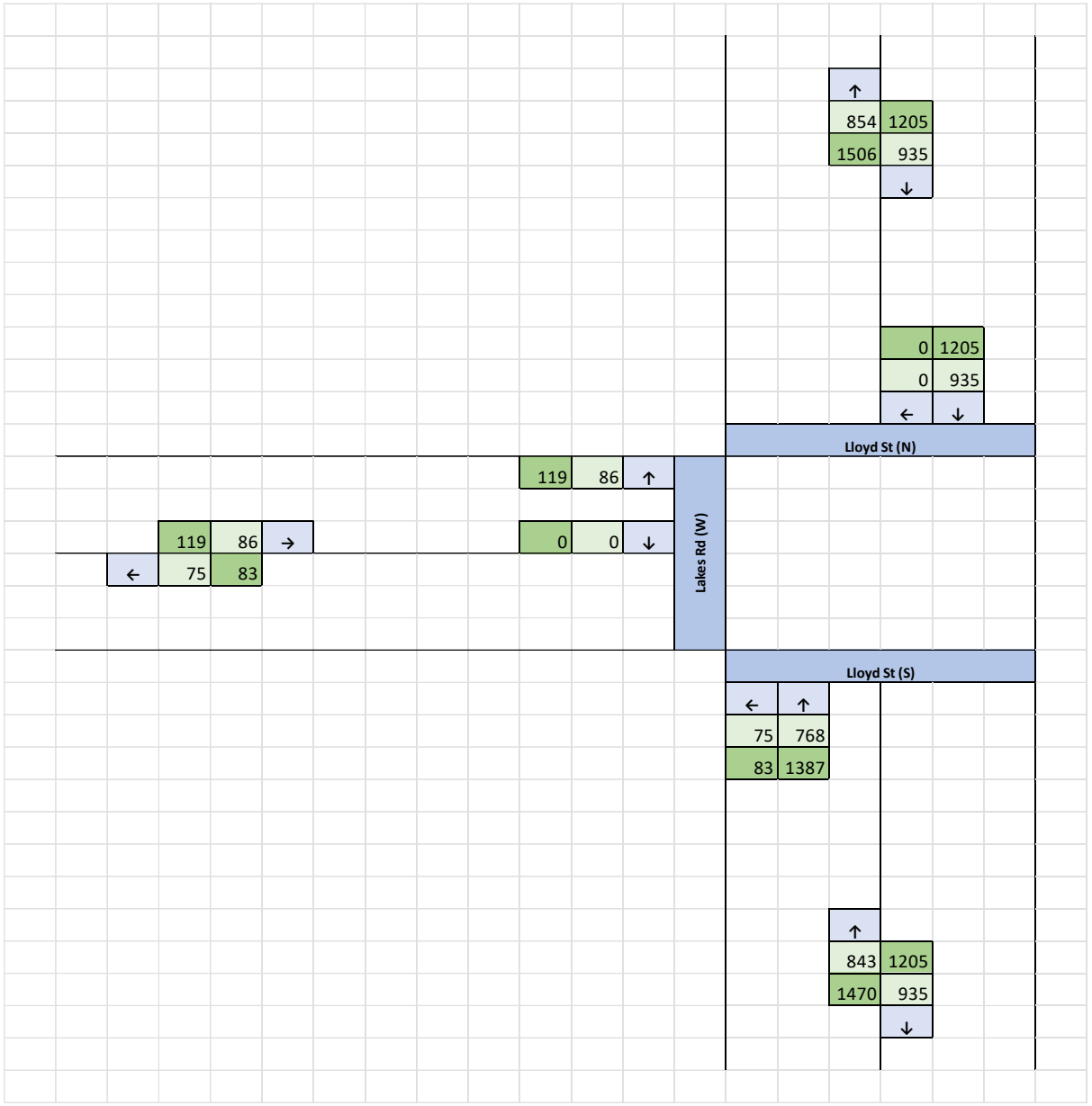
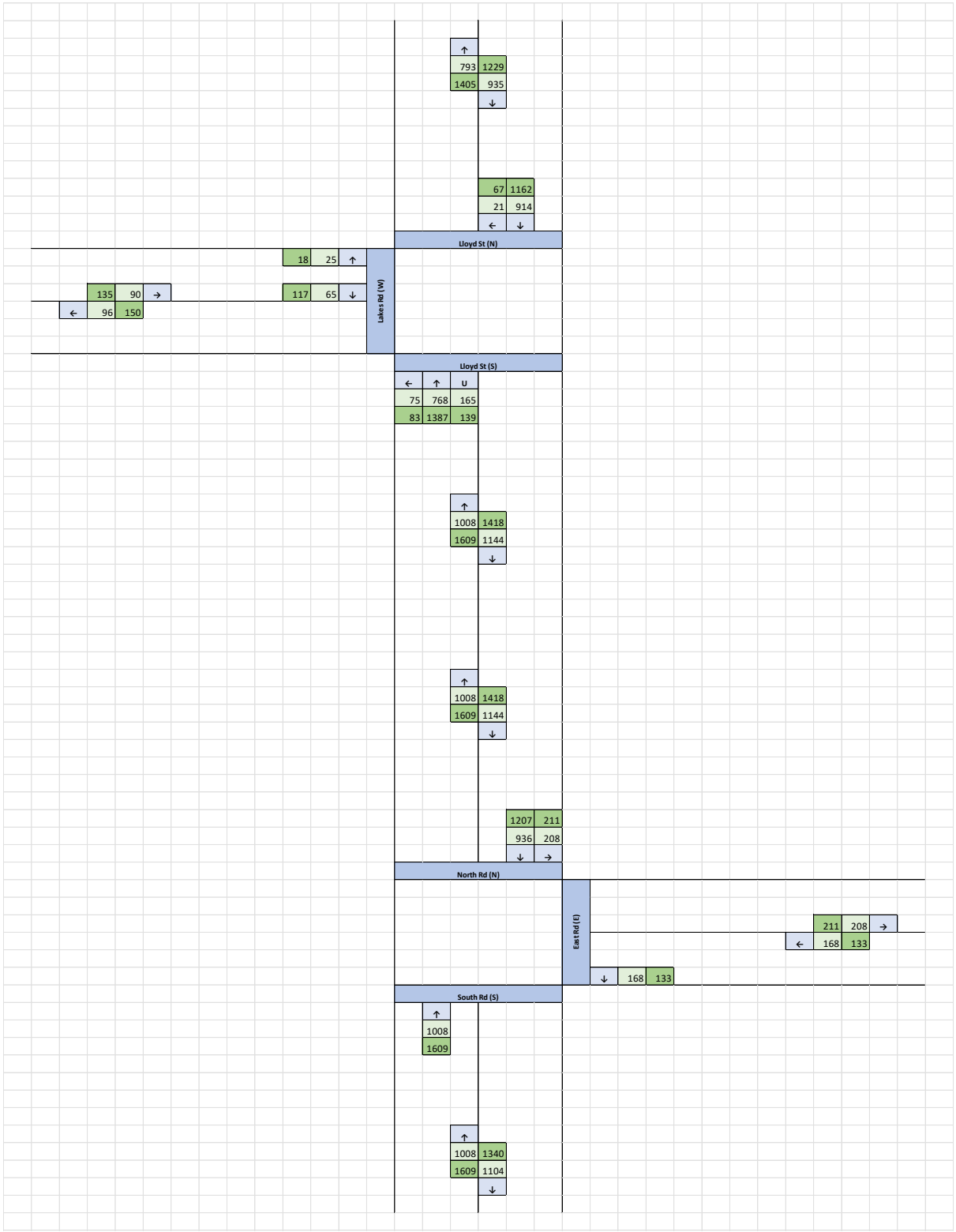


Figure 31 – Scenario 3: Background 2036 with Development



5.6 Key Assumptions

For the purposes of this assessment, the following assumptions have been made based on the best available information at the time of preparation of this report:

- The background traffic volumes at the Lloyd Street/Lakes Road intersection for all threes assessment scenarios were derived from the '*GEH Bypass Interchanges Project Lloyd Street/Lakes Road Investigation*' report, prepared by Urbsol for the Greater Connect Alliance, May 2022 (the Urbsol report). The relevant extract from the report is included at **Appendix D**.
    - Scenario 1: Volumes for Lloyd Street were obtained from MRWA traffic map for Lloyd Street. As there is no available traffic data for Lakes Road, the 2036 estimated volumes from the Urbsol report were used instead.
    - Scenarios 2 and 3: Turning volumes were derived from 2036 AM and PM (Figures 2 and 3 of the Urbsol report) and adjusted for the prohibited movements – e.g. for Scenario 2 the right turn movement from Lakes Road (west) into Lloyd Street (south) was redistributed to the left turn into Lloyd Street (north) and a southbound through movement.
- The heavy vehicles volumes and breakdown for all assessment scenarios were taken from Figures 2 and 3 of the Urbsol report.
- Even though the volumes derived from the Urbsol report are assumed to include traffic generated by the full build-out of the HEA, development traffic has been added on top of these volumes for a robust assessment. In reality, development traffic should already be incorporated in the 2036 volumes provided in the Urbsol report.
- A SIDRA assessment has not been conducted for the three site accesses as the anticipated volumes at these accesses and the frontage road will be low and unlikely to result in any material impact to the surrounding road network.
- The opening year the 10-year horizon for the proposed development is anticipated to be 2026 and 2036 respectively.
- The following assumptions with regards to the layout of the left in, left out and roundabout options are as follows:
    - The left in, left out option is based on the proposed layout by Main Roads WA (as part of the GEHBI project).
    - The roundabout option is based on a sketch layout for a dual lane roundabout prepared by Transcore.

5.7 Analysis of Development Accesses

Analysis was limited to Lloyd Street/Lakes Road as this intersection will carry the majority of traffic traveling to and from the proposed development.

The identified key intersections have been analysed using the SIDRA analysis program. This program calculates the performance of intersections based on input parameters, including geometry and traffic volumes. As an output, SIDRA provides values for the Degree of Saturation (DOS), queue lengths, delays, level of service, and 95th Percentile Queue. These parameters are defined as follows:

- Degree of Saturation (DOS): is the ratio of the arrival traffic flow to the capacity of the approach during the same period. The theoretical intersection capacity is exceeded for an un-signalized intersection where DOS > 0.80;
- 95% Queue: is the statistical estimate of the queue length up to or below which 95% of all observed queues would be expected.
- Average Delay: is the average of all travel time delays for vehicles through the intersection. An unsignalised intersection can be considered to be operating at capacity if the average delay exceeds 40 seconds for any movement; and
- Level of Service (LOS): is the qualitative measure describing operational conditions within a traffic stream and the perception by motorists and/or passengers. The different levels of service can generally be described as shown in **Table 8**.

Table 8 – Levels of Service Definitions

LOS	Description	Signalised Intersection	Unsignalised Intersection	Roundabout
A	No or minimal delays (best condition). Queues are rarely more than one vehicle	⩽10 sec	⩽10 sec	≤10 sec
B	Short traffic delays. Occasionally more than one queued vehicle.	10-20 sec	10-15 sec	10-20 sec
C	Average traffic delays. Often more than one queued.	20-35 sec	15-25 sec	20-35 sec
D	Long traffic delays. Regularly more than one queued vehicle.	35-55 sec	25-35 sec	35-50 sec
E	Very long traffic delays. Traffic demand is near or equal to the practical capacity of the intersection. Almost always more than one queued vehicle.	55-80 sec	35-50 sec	50-70 sec
F	Forced flow conditions with extensive delays caused by geometric and/or operational constraints external to the intersection.	⩾80 sec	⩾50 sec	≥70 sec

** Source: Highway Capacity Manual, 1997*

A LOS exceeding these values indicates that the road section is exceeding its practical capacity. Above these values, users of the intersection are likely to experience unsatisfactory queueing and delays during the peak hour periods.

5.7.1 Lloyd Street/Lakes Road

5.7.1.1 Scenario 1

The SIDRA layout for the Lloyd Street/Lakes Road intersection is shown in **Figure 29** with the results summarised in **Table 9**.

Figure 32 – SIDRA Layout for Lloyd St/Lakes Rd (Existing)

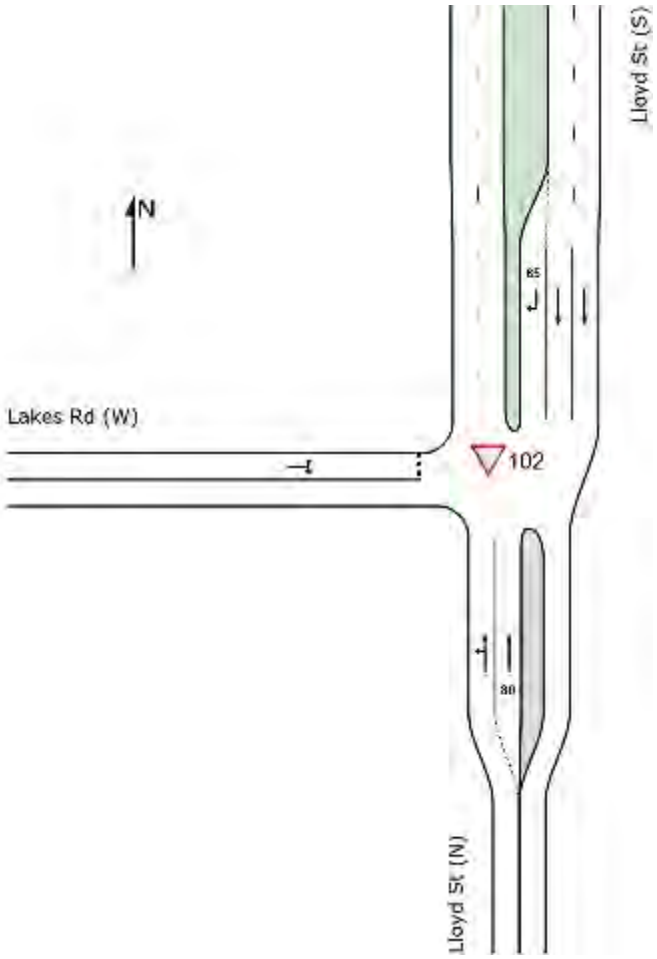


Table 9 – SIDRA Movement Summary for Lloyd Street/Lakes Road – Scenario 1

Intersection Approach		AM peak				PM Peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
Lloyd Street (N)	T	0.066	5.1	A	0	0.077	5.1	A	0
	R	0.024	0	A	0	0.023	0	A	0
Lloyd Street (S)	L	0.003	0	A	0	0.004	0	A	0
	T	0.025	6.3	A	1.2	0.091	6.9	A	5.5
Lakes Road (W)	L	0.153	4.9	A	6.6	0.187	5	A	6.3
	R	0.153	5.3	A	6.6	0.187	4.8	A	6.3
All Vehicles		0.153	4.3	A	6.6	0.187	4.7	A	6.3

5.7.1.2 Scenario 2

The SIDRA layout for the Lloyd Street/Lakes Road intersection is shown in **Figure 30** with the results summarised in **Table 10**.

Figure 33 – SIDRA Layout for Lloyd St/Lakes Rd (Left In, Left Out Option)

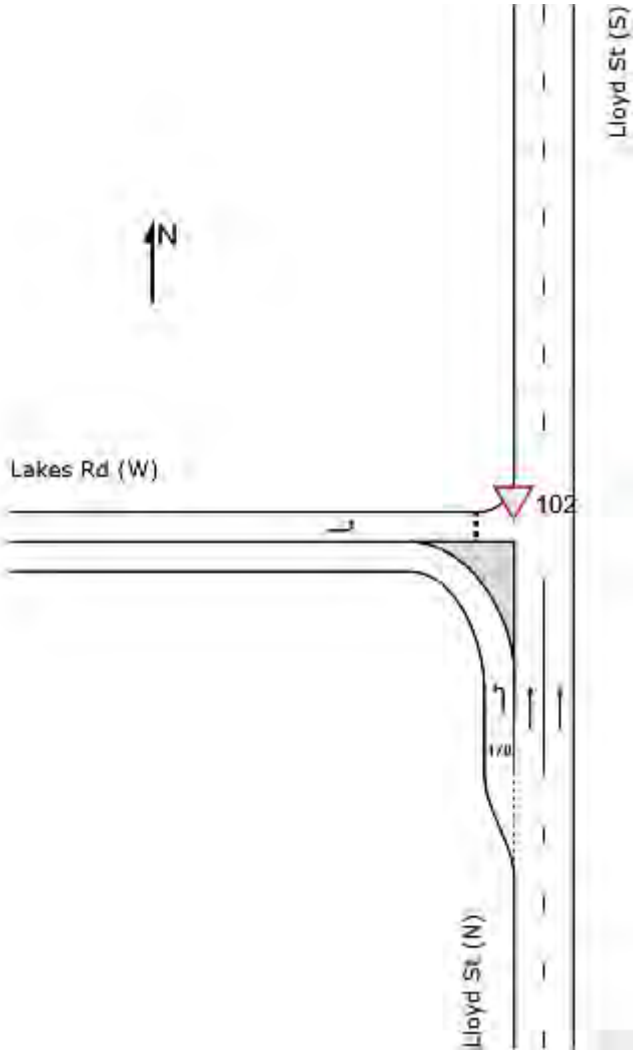


Table 10 – SIDRA Movement Summary for Lloyd Street/Lakes Road – Scenario 2

Intersection Approach		AM peak				PM Peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
Lloyd Street (S)	L	0.066	4.8	A	0	0.083	5	A	0
	T	0.277	0.1	A	0	0.482	0.3	A	0
Lakes Road (W)	L	0.119	8	A	4.3	0.667	35.9	E	31.9
All Vehicles		0.277	1.2	A	4.3	0.667	3.2	A	31.9

5.7.1.3 Scenario 3

The SIDRA layout for the Lloyd Street/Lakes Road intersection is shown in **Figure 31** with the results summarised in **Table 11** and .

Figure 34 – SIDRA Layout for Lloyd St/Lakes Rd (Roundabout Option)

Table 11 – SIDRA Movement Summary for Lloyd Street/Lakes Road (W) – Scenario 3

Intersection Approach		AM peak				PM Peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
Lloyd Street (N)	T	0.381	3.2	A	14.5	0.692	4.9	A	36.2
	R	0.381	2.8	A	14.5	0.692	4.1	A	36.2
	U	0.381	11.4	B	14	0.692	13.1	B	36
Lloyd Street (S)	L	0.476	5.2	A	15.3	0.588	5.6	A	21.7
	T	0.476	12.3	B	15	0.588	14.2	B	21.7
Lakes Road (W)	L	0.287	10.5	B	5.9	0.642	33.1	C	13
	R	0.287	19.3	B	5.9	0.642	29.2	C	13
All Vehicles		0.476	5.3	A	15.3	0.692	6.5	A	36.2

Table 12 – SIDRA Movement Summary for Lloyd Street/Lakes Road (E) – Scenario 3

Intersection Approach		AM peak				PM Peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
Lakes Road (E)	L	0.497	18.8	C	9.5	0.226	9.8	A	2.9
Lloyd Street (N)	L	0.117	4.4	A	0	0.15	4.5	A	0
	T	0.333	0	A	0	0.351	0	A	0
All Vehicles		0.497	3.1	A	9.5	0.351	1.5	A	2.9

5.7.1.4 Results Discussion

The SIDRA analysis indicates that the Lloyd Street / Lakes Road intersection operates satisfactorily in all the modelled scenarios. The worst movement across all three scenarios is the left turn from Lakes Road (west) into Lloyd Street (north) for Scenario 2 (LILO), which is LOS E. This is primarily due to the volume of traffic travelling northbound on Lloyd Street.

Scenario 3 analysis indicates that the proposed three-leg roundabout option also operates satisfactorily. This option would provide significant benefits to the Hazelmere Enterprise Area (HEA), including improved access from the north and a reduction in the volume of traffic (including large RAVs) performing U-turns at the Lloyd Street / Bushmead Road roundabout to access or egress Lakes Road.

Overall, the traffic generated by the proposed development will have no material impact on the operation of the surrounding network, whichever intersection configuration is ultimate decided upon.

6 SITE SPECIFIC ISSUES

6.1 Crossover Location

Access 3 (eastern crossover, entry only for trucks) is located in the same position as the crossover previously approved for the Site on Application DA-205/2021. The existing approval contemplates a full-movement crossover for a mixture of light and heavy vehicles.

Presently, the crossover is located approximately 120m from the Lloyd Street / Lakes Road intersection. Based on the available designs for the Lloyd Street Extension, it is unlikely that the offset between Lloyd Street and the crossover would reduce by any more than 10-20m (i.e. still >100m).

Based on the roundabout sketch layout prepared by Transcore; if a roundabout intersection was to be constructed, the crossover would be located approximately 80-85m beyond the circulating roadway of the roundabout.

Adopting a conservative 40km/h design speed for vehicles exiting the roundabout, Austroads *Guide to Road Design* indicates the downstream functional area to be approximately 40m. As the crossover will be located at least double that distance from the proposed roundabout, the crossover is anticipated to have no impact on the operation of the Lloyd Street / Lakes Road intersection.

7 SUMMARY

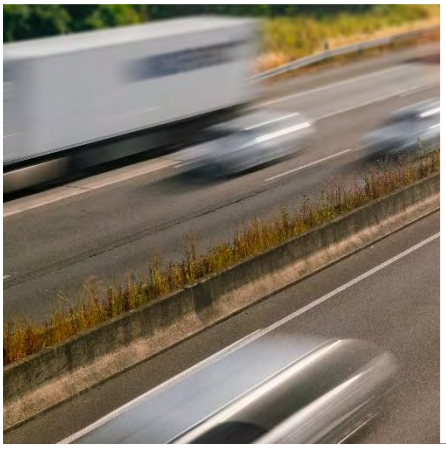
This report has been prepared in accordance with the Western Australian Planning Commission (WAPC) Transport Assessment Guidelines for Developments: Volume 4 – Individual Development.

The following conclusions have been made with regard to the proposed development:

- The proposal is for a warehouse development comprising the following:
  - Warehouse 1 – 22,500m^2
  - Warehouse 2 – 15,000m^2
  - Office (2 levels) – 1,000m^2
  - 169 car parking spaces
  - 30 loading docks
- A total of 169 car parking spaces will be provided. The statutory car parking requirement for the proposed development was estimated at 798 parking spaces which represents a shortfall of 629 spaces. However, it is anticipated that the proposed parking supply will be sufficient for the Site given the nature of modern warehouses that are less reliant on floor staff.
- A swept path analysis undertaken for the Site indicates that all crossovers and internal movements can be performed satisfactorily by each of the nominated design vehicles.
- The proposed development is expected to generate approximately 102 trips during both the AM and PM peak hour periods.
- The SIDRA results indicate that the Lloyd Street/Lakes Road intersection is expected to operate at satisfactorily for all assessment scenarios.
- Overall, the proposed warehouse development is expected to have no material impact on the traffic operations and safety of the surrounding road network.

Appendix A

WAPC Checklist

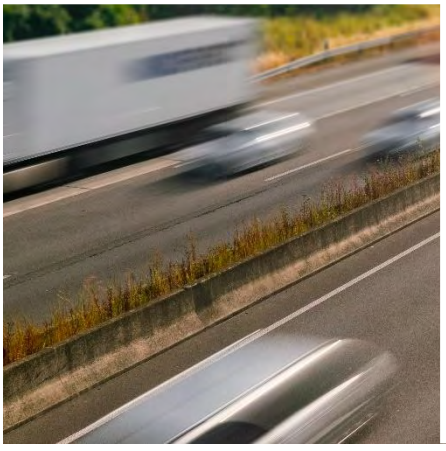


Item	Provided	Comments/Proposals
Summary		
Introduction/Background		
Name of Applicant and Consultant	Section 1	
Development Location and Context	Section 1	
Brief Description of Development Proposal	Section 1	
Key Issues	N/A	
Background Information	Section 1	
Existing Situation		
Existing Site Uses (If Any)	Section 2	
Existing Parking and Demand (If Appropriate)	Section 2	
Existing Access Arrangements	Section 2	
Existing Site Traffic	Section 2	
Surrounding Land Uses	Section 2	
Surrounding Road Network	Section 2	
Traffic Management on Frontage Roads	Section 2	
Traffic Flows on Surrounding Roads (Usually AM and PM Peak Hours)	Section 2	
Traffic Flows at Major Intersections (Usually AM and PM Peak Hours)	Section 2	
Operation of Surrounding Intersections	Section 2	
Existing Pedestrian/Cycle Networks	Section 2	
Existing Public Transport Services Surrounding the Development	Section 2	
Crash Data	Section 2	
Development Proposal		
Regional Context	Section 3	
Proposed Land Uses	Section 3	
Table of Land Uses and Quantities	Section 3	
Access Arrangements	Section 3	
Parking Provision	Section 3	
End of Trip Facilities	Section 3	
Any Specific Issues	Section 6	
Road Network	Section 3	
Intersection Layouts and Controls	Section 3	
Pedestrian/Cycle Networks and Crossing Facilities	Section 3	
Public Transport Services	Section 3	
Integration With Surrounding Area		
Surrounding Major Attractors/Generators	Section 4	

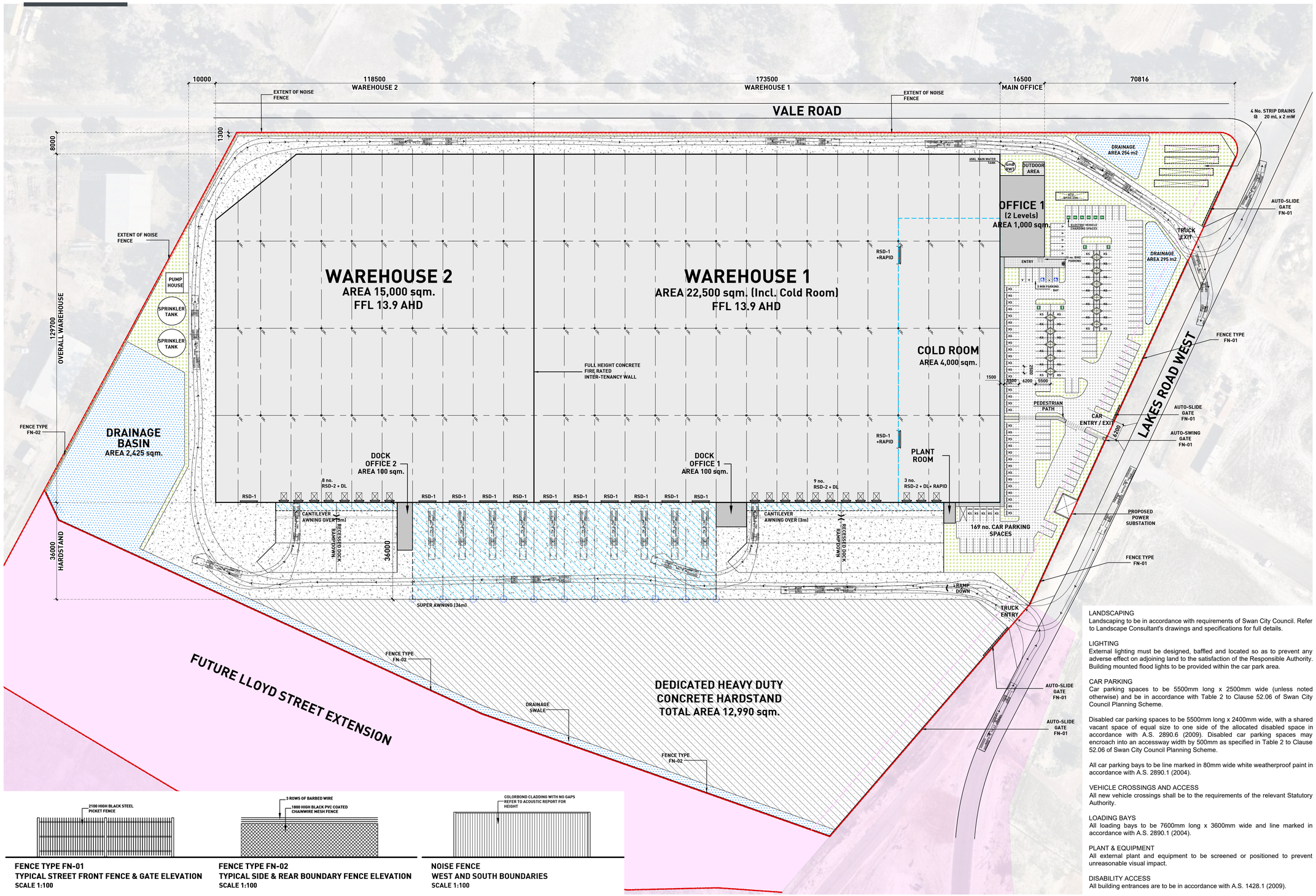
Committed Developments and Transport Proposals	Section 4	
Proposed Changes to Land Uses Within 1200 Metres	Section 4	
Travel Desire Lines from Development to These Attractors/Generators	Section 4	
Adequacy of Existing Transport Networks	Section 4	
Deficiencies in Existing Transport Networks	Section 4	
Remedial Measures to Address Deficiencies	Section 4	
Analysis Of Transport Networks		
Assessment Years	Section 5	
Time Periods	Section 5	
Development Generated Traffic	Section 5	
Distribution of Generated Traffic	Section 5	
Parking Supply & Demand	Section 5	
Base and "With Development" Traffic Flows	Section 5	
Analysis of Development Accesses	Section 5	
Impact on Surrounding Roads	Section 5	
Impact on Intersections	Section 5	
Impact on Neighbouring Areas	Section 5	
Traffic Noise and Vibration	N/A	
Road Safety	Section 2	
Public Transport Access	Section 2	
Pedestrian Access/Amenity	Section 2	
Cycle Access/Amenity	Section 2	
Analysis of Pedestrian/Cycle Networks	Section 2	
Safe Walk/Cycle to School (For Residential and School Site Developments Only)	N/A	
Traffic Management Plan (Where Appropriate)	N/A	
Conclusions	Section 7	

Appendix B

Site Plans



FOR DEVELOPMENT APPLICATION ONLY
SUBJECT TO STATUTORY APPROVAL



FENCE TYPE FN-01
TYPICAL STREET FRONT FENCE & GATE ELEVATION
SCALE 1:100

FENCE TYPE FN-02
TYPICAL SIDE & REAR BOUNDARY FENCE ELEVATION
SCALE 1:100

NOISE FENCE
WEST AND SOUTH BOUNDARIES
SCALE 1:100

DEVELOPMENT SUMMARY

SITE AREA	78,702	sqm. approx.
Total Drainage Basin & Swale Area	3,940	sqm. approx.
Total Dry Landscape Area	4,095	sqm. approx.
Total Pedestrian & Outdoor Paving Area	325	sqm. approx.
Net Developable Site Area	70,342	sqm. approx.
Warehouse 1 (Incl. Cold Room)	22,500	sqm.
Main Office 1 (2 Levels)	1,000	sqm.
Dock Office 1	100	sqm.
Plant Room	35	sqm.
Warehouse 2	15,000	sqm.
Dock Office 2	100	sqm.
TOTAL BUILDING AREA	38,735	sqm.
Total Heavy Duty Paving Area (Concrete)	14,535	sqm. approx.
Total Dedicated Heavy Duty Paving Area (Concrete)	12,990	sqm. approx.
Total Light Duty Paving Area	4,470	sqm. approx.
Total Cantilever Awning Area (3m)	360	sqm. approx.
Total Super Awning Area (36m)	4,070	sqm. approx.
Total Car Parking Provided	169	spaces

EXTENT OF HEAVY DUTY PAVING AREA

EXTENT OF HEAVY DUTY DEDICATED CONCRETE HARDSTAND

EXTENT OF LIGHT DUTY PAVING AREA (RED ASPHALT)

EXTENT OF LANDSCAPE AREA

EXTENT OF AWNING AREA

EXTENT OF DRAINAGE BASING & SWALE AREA

TREE WELL AT 2.3m x 1.75m (250mm CONCRETE FLUSH KERB) TO BE PROVIDED TO CARPARKING

FENCING

EXTENT OF NOISE FENCE

KS KERB STOP

EXISTING PRIVATE SEWER RISING MAIN TO BE RELOCATED

RSD-1 ROLLER SHUTTER DOOR 6mW x 6mH

RSD-1 +RAPID ROLLER SHUTTER DOOR 6mW x 6mH + SAME SIZE RAPID ROLL DOOR

RSD-2+DL ROLLER SHUTTER DOOR 2.7mW x 3.3mH + DOCK LEVELLER

RSD-2+DL +RAPID ROLLER SHUTTER DOOR 2.7mW x 3.3mH + DOCK LEVELLER + SAME SIZE RAPID ROLL DOOR

LANDSCAPING
Landscaping to be in accordance with requirements of Swan City Council. Refer to Landscape Consultant's drawings and specifications for full details.

LIGHTING
External lighting must be designed, baffled and located so as to prevent any adverse effect on adjoining land to the satisfaction of the Responsible Authority. Building mounted flood lights to be provided within the car park area.

CAR PARKING
Car parking spaces to be 5500mm long x 2500mm wide (unless noted otherwise) and be in accordance with Table 2 to Clause 52.06 of Swan City Council Planning Scheme.

Disabled car parking spaces to be 5500mm long x 2400mm wide, with a shared vacant space of equal size to one side of the allocated disabled space in accordance with A.S. 2890.6 (2009). Disabled car parking spaces may encroach into an accessway width by 500mm as specified in Table 2 to Clause 52.06 of Swan City Council Planning Scheme.

All car parking bays to be line marked in 80mm wide white weatherproof paint in accordance with A.S. 2890.1 (2004).

VEHICLE CROSSINGS AND ACCESS
All new vehicle crossings shall be to the requirements of the relevant Statutory Authority.

LOADING BAYS
All loading bays to be 7600mm long x 3600mm wide and line marked in accordance with A.S. 2890.1 (2004).

PLANT & EQUIPMENT
All external plant and equipment to be screened or positioned to prevent unreasonable visual impact.

DISABILITY ACCESS
All building entrances are to be in accordance with A.S. 1428.1 (2009).

NOTE:

- This concept plan is intended for Development Application purposes only. All setbacks, site coverage, car parking numbers, landscape areas and the like are subject to statutory approval.
- No assurance is given as to the features, attributes, feasibility or accuracy of anything shown on or disclosed in this plan.
- All existing & proposed features, dimensions, areas and boundaries are approximate only and subject to verification via detailed site survey by licensed surveyor.

CLIENT:
HESPERIA

concept
Suite 307
546 Collins Street
Melbourne VIC 3000
t: (03) 9978 9888
e: architect@concepty.com.au

PROPOSED DEVELOPMENT

LOTS 119 & 808, LAKES ROAD, HAZELMERE WA

SITE PLAN

DRAWING TYPE: DEVELOPMENT APPLICATION
DRAWING NUMBER: 2411-169-DA-021
REVISION: B
DATE: 01.08.2024
SCALE: 1:700 @ A1 / 1:1400 @ A3
0 35 70
SCALE BAR @ A1

Appendix C

Swept Path Analysis

10000 | 118500 WAREHOUSE 2 | 173500 WAREHOUSE 1 | 16500 MAIN OFFICE | 70816

EXTENT OF NOISE FENCE

VALE ROAD

EXTENT OF NOISE FENCE

1300

4 No. STRIP DRAI
@ 20 mL x 2
mW

65KL RAIN WATER TANK

Amo RWT

OFFICE 1
(2 Levels)
AREA 1,000 sqm.

ATU
Ø12m x3m

ELECTRIC VEHICLE CHARGING SPACES

TRUCK EXIT

AUTO-SL
GATE
FN-01

DRAINAGE AREA 'A'

DRAINAGE AREA 'B'

16 no. BIKE PARKING

ENTRY

5 MIN PARKING BAY

WAREHOUSE 2
AREA 15,000 sqm.
FFL 13.9 AHD

WAREHOUSE 1
AREA 22,500 sqm. (Incl. Cold Room)
FFL 13.9 AHD

RSD-1
+RAPID

COLD ROOM
AREA 4,000 sqm.

FULL HEIGHT CONCRETE FIRE RATED INTER-TENANCY WALL

FENCE TYPE FN-01

2500

1500 6200 5500

PEDESTRIAN PATH

CAR ENTRY EXIT

AUTO-SLIDE GATE FN-01

6200

AUTO-SWING GATE FN-01

PUMP HOUSE

SPRINKLER TANK

SPRINKLER TANK

DOCK OFFICE 2
AREA 100 sqm.

DOCK OFFICE 1
AREA 100 sqm.

PLANT ROOM

3 no. RSD-2 + DL+ RAPID

8 no. RSD-2 + DL

9 no. RSD-2 + DL

RSD-1

CANTILEVER AWNING OVER (3m)

RAMP DOWN

RECESSED DOCK

3600

SUPER AWNING (36m)

169 no. CAR PARKING SPACES

PROPOSED POWER SUBSTATION

FENCE TYPE FN-01

RAMP DOWN

TRUCK ENTRY

AUTO-SLIDE GATE FN-01

AUTO-SLIDE GATE FN-01

FUTURE LLOYD STREET EXTENSION

FENCE TYPE FN-02

DRAINAGE SWALE

FENCE TYPE FN-02

DEDICATED HEAVY DUTY CONCRETE HARDSTAND
TOTAL AREA 12,990 sqm.

4200 13700

1400 9500

200

1600 5300

PM S 19M

	mm		
Tractor Width	: 2500	Lock to Lock Time	: 6.0
Trailer Width	: 2500	Steering Angle	: 27.8
Tractor Track	: 2500	Articulating Angle	: 70.0
Trailer Track	: 2500		

10000 | 118500 WAREHOUSE 2 | 173500 WAREHOUSE 1 | 16500 MAIN OFFICE | 70816

VALE ROAD

EXTENT OF NOISE FENCE

1300

WAREHOUSE 2
AREA 15,000 sqm.
FFL 13.9 AHD

WAREHOUSE 1
AREA 22,500 sqm. (Incl. Cold Room)
FFL 13.9 AHD

FULL HEIGHT CONCRETE FIRE RATED INTER-TENANCY WALL

COLD ROOM
AREA 4,000 sqm.

OFFICE 1
(2 Levels)
AREA 1,000 sqm.

65KL RAIN WATER TANK
Ama RWT

ATU
@12m x3m

ELECTRIC VEHICLE CHARGING SPACES

TRUCK EXIT

DRAINAGE AREA 2,425 sqm.

PUMP HOUSE
SPRINKLER TANK
SPRINKLER TANK

DRAINAGE BASIN
A 2,425 sqm.

RSD-1 +RAPID

ENTRY

6 no. BIKE PARKING

5 MIN PARKING BAY

KS

2500
1500 6200 5500

PEDESTRIAN PATH

CAR ENTRY EXIT

AUTO-SLIDE GATE FN-01

6200

AUTO-SWING GATE FN-01

FENCE TYPE FN-01

DOCK OFFICE 2
AREA 100 sqm.

DOCK OFFICE 1
AREA 100 sqm.

PLANT ROOM

3 no. RSD-2 + DL+ RAPID

8 no. RSD-2 + DL

9 no. RSD-2 + DL

RSD-1

CANTILEVER AWNING OVER (3m)

RAMP DOWN

RSD-2 PASS DOOR

3600

169 no. CAR PARKING SPACES

PROPOSED POWER SUBSTATION

FENCE TYPE FN-01

SOLAR AWNING (36m)

RAMP DOWN

TRUCK ENTRY

FUTURE LLOYD STREET EXTENSION

FENCE TYPE FN-02

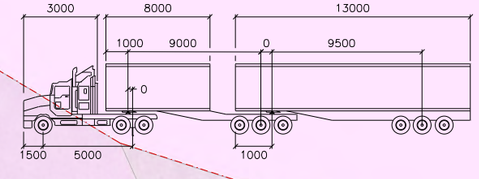
DRAINAGE SWALE

DEDICATED HEAVY DUTY CONCRETE HARDSTAND
TOTAL AREA 12,990 sqm.

AUTO-SLIDE GATE FN-01

AUTO-SLIDE GATE FN-01

FENCE TYPE FN-02

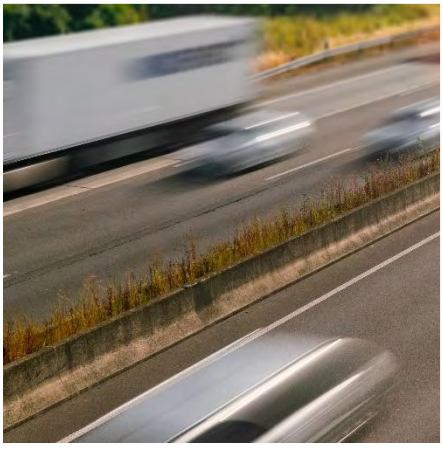


MRWA RAV 2(C) – REV1
mm

Tractor Width	: 2500	Lock to Lock Time	: 6.0
Trailer Width	: 2500	Steering Angle	: 26.1
Tractor Track	: 2500	Articulating Angle	: 70.0

Appendix D

Extract from Urbsol Report



Other relevant parameters were coded into the models as per Main Roads' preference, most critically for this exercise, the various vehicle class characteristics; due to the relatively high proportion of higher vehicle classes expected in this part of the network.

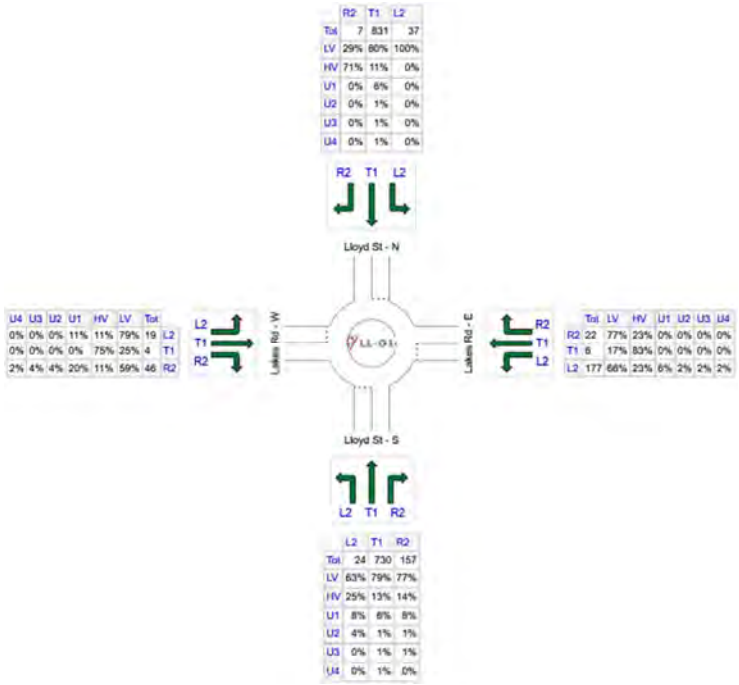


Figure 2 2036 AM Peak Traffic Projections

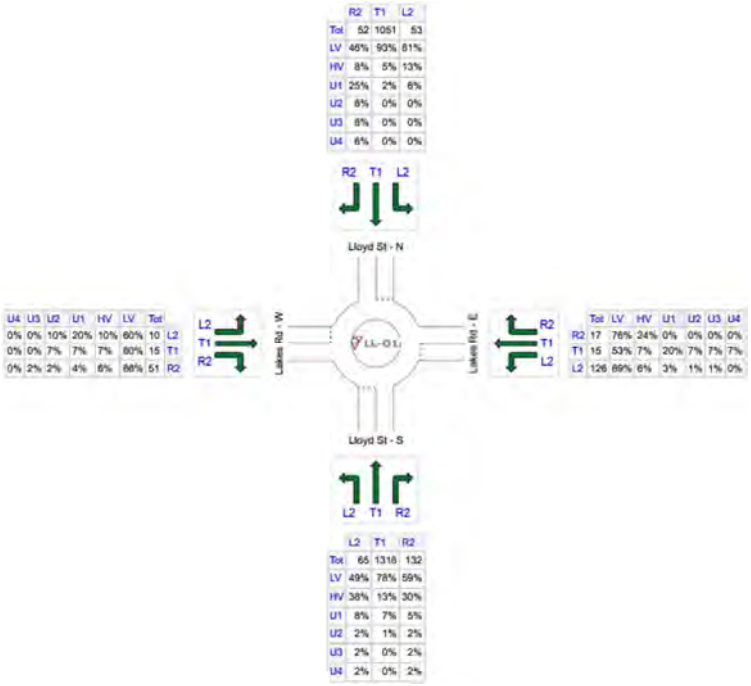


Figure 3 2036 PM Peak Traffic Projections

www.ptgconsulting.com.au

Attachment 9

Galt GEOTECHNICS

Report on:

SITE AND SOIL EVALUATION PROPOSED WAREHOUSE DEVELOPMENT LOTS 119 AND 808 LAKES ROAD HAZELMERE WA

WAG240385-01 001 R Rev1 SSE

Submitted to:

HIF 54LR Pty Ltd as Trustee for the 54 Lakes Road Trust
PO Box 872
SUBIACO WA

31 July 2024

CONTENTS

1. INTRODUCTION

This revised report presents the outcomes of Galt Geotechnics' (Galt's) Site and Soil Evaluation (SSE) for the proposed warehouse development, at Lots 119 and 808 Lakes Road, Hazelmere WA ("the site", refer Appendix A).

This revision includes a revised development layout and hydraulic loading.

This report is to be read in conjunction with the appended "Requirements and Limitations" found at the back of this report.

2. DEFINITIONS

Site and Soil Evaluation (SSE): an assessment of all relevant constraints and the risks to public health and the environment in accordance with AS1547-2012 "On-site domestic wastewater management". This SSE is a general assessment SSE, with the purpose being to undertake a site suitability assessment for onsite wastewater management and to recommend the type of onsite wastewater system for the proposed development.

A specific assessment is required to support an "application to install" an onsite wastewater system. This is for when a particular type of system/model is proposed, and a detailed design, including management recommendations and operation requirements. This document is not a specific assessment.

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

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

Effluent: The liquid discharged from a wastewater treatment unit.

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

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

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

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

3. GOVERNING STANDARDS, REGULATIONS AND POLICIES

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

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

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

SSEs can be rejected on the basis of not meeting the regulatory requirements of the above. This report is intended to address all these various requirements.

4. SITE DESCRIPTION

Table 1: Summary of Site

Item	Comment
Site Extent	About 7 Ha
Site Area	Refer In Line Image 1 and Appendix A.
Current Site Surface Levels[1]	About RL 12.4 m AHD in the south to RL 14.4 m AHD in the north
Vegetation	Typically none
Current Land Use	Hardstand / laydown area
Site Drainage	Surface runoff directed to south west and south east over gently sloping site. Drainage swale along Vale Road diverts stormwater runoff towards culvert near south west corner of site. Culvert diverts stormwater to Hazelmere Lake South, about 150 m west of site.
Site History[2]	**Prior to 2020**: Generally Pastoral land. **2021 to 2023**: Earthworks in various stages. **2023 to present**: used as a laydown area.

NOTES: ***1.*** *Site levels based on feature survey provided.*

2. *Site history based on aerial imagery (Landgate).*

5. PROPOSED DEVELOPMENT

Table 2: Summary of Proposed Development

Item	Comment
Proposed Development	Warehouse development
Cut/Fill	Typically about ± 2 m across development. At proposed LAA, a level of about RL13.9 m AHD is proposed, which would require cut / fill of about ± 0.5 m.
Assumed Stormwater Disposal	Drainage basin proposed in north and south of site, possibly with overflow to Hazelmere Lake South (refer Appendix A).
Assumed Sewage Disposal	Via leach drains in north west corner of site (refer Appendix A).

6. PRELIMINARY HYDRAULIC LOADING

We have been provided with the following wastewater flow rates which we understand were derived using Health Regulations 29. We have assumed that no industrial liquid waste is to be disposed of on site.

Table 3: Summary of Preliminary Hydraulic Loading

Source	Personnel	Rate (L/ person/day)	Total Volume (L/day)
Full Time Staff, Members - Office and Warehouse (non showering)	130	30	3,900
Full Time staff - showering	10	70	700
Visitors	20	10	200
TOTAL	-	-	**4,800**

7. GEOTECHNICAL INFORMATION PROVIDED

We have been provided with a geotechnical investigation report prepared by Douglas Partners dated February 2021 (project reference 82463.01, document number R.001.Rev0) which has been relied upon. This report is included in Appendix B. The investigation work summarised in the report includes:

- Excavation of 23 test pits (TP01 to TP23), extending to depths of 1.6 m to 3.5 m. Dynamic Cone Penetrometer (DCP) testing was undertaken adjacent each test pit; and
- Falling head permeability testing in shallow boreholes adjacent TP03, TP09, TP14 and TP22 at depths of about 0.5 m to 1.1 m. The testing measured unsaturated hydraulic conductivities of about 6 m/day to over 15 m/day in surficial sand soils.

The location of the test pits are shown on In Line Image 1.

We have also been provided with a stormwater management plan, prepared by Hyd$_2$o Hydrology dated 24 February 2021 (referenced H20106Av2). The report indicates an Average Annual Maximum Groundwater Level (AAMGL) of about RL 12 m AHD to RL 12.5 m AHD across the site (refer In Line Image 2).

8. SITE CONDITIONS

8.1. Geology

Table 4: Summary of Geology Mapping

Map Sheet	Map Scale	Mapped Soils	Site Findings
Perth	1:50,000	A relatively thin layer of Bassendean Sand overlying typically clay / clayey soils of the Guildford Formation	**Surficial SAND** about 0 m to over 3 m thick, over layers of **COFFEE ROCK and / or CLAYEY / SILTY SOILS.**

NOTE: Thin surficial topsoil layers generally present over the site.

8.2. Ground Model

The subsurface conditions encountered by Douglas Partners (refer Section 7) can be summarised as comprising:

Generally north west portion of site (refer In Line Image 1):

- **Surficial TOPSOIL SAND (SP)** up to about 0.08 m to 0.25 m thick; overlying
- **SAND (SP)**, fine to medium grained, pale grey / white / yellow brown, trace fines, loose to dense, extends to depths of about 1.7 m to over 3.2 m; overlying
- **Layers of Coffee Rock (in TP01, TP03, TP04, TP06 and TP08) and / or Clayey SAND (in TP07, TP08).**

Generally south east portion of site (area hatched blue on In Line Image 1):

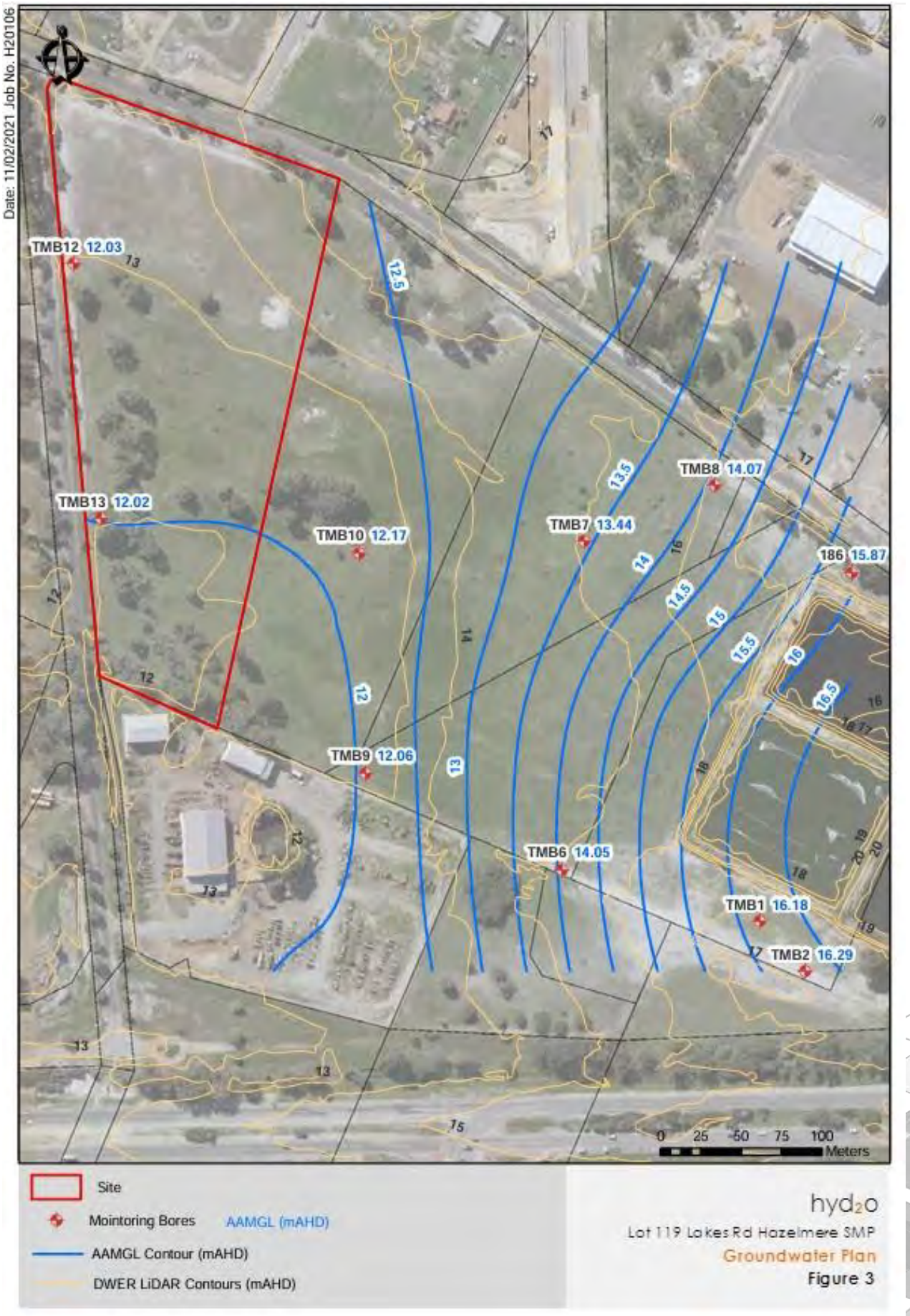
- **Surficial TOPSOIL SAND (SP)** up to about 0.08 m to 0.25 m thick; overlying
- **SAND (SP)**, fine to medium grained, pale grey / white / yellow brown, trace / with fines, loose to dense, extends to depths of up to 1.2 m, not encountered in TP21; overlying
- **Layers of Coffee Rock, Silty SAND, Clayey SAND, Clayey Gravelly SAND, Sandy CLAY (SM/SC/CH)**.

In proposed LAA (around TP01 to TP03, In Line Image 1):

- **Surficial TOPSOIL SAND (SP)** up to about 0.08 m to 0.25 m thick; overlying
- **SAND (SP)**, fine to medium grained, pale grey / white / yellow brown, trace fines, loose to dense, extends to depth of at least 2.7 m; overlying
- **Coffee Rock (in TP01 and TP03 only)**, typically logged as a dark brown, moderately cemented Silty SAND.

Inline Image 1 – Douglas Partners test pit locations. Nominal site boundary shown in red. Nominal area of encountered shallow clayey soils indicated in blue shading.

Inline Image 2 – Excerpt from Hyd2o Hydrology report indicating AAMGL for site



8.3. Groundwater and Surface Water

Table 5: Summary of Groundwater and Surface Water Levels

Item	Date	Depth Range (m)	Elevation Range (m AHD)	Comment
Perth Groundwater Atlas[1]	2004	-	7.0	End of summer level in 2004
	2019	-	9.0 to 11.0	Measured groundwater fluctuation in 2019
Douglas Partners Site observations	January 2021	1.5 to 2.3	9.6 to 11.0	Only measured / encountered in TP16, TP18, TP20 and possibly TP22 on day of investigation only (Refer Section 7).
DBCA Mapping	-	-	-	Portion of site to south of proposed LAA mapped as a dampland.
Hyd2o Hydrology report	February 2021	-	12.0 to 12.5	AAMGL (Refer Section 7).
Design water level at proposed LAA	-	-	12.2[3]	Inferred from In Line Image 1 **for proposed LAA in north west corner of site only.**

NOTES: ***1.*** *Perth Groundwater Atlas observations based on levels in nearby boreholes.*

9. SITE ASSESSMENT

9.1. General

The results of our site assessment are presented in Attached Table 1.

9.2. Horizontal Setbacks

Table 6: Required Horizontal Setback Distances (AS1547)

Feature	Sub-Type	Horizontal Setback Distances (m)
Treatment tanks to buildings, property boundaries, driveways, paths and other tanks	-	1.2
Trenches, beds and soak wells to boundary, building, tanks and other land application systems	-	1.8
Trenches, beds and soak wells to trafficable areas	-	1.2
Any land application system to wells, streams, private bores or underground source of water intended for human consumption	-	30.0
Trenches, beds and soak wells to subsoil drains or open drainage channels	-	6.0
Spray irrigation	Boundaries, buildings, driveways etc.	1.8
	Subsoil and open drains	6.0
	Swimming pools	3.0
	Treatment tanks	1.2
Subsurface Drippers	Boundaries, buildings, driveways etc.	0.5
	Subsoil and open drains	3.0
	Swimming pools	2.0
	Garden bore	10.0
On-site waste system to water resources (river, stream etc.)	-	100.0

9.3. Land Application Areas

9.3.1. Government Sewerage Policy (GSP, 2019)

The minimum LAA size in accordance with the GSP (2019) has been calculated and is shown below. The LAA may need to be resized if the hydraulic loading changes.

Table 7: GSP LAA Calculation

Soil Category (AS1547)	Conversion Factor (Table 2 of GSP)	Hydraulic Loading (L/day, Section 6)	Minimum LAA (m^2)
1	0.2	4,800	960

9.3.2. Water Balance

Water balance calculations are presented in Appendix C.

The proposed leach drain configuration must have a greater infiltrative area than the minimum required to meet the infiltrative area requirements (in accordance with the WA Health Regulations Method). The leach drains must be installed to meet the horizontal setback requirements outlined in Section 9.2. The LAA must be clearly shown on drawings including setbacks to meet the required area.

9.3.3. Summary

The minimum leach drain infiltrative area for the proposed loading is 104 m^2, within a minimum 960 m^2 total LAA. This may need to be resized if the hydraulic loading changes.

A detailed plan will be required with the application to install that shows that the required setbacks are met.

10. SOIL ASSESSMENT

Details of our soil assessment are presented in Attached Table 2.

11. SITE SUITABILITY AND RECOMMENDATIONS

Based on our assessment, the site is suitable for disposal of wastewater. Wastewater must have secondary treatment (i.e. an ATU). The WA Health Regulations method indicates a minimum LAA of 960 m^2 is required for wastewater disposal, with the LAA appropriately set back from drains, driveways, site boundaries, buildings etc.. This will need to be resized if the hydraulic loading changes.

LAA Location and Setbacks

The nominal location of the proposed LAA in the north western portion of the site is indicated on the development plan in Appendix A. The proposed LAA will need to satisfy the setback requirements, including meeting the appropriate distances from site boundaries, buildings, trafficable areas, drainage basins and driveways etc…

Disposal Method

We recommend the use of leach drains for wastewater disposal.

Separation to Groundwater and LAA Surface Level

The base of the disposal area (i.e., underside of leach drains) must be minimum 1.5 m above maximum groundwater levels. Based on the information available (refer Table 5), this could require a leach drain invert level of about RL 13.7 m AHD, and filling to about RL 14.0 m AHD. Stormwater runoff must be diverted away from the disposal area to ensure groundwater levels are controlled in the vicinity of the LAA.

Treatment Units

The wastewater may be treated using an ATU (secondary treatment), also known as aerated wastewater treatment systems (AWTS). ATU's use the processes of aeration followed by clarification to achieve biological treatment of wastewater.

ATU's (or any other proposed system) must be certified to AS1546.3 (2008) and require approval by the Chief Health Officer. A list of approved ATU's is presented in Table 2 on the Department of Health website. The selected ATU must meet the hydraulic loading for the site and must treat sewage to achieve the following nutrient targets:

- Phosphorous: <1 mg/L
- Nitrogen: <10 mg/L

Soil Improvement

Improvement of the disposal areas must be done to achieve a phosphorous retention index (PRI) of at least 20, and monitored 3-yearly, in accordance with Department of Health requirements. This can be done with a product like 'gypsum', or by importing a high-PRI sand from off site. Improvement must be carried out to a minimum depth of 200 mm below the base of all infiltration zones and at least 0.5 m in plan outside the ETA / ETS trenches and beds.

12. CLOSURE

GALT GEOTECHNICS

Owen Woodland CPEng
Geotechnical Engineer

Tyrone Mardesic CPEng
Geotechnical Engineer

https://galtgeo.sharepoint.com/sites/wag240385/shared documents/01 hesperia sse/03 correspondence/wag240385-01 001 r rev1 sse.docx

Attached Table 1: Site Assessment

Consideration	Assessment / Discussion	Reference	Level of Constraint	Mitigation Measures
Geology	Described on map as Bassendean Sand overlying typically clay / clayey soils of the Guildford Formation.	Perth Sheet of the 1:50,000 Environmental Geology Series Map	Nil	-
Climate	To satisfy zero storage requirements, minimum LAA's to be sized as required for hydraulic loading.	Appendix C, Water Balance Calculation	Low	LAA to be greater than area required to meet zero storage requirement.
Exposure	Site will be cleared and broadly levelled - minimal/no tree cover or significant site aspect.	-	Low	-
Vegetation	Assume light grass at surface, no significant vegetation	-	Moderate	LAA designed to accommodate water balance and have nutrient stripping capabilities.
Landform and Drainage	Surrounding stormwater diverted to Hazelmere Lake South, about 150 m west of site. Surface runoff to be directed to proposed drainage basins in north and south of site, possibly with overflow to Hazelmere Lake South about 150 m west of site (refer Appendix A).	-	Low to Moderate	Civil design to minimise rainfall run-on and run-off (using bunds/curbs etc.).
Slope	The site has a gentle slope generally to south.	-	Low	Slope is <5% grade.
Fill (Imported)	Site will require minor fill to achieve water separation (possibly about 1 m). Imported fill must be high permeability sand soil (Soil Category 1).	-	Low	Imported fill must high permeability sand soil (Soil Category 1).
PDWSAs	The site is **not** mapped as being within a public drinking water source area.	Department of water (DoW) mapping service	-	-
SSAs	The site is mapped as a Sewage Sensitive Area (within the estuary catchment of the Swan River Plain)	Department of lands and heritage (DPLH) mapping service.	Moderate	ATU's must be used for effluent treatment (Secondary treatment is required). 1.5 m vertical clearance from base of disposal area to maximum known water level is required.

Attached Table 1: Site Assessment CONTINUED (Page 2 of 2)

Consideration	Assessment / Discussion	Reference	Level of Constraint	Mitigation Measures
Groundwater Level	AAMGL of about RL12.2 m AHD inferred for LAA from Information provided, (refer Section 7, Table 5, and In Line Image 2).	Table 5	Moderate	The underside of any disposal area (i.e. leach drains) must be at least 1.5 m above maximum groundwater levels. This could require this could require a leach drain invert level of about RL 13.7 m AHD, and filling to about RL 14.0 m AHD (assuming flatbed leach drains). Stormwater runoff must be diverted away from the disposal area to ensure groundwater levels are controlled in the vicinity of the LAA.
Groundwater Separation	Because the site is in an SSA, a minimum separation of 1.5 m is required from the base of the disposal area to the maximum known groundwater level.	Government Sewerage Policy (2019)	Moderate	See comment above
Rainfall Run-on/Seepage	There is a gentle slope down towards the south. Some rainfall run-on and run-off may occur	-	Moderate	Incident rainfall must be diverted away from LAA's using curbs or diversion bunds. Similarly, any run-off must be prevented by either having a level LAA, or by using retention bunds.
Surface Water/Water Resources	Surface water could occur in the table drains along Vale Road along the western site boundary. Drainage basins are proposed in the north and south of site, which could possibly have standing water during winter.	-	Moderate	The required minimum setbacks to water resources must be met for the proposed LAA configuration. Over 100 m set back between Proposed LAA and Hazelmere Lake South. Setback of 6 m required between LAA and nearby drainage basins.
Flood Potential	The site is **not** in a floodplain area	DWER floodplain mapping	Low	-
Setbacks	All setbacks to be met.	Section 9.2	Moderate	LAA to meet setback requirements.
LAA	Within the LAA, minimum 104 m^2 is required to meet the minimum infiltrative area for leach drains, based on assumed hydraulic loading. The minimum total LAA area by the GSP 2019 method is 960 m^2 and should not be dual use. This will need to be resized as required for the hydraulic loading if a different hydraulic loading applies.	Section 9.3.3	Moderate	LAA to be sized to meet the minimum required infiltrative area and setbacks. Design Loading Rate to be confirmed.

Attached Table 2: Soil Assessment

Consideration	Assessment / Discussion				Reference	Level of Constraint	Mitigation Measures
Subsurface Soil Conditions	At proposed LAA, soil conditions generally comprise SAND to at least 2.7 m depth (Category 1 to 2 soil) over COFFEE ROCK (logged as Cemented Silty SAND)				Section 8.2	Low	-
Acid Sulfate Soils	Site soils are mapped as "moderate to low" risk of ASS. No indicators of ASS are noted, and the LAA will be above groundwater.				Department of Environmental Regulation (DER) mapping	Low	-
Soil Category	Insitu SAND Soil Category 1 based on falling head testing done by Douglas Partners.				AS1547-2012	Low to Moderate	-
Design Loading Rates	50 mm/day				Table L1, AS1547-2012	-	Secondary treated effluent
Laboratory Testing	**Level of Constraint**						-
	Result	**Low**	**Medium**	**High**			
Coarse Fragments[1]	<10	<10%	10-40%	>40%	-	Low	Erosion risk is relatively low for sand and can be controlled using vegetation etc.. as per civil design requirements.
Phosphorous Retention Index (PRI)[2]	<5 (Presumptive)	>20	5-20	<5		Low to Moderate	Bassendean sand as found on the site is known to have a low PRI. Therefore, the upper 0.2 m of soil below the disposal area must comprise either imported high PRI (PRI>20) sand, or the in situ sand amended with gypsum to improve nutrient stripping capability.
pH[1]	NA	6-8	4.5-6	<4.5,>8		-	Erosion risk is relatively low for sand and can be controlled using vegetation etc.. as per civil design requirements.
Exchangeable Sodium Percentage[1]	NA	<10	10-20	<20		-	
Electric Conductivity (dS/m)[1]	NA	<0.3	0.3 – 2.0	>2.0		-	
Emerson Class[1]	NA	> 4	4	1 - 3		-	

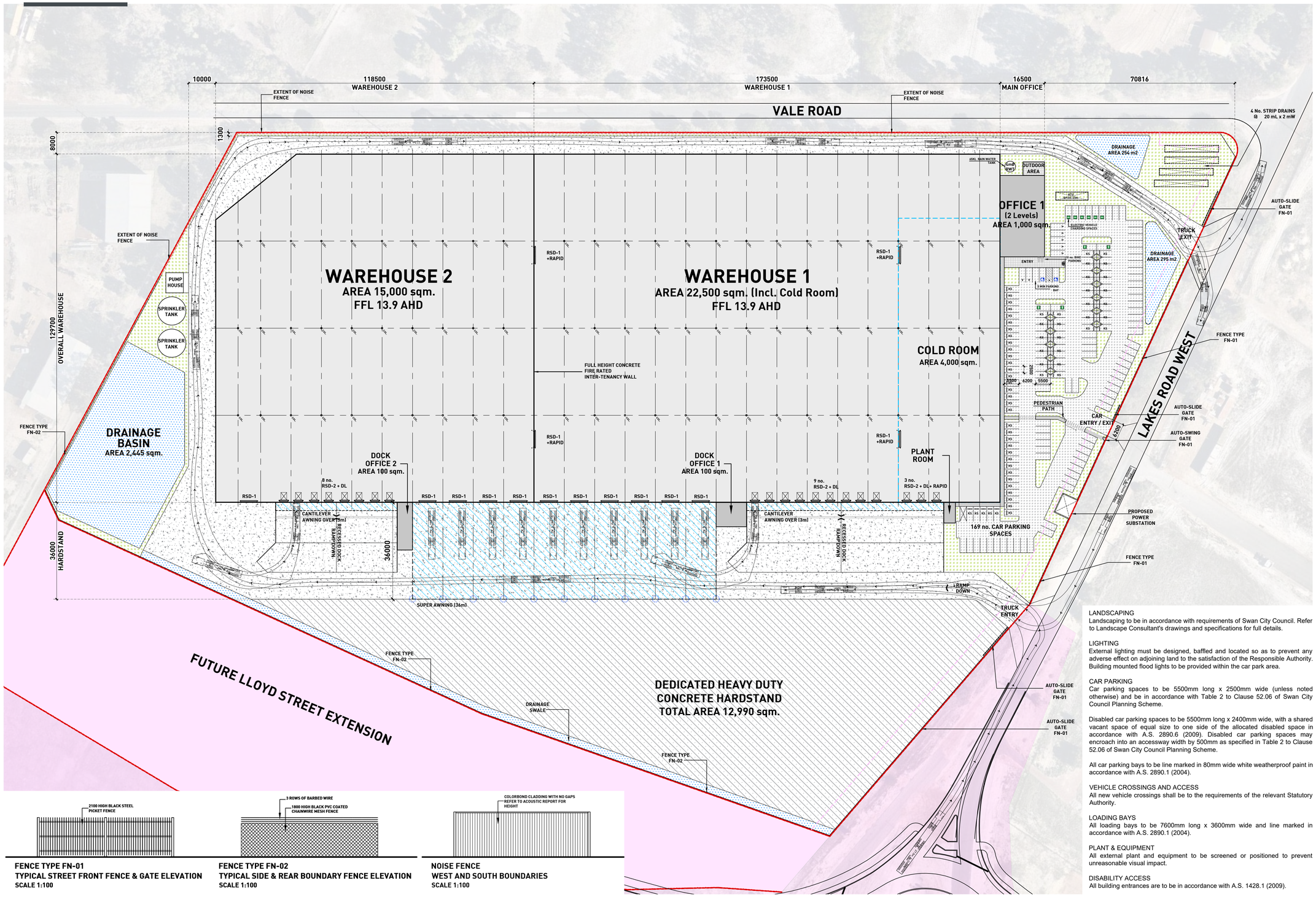
Notes

1. *Level of constraint based on our interpretation of AS1547 description of "non-dispersive soils".*
2. *Phosphorus retention index requirements are based on our interpretation of The Department of Primary Industries and Regional Development Standards for Land Resource Mapping (2005), as this is not specified in AS1547.*

Appendices

Appendix A: Proposed Development Plan Provided

FOR DEVELOPMENT APPLICATION ONLY
SUBJECT TO STATUTORY APPROVAL



FENCE TYPE FN-01
TYPICAL STREET FRONT FENCE & GATE ELEVATION
SCALE 1:100

FENCE TYPE FN-02
TYPICAL SIDE & REAR BOUNDARY FENCE ELEVATION
SCALE 1:100

NOISE FENCE
WEST AND SOUTH BOUNDARIES
SCALE 1:100

DEVELOPMENT SUMMARY

SITE AREA	78,702	sqm. approx.
Total Drainage Basin & Swale Area	3,825	sqm. approx.
Total Dry Landscape Area	4,210	sqm. approx.
Total Pedestrian & Outdoor Paving Area	325	sqm. approx.
Net Developable Site Area	70,342	sqm. approx.
Warehouse 1 (Incl. Cold Room)	22,500	sqm.
Main Office 1 (2 Levels)	1,000	sqm.
Dock Office 1	100	sqm.
Plant Room	35	sqm.
Warehouse 2	15,000	sqm.
Dock Office 2	100	sqm.
TOTAL BUILDING AREA	38,735	sqm.
Total Heavy Duty Paving Area (Concrete)	14,535	sqm. approx.
Total Dedicated Heavy Duty Paving Area (Concrete)	12,990	sqm. approx.
Total Light Duty Paving Area	4,470	sqm. approx.
Total Cantilever Awning Area (3m)	360	sqm. approx.
Total Super Awning Area (36m)	4,070	sqm. approx.
Total Car Parking Provided	169	spaces

EXTENT OF HEAVY DUTY PAVING AREA

EXTENT OF HEAVY DUTY DEDICATED CONCRETE HARDSTAND

EXTENT OF LIGHT DUTY PAVING AREA (RED ASPHALT)

EXTENT OF LANDSCAPE AREA

EXTENT OF AWNING AREA

EXTENT OF DRAINAGE BASING & SWALE AREA

TREE WELL AT 2.3m x 1.75m (250mm CONCRETE FLUSH KERB) TO BE PROVIDED TO CARPARKING

FENCING

EXTENT OF NOISE FENCE

KS KERB STOP

EXISTING PRIVATE SEWER RISING MAIN TO BE RELOCATED

RSD-1 ROLLER SHUTTER DOOR 6mW x 6mH

RSD-1 +RAPID ROLLER SHUTTER DOOR 6mW x 6mH + SAME SIZE RAPID ROLL DOOR

RSD-2+DL ROLLER SHUTTER DOOR 2.7mW x 3.3mH + DOCK LEVELLER

RSD-2+DL +RAPID ROLLER SHUTTER DOOR 2.7mW x 3.3mH + DOCK LEVELLER + SAME SIZE RAPID ROLL DOOR

LANDSCAPING
Landscaping to be in accordance with requirements of Swan City Council. Refer to Landscape Consultant's drawings and specifications for full details.

LIGHTING
External lighting must be designed, baffled and located so as to prevent any adverse effect on adjoining land to the satisfaction of the Responsible Authority. Building mounted flood lights to be provided within the car park area.

CAR PARKING
Car parking spaces to be 5500mm long x 2500mm wide (unless noted otherwise) and be in accordance with Table 2 to Clause 52.06 of Swan City Council Planning Scheme.

Disabled car parking spaces to be 5500mm long x 2400mm wide, with a shared vacant space of equal size to one side of the allocated disabled space in accordance with A.S. 2890.6 (2009). Disabled car parking spaces may encroach into an accessway width by 500mm as specified in Table 2 to Clause 52.06 of Swan City Council Planning Scheme.

All car parking bays to be line marked in 80mm wide white weatherproof paint in accordance with A.S. 2890.1 (2004).

VEHICLE CROSSINGS AND ACCESS
All new vehicle crossings shall be to the requirements of the relevant Statutory Authority.

LOADING BAYS
All loading bays to be 7600mm long x 3600mm wide and line marked in accordance with A.S. 2890.1 (2004).

PLANT & EQUIPMENT
All external plant and equipment to be screened or positioned to prevent unreasonable visual impact.

DISABILITY ACCESS
All building entrances are to be in accordance with A.S. 1428.1 (2009).

NOTE:

- This concept plan is intended for Development Application purposes only. All setbacks, site coverage, car parking numbers, landscape areas and the like are subject to statutory approval.
- No assurance is given as to the features, attributes, feasibility or accuracy of anything shown on or disclosed in this plan.
- All existing & proposed features, dimensions, areas and boundaries are approximate only and subject to verification via detailed site survey by licensed surveyor.

CLIENT:
HESPERIA

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PROPOSED DEVELOPMENT

LOTS 119 & 808, LAKES ROAD, HAZELMERE WA

SITE PLAN

DRAWING TYPE: DEVELOPMENT APPLICATION
DRAWING NUMBER: 2411-169-DA-021
REVISION: B
DATE: 30.07.2024
SCALE: 1:700 @ A1 / 1:1400 @ A3
0 35 70
SCALE BAR @ A1

Appendix B: Douglas Partners Geotechnical Report

Douglas Partners
Geotechnics / Environment / Groundwater

Integrated Practical Solutions

Report on
Geotechnical Investigation

Proposed Industrial Subdivision Development
Lots 118 and 119 Lakes Road, Hazelmere, WA

Prepared for
Hesperia Projects Pty Ltd

Project 82463.01
February 2021

Douglas Partners
Geotechnics | Environment | Groundwater

Document History

Document details

Project No.	82463.01	Document No.	R.001.Rev0
Document title	Report on Geotechnical Investigation Proposed Industrial Subdivision Development		
Site address	Lots 118 and 119 Lakes Road, Hazelmere, WA		
Report prepared for	Hesperia Projects Pty Ltd		
File name	82463.01.R.001.Rev0.Geotechnical Report, Lots 118 and 119 Lakes Rd, Hazelmere		

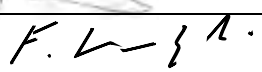
Document status and review

Status	Prepared by	Reviewed by	Date issued
Revision 0	Dan Reaveley	F. Verheyde	5 February 2021

Distribution of copies

Status	Electronic	Paper	Issued to
Revision 0	1	-	Steve Robertson, Hesperia Projects Pty Ltd

The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

	Signature	Date
Author		5 February 2021
Reviewer		5 February 2021

FS 604853

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Table of Contents

Report on Geotechnical Investigation
Proposed Industrial Subdivision Development
Lots 118 and 119 Lakes Road, Hazelmere, WA

1. Introduction

This report presents the results of a geotechnical investigation undertaken for a proposed industrial subdivision development at Lots 118 and 119 Lakes Road, Hazelmere, WA. The investigation was commissioned in an email dated 17 December 2020 by Steve Robertson on behalf of Hesperia Projects Pty Ltd and was undertaken in accordance with a Professional Services Agreement (Ref: Hesperia/Craig Mostyn Hazelmere) and Douglas Partners' proposal PER200361 dated 5 October 2020.

It is understood that the proposed development of the site comprises an industrial subdivision with four new lots for warehouse type developments and associated access roads.

The aim of the investigation was to assess the subsurface soil and groundwater conditions across the site in order to provide:

- an assessment of the geotechnical suitability of the site for the proposed development;
- an appropriate site classification in accordance with the requirements of AS2870;
- recommendations on site preparation and earthworks;
- the depth of available sand at the site, and its suitability of re-use;
- recommendations on appropriate foundation systems for the proposed development, including an assessment of allowable bearing pressures and likely settlements;
- recommendations in relation to external pavements, including indicative subgrade pavement CBR based on field observations, laboratory testing and Douglas Partners experience for the soils encountered at the site;
- A suitable permeability rate for the soils at the site, for the purposes of stormwater and effluent disposal design disposal design;
- Depth to groundwater, if encountered; and
- An evaluation of the suitability and limitations of the ground conditions for on-site sewage disposal, with reference to AS1547-2012, to assist with system design requirements by others.

The investigation included the excavation of 23 test pits, in situ infiltration tests at four locations and laboratory testing of selected samples. The details of the field work are presented in this report, together with comments and recommendations on the items listed above.

2. Site Description

The site comprises Lots 118 and 119, and a portion of Lots 117 and 50 on Lakes Road in Hazelmere and covers an irregular shaped area of approximately 9.7 ha. It is bounded by Lakes Road to the north, by Vale Road to the west, vacant land to the east and a developed industrial site to the south.

At the time of the investigation, the site comprised a fenced paddock, generally vegetated by grass and small shrubs and with a few stands of mature trees. General views of the site are presented as Figures 1 and 2 below.

Figure 1: Photo of site on 5 January 2021, looking south across the site.

The existing surface elevation of the site is between approximately RL 16.0 m AHD along the northern boundary, gently sloping to approximately RL 12 m AHD along the southern and western boundaries, according to survey data provided by the project's surveyors, MNG.

The published Perth 1:50,000 Environmental Geology sheet indicates that shallow sub surface conditions beneath the site are comprise a thin lens of Bassendean Sand over clayey materials of the Guildford Formation.

The Perth Groundwater Atlas (2004) indicates that the groundwater was at a level of approximately RL 7 m to 9 m AHD in May 2003, i.e. approximately 5 m to 7 m below the current surface levels.

Published ASS risk mapping indicates that the site is generally mapped as "moderate to low risk of acid sulphate soils occurring within 3 m of natural soil surface".

Figure 2: Photo of site on 5 January 2021, looking west across the site.

3. Field Work

Field work was carried out on 5 and 6 January 2021 and comprised:

- Excavation of 23 test pits;
- Dynamic penetrometer testing at each test pit location; and
- In-situ permeability testing at four locations.

The test pits (locations 1 to 23) were excavated to a maximum depth of 3.5 m, using an 8 tonne backhoe equipped with a 450 mm wide toothed bucket. The ground conditions were logged in general accordance with AS1726-2017 by a suitably experienced geotechnical engineer from Douglas Partners, and soil samples were recovered for subsequent laboratory testing.

Dynamic cone penetrometer tests (DCP) and Perth Sand Penetrometer tests (PSP) were carried out in accordance with AS 1289.6.3.2 and AS 1289.6.3.3 respectively, adjacent to each test location, to assess the in situ density of the shallow soils. The results of these tests are presented on the test pit log sheets in Appendix B.

Falling head permeability tests were carried out at a depth of 0.5 m and 1.1 m adjacent to test pit locations 3, 9, 14 and 22.

Test locations were determined using a hand-held GPS (accuracy of ±3 m), and are presented on Drawing 1 in Appendix B. The surface elevations at each test location were surveyed and provided by MNG.

4. Field Work Results

4.1 Ground Conditions

Detailed logs of the ground conditions and results of the field testing carried out on 5 and 6 January 2021 are presented in Appendix B, and notes defining descriptive terms and classification methods are presented in Appendix A.

The encountered ground conditions generally comprised topsoil overlying a variable thickness of sand, with cemented silty sand, colloquially known as Coffee Rock, and clayey soils underlying the sand in some locations.

A summary of the ground conditions encountered at the test locations is given below:

- **Topsoil** – dark grey, sandy topsoil with organics, generally to depths of between 0.10 m and 0.15 m;
- **Sand (SP and SP-SM) –** pale grey to yellow-brown at depth, trace silt and with silt (fines varying between approximately 3% and 7%), generally medium dense and dense, underlying the topsoil at all test locations except locations 21 and 23. The sand extends to depths of between 2.5 m and 3.1 m within the approximate north-western half of the site, and to variable depths of between 0.4 m and 2.7 m within the approximate south-eastern half of the site. No sand was present at locations 21 and 23.
- **Silty Sand (SM)** – brown mottled black, orange-brown and grey-blue, fine to medium grained silty sand with some clay, encountered underlying either the topsoil, sand and cemented silty sand from various depths (between 0.08 m and 1.9 m) at several locations within the southern part of the site (locations 15, 18, 19, 21 and 23).
- **Cemented Silty Sand (Coffee Rock)** – orange brown and dark brown, generally moderately to well cemented silty sand, underlying the grey sand at various locations across the site (locations 1, 3, 4, 6, 8, 9, 15, 17 and 19). Typically between 0.2 m and 0.4 m in thickness.
- **Clayey SAND/ Sandy CLAY (SC, CI and CH)** – generally orange-brown, blue-green and grey moderately to high plasticity clayey materials underlying the sand and coffee rock from depths of between 0.8 m and 2.8 m and encountered to the test pitting depth at various locations in the eastern half of the site (locations 7, 8, 9, 12, 13, 16, 17, 20 and 21).

4.2 Groundwater

Groundwater was observed at location 16 at 1.6 m depth, location 18 at 2.3 m depth, and location 20 at 1.5 m depth. No other groundwater observations were recorded, and each test pit was backfilled

immediately after soil sampling which prevented long-term monitoring of levels. Groundwater levels can be affected by climate conditions and land usage, and will vary with time.

4.3 Soil Permeability

Four in-situ infiltration tests were carried out using the falling head method at depths of between 0.5 m and 1.1 m adjacent to test pit locations 3, 9, 14 and 22. Permeability values were estimated from the in-situ permeability test data using a calculation derived from a method based on Hvorslev (1951). Permeability has also been estimated from particle size distribution test result from a sample taken from within the same soil type at each location, using Hazen's formula. Hazen's formula provides an indication of the permeability for clean sand in loose conditions, and thus the result derived using this approach should be considered with caution. Table 1 below summarises the permeability results.

Table 1: Summary of Permeability Analysis

Test Location	Depth (m)	Measured Permeability[1]		Derived Permeability (m/s) [2]		In situ Conditions of Tested Material
		(m/s)	(m/day)	(m/s)	(m/day)	
3	1.1	2.2×10^{-4}	19	2.3×10^{-4}	19	Sand with trace silt, dense
9	0.5	0.7×10^{-4}	6	0.6×10^{-4}	5	Sand with silt, medium dense
14	0.95	1.5×10^{-4}	13	0.8×10^{-4}	7	Sand with silt, dense
22	0.6	1.2×10^{-4}	10	- [3]	- [3]	Sand with trace silt, medium dense

Notes: [1]: In-situ permeability.
[2]: Hazen's formula.
[3]: Not assessed.

5. Laboratory Testing

A geotechnical laboratory testing programme was carried out on selected soil samples by a NATA registered laboratory, and comprised the determination of:

- the particle size distribution of 9 samples;
- the Atterberg limits and linear shrinkage of three samples;
- The shrink-swell Index of one sample;
- the modified maximum dry density (MMDD) and optimum moisture content (OMC) of three samples; and
- the California bearing ratio (CBR) values of three samples.

Detailed test report sheets are given in Appendix C and the results are summarised in Tables 2 and 3 (following page).

Table 2: Results of Laboratory Testing for Soil Identification

Test Location	Depth (m)	Fines (%)	Sand (%)	Gravel (%)	LL (%)	PL (%)	PI (%)	LS (%)	I_{ss} (%)	Material
3	1.2	4	96	0	-	-	-	-	-	Sand with trace silt
9	0.5	7	93	0	-	-	-	-	-	Sand with silt
10	0.5	4	96	0	-	-	-	-	-	Sand with trace silt
11	0.5	3	97	0	-	-	-	-	-	Sand with trace silt
12	1.5	17	67	16	47	18	29	6.0	-	Clayey Sand with gravel
14	1.5	6	94	0	-	-	-	-	-	Sand with silt
18	1.5	7	93	0	-	-	-	-	-	Sand with silt
20	1.9	39	58	3	63	16	47	7.0	-	Sandy Clay
23	0.45-0.75	17	43	40	42	14	28	6.0	-	Clayey Gravelly Sand
23	0.9-1.2	-	-	-	-	-	-	-	0.6	Clayey Gravelly Sand

Notes: Fines are particles smaller than 75 µm.
Sand is particles larger than 75 µm and smaller than 2.36 mm.
Gravel is particles larger than 2.36 mm and smaller than 63 mm.
PL: plastic limit LL: liquid limit PI: plasticity Index LS: linear shrinkage
OC: organic content I_{ss}: Shrink-swell Index '-' not tested.

The CBR tests were undertaken at a target compaction level of 95% of modified maximum dry density. The samples were soaked for 4 days prior to testing under a confining surcharge of 4.5 kg. The results are presented in Table 3 below.

Table 3: Results of Laboratory Testing for Pavement Design Parameters

Test Location	Depth (m)	MMDD (t/m^3)	CBR (%)	OMC (%)	Swell (%)	Material
9	0.5	1.79	14	13.0	0	Sand with silt
10	0.5	1.72	8	15.5	0	Sand with trace silt
23	0.45-0.75	1.97	1.5	10.0	4.0	Clayey Gravelly Sand

Notes: MMDD: modified maximum dry density. CBR: California bearing ratio. OMC: optimum moisture content.

6. Proposed Development

It is understood that the proposed development of the site will comprise an industrial subdivision into four new lots for warehouse type developments, with associated access roads and parking areas. It is understood that on-site disposal of effluent will also be required at the site utilising Aerobic Treatment Units (ATU) and leach drains.

We understand that the site will be required to be raised above the existing surface levels. As such a proposed strategy for bulk earthworks includes stripping and stockpiling suitable clean sand from the site, followed by the placement of imported fill materials and subsequent replacement of the stockpiled sand.

7. Comments

7.1 Site Suitability

Results of the investigation indicate that the site is generally underlain by medium dense and dense natural sand, overlying silty sand, cemented silty sand and clayey soils in some areas. Groundwater was encountered at three test locations during the investigation undertaken on 5 and 6 January 2021 at depths of between 1.5 m and 2.3 m below existing ground level (i.e. between approximately RL 9.6 AHD and RL 10.9 m AHD).

From a geotechnical standpoint, the land is considered to be physically capable of development for the proposed industrial subdivision development, provided that the provisions outlined in the subsequent subsections of the report are taken into consideration, and recommendations are implemented. Furthermore, the light grey to yellow-brown sand with silt/and silt (soil group “SP and SP-SM” described in Section 4.1 and on the logs), which covers the majority of the site to variable depths of between 0.4 m and 3.1 m is considered suitable for excavation, stockpiling and re-use as a structural fill with good drainage characteristics. If required, the sand could be excavated to the base of the layer, where either groundwater, silty sand, coffee rock or the clayey materials are encountered. It is recommended that a minimum separation of 1 m is allowed between the base of any excavated areas and groundwater, to allow suitable compaction of the stripped surface prior to placement of fill.

7.2 Site Classification

The encountered ground conditions and results of laboratory testing indicate that the site is generally underlain by medium dense and dense natural sand, overlying areas of silty sand, cemented silty sand and some clayey soils which are generally slightly to moderately reactive. Owing to the variation in depth to the reactive materials, surface movements of the site in its current conditions due to seasonal moisture changes is expected to vary from 0 mm to approximately 15 mm, therefore corresponding to a site classification of Class A and Class S in accordance with AS 2870-2011.

Following suitable site preparation during earthworks (refer to Section 7.4) and assuming earthworks design is undertaken as outlined in Section 6, the site can be improved to achieve the following site classifications:

- Class A – where a minimum thickness of 1.8 m of non-reactive granular sand is placed or exists between surface level and underlying clayey materials.
- Class S - where a minimum thickness of 0.8 m of non-reactive granular sand is placed or exists between surface level and underlying clayey materials.

7.3 Excavation Conditions

The encountered ground conditions comprise natural sand, overlying moderately to well cemented silty sand (colloquially know as Coffee rock) and clayey materials in some places.

Conventional earthmoving equipment should be generally suitable for excavations across the site within the surficial sand.

Slow excavation rates with an 8 tonne backhoe was experienced during excavation of the cemented silty sand. Therefore, if required, excavation through this material may require larger equipment such as a 20 tonne excavator with toothed bucket.

Groundwater was encountered at three test locations during the investigation undertaken on 5 and 6 January 2021 at depths of between 1.5 m and 2.3 m below existing ground level (i.e. between approximately RL 9.6 AHD and RL 10.9 m AHD). Higher groundwater elevation can be anticipated to occur during the winter and following wet periods. Therefore, provision for dewatering should be considered for deep excavation below existing surface levels, in particular within low parts of the site.

It is recommended that batter slopes not steeper than 1.5H:1V (horizontal : vertical) be adopted for temporary excavations not deeper than 3 m in sand material. This recommended batter angle should be re-assessed if loads are to be applied near the top of the batter. Permanent batter slopes should be not steeper than 2H:1V. The recommended batter slopes should be reconsidered for slopes below the groundwater table or subject to surface flows.

7.4 Site Preparation

7.4.1 Site Stripping

All deleterious material, including (if encountered) waste, topsoil and vegetation should be stripped from the proposed development areas of the site. Tree roots remaining from any clearing operations should be completely removed. Topsoil was generally encountered to depths of between 0.1 m and 0.15 m within the test locations. Further advice on the possible re-use of topsoil is provided below in Section 7.4.4.

7.4.2 Proof Rolling and Compaction

Following stripping of the site, the excavation of cut material and prior to placement of any fill, it is recommended that the exposed ground beneath the proposed building envelopes and pavement areas be proof rolled with a smooth drum roller of say 14 tonnes deadweight in vibrating mode in areas of sandy soils. A pad foot roller should be utilised to proof roll areas of exposed clayey soils, if excavation of sand has been undertaken. It is recommended that a minimum separation of 1 m is allowed between the base of any excavated areas and groundwater, to allow suitable compaction of the stripped surface prior to placement of fill.

Any areas that show signs of excessive deformation during compaction should be compacted until deformation ceases or, alternatively, the poor quality material should be excavated and replaced with suitable structural filling and compacted.

Care should be taken not to run heavy plant immediately adjacent to existing buildings and services. In these areas, the use of lighter compaction equipment, such as a vibrating plate compactor, is suggested.

Following stripping of topsoil and proof rolling, and prior to any placement of fill, it is recommended that a geotechnical engineer inspects the site.

7.4.3 Re-use of In Situ Sand

Sand extends to depths of between 2.5 m and 3.1 m within the approximate north-western half of the site, and to variable depths of between 0.4 m and 2.7 m within the approximate south-eastern half of the site, Based on the nature of the material encountered during the investigation, it is anticipated that in situ sand excavated from the site should be generally suitable for re-use as structural fill material provided it is free from organic matter and particles greater than 150 mm in size.

The silty sand, cemented silty sand and underlying clayey materials, encountered at depth, are generally not considered suitable for re-use as structural fill.

7.4.4 Re-use of Topsoil

Topsoil was encountered across the site to depths of between 0.1 m and 0.15 m. Based on the results of the investigation, the topsoil at the site, after vegetation stripping, is considered suitable for reuse as part of a topsoil and clean sand blend, for use as a structural fill material, provided that the topsoil is suitably prepared, and the controls outlined below are adopted. A preliminary blending ratio of 2:1 (clean sand:topsoil) is suggested, based on observations made during the site investigation. It is suggested that additional testing of topsoil following screening is undertaken to refine the blending ratio.

The procedure for re-using the topsoil generally comprises separation of the sandy fraction of the topsoil from the bulk of the organics using a mechanical screening plant, and then blending the sandy fraction with clean sand at an appropriate ratio to form a suitable structural material. In the vegetated and grassed areas of the site, consideration should be given to initially stripping off the bulk of the vegetation and root mass, to limit the quantity of organic material within the underlying topsoil.

The blending of topsoil with clean sand may decrease the permeability of the sand, therefore some consideration should be given to the implication on site drainage, if blended topsoil material is to be used. Consideration can also be given to further assess the permeability of blended topsoil material for various blending ratios, to assess a suitable ratio and associated fill permeability. Douglas Partners would be pleased to further assist with this assessment if required.

7.4.5 Fill Placement

Any sand fill should be placed in layers not exceeding 300 mm loose thickness and compacted near optimum moisture content with a roller of say 14 tonne deadweight to achieve a dry density ratio of 95% relative to modified compaction (ie. 95% MMDD). Care should be taken not to run heavy plant immediately adjacent to existing structures and services. It is recommended that earthworks be carried out with regular inspections by a geotechnical engineer. The use of heavy rollers with vibration is not recommended within 20 m of existing development and services to minimise the risk of damage to the existing buildings and to minimise disturbance to the residents.

7.4.6 Compaction Testing

Compaction control of the sand fil could be carried out using a Perth sand penetrometer (PSP) test in accordance with test method AS 1289.6.3.3. All areas within the proposed building envelopes should be compacted to achieve a minimum blow count of 8 blows per 300 mm penetration to a depth of not less than 0.5 m below foundation level.

This compaction level has not been directly correlated to a dry density of 95% relative to modified compaction. Lower blow counts than the above level may be acceptable provided that a correlation between Perth sand penetrometer (PSP) test and dry density ratio has been established by a NATA accredited laboratory and following review by a geotechnical engineer.

The top 300 mm in the base of any excavation should be re-compacted using a vibratory plate compactor prior to construction of any footings. Inspection of footing excavations by a geotechnical engineer is also recommended.

7.5 Foundation Design

Shallow foundation systems comprising slab, pad and strip footings should be suitable to support typical one and two storey buildings and typical industrial warehouse structures at this site. Footings of buildings covered by AS 2870-2011 should be designed to satisfy the requirements of this standard for the site classification discussed in Section 7.2, provided that site preparation is carried out in accordance with Section 7.4.

If proposed structures are not covered by AS 2870-2011 then the foundation should be designed using engineering principles. The table below summarises preliminary allowable bearing pressures for pad and strip footings founded at 0.5 m depth assuming a minimum thickness of 0.8 m of compacted sand fill is placed over clayey soils, however as earthworks details are not known at the time of writing (e.g. how much fill will be placed above clayey soils), it is suggested that the figures in the table below are considered to be lower bound. It is anticipated that higher allowable bearing pressures will be possible following earthworks of the site and subsequent assessment by a geotechnical engineer.

Table 4: Preliminary Footing Design Parameters

Footing Width (m)	Allowable Bearing Capacity (kPa)	Modulus of Subgrade Reaction (kPa/mm)
Square pad footings		
1.0	150	15
1.5	140	10
2.0	110	5 - 10
Strip footings		
0.5	130	10 - 15
0.75	120	10
1.0	110	5 - 10

Total settlements for the above tabulated footing configurations are estimated to be less than 15 mm. Differential settlements are likely to be less than half of the total settlement, therefore, less than 10 mm.

7.6 Pavement Design Parameters

The results of 4-day soaked California bearing ratio tests undertaken in the laboratory indicate CBR values of 8% and 14% for two samples of the sand at the site. Based on these results, a CBR design value of 8% should be adopted for pavement design on sand subgrade at this site, provided the subgrade is compacted to not less than 95% of modified maximum dry density to a depth of at least 1.0 m below subgrade level.

However our observations of the medium dense to dense sandy soils underlying the site and our experience with Perth sands suggest that a higher CBR value, of say CBR 10% could be considered, provided that some favourable results (ie. 10% or higher) of additional testing of the sand during detailed design of the development warrants such an increase.

7.7 Stormwater Disposal and Drainage

The ground conditions comprise generally natural sand with between approximately 3% and 7% fines. Silty sand, cemented silty sand and clayey soils were encountered underlying the sand. Groundwater was encountered during the investigation undertaken in January 2021 at depths of between 1.5 m and 2.3 m below existing ground level (i.e. between approximately RL 9.6 AHD and RL 10.9 m AHD). Higher groundwater levels can be anticipated during winter or following wet periods.

In-situ falling head infiltration tests were undertaken in the medium dense and dense natural sand at the site, as described in Section 4.3 above. The estimated permeability values arising from the tests indicate values of between approximately 6 m/day and 19 m/day for the in-situ condition of the sand.

A further assessment of permeability has been carried out by applying Hazen's formula to the particle size distribution result from a sample taken from selected samples. It should be noted that Hazen's formula applies to 'clean' sand in a loose state. The results of this assessment suggest permeability values of between approximately 7 m/day to 19 m/day for the natural sand in loose condition.

It is considered that a permeability value of approximately 5 m/day could be adopted for the sand at the site in its in-situ conditions, for drainage purposes. Taking into account a decrease in permeability due to densification during site compaction operations, it is considered that a lower value of approximately 3 m/day could be adopted for the sand at the site following earthworks. It is recommended that further in-situ infiltration tests are undertaken on trial pads of compacted sand during earthworks to verify this value. In addition, similar testing of trial pads should be adopted if topsoil is blended with the site sand, to determine a suitable permeability value for use in drainage design.

The silty sand, cemented silty sand and clayey materials encountered below the site should be considered generally impervious for the purposes of drainage design.

On-site stormwater disposal using soakwells and sumps, or suitably treated effluent disposal using leach drains is generally considered suitable, provided the presence of the silty sand, cemented silty sand, clayey materials and shallow groundwater is accounted for in the design. The infiltration capability commonly reduces over time due to silt build up at the base of soakwells and therefore the soakwells must be cleaned and maintained on a regular basis. Soakwells should be positioned at a distance from all buildings, retaining walls and boundaries by not less than 2 m.

8. Evaluation of the Ground Conditions for On-site Effluent Disposal

Site characteristics observed during the field work and soil properties determined during subsequent laboratory testing have been assessed in relation to the anticipated limitations that they may pose to on-site disposal of domestic effluent.

It is understood that on-site effluent disposal systems may be required at the site, and would likely comprise Department of Health approved aerobic treatment units (ATU) connected to flatbed leach drains.

The comments in this section are provided with reference to AS1547-2012, On-Site Domestic Wastewater Management. The soil characteristics with potential influence on site suitability for effluent disposal, as described in AS 1547-2012, are discussed in Section 8.1 to 8.6 below and conclusions regarding the suitability of the site's soils for the proposed system provided in Section 8.7.

8.1 Soil Permeability

Saturated hydraulic conductivity (permeability) is a measure of the ability of soil to transmit water based on soil properties such as structure, texture and porosity. The soil types noted at the test locations generally comprise sand, overlying cemented silty sand, clayey sand and sandy clay in some parts of the site.

A soil permeability category Group 1 (reference to AS 1547-2012 Tables 5.1 and E1) is considered suitable for the encountered surficial sand, with a measured permeability of greater than 6 m/day. It is suggested that a design permeability of approximately 5 m/day is adopted for the surficial sand underlying the site to allow for possible variability and the effects of possible further compaction during construction. Where a minimum depth of say 0.5 m to 1.0 m of sand underlies the base of an infiltration system, soil permeability is not considered to be a limitation for on-site sewage disposal at the site.

8.2 Depth to Hardpan / Impermeable Layer

Cemented silty sand and clayey materials were encountered within depths of 0.4 m and 0.45 m at selected locations within the site, which may result in some limitations to the placement of effluent infiltration systems. However, it is understood that the site levels will be raised during proposed earthworks. Therefore, it is considered that depth to hardpan will not form a limitation for on-site sewage disposal at the site following proposed earthworks, provided that a minimum depth of say 0.5 m to 1.0 m of sand underlies the base of an infiltration system.

8.3 Depth to Groundwater

Groundwater was observed at location 16 at 1.6 m depth, location 18 at 2.3 m depth, and location 20 at 1.5 m depth. Furthermore, it is understood that the site levels will be raised during earthworks. Therefore, it is considered that depth to groundwater does not form a limitation for on-site sewage disposal at the site.

8.4 Coarse Fragments

Coarse fragments are defined as particles greater than 2 mm in AS 1547-2012. The abundance of coarse fragments in the soils encountered underlying the site is “very few”, in accordance with Table E2, AS 1547-2012.

Such a low abundance of coarse fragments does not form a limitation for on-site sewage disposal at the site.

8.5 Slope

The site and surrounding areas gently slope to the south. It is considered that site slope does not form a limitation for on-site sewage disposal at the site.

8.6 Dispersivity

The surficial soil at the site is sand with fines content ranging between approximately 3% and 7%. Sand is non-dispersive. Therefore, dispersivity does not form a limitation for on-site sewage disposal at the site.

8.7 Conclusions on Site Suitability for Effluent Disposal Using an ATU and Flatbed Leach Drains

It is understood that an on-site effluent disposal system is proposed, comprising Department of Health approved aerobic treatment units (ATU) connected to flatbed leach drains. The soil conditions at this site are generally considered suitable for the disposal of treated effluent from an ATU in general accordance with AS 1547-2012.

This assessment relates to the suitability of the soil conditions only, additional assessment of the site and nearby off-site conditions as required by the Government Sewerage Policy, local government conditions and WA Department of Health may be required, which were outside the scope of this investigation.

9. References

1. Australian Standard AS 1289-2000, Methods of Testing Soils for Engineering Purposes.
2. Australian Standard AS 1289.6.3.3-1999, Soil Strength and Consolidation Tests-Determination of the Penetration Resistance of a Soil – Perth Sand Penetrometer Test.
3. Australian Standard AS 1726-2017, Geotechnical Site Investigation.
4. Australian Standard AS 2870-2011, Residential Slabs and Footings.
5. Department of Environment, Perth Groundwater Atlas, Second Edition, December 2004.
6. Australian Standard AS 1547-2012, On-site Domestic-wastewater Management.

10. Limitations

Douglas Partners has prepared this report for a proposed industrial subdivision development at Lots 118 and 119 Lakes Road, Hazelmere, WA in accordance with Douglas Partners' proposal dated 5 October 2020 and acceptance received from Steve Robertson on behalf of Hesperia Projects Pty Ltd dated 17 December 2020. The work was carried out in accordance with a Professional Services Agreement (Ref: Hesperia/Craig Mostyn Hazelmere). This report is provided for the exclusive use of Hesperia Projects Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of Douglas Partners, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report Douglas Partners has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

The assessment of atypical safety hazards arising from this advice is restricted to the (geotechnical / environmental / groundwater) components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

Douglas Partners Pty Ltd

Appendix A

About This Report

About this Report

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

- In the case where full penetration is obtained with successive blow counts for each 150 mm of, say, 4, 6 and 7 as:

  4,6,7
  N=13

- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:

  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are generally based on Australian Standard AS1726:2017, Geotechnical Site Investigations. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Type	Particle size (mm)
Coarse gravel	19 - 63
Medium gravel	6.7 - 19
Fine gravel	2.36 – 6.7
Coarse sand	0.6 - 2.36
Medium sand	0.21 - 0.6
Fine sand	0.075 - 0.21

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

The proportions of secondary constituents of soils are described as follows:

In fine grained soils (>35% fines)

Term	Proportion of sand or gravel	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	>30%	Sandy Clay
With	15 – 30%	Clay with sand
Trace	0 - 15%	Clay with trace sand

In coarse grained soils (>65% coarse)
- with clays or silts

Term	Proportion of fines	Example
And	Specify	Sand (70%) and Clay (30%)
Adjective	>12%	Clayey Sand
With	5 - 12%	Sand with clay
Trace	0 - 5%	Sand with trace clay

In coarse grained soils (>65% coarse)
- with coarser fraction

Term	Proportion of coarser fraction	Example
And	Specify	Sand (60%) and Gravel (40%)
Adjective	>30%	Gravelly Sand
With	15 - 30%	Sand with gravel
Trace	0 - 15%	Sand with trace gravel

The presence of cobbles and boulders shall be specifically noted by beginning the description with 'Mix of Soil and Cobbles/Boulders' with the word order indicating the dominant first and the proportion of cobbles and boulders described together.

Soil Descriptions

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	VS	<12
Soft	S	12 - 25
Firm	F	25 - 50
Stiff	St	50 - 100
Very stiff	VSt	100 - 200
Hard	H	>200
Friable	Fr	-

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	Density Index (%)
Very loose	VL	<15
Loose	L	15-35
Medium dense	MD	35-65
Dense	D	65-85
Very dense	VD	>85

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Extremely weathered material – formed from in-situ weathering of geological formations. Has soil strength but retains the structure or fabric of the parent rock;
- Alluvial soil – deposited by streams and rivers;
- Estuarine soil – deposited in coastal estuaries;
- Marine soil – deposited in a marine environment;
- Lacustrine soil – deposited in freshwater lakes;
- Aeolian soil – carried and deposited by wind;
- Colluvial soil – soil and rock debris transported down slopes by gravity;
- Topsoil – mantle of surface soil, often with high levels of organic material.
- Fill – any material which has been moved by man.

Moisture Condition – Coarse Grained Soils

For coarse grained soils the moisture condition should be described by appearance and feel using the following terms:

- Dry (D) Non-cohesive and free-running.
- Moist (M) Soil feels cool, darkened in colour.
  Soil tends to stick together.
  Sand forms weak ball but breaks easily.
- Wet (W) Soil feels cool, darkened in colour.
  Soil tends to stick together, free water forms when handling.

Moisture Condition – Fine Grained Soils

For fine grained soils the assessment of moisture content is relative to their plastic limit or liquid limit, as follows:

- 'Moist, dry of plastic limit' or 'w <PL' (i.e. hard and friable or powdery).
- 'Moist, near plastic limit' or 'w ≈ PL (i.e. soil can be moulded at moisture content approximately equal to the plastic limit).
- 'Moist, wet of plastic limit' or 'w >PL' (i.e. soils usually weakened and free water forms on the hands when handling).
- 'Wet' or 'w ≈LL' (i.e. near the liquid limit).
- 'Wet' or 'w >LL' (i.e. wet of the liquid limit).

Symbols & Abbreviations

Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	Pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	Lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

Symbols & Abbreviations

Graphic Symbols for Soil and Rock

General


Asphalt


Road base


Concrete


Filling

Soils


Topsoil


Peat

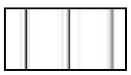

Clay

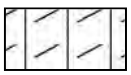

Silty clay


Sandy clay

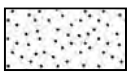

Gravelly clay

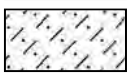

Shaly clay

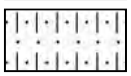

Silt


Clayey silt


Sandy silt


Sand

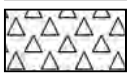

Clayey sand


Silty sand


Gravel


Sandy gravel


Cobbles, boulders

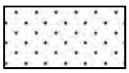

Talus

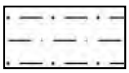
Sedimentary Rocks


Boulder conglomerate

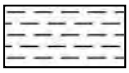

Conglomerate


Conglomeratic sandstone

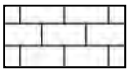

Sandstone


Siltstone


Laminite

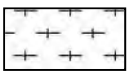

Mudstone, claystone, shale


Coal


Limestone

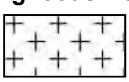
Metamorphic Rocks

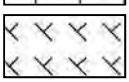

Slate, phyllite, schist

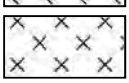

Gneiss

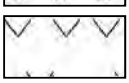

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

Appendix B

Drawing 1
Results of Field Work

Douglas Partners Geotechnics | Environment | Groundwater	**Test Location Plan** **Lots 118 and 119 Lakes Road** **Hazelmere, WA**	PROJECT: 82463.01 Drawing No: 1 REV: 0
	CLIENT: Hesperia Projects Pty Ltd	DATE: 11/1/2021

TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 13.80 m AHD **PIT No:** 1
EASTING: 405345 **PROJECT No:** 82463.01
NORTHING: 6468891 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
13	0.1	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry, covered with grass, topsoil.							
		SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, medium dense, aeolian.							
		- becoming moist from 0.5 m depth.							
12	1	- becoming dense from 0.9 m depth.							
	2			D	2.0				
11	2.7	Silty SAND SM (Coffee Rock): fine to medium grained, orange-brown mottled dark brown, moist, apparently dense, moderately to well cemented, excavated as gravelly sand with cobbles and boulders (coffee rock).							
10	3 3.0	Pit discontinued at 3.0m (hard digging)							

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 13.10 m AHD **PIT No:** 2
EASTING: 405352 **PROJECT No:** 82463.01
NORTHING: 6468817 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
13	0.15	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry, covered with grass, topsoil.							
		SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, medium dense, aeolian.							
12	1	- becoming moist from 0.5 m depth.							
		- becoming dense from 0.9 m depth.							
11	2	- becoming moist to wet from 2.4 m depth.							
	2.7	Pit discontinued at 2.7m (collapsing conditions)							
10	3								

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 13.74 m AHD **PIT No:** 3
EASTING: 405402 **PROJECT No:** 82463.01
NORTHING: 6468848 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
13	0.15	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry, covered with grass, topsoil.		D	0.1				
		SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, medium dense, aeolian.							
12	1	- becoming dense from 0.9 m depth. - becoming moist from 1.0 m depth.		D	1.2				
11	2.7	Silty SAND SM (Coffee Rock): fine to medium grained, pale grey-brown mottled dark brown, moist, apparently dense, moderately cemented, excavated as sand with gravel and cobbles (coffee rock).		D	2.9				
10	3.1	Pit discontinued at 3.1m (target)							

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 14.65 m AHD **PIT No:** 4
EASTING: 405473 **PROJECT No:** 82463.01
NORTHING: 6468837 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm) 5 10 15 20
14	0.15	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry, covered with grass, topsoil.							
		SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, medium dense, aeolian.							
	1	- pale yellow-grey from 0.5 m depth.							1
		- becoming moist from 1.0 m depth.							
13		- yellow-brown from 1.3 m depth.							
		- becoming dense from 1.45 m depth.		D	1.8				
	2								2
12	3								3
	3.0	Silty SAND SM (Coffee Rock): fine to medium grained, orange-brown mottled dark brown, moist, apparently dense, moderately cemented, excavated as sand with gravel and cobbles (coffee rock).							
11	3.2	Pit discontinued at 3.2m (target)							

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 13.30 m AHD **PIT No:** 5
EASTING: 405423 **PROJECT No:** 82463.01
NORTHING: 6468785 **DATE:** 6/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
13	0.09	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry, covered with grass, topsoil.							
		SAND SP: fine to medium grained, pale grey, trace silt, trace roots, dry to moist, medium dense, aeolian.							
		- medium to large tree root (100 mm dia) at 0.3 m depth.							
		- becoming moist from 0.5 m depth.							
12	1	- becoming dense from 0.75 m depth.		D	1.0				
11	2			D	2.5				
	3	- becoming wet from 3.0 m depth.							
10	3.2	Pit discontinued at 3.2m (target)							

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 15.16 m AHD **PIT No:** 6
EASTING: 405530 **PROJECT No:** 82463.01
NORTHING: 6468799 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
15	0.17	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry, covered with grass, topsoil.							
		SAND SP: fine to medium grained, pale yellow-grey, trace silt, dry to moist, medium dense, aeolian.							
	1	- becoming moist from 0.8 m depth.							
14									
		- becoming yellow-brown and dense from 1.45 m depth.							
	2								
13									
	3								
12	3.1	Silty SAND SM (Coffee Rock): fine to medium grained, orange-brown mottled dark brown, moist, apparently dense, moderately cemented, excavated as sand with gravel and cobbles (coffee rock).							
	3.5	Pit discontinued at 3.5m (target)							

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 14.05 m AHD **PIT No:** 7
EASTING: 405503 **PROJECT No:** 82463.01
NORTHING: 6468749 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
14	0.15	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry, covered with grass, topsoil.							
		SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, medium dense, aeolian.							
		- becoming dense from 0.6 m depth.		D	0.8				
13	1	- becoming moist from 1.0 m depth.							1
12	2								2
	2.8	Clayey SAND SC: fine to medium grained, orange-brown mottled red-brown, low plasticity, moist, stiff, alluvium.		D	3.0		pp = 150		
11	3								3
	3.2	Pit discontinued at 3.2m (target)							

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 14.69 m AHD **PIT No:** 8
EASTING: 405623 **PROJECT No:** 82463.01
NORTHING: 6468749 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
14	0.12	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry, covered with grass, topsoil.							
		SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, medium dense, aeolian.							
		- becoming moist from 0.5 m depth.							
	1			D	1.0				1
13		- becoming dense from 1.45 m depth.							
	2								2
	2.5								
12	2.6	Silty SAND SM (Coffee Rock): fine to medium grained, orange-brown mottled dark brown, moist, apparently dense, moderately to well cemented, excavated as gravelly sand with cobbles and boulders (coffee rock).		D	2.65		pp >=100		
	2.7								
	3	Clayey SAND SC: fine to medium grained, blue-grey, low to medium plasticity, moist, firm to stiff, alluvium.							
11		Pit discontinued at 2.7m (target)							

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 14.05 m AHD **PIT No:** 9
EASTING: 405584 **PROJECT No:** 82463.01
NORTHING: 6468708 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
14	0.15	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry, covered with grass, topsoil.							
		SAND SP-SM: fine to medium grained, pale grey, with silt, dry to moist, medium dense, aeolian.		B D	0.5 0.6				
13	1	- becoming dense from 0.75 m depth. - becoming moist from 0.9 m depth.							
	1.1								
	1.3	Silty SAND SM (Coffee Rock): fine to medium grained, orange-brown mottled dark brown, moist, very dense, moderately to well cemented, excavated as gravelly sand with cobbles and boulders (coffee rock).		D	1.5		pp = 300		
		Clayey SAND SC: fine to medium grained, brown mottled grey, low to medium plasticity, moist, very stiff, alluvium.							
12	2								
	2.0	Pit discontinued at 2.0m (target)							
11	3								

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 12.37 m AHD **PIT No:** 10
EASTING: 405359 **PROJECT No:** 82463.01
NORTHING: 6468726 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
12	0.2	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry, covered with grass, topsoil.							
		SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, medium dense, aeolian.		B	0.5				
		- becoming moist and dense from 0.75 m depth.							
11	2.9	Pit discontinued at 2.9m (collapsing conditions)							
10									
9									

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 12.28 m AHD **PIT No:** 11
EASTING: 405447 **PROJECT No:** 82463.01
NORTHING: 6468709 **DATE:** 6/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
12	0.15	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry, covered with grass, topsoil.							
		SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, medium dense, aeolian.		D	0.5				
11	1	- becoming moist and dense from 0.6 m depth							
10	2								
	2.8	Pit discontinued at 2.8m (collapsing conditions)							
9	3								

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 12.65 m AHD **PIT No:** 12
EASTING: 405521 **PROJECT No:** 82463.01
NORTHING: 6468672 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
12	0.1	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry, covered with grass, topsoil.							
	0.4	SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, medium dense, aeolian.							
11	1 0.95	Sandy GRAVEL GC: fine to coarse gravel (lateritic), fine to medium grained sand, grey-brown, with clay, moist, apparently dense, alluvium.		D	0.8				
		Clayey SAND SC: with gravel, fine to medium grained, orange-brown mottled red-brown, low plasticity, moist, very stiff, alluvium.		D	1.5				
	2	- becoming hard from 1.75 m depth.							
		- brown mottled grey from 2.0 m depth.							
10	2.5	Pit discontinued at 2.5m (target)							
	3								
9									

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 14.25 m AHD **PIT No:** 13
EASTING: 405617 **PROJECT No:** 82463.01
NORTHING: 6468645 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
14	0.15	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry to moist, covered with grass, topsoil.							
		SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, dense, aeolian.							
	1	- becoming moist from 0.7 m depth.							
		- pale yellow-grey from 0.9 m depth.							
13	1.2	Clayey SAND SC: fine to medium grained, brown mottled orange-brown, low to medium plasticity, moist, stiff, alluvium.		D	1.5		pp = 100		
	2								
12	2.1	Pit discontinued at 2.1m (target)							
	3								
11									

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 12.27 m AHD **PIT No:** 14
EASTING: 405361 **PROJECT No:** 82463.01
NORTHING: 6468654 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
12	0.1	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, with roots, dry, covered with grass, topsoil.							
		SAND SP-SM: fine to medium grained, pale grey, with silt, dry to moist, medium dense, aeolian.							
		- becoming moist from 0.5 m depth.							
		- becoming dense from 0.75 m depth.							
11	1			D	1.1				
				D	1.5				
10	2	- becoming moist to wet from 2.1 m depth.							
	2.8	Pit discontinued at 2.8m (collapsing conditions)							
9	3								

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 12.00 m AHD **PIT No:** 15
EASTING: 405438 **PROJECT No:** 82463.01
NORTHING: 6468631 **DATE:** 6/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
12	0.25	TOPSOIL / SAND SP-SM: fine to medium grained, dark grey-brown, withsilt, trace rootlets, dry, covered with grass, topsoil.		D	0.2				
		SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, dense, aeolian. - becoming moist from 0.5 m depth.							
11	1 0.95	SAND SP-SM (Coffee Rock): fine to medium grained, orange-brown mottled dark brown, with silt, moist, dense, moderately cemented, excavates as sand with gravel, cobbles and boulders (coffee rock).							1
	1.4	Silty SAND SM: fine to medium grained, grey-blue, moist to wet, dense, alluvium.							
10	2								2
	2.5	Pit discontinued at 2.5m (target)							
9	3								

Dynamic Penetrometer Test (blows per 150mm): 5 10 15 20

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 12.25 m AHD **PIT No:** 16
EASTING: 405521 **PROJECT No:** 82463.01
NORTHING: 6468605 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
12	0.12	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry to moist, covered with grass, topsoil.		D	0.1				
		SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, dense, aeolian.							
		- becoming moist from 0.7 m depth.							
11	1							05-01-21	
		- becoming wet from 1.5 m depth.							
		- becoming very dense from 1.75 m depth.							
10	2								
	2.3	Sandy CLAY CI: medium plasticity, grey, moist to wet, stiff, alluvium.		D	2.4		pp = 100		
	2.5	Pit discontinued at 2.5m (collapsing conditions)							
9	3								

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: Groundwater observed at 1.6 m depth.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 14.46 m AHD **PIT No:** 17
EASTING: 405603 **PROJECT No:** 82463.01
NORTHING: 6468575 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
14	0.15	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry, covered with grass, topsoil.							
		SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, dense, aeolian.		D	0.5				
	1	- becoming moist from 0.8 m depth.							1
13	1.2	Silty SAND SM (Coffee Rock): fine to medium grained, orange-brown mottled dark brown, moist, very dense, moderately to well cemented, excavated at gravelly sand with cobbles and boulders (coffee rock).							
	1.8	Clayey SAND SC: fine to medium grained, brown mottled grey, low to medium plasticity, moist, stiff, alluvium.			2.0		pp = 100		2
12	2								
	2.5	Pit discontinued at 2.5m (target)							
	3								
11									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 11.90 m AHD **PIT No:** 18
EASTING: 405371 **PROJECT No:** 82463.01
NORTHING: 6468575 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
11	0.1	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry, covered with grass, topsoil.							
		SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, dense, aeolian. - becoming moist from 0.5 m depth.							
	0.85	Silty SAND SM: fine to medium grained, brown, moist, dense.							
10	1.1	SAND SP-SM: fine to medium grained, pale yellow-grey, with silt, moist, dense, alluvium. - becoming moist to wet from 1.6 m depth. - pale grey from 2.1 m depth.		D	1.5			05-01-21	
9	2.5	Pit discontinued at 2.5m (collapsing conditions)							
8									

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: Groundwater observed at 2.3 m depth.

REMARKS: Surface levels surveyed by MNG.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 11.96 m AHD **PIT No:** 19
EASTING: 405447 **PROJECT No:** 82463.01
NORTHING: 6468575 **DATE:** 6/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
11	0.15	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry, covered with grass, topsoil.							
		SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, dense, aeolian. - becoming moist and pale yellow-grey from 0.6 m depth.							
	1.1	SAND SP-SM (Coffee Rock): fine to medium grained, orange-brown mottled dark brown, with silt, moist, very dense, moderately to well cemented, excavated as sand with gravel, cobbles and boulders (coffee rock).		D	1.4				
10	1.9	Silty SAND SM: fine to medium grained, grey-blue, moist to wet, alluvium.		D	2.4				
9	2.8	Pit discontinued at 2.8m (target)							

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 12.43 m AHD **PIT No:** 20
EASTING: 405523 **PROJECT No:** 82463.01
NORTHING: 6468548 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
12	0.09	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry to moist, covered with grass, topsoil.							
		SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, medium dense, aeolian.							
	1	- becoming moist from 0.5 m depth.							1
11		- becoming moist to wet from 1.1 m depth.						05-01-20	
	1.7	Sandy CLAY CH: high plasticity fines, grey-blue mottled brown, moist to wet, stiff, alluvium.		D	1.9		pp = 150		
	2								2
	2.1	Pit discontinued at 2.1m (target)							
10									
	3								
9									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: Groundwater observed at 1.5 m depth.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 13.82 m AHD **PIT No:** 21
EASTING: 405577 **PROJECT No:** 82463.01
NORTHING: 6468503 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
13	0.08	TOPSOIL / SAND SP-SM: fine to medium grained, dark grey-brown, with silt, trace rootlets, dry to moist, covered with grass, topsoil.		D	0.3				
		Silty SAND SM: fine to medium grained, dark orange-brown, dry to moist, very dense, alluvium.							
	0.8	- with lateritic gravel and cobble between 0.4 m and 0.7 m depth.							
1		Clayey SAND SC: fine to medium grained, brown mottled orange-brown, low plasticity, trace gravel (laterite), moist, hard, alluvium.		U	0.95		pp = 450		
					1.25				
				D	1.5				
	1.6	Pit discontinued at 1.6m (target)							
12									
2									
11									
3									
10									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20; 1; >>; >>

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 12.23 m AHD **PIT No:** 22
EASTING: 405515 **PROJECT No:** 82463.01
NORTHING: 6468476 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
12	0.15	TOPSOIL / SAND SP: fine to medium grained, dark grey-brown, trace silt, trace rootlets, dry to moist, covered with grass, topsoil.		D	0.1				
		SAND SP: fine to medium grained, pale grey, trace silt, moist, medium dense, aeolian.		D	0.7				
11	1	- becoming moist to wet from 0.8 m depth.							
10	2	- becoming wet from 1.5 m depth.							
9	2.7	Pit discontinued at 2.7m (collapsing conditions)							

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▽	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 12.01 m AHD **PIT No:** 23
EASTING: 405431 **PROJECT No:** 82463.01
NORTHING: 6468524 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
12	0.13	TOPSOIL / SAND SP-SM: fine to medium grained, dark grey-brown, with silt, trace rootlets, dry to moist, covered with grass, topsoil.							
	0.3								
	0.45	Silty SAND SM: fine to medium grained, dark orange-brown, dry to moist, medium dense, alluvium.		B	0.45				
		SAND SP: fine grained, pale grey, trace silt, moist, medium dense, aeolian.			0.75				
11	1	Clayey Gravelly SAND SC: fine to medium grained, brown, medium plasticity fines, moist, stiff, alluvium.		U	0.9				
					1.2				
		- becoming more clayey from 1.5 m depth.							
	1.8	Sandy CLAY CH: high plasticity, dark orange-brown, moist, stiff, alluvium.		D	1.9				
10	2								
	2.05	Pit discontinued at 2.05m (target)							
9	3								

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

Appendix C

Laboratory Tests

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

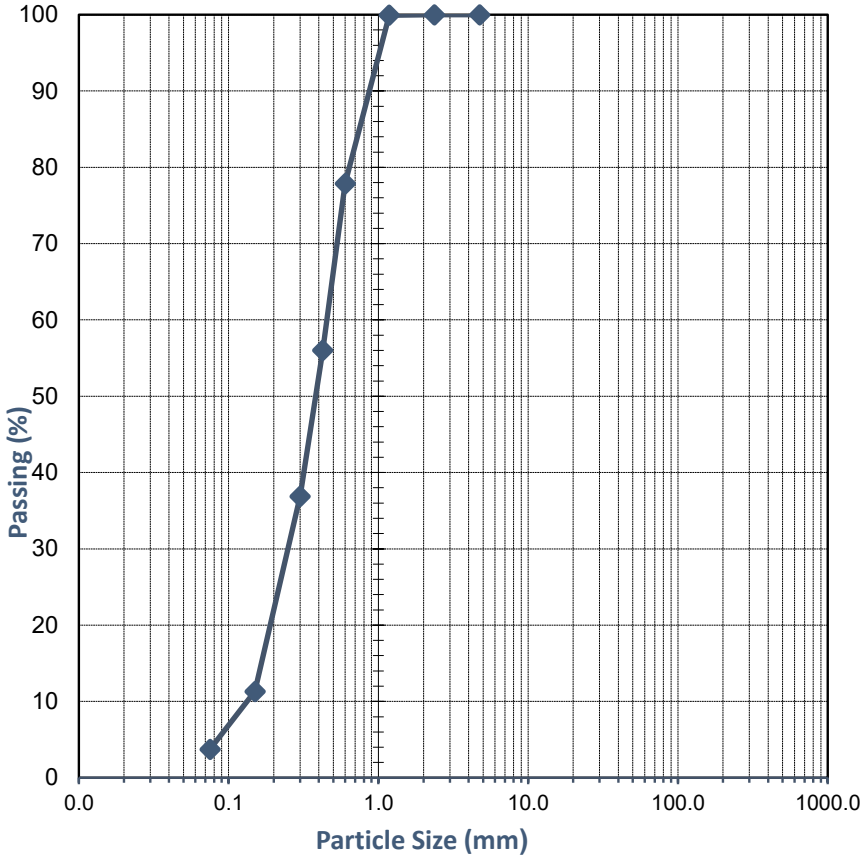
TEST REPORT - AS 1289.3.6.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1575_1_PSD
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1575
Location:	Hazelmere, WA	*Date Sampled:*	5-01-2021
Sample Identification:	3, 1.2 m	*Date Tested:*	11/1 - 12/1/2021

TEST RESULTS - Particle Size Distribution of Soil

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

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	
9.5	
4.75	100
2.36	100
1.18	100
0.600	78
0.425	56
0.300	37
0.150	11
0.075	4



Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 12-January-2021

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

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.5.2.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1576_1_MMDD
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1576
Location:	Hazelmere, WA	*Date Sampled:*	5/01/2021
Sample Identification:	9, 0.5 m (Bulk)	*Date Tested:*	11/01/2021

TEST RESULTS - Modified Maximum Dry Density

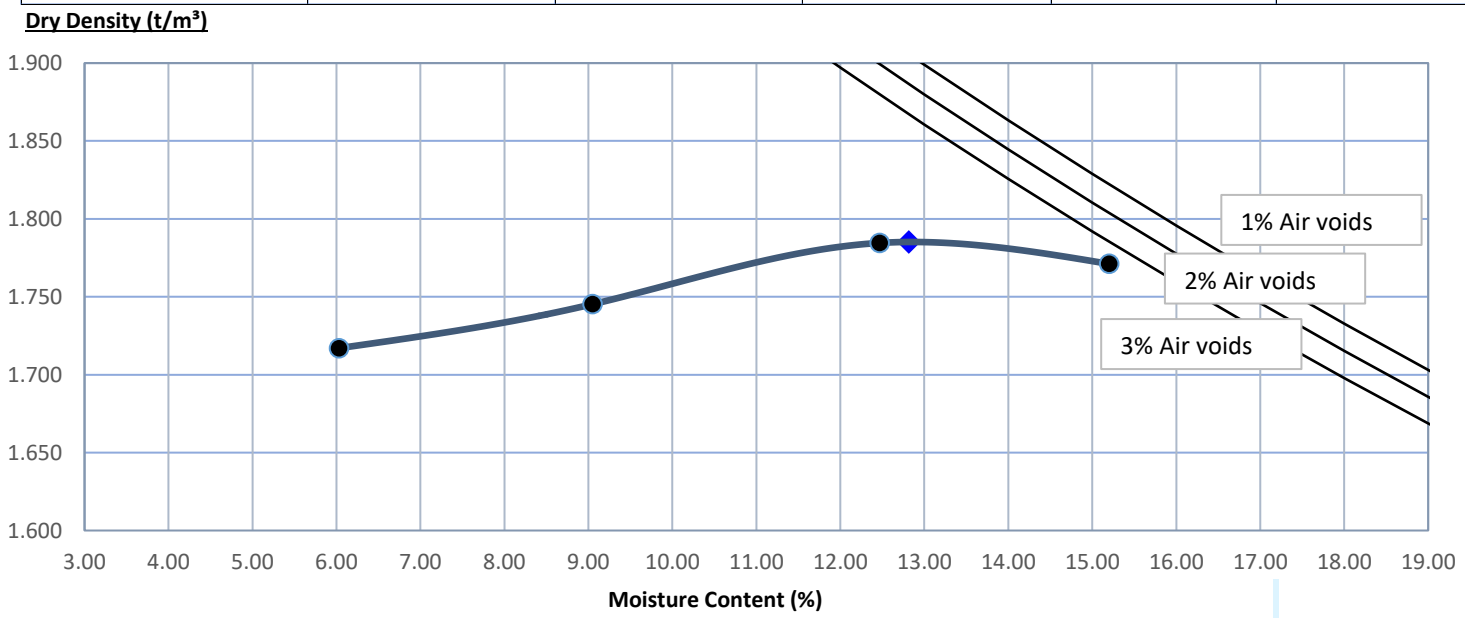
Sampling Method: Sampled by Client, Tested as Received

Sample Curing Time: 2 Hours

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

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

Moisture Content (%)	6.0	9.1	12.5	15.2	
Dry Density (t/m³)	1.717	1.745	1.785	1.771	



Modified Maximum Dry Density (t/m³) **1.79**

Optimum Moisture Content (%) **13.0**

Comments: *The above air void lines are derived from a calculated apparent particle density of 2.555 t/m³*

Approved Signatory:

Name: Cody O'Neill

Date: 12/January/2021

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

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

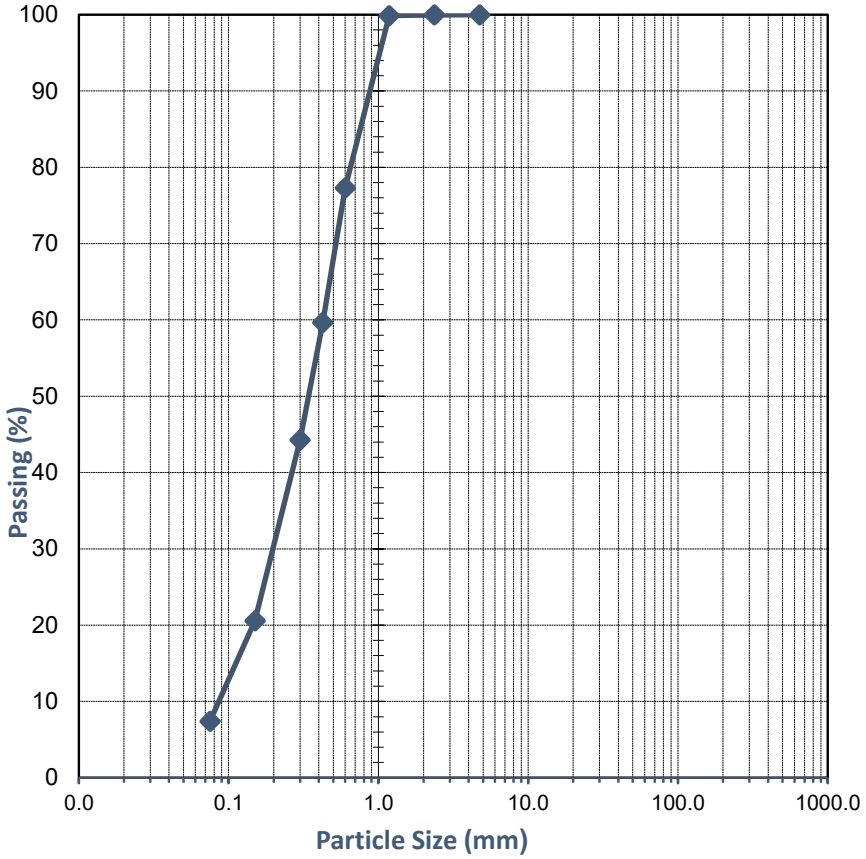
TEST REPORT - AS 1289.3.6.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1576_1_PSD
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1576
Location:	Hazelmere, WA	*Date Sampled:*	5-01-2021
Sample Identification:	9, 0.5 m (Bulk)	*Date Tested:*	11/1 - 12/1/2021

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	
9.5	
4.75	100
2.36	100
1.18	100
0.600	77
0.425	60
0.300	44
0.150	21
0.075	7



Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 12-January-2021

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

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.6.1.1

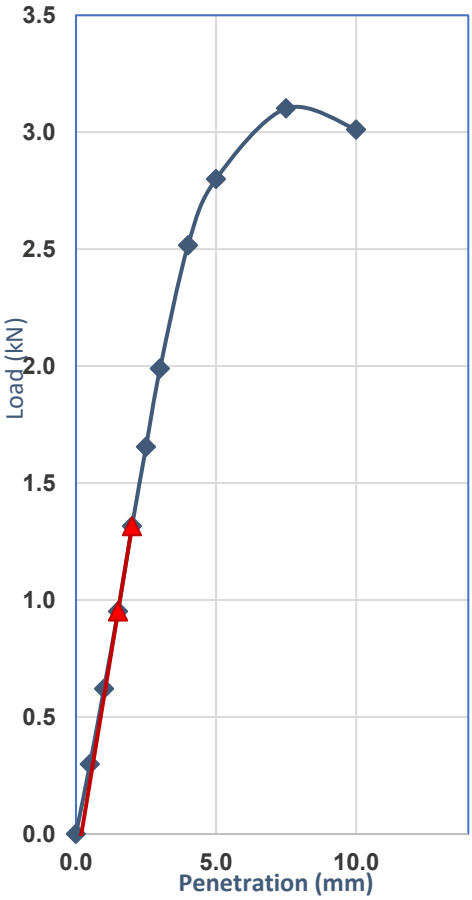
Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1576_1_SCBR
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1576
Location:	Hazelmere, WA	*Date Sampled:*	5-01-2021
Sample Identification:	9, 0.5 m (Bulk)	*Date Tested:*	11/1 - 16/1/2021

TEST RESULTS - CALIFORNIA BEARING RATIO

Sample Description: Sand

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)	2 Hours
% Retained 19.0mm	0	Excluded/Replaced	Excluded
Maximum Dry Density (t/m^3)	1.79	Optimum Moisture (%)	13.0
Target Dry Density Ratio (%)	96	Target Moisture Ratio (%)	100

Specimen Conditions At Compaction			
Dry Density (t/m3)	1.71	Moisture Content (%)	13.1
Density Ratio (%)	95.5	Moisture Ratio (%)	102.5

Specimen Conditions After Soak			
Soaked or Unsoaked	Soaked	Soaking Period (days)	4
Surcharges Applied (kg)	4.50	Measured Swell (%)	0.0
Dry Density (t/m³)	1.71	Dry Density Ratio (%)	95.5
Moisture Content (%)	15.4	Moisture Ratio (%)	120.5

Specimen Conditions After Test			
Top 30mm Moisture (%)	13.6	Remaining Depth (%)	15.2

Correction applied to Penetration: 0.2mm

Determined at a Penetration of: 5.0mm

California Bearing Ratio (CBR): 14%

Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 18-January-2021

NATA WORLD RECOGNISED ACCREDITATION

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

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.5.2.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1577_1_MMDD
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1577
Location:	Hazelmere, WA	*Date Sampled:*	5/01/2021
Sample Identification:	10, 0.5 m (Bulk)	*Date Tested:*	11/01/2021

TEST RESULTS - Modified Maximum Dry Density

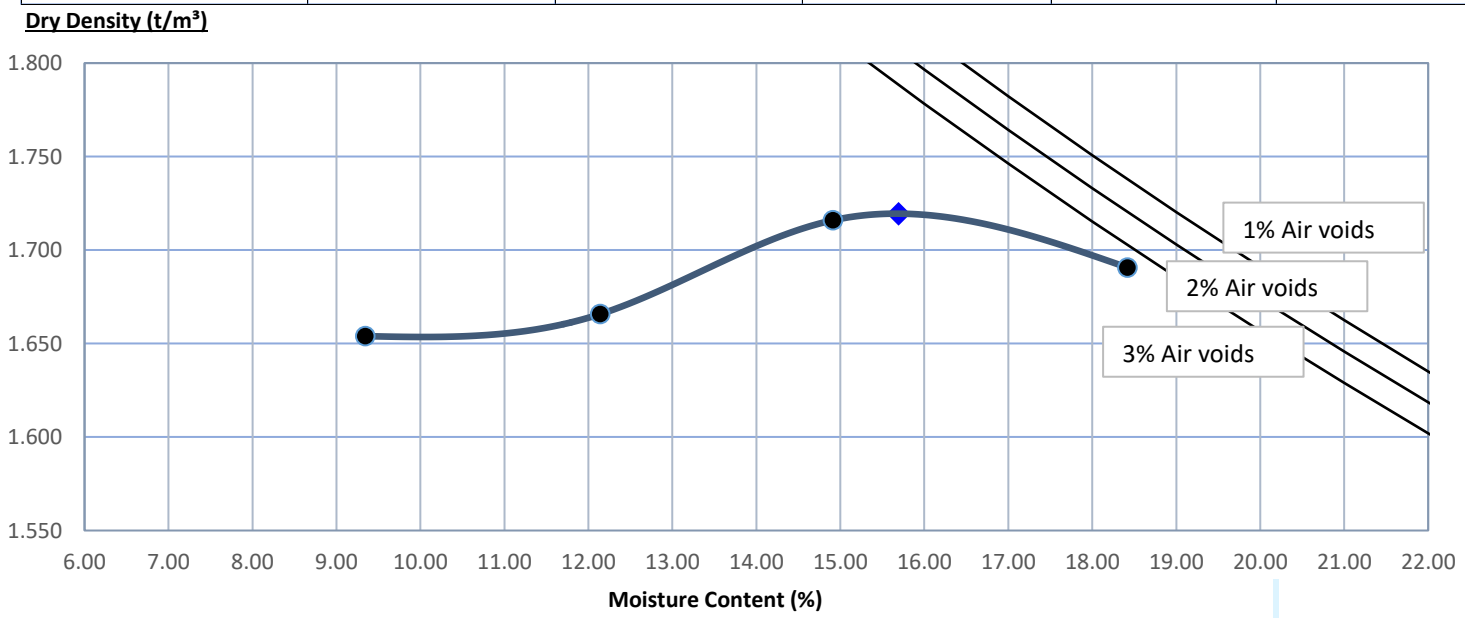
Sampling Method: Sampled by Client, Tested as Received

Sample Curing Time: 2 Hours

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

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

Moisture Content (%)	9.3	12.1	14.9	18.4	
Dry Density (t/m³)	1.654	1.666	1.716	1.691	



Modified Maximum Dry Density (t/m³) **1.72**

Optimum Moisture Content (%) **15.5**

Comments: *The above air void lines are derived from a calculated apparent particle density of 2.594 t/m³*

Approved Signatory:

Name: Cody O'Neill

Date: 12/January/2021

NATA WORLD RECOGNISED ACCREDITATION

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

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

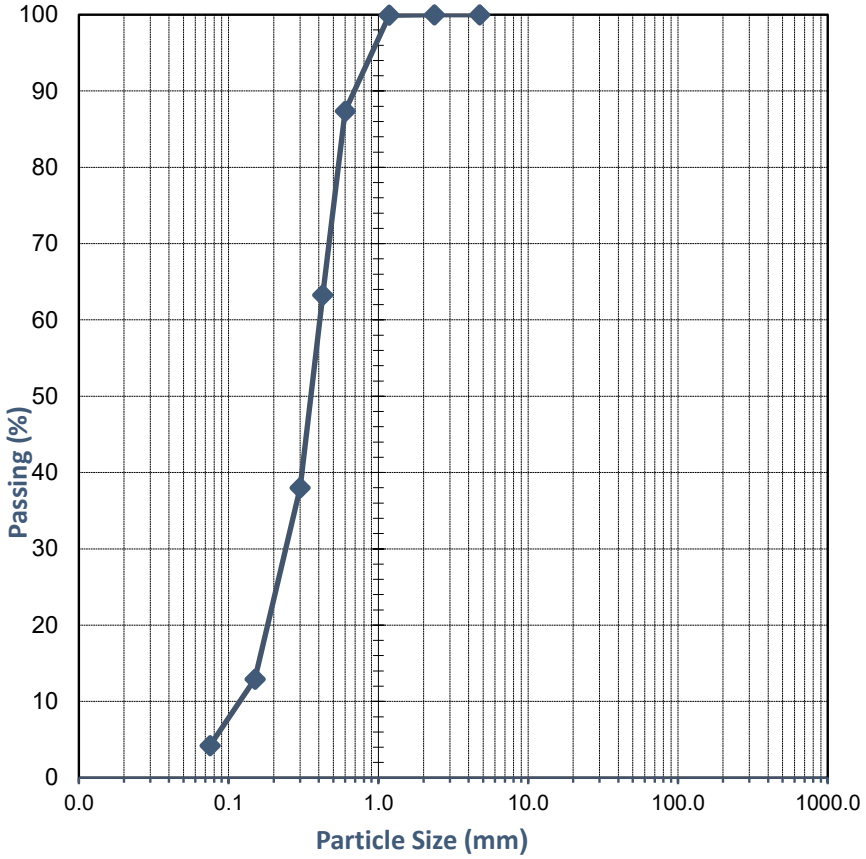
TEST REPORT - AS 1289.3.6.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1577_1_PSD
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1577
Location:	Hazelmere, WA	*Date Sampled:*	5-01-2021
Sample Identification:	10, 0.5 m (Bulk)	*Date Tested:*	11/1 - 12/1/2021

TEST RESULTS - Particle Size Distribution of Soil

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

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	
9.5	
4.75	100
2.36	100
1.18	100
0.600	87
0.425	63
0.300	38
0.150	13
0.075	4



Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 12-January-2021

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

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.6.1.1

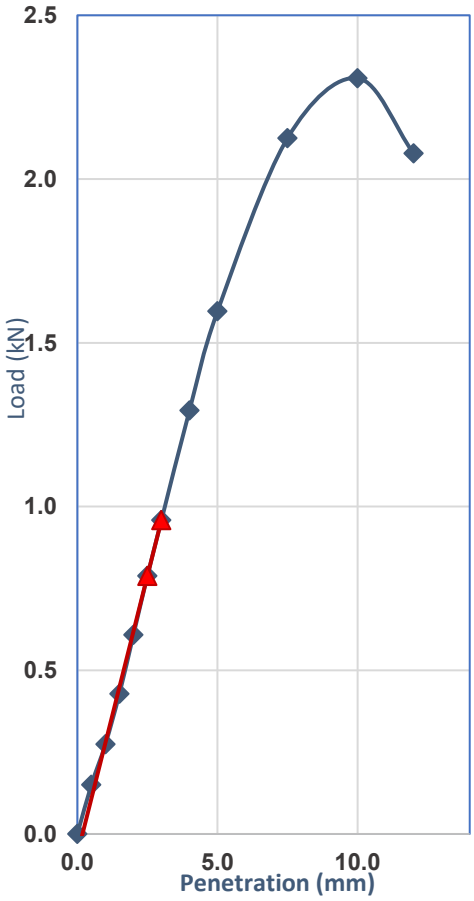
Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1577_1_SCBR
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1577
Location:	Hazelmere, WA	*Date Sampled:*	5-01-2021
Sample Identification:	10, 0.5 m (Bulk)	*Date Tested:*	11/1 - 16/1/2021

TEST RESULTS - CALIFORNIA BEARING RATIO

Sample Description: Sand

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)	2 Hours
% Retained 19.0mm	0	Excluded/Replaced	Excluded
Maximum Dry Density (t/m^3)	1.72	Optimum Moisture (%)	15.5
Target Dry Density Ratio (%)	96	Target Moisture Ratio (%)	100

Specimen Conditions At Compaction			
Dry Density (t/m3)	1.65	Moisture Content (%)	16.1
Density Ratio (%)	95.5	Moisture Ratio (%)	102.5

Specimen Conditions After Soak			
Soaked or Unsoaked	Soaked	Soaking Period (days)	4
Surcharges Applied (kg)	4.50	Measured Swell (%)	0.0
Dry Density (t/m³)	1.65	Dry Density Ratio (%)	95.5
Moisture Content (%)	17.5	Moisture Ratio (%)	111.5

Specimen Conditions After Test			
Top 30mm Moisture (%)	16.2	Remaining Depth (%)	16.5

Correction applied to Penetration: 0.2mm

Determined at a Penetration of: 5.0mm

California Bearing Ratio (CBR): 8%

Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 18-January-2021

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

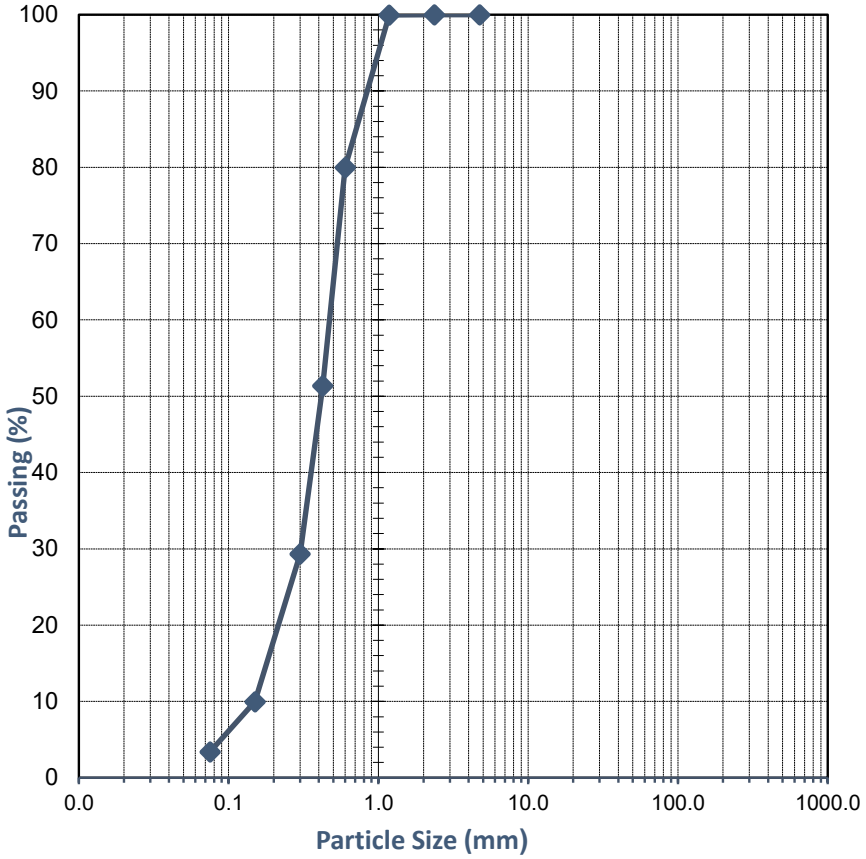
TEST REPORT - AS 1289.3.6.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1578_1_PSD
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1578
Location:	Hazelmere, WA	*Date Sampled:*	5-01-2021
Sample Identification:	11, 0.5 m	*Date Tested:*	11/1 - 12/1/2021

TEST RESULTS - Particle Size Distribution of Soil

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

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	
9.5	
4.75	100
2.36	100
1.18	100
0.600	80
0.425	51
0.300	29
0.150	10
0.075	3



Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 12-January-2021

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

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1579_1_PI
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1579
Location:	Hazelmere, WA	*Date Sampled:*	5-01-2021
Sample Identification:	12, 1.5 m	*Date Tested:*	12-01-2021

TEST RESULTS - Consistency Limits (Casagrande)

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

AS 1289.3.1.1	**Liquid Limit (%)**	**47**
AS 1289.3.2.1	**Plastic Limit (%)**	**18**
AS 1289.3.3.1	**Plasticity Index (%)**	**29**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**6.0**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**Cracked, Curled**

Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 13-January-2021

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

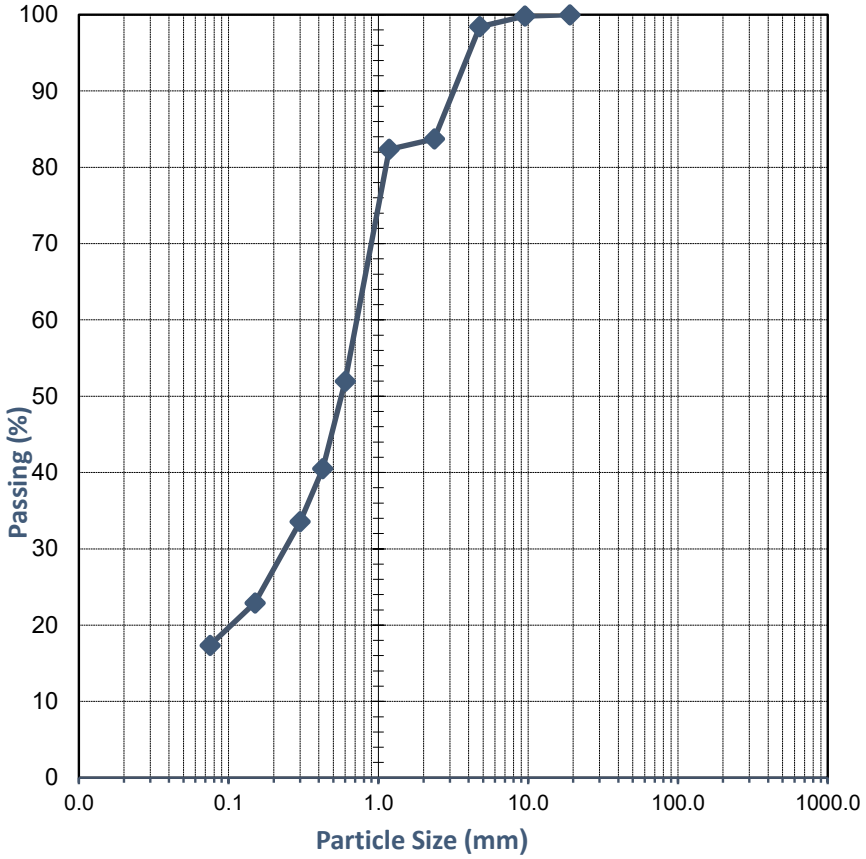
TEST REPORT - AS 1289.3.6.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1579_1_PSD
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1579
Location:	Hazelmere, WA	*Date Sampled:*	5-01-2021
Sample Identification:	12, 1.5 m	*Date Tested:*	11/1 - 12/1/2021

TEST RESULTS - Particle Size Distribution of Soil

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

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	100
9.5	100
4.75	98
2.36	84
1.18	82
0.600	52
0.425	40
0.300	34
0.150	23
0.075	17



Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 12-January-2021

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

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

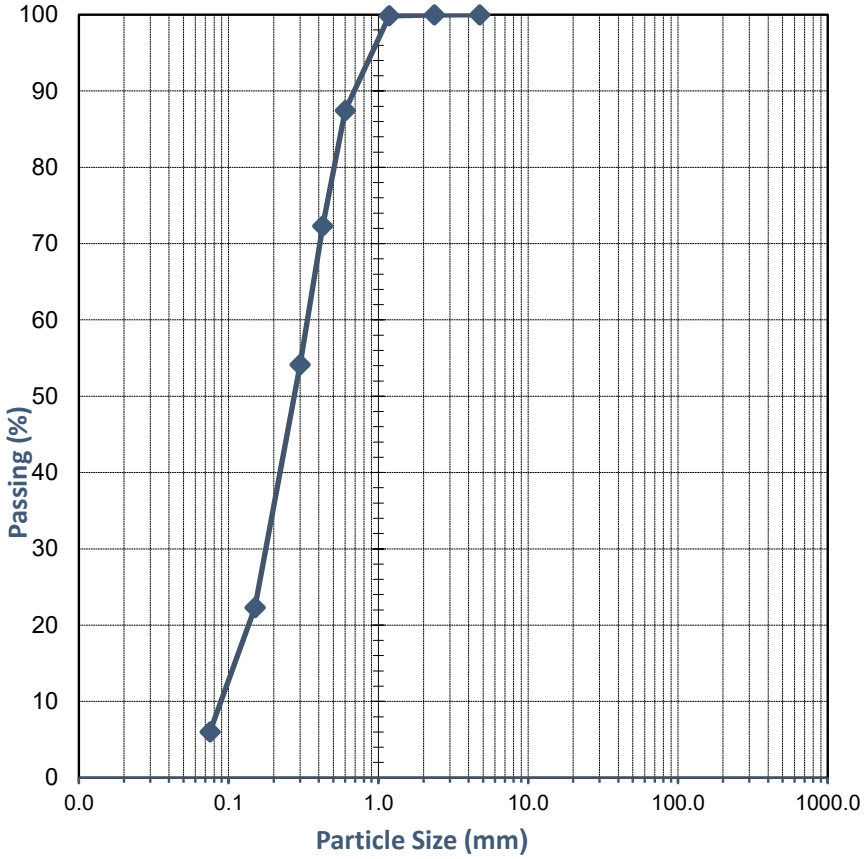
TEST REPORT - AS 1289.3.6.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1580_1_PSD
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1580
Location:	Hazelmere, WA	*Date Sampled:*	5-01-2021
Sample Identification:	14, 1.5 m	*Date Tested:*	11/1 - 12/1/2021

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	
9.5	
4.75	100
2.36	100
1.18	100
0.600	87
0.425	72
0.300	54
0.150	22
0.075	6



Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 12-January-2021

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

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

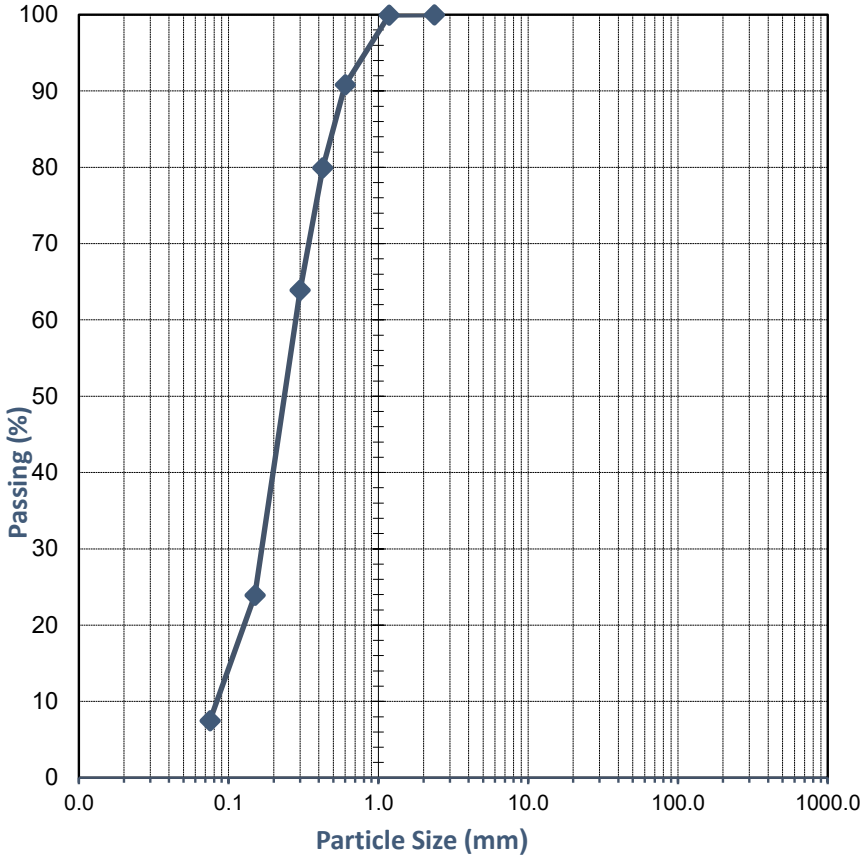
TEST REPORT - AS 1289.3.6.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1581_1_PSD
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1581
Location:	Hazelmere, WA	*Date Sampled:*	5-01-2021
Sample Identification:	18, 1.5 m	*Date Tested:*	11/1 - 12/1/2021

TEST RESULTS - Particle Size Distribution of Soil

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

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	
9.5	
4.75	
2.36	100
1.18	100
0.600	91
0.425	80
0.300	64
0.150	24
0.075	7



Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 12-January-2021

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

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1582_1_PI
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1582
Location:	Hazelmere, WA	*Date Sampled:*	5-01-2021
Sample Identification:	20, 1.9 m	*Date Tested:*	12-01-2021

TEST RESULTS - Consistency Limits (Casagrande)

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

AS 1289.3.1.1	**Liquid Limit (%)**	**63**
AS 1289.3.2.1	**Plastic Limit (%)**	**16**
AS 1289.3.3.1	**Plasticity Index (%)**	**47**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**7.0**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**Cracked, Curled**

Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 13-January-2021

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

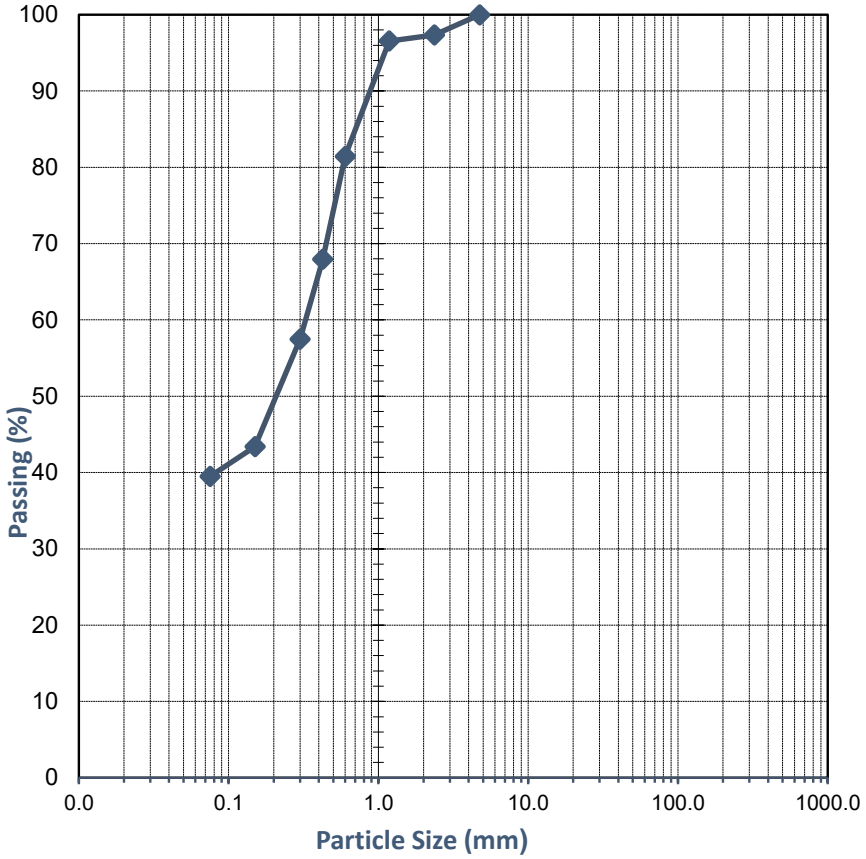
TEST REPORT - AS 1289.3.6.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1582_1_PSD
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1582
Location:	Hazelmere, WA	*Date Sampled:*	5-01-2021
Sample Identification:	20, 1.9 m	*Date Tested:*	11/1 - 12/1/2021

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	
9.5	
4.75	100
2.36	97
1.18	97
0.600	81
0.425	68
0.300	57
0.150	43
0.075	39



Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 12-January-2021

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

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.5.2.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1583_1_MMDD
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1583
Location:	Hazelmere, WA	*Date Sampled:*	5/01/2021
Sample Identification:	23, 0.45-0.75 m (Bulk)	*Date Tested:*	12/01/2021

TEST RESULTS - Modified Maximum Dry Density

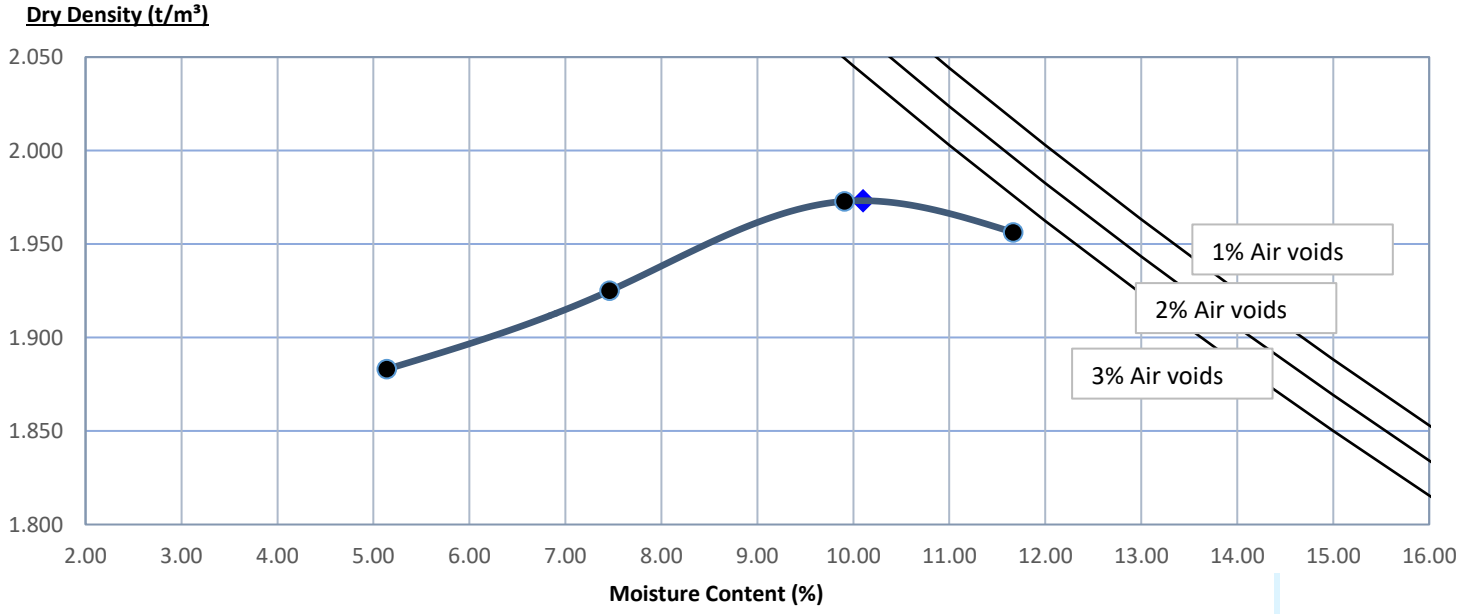
Sampling Method: Sampled by Client, Tested as Received

Sample Curing Time: 24 Hours

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

Material + 19.0mm (%): 3 **Material + 37.5mm (%)** -

Moisture Content (%)	5.1	7.5	9.9	11.7	
Dry Density (t/m³)	1.883	1.925	1.973	1.956	



Modified Maximum Dry Density (t/m³) **1.97**

Optimum Moisture Content (%) **10.0**

Comments: *The above air void lines are derived from a calculated apparent particle density of 2.672 t/m³*

Approved Signatory:

Name: Cody O'Neill

Date: 13/January/2021

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1583_1_PI
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1583
Location:	Hazelmere, WA	*Date Sampled:*	5-01-2021
Sample Identification:	23, 0.45-0.75 m (Bulk)	*Date Tested:*	12-01-2021

TEST RESULTS - Consistency Limits (Casagrande)

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

AS 1289.3.1.1	**Liquid Limit (%)**	**42**
AS 1289.3.2.1	**Plastic Limit (%)**	**14**
AS 1289.3.3.1	**Plasticity Index (%)**	**28**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**6.0**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**Cracked, Curled**

Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 13-January-2021

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

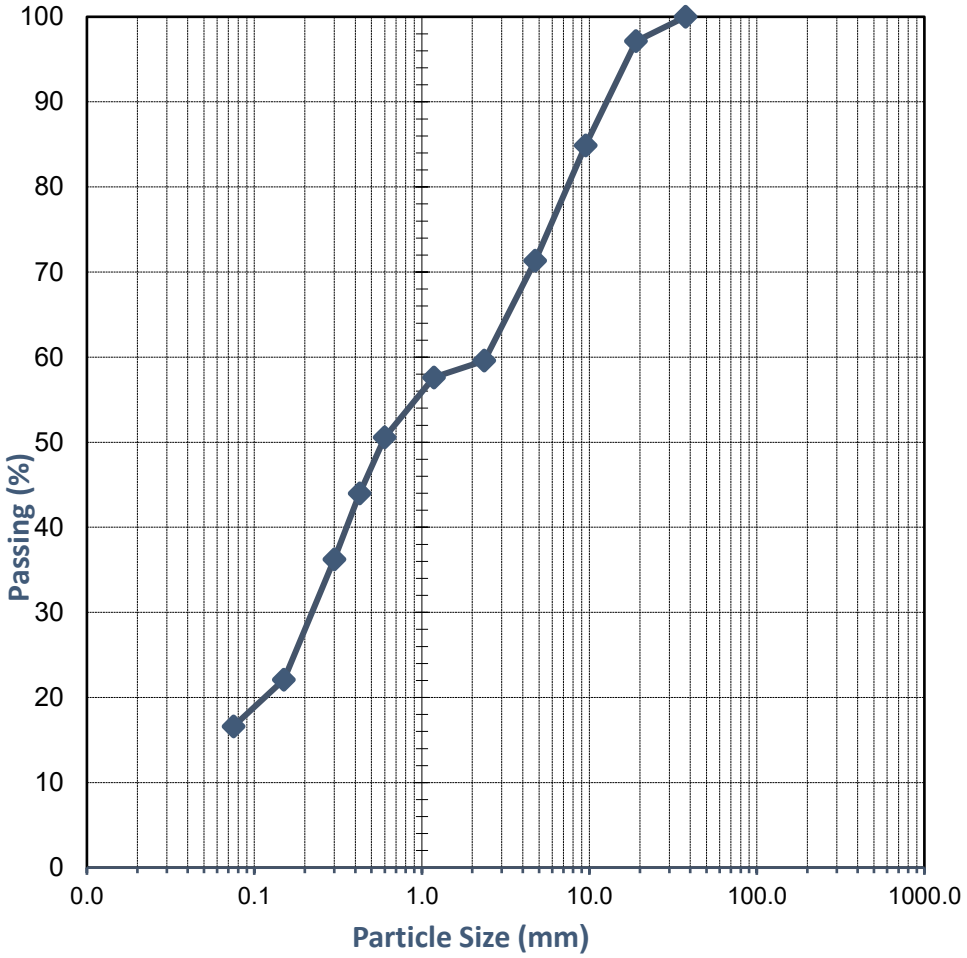
TEST REPORT - AS 1289.3.6.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1583_1_PSD
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1583
Location:	Hazelmere, WA	*Date Sampled:*	5/01/2021
Sample Identification:	23, 0.45-0.75 m (Bulk)	*Date Tested:*	11/1/21-13/1/21

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	97
9.5	85
4.75	71
2.36	60
1.18	58
0.600	51
0.425	44
0.300	36
0.150	22
0.075	17



Comments:

Approved Signatory:

Name: Cody O'Neill

Date: 13/January/2021

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

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.6.1.1

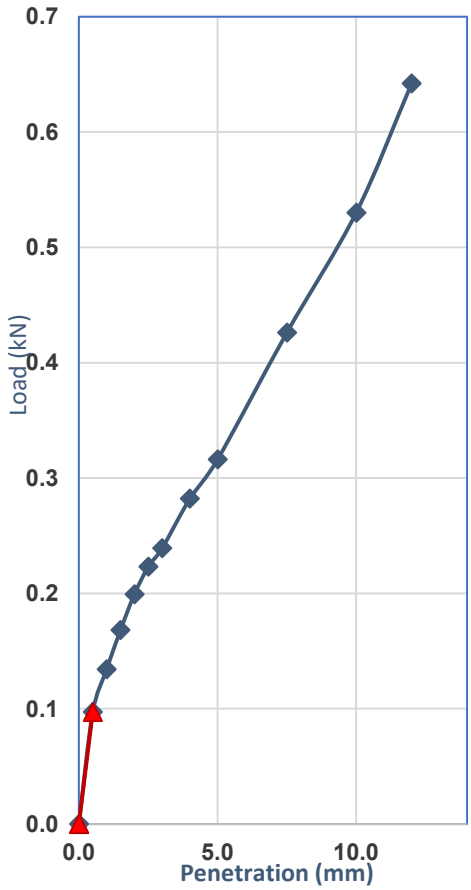
Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1583_1_SCBR
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1583
Location:	Hazelmere, WA	*Date Sampled:*	5-01-2021
Sample Identification:	23, 0.45-0.75 m (Bulk)	*Date Tested:*	12/01 - 18/01/21

TEST RESULTS - CALIFORNIA BEARING RATIO

Sample Description: Sandy Clay

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	3	Excluded/Replaced	Excluded
Maximum Dry Density (t/m^3)	1.97	Optimum Moisture (%)	10.0
Target Dry Density Ratio (%)	95	Target Moisture Ratio (%)	100

Specimen Conditions At Compaction			
Dry Density (t/m3)	1.86	Moisture Content (%)	10.1
Density Ratio (%)	94.5	Moisture Ratio (%)	100.0

Specimen Conditions After Soak			
Soaked or Unsoaked	Soaked	Soaking Period (days)	4
Surcharges Applied (kg)	4.50	Measured Swell (%)	4.0
Dry Density (t/m³)	1.79	Dry Density Ratio (%)	90.5
Moisture Content (%)	17.2	Moisture Ratio (%)	170.5

Specimen Conditions After Test			
Top 30mm Moisture (%)	19.2	Remaining Depth (%)	17.3

Correction applied to Penetration: 0mm

Determined at a Penetration of: 2.5mm

California Bearing Ratio (CBR): 1.5%

Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 20-January-2021

NATA WORLD RECOGNISED ACCREDITATION

Accreditation No. 20599
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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.7.1.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1584_1_SSI
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1584
Location:	Hazelmere, WA	*Date Sampled:*	5-01-2021
Sample Identification:	23, 0.9-1.2 m (Tube)	*Date Tested:*	11/01 - 12/01/2021

TEST RESULTS - SHRINK SWELL INDEX

Sampling Method: Sampled by Client, Tested as Received

Material Description: Sandy Clay

SWELL SPECIMEN	
Moisture Content Initial (%):	17.7
Dry Density - Initial (t/m^3):	1.57
Moisture Content Final (%):	25.4
Estimated Inert Inclusions (%):	Nil

SHRINK SPECIMEN	
Moisture Content Initial (%):	19.1
Extent of Crumbling:	Nil
Length/Diameter Ratio:	2.0
Extent of Cracking:	Slight

SHRINK SWELL INDEX	
Shrink Swell Index (I_{ss})	**0.6**

Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 14-January-2021

Appendix C: Water Balance

WA Site & Soil Evaluation
Irrigation area sizing

Please read the attached notes before using this spreadsheet

Water Balance for Zero Storage

Site Address:	**Lots 119 and 808 Lakes Road, Hazelmere**		
Date:	Wednesday, 31 July 2024	**Assessor:**	Tyrone Mardesic

INPUT DATA

Design Wastewater Flow	Q	4,800	L/day	Based on maximum potential occupancy and derived from the Supplement to Regulation 29 and Schedule 9 - Wastewater system loading rates
Design Irrigation Rate	DIR	50.0	mm/day	Based on soil texture class/permeability and derived from Table M1 of AS/NZS 1547:2012
Nominated Land Application Area	L	105	m^2	[1]
Crop Factor	C	0.8-1.0	unitless	Estimates evapotranspiration as a fraction of pan evaporation; varies with season and crop type[2]
Rainfall Runoff Factor	RF	1.0	unitless	Proportion of rainfall that remains onsite and infiltrates, allowing for any runoff
Mean Monthly Rainfall Data		Midland		BoM Station and number
Mean Monthly Pan Evaporation Data		Upper Swan		BoM Station and number or data from the Evaporation Data for Western Australia Report (https://researchlibrary.agric.wa.gov.au/cgi/viewcontent.cgi?article=1058&context=rmtr

Parameter	Symbol	Formula	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Days in month	D		days	31	28	31	30	31	30	31	31	30	31	30	31	**365**
Rainfall	R		mm/month	10	13.1	16.9	40.3	100.1	159.1	162	122.1	74.1	46.7	22.3	10.7	**777.4**
Evaporation	E		mm/month	327	281	241	136	89	63	60	87	110	161	221	303	**2079**
Crop Factor	C		unitless	1.00	1.00	0.90	0.90	0.80	0.80	0.80	0.80	0.90	1.00	1.00	1.00	
OUTPUTS																
Evapotranspiration	ET	ExC	mm/month	327	281	217	122	71	50	48	70	99	161	221	303	**1970.5**
Percolation	B	DIRxD	mm/month	1550.0	1400	1550.0	1500.0	1550.0	1500.0	1550.0	1550.0	1500.0	1550.0	1500.0	1550.0	**18250.0**
Outputs		ET+B	mm/month	1877.0	1681	1766.9	1622.4	1621.2	1550.4	1598.0	1619.6	1599.0	1711.0	1721.0	1853.0	**20220.5**
INPUTS																
Retained Rainfall	RR	RxRF	mm/month	10	13.1	16.9	40.3	100.1	159.1	162	122.1	74.1	46.7	22.3	10.7	**777.4**
Applied Effluent	W	(QxD)/L	mm/month	1417.1	1280.0	1417.1	1371.4	1417.1	1371.4	1417.1	1417.1	1371.4	1417.1	1371.4	1417.1	**16685.7**
Inputs		RR+W	mm/month	1427.1	1293.1	1434.0	1411.7	1517.2	1530.5	1579.1	1539.2	1445.5	1463.8	1393.7	1427.8	**17463.1**
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+W)-(ET+B)	mm/month	-449.9	-387.9	-332.9	-210.7	-104.0	-19.9	-18.9	-80.4	-153.5	-247.2	-327.3	-425.2	
Cumulative Storage	M		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	N		mm	0.00												
	V	NxL	L	0												
LAND AREA REQUIRED FOR ZERO STORAGE			m^2	80	81	85	91	98	104	104	99	94	89	85	81	

MINIMUM AREA REQUIRED FOR ZERO STORAGE: 104 m^2

CELLS

	Please enter data in blue cells
XX	Enter available Land Application Area
XX	Data in yellow cells is calculated by the spreadsheet, DO NOT ALTER THESE CELLS

NOTES

[1] This value should be the largest of the following: land application area required based on the most limiting nutrient balance or minimum area required for zero storage

[2] Values selected are suitable for grass in WA

Understanding your Report

1. EXPECTATIONS OF THE REPORT

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

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

2. THIS REPORT RELATES TO PROJECT-SPECIFIC CONDITIONS

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

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

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

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

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

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

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

3. DATA PROVIDED BY THIRD PARTIES

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

4. SOIL LOGS

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

5. THIRD PARTY RELIANCE

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

6. CHANGE IN SUBSURFACE CONDITIONS

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

7. SUBSURFACE CONDITIONS DURING CONSTRUCTION

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

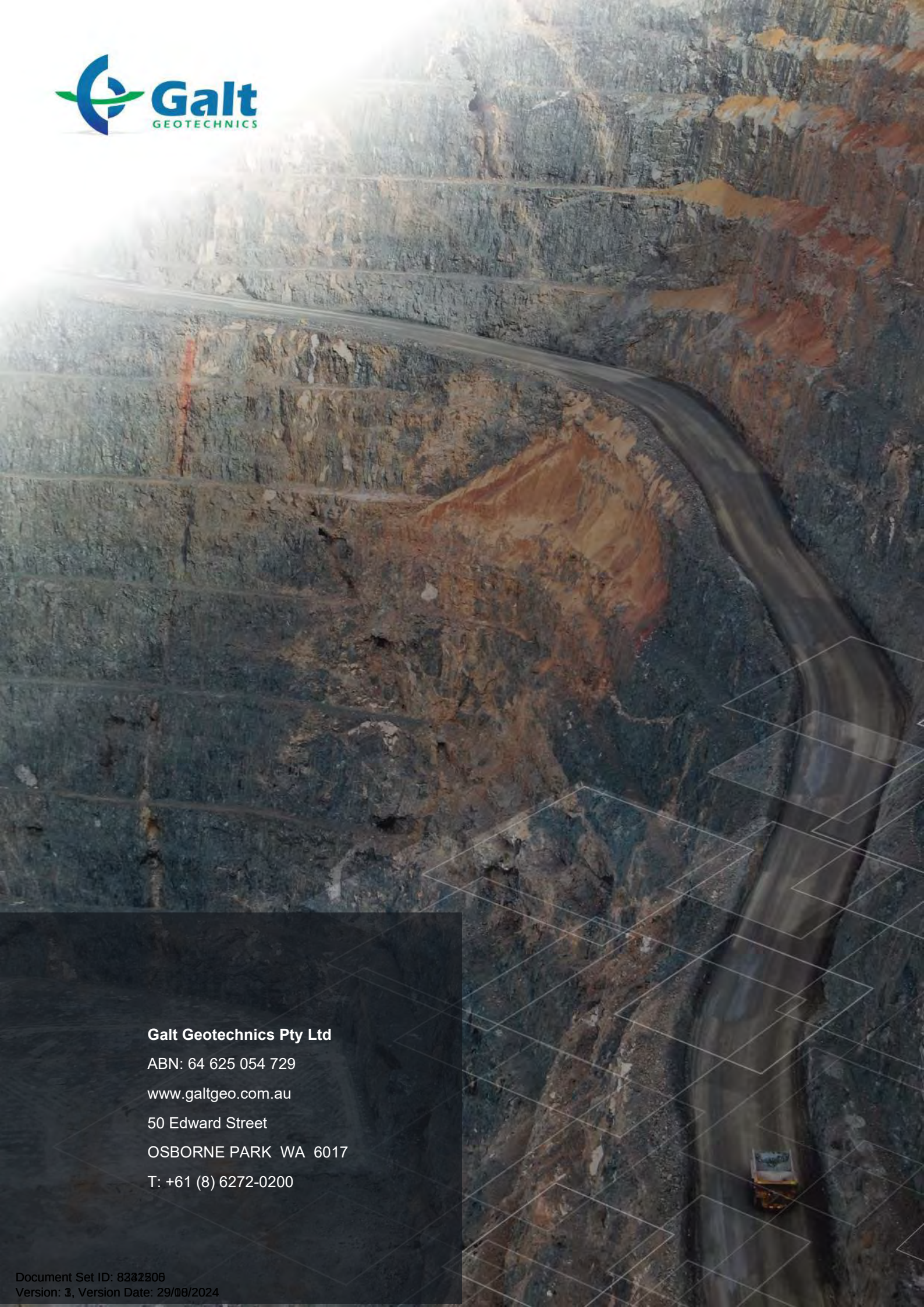
The most effective means of dealing with unanticipated ground conditions is to engage us for construction support. We can only finalise our recommendations by observing actual subsurface conditions encountered during construction. We cannot accept liability for a report's recommendations if we cannot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

8. ENVIRONMENTAL AND GEOTECHNICAL ISSUES

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

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

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



Galt Geotechnics Pty Ltd

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Attachment 10

16 Aug 2024

Your Ref:
Our Ref: H24053Av1

Brett Chivers
c/- Hesperia Projects Pty Ltd
PO Box 782
Subiaco, WA 6904

Dear Brett,

LOT 119 & 808 LAKES RD, HAZELMERE STORMWATER MANAGEMENT PLAN

This Stormwater Management Plan (SMP) has been prepared by Hyd2o on behalf of Hesperia Projects Pty Ltd in support of the development of Lot 119 & 808 Lakes Rd, Hazelmere (herein referred to as the site).

The site is located within the City of Swan and proposes the development of an industrial tenancy with two warehouses and associated infrastructure with access via Lakes Rd. A copy of the site plan is included as Appendix A.

In relation to water management planning approvals, Better Urban Water Management (Western Australian Planning Commission, WAPC, 2008) typically require an Urban Water Management Plan (UWMP) to be prepared for subdivisions in excess of 25 lots. Based on the scale of the proposed development, a brief letter report Stormwater Management Plan (SMP) is therefore considered appropriate rather than a UWMP to guide future stormwater management planning and engineering design.

This SMP provides an assessment of the site and an overarching plan for stormwater and groundwater management in the site. It contains mapping of groundwater levels and the required characteristics of the stormwater system based on modelling outcomes. Subsequent engineering design for these lots will be required to comply with this SMP.

This SMP has been prepared to meet the requirements of the City of Swan, Department of Water and Environmental Regulation (DWER), and the Better Urban Water Management framework (WAPC, 2008).

1. SITE CHARACTERISTICS

A site conditions plan is included as Figure 1. The site is generally described as having the following existing characteristics:

- The site has historically been cleared pasture that has been identified as excess land to the adjacent Talloman rendering facility. The land has not previously been used directly by the facility, other than for irrigation of treated wastewater from the plant. Notably this irrigation ceased in June 2008 and more recent investigations by Strategen (2019) deemed the site suitable for unrestricted use.

- The site is currently being used as a graded-out storage yard during the transition to proposed ultimate development.

- The site is surrounded by commercial/industrial lots to the north and south, Lloyd Street extension and the Talloman rendering facility to the east and Hazelmere Lake South to the west.

- A survey of the site was carried out by MNG in August 2021 and updated current to July 2024. Surveyed levels show that the topography of the site grades from a maximum elevation of approximately 15.9 mAHD in the north-eastern corner (where levels tie in with Lakes Rd) down to a minimum elevation of approximately 12.4 mAHD in the south-western corner. The site survey is contained as Appendix B. Site levels prior to grading out the site for current use are shown via DWER LiDAR contours in Figure 1.

- According to the Perth Sheet 2034 II and Part Sheets 2034 II and 2134 III, Environmental Geology Series (Gozzard, 1986) the site is characterised by sand overlying pebbly silt. The sand is noted to be very light grey at the surface, yellow at depth, fine to medium grained, sub rounded quartz, moderately well sorted of eolian origin while the pebbly silt is a strong brown silt with common fine to occasionally coarse grained sub rounded laterite, quartz, heavily weathered granite pebbles, some fine-medium grained quartz sand, of alluvial origin. A site geotechnical investigation was undertaken by Douglas Partners in February 2021 (Appendix C) which describes the geological profile of the site in more detail. The general ground conditions was described as follows, with reference to the test locations shown in Appendix C:

  a) Topsoil – dark grey, sandy topsoil with organics, generally to depths of between 0.10 m and 0.15 m

  b) Sand – pale grey to yellow-brown at depth, trace silt and with silt (fines varying between approximately 3% and 7%), generally medium dense and dense, underlying the topsoil at all test locations except locations 21 and 23. The sand extends to depths of between 2.5 m and 3.1 m within the approximate north-western half of the site, and to variable depths of between 0.4 m and 2.7 m within the approximate south-eastern half of the site. No sand was present at locations 21 and 23.

  c) Silty Sand – brown mottled black, orange-brown and grey-blue, fine to medium grained silty sand with some clay, encountered underlying either the topsoil, sand and cemented silty sand from various depths (between 0.08 m and 1.9 m) at several locations within the southern part of the site (locations 15, 18, 19, 21 and 23).

  d) Cemented Silty Sand (Coffee Rock) – orange brown and dark brown, generally moderately to well cemented silty sand, underlying the grey sand at various locations across the site (locations 1, 3, 4, 6, 8, 9, 15, 17 and 19). Typically between 0.2 m and 0.4 m in thickness.

  e) Clayey SAND/ Sandy CLAY – generally orange-brown, blue-green and grey moderately to high plasticity clayey materials underlying the sand and coffee rock from depths of between 0.8 m and 2.8 m and encountered to the test pitting depth

at various locations in the eastern half of the site (locations 7, 8, 9, 12, 13, 16, 17, 20 and 21).

Overall the site was considered suitable for the proposed development. With respect to stormwater, permeability testing in sandy areas indicated rates between 6 to 19 m/day, with a permeability rate of approximately 5m/day for sand at the site recommended for drainage design. The layers underneath the sand however, are to be considered generally impermeable.

- Published acid sulphate risk mapping indicates that the site is in an area which is mapped as a low to moderate risk of acid sulphate soils occurring within 3 m of natural soil surface.
- There are no conservation category wetlands, resource enhancement wetlands, or natural waterways within the site. Hazelmere Lake South, located 120m west of the site is classified as a resource enhancement wetland.
- There are no existing groundwater licences within the site. According to DWER's online Water Register (DWER, 2024a) groundwater resources in the area are fully allocated in the Perth-Superficial Swan and Perth-Leederville aquifers.

2. SURFACE WATER

Prior to current land use stormwater flow at the site would occur as diffuse overland flow to the low point in the southwestern corner before discharging to a roadside drain on Vale Rd. With current landuse stormwater infrastructure has been implemented to manage stormwater prior to attenuated discharge via the same outlet location in the southwest corner.

Consistent with the Hazelmere Drainage Strategy (DWA, 2014) a permissible discharge of 128 L/s exists via this outlet location to service the site. The receiving Vale Rd roadside drain is part of a series of open drains in the local area that conveys stormwater toward a culvert crossing comprised of 4 x 1200mm x 450mm box culverts (US invert 11.22 mAHD) that pass underneath Vale Rd to discharge to Hazelmere Lake South. The capacity of this crossing was increased in 2022 as part of upgrade works for a portion of Vale Rd to accommodate ongoing development of the greater Hazelmere Enterprise Area (HEA).

Two catchments contribute flow to Hazelmere Lake South via this culvert consistent with the Hazelmere Drainage Strategy. These are Catchment 3 (Lakes Road) in which the site is located (approximately 53 ha) and Catchment 1 (Talbot Rd) located to the south of Great Eastern Highway (approximately 114 ha). Catchment 1 connects to Catchment 3 via a culvert under Great Eastern Highway. DWA (2014) catchment plans are contained in Appendix D.

The AECOM (2010) HEA District Water Management Strategy reports a 1% Annual Exceedence Probability (AEP) level at Hazelmere Lake South of 11.83 mAHD, which indicates major event flow from Hazelmere Lake South to Hazelmere Lake North via an existing 375mm culvert under Hazelmere Circus (Figure 2).

Independent XP-Storm modelling of Hazelmere Lake South for the 1% AEP event by Hyd2o was performed to assess this level with modelling results contained in Appendix E. Modelling

was based on DWA (2014) catchment areas, runoff parameters via AECOM (2010), and DWER LiDAR data to estimate lake storage volumes. A conservative commencement level of 11 mAHD within the lake was adopted for modelling based on the estimated average annual maximum groundwater level (AAMGL) at that location.

Hyd2o modelling resulted in a 1% AEP level of approximately 12 mAHD at the lake with a critical duration of 48 hours. This elevation is higher but broadly similar to AECOM (2010) and has been adopted for the assessment in this report. This result indicates a small area in the bottom southwest corner of the predevelopment site would have been inundated in the 1% AEP event, albeit at very shallow depth with a minor volume.

Hyd2o also notes that at a level of 12 mAHD, an overland flow path to the south toward the Golf Course Drain may also exist (as shown on Figure 2). This overflow path was not included in the Hyd2o model, and this may ultimately result in a lower 1% AEP level for Lake Hazelmere South than detailed in this report. As shown on the DWA catchment plan provided by the City of Swan in Appendix D, diversion of the Perth Airport catchment may also occur to the lakes in future. Control of the level in Hazelmere Lake South would also be provided via overflow to Hazelmere Lake North at approximately 12 mAHD and then beyond further north.

3. GROUNDWATER

DWER's online Perth Groundwater Map (DWER, 2024b) shows groundwater flow to the north-west with contours ranging from 11 to 13 mAHD across the site. It is understood that these contours are a reflection of Gnangara Jandakot maximum water table contours for 2019. These contours are shown in Figure 3. It should also be noted that accuracy of the regional mapping in the area would be limited due to the availability of DWER bore data.

More detailed groundwater mapping of the average annual maximum groundwater levels (AAMGL) was undertaken by Hyd2o based on numerous bores within and around the site which have been previously installed and monitored for the neighbouring Talloman Rendering Facility. Locations of the bores used for AAMGL mapping are shown in Figure 3 with groundwater data contained in Appendix E.

Based on correlating recorded site groundwater monitoring data to a nearby DWER bore, the AAMGLs of monitored bores were calculated.

September 2007 site bore data was used for this analysis being the highest recorded level at the site, however the best available nearby DWER bore was not in operation at this time with a record only from 2010 onwards. To account for this Bureau of Meteorology (BoM) annual rainfall data was assessed to determine the winter rainfall in 2007 prior to the groundwater peak (457mm) and find the most closely correlated winter rainfall amount (2017, 467mm) for the 10-year period of record analysed (2010 – 2020) (BoM, 2021). Assuming this similar rainfall would likely result in similar winter peak groundwater levels, a September 2017 reading was used in determining the applicable correction factor for site bores.

Table 1 details a summary of DWER bore data and the determination a correction factor to apply to site bores for AAMGLs. The hydrograph for the DWER bore for the analysed period of record is contained as Appendix F.

The resulting AAMGLs for the monitoring bores are shown in Table 2, with AAMGL groundwater contours for the site shown in Figure 3. Additional summer groundwater level data from Strategen (2019) was then used to confirm the contouring considering more recent monitoring data from the site.

The AAMGL on site ranges from approximately 12.0 to 12.5 mAHD with groundwater flow in a south-western direction. Although this differs to the north-western direction shown in the Perth Groundwater Map (DWER, 2024a), it is considered better reflective of groundwater behaviour at the site given the topography and the existing control of the culvert crossing (US invert 11.22 mAHD) under Vale Rd near the south-west corner.

Table 1: AAMGL for DWER Bore and Monitored Bore Correction Factor

Bore	Period of Record Used	AAMGL (mAHD)	GWL 20-09-17 (mAHD)	Correction Factor to Apply to Site Bores
SCC 03/08	2010-2020	7.99	7.76	0.23

Table 2: AAMGL for Monitored Bores

Bore ID	GWL 25-09-07 (mAHD)	AAMGL (mAHD)
TMB1	15.95	16.18
TMB2	16.06	16.29
TMB6	13.82	14.05
TMB7	13.21	13.44
TMB8	13.84	14.07
TMB9	11.83	12.06
TMB10	11.94	12.17
TMB12	11.80	12.03
TMB13	11.79	12.02
1/86	15.64	15.87

4. WATER USE SUSTAINABILITY

Water supply will be provided via extension of the Water Corporation's Integrated Water Supply System. Rainwater tanks (RWT) will not be mandated however given stormwater management requirements on site (Section 5) and large contributing roof areas, use of RWT's as both a water supply source and stormwater management device may be a suitable way to offset underground storage requirements.

Water conservation measures within the development will be consistent with Water Corporation's Waterwise land development criteria and include the implementation of

waterwise practices at lot scale, and stormwater treatment and detention compliant with requirements as detailed in Section 5.

Wastewater will be via Department of Health approved Aerobic Treatment Units (ATU's), connected to flatbed leach drains. Douglas Partners (2021) reports soil conditions at this site as generally suitable for the disposal of treated effluent from an ATU in accordance with Australian Standard 1547-2012.

5. STORMWATER MANAGEMENT

With consideration of the Hazelmere Drainage Strategy discussed in Section 2, ultimate drainage design has been developed as a detention system with a permissible discharge of 128 L/s.

The key elements of the stormwater management strategy for the site are as follows, consistent with City of Swan Design Specifications (2012) and Better Urban Water Management (WAPC, 2008) requirements as well as integrating principles of Water Sensitive Urban Design (DWER, 2011):

- Flood storage on site sized to manage up to and inclusive of the 1% AEP event
- Retention of first 15mm of hardstand runoff within landscaped biofiltration areas.
- Treatment of roof runoff not required.
- Below ground storage large enough to retain the 10% AEP event.
- Hardstand areas designed to permit up to 50 mm of flood storage above ground in the 1% AEP event.
- 300mm freeboard from terminal (system low-point) below ground flood storage to building floor level.

Stormwater modelling to align the proposed drainage layout with the stormwater management strategy was done using XP-Storm. XP-Storm is an industry standard program that performs detailed hydraulic and hydrological calculations to simulate the performance of stormwater systems for a range of design storm events. The design storms modelled by XP-Storm were based on methodology in Australian Rainfall & Runoff (Ball J, Babister M, Nathan R, Weeks W, Weinmann E, Retallick M, Testoni I, 2016) and the Bureau of Meteorology Computerised Design Intensity Frequency Duration (IFD) Rainfall System. Storms modelled for the 1% AEP (Annual Exceedance Probability) event ranged from 10 minutes to 12 hours.

The landuse breakdown for the site provided in Table 3 based on the site plan in Appendix A. Consistent with proposed engineering design (Appendix G) the site has been further divided into three catchments as shown in Figure 4, with each primarily serviced by a flood storage area. Notably the northern carpark catchment is serviced by both Basin B and Basin C, with these storages combined for modelling purposes. The resulting catchment breakdown is shown in Table 3. Runoff coefficients used, shown in Table 3, are consistent with City of Swan guidelines and other industrial stormwater management plans approved in the local area.

Storage provision in design is also inclusive of 2 RWT's included in site design. Each tank has an approximate 167 m^3 capacity (6m high) with the intent to provide low level outlets for

controlled discharge as part of the stormwater management system. With reference to engineering design (Appendix G) roof catchments for tank storage are provided in Table 3 and shown in Figure 4. Each RWT was modelled with a limited orifice discharge of 5.3 L/s to remain consistent.

The site storage configuration used in the model is shown in Figure 4. The modelled system generally consists of distributed storage areas with invert levels and interconnection with reference to proposed engineering design (Appendix G). Connection from the northern carpark storage and eastern swale storage to the southern storage occurs via underground pipework and bubble-ups to allow for interdependent flood levels for major events. The restricted outlet location to Vale Rd is located from the southern storage.

Given sands across the site tested permeabilities between 6 to 19 m/d, Doughlas Partners (2021) recommended a general application rate of 5m/d for site design pending lesser compaction of allocated drainage areas. A design permeability of 2.5 m/d is generally considered reflective of biomedia with long term clogging. Based on these soil characteristics, proximity to test sites and variability in sand profile across the site, design permeabilities provided for each storage location in Table 3 were considered suitable for modelling. In support of these permeabilities subsoil will be implemented in storage design to account for any proximity to AAMGL and the variability of profile encountered with the redistribution of stormwater long term.

Indicative modelling results are provided in Table 3 with XP-Storm modelling outputs contained as Appendix H.

Modelling results indicated that the 15mm event was effectively retained on site with corresponding flood elevations not accessing an outlet off the base of the Southern Storage at 12.8 mAHD.

Modelling results indicate a 1% AEP volume and area requirement of 2184 m^3 and 3667 m^2 respectively (excluding RWT storage). These requirements are met with proposed engineering design (Appendix G) with an overall volume and area provision of 2248 m^3 and 3752 m^2 respectively (excluding RWT storage).

Based on additional design considerations the site outlet to Vale Rd will have invert level of approximately 11.5 mAHD. As discussed in Section 2 Hazelmere Lake South has a 1% AEP flood level of approximately 12 mAHD. This backwater condition has been incorporated into the model for the 1% AEP event to produce the results in Table 3 below. Hydraulically the invert of the Southern Storage (12.50 mAHD) sits above this level.

Table 3: Stormwater Management

Catchment	Southern Storage	Eastern Swale	Northern Carpark
Roof (ha) @ 95% RO	4.18	-	0.05
Hardstand @ 100% RO	0.87	1.60	0.37
Drainage @ 33% RO	0.26	0.08	0.05
Landscaped Area @ 10% RO	0.21	-	0.20
Total Area (ha)	5.52	1.68	0.68
Equiv Imp Area (ha)	4.95	1.63	0.46
Storage Characteristics			
Rainwater Tanks (with low level outlet)			
Roof Catchment (ha)	0.66	-	-
Tank Storage Provided (Tanks/Volume)	2/333 m^3	-	-
Storage Height (m)	6	-	-
Drainage Basin/Swale			
AAMGL (mAHD)	~11.7 - 12	~12 – 12.7	~12.1
Invert (mAHD)	12.5	12.72	12.5
Batter Slopes	1:3	1:0	1:3
Base Area (m^2)	1638	778	207
Storage Depth (m)	0.80	0.58	0.80
Outlet (mAHD)	12.80	11.60 (bubble-up)	12.5
15mm Event			
Design Perm (m/d)	2.5	1.0	2.5
Flood Depth (m)	0.30	0.08	0.25
Volume (m^3)	521	76	63
TWL Area (m^2)	1791	778	292
10% AEP Event			
Tank Storage Req. (m^3)	193	-	-
Tank Peak Discharge to Swales (L/s)	7	-	-
Flood Depth (m)	0.53	0.31	0.50
Volume (m^3)	937	252	148
TWL Area (m^2)	1912	778	384
Critical Storm (hr)		3	
Outlet Discharge (L/s)		113	
1% AEP Event			
Tank Storage Req. (m^3)	333	-	-
Tank Peak Discharge to Swales (L/s)	11	-	-
Design Perm (m/d)	3.5	1.0	2.5
Flood Depth (m)	0.79	0.57	0.75
Volume (m^3)	1472	458	254
TWL Area (m^2)	2383	778	506
Critical Storm (hr)		3	
Outlet Discharge (L/s)		127	

6. GROUNDWATER MANAGEMENT

Proposed earthworks levels for the site are required to consider a range of factors including clearance to groundwater, flood storage levels, on site wastewater disposal, and integration with the existing surrounding infrastructure levels, such as Vale and Lakes Rd.

As shown on the site plan in Appendix A both warehouses have a finished floor level of 13.9 mAHD. This provides a minimum clearance to AAMGL more than 1.5m and as such no control of the regional groundwater table is considered necessary. As detailed in Section 5 subsoil implementation beneath surface water recharge areas will provide added protection.

For engineering design to remain consistent with the stormwater strategy the maximum allowable storage height at the terminal outlet basin is 13.6 mAHD (300mm freeboard). As per engineering design (Appendix G) the terminal basin has a top storage height of 13.3 mAHD.

Biofiltration areas will be designed consistent with the Adoption Guidelines for Stormwater Biofiltration Systems (CRC for Water Sensitive Cities, 2015). This area will typically consist of native ephemeral plantings above a 0.3-0.5m biofilter media layer with high PRI and permeability >5 m/day to ensure drainage function. Further detail as to the landscaping of drainage areas is provided in Appendix I.

In subsoil implementation beneath drainage it is recommended that where practical subsoils are set at AAMGL or above in order to minimise the displacement of groundwater and environmental impact. As shown in Table 4 below this will be achievable over most of the site while allowing for biofilter media guidelines as per above.

Table 4: Groundwater Management

Site Location	Proposed FFL/Invert (mAHD)	1% AEP Flood Storage Level (mAHD)	AAMGL (mAHD)	Indicative Subsoil Level with Bio Media (mAHD)
Warehouse (1&2)	13.9	-	~12 – 12.3	-
Basin A	12.5	13.30	~11.7 - 12	12.20
Basin B	12.5	13.20	~12	12.20
Basin C	12.5	13.20	~12.1	12.20
Basin D	12.72	13.32	~12 – 12.7	12.42

7. IMPLEMENTATION PLAN

Roles and responsibilities for implementation are detailed in Table 5 below.

Construction of the stormwater system within the site will be the responsibility of the developer. Maintenance and management of stormwater infrastructure will be the responsibility of the lot owner and tenants.

Long term maintenance of stormwater drainage infrastructure outside of the site will be the responsibility of the City of Swan.

Maintenance will include but not be limited to street sweeping to reduce particulate build up, removal of sediment and rubbish in manholes and removal of debris and vegetation build up within biofiltration areas and storages to prevent stormwater blockages.

Table 5: Actions and Responsibilities

Action	Responsibility		
	Developer	City of Swan	Lot Owner / Tenant
Preparation of SMP (this document)	✓		
Review and Assessment of SMP		✓	
Construction of stormwater infrastructure within the site	✓		
Maintenance and management of stormwater infrastructure within site boundaries			✓
Maintenance and management of stormwater infrastructure outside site boundaries		✓	

8. REFERENCES

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Should you have any queries regarding this report, please do not hesitate to contact Sean O'Sullivan or Sasha Martens of this office.

Yours sincerely,

Sean O'Sullivan,
Engineering Hydrologist

Attachments

Figure 1: Site Conditions Plan
Figure 2: Surface Water Plan
Figure 3: Groundwater Plan
Figure4: Stormwater Management Plan

Appendix A: Site Plan
Appendix B: MNG Site Survey
Appendix C: Geotechnical Report
Appendix D: Hazelmere Drainage Strategy
Appendix E: XP-Storm Modelling Hazelmere Lake South
Appendix F: Site Groundwater Data
Appendix G: DWER Bore Hydrograph
Appendix H: Engineering Drawings
Appendix I: XP-Storm Stormwater Modelling
Appendix J: Landscape Plan

FIGURES

Date: 06/08/2024 Job No. H24053

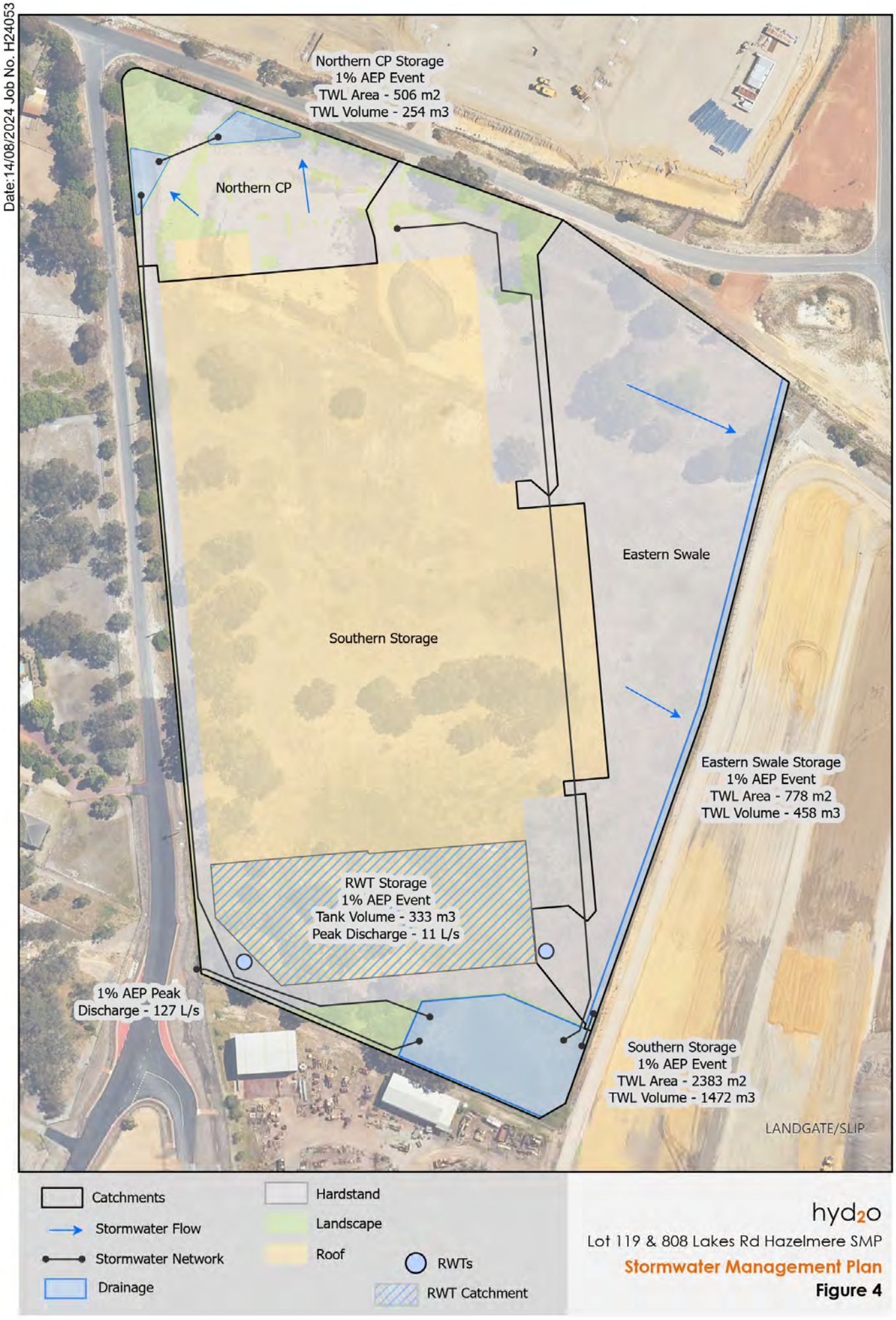
Site
DWA (2014) Catchments
Existing Culverts
Overland Flowpath
Open Drains
1% AEP Flood Extent ~12 mAHD
Lidar Topography (mAHD)

hyd2o

Lots 119 & 808 Lakes Rd Hazelmere SMP

Surface Water Plan

Figure 2



hyd2o

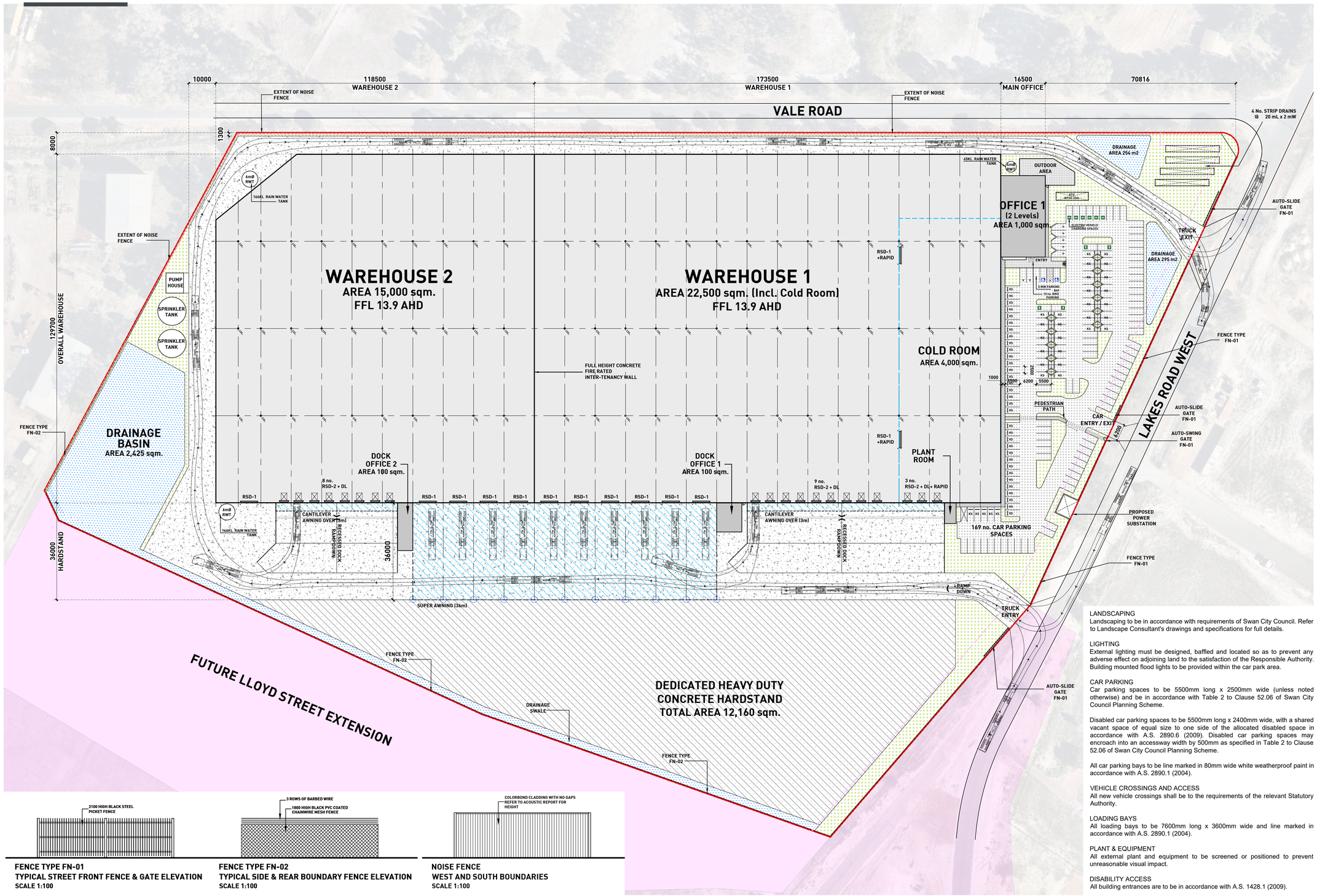
Lot 119 & 808 Lakes Rd Hazelmere SMP

Stormwater Management Plan

Figure 4

APPENDIX A
Site Plan

FOR DEVELOPMENT APPLICATION ONLY
SUBJECT TO STATUTORY APPROVAL



FENCE TYPE FN-01
TYPICAL STREET FRONT FENCE & GATE ELEVATION
SCALE 1:100

FENCE TYPE FN-02
TYPICAL SIDE & REAR BOUNDARY FENCE ELEVATION
SCALE 1:100

NOISE FENCE
WEST AND SOUTH BOUNDARIES
SCALE 1:100

DEVELOPMENT SUMMARY

SITE AREA	78,702	sqm. approx.
Total Drainage Basin & Swale Area	3,920	sqm. approx.
Total Dry Landscape Area	4,815	sqm. approx.
Total Pedestrian & Outdoor Paving Area	455	sqm. approx.
Net Developable Site Area	69512	sqm. approx.
Warehouse 1 (Incl. Cold Room)	22,500	sqm.
Main Office 1 (2 Levels)	1,000	sqm.
Dock Office 1	100	sqm.
Plant Room	35	sqm.
Warehouse 2	15,000	sqm.
Dock Office 2	100	sqm.
TOTAL BUILDING AREA	38,735	sqm.
Total Heavy Duty Paving Area (Concrete)	14,535	sqm. approx.
Total Dedicated Heavy Duty Paving Area (Concrete)	12,160	sqm. approx.
Total Light Duty Paving Area	4,470	sqm. approx.
Total Cantilever Awning Area (3m)	360	sqm. approx.
Total Super Awning Area (36m)	4,070	sqm. approx.
Total Car Parking Provided	169	spaces

EXTENT OF HEAVY DUTY PAVING AREA

EXTENT OF HEAVY DUTY DEDICATED CONCRETE HARDSTAND

EXTENT OF LIGHT DUTY PAVING AREA (RED ASPHALT)

EXTENT OF LANDSCAPE AREA

EXTENT OF AWNING AREA

EXTENT OF DRAINAGE BASING & SWALE AREA

TREE WELL AT 2.3m x 1.75m (250mm CONCRETE FLUSH KERB) TO BE PROVIDED TO CARPARKING

FENCING

EXTENT OF NOISE FENCE

KS KERB STOP

EXISTING PRIVATE SEWER RISING MAIN TO BE RELOCATED

RSD-1 ROLLER SHUTTER DOOR 6mW x 6mH

RSD-1 +RAPID ROLLER SHUTTER DOOR 6mW x 6mH + SAME SIZE RAPID ROLL DOOR

RSD-2+DL ROLLER SHUTTER DOOR 2.7mW x 3.3mH + DOCK LEVELLER

RSD-2+DL +RAPID ROLLER SHUTTER DOOR 2.7mW x 3.3mH + DOCK LEVELLER + SAME SIZE RAPID ROLL DOOR

LANDSCAPING
Landscaping to be in accordance with requirements of Swan City Council. Refer to Landscape Consultant's drawings and specifications for full details.

LIGHTING
External lighting must be designed, baffled and located so as to prevent any adverse effect on adjoining land to the satisfaction of the Responsible Authority. Building mounted flood lights to be provided within the car park area.

CAR PARKING
Car parking spaces to be 5500mm long x 2500mm wide (unless noted otherwise) and be in accordance with Table 2 to Clause 52.06 of Swan City Council Planning Scheme.

Disabled car parking spaces to be 5500mm long x 2400mm wide, with a shared vacant space of equal size to one side of the allocated disabled space in accordance with A.S. 2890.6 (2009). Disabled car parking spaces may encroach into an accessway width by 500mm as specified in Table 2 to Clause 52.06 of Swan City Council Planning Scheme.

All car parking bays to be line marked in 80mm wide white weatherproof paint in accordance with A.S. 2890.1 (2004).

VEHICLE CROSSINGS AND ACCESS
All new vehicle crossings shall be to the requirements of the relevant Statutory Authority.

LOADING BAYS
All loading bays to be 7600mm long x 3600mm wide and line marked in accordance with A.S. 2890.1 (2004).

PLANT & EQUIPMENT
All external plant and equipment to be screened or positioned to prevent unreasonable visual impact.

DISABILITY ACCESS
All building entrances are to be in accordance with A.S. 1428.1 (2009).

NOTE:

- This concept plan is intended for Development Application purposes only. All setbacks, site coverage, car parking numbers, landscape areas and the like are subject to statutory approval.
- No assurance is given as to the features, attributes, feasibility or accuracy of anything shown on or disclosed in this plan.
- All existing & proposed features, dimensions, areas and boundaries are approximate only and subject to verification via detailed site survey by licensed surveyor.

CLIENT:
HESPERIA

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Melbourne VIC 3000
t: (03) 9978 9888
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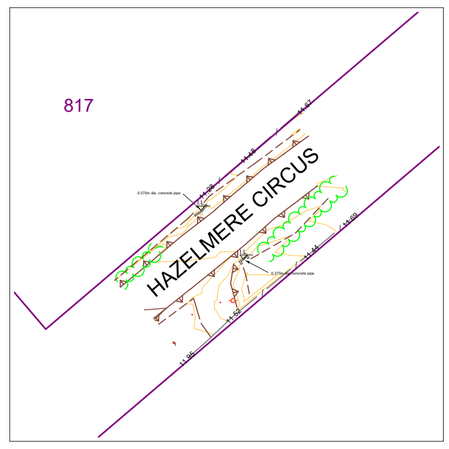
PROPOSED DEVELOPMENT

LOTS 119 & 808, LAKES ROAD, HAZELMERE WA

SITE PLAN

DRAWING TYPE: DEVELOPMENT APPLICATION
DRAWING NUMBER: 2411-169-DA-021
REVISION: D
DATE: 16.08.2024
SCALE: 1:700 @ A1 / 1:1400 @ A3
0 35 70
SCALE BAR @ A1

APPENDIX B
Site Feature Survey



HAZELMERE CIRCUS
DRAIN LOCATION SKETCH
SCALE 1:750

LAKES ROAD
VALE ROAD
VALE ROAD
LAKES ROAD
DRAINAGE BASIN
Sewer Easement Doc F246681
Easement Doc O190904
Easement DOC D751545
Contaminated Sites Easement Doc L470579
4 x 1200x450 CONC. BOX
Ø 300mm POLY
Ø 450mm CONC.
IL = 11.13
IL = 11.91
IL = 11.97
IL = 11.22
IL = 11.30
IL = 11.43
0.3m dia. concrete pipe
815
816
817
808
807
810
812
119
267975
267900
267825
267750
267675
267600
267525
67200
67275
67350
67425
67500
67575

Existing boundaries have been extracted from Landgate's Spatial Cadastral Database, which is only a model of the cadastre. The depicted boundary locations are a graphical representation only and as they have not been re-established by survey. MNG does not guaranteed the position unless stated otherwise.
Re-establishment of lot boundaries by a Licensed Surveyor is recommended for any works on or about a boundary.
This note is an integral part of this plan

Surface features and levels have been surveyed to meet the requested scope of works accuracy. The surface may be contoured to depict topography or defined only by spot heights. For clarity on hard copy some level information is not shown, refer to 3D digital file.
Above ground indicators (markers) of underground services are located where visible.
Third parties utilising this information should confirm the capture accuracies meet requirements prior to use.
This note is an integral part of this plan.

This survey has been completed to CLASS 2/3 Accuracy
Hard Stand Areas are to Class 2 Accuracy
Horizontal Accuracy ± 20mm
Vertical Accuracy ± 20mm
All other Areas are to Class 3 Accuracy
Horizontal Accuracy ± 30mm
Vertical Accuracy ± 50mm
This note is an integral part of this plan

Rev.	Description	Drawn	Date	Checked
C	Add site levels, new Vale Road verge and updated verge survey since previous survey	TGM	18/07/2024	TAV
B	Add updated boundaries & easements	MJ	6/09/2022	TAV
A	Initial Issue	DRD	20/08/2021	TAV

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Surveyor:- RGA
Survey Date:- 10/08/2021
Precal/Cad:- SCDB

N

DETAIL SURVEY
LOTS 119 & 808 LAKES ROAD
HAZELMERE

CLIENT:
HESPERIA PROPERTY GROUP PTY LTD

The contents of this plan are current and correct as of the date stated within the revision panel. All consultants and persons wishing to utilise this data should satisfy themselves of this plans currency by contacting the McMullen Nolan Group.

SCALE 1:750 @ A1
0 25 50 75
ALL DISTANCES ARE IN METRES
For a true to scale reproduction of this plan, plot it to A1 with the Paging Scaling set to None.

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, encumbrance or interest 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 on or near existing boundaries.

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info@mngsurvey.com.au
www.mngsurvey.com.au
ABN 90 009 363 311

Project Mngr.	Trevor Veen	Datum	PCG94 / AHD

102557 - DE - 007 - C
Job Number | Type | Plan Number | Revision

ROAD FEATURES

- Traffic Junction Box
- Traffic Signals - 1 Aspect
- Traffic Signals - 2 Aspect
- Traffic Signals - 3 Aspect
- Traffic Signals - 4 Aspect
- Pedestrian Signals
- Sign On One Pole
- Sign Multiple Poles
- Overhead Sign
- Traffic Controller Box
- Finger Sign (F SIGN)
- Traffic Earth Pit
- Police Traffic Camera
- Guide Post
- Km Marker (SLKP)
- Traffic Count
- Solar Panel - Single Pole
- Variable Speed Sign

ELECTRICAL

- Earth Pit (Earth)
- Electrical Pillar (E)
- Electrical Dome (WP)
- Light Pole - Directional (HL)
- Power Pole
- Transformer Single Pole
- Stay Pole
- Steel Wire Anchor
- High Mast Lighting
- Electrical Cable Marker (E)
- MRWA Cable Marker (M)
- MRWA Electrical Cable Box (MR)
- Electrical Cable Pit/Box (E)
- MRWA Distribution Board (EDB)
- High Tension Power Pole (PP)
- Electrical Supply Pole (EP)
- Ground Floodlight (GFL)
- MRWA Electrical Manhole
- Meter Box (MB)
- Power Meter Box
- Electrical Transformer
- MRWA Light Pole
- MRWA Multiple Light Pole

COMMUNICATION

- Telstra Pit
- Telstra Pillar
- Telstra Marker
- Telstra Pole
- Telephone Booth (T)
- Emergency Phone (TEL)
- Antenna
- Telstra Elevated Joint
- Cable Marker (Optus)
- Telstra Tower
- Communication Manhole

WATER

- Water Meter (WM)
- Water Stop Valve (WA)
- Hydrant (Ground Level) (G.HYD)
- Hydrant (Pillar) (FH)
- Water Bore (WB)
- Stand Pipe
- Reticulation Sprinkler
- Reticulation Control Valve (WA)
- Well (WELL)
- Water Main Marker
- Water Tap
- Flushing Point (FP)
- Air Valve (AV)
- Peizometer (P)
- Water Access Chamber
- Hydrant Booster Box

GAS

- Gas Marker
- Gas Valve (GV)
- Gas Test Valve (GTV)
- LPG Tank (LPG)
- Gas Test Pit (Gas Pit)
- Gas Manhole

DRAINAGE

- Invert Level (IL)
- Overt Level (OL)
- Flood Level (FL)
- Water Line (WL)
- Flood Level Indicator (FL)
- Storm Water Grate
- Drainage Gully
- Drainage Manhole
- Drainage Headwall

SEWER

- Sewer Vent
- Sewer Line Marker
- Sewer Inspection Shaft (IS)
- Sewer Inspection Opening (IO)
- Sewer Manhole

RAIL

- Rail Traffic Signals (3)
- Rail Traffic Control Box (RAIL)
- Rail Telephone Box
- Rail Cable Pit (RAIL)
- Rail Cable Marker (T)
- Rail SLK Post (SLKP)
- Manhole - Rail Cable (RC)

STRUCTURE

- Deck Level (D.L.)
- Floor Level (FL)
- Column Centre

GENERAL

- Clothes Hoist
- Air Conditioner
- Marker Unk/Undefined
- Undefined Manhole
- Control Of Access Sign
- Count Station
- Advertising Sign (AD)
- Windmill
- Stock Trough (TROUGH)
- Litter Bin (BIN)
- Mail Box (MAIL)
- Parking Meter (PM)
- Bus Stop (BUS)
- Ticket Machine (TM)
- Borehole (BORE)
- Flag Pole (FLAG)
- Bollard
- Fuel Bowser
- Underground Filler (UTF)
- Diesel Tank (D)
- Oil Main Marker
- Security Post
- Special Environment Area Marker ("yellow Hockey Sticks") (SEAM)
- Roadside Memorial Cross
- Other Pole/post

GROUND FEATURES

- Natural Surface (12.34)
- Aerial Survey Marker

VEGETATION

- Tree Details - Canopy & Trunk
- Tree 0,1m-0,3m Trunk Diameter
- Tree 0,3m-0,5m Trunk Diameter
- Tree 0,5m-1,0m Trunk Diameter
- Tree > 1,0m Trunk Diameter
- Bush
- Die Back Area - Marker
- Nesting Tree
- Tree Trunk / Stump
- Grass Tree

SURVEY CONTROL

- Star Iron Picket
- Trig Point
- SSM
- Bench Mark (BM)
- Photo Point
- Cadastral Peg/Post (OP)
- Reference Peg (R.PEG)
- Alignment Control
- Spring Head Nail
- Spike (SP)
- TBM
- Peg Placed / Found
- Minor Vertical Control Mark Mvcm

ROAD FEATURES

- Edge Of Bitumen
- Road Shoulder
- Edge Of Unsealed Road
- On Road
- Centre Of Road
- Kerb Top
- Kerb Bottom
- Cattle Grid
- Centre Of Driveway
- Edge Of Driveway
- Pedestrian Ramp
- Pedestrian Crosswalk
- Track
- Parking Bay
- Line Markings 1m Line & 1m Gap
- Line Markings 1m Line & 3m Gap
- Line Markings 3m Line & 9m Gap
- Lane Marking (9m*3m GAP)
- Lane Markings - Audible
- Shared Pathway - Guide Line 900mm*300mm GAP
- Footpath/Shared Path - Give Way 200mm*200mm GAP
- Giveway/Hold/Turn Lines 600mm*600mm GAP
- Double Barrier Line
- Overtaking Lane Left
- Overtaking Lane Right
- Single Solid Line
- Arrow Straight
- Arrow Straight/Left
- Arrow Straight/Right
- Arrow Left
- Arrow Right
- Arrow 3 Ways
- Arrow Right & Left
- Arrow U-Turn
- Arrow Merge
- Painted Lettering On Seal
- Painted Bicycle Traffic Signal Detector
- Guardrail - W Beam
- Guardrail - Thrie
- Barrier Concrete
- Barrier Steel Rope
- Barrier - Single Rail
- Barrier - Double Rail
- Barrier Triple Rail
- Bridge Barrier - (All Types)
- Bridge Expansion Joints
- Bridge - Outside Of Deck
- Soffit String

STRUCTURE

- Bridge
- Abutment
- Columns
- Piers
- Underpass
- Ramp
- Steps/Stairs
- Edge Of Concrete
- Bus Shelter
- Memorial
- Ruin
- Building / Structure
- Awning
- Shed
- Verandah
- Door Opening
- Window
- Roof Gutter Line
- Roof Ridge Line
- Top Of Wall
- Brick Wall
- Concrete Wall
- Livestock Grid

GROUND FEATURE

- Major Contour (10)
- Minor Contour
- Bank Bottom
- Bank Top
- Line Of Levels
- Levee Top
- Levee Bottom
- Rock Outcrop
- Ridge Line
- Borrow Pit
- Earthworks Area
- Ground Subsidence
- Rock Pitching

VEGETATION

- Tree Line/Canopy
- Bush Line
- Hedge
- Garden Bed
- Lawn Area
- Vineyard
- Plantation
- Orchard
- Nursery
- Market Garden
- Recreational Area
- Trunk Circumference Circle
- Tree-line Face Of Trunks

ELECTRICAL

- Varible Message Sign
- Electrical Structure String
- Overhead Powerlines - Null Height
- Overhead Powerlines - True Height
- High Tension Power Lines - Null Height
- High Tension Power Lines - True Height
- Guy-wire / Stay Wire / Anchor Wire - True Height
- Guy-wire / Stay Wire / Anchor Wire - 2D Null Height

COMMUNICATION

- Unidentifed Service Pit
- Telstra Cable (T)
- Amcom Cable
- Telstra Fibre Optic U/g -" Direct Measure"

WATER

- Water Pipe (W)

GAS

- Gas Line

DRAINAGE

- Drainage Pipe (D)
- Drainage Culvert
- Floodway
- Drain
- Edge Of Drain
- Sump
- Waters Edge
- Swamp
- Dam
- Edge Of Creek/Water
- Centre Of Channel
- Wet Area
- Flood Level Line
- Waterways Cross Section
- Obvert String - Top inside of drainage structure/pipe
- Top Outside of Pipe / Culvert

SEWER

- Sewer Pressure Main (PM)
- Sewer Pipe (S)

RAIL

- Railway Platform
- On Rail
- Rail Boom Gate
- Rail Underground Cable
- Dual Gauge Rail
- Narrow Gauge Rail
- Cross Setion - Rail
- Standard Gauge Rail
- Rail U/G Cable

CADASTRAL

- MNG Precal/Re Established
- (SCDB) - State Cadastral Data Base
- Cadastre By Others

GENERAL

- Swimming Pool
- Tank Perimeter
- Mine Shaft
- Mine Workings
- Koppa Logging Fence
- Fence/Gate
- Wall
- Top Of Barrier / Wall etc
- Retaining Wall
- Boundary Line
- Footpath
- Gas Cylinder/Tank
- Brick Paving
- Bike Rack
- Bench Seating
- Handrail
- Special Environment Area Boundary (line)
- Clearing Line - As Constructed/cleared
- Pegged Clearing Line

UNDERGROUND SERVICES - AUSTRALIAN STANDARDS
CLASSIFICATION OF SUBSURFACE UTILITY INFORMATION AS5488.1-2022

INDIRECT MEASUREMENT TO TOP OF SERVICE - CLASS B AND C		SURVICE LOCATION AT SURFACE- CLASS A to C		DIRECT MEASUREMENT TO TOP OF SERVICE- CLASS A		DBYD COMPILED - CLASS D - NO DEPTH	
(PZA)	Underground Amcom/Vocus Cable	HA	AMCOM/VOCUS Cable - Surface Location	(PQA)	Underground Amcom/Vocus Cable	QA	AMCOM/VOCUS Cable - Unverified, No Measurement
(PZC)	Underground Drainage Pipe	HC	Drainage Pipe / Stormwater - Surface Location	(PQC)	Underground Drainage Pipe	QC	Drainage Pipe / Stormwater - Unverified, No Measurement
(PZE)	Underground Electrical Cable	HE	Electrical Cable - Surface Location	(PQE)	Underground Electrical Cable	QE	Electrical Cable - Unverified, No Measurement
(PZF)	Underground Western Power Comms	HF	Western Power Communication - Surface Location	(PQF)	Underground Western Power Comms	QF	Western Power Communication - Unverified, No Measurement
(PZG)	Underground Gas Line	HG	Gas Line - Surface Location	(PQG)	Underground Gas Line	QG	Gas Line - Unverified, No Measurement
(PZH)	Underground MRWA Comms	HH	MRWA Communication - Surface Location	(PQH)	Underground MRWA Comms	QH	MRWA Communication - Unverified, No Measurement
(PZJ)	Underground MRWA Power	HI	MRWA Power - Surface Location	(PQJ)	Underground MRWA Power	QJ	MRWA Power- Unverified, No Measurement
(PZJ)	Underground NBN Comms	HJ	Underground NBN Fibre - Surface Location	(PQJ)	Underground NBN Comms	QJ	Underground NBN Comms - Unverified, No Measurement
(PZK)	Underground TPG /Pipe Networks	HK	Underground TPG/Pipe Networks Surface Location	(PQK)	Underground TPG /Pipe Networks	QK	Underground TPG/Pipe Networks - Unverified, No Measurement
(PZN)	Underground Next Gen Comms	HN	Next Gen Communication - Surface Location	(PQN)	Underground Next Gen Comms	QN	Next Gen Communication - Unverified, No Measurement
(PZO)	Underground Optus Fibre Optic	HO	Optus Optic Fibre - Surface Location	(PQO)	Underground Optus Fibre Optic	QO	Optus Optic Fibre - Unverified, No Measurement
(PZP)	Underground Optus Copper	HP	Optus Copper - Surface Location	(PQP)	Underground Optus Copper	QP	Optus Copper - Unverified, No Measurement
(PZR)	Underground Rail Services	HR	Rail Services - Surface Location	(PQR)	Underground Rail Services	QT	Telstra Copper - Unverified, No Measurement
(PZS)	Underground Sewer Pipe	HS	Sewer Pipe - Surface Location	(PQS)	Underground Sewer Pipe	QV	Telstra Optic Fibre - Unverified, No Measurement
(PZT)	Underground Telstra Copper	HT	Telstra Copper - Surface Location	(PQT)	Underground Telstra Copper	QR	Rail Services - Unverified, No Measurement
(PZU)	Underground Unknown Service	HU	Unknown Service - Surface Location	(PQU)	Underground Unknown Service	QS	Sewer Pipe - Unverified, No Measurement
(PZV)	Underground Telstra Optic Fibre	HV	Telstra Optic Fibre - Surface Location	(PQV)	Underground Telstra Optic Fibre	QU	Unknown Service - Unverified, No Measurement
(PZW)	Underground Water Pipe	HW	Water Pipe - Surface Location	(PQW)	Underground Water Pipe	QW	Water Pipe - Unverified, No Measurement
(PZX)	Underground Reticulation Pipe	HX	Reticulation - Surface Location	(PQX)	Underground Reticulation Pipe	QX	Reticulation - Unverified, No Measurement
(PZZ)	Abandoned Service	HZ	Abandoned Service - Surface Location	(PQZ)	Abandoned Service	QZ	Abandoned Service - Unverified, No Measurement

Rev.	Description	Drawn	Date	Checked
J	New Lines & Symbols added	DRD	21/03/2023	SAH
I	U/G Services Amended	DRD	18/08/2022	SAH
H	U/G Services Amended	SAH	30/10/2020	TKI

SCALE 1:1000 @ A3
0 10 20 30 40 50
ALL DISTANCES ARE IN METRES
For a true to scale reproduction of this plan, plot it to A3 with the Paging Scaling set to None.

Surveyor:- MNG
Survey Date:- 30/06/2020
Precal/Cad:- 30/06/2020

ISO 9001 : ISO14001 : ISO45001
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N

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, encumbrance or interest 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 on or near existing boundaries.

McMULLEN NOLAN GROUP
FEATURE SURVEY - GENERAL LEGEND

MNG
MCMULLEN NOLAN GROUP
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www.mngsurvey.com.au
ABN 90 009 363 311

CLIENT: N/A

Project Mngr	Datum
MNG Group	LOCAL

Job Number	Type	Plan Number	Revision
95465	DOC	012	J

APPENDIX C
Geotechnical Report

Douglas Partners
Geotechnics / Environment / Groundwater

Integrated Practical Solutions

Report on
Geotechnical Investigation

Proposed Industrial Subdivision Development
Lots 118 and 119 Lakes Road, Hazelmere, WA

Prepared for
Hesperia Projects Pty Ltd

Project 82463.01
February 2021

Douglas Partners
Geotechnics / Environment / Groundwater

Document History

Document details

Project No.	82463.01	Document No.	R.001.Rev0
Document title	Report on Geotechnical Investigation Proposed Industrial Subdivision Development		
Site address	Lots 118 and 119 Lakes Road, Hazelmere, WA		
Report prepared for	Hesperia Projects Pty Ltd		
File name	82463.01.R.001.Rev0.Geotechnical Report, Lots 118 and 119 Lakes Rd, Hazelmere		

Document status and review

Status	Prepared by	Reviewed by	Date issued
Revision 0	Dan Reaveley	F. Verheyde	5 February 2021

Distribution of copies

Status	Electronic	Paper	Issued to
Revision 0	1	-	Steve Robertson, Hesperia Projects Pty Ltd

The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

	Signature	Date
Author		5 February 2021
Reviewer		5 February 2021

FS 604853

Douglas Partners Pty Ltd
ABN 75 053 980 117
www.douglaspartners.com.au
36 O'Malley Street
Osborne Park WA 6017
Phone (08) 9204 3511

Douglas Partners
Geotechnics | Environment | Groundwater

Table of Contents

Report on Geotechnical Investigation
Proposed Industrial Subdivision Development
Lots 118 and 119 Lakes Road, Hazelmere, WA

1. Introduction

This report presents the results of a geotechnical investigation undertaken for a proposed industrial subdivision development at Lots 118 and 119 Lakes Road, Hazelmere, WA. The investigation was commissioned in an email dated 17 December 2020 by Steve Robertson on behalf of Hesperia Projects Pty Ltd and was undertaken in accordance with a Professional Services Agreement (Ref: Hesperia/Craig Mostyn Hazelmere) and Douglas Partners' proposal PER200361 dated 5 October 2020.

It is understood that the proposed development of the site comprises an industrial subdivision with four new lots for warehouse type developments and associated access roads.

The aim of the investigation was to assess the subsurface soil and groundwater conditions across the site in order to provide:

- an assessment of the geotechnical suitability of the site for the proposed development;
- an appropriate site classification in accordance with the requirements of AS2870;
- recommendations on site preparation and earthworks;
- the depth of available sand at the site, and its suitability of re-use;
- recommendations on appropriate foundation systems for the proposed development, including an assessment of allowable bearing pressures and likely settlements;
- recommendations in relation to external pavements, including indicative subgrade pavement CBR based on field observations, laboratory testing and Douglas Partners experience for the soils encountered at the site;
- A suitable permeability rate for the soils at the site, for the purposes of stormwater and effluent disposal design disposal design;
- Depth to groundwater, if encountered; and
- An evaluation of the suitability and limitations of the ground conditions for on-site sewage disposal, with reference to AS1547-2012, to assist with system design requirements by others.

The investigation included the excavation of 23 test pits, in situ infiltration tests at four locations and laboratory testing of selected samples. The details of the field work are presented in this report, together with comments and recommendations on the items listed above.

2. Site Description

The site comprises Lots 118 and 119, and a portion of Lots 117 and 50 on Lakes Road in Hazelmere and covers an irregular shaped area of approximately 9.7 ha. It is bounded by Lakes Road to the north, by Vale Road to the west, vacant land to the east and a developed industrial site to the south.

At the time of the investigation, the site comprised a fenced paddock, generally vegetated by grass and small shrubs and with a few stands of mature trees. General views of the site are presented as Figures 1 and 2 below.

Figure 1: Photo of site on 5 January 2021, looking south across the site.

The existing surface elevation of the site is between approximately RL 16.0 m AHD along the northern boundary, gently sloping to approximately RL 12 m AHD along the southern and western boundaries, according to survey data provided by the project's surveyors, MNG.

The published Perth 1:50,000 Environmental Geology sheet indicates that shallow sub surface conditions beneath the site are comprise a thin lens of Bassendean Sand over clayey materials of the Guildford Formation.

The Perth Groundwater Atlas (2004) indicates that the groundwater was at a level of approximately RL 7 m to 9 m AHD in May 2003, i.e. approximately 5 m to 7 m below the current surface levels.

Published ASS risk mapping indicates that the site is generally mapped as "moderate to low risk of acid sulphate soils occurring within 3 m of natural soil surface".

Figure 2: Photo of site on 5 January 2021, looking west across the site.

3. Field Work

Field work was carried out on 5 and 6 January 2021 and comprised:

- Excavation of 23 test pits;
- Dynamic penetrometer testing at each test pit location; and
- In-situ permeability testing at four locations.

The test pits (locations 1 to 23) were excavated to a maximum depth of 3.5 m, using an 8 tonne backhoe equipped with a 450 mm wide toothed bucket. The ground conditions were logged in general accordance with AS1726-2017 by a suitably experienced geotechnical engineer from Douglas Partners, and soil samples were recovered for subsequent laboratory testing.

Dynamic cone penetrometer tests (DCP) and Perth Sand Penetrometer tests (PSP) were carried out in accordance with AS 1289.6.3.2 and AS 1289.6.3.3 respectively, adjacent to each test location, to assess the in situ density of the shallow soils. The results of these tests are presented on the test pit log sheets in Appendix B.

Falling head permeability tests were carried out at a depth of 0.5 m and 1.1 m adjacent to test pit locations 3, 9, 14 and 22.

Test locations were determined using a hand-held GPS (accuracy of ±3 m), and are presented on Drawing 1 in Appendix B. The surface elevations at each test location were surveyed and provided by MNG.

4. Field Work Results

4.1 Ground Conditions

Detailed logs of the ground conditions and results of the field testing carried out on 5 and 6 January 2021 are presented in Appendix B, and notes defining descriptive terms and classification methods are presented in Appendix A.

The encountered ground conditions generally comprised topsoil overlying a variable thickness of sand, with cemented silty sand, colloquially known as Coffee Rock, and clayey soils underlying the sand in some locations.

A summary of the ground conditions encountered at the test locations is given below:

- **Topsoil** – dark grey, sandy topsoil with organics, generally to depths of between 0.10 m and 0.15 m;
- **Sand (SP and SP-SM) –** pale grey to yellow-brown at depth, trace silt and with silt (fines varying between approximately 3% and 7%), generally medium dense and dense, underlying the topsoil at all test locations except locations 21 and 23. The sand extends to depths of between 2.5 m and 3.1 m within the approximate north-western half of the site, and to variable depths of between 0.4 m and 2.7 m within the approximate south-eastern half of the site. No sand was present at locations 21 and 23.
- **Silty Sand (SM)** – brown mottled black, orange-brown and grey-blue, fine to medium grained silty sand with some clay, encountered underlying either the topsoil, sand and cemented silty sand from various depths (between 0.08 m and 1.9 m) at several locations within the southern part of the site (locations 15, 18, 19, 21 and 23).
- **Cemented Silty Sand (Coffee Rock)** – orange brown and dark brown, generally moderately to well cemented silty sand, underlying the grey sand at various locations across the site (locations 1, 3, 4, 6, 8, 9, 15, 17 and 19). Typically between 0.2 m and 0.4 m in thickness.
- **Clayey SAND/ Sandy CLAY (SC, CI and CH)** – generally orange-brown, blue-green and grey moderately to high plasticity clayey materials underlying the sand and coffee rock from depths of between 0.8 m and 2.8 m and encountered to the test pitting depth at various locations in the eastern half of the site (locations 7, 8, 9, 12, 13, 16, 17, 20 and 21).

4.2 Groundwater

Groundwater was observed at location 16 at 1.6 m depth, location 18 at 2.3 m depth, and location 20 at 1.5 m depth. No other groundwater observations were recorded, and each test pit was backfilled

immediately after soil sampling which prevented long-term monitoring of levels. Groundwater levels can be affected by climate conditions and land usage, and will vary with time.

4.3 Soil Permeability

Four in-situ infiltration tests were carried out using the falling head method at depths of between 0.5 m and 1.1 m adjacent to test pit locations 3, 9, 14 and 22. Permeability values were estimated from the in-situ permeability test data using a calculation derived from a method based on Hvorslev (1951). Permeability has also been estimated from particle size distribution test result from a sample taken from within the same soil type at each location, using Hazen's formula. Hazen's formula provides an indication of the permeability for clean sand in loose conditions, and thus the result derived using this approach should be considered with caution. Table 1 below summarises the permeability results.

Table 1: Summary of Permeability Analysis

Test Location	Depth (m)	Measured Permeability[1]		Derived Permeability (m/s) [2]		In situ Conditions of Tested Material
		(m/s)	(m/day)	(m/s)	(m/day)	
3	1.1	2.2×10^{-4}	19	2.3×10^{-4}	19	Sand with trace silt, dense
9	0.5	0.7×10^{-4}	6	0.6×10^{-4}	5	Sand with silt, medium dense
14	0.95	1.5×10^{-4}	13	0.8×10^{-4}	7	Sand with silt, dense
22	0.6	1.2×10^{-4}	10	- [3]	- [3]	Sand with trace silt, medium dense

Notes: [1]: In-situ permeability.
[2]: Hazen's formula.
[3]: Not assessed.

5. Laboratory Testing

A geotechnical laboratory testing programme was carried out on selected soil samples by a NATA registered laboratory, and comprised the determination of:

- the particle size distribution of 9 samples;
- the Atterberg limits and linear shrinkage of three samples;
- The shrink-swell Index of one sample;
- the modified maximum dry density (MMDD) and optimum moisture content (OMC) of three samples; and
- the California bearing ratio (CBR) values of three samples.

Detailed test report sheets are given in Appendix C and the results are summarised in Tables 2 and 3 (following page).

Table 2: Results of Laboratory Testing for Soil Identification

Test Location	Depth (m)	Fines (%)	Sand (%)	Gravel (%)	LL (%)	PL (%)	PI (%)	LS (%)	I_{ss} (%)	Material
3	1.2	4	96	0	-	-	-	-	-	Sand with trace silt
9	0.5	7	93	0	-	-	-	-	-	Sand with silt
10	0.5	4	96	0	-	-	-	-	-	Sand with trace silt
11	0.5	3	97	0	-	-	-	-	-	Sand with trace silt
12	1.5	17	67	16	47	18	29	6.0	-	Clayey Sand with gravel
14	1.5	6	94	0	-	-	-	-	-	Sand with silt
18	1.5	7	93	0	-	-	-	-	-	Sand with silt
20	1.9	39	58	3	63	16	47	7.0	-	Sandy Clay
23	0.45-0.75	17	43	40	42	14	28	6.0	-	Clayey Gravelly Sand
23	0.9-1.2	-	-	-	-	-	-	-	0.6	Clayey Gravelly Sand

Notes: Fines are particles smaller than 75 µm.
Sand is particles larger than 75 µm and smaller than 2.36 mm.
Gravel is particles larger than 2.36 mm and smaller than 63 mm.
PL: plastic limit LL: liquid limit PI: plasticity Index LS: linear shrinkage
OC: organic content I_{ss}: Shrink-swell Index '-' not tested.

The CBR tests were undertaken at a target compaction level of 95% of modified maximum dry density. The samples were soaked for 4 days prior to testing under a confining surcharge of 4.5 kg. The results are presented in Table 3 below.

Table 3: Results of Laboratory Testing for Pavement Design Parameters

Test Location	Depth (m)	MMDD (t/m^3)	CBR (%)	OMC (%)	Swell (%)	Material
9	0.5	1.79	14	13.0	0	Sand with silt
10	0.5	1.72	8	15.5	0	Sand with trace silt
23	0.45-0.75	1.97	1.5	10.0	4.0	Clayey Gravelly Sand

Notes: MMDD: modified maximum dry density. CBR: California bearing ratio. OMC: optimum moisture content.

6. Proposed Development

It is understood that the proposed development of the site will comprise an industrial subdivision into four new lots for warehouse type developments, with associated access roads and parking areas. It is understood that on-site disposal of effluent will also be required at the site utilising Aerobic Treatment Units (ATU) and leach drains.

We understand that the site will be required to be raised above the existing surface levels. As such a proposed strategy for bulk earthworks includes stripping and stockpiling suitable clean sand from the site, followed by the placement of imported fill materials and subsequent replacement of the stockpiled sand.

7. Comments

7.1 Site Suitability

Results of the investigation indicate that the site is generally underlain by medium dense and dense natural sand, overlying silty sand, cemented silty sand and clayey soils in some areas. Groundwater was encountered at three test locations during the investigation undertaken on 5 and 6 January 2021 at depths of between 1.5 m and 2.3 m below existing ground level (i.e. between approximately RL 9.6 AHD and RL 10.9 m AHD).

From a geotechnical standpoint, the land is considered to be physically capable of development for the proposed industrial subdivision development, provided that the provisions outlined in the subsequent subsections of the report are taken into consideration, and recommendations are implemented. Furthermore, the light grey to yellow-brown sand with silt/and silt (soil group “SP and SP-SM” described in Section 4.1 and on the logs), which covers the majority of the site to variable depths of between 0.4 m and 3.1 m is considered suitable for excavation, stockpiling and re-use as a structural fill with good drainage characteristics. If required, the sand could be excavated to the base of the layer, where either groundwater, silty sand, coffee rock or the clayey materials are encountered. It is recommended that a minimum separation of 1 m is allowed between the base of any excavated areas and groundwater, to allow suitable compaction of the stripped surface prior to placement of fill.

7.2 Site Classification

The encountered ground conditions and results of laboratory testing indicate that the site is generally underlain by medium dense and dense natural sand, overlying areas of silty sand, cemented silty sand and some clayey soils which are generally slightly to moderately reactive. Owing to the variation in depth to the reactive materials, surface movements of the site in its current conditions due to seasonal moisture changes is expected to vary from 0 mm to approximately 15 mm, therefore corresponding to a site classification of Class A and Class S in accordance with AS 2870-2011.

Following suitable site preparation during earthworks (refer to Section 7.4) and assuming earthworks design is undertaken as outlined in Section 6, the site can be improved to achieve the following site classifications:

- Class A – where a minimum thickness of 1.8 m of non-reactive granular sand is placed or exists between surface level and underlying clayey materials.
- Class S - where a minimum thickness of 0.8 m of non-reactive granular sand is placed or exists between surface level and underlying clayey materials.

7.3 Excavation Conditions

The encountered ground conditions comprise natural sand, overlying moderately to well cemented silty sand (colloquially know as Coffee rock) and clayey materials in some places.

Conventional earthmoving equipment should be generally suitable for excavations across the site within the surficial sand.

Slow excavation rates with an 8 tonne backhoe was experienced during excavation of the cemented silty sand. Therefore, if required, excavation through this material may require larger equipment such as a 20 tonne excavator with toothed bucket.

Groundwater was encountered at three test locations during the investigation undertaken on 5 and 6 January 2021 at depths of between 1.5 m and 2.3 m below existing ground level (i.e. between approximately RL 9.6 AHD and RL 10.9 m AHD). Higher groundwater elevation can be anticipated to occur during the winter and following wet periods. Therefore, provision for dewatering should be considered for deep excavation below existing surface levels, in particular within low parts of the site.

It is recommended that batter slopes not steeper than 1.5H:1V (horizontal : vertical) be adopted for temporary excavations not deeper than 3 m in sand material. This recommended batter angle should be re-assessed if loads are to be applied near the top of the batter. Permanent batter slopes should be not steeper than 2H:1V. The recommended batter slopes should be reconsidered for slopes below the groundwater table or subject to surface flows.

7.4 Site Preparation

7.4.1 Site Stripping

All deleterious material, including (if encountered) waste, topsoil and vegetation should be stripped from the proposed development areas of the site. Tree roots remaining from any clearing operations should be completely removed. Topsoil was generally encountered to depths of between 0.1 m and 0.15 m within the test locations. Further advice on the possible re-use of topsoil is provided below in Section 7.4.4.

7.4.2 Proof Rolling and Compaction

Following stripping of the site, the excavation of cut material and prior to placement of any fill, it is recommended that the exposed ground beneath the proposed building envelopes and pavement areas be proof rolled with a smooth drum roller of say 14 tonnes deadweight in vibrating mode in areas of sandy soils. A pad foot roller should be utilised to proof roll areas of exposed clayey soils, if excavation of sand has been undertaken. It is recommended that a minimum separation of 1 m is allowed between the base of any excavated areas and groundwater, to allow suitable compaction of the stripped surface prior to placement of fill.

Any areas that show signs of excessive deformation during compaction should be compacted until deformation ceases or, alternatively, the poor quality material should be excavated and replaced with suitable structural filling and compacted.

Care should be taken not to run heavy plant immediately adjacent to existing buildings and services. In these areas, the use of lighter compaction equipment, such as a vibrating plate compactor, is suggested.

Following stripping of topsoil and proof rolling, and prior to any placement of fill, it is recommended that a geotechnical engineer inspects the site.

7.4.3 Re-use of In Situ Sand

Sand extends to depths of between 2.5 m and 3.1 m within the approximate north-western half of the site, and to variable depths of between 0.4 m and 2.7 m within the approximate south-eastern half of the site, Based on the nature of the material encountered during the investigation, it is anticipated that in situ sand excavated from the site should be generally suitable for re-use as structural fill material provided it is free from organic matter and particles greater than 150 mm in size.

The silty sand, cemented silty sand and underlying clayey materials, encountered at depth, are generally not considered suitable for re-use as structural fill.

7.4.4 Re-use of Topsoil

Topsoil was encountered across the site to depths of between 0.1 m and 0.15 m. Based on the results of the investigation, the topsoil at the site, after vegetation stripping, is considered suitable for reuse as part of a topsoil and clean sand blend, for use as a structural fill material, provided that the topsoil is suitably prepared, and the controls outlined below are adopted. A preliminary blending ratio of 2:1 (clean sand:topsoil) is suggested, based on observations made during the site investigation. It is suggested that additional testing of topsoil following screening is undertaken to refine the blending ratio.

The procedure for re-using the topsoil generally comprises separation of the sandy fraction of the topsoil from the bulk of the organics using a mechanical screening plant, and then blending the sandy fraction with clean sand at an appropriate ratio to form a suitable structural material. In the vegetated and grassed areas of the site, consideration should be given to initially stripping off the bulk of the vegetation and root mass, to limit the quantity of organic material within the underlying topsoil.

The blending of topsoil with clean sand may decrease the permeability of the sand, therefore some consideration should be given to the implication on site drainage, if blended topsoil material is to be used. Consideration can also be given to further assess the permeability of blended topsoil material for various blending ratios, to assess a suitable ratio and associated fill permeability. Douglas Partners would be pleased to further assist with this assessment if required.

7.4.5 Fill Placement

Any sand fill should be placed in layers not exceeding 300 mm loose thickness and compacted near optimum moisture content with a roller of say 14 tonne deadweight to achieve a dry density ratio of 95% relative to modified compaction (ie. 95% MMDD). Care should be taken not to run heavy plant immediately adjacent to existing structures and services. It is recommended that earthworks be carried out with regular inspections by a geotechnical engineer. The use of heavy rollers with vibration is not recommended within 20 m of existing development and services to minimise the risk of damage to the existing buildings and to minimise disturbance to the residents.

7.4.6 Compaction Testing

Compaction control of the sand fil could be carried out using a Perth sand penetrometer (PSP) test in accordance with test method AS 1289.6.3.3. All areas within the proposed building envelopes should be compacted to achieve a minimum blow count of 8 blows per 300 mm penetration to a depth of not less than 0.5 m below foundation level.

This compaction level has not been directly correlated to a dry density of 95% relative to modified compaction. Lower blow counts than the above level may be acceptable provided that a correlation between Perth sand penetrometer (PSP) test and dry density ratio has been established by a NATA accredited laboratory and following review by a geotechnical engineer.

The top 300 mm in the base of any excavation should be re-compacted using a vibratory plate compactor prior to construction of any footings. Inspection of footing excavations by a geotechnical engineer is also recommended.

7.5 Foundation Design

Shallow foundation systems comprising slab, pad and strip footings should be suitable to support typical one and two storey buildings and typical industrial warehouse structures at this site. Footings of buildings covered by AS 2870-2011 should be designed to satisfy the requirements of this standard for the site classification discussed in Section 7.2, provided that site preparation is carried out in accordance with Section 7.4.

If proposed structures are not covered by AS 2870-2011 then the foundation should be designed using engineering principles. The table below summarises preliminary allowable bearing pressures for pad and strip footings founded at 0.5 m depth assuming a minimum thickness of 0.8 m of compacted sand fill is placed over clayey soils, however as earthworks details are not known at the time of writing (e.g. how much fill will be placed above clayey soils), it is suggested that the figures in the table below are considered to be lower bound. It is anticipated that higher allowable bearing pressures will be possible following earthworks of the site and subsequent assessment by a geotechnical engineer.

Table 4: Preliminary Footing Design Parameters

Footing Width (m)	Allowable Bearing Capacity (kPa)	Modulus of Subgrade Reaction (kPa/mm)
Square pad footings		
1.0	150	15
1.5	140	10
2.0	110	5 - 10
Strip footings		
0.5	130	10 - 15
0.75	120	10
1.0	110	5 - 10

Total settlements for the above tabulated footing configurations are estimated to be less than 15 mm. Differential settlements are likely to be less than half of the total settlement, therefore, less than 10 mm.

7.6 Pavement Design Parameters

The results of 4-day soaked California bearing ratio tests undertaken in the laboratory indicate CBR values of 8% and 14% for two samples of the sand at the site. Based on these results, a CBR design value of 8% should be adopted for pavement design on sand subgrade at this site, provided the subgrade is compacted to not less than 95% of modified maximum dry density to a depth of at least 1.0 m below subgrade level.

However our observations of the medium dense to dense sandy soils underlying the site and our experience with Perth sands suggest that a higher CBR value, of say CBR 10% could be considered, provided that some favourable results (ie. 10% or higher) of additional testing of the sand during detailed design of the development warrants such an increase.

7.7 Stormwater Disposal and Drainage

The ground conditions comprise generally natural sand with between approximately 3% and 7% fines. Silty sand, cemented silty sand and clayey soils were encountered underlying the sand. Groundwater was encountered during the investigation undertaken in January 2021 at depths of between 1.5 m and 2.3 m below existing ground level (i.e. between approximately RL 9.6 AHD and RL 10.9 m AHD). Higher groundwater levels can be anticipated during winter or following wet periods.

In-situ falling head infiltration tests were undertaken in the medium dense and dense natural sand at the site, as described in Section 4.3 above. The estimated permeability values arising from the tests indicate values of between approximately 6 m/day and 19 m/day for the in-situ condition of the sand.

A further assessment of permeability has been carried out by applying Hazen's formula to the particle size distribution result from a sample taken from selected samples. It should be noted that Hazen's formula applies to 'clean' sand in a loose state. The results of this assessment suggest permeability values of between approximately 7 m/day to 19 m/day for the natural sand in loose condition.

It is considered that a permeability value of approximately 5 m/day could be adopted for the sand at the site in its in-situ conditions, for drainage purposes. Taking into account a decrease in permeability due to densification during site compaction operations, it is considered that a lower value of approximately 3 m/day could be adopted for the sand at the site following earthworks. It is recommended that further in-situ infiltration tests are undertaken on trial pads of compacted sand during earthworks to verify this value. In addition, similar testing of trial pads should be adopted if topsoil is blended with the site sand, to determine a suitable permeability value for use in drainage design.

The silty sand, cemented silty sand and clayey materials encountered below the site should be considered generally impervious for the purposes of drainage design.

On-site stormwater disposal using soakwells and sumps, or suitably treated effluent disposal using leach drains is generally considered suitable, provided the presence of the silty sand, cemented silty sand, clayey materials and shallow groundwater is accounted for in the design. The infiltration capability commonly reduces over time due to silt build up at the base of soakwells and therefore the soakwells must be cleaned and maintained on a regular basis. Soakwells should be positioned at a distance from all buildings, retaining walls and boundaries by not less than 2 m.

8. Evaluation of the Ground Conditions for On-site Effluent Disposal

Site characteristics observed during the field work and soil properties determined during subsequent laboratory testing have been assessed in relation to the anticipated limitations that they may pose to on-site disposal of domestic effluent.

It is understood that on-site effluent disposal systems may be required at the site, and would likely comprise Department of Health approved aerobic treatment units (ATU) connected to flatbed leach drains.

The comments in this section are provided with reference to AS1547-2012, On-Site Domestic Wastewater Management. The soil characteristics with potential influence on site suitability for effluent disposal, as described in AS 1547-2012, are discussed in Section 8.1 to 8.6 below and conclusions regarding the suitability of the site's soils for the proposed system provided in Section 8.7.

8.1 Soil Permeability

Saturated hydraulic conductivity (permeability) is a measure of the ability of soil to transmit water based on soil properties such as structure, texture and porosity. The soil types noted at the test locations generally comprise sand, overlying cemented silty sand, clayey sand and sandy clay in some parts of the site.

A soil permeability category Group 1 (reference to AS 1547-2012 Tables 5.1 and E1) is considered suitable for the encountered surficial sand, with a measured permeability of greater than 6 m/day. It is suggested that a design permeability of approximately 5 m/day is adopted for the surficial sand underlying the site to allow for possible variability and the effects of possible further compaction during construction. Where a minimum depth of say 0.5 m to 1.0 m of sand underlies the base of an infiltration system, soil permeability is not considered to be a limitation for on-site sewage disposal at the site.

8.2 Depth to Hardpan / Impermeable Layer

Cemented silty sand and clayey materials were encountered within depths of 0.4 m and 0.45 m at selected locations within the site, which may result in some limitations to the placement of effluent infiltration systems. However, it is understood that the site levels will be raised during proposed earthworks. Therefore, it is considered that depth to hardpan will not form a limitation for on-site sewage disposal at the site following proposed earthworks, provided that a minimum depth of say 0.5 m to 1.0 m of sand underlies the base of an infiltration system.

8.3 Depth to Groundwater

Groundwater was observed at location 16 at 1.6 m depth, location 18 at 2.3 m depth, and location 20 at 1.5 m depth. Furthermore, it is understood that the site levels will be raised during earthworks. Therefore, it is considered that depth to groundwater does not form a limitation for on-site sewage disposal at the site.

8.4 Coarse Fragments

Coarse fragments are defined as particles greater than 2 mm in AS 1547-2012. The abundance of coarse fragments in the soils encountered underlying the site is “very few”, in accordance with Table E2, AS 1547-2012.

Such a low abundance of coarse fragments does not form a limitation for on-site sewage disposal at the site.

8.5 Slope

The site and surrounding areas gently slope to the south. It is considered that site slope does not form a limitation for on-site sewage disposal at the site.

8.6 Dispersivity

The surficial soil at the site is sand with fines content ranging between approximately 3% and 7%. Sand is non-dispersive. Therefore, dispersivity does not form a limitation for on-site sewage disposal at the site.

8.7 Conclusions on Site Suitability for Effluent Disposal Using an ATU and Flatbed Leach Drains

It is understood that an on-site effluent disposal system is proposed, comprising Department of Health approved aerobic treatment units (ATU) connected to flatbed leach drains. The soil conditions at this site are generally considered suitable for the disposal of treated effluent from an ATU in general accordance with AS 1547-2012.

This assessment relates to the suitability of the soil conditions only, additional assessment of the site and nearby off-site conditions as required by the Government Sewerage Policy, local government conditions and WA Department of Health may be required, which were outside the scope of this investigation.

9. References

1. Australian Standard AS 1289-2000, Methods of Testing Soils for Engineering Purposes.
2. Australian Standard AS 1289.6.3.3-1999, Soil Strength and Consolidation Tests-Determination of the Penetration Resistance of a Soil – Perth Sand Penetrometer Test.
3. Australian Standard AS 1726-2017, Geotechnical Site Investigation.
4. Australian Standard AS 2870-2011, Residential Slabs and Footings.
5. Department of Environment, Perth Groundwater Atlas, Second Edition, December 2004.
6. Australian Standard AS 1547-2012, On-site Domestic-wastewater Management.

10. Limitations

Douglas Partners has prepared this report for a proposed industrial subdivision development at Lots 118 and 119 Lakes Road, Hazelmere, WA in accordance with Douglas Partners' proposal dated 5 October 2020 and acceptance received from Steve Robertson on behalf of Hesperia Projects Pty Ltd dated 17 December 2020. The work was carried out in accordance with a Professional Services Agreement (Ref: Hesperia/Craig Mostyn Hazelmere). This report is provided for the exclusive use of Hesperia Projects Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of Douglas Partners, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report Douglas Partners has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

The assessment of atypical safety hazards arising from this advice is restricted to the (geotechnical / environmental / groundwater) components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

Douglas Partners Pty Ltd

Appendix A

About This Report

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

- In the case where full penetration is obtained with successive blow counts for each 150 mm of, say, 4, 6 and 7 as:

  4,6,7
  N=13

- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:

  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Soil Descriptions

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are generally based on Australian Standard AS1726:2017, Geotechnical Site Investigations. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Type	Particle size (mm)
Coarse gravel	19 - 63
Medium gravel	6.7 - 19
Fine gravel	2.36 – 6.7
Coarse sand	0.6 - 2.36
Medium sand	0.21 - 0.6
Fine sand	0.075 - 0.21

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

The proportions of secondary constituents of soils are described as follows:

In fine grained soils (>35% fines)

Term	Proportion of sand or gravel	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	>30%	Sandy Clay
With	15 – 30%	Clay with sand
Trace	0 - 15%	Clay with trace sand

In coarse grained soils (>65% coarse)
- with clays or silts

Term	Proportion of fines	Example
And	Specify	Sand (70%) and Clay (30%)
Adjective	>12%	Clayey Sand
With	5 - 12%	Sand with clay
Trace	0 - 5%	Sand with trace clay

In coarse grained soils (>65% coarse)
- with coarser fraction

Term	Proportion of coarser fraction	Example
And	Specify	Sand (60%) and Gravel (40%)
Adjective	>30%	Gravelly Sand
With	15 - 30%	Sand with gravel
Trace	0 - 15%	Sand with trace gravel

The presence of cobbles and boulders shall be specifically noted by beginning the description with 'Mix of Soil and Cobbles/Boulders' with the word order indicating the dominant first and the proportion of cobbles and boulders described together.

Soil Descriptions

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	VS	<12
Soft	S	12 - 25
Firm	F	25 - 50
Stiff	St	50 - 100
Very stiff	VSt	100 - 200
Hard	H	>200
Friable	Fr	-

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	Density Index (%)
Very loose	VL	<15
Loose	L	15-35
Medium dense	MD	35-65
Dense	D	65-85
Very dense	VD	>85

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Extremely weathered material – formed from in-situ weathering of geological formations. Has soil strength but retains the structure or fabric of the parent rock;
- Alluvial soil – deposited by streams and rivers;
- Estuarine soil – deposited in coastal estuaries;
- Marine soil – deposited in a marine environment;
- Lacustrine soil – deposited in freshwater lakes;
- Aeolian soil – carried and deposited by wind;
- Colluvial soil – soil and rock debris transported down slopes by gravity;
- Topsoil – mantle of surface soil, often with high levels of organic material.
- Fill – any material which has been moved by man.

Moisture Condition – Coarse Grained Soils

For coarse grained soils the moisture condition should be described by appearance and feel using the following terms:

- Dry (D) Non-cohesive and free-running.
- Moist (M) Soil feels cool, darkened in colour.
  Soil tends to stick together.
  Sand forms weak ball but breaks easily.
- Wet (W) Soil feels cool, darkened in colour.
  Soil tends to stick together, free water forms when handling.

Moisture Condition – Fine Grained Soils

For fine grained soils the assessment of moisture content is relative to their plastic limit or liquid limit, as follows:

- ‘Moist, dry of plastic limit’ or ‘w <PL’ (i.e. hard and friable or powdery).
- ‘Moist, near plastic limit’ or ‘w ≈ PL (i.e. soil can be moulded at moisture content approximately equal to the plastic limit).
- ‘Moist, wet of plastic limit’ or ‘w >PL’ (i.e. soils usually weakened and free water forms on the hands when handling).
- ‘Wet’ or ‘w ≈LL’ (i.e. near the liquid limit).
- ‘Wet’ or ‘w >LL’ (i.e. wet of the liquid limit).

Symbols & Abbreviations

Douglas Partners

Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	Pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	Lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

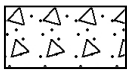
Symbols & Abbreviations

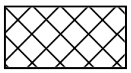
Graphic Symbols for Soil and Rock

General

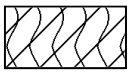

Asphalt

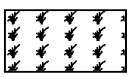

Road base

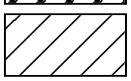

Concrete


Filling

Soils


Topsoil

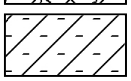

Peat


Clay


Silty clay

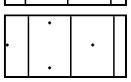

Sandy clay

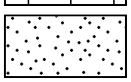

Gravelly clay

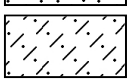

Shaly clay

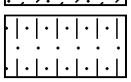

Silt


Clayey silt


Sandy silt

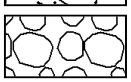

Sand


Clayey sand


Silty sand


Gravel

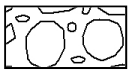

Sandy gravel


Cobbles, boulders

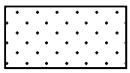

Talus

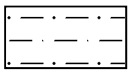
Sedimentary Rocks

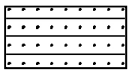

Boulder conglomerate

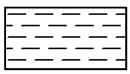

Conglomerate


Conglomeratic sandstone

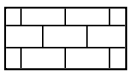

Sandstone


Siltstone

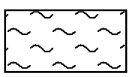

Laminite

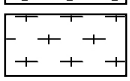

Mudstone, claystone, shale

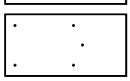

Coal


Limestone

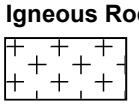
Metamorphic Rocks

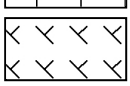

Slate, phyllite, schist

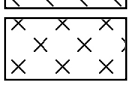

Gneiss

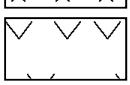

Quartzite

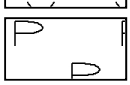
Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

Appendix B

Drawing 1
Results of Field Work

Douglas Partners Geotechnics | Environment | Groundwater	**Test Location Plan** **Lots 118 and 119 Lakes Road** **Hazelmere, WA**	PROJECT: 82463.01 Drawing No: 1 REV: 0
	CLIENT: Hesperia Projects Pty Ltd	DATE: 11/1/2021

TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 13.80 m AHD **PIT No:** 1
EASTING: 405345 **PROJECT No:** 82463.01
NORTHING: 6468891 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
13	0.1	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry, covered with grass, topsoil.							
	1	SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, medium dense, aeolian. - becoming moist from 0.5 m depth. - becoming dense from 0.9 m depth.							
12	2			D	2.0				
11	2.7	Silty SAND SM (Coffee Rock): fine to medium grained, orange-brown mottled dark brown, moist, apparently dense, moderately to well cemented, excavated as gravelly sand with cobbles and boulders (coffee rock).							
	3								
10	3.0	Pit discontinued at 3.0m (hard digging)							

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 13.10 m AHD **PIT No:** 2
EASTING: 405352 **PROJECT No:** 82463.01
NORTHING: 6468817 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
13	0.15	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry, covered with grass, topsoil.							
		SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, medium dense, aeolian.							
12	1	- becoming moist from 0.5 m depth.							
		- becoming dense from 0.9 m depth.							
11	2	- becoming moist to wet from 2.4 m depth.							
	2.7	Pit discontinued at 2.7m (collapsing conditions)							
10	3								

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 13.74 m AHD **PIT No:** 3
EASTING: 405402 **PROJECT No:** 82463.01
NORTHING: 6468848 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
13	0.15	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry, covered with grass, topsoil.		D	0.1				
		SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, medium dense, aeolian.							
12	1	- becoming dense from 0.9 m depth. - becoming moist from 1.0 m depth.		D	1.2				
11	2.7	Silty SAND SM (Coffee Rock): fine to medium grained, pale grey-brown mottled dark brown, moist, apparently dense, moderately cemented, excavated as sand with gravel and cobbles (coffee rock).		D	2.9				
10	3.1	Pit discontinued at 3.1m (target)							

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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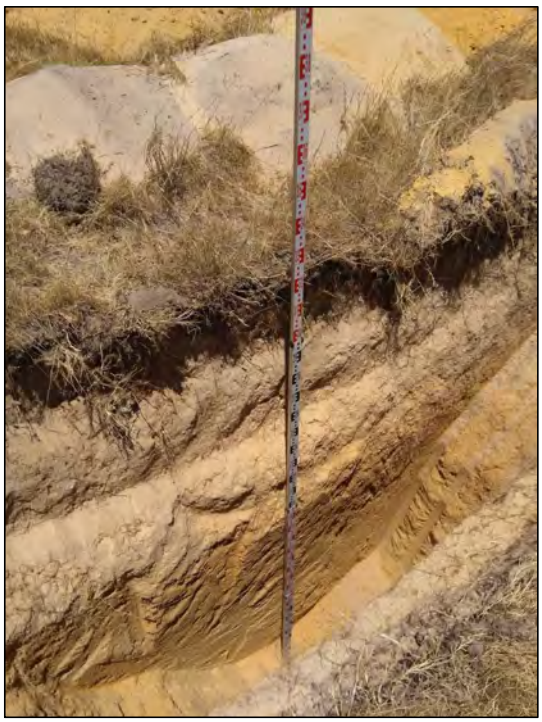
TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 14.65 m AHD **PIT No:** 4
EASTING: 405473 **PROJECT No:** 82463.01
NORTHING: 6468837 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
14	0.15	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry, covered with grass, topsoil.							
		SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, medium dense, aeolian.							
		- pale yellow-grey from 0.5 m depth.							
13	1	- becoming moist from 1.0 m depth.							
		- yellow-brown from 1.3 m depth.							
		- becoming dense from 1.45 m depth.		D	1.8				
12	2								
	3								
	3.0	Silty SAND SM (Coffee Rock): fine to medium grained, orange-brown mottled dark brown, moist, apparently dense, moderately cemented, excavated as sand with gravel and cobbles (coffee rock).							
	3.2	Pit discontinued at 3.2m (target)							
11									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20



RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 13.30 m AHD **PIT No:** 5
EASTING: 405423 **PROJECT No:** 82463.01
NORTHING: 6468785 **DATE:** 6/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
13	0.09	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry, covered with grass, topsoil.							
		SAND SP: fine to medium grained, pale grey, trace silt, trace roots, dry to moist, medium dense, aeolian.							
		- medium to large tree root (100 mm dia) at 0.3 m depth.							
		- becoming moist from 0.5 m depth.							
12	1	- becoming dense from 0.75 m depth.		D	1.0				
11	2			D	2.5				
	3	- becoming wet from 3.0 m depth.							
10	3.2	Pit discontinued at 3.2m (target)							

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 15.16 m AHD **PIT No:** 6
EASTING: 405530 **PROJECT No:** 82463.01
NORTHING: 6468799 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
15	0.17	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry, covered with grass, topsoil.							
		SAND SP: fine to medium grained, pale yellow-grey, trace silt, dry to moist, medium dense, aeolian.							
		- becoming moist from 0.8 m depth.							
14	1								1
		- becoming yellow-brown and dense from 1.45 m depth.							
13	2								2
	3								3
12	3.1	Silty SAND SM (Coffee Rock): fine to medium grained, orange-brown mottled dark brown, moist, apparently dense, moderately cemented, excavated as sand with gravel and cobbles (coffee rock).							
	3.5	Pit discontinued at 3.5m (target)							

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 14.05 m AHD **PIT No:** 7
EASTING: 405503 **PROJECT No:** 82463.01
NORTHING: 6468749 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
14	0.15	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry, covered with grass, topsoil.							
		SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, medium dense, aeolian.							
		- becoming dense from 0.6 m depth.		D	0.8				
13	1	- becoming moist from 1.0 m depth.							1
12	2								2
	2.8	Clayey SAND SC: fine to medium grained, orange-brown mottled red-brown, low plasticity, moist, stiff, alluvium.		D	3.0		pp = 150		
11	3								3
	3.2	Pit discontinued at 3.2m (target)							

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 14.69 m AHD **PIT No:** 8
EASTING: 405623 **PROJECT No:** 82463.01
NORTHING: 6468749 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
14	0.12	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry, covered with grass, topsoil.							
		SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, medium dense, aeolian.							
		- becoming moist from 0.5 m depth.		D	1.0				
13		- becoming dense from 1.45 m depth.							
12	2.5	Silty SAND SM (Coffee Rock): fine to medium grained, orange-brown mottled dark brown, moist, apparently dense, moderately to well cemented, excavated as gravelly sand with cobbles and boulders (coffee rock).		D	2.65		pp >=100		
	2.6	Clayey SAND SC: fine to medium grained, blue-grey, low to medium plasticity, moist, firm to stiff, alluvium.							
	2.7	Pit discontinued at 2.7m (target)							
11									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 14.05 m AHD **PIT No:** 9
EASTING: 405584 **PROJECT No:** 82463.01
NORTHING: 6468708 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
14	0.15	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry, covered with grass, topsoil.							
		SAND SP-SM: fine to medium grained, pale grey, with silt, dry to moist, medium dense, aeolian.		B D	0.5 0.6				
13	1	- becoming dense from 0.75 m depth. - becoming moist from 0.9 m depth.							
	1.1	Silty SAND SM (Coffee Rock): fine to medium grained, orange-brown mottled dark brown, moist, very dense, moderately to well cemented, excavated as gravelly sand with cobbles and boulders (coffee rock).		D	1.5		pp = 300		
		Clayey SAND SC: fine to medium grained, brown mottled grey, low to medium plasticity, moist, very stiff, alluvium.							
12	2	2.0 Pit discontinued at 2.0m (target)							
11	3								

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 12.37 m AHD **PIT No:** 10
EASTING: 405359 **PROJECT No:** 82463.01
NORTHING: 6468726 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
12	0.2	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry, covered with grass, topsoil.							
		SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, medium dense, aeolian.		B	0.5				
		- becoming moist and dense from 0.75 m depth.							
11	1								1
	2								2
10	2.9	Pit discontinued at 2.9m (collapsing conditions)							
9	3								

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 12.28 m AHD **PIT No:** 11
EASTING: 405447 **PROJECT No:** 82463.01
NORTHING: 6468709 **DATE:** 6/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
12	0.15	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry, covered with grass, topsoil.							
		SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, medium dense, aeolian. - becoming moist and dense from 0.6 m depth		D	0.5				
11	1								1
10	2								2
	2.8	Pit discontinued at 2.8m (collapsing conditions)							
9	3								

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 12.65 m AHD **PIT No:** 12
EASTING: 405521 **PROJECT No:** 82463.01
NORTHING: 6468672 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
12	0.1	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry, covered with grass, topsoil.							
	0.4	SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, medium dense, aeolian.							
11	1 0.95	Sandy GRAVEL GC: fine to coarse gravel (lateritic), fine to medium grained sand, grey-brown, with clay, moist, apparently dense, alluvium.		D	0.8				
		Clayey SAND SC: with gravel, fine to medium grained, orange-brown mottled red-brown, low plasticity, moist, very stiff, alluvium.		D	1.5				
	2	- becoming hard from 1.75 m depth.							
10		- brown mottled grey from 2.0 m depth.							
	2.5	Pit discontinued at 2.5m (target)							
9	3								

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20; 1, 2

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 14.25 m AHD **PIT No:** 13
EASTING: 405617 **PROJECT No:** 82463.01
NORTHING: 6468645 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
14	0.15	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry to moist, covered with grass, topsoil.							
	1	SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, dense, aeolian. - becoming moist from 0.7 m depth. - pale yellow-grey from 0.9 m depth.							
13	1.2	Clayey SAND SC: fine to medium grained, brown mottled orange-brown, low to medium plasticity, moist, stiff, alluvium.		D	1.5		pp = 100		
	2								
12	2.1	Pit discontinued at 2.1m (target)							
	3								
11									

Dynamic Penetrometer Test (blows per 150mm): 5 10 15 20

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 12.27 m AHD **PIT No:** 14
EASTING: 405361 **PROJECT No:** 82463.01
NORTHING: 6468654 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
12	0.1	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, with roots, dry, covered with grass, topsoil.							
		SAND SP-SM: fine to medium grained, pale grey, with silt, dry to moist, medium dense, aeolian.							
		- becoming moist from 0.5 m depth.							
		- becoming dense from 0.75 m depth.							
11	1			D	1.1				
				D	1.5				
10	2	- becoming moist to wet from 2.1 m depth.							
	2.8	Pit discontinued at 2.8m (collapsing conditions)							
9	3								

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

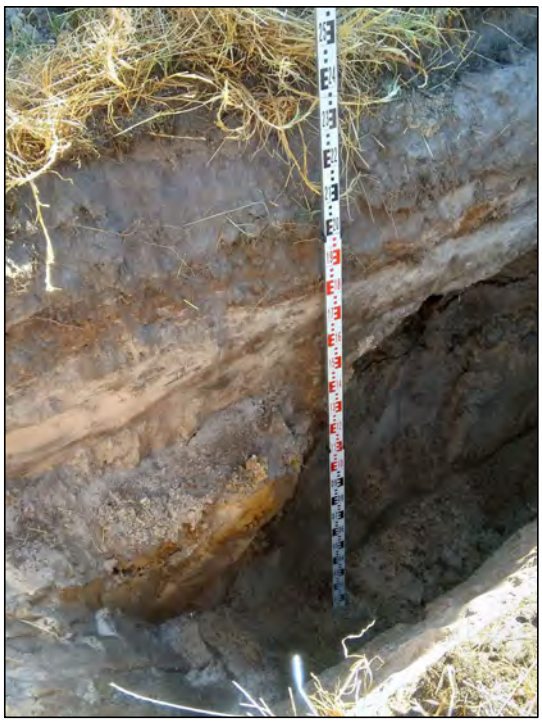
TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 12.00 m AHD **PIT No:** 15
EASTING: 405438 **PROJECT No:** 82463.01
NORTHING: 6468631 **DATE:** 6/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
12	0.25	TOPSOIL / SAND SP-SM: fine to medium grained, dark grey-brown, withsilt, trace rootlets, dry, covered with grass, topsoil.		D	0.2				
		SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, dense, aeolian. - becoming moist from 0.5 m depth.							
11	1 0.95	SAND SP-SM (Coffee Rock): fine to medium grained, orange-brown mottled dark brown, with silt, moist, dense, moderately cemented, excavates as sand with gravel, cobbles and boulders (coffee rock).							1
	1.4	Silty SAND SM: fine to medium grained, grey-blue, moist to wet, dense, alluvium.							
10	2								2
	2.5	Pit discontinued at 2.5m (target)							
9	3								

5 10 15 20



RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 12.25 m AHD **PIT No:** 16
EASTING: 405521 **PROJECT No:** 82463.01
NORTHING: 6468605 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
12	0.12	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry to moist, covered with grass, topsoil.		D	0.1				
		SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, dense, aeolian.							
		- becoming moist from 0.7 m depth.							
11	1								
		- becoming wet from 1.5 m depth.						05-01-21	
		- becoming very dense from 1.75 m depth.							
	2								
10	2.3	Sandy CLAY CI: medium plasticity, grey, moist to wet, stiff, alluvium.		D	2.4		pp = 100		
	2.5	Pit discontinued at 2.5m (collapsing conditions)							
	3								
9									

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: Groundwater observed at 1.6 m depth.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 14.46 m AHD **PIT No:** 17
EASTING: 405603 **PROJECT No:** 82463.01
NORTHING: 6468575 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
14	0.15	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry, covered with grass, topsoil.							
		SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, dense, aeolian.		D	0.5				
	1	- becoming moist from 0.8 m depth.							1
13	1.2	Silty SAND SM (Coffee Rock): fine to medium grained, orange-brown mottled dark brown, moist, very dense, moderately to well cemented, excavated at gravelly sand with cobbles and boulders (coffee rock).							
	1.8	Clayey SAND SC: fine to medium grained, brown mottled grey, low to medium plasticity, moist, stiff, alluvium.			2.0		pp = 100		2
12	2								
	2.5	Pit discontinued at 2.5m (target)							
	3								
11									

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 11.90 m AHD **PIT No:** 18
EASTING: 405371 **PROJECT No:** 82463.01
NORTHING: 6468575 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
11	0.1	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry, covered with grass, topsoil.							
		SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, dense, aeolian. - becoming moist from 0.5 m depth.							
	0.85	Silty SAND SM: fine to medium grained, brown, moist, dense.							
10	1.1	SAND SP-SM: fine to medium grained, pale yellow-grey, with silt, moist, dense, alluvium.		D	1.5				
		- becoming moist to wet from 1.6 m depth.							
		- pale grey from 2.1 m depth.							
9	2.5	Pit discontinued at 2.5m (collapsing conditions)						05-01-21	
8									

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: Groundwater observed at 2.3 m depth.

REMARKS: Surface levels surveyed by MNG.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 11.96 m AHD **PIT No:** 19
EASTING: 405447 **PROJECT No:** 82463.01
NORTHING: 6468575 **DATE:** 6/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
11	0.15	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry, covered with grass, topsoil.							
	1	SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, dense, aeolian. - becoming moist and pale yellow-grey from 0.6 m depth.							
	1.1	SAND SP-SM (Coffee Rock): fine to medium grained, orange-brown mottled dark brown, with silt, moist, very dense, moderately to well cemented, excavated as sand with gravel, cobbles and boulders (coffee rock).		D	1.4				
10	1.9	Silty SAND SM: fine to medium grained, grey-blue, moist to wet, alluvium.		D	2.4				
	2								
	2.8	Pit discontinued at 2.8m (target)							
9	3								

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 12.43 m AHD **PIT No:** 20
EASTING: 405523 **PROJECT No:** 82463.01
NORTHING: 6468548 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
12	0.09	TOPSOIL / SAND SP: fine to medium grained, grey-brown, trace silt, trace rootlets, dry to moist, covered with grass, topsoil.							
		SAND SP: fine to medium grained, pale grey, trace silt, dry to moist, medium dense, aeolian.							
	1	- becoming moist from 0.5 m depth.							
11		- becoming moist to wet from 1.1 m depth.						05-01-20	
	1.7	Sandy CLAY CH: high plasticity fines, grey-blue mottled brown, moist to wet, stiff, alluvium.		D	1.9		pp = 150		
	2								
10	2.1	Pit discontinued at 2.1m (target)							
	3								
9									

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: Groundwater observed at 1.5 m depth.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 13.82 m AHD **PIT No:** 21
EASTING: 405577 **PROJECT No:** 82463.01
NORTHING: 6468503 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
13	0.08	TOPSOIL / SAND SP-SM: fine to medium grained, dark grey-brown, with silt, trace rootlets, dry to moist, covered with grass, topsoil.		D	0.3				
		Silty SAND SM: fine to medium grained, dark orange-brown, dry to moist, very dense, alluvium. - with lateritic gravel and cobble between 0.4 m and 0.7 m depth.							
	0.8	Clayey SAND SC: fine to medium grained, brown mottled orange-brown, low plasticity, trace gravel (laterite), moist, hard, alluvium.		U	0.95		pp = 450		
					1.25				
				D	1.5				
12	1.6	Pit discontinued at 1.6m (target)							

Dynamic Penetrometer Test (blows per 150mm): 5, 10, 15, 20

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 12.23 m AHD **PIT No:** 22
EASTING: 405515 **PROJECT No:** 82463.01
NORTHING: 6468476 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
12	0.15	TOPSOIL / SAND SP: fine to medium grained, dark grey-brown, trace silt, trace rootlets, dry to moist, covered with grass, topsoil.		D	0.1				
		SAND SP: fine to medium grained, pale grey, trace silt, moist, medium dense, aeolian.		D	0.7				
11	1	- becoming moist to wet from 0.8 m depth.							
		- becoming wet from 1.5 m depth.							
10	2								
	2.7	Pit discontinued at 2.7m (collapsing conditions)							
9	3								

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☒ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Hesperia Projects Pty Ltd
PROJECT: Lots 118 and 119 Lakes Road
LOCATION: Hazelmere, WA

SURFACE LEVEL: 12.01 m AHD **PIT No:** 23
EASTING: 405431 **PROJECT No:** 82463.01
NORTHING: 6468524 **DATE:** 5/1/2021
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per 150mm)
12	0.13	TOPSOIL / SAND SP-SM: fine to medium grained, dark grey-brown, with silt, trace rootlets, dry to moist, covered with grass, topsoil.							
	0.3								
	0.45	Silty SAND SM: fine to medium grained, dark orange-brown, dry to moist, medium dense, alluvium.			0.45				
				B					
		SAND SP: fine grained, pale grey, trace silt, moist, medium dense, aeolian.			0.75				
11	1				0.9				
		Clayey Gravelly SAND SC: fine to medium grained, brown, medium plasticity fines, moist, stiff, alluvium.		U					
					1.2				
		- becoming more clayey from 1.5 m depth.							
	1.8								
10	2	Sandy CLAY CH: high plasticity, dark orange-brown, moist, stiff, alluvium.		D	1.9				
	2.05	Pit discontinued at 2.05m (target)							
9	3								

RIG: 8 tonne backhoe with 450 mm toothed bucket **LOGGED:** PD **SURVEY DATUM:** MGA94 Zone 50 J

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: Surface levels surveyed by MNG.

☐ Sand Penetrometer AS1289.6.3.3
☒ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

Appendix C

Laboratory Tests

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

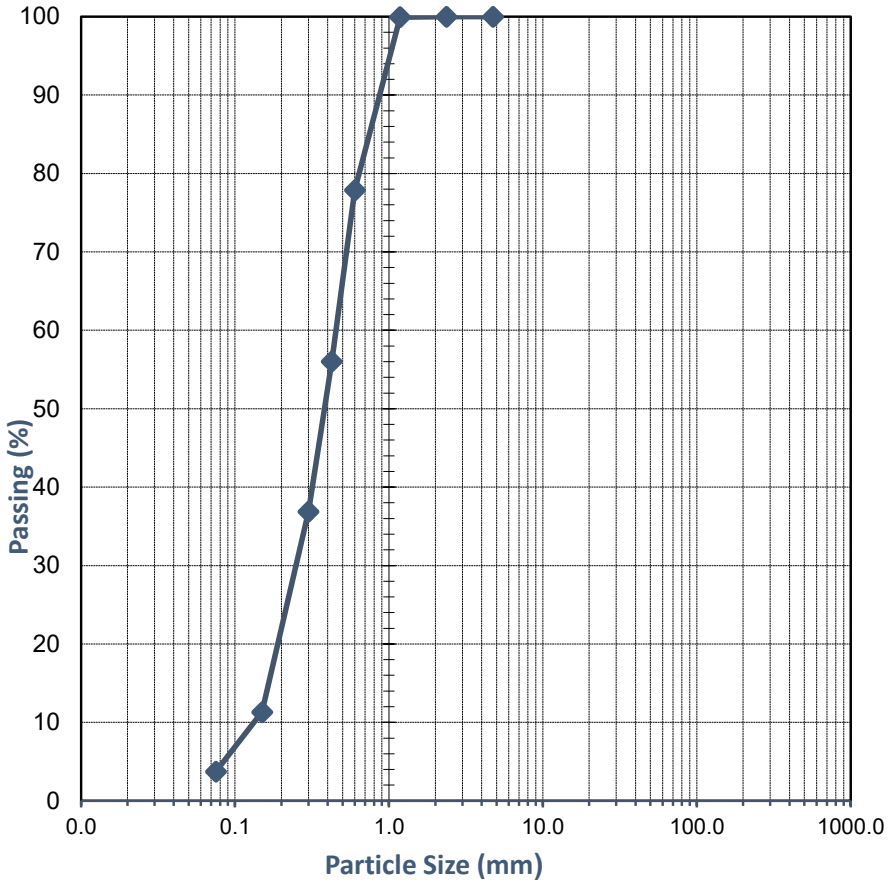
TEST REPORT - AS 1289.3.6.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1575_1_PSD
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1575
Location:	Hazelmere, WA	*Date Sampled:*	5-01-2021
Sample Identification:	3, 1.2 m	*Date Tested:*	11/1 - 12/1/2021

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	
9.5	
4.75	100
2.36	100
1.18	100
0.600	78
0.425	56
0.300	37
0.150	11
0.075	4



Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 12-January-2021

NATA WORLD RECOGNISED ACCREDITATION

Accreditation No. 20599

Accredited for compliance with ISO/IEC 17025 - Testing

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.5.2.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1576_1_MMDD
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1576
Location:	Hazelmere, WA	*Date Sampled:*	5/01/2021
Sample Identification:	9, 0.5 m (Bulk)	*Date Tested:*	11/01/2021

TEST RESULTS - Modified Maximum Dry Density

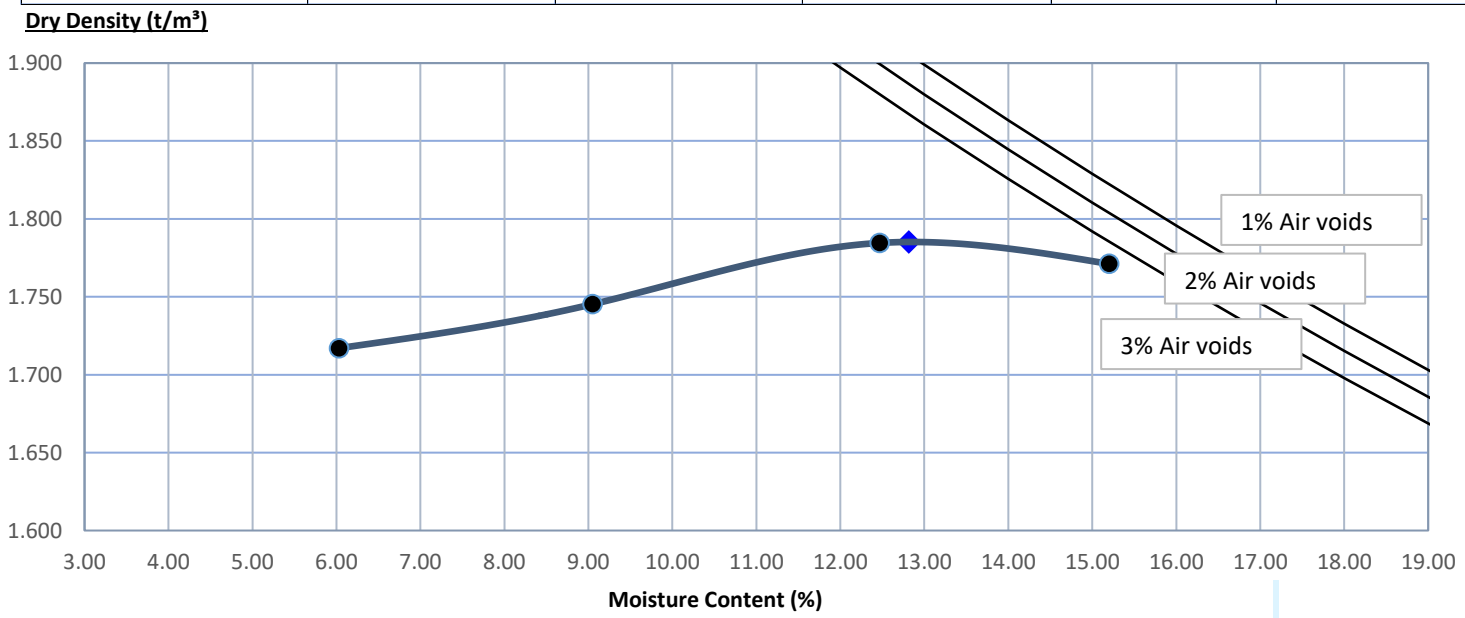
Sampling Method: Sampled by Client, Tested as Received

Sample Curing Time: 2 Hours

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

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

Moisture Content (%)	6.0	9.1	12.5	15.2	
Dry Density (t/m³)	1.717	1.745	1.785	1.771	



Modified Maximum Dry Density (t/m³) **1.79**

Optimum Moisture Content (%) **13.0**

Comments: *The above air void lines are derived from a calculated apparent particle density of 2.555 t/m³*

Approved Signatory:

Name: Cody O'Neill

Date: 12/January/2021

NATA WORLD RECOGNISED ACCREDITATION

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

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

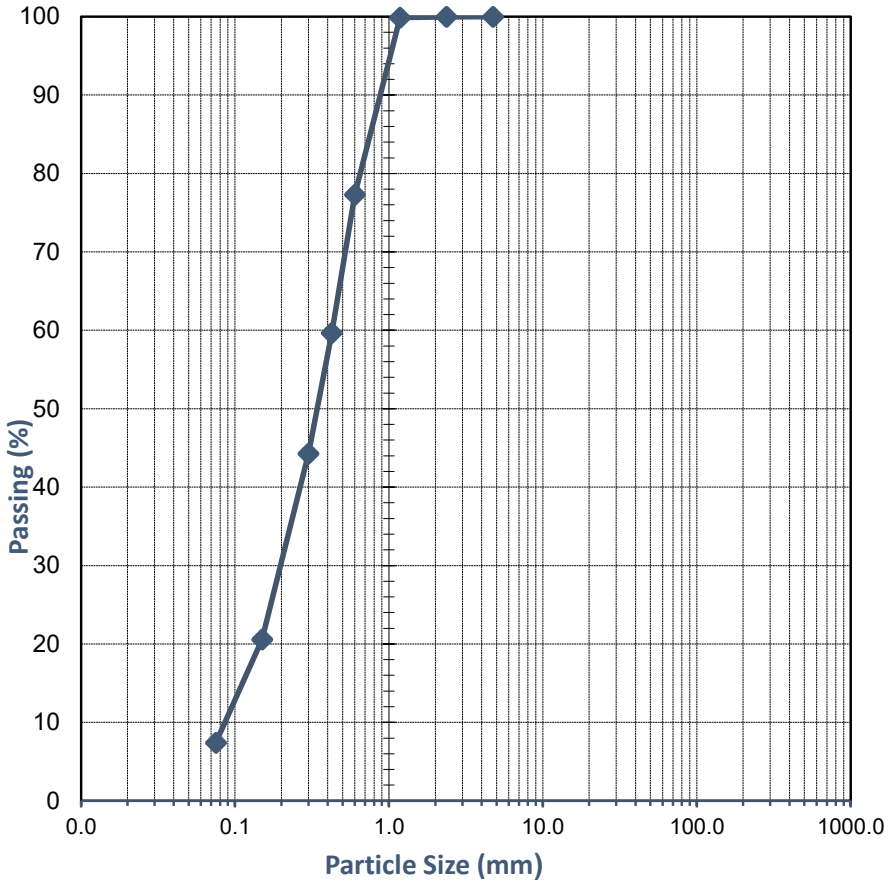
TEST REPORT - AS 1289.3.6.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1576_1_PSD
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1576
Location:	Hazelmere, WA	*Date Sampled:*	5-01-2021
Sample Identification:	9, 0.5 m (Bulk)	*Date Tested:*	11/1 - 12/1/2021

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	
9.5	
4.75	100
2.36	100
1.18	100
0.600	77
0.425	60
0.300	44
0.150	21
0.075	7



Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 12-January-2021

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

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.6.1.1

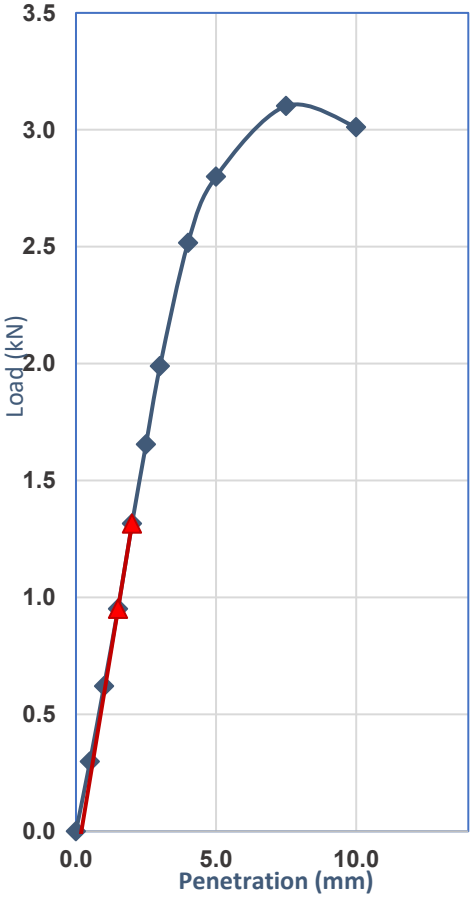
Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1576_1_SCBR
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1576
Location:	Hazelmere, WA	*Date Sampled:*	5-01-2021
Sample Identification:	9, 0.5 m (Bulk)	*Date Tested:*	11/1 - 16/1/2021

TEST RESULTS - CALIFORNIA BEARING RATIO

Sample Description: Sand

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)	2 Hours
% Retained 19.0mm	0	Excluded/Replaced	Excluded
Maximum Dry Density (t/m^3)	1.79	Optimum Moisture (%)	13.0
Target Dry Density Ratio (%)	96	Target Moisture Ratio (%)	100

Specimen Conditions At Compaction			
Dry Density (t/m3)	1.71	Moisture Content (%)	13.1
Density Ratio (%)	95.5	Moisture Ratio (%)	102.5

Specimen Conditions After Soak			
Soaked or Unsoaked	Soaked	Soaking Period (days)	4
Surcharges Applied (kg)	4.50	Measured Swell (%)	0.0
Dry Density (t/m³)	1.71	Dry Density Ratio (%)	95.5
Moisture Content (%)	15.4	Moisture Ratio (%)	120.5

Specimen Conditions After Test			
Top 30mm Moisture (%)	13.6	Remaining Depth (%)	15.2

Correction applied to Penetration: 0.2mm

Determined at a Penetration of: 5.0mm

California Bearing Ratio (CBR): 14%

Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 18-January-2021

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.5.2.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1577_1_MMDD
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1577
Location:	Hazelmere, WA	*Date Sampled:*	5/01/2021
Sample Identification:	10, 0.5 m (Bulk)	*Date Tested:*	11/01/2021

TEST RESULTS - Modified Maximum Dry Density

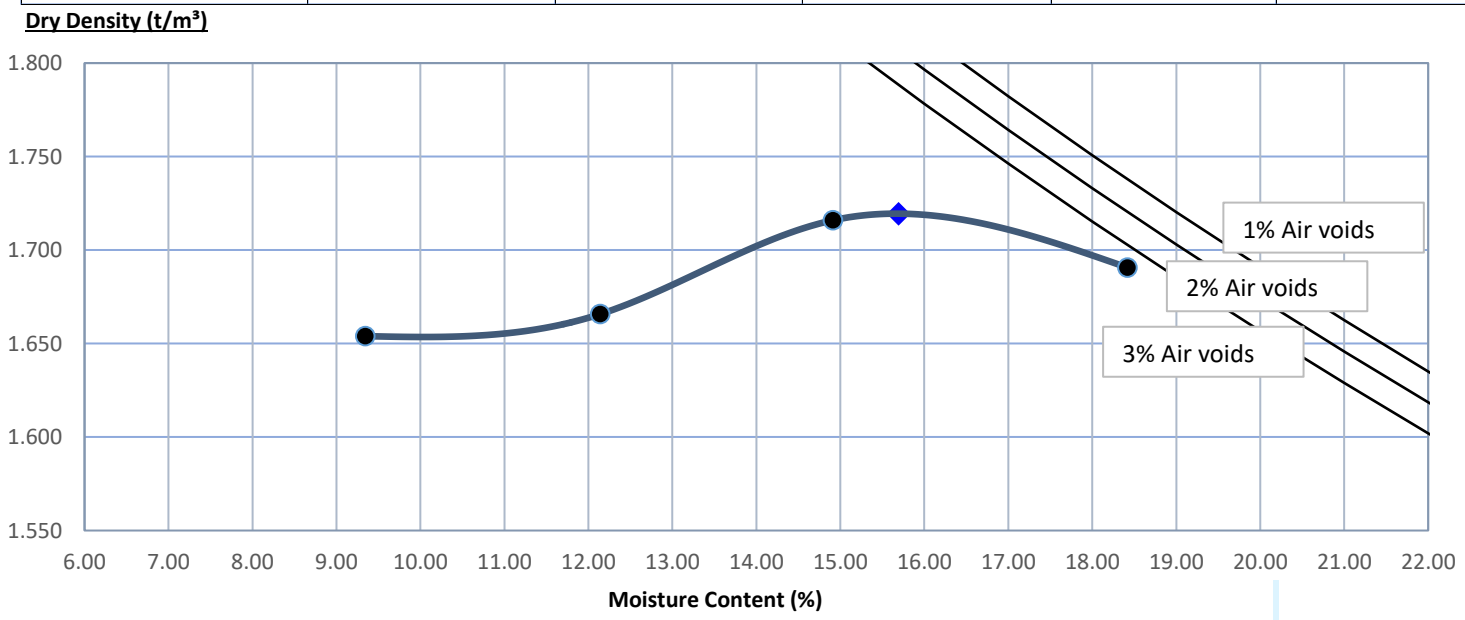
Sampling Method: Sampled by Client, Tested as Received

Sample Curing Time: 2 Hours

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

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

Moisture Content (%)	9.3	12.1	14.9	18.4	
Dry Density (t/m³)	1.654	1.666	1.716	1.691	



Modified Maximum Dry Density (t/m³) **1.72**

Optimum Moisture Content (%) **15.5**

Comments: *The above air void lines are derived from a calculated apparent particle density of 2.594 t/m³*

Approved Signatory:

Name: Cody O'Neill

Date: 12/January/2021

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SOIL | AGGREGATE | CONCRETE | CRUSHING

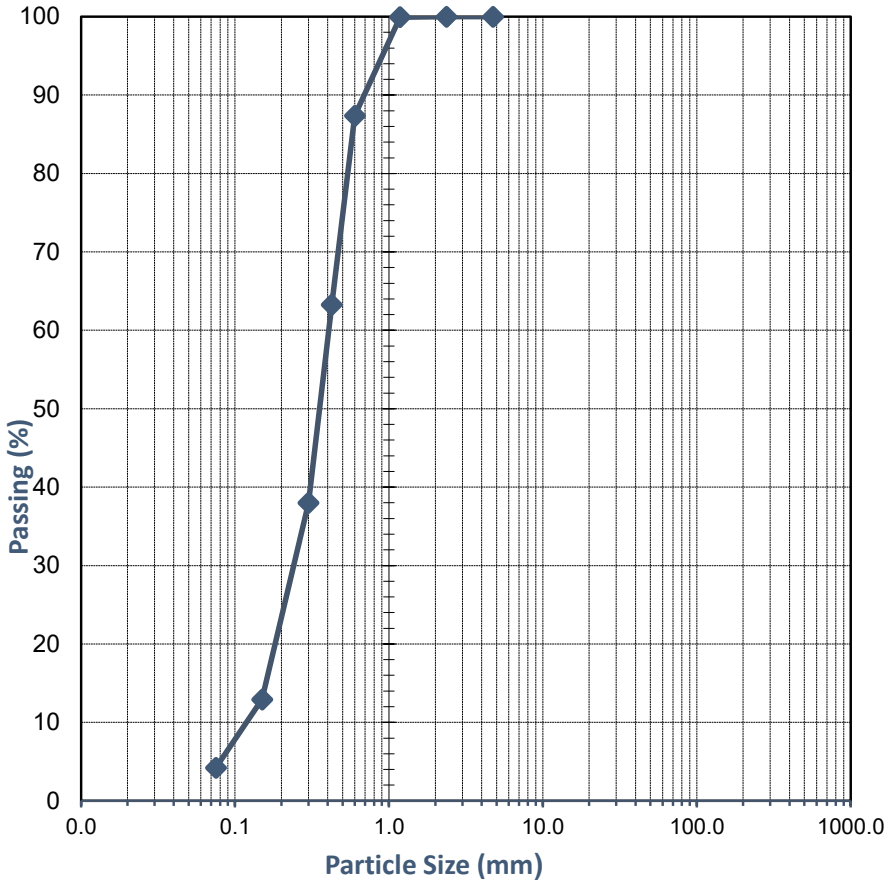
TEST REPORT - AS 1289.3.6.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1577_1_PSD
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1577
Location:	Hazelmere, WA	*Date Sampled:*	5-01-2021
Sample Identification:	10, 0.5 m (Bulk)	*Date Tested:*	11/1 - 12/1/2021

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	
9.5	
4.75	100
2.36	100
1.18	100
0.600	87
0.425	63
0.300	38
0.150	13
0.075	4



Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 12-January-2021

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SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.6.1.1

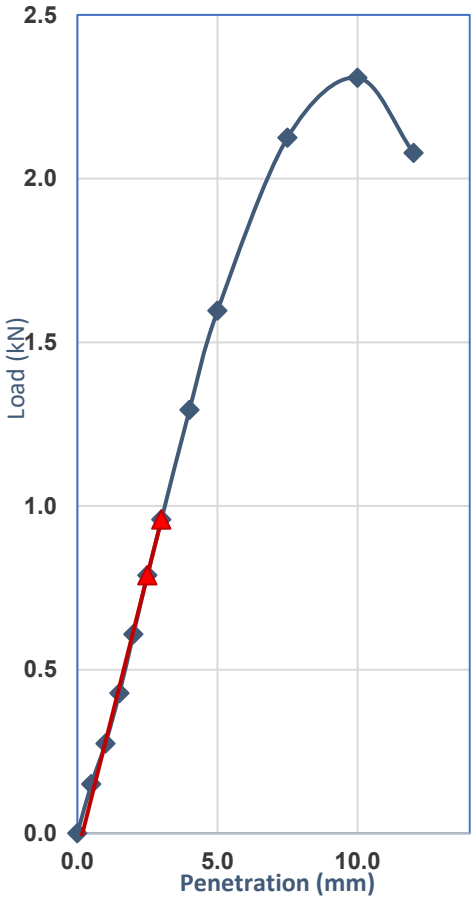
Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1577_1_SCBR
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1577
Location:	Hazelmere, WA	*Date Sampled:*	5-01-2021
Sample Identification:	10, 0.5 m (Bulk)	*Date Tested:*	11/1 - 16/1/2021

TEST RESULTS - CALIFORNIA BEARING RATIO

Sample Description: Sand

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)	2 Hours
% Retained 19.0mm	0	Excluded/Replaced	Excluded
Maximum Dry Density (t/m^3)	1.72	Optimum Moisture (%)	15.5
Target Dry Density Ratio (%)	96	Target Moisture Ratio (%)	100

Specimen Conditions At Compaction			
Dry Density (t/m3)	1.65	Moisture Content (%)	16.1
Density Ratio (%)	95.5	Moisture Ratio (%)	102.5

Specimen Conditions After Soak			
Soaked or Unsoaked	Soaked	Soaking Period (days)	4
Surcharges Applied (kg)	4.50	Measured Swell (%)	0.0
Dry Density (t/m³)	1.65	Dry Density Ratio (%)	95.5
Moisture Content (%)	17.5	Moisture Ratio (%)	111.5

Specimen Conditions After Test			
Top 30mm Moisture (%)	16.2	Remaining Depth (%)	16.5

Correction applied to Penetration: 0.2mm

Determined at a Penetration of: 5.0mm

California Bearing Ratio (CBR): 8%

Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 18-January-2021

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SOIL | AGGREGATE | CONCRETE | CRUSHING

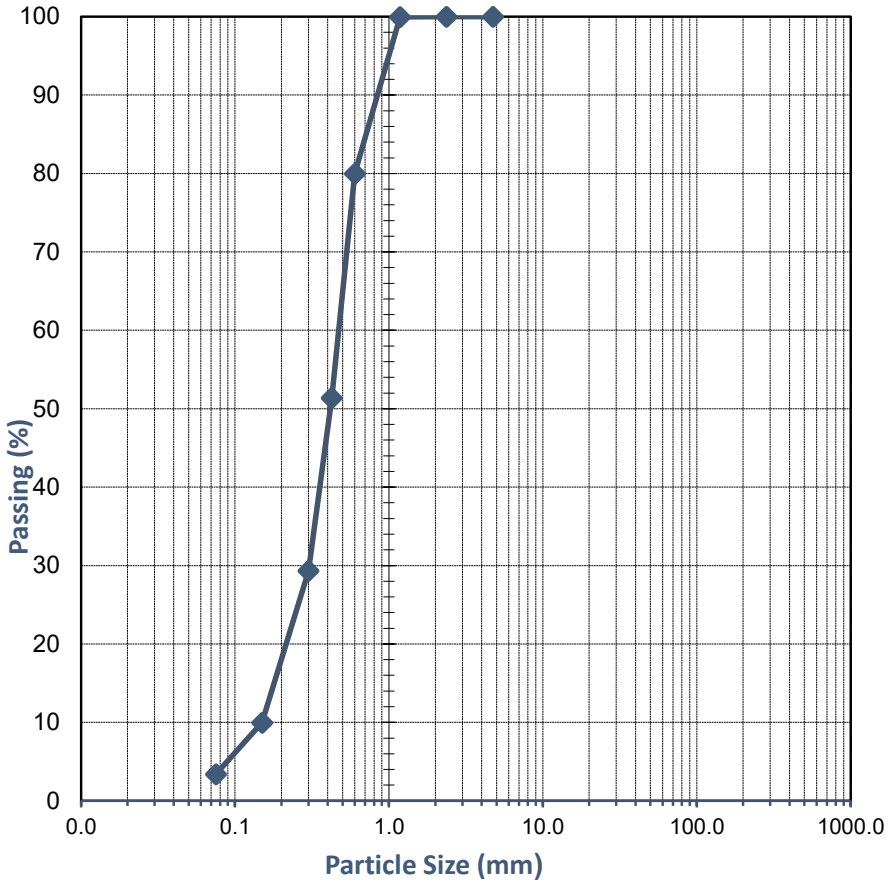
TEST REPORT - AS 1289.3.6.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1578_1_PSD
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1578
Location:	Hazelmere, WA	*Date Sampled:*	5-01-2021
Sample Identification:	11, 0.5 m	*Date Tested:*	11/1 - 12/1/2021

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	
9.5	
4.75	100
2.36	100
1.18	100
0.600	80
0.425	51
0.300	29
0.150	10
0.075	3



Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 12-January-2021

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SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1579_1_PI
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1579
Location:	Hazelmere, WA	*Date Sampled:*	5-01-2021
Sample Identification:	12, 1.5 m	*Date Tested:*	12-01-2021

TEST RESULTS - Consistency Limits (Casagrande)

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

AS 1289.3.1.1	**Liquid Limit (%)**	**47**
AS 1289.3.2.1	**Plastic Limit (%)**	**18**
AS 1289.3.3.1	**Plasticity Index (%)**	**29**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**6.0**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**Cracked, Curled**

Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 13-January-2021

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SOIL | AGGREGATE | CONCRETE | CRUSHING

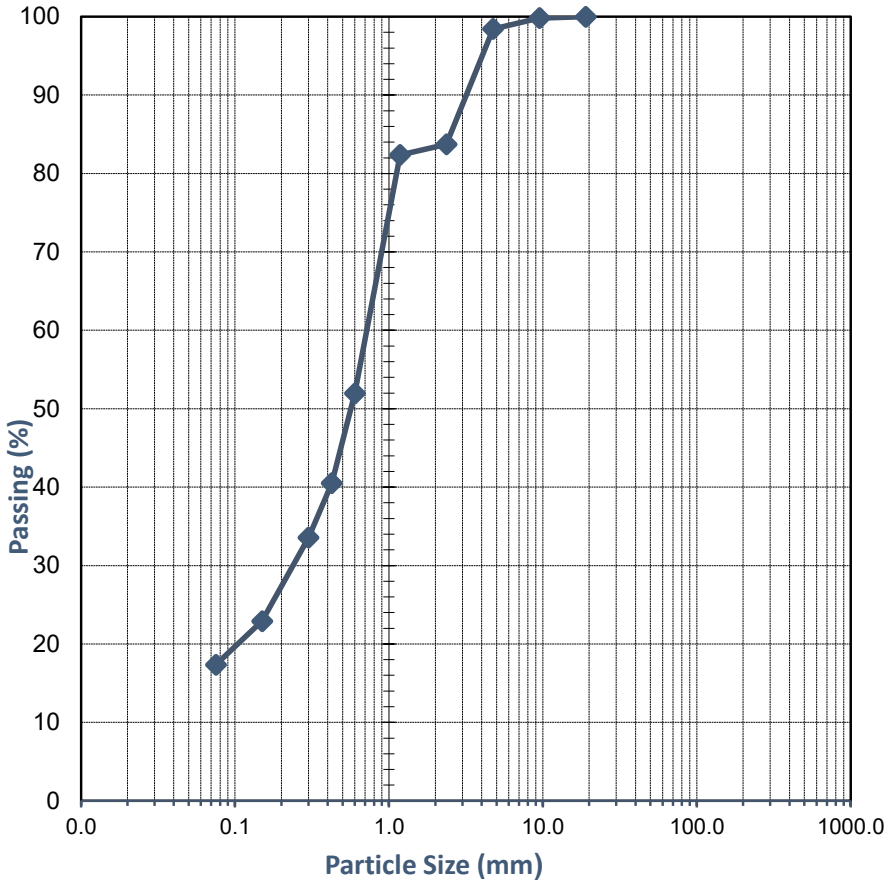
TEST REPORT - AS 1289.3.6.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1579_1_PSD
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1579
Location:	Hazelmere, WA	*Date Sampled:*	5-01-2021
Sample Identification:	12, 1.5 m	*Date Tested:*	11/1 - 12/1/2021

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	100
9.5	100
4.75	98
2.36	84
1.18	82
0.600	52
0.425	40
0.300	34
0.150	23
0.075	17



Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 12-January-2021

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SOIL | AGGREGATE | CONCRETE | CRUSHING

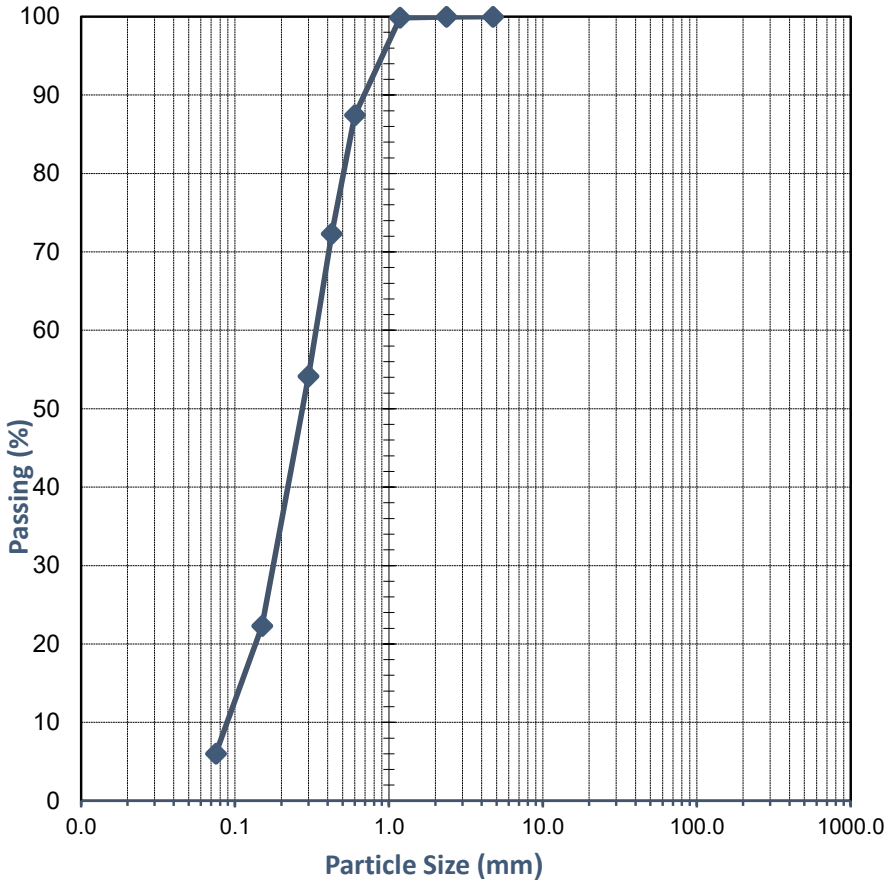
TEST REPORT - AS 1289.3.6.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1580_1_PSD
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1580
Location:	Hazelmere, WA	*Date Sampled:*	5-01-2021
Sample Identification:	14, 1.5 m	*Date Tested:*	11/1 - 12/1/2021

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	
9.5	
4.75	100
2.36	100
1.18	100
0.600	87
0.425	72
0.300	54
0.150	22
0.075	6



Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 12-January-2021

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SOIL | AGGREGATE | CONCRETE | CRUSHING

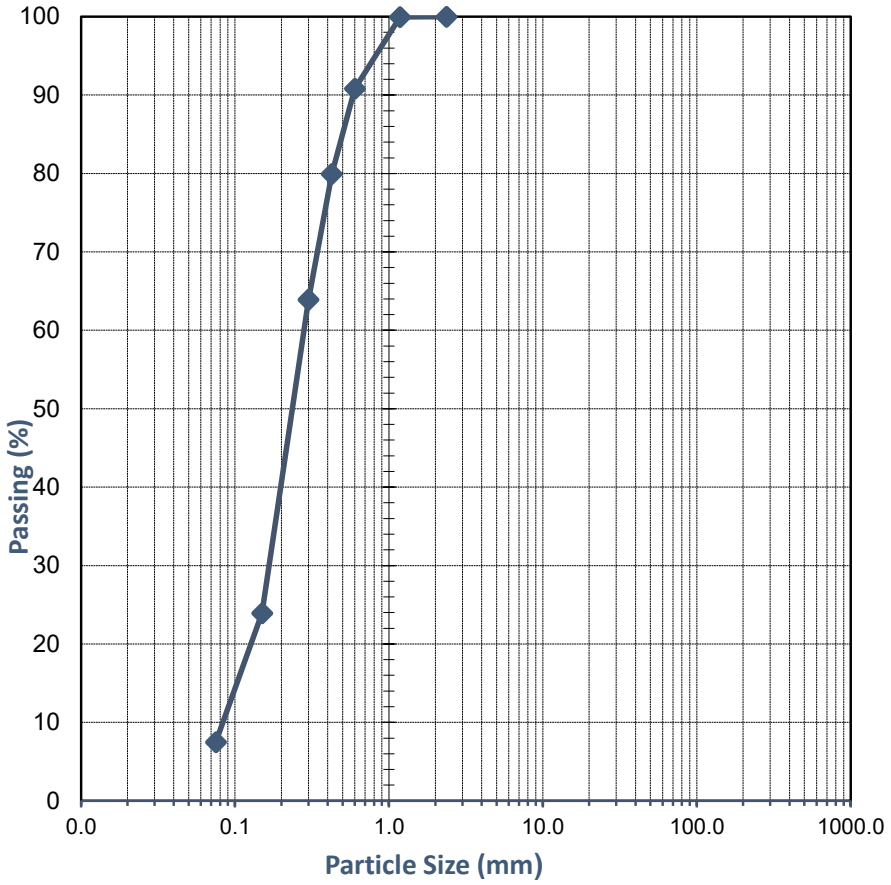
TEST REPORT - AS 1289.3.6.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1581_1_PSD
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1581
Location:	Hazelmere, WA	*Date Sampled:*	5-01-2021
Sample Identification:	18, 1.5 m	*Date Tested:*	11/1 - 12/1/2021

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	
9.5	
4.75	
2.36	100
1.18	100
0.600	91
0.425	80
0.300	64
0.150	24
0.075	7



Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 12-January-2021

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1582_1_PI
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1582
Location:	Hazelmere, WA	*Date Sampled:*	5-01-2021
Sample Identification:	20, 1.9 m	*Date Tested:*	12-01-2021

TEST RESULTS - Consistency Limits (Casagrande)

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

AS 1289.3.1.1	**Liquid Limit (%)**	**63**
AS 1289.3.2.1	**Plastic Limit (%)**	**16**
AS 1289.3.3.1	**Plasticity Index (%)**	**47**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**7.0**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**Cracked, Curled**

Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 13-January-2021

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

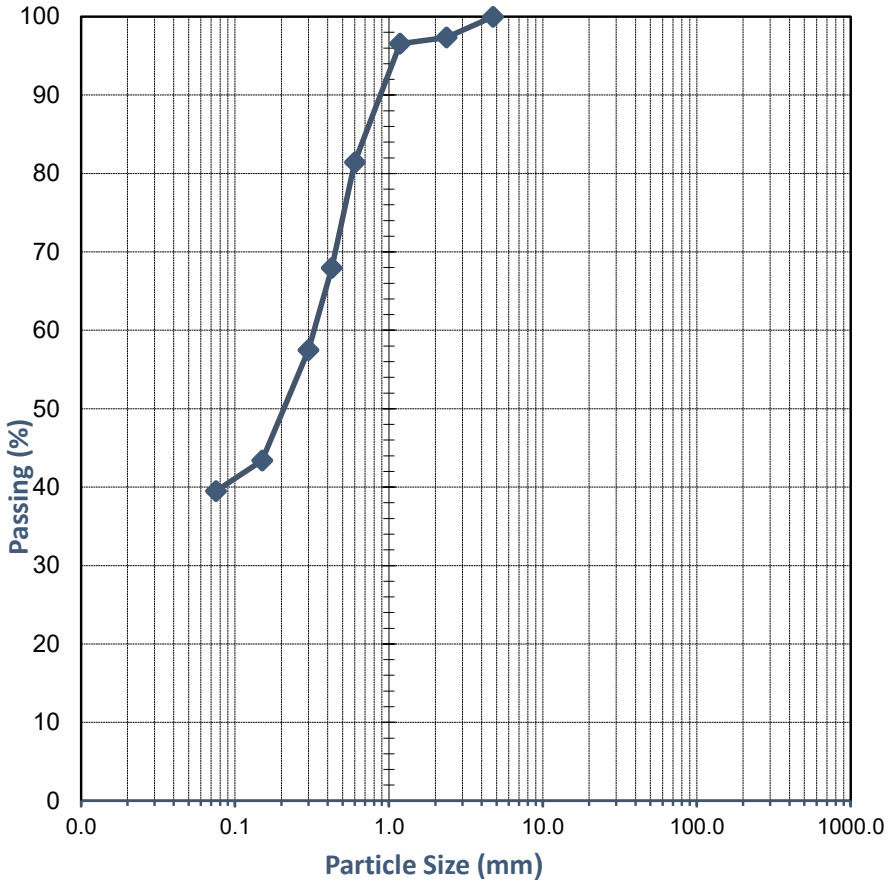
TEST REPORT - AS 1289.3.6.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1582_1_PSD
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1582
Location:	Hazelmere, WA	*Date Sampled:*	5-01-2021
Sample Identification:	20, 1.9 m	*Date Tested:*	11/1 - 12/1/2021

TEST RESULTS - Particle Size Distribution of Soil

Sampling Method: Sampled by Client, Tested as Received

Sieve Size (mm)	Percent Passing Sieve (%)
150.0	
100.0	
75.0	
37.5	
19.0	
9.5	
4.75	100
2.36	97
1.18	97
0.600	81
0.425	68
0.300	57
0.150	43
0.075	39



Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 12-January-2021

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SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.5.2.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1583_1_MMDD
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1583
Location:	Hazelmere, WA	*Date Sampled:*	5/01/2021
Sample Identification:	23, 0.45-0.75 m (Bulk)	*Date Tested:*	12/01/2021

TEST RESULTS - Modified Maximum Dry Density

Sampling Method: Sampled by Client, Tested as Received

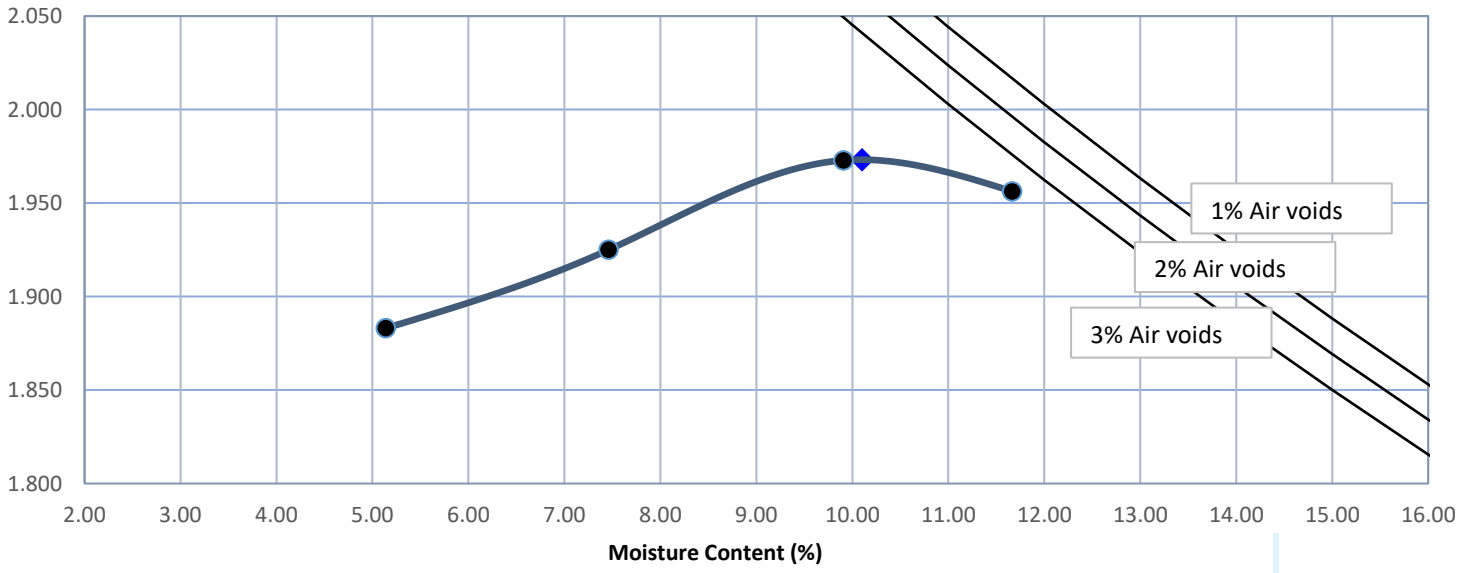
Sample Curing Time: 24 Hours

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

Material + 19.0mm (%): 3 **Material + 37.5mm (%)** -

Moisture Content (%)	**5.1**	**7.5**	**9.9**	**11.7**	
Dry Density (t/m³)	**1.883**	**1.925**	**1.973**	**1.956**	

Dry Density (t/m³)



Modified Maximum Dry Density (t/m³) **1.97**

Optimum Moisture Content (%) **10.0**

Comments: *The above air void lines are derived from a calculated apparent particle density of 2.672 t/m³*

Approved Signatory:

Name: Cody O'Neill

Date: 13/January/2021

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.3.1.1, 3.2.1, 3.3.1 & 3.4.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1583_1_PI
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1583
Location:	Hazelmere, WA	*Date Sampled:*	5-01-2021
Sample Identification:	23, 0.45-0.75 m (Bulk)	*Date Tested:*	12-01-2021

TEST RESULTS - Consistency Limits (Casagrande)

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

AS 1289.3.1.1	**Liquid Limit (%)**	**42**
AS 1289.3.2.1	**Plastic Limit (%)**	**14**
AS 1289.3.3.1	**Plasticity Index (%)**	**28**
AS 1289.3.4.1	**Linear Shrinkage (%)**	**6.0**
AS 1289.3.4.1	**Length of Mould (mm)**	**250**
AS 1289.3.4.1	**Condition of Dry Specimen:**	**Cracked, Curled**

Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 13-January-2021

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SOIL | AGGREGATE | CONCRETE | CRUSHING

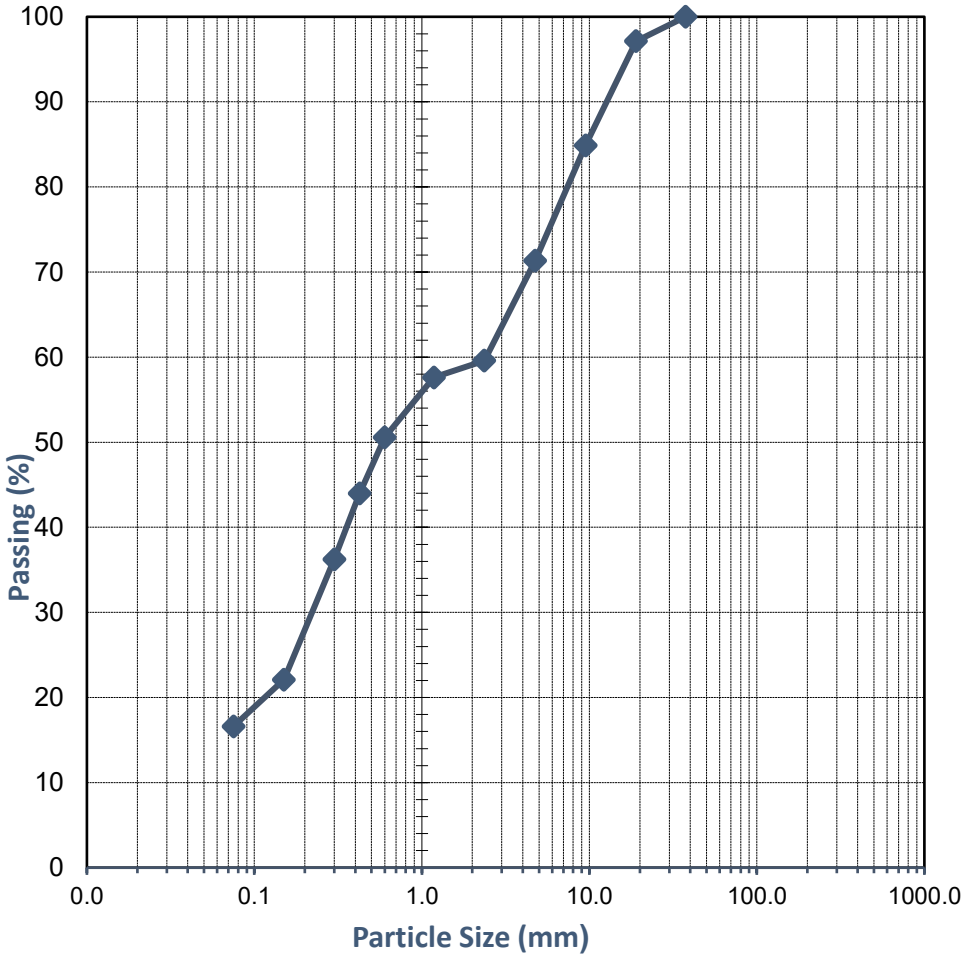
TEST REPORT - AS 1289.3.6.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1583_1_PSD
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1583
Location:	Hazelmere, WA	*Date Sampled:*	5/01/2021
Sample Identification:	23, 0.45-0.75 m (Bulk)	*Date Tested:*	11/1/21-13/1/21

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	97
9.5	85
4.75	71
2.36	60
1.18	58
0.600	51
0.425	44
0.300	36
0.150	22
0.075	17



Comments:

Approved Signatory:

Name: Cody O'Neill

Date: 13/January/2021

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WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.6.1.1

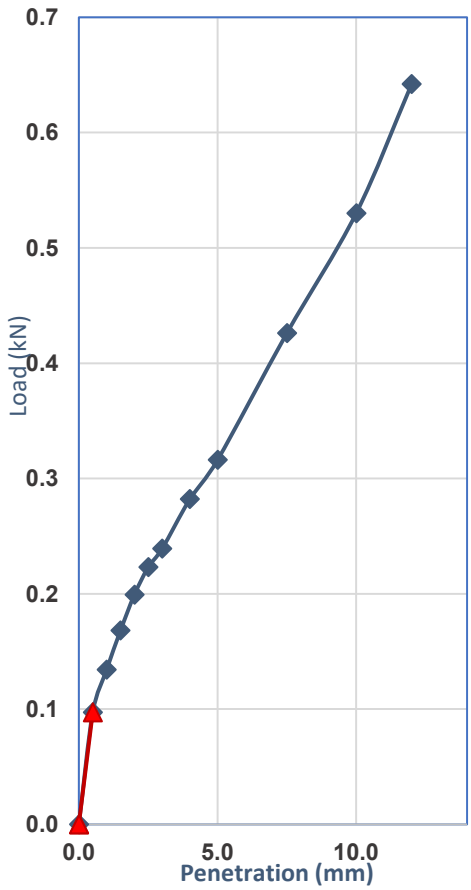
Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1583_1_SCBR
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1583
Location:	Hazelmere, WA	*Date Sampled:*	5-01-2021
Sample Identification:	23, 0.45-0.75 m (Bulk)	*Date Tested:*	12/01 - 18/01/21

TEST RESULTS - CALIFORNIA BEARING RATIO

Sample Description: Sandy Clay

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	3	Excluded/Replaced	Excluded
Maximum Dry Density (t/m^3)	1.97	Optimum Moisture (%)	10.0
Target Dry Density Ratio (%)	95	Target Moisture Ratio (%)	100

Specimen Conditions At Compaction			
Dry Density (t/m3)	1.86	Moisture Content (%)	10.1
Density Ratio (%)	94.5	Moisture Ratio (%)	100.0

Specimen Conditions After Soak			
Soaked or Unsoaked	Soaked	Soaking Period (days)	4
Surcharges Applied (kg)	4.50	Measured Swell (%)	4.0
Dry Density (t/m³)	1.79	Dry Density Ratio (%)	90.5
Moisture Content (%)	17.2	Moisture Ratio (%)	170.5

Specimen Conditions After Test			
Top 30mm Moisture (%)	19.2	Remaining Depth (%)	17.3

Correction applied to Penetration: 0mm

Determined at a Penetration of: 2.5mm

California Bearing Ratio (CBR): 1.5%

Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 20-January-2021

NATA WORLD RECOGNISED ACCREDITATION

Accreditation No. 20599

Accredited for compliance with ISO/IEC 17025 - Testing

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - AS 1289.7.1.1

Client:	Hesperia Projects Pty Ltd	*Ticket No.*	S2284
Client Address:	-	*Report No.*	WG21/1584_1_SSI
Project:	Lots 118 and 119 Lakes Road	*Sample No.*	WG21/1584
Location:	Hazelmere, WA	*Date Sampled:*	5-01-2021
Sample Identification:	23, 0.9-1.2 m (Tube)	*Date Tested:*	11/01 - 12/01/2021

TEST RESULTS - SHRINK SWELL INDEX

Sampling Method: Sampled by Client, Tested as Received

Material Description: Sandy Clay

SWELL SPECIMEN	
Moisture Content Initial (%):	17.7
Dry Density - Initial (t/m^3):	1.57
Moisture Content Final (%):	25.4
Estimated Inert Inclusions (%):	Nil

SHRINK SPECIMEN	
Moisture Content Initial (%):	19.1
Extent of Crumbling:	Nil
Length/Diameter Ratio:	2.0
Extent of Cracking:	Slight

SHRINK SWELL INDEX	
Shrink Swell Index (I_{ss})	**0.6**

Comments:

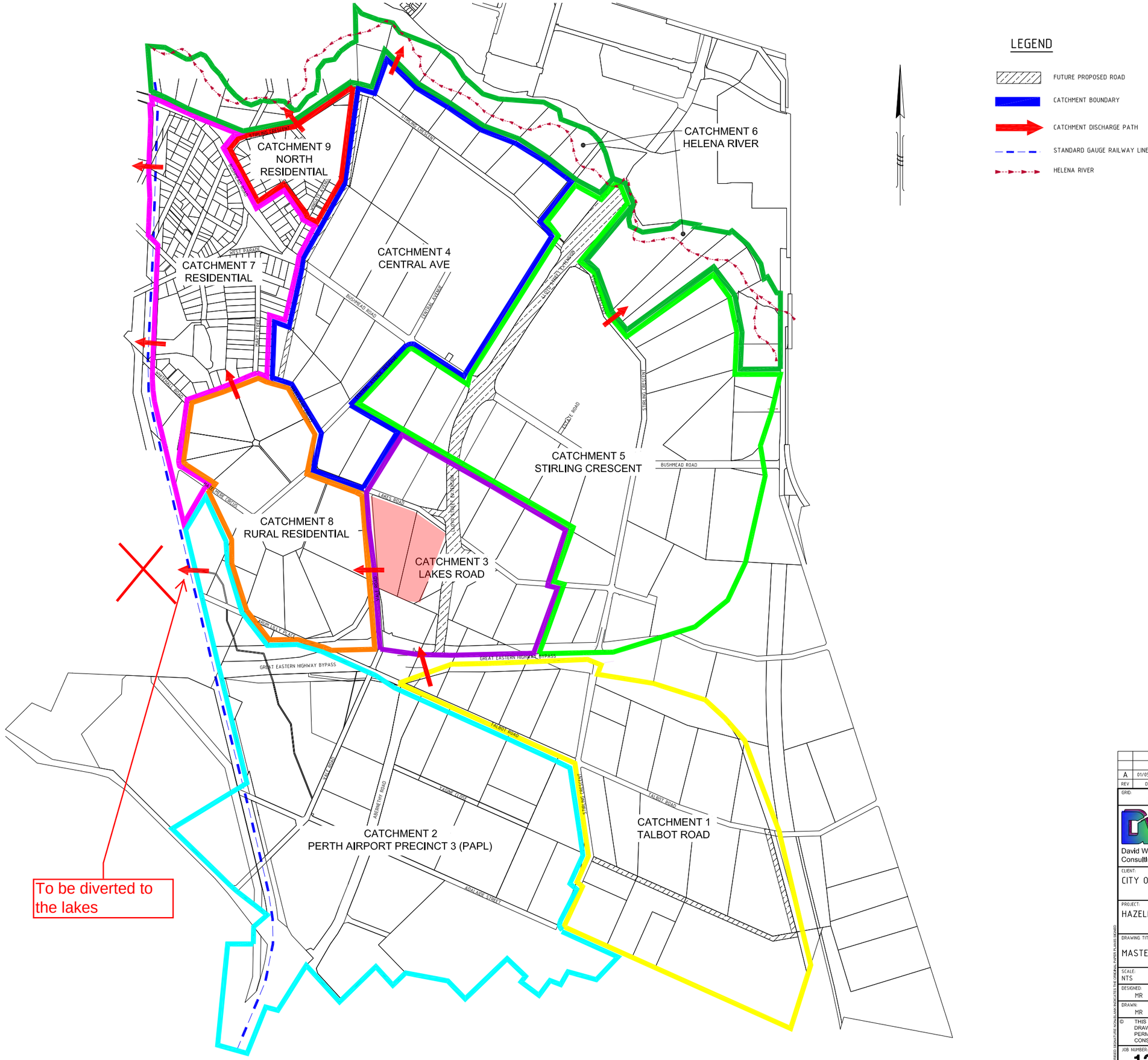
Approved Signatory:

Name: Brooke Elliott

Date: 14-January-2021

APPENDIX D

Hazelmere Drainage Strategy



REV	DATE	DESCRIPTION
A	01/05/2014	ISSUED FOR INFORMATION

GRID: LOCAL
DATUM: AHD

David Wills and Associates
Consulting Engineers
Office: Unit 1/9 Shields Crescent BOORAGOON WA 6154
Mail: PO Box 3084 MYAREE LPO WA 6154
phone (08) 9330 3033
fax (08) 9330 3133
e-mail dwa@dwaconsulting.com.au
ABN 34 900 498 130

CLIENT: CITY OF SWAN

PROJECT: HAZELMERE DRAINAGE STRATEGY

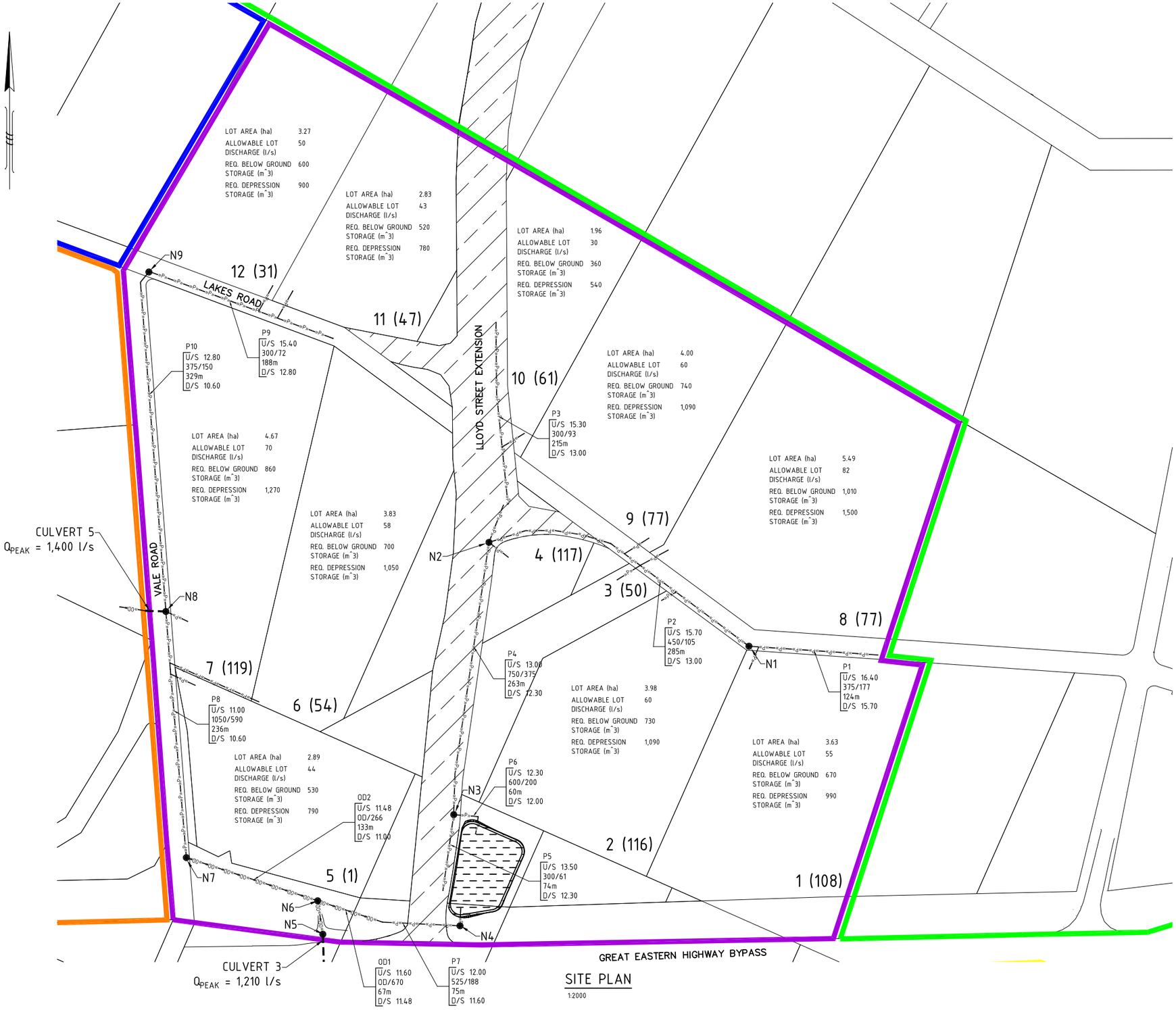
DRAWING TITLE: MASTER CATCHMENT PLAN

SCALE: NTS
ORIGINAL DRAWING SIZE: A1

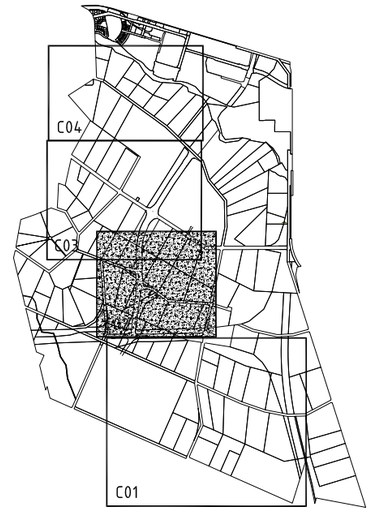
DESIGNED:	DATE:	AUTHORISED	DATE:
MR	30/08/2013	D Wills	01/05/2014
DRAWN:	DATE:	David Wills	
MR	13/02/2014	AIT(Civil) GradDipB HIEAust CPEng	

JOB NUMBER: 12257
DWG No: C01
REV No: A

AUTHORISED SIGNATURE NONALON INDICATES THE ORIGINAL PAPER PLANS SIGNED



SITE PLAN
1:2000

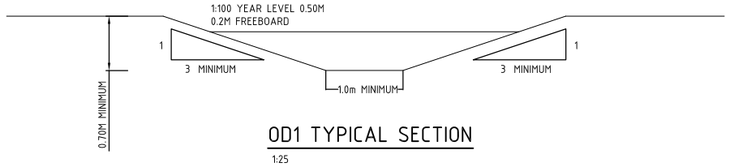


LOCALITY PLAN
NTS

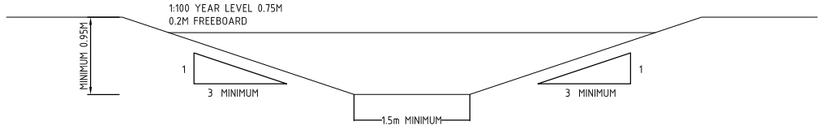
LEGEND

- CATCHMENT BOUNDARY
- NODE POINTS
- U/S 15.25 375/210 292m D/S 15.20 — DRAINAGE PIPE DETAIL
- PROPOSED PIPE
- PROPOSED OPEN DRAIN
- EXISTING CULVERT
- 11 (147) — LOT LABEL (ACTUAL LOT NUMBER)
- FUTURE PROPOSED ROAD
- EXISTING COMPENSATING BASIN
- N2 — NODE NUMBER

metres
0 40 80 120 160m
1:2000
scales quoted apply to original drawing scale
A1



OD1 TYPICAL SECTION
1:25



OD2 TYPICAL SECTION
1:25

REV.	DATE	DESCRIPTION
A	01/05/2014	ISSUED FOR INFORMATION

GRID: LOCAL
DATUM: AHD

David Wills and Associates Consulting Engineers
Office: Unit 1/9 Shields Crescent BOORAGOON WA 6154
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e-mail dwa@dwaconsulting.com.au
ABN 34 900 498 130

CLIENT: CITY OF SWAN

PROJECT: HAZELMERE DRAINAGE STRATEGY

DRAWING TITLE: CATCHMENT 3 DRAINAGE DESIGN

SCALE: 1:2000
ORIGINAL DRAWING SIZE: A1

DESIGNED	DATE	AUTHORISED	DATE
MR	30/08/2013	D Wills	01/05/2014
DRAWN	DATE	David Wills BE(Civil) GradDip8 MIEAust CPEng	
MR	13/02/2014		

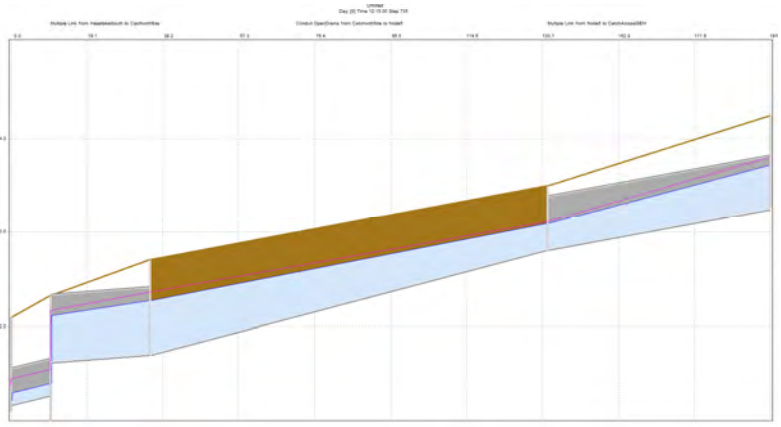
AUTHORISED SIGNATURE INDICATES THE ORIGINAL PAPER PLANS SIGNED

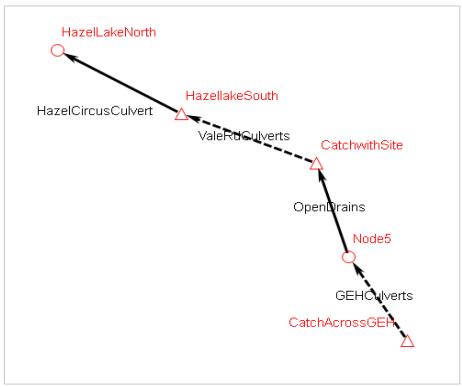
JOB NUMBER: 12257
DWG No: C04
REV No: A

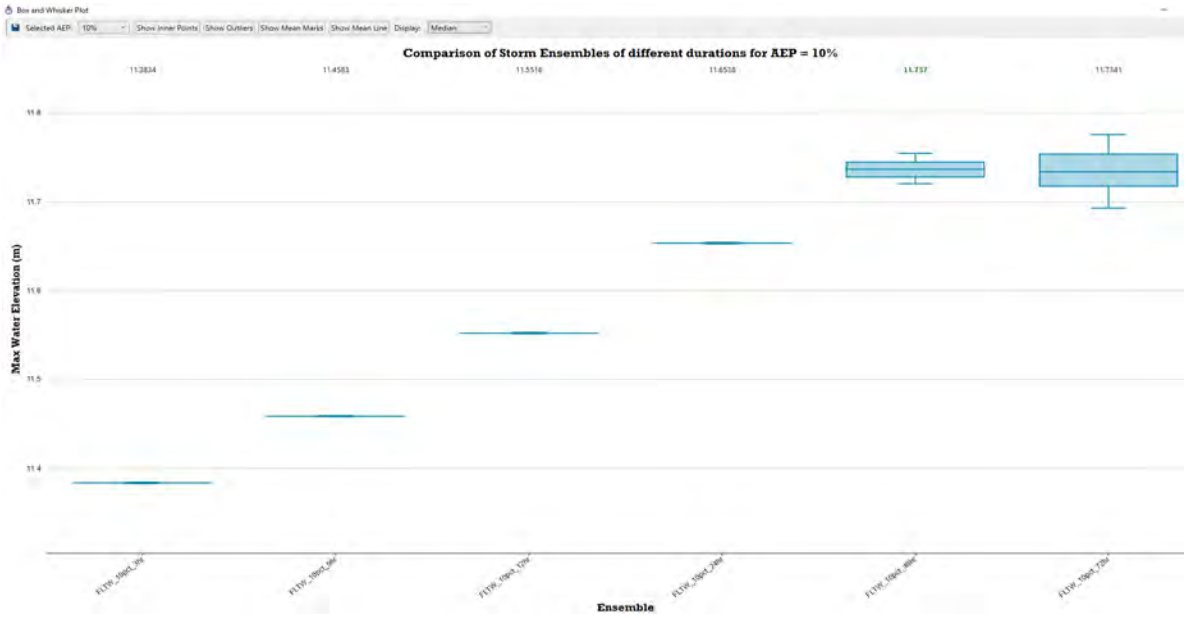
APPENDIX E

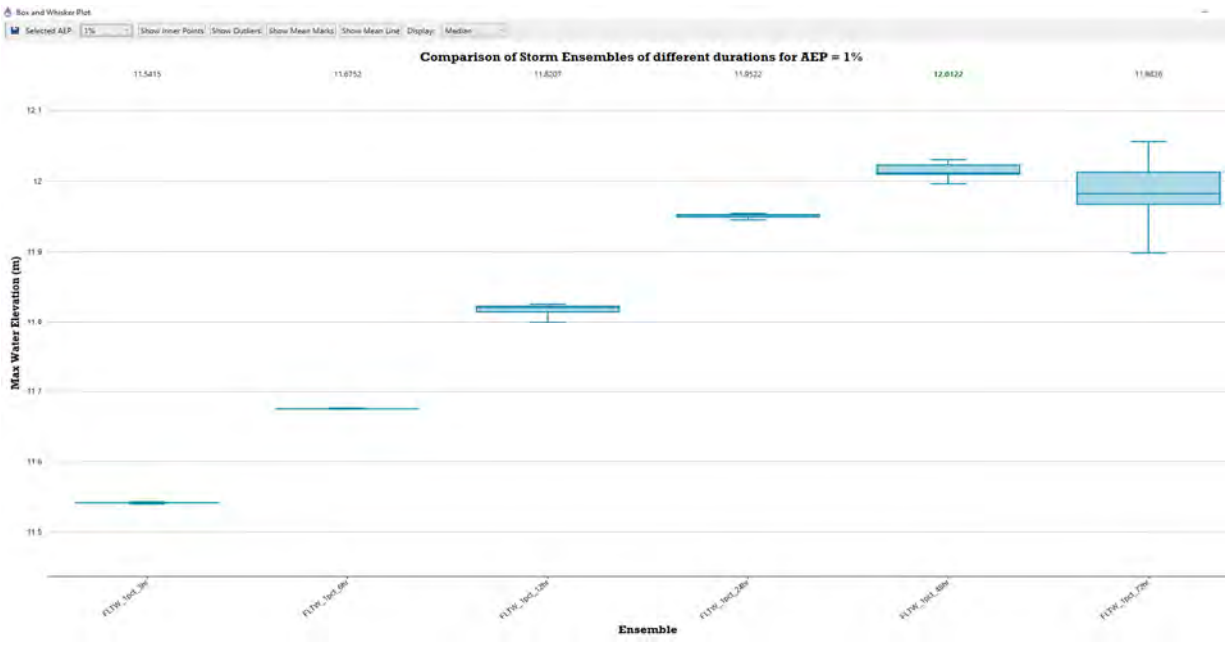
XP-Storm Modelling Hazelmere Lake

Date: 15/02/2021 Job No. H20106









hyd2o

Lot 119 Lakes Rd Hazelmere SMP

XP-Storm Modelling Outputs - Hazelmere Lake South

Appendix E

APPENDIX F
Groundwater Data

TALOMAN SITE HAZELMERE - Interpreted Groundwater Levels (URS, 2008)

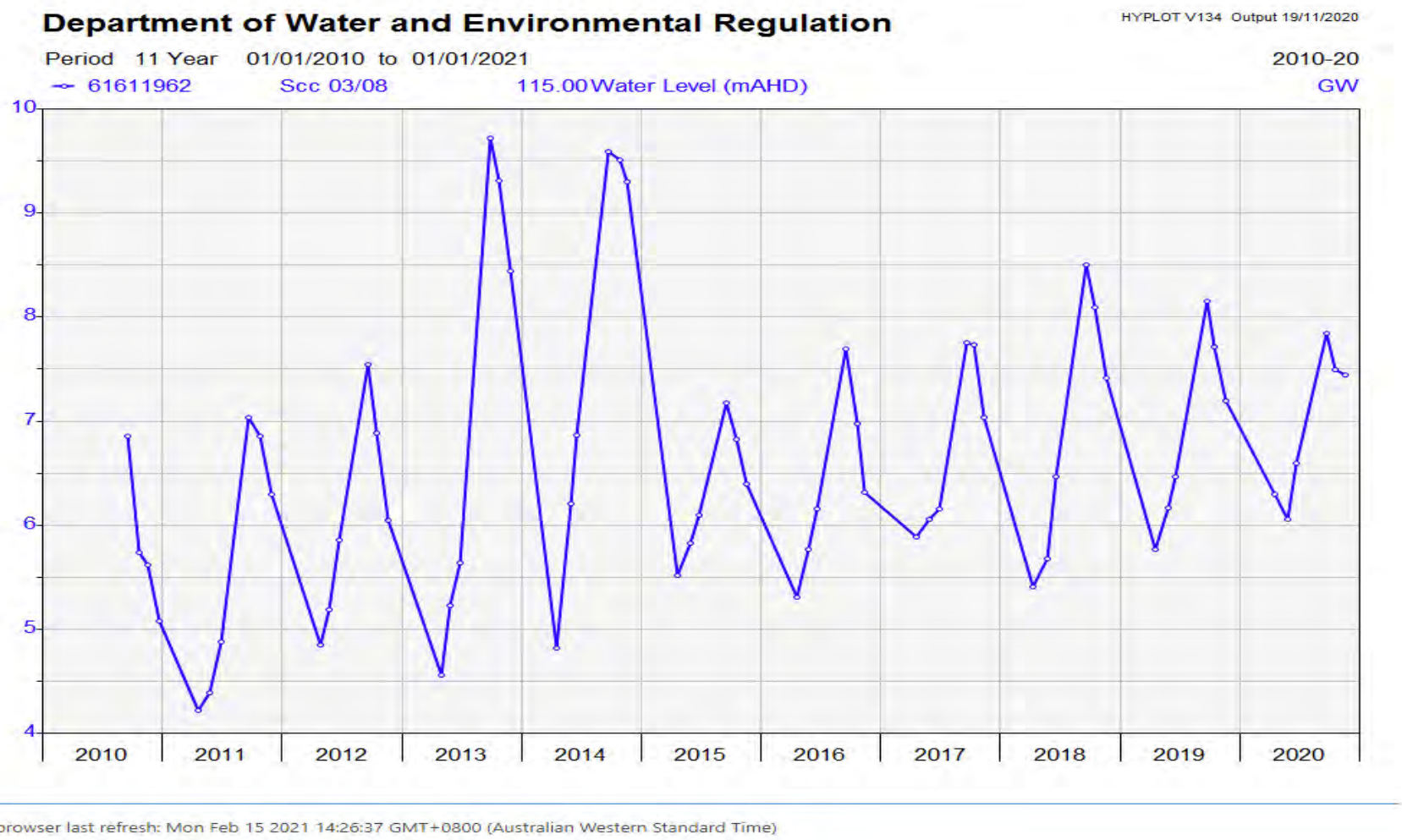
Bore ID	23/03/04	15/06/04	14/09/04	21/12/04		14/03/05	28/06/05	19/09/05	23/12/05	13/03/06	06-06-06	14/09/06	12-11-06	26/03/07	28/06/07	25/09/07	12-10-07	17/03/08	19/06/08
TMB1	15.23	15.78	16.14		15.75	14.61	15.77	16.13		16.06	15.87					15.95	15.54	15.38	15.63
TMB2	15.27	16.07	16.29		15.89	15.59	16.5	16.24	16.54	15.64	15.68	16.48	15.77	15.05	15.42	16.06	15.6	15.18	15.74
TMB3	14.3	14.94	15.18		15.71	14.83	15.35	15.17	15.59	14.92	14.93	15.5	15.29	11.53	14.39	14.96	15.54	14.58	14.91
TMB4	13.02	14.15	14.75		14.15	14.37	15.09	15.34	15.09	13.72	14.33	15.25	14.42	13.13	13.86	12.55	14.26	13.94	15.32
TMB5	14.02	14.47	15.33		15.04	13.4	15.76	15.94		14.41			13.31						
TMB6	12.63	13.14	13.77		13.64	12.87	13.85	13.88	13.62	12.66	13.19	13.81	12.95	12.54	12.77	13.82	13	13.02	13.61
TMB7	12.28	13.21	12.36		13.56	12.65	13.71	13.74	13.75	12.46			13.86	12.89	13.17	13.21	12.59	12.32	13.14
TMB8	13.06	13.35	13.84		13.88	12.89	14.02	14.41	14.42	13.27	12.98	13.52	13.13	12.55	12.7	13.84	13.71	13.21	13.77
TMB9	10.43	11.03	11.76		11.47	10.51	11.95	12.02	11.77	10.67	10.63	11.7	10.81	12.2	11.06	11.83	10.98	10.35	11.61
TMB10	10.5	11.62	12.03		11.04	10.67		11.92		10.83	11.28	11.69	10.43	10	11.15	11.94	10.54	10.57	11.45
TMB11																			
TMB12	10.99	11.63	11.98		11.4	10.88		12.32	12.25	11.24	11	11.46	11.07	10.66	10.93	11.8	11.43	11.05	11.65
TMB13	10.48	11.15			11.03	11				11.07	10.68	11.56	9.79	10.34	10.71	11.79	11.07	10.5	11.73
3/91	15.83	16.71	16.87			14.78	17.04		17.21										
4/91	15.97	16.5	17.25		16.31	15.37	17.39	17.79	17.68	15.99	15.72	16.57	15.94	14.97	15.25	17.26	16.41	15.54	16.54
1/86									16.27	15.27			14.21	13.2	13.59	15.64	14.73	14.4	15.09

Lot 118 and 119 Lakes Rd Hazelmere - Interpreted Groundwater Levels (Strategen, 2019)

BoreID	mbTOC 11-17-18	GWL 11-07-18
TMB12	2.36	11.12
TMB10	1.395	11.63
TMB9	1.52	11.64
TMB7	3.155	12.675
TMB8	2.473	13.297

APPENDIX G
DWER Bore Hydrograph

Date : 15/02/2021 Job No: H24053



Source: DWER (2021)

hyd$_2$o

Lot 119 & 808 Lakes Rd Hazelmere SMP

DWER Bore Hydrograph

Appendix G

APPENDIX H
Engineering Drainage Design

NOTES

GENERAL

1. LEVELS ARE RELATIVE TO AHD.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
3. THIS DRAWING MUST BE READ IN CONJUNCTION WITH THE COMPLETE SET OF DRAWINGS AND SPECIFICATIONS.
4. ALL DOWNPIPE CONNECTIONS #225
   ALL PIT TO PIT PIPEWORK #450 UNO

LEGEND

- STORMWATER CATCHMENT AREAS
- STORMWATER PIPE
- STORMWATER GULLY/ ACCESS/ BUBBLEUP STRUCTURE
- RECESS DOCK PUMP AND ASSOCIATED PIPEWORK
- 2021 HYD20 UWMP AAMGL (mAHD)
- PROPOSED CONTOURS (0.05m INT)
- EXISTING EXTERNAL CONTOURS
  INTERNAL CONTOURS NOT SHOWN

VALE ROAD

EXTENT OF NOISE FENCE

WAREHOUSE 2
AREA 15,000 sqm.
FFL 13.9 AHD

WAREHOUSE 1
AREA 22,500 sqm. (Incl. Cold Room)
FFL 13.9 AHD

COLD ROOM
AREA 4,000 sqm.

OFFICE 1
(2 Levels)
AREA 1,000 sqm

PLANT ROOM

DOCK OFFICE 2
AREA 100 sqm.

DOCK OFFICE 1
AREA 100 sqm.

DRAINAGE BASIN
AREA 2,425 sqm.

DEDICATED HEAVY DUTY CONCRETE HARDSTAND
TOTAL AREA 12,990 sqm.

LAKES ROAD WEST

RAIN WATER TANK A
166.5m³ VOL
6.02m DIA
6.35m HIGH
MAX ROOF CATCHMENT 3300m²
WITH ORIFICE LIMITED TO 5.28L/s

RAIN WATER TANK B
166.5m³ VOL
6.02m DIA
6.35m HIGH
MAX ROOF CATCHMENT 3300m²
WITH ORIFICE LIMITED TO 5.28L/s

RAIN WATER HARVESTING TANK C
4m DIA
65kL

OFFICE DOWNPIPES TO BE DIRECTED TOWARDS RWT. RWT TO HAVE FULL FLOW OVERFLOW INTO BELOW GROUND STORMWATER SYSTEM

BASIN A
TWL 13.3mAHD
INVERT 12.5mAHD

BASIN B
TWL 13.3mAHD
INVERT 12.5mAHD

BASIN C
TWL 13.3mAHD
INVERT 12.5mAHD

BASIN D
TWL 13.3mAHD
INVERT 12.72mAHD

TANK A

TANK B

PUMP HOUSE

SPRINKLER TANK

SPRINKLER TANK

PUMP STATION

PUMP STATION

BUBBLE UP SOAK BASE

BUBBLE UP GRATE LEVEL 12.80

BUBBLE UP SOAK BASE

BUBBLE UP SOAK BASE

BUBBLE UP

ORIFICE TO RESTRICT OUTFLOW TO 125.8L/s

TIE PRESSURE MAIN INTO EXISTING

PRIVATE PRESSURE MAIN RE-ALIGNMENT TBC

TIE PRESSURE MAIN INTO EXISTING

2021 UWMP AAMGL 12.0mAHD

2021 UWMP AAMGL 12.5mAHD

4 No. STRIP DRAINS 20 mL x 2 mW

DRAINAGE AREA 254 m2

DRAINAGE AREA 299 m2

OUTDOOR AREA

ENTRY

TRUCK EXIT

169 no. CAR PARKING SPACES

PEDESTRIAN PATH

PROPOSED POWER SUBSTATION

FENCE TYPE FN-01

AUTO-SLIDE GATE FN-01

AUTO-SWING GATE FN-01

AUTO-SLIDE GATE FN-01

AUTO-SLIDE GATE FN-01

CANTILEVER AWNING OVER (3m)

SUPER AWNING (36m)

RAMP DOWN

TRUCK WASH BAY

ELECTRIC VEHICLE CHARGING SPACES

4 No. BIKE PARKING

RSD-1 +RAPID

RSD-2 + DL

RSD-2 + DL+ RAPID

9 no. RSD-2 + DL

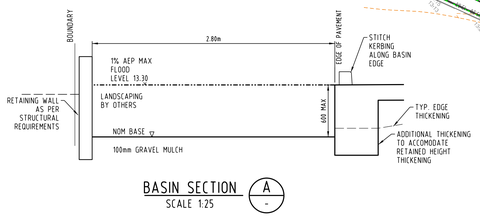
3 no. RSD-2 + DL+ RAPID

6 no. RSD-2 + DL

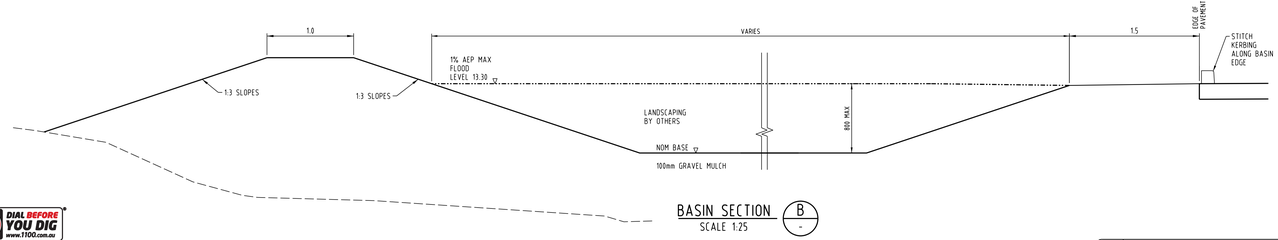
808

119

BASIN SECTION A
SCALE 1:25



BASIN SECTION B
SCALE 1:25



STORMWATER MANAGEMENT PLAN

1. GEOTECHNICAL REPORT (LOTS 118 & 119) - DOUGLAS PARTNERS 82463.01.R.001.REV0 DATED 5 FEB 2021.
2. IMPERVIOUS CATCHMENT AREA OVERFLOW AT SOUTH-WEST CORNER OF SITE OUT TO VALE RD.
3. DESIGN CRITERIA - STORE 1% AEP STORM EVENT ON SITE WITH ALLOWABLE DISCHARGE 16L/s/Ha (BASED ON PRE-DEVELOPMENT SITE AREA) = 125.8L/s
4. ANNUAL AVERAGE MAXIMUM GROUNDWATER LEVEL (AAMGL) VARIES FROM APPROX. 12.0mAHD AT THE SOUTH-WEST OF SITE TO 12.5mAHD TO THE NORTH-EAST OF SITE - AS PER HYD20 UWMP H210168v2 DATED 24 FEB 2021.

AREA OF WORKS

TOTAL AREA OF WORKS (m²)	78,702
IMPERVIOUS AREA (m²)	70,647
VOLUME REQUIRED (m³)	2544.0

STORMWATER STORAGE (m³)

INFRASTRUCTURE	TWL / BASE (RL mAHD)	PROPOSED INFILTRATION RATES (M/DAY)	INTERPOLATED DEPTHS TO AAMGL (M)	VOLUME (m³)
BASIN A	13.3 / 12.5	2.5	0.5	1493.1
BASIN B	13.3 / 12.7	2.5	0.5	137.9
BASIN C	13.3 / 12.7	2.5	0.4	159.0
BASIN D	13.3 / 12.7	1.0	0 - 0.7 (VARIES)	457.6
TANK A	-	-	-	166.5
TANK B	-	-	-	166.5
			TOTAL VOLUME REQUIRED	2572.4
			TOTAL VOLUME PROVIDED	2580.6

DETAILS CORRECT WHEN PRINTED IN COLOUR

NOT FOR CONSTRUCTION
PRELIMINARY

DIAL BEFORE YOU DIG www.1100.com.au

RETAINING WALLS INDICATIVE ONLY, REFER STRUCTURAL ENGINEERS DRAWINGS FOR DETAILS

SCALE OF METRES 1:25

SCALE OF METRES 1:500

REV.	DESCRIPTION	DATE	DRAWN	DFT CHK	DES CHK	DESIGN	APPR.D
D	RE-ISSUED FOR DEVELOPMENT APPLICATION	15.08.24	JC	-	-	JC	-
C	ISSUED FOR DEVELOPMENT APPLICATION	14.08.24	JC	-	-	JC	-
B	ISSUED TO HYD2O FOR REVIEW	09.08.24	JC	-	-	JC	-
A	DRAWING CREATED FOR PT257 - ISSUED FOR INFORMATION	05.08.24	JC	-	-	JC	-

Tadros Engineering
YOUR VISION / OUR EXPERTISE / ENGINEERED SUCCESS

CLIENT: HESPERIA

LOCATION: LOTS 119 & 808, LAKES ROAD, HAZELMERE

ENGINEERS SIGNATURE

PT257C - LOTS 119 & 808, LAKES ROAD, HAZELMERE

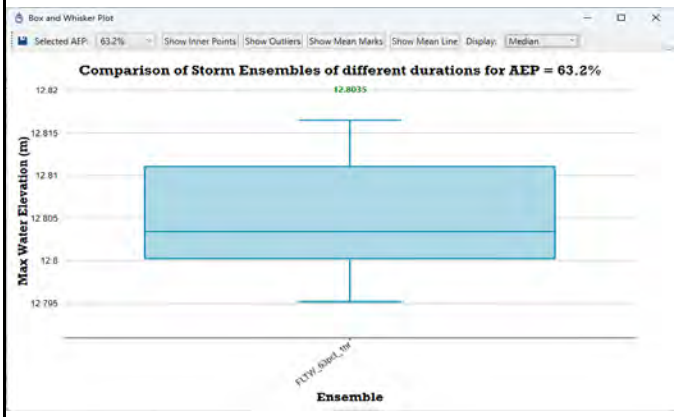
CIVIL
STORMWATER MANAGEMENT PLAN

SCALE @ A0 1:500 | DRG No. PT257-CI-DRG-S-01 | D

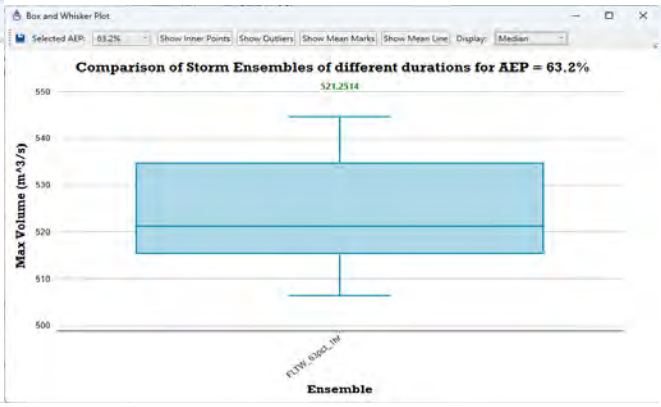
APPENDIX I
XP-Storm Modelling Outputs

15mm Event

Flood Elevation (mAHD)

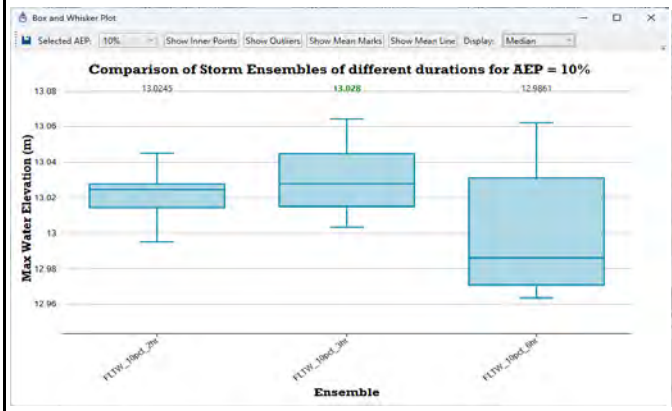


TWL Volume (m3)

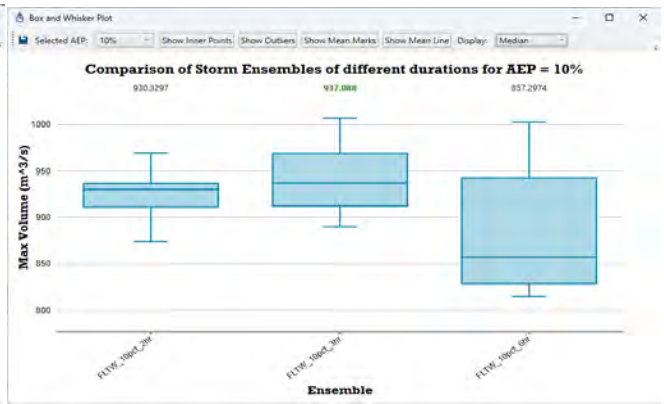


10% AEP Event

Flood Elevation (mAHD)

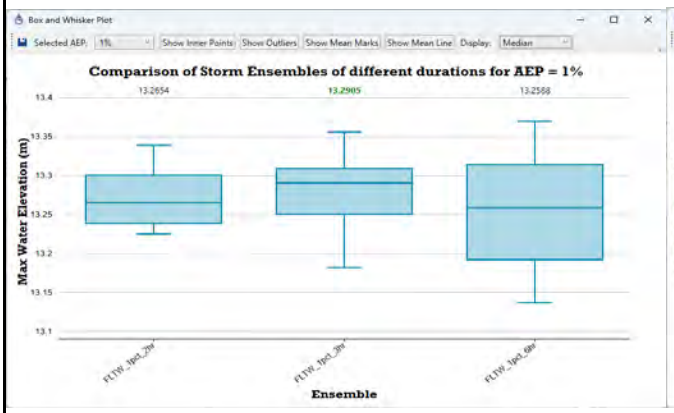


TWL Volume (m3)

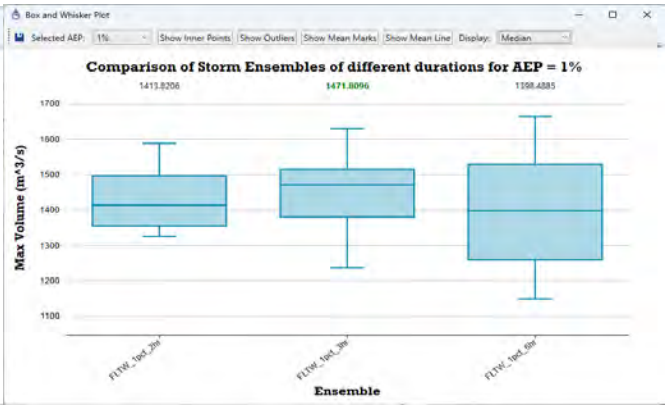


1% AEP Event

Flood Elevation (mAHD)

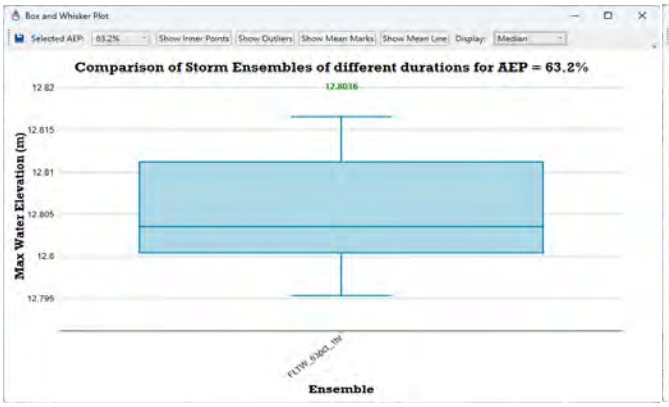


TWL Volume (m3)

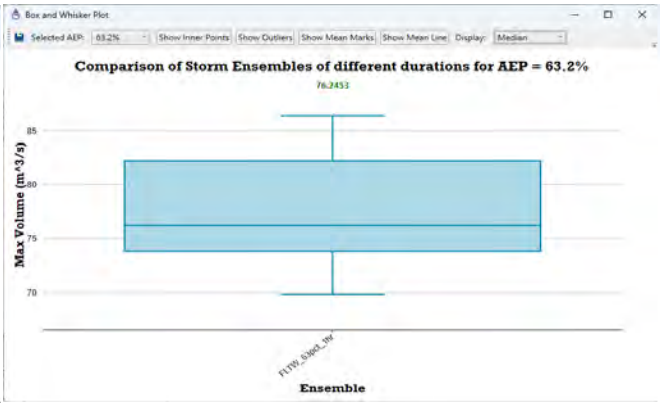


15mm Event

Flood Elevation (mAHD)

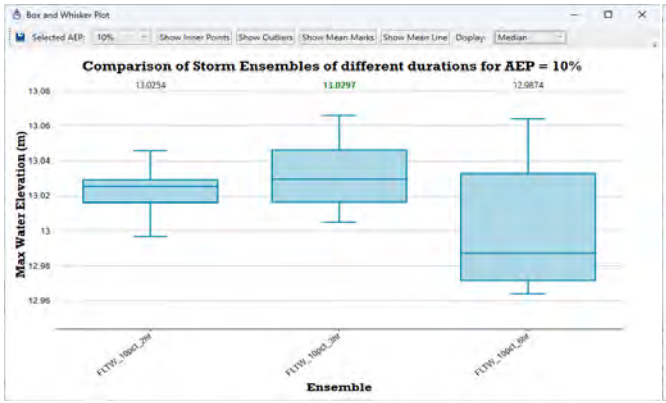


TWL Volume (m3)

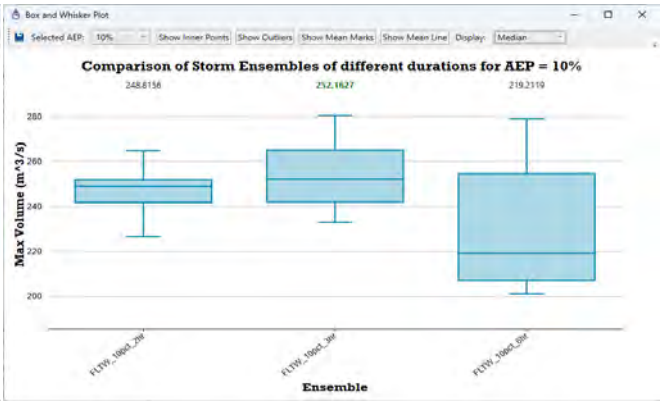


10% AEP Event

Flood Elevation (mAHD)

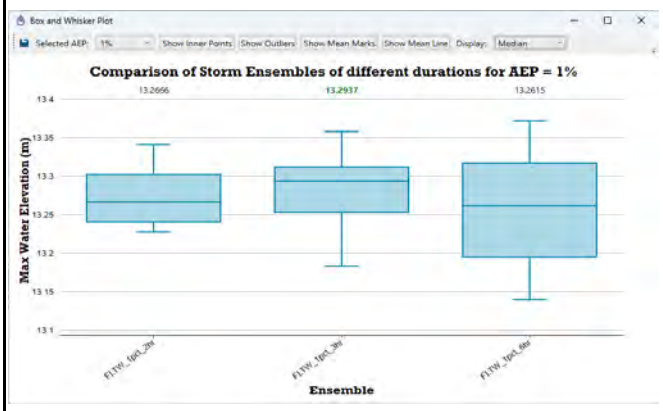


TWL Volume (m3)

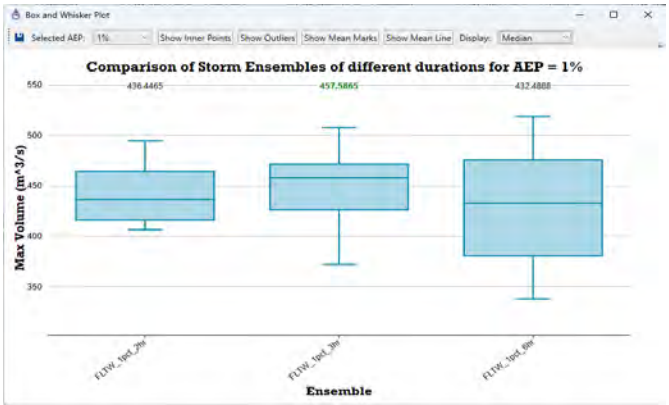


1% AEP Event

Flood Elevation (mAHD)

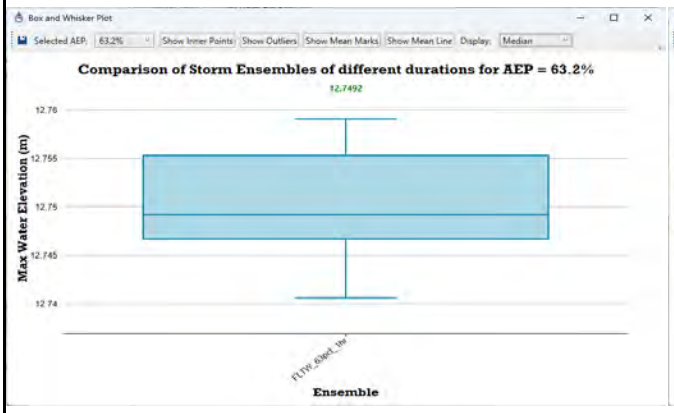


TWL Volume (m3)



15mm Event

Flood Elevation (mAHD)



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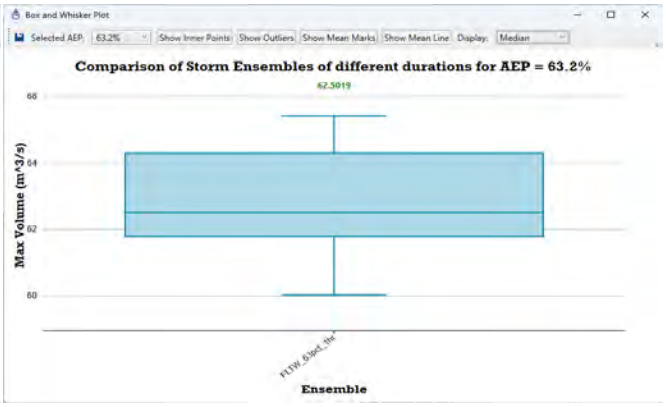
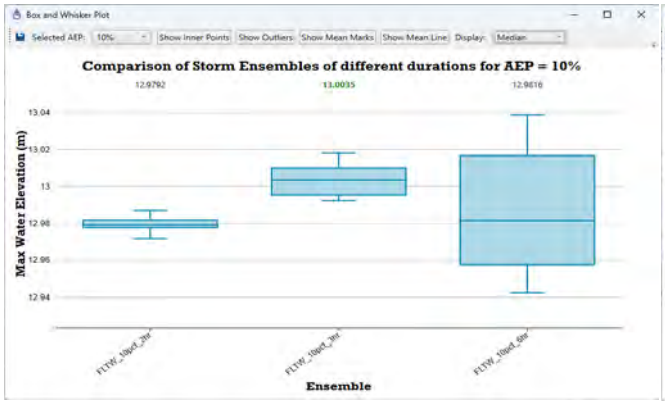


10% AEP Event

Flood Elevation (mAHD)



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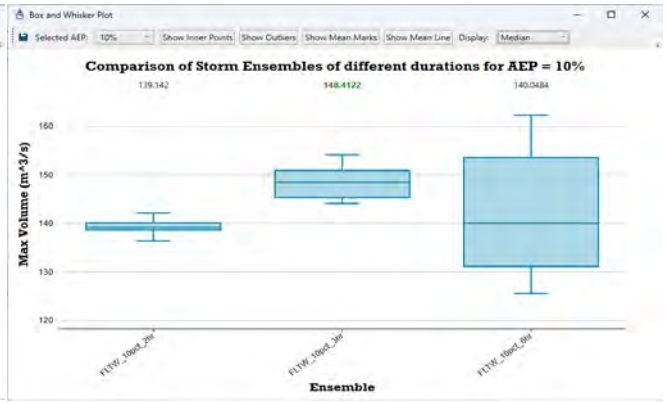
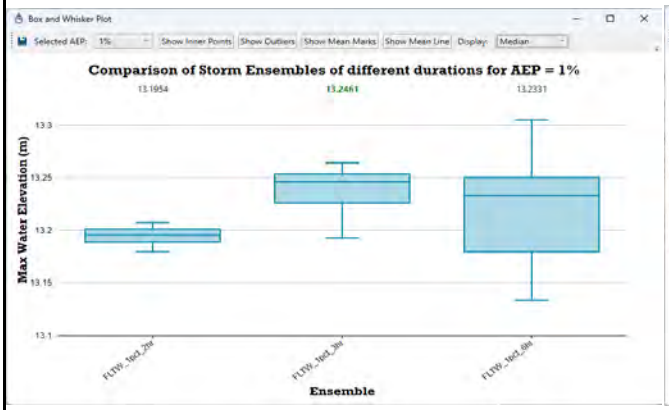
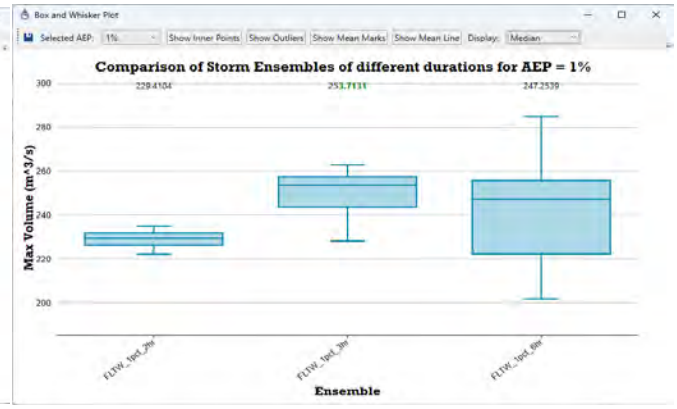


1% AEP Event

Flood Elevation (mAHD)



TWL Volume (m3)



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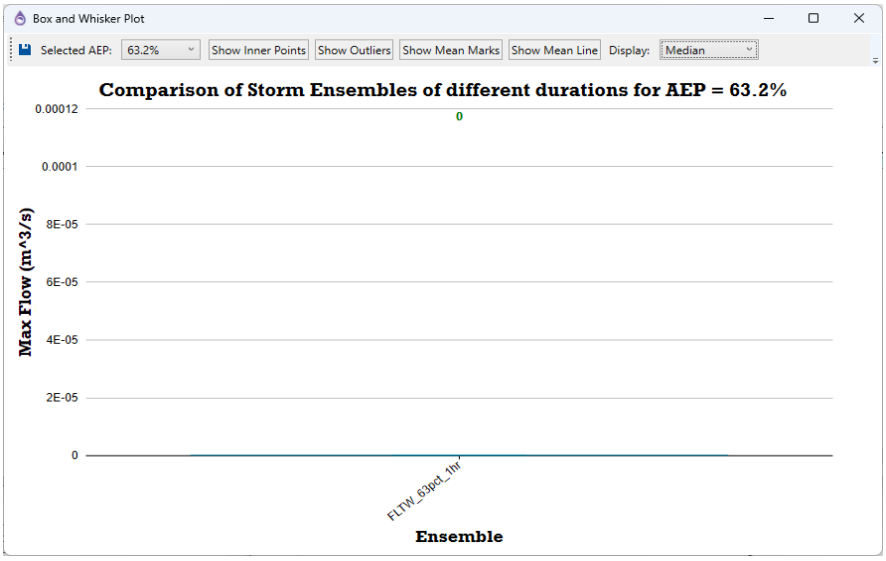

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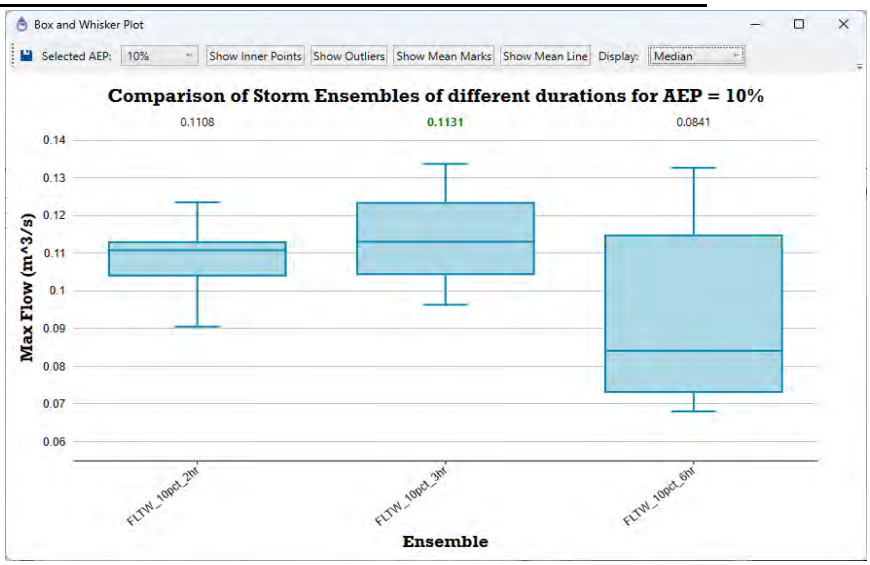

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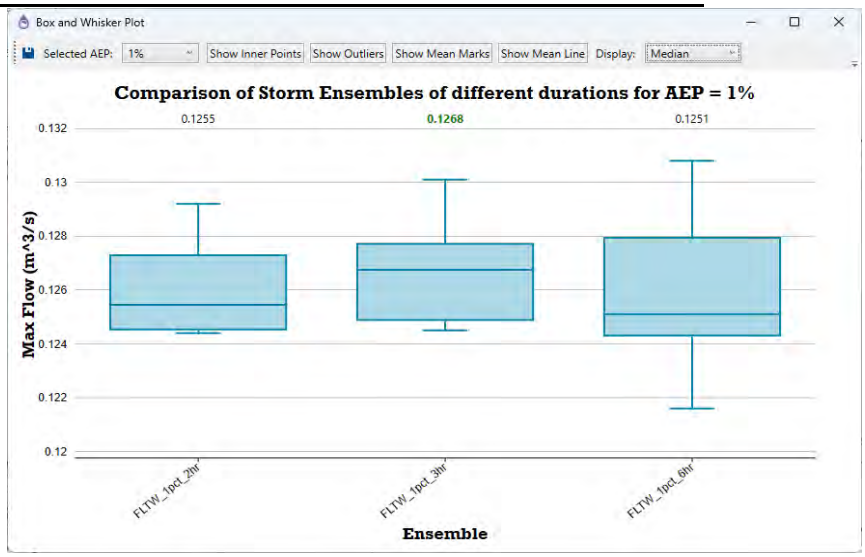


Attachment 11

NOTES

GENERAL

1. LEVELS ARE RELATIVE TO AHD.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
3. THIS DRAWING MUST BE READ IN CONJUNCTION WITH THE COMPLETE SET OF DRAWINGS AND SPECIFICATIONS.

LEGEND

- PROPOSED RETAINING WALL
- PROPOSED SURFACE CONTOUR (13.50)
- PROPOSED SURFACE RL (RL 12.50)
- RETAINING WALL PROFILE (RW1)
- START & END OF RETAINING WALL PROFILE (S1 / E1)
- 150 HIGH BARRIER KERB
- 150 HIGH STITCHED KERBING
- 120 HIGH SEMI-MOUNTABLE KERB
- EXISTING EXTERNAL CONTOURS INTERNAL CONTOURS NOT SHOWN

VALE ROAD

LIMESTONE RETAINING

EARTHWORK BUND - RL13.60

PANEL AND POST RETAINING

1:3 BATTERS

1:3 BATTER

1.5 BATTER

LAKES ROAD

119

808

807

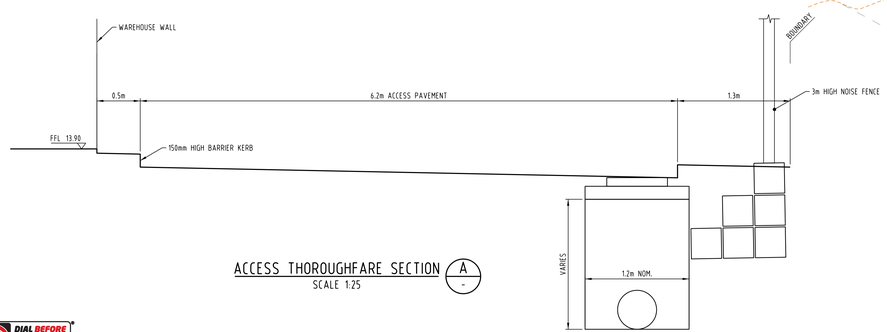
816

815

Easement Dpc 0198094

ACCESS THOROUGHFARE SECTION (A)

SCALE 1:25



SCALE OF METRES 1:500

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REV.	DESCRIPTION	DATE	DRAWN	DFT CHK	DES CHK	DESIGN	APPR.D
G	RE-ISSUED FOR DEVELOPMENT APPLICATION	16.08.24	JC	-	-	JC	-
E	ISSUED FOR DEVELOPMENT APPLICATION	15.08.24	JC	-	-	JC	-
D	ISSUED FOR REVIEW	14.08.24	JC	-	-	JC	-
C	ISSUED FOR REVIEW	08.08.24	JC	-	-	JC	-
B	ISSUED FOR REVIEW	07.08.24	JC	-	-	JC	-
A	DRAWING CREATED FOR PT257 - ISSUED FOR INFORMATION	05.08.24	JC	-	-	JC	-

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CLIENT: HESPERIA

LOCATION: LOTS 119 & 808, LAKES ROAD, HAZELMERE

ENGINEERS SIGNATURE

PT257C - LOTS 119 & 808, LAKES ROAD, HAZELMERE

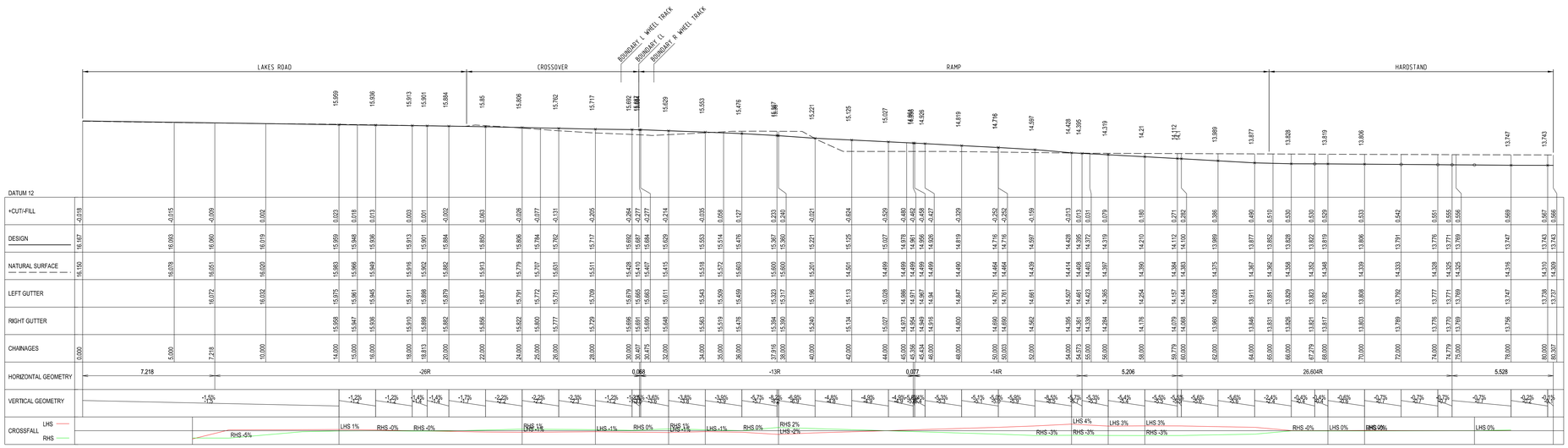
CIVIL
PAVEMENT & RETAINING
PLAN

SCALE @ A0: 1:500 | DRG No. PT257-CI-DRG-P-01 | F

NOTES

GENERAL

1. LEVELS ARE RELATIVE TO AHD.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
3. THIS DRAWING MUST BE READ IN CONJUNCTION WITH THE COMPLETE SET OF DRAWINGS AND SPECIFICATIONS.



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SCALE OF METRES 1:100

REV.	DESCRIPTION	DATE	DRAWN	DFT CHK	DES CHK	DESIGN	APPR.D
B	ISSUED FOR DEVELOPMENT APPLICATION	16.08.24	JC	-	-	JC	-
A	DRAWING CREATED FOR PT257 - ISSUED FOR INFORMATION	14.08.24	JC	-	-	JC	-

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CLIENT
HESPERIA

LOCATION
LOTS 119 & 808, LAKES ROAD, HAZELMERE

ENGINEERS SIGNATURE

PT257C - LOTS 119 & 808, LAKES ROAD, HAZELMERE

CIVIL
TRUCK ENTRY CROSSOVER
LONGSECTION

SCALE @ A0 1:100 | DRG No. PT257-CI-DRG-P-02 | B

NOTES

GENERAL

1. LEVELS ARE RELATIVE TO AHD.
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
3. THIS DRAWING MUST BE READ IN CONJUNCTION WITH THE COMPLETE SET OF DRAWINGS AND SPECIFICATIONS.
4. ALL DOWNPIPE CONNECTIONS #225
   ALL PIT TO PIT PIPEWORK #450 UNO

LEGEND

- STORMWATER CATCHMENT AREAS
- STORMWATER PIPE
- STORMWATER GULLY/ ACCESS/ BUBBLEUP STRUCTURE
- RECESS DOCK PUMP AND ASSOCIATED PIPEWORK
- 2021 HYD20 UWMP AAMGL (mAHD)
- PROPOSED CONTOURS (0.05m INT)
- EXISTING EXTERNAL CONTOURS
  INTERNAL CONTOURS NOT SHOWN

VALE ROAD

WAREHOUSE 2
AREA 15,000 sqm.
FFL 13.9 AHD

WAREHOUSE 1
AREA 22,500 sqm. (Incl. Cold Room)
FFL 13.9 AHD

COLD ROOM
AREA 4,000 sqm.

OFFICE 1
(2 Levels)
AREA 1,000 sqm

PLANT ROOM

DOCK OFFICE 2
AREA 100 sqm.

DOCK OFFICE 1
AREA 100 sqm.

DRAINAGE BASIN
AREA 2,425 sqm.

DEDICATED HEAVY DUTY CONCRETE HARDSTAND
TOTAL AREA 12,990 sqm.

LAKES ROAD WEST

PUMP HOUSE
SPRINKLER TANK
SPRINKLER TANK

TANK A
166.5m³ VOL
6.02m DIA
6.35m HIGH
MAX ROOF CATCHMENT 3300m²
WITH ORIFICE LIMITED TO 5.28L/s

TANK B
166.5m³ VOL
6.02m DIA
6.35m HIGH
MAX ROOF CATCHMENT 3300m²
WITH ORIFICE LIMITED TO 5.28L/s

RAIN WATER HARVESTING TANK C
4m DIA
65kL

BASIN A
TWL 13.3mAHD
INVERT 12.5mAHD

BASIN B
TWL 13.3mAHD
INVERT 12.5mAHD

BASIN C
TWL 13.3mAHD
INVERT 12.5mAHD

BASIN D
TWL 13.3mAHD
INVERT 12.72mAHD

2021 UWMP AAMGL
12.0mAHD

2021 UWMP AAMGL
12.5mAHD

ORIFICE TO RESTRICT OUTFLOW TO 125.8L/s

TIE PRESSURE MAIN INTO EXISTING

PRIVATE PRESSURE MAIN RE-ALIGNMENT TBC

OFFICE DOWNPIPES TO BE DIRECTED TOWARDS RWT. RWT TO HAVE FULL FLOW OVERFLOW INTO BELOW GROUND STORMWATER SYSTEM

4 No. STRIP DRAINS
20 mL x 2 mW

DRAINAGE AREA 254 m2

DRAINAGE AREA 299 m2

OUTDOOR AREA

169 no. CAR PARKING SPACES

PROPOSED POWER SUBSTATION

AUTO-SLIDE GATE FN-01

AUTO-SWING GATE FN-01

FENCE TYPE FN-01

TRUCK EXIT

ENTRY

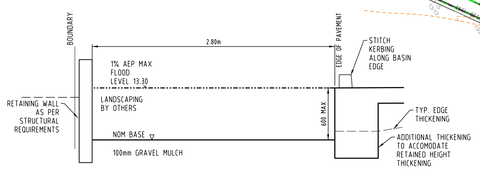
PEDESTRIAN PATH

CANTILEVER AWNING OVER (3m)

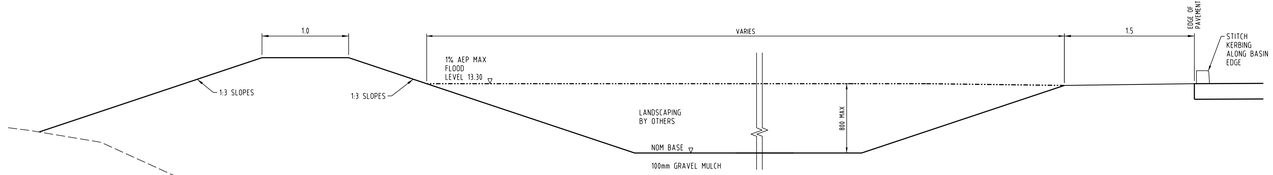
SUPER AWNING (36m)

RETAINING WALLS INDICATIVE ONLY, REFER STRUCTURAL ENGINEERS DRAWINGS FOR DETAILS

BASIN SECTION A
SCALE 1:25



BASIN SECTION B
SCALE 1:25



STORMWATER MANAGEMENT PLAN

1. GEOTECHNICAL REPORT (LOTS 118 & 119) - DOUGLAS PARTNERS 82463.01.R.001.REV0 DATED 5 FEB 2021.
2. IMPERVIOUS CATCHMENT AREA OVERFLOW AT SOUTH-WEST CORNER OF SITE OUT TO VALE RD.
3. DESIGN CRITERIA - STORE 1% AEP STORM EVENT ON SITE WITH ALLOWABLE DISCHARGE 16L/s/Ha (BASED ON PRE-DEVELOPMENT SITE AREA) = 125.8L/s
4. ANNUAL AVERAGE MAXIMUM GROUNDWATER LEVEL (AAMGL) VARIES FROM APPROX. 12.0mAHD AT THE SOUTH-WEST OF SITE TO 12.5mAHD TO THE NORTH-EAST OF SITE - AS PER HYD20 UWMP H210168v2 DATED 24 FEB 2021.

AREA OF WORKS

TOTAL AREA OF WORKS (m²)	78,702
IMPERVIOUS AREA (m²)	70,667
VOLUME REQUIRED (m³)	2544.0

STORMWATER STORAGE (m³)

INFRASTRUCTURE	TWL / BASE (RL mAHD)	PROPOSED INFILTRATION RATES (M/DAY)	INTERPOLATED DEPTHS TO AAMGL (M)	VOLUME (m³)
BASIN A	13.3 / 12.5	2.5	0.5	1493.1
BASIN B	13.3 / 12.7	2.5	0.5	137.9
BASIN C	13.3 / 12.7	2.5	0.4	159.0
BASIN D	13.3 / 12.7	1.0	0 - 0.7 (VARIES)	457.6
TANK A	-	-	-	166.5
TANK B	-	-	-	166.5
			TOTAL VOLUME REQUIRED	2572.4
			TOTAL VOLUME PROVIDED	2580.6

DETAILS CORRECT WHEN PRINTED IN COLOUR

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SCALE OF METRES 1:25

SCALE OF METRES 1:500

REV.	DESCRIPTION	DATE	DRAWN	DFT CHK	DES CHK	DESIGN	APPR.D
D	RE-ISSUED FOR DEVELOPMENT APPLICATION	15.08.24	JC	-	-	JC	-
C	ISSUED FOR DEVELOPMENT APPLICATION	14.08.24	JC	-	-	JC	-
B	ISSUED TO HYD2O FOR REVIEW	09.08.24	JC	-	-	JC	-
A	DRAWING CREATED FOR PT257 - ISSUED FOR INFORMATION	05.08.24	JC	-	-	JC	-

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CLIENT: HESPERIA

LOCATION: LOTS 119 & 808, LAKES ROAD, HAZELMERE

ENGINEERS SIGNATURE

PT257C - LOTS 119 & 808, LAKES ROAD, HAZELMERE

CIVIL
STORMWATER MANAGEMENT PLAN

SCALE @ A0 1:500 | DRG No. PT257-CI-DRG-S-01 | D

Attachment 12

Lots 119 & 808 Lakes Road

Environmental Noise Impact Assessment

c/o Hesperia Property Pty Ltd

L3/338 Barker Road Subiaco WA 6904

Prepared by:

SLR Consulting Australia Pty Ltd

Level 1, 500 Hay Street, Subiaco WA 6008,
Australia

SLR Report 675.072828.00001:R00

12 August 2024

Revision: 01

Making Sustainability Happen

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
1	12 August 2024	Paul Drew	Luke Zoontjens	Paul Drew
0	12 August 2024	Paul Drew	Luke Zoontjens	Paul Drew

Basis of Report

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with the Client. Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

Table of Contents

Tables

Figures

Appendices

1.0 Introduction

SLR Consulting Pty Ltd (SLR) was commissioned by HIF 54LR Pty Ltd ATF 54 Lakes Road Trust, through Hesperia Property Pty Ltd to undertake an Environmental Noise Impact Assessment of a proposed warehouse development.

The proposed site development is intended to include warehouse buildings with attached office buildings, being a multi-user warehouse complex.

This assessment considers the environmental noise impact of the development. The site was previously granted development approval for a similar warehouse with different layout.

The site is adjacent other industrial premises to the east, with an existing rural residence to the west, with Vale Road bordering the development site. The site is being developed in accordance with local planning policies / structure plan.

This report, prepared by SLR Consulting Australia Pty Limited (SLR), details an assessment of predicted noise emissions from the proposed development. The report details the predicted noise levels to the surrounding receptors, and an assessment of compliance against applicable noise limits from the Regulations.

2.0 Criteria

2.1 Noise Regulations

The site noise emissions are required to achieve compliance with the Environmental Protection (Noise) Regulations 1997 (the “Regulations”). Under the regulations, noise levels at nearby residential areas from development operations are not to exceed defined limits (Assigned levels). The ‘assigned levels’ vary with time of day and standard work days versus holiday periods.

The most critical receptors to the west of the proposed development are termed ‘noise sensitive premises’. These are residential receptors, for which the ‘assigned levels’ are determined from a ‘base level’ with an Influencing Factor (IF) based on proximity to industrial and commercial land uses, and roads with high traffic flows. The relevant parameter for assessment of operational noise is the L_{A10} statistical noise level, the noise level exceeded from greater than 10% of the representative time period.

For these receptors, the ‘assigned levels’ are described in **Table A**.

Table A: EPNR Table 1 'Assigned Levels'

Type of premises receiving noise	Time of day	Assigned level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises: highly sensitive area	0700 to 1900 hours Monday to Saturday	45 + IF	55 + IF	65 + IF
	0900 to 1900 hours Sunday and public holidays	40 + IF	50 + IF	65 + IF
	1900 to 2200 hours all days	40 + IF	50 + IF	55 + IF
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays	35 + IF	45 + IF	55 + IF
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80
Commercial premises	All hours	60	75	80
Industrial and utility premises other than those in the Kwinana Industrial Area	All hours	65	80	90

Table B summarises applicable adjustments for intrusive or annoying characteristics.

Table B: Adjustment for Intrusive or Dominant Noise Characteristics

Adjustment where noise emission is not music			Adjustment where noise emission is music	
Where tonality is present	**Where modulation is present**	**Where impulsiveness is present**	**Where impulsiveness is not present**	**Where impulsiveness is present**
+5 dB	+5 dB	+10 dB	+10 dB	+15 dB

These adjustments are cumulative to a maximum of 15 dB.

2.2 Key receptors

To simplify this assessment, the most significant receptors have been considered. The key noise sensitive residential receptors are described in **Table C**. Compliance at these identified receptors is predicted to result in compliance at all other receptors in the vicinity.

Table C: Key residential receptors

Sensitive receptors	Description
R1	Residence near Lakes Road
R2	Residence near Vale Road
R3	Residence inset from Vale Road

These receptors are shown in Figure 1.

Figure 1 Residential receptor locations

2.3 Receptor assigned levels

The assigned noise levels determined for sensitive receptors adjacent to the site are detailed in **Table D**.

The assigned levels include the IF derived based on the proximity of the receptors to industrial and commercial zoned areas, and major and secondary roads. These areas have been identified from the City of Swan Local Planning Scheme 17.

The key receptors have determined influencing factors shown in **Table D**.

Table D: Assigned levels – key receptors, dB

Receptor	Influencing Factor	Assigned Levels, L_{A10}		
		Day	Evening	Night
R1	9	54	49	44
R2	9	54	49	44
R3	7	52	47	42
Industrial	Not applicable	65	65	65

The key residential receptors are exposed to general background noise from Great Eastern Highway bypass and road traffic within the surrounding industrial precinct. Noise from the proposed site towards the receptors will be predominantly from slow moving trucks behind a 3 metre wall. This noise is not expected to exhibit noise characteristic as assessed under Regulation 9.

3.0 Methodology

Noise emissions from the operation of the proposed site were modelled using ISO 17534[1] compliant software (SoundPLAN v8.2).

3.1 Site specific noise model

A noise model was developed for the site as follows:

- Detailed 3-dimensional representation of the site terrain model and local environment inclusive of key receptor locations.
- Receptor buildings digitised in the model and single point receptors were established at 1.5 m above the ground floor level at representative premises.
- Buildings identified from aerial imagery as non-sensitive, including site buildings such as warehouses, and property fences were retained in the noise model as they could provide screening on noise levels.
- The buildings and representative noise sources for the proposed development were incorporated into the noise model.
- 0.6 ground absorption coefficient which is considered reasonably representative of the proportion of soft and hard ground areas in each direction. The lake was modelled as water with zero ground absorption, representative of sound reflection associated with water.

3.2 Calculation of noise levels

The model applied the 'CONCAWE' method for calculating outdoor noise propagation. CONCAWE started with a group of oil refining companies developing methods to assess environmental emissions in 1963, a concatenation of "**CON**servation of **C**lean **A**ir and **W**ater in **E**urope". The group developed an empirical method of modelling noise emissions from refineries to the far field, which has since evolved and continues to be used in 2023.

This method is accepted as being appropriate for modelling of projects of this type in Western Australia. The CONCAWE method permits calculation of noise levels with meteorological conditions favourable for downwind propagation of noise (wind speeds between approximately 1 m/s and 5 m/s) or under a moderate ground-based temperature inversion.

Both the SoundPLAN modelling software and the CONCAWE method are widely applied in Western Australia for the prediction of noise from industrial and commercial premises.

3.3 Assessment scenarios

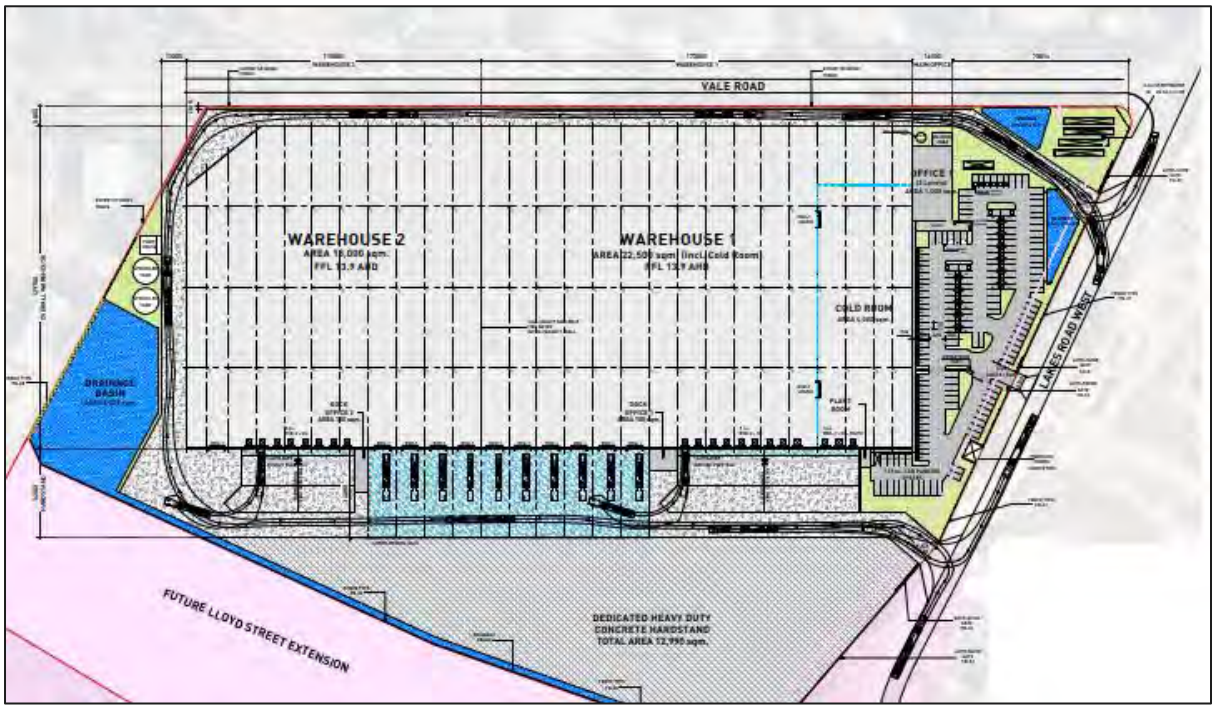
Warehouse operations are expected to be intermittent. Typically, a truck will arrive, shut down or idle while being loaded / unloaded, then restart and move off site. Site activities are not proposed to be restricted to a particular time period, although typically warehouse operations would be most active during the day period.

An extract of the proposed site layout is shown in **Figure 2**. In this figure, the drawing has been rotated 90 degrees clockwise, such that the relative location of the key residential receptors is to the top, on the opposite side from the loading docks. This layout means that activities with potential for direct noise emissions toward the residential receptors are limited

[1] ISO 17534-1:2015 Acoustics — Software for the calculation of sound outdoors — Part 1: Quality requirements and quality assurance

to trucks exiting around the warehouse building. There is a site speed limit of 20 km/hr, therefore truck noise emissions will be significantly lower than the maximum for these vehicles.

Figure 2 Lakes Road site development plan (rotated 90 degrees clockwise)



The acoustic modelling is based on the inclusion of a 3 metre high acoustic barrier wall on the western side of the lot, shielding truck engine noise in the direction of the key residential receptors. The extent of the noise wall is shown in **Figure 3**.

Most trucks will be unloaded / loaded directly to the rear via the loading dock. However to allow for all scenarios, the acoustic modelling also includes two forklifts in the external loading area.

3.4 Source noise emission levels

The adopted noise emission levels for each source, and associated noise emission characteristics have been determined from measurement of noise levels for the relevant noise source (previously measured for other projects. The truck is represented by a line source traversing the extent of the internal access road, with the maximum noise emission calculated for this truck route. Two forklifts have been modelled operating near the truck unloading bays.

The combination of two forklifts and simultaneous truck movement is not expected to occur for more than 10% of the representative period. Therefore the combination of truck and forklifts is considered to be the representative noise emission that is likely to generate noise emissions from greater than 10% of the time period.

Table E: Noise Source Sound Power Levels

Noise Sources	A-weighted Overall Sound Power Level, dB
Gas forklift	96
Truck (moving on site, 20 km/hr)	98

4.0 Impact assessment

The proposal for development of a multi-unit warehouse facility on Lots 119 and 808 Lakes Road is shown diagrammatically in **Figure 3**.

Figure 3 Lakes Road site development plan with noise wall

Shown in **Figure 3** is the proposed three metre high sheet metal fence, to reduce truck and forklift noise at existing residential receptors.

Predicted noise emissions for this scenario at the key receptors are shown in **Table F**. It can be seen that the predicted noise levels comply with the regulation night-time L_{A10} 'assigned levels'. Compliance with the more stringent night-time period 'Assigned Levels' also ensures compliance with the 'Assigned Levels' for other time periods. **Appendix A** includes predicted noise contours for the night-time operations.

The modelled scenario incorporates a sheet metal fence along the western side of the site to assist in mitigation of operational noise to residential receptors to the west The location of the proposed acoustic barrier fence is shown in **Figure 3**

Table F: Predicted noise emissions for night-time period, L_{A10} dB

Receptor	Predicted noise emission	Night assigned noise level	Predicted outcome
R1	43	44	Complies
R2	44	44	Complies
R3	41	42	Complies

The above results can be regarded as the 'worst case' scenario with continuous site activity throughout the day and night times. In reality, it is expected the site to be less active during

the night-time, therefore the noise emission is expected to be less than that presented in **Table F**.

With the proposed barrier wall, the predicted noise emissions comply with the assigned levels at all times.

5.0 Conclusion

Predicted noise emissions from of the proposed warehouse development of Lots 119 & 808 Lakes Road are compliant to all receptors at all times. The findings are on the basis of three metre high sheet metal fencing on the western side of the site as indicated in **Figure 3**.

Appendix A Noise contour plots

Lots 119 & 808 Lakes Road

Environmental Noise Impact Assessment

c/o Hesperia Property Pty Ltd

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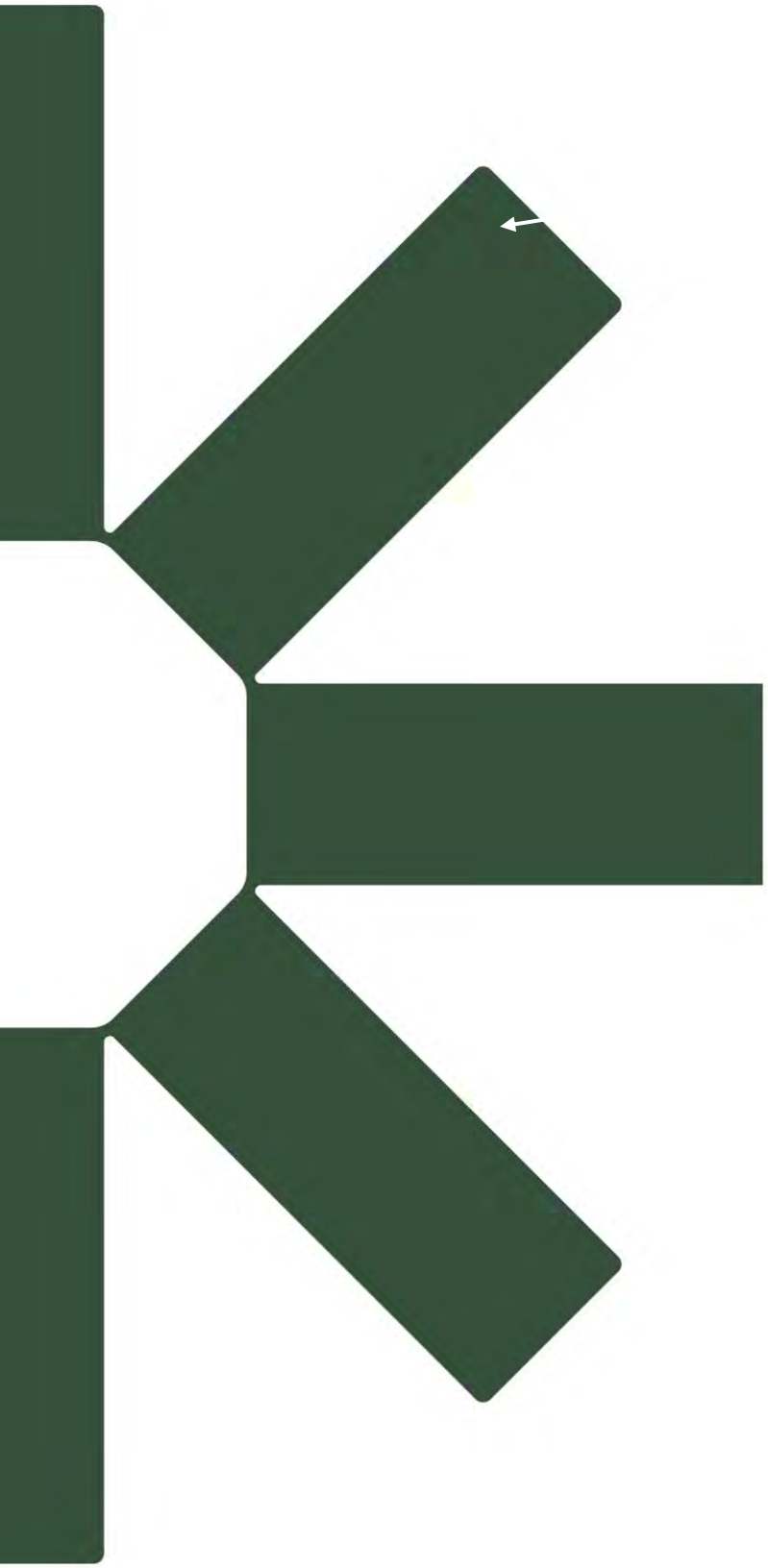
12 August 2024

SLR

Figure 4 Lakes Road warehouse noise contours, L_{A10} dB



Making Sustainability Happen

Appendix J

Bushfire Attack Level (BAL) Plan

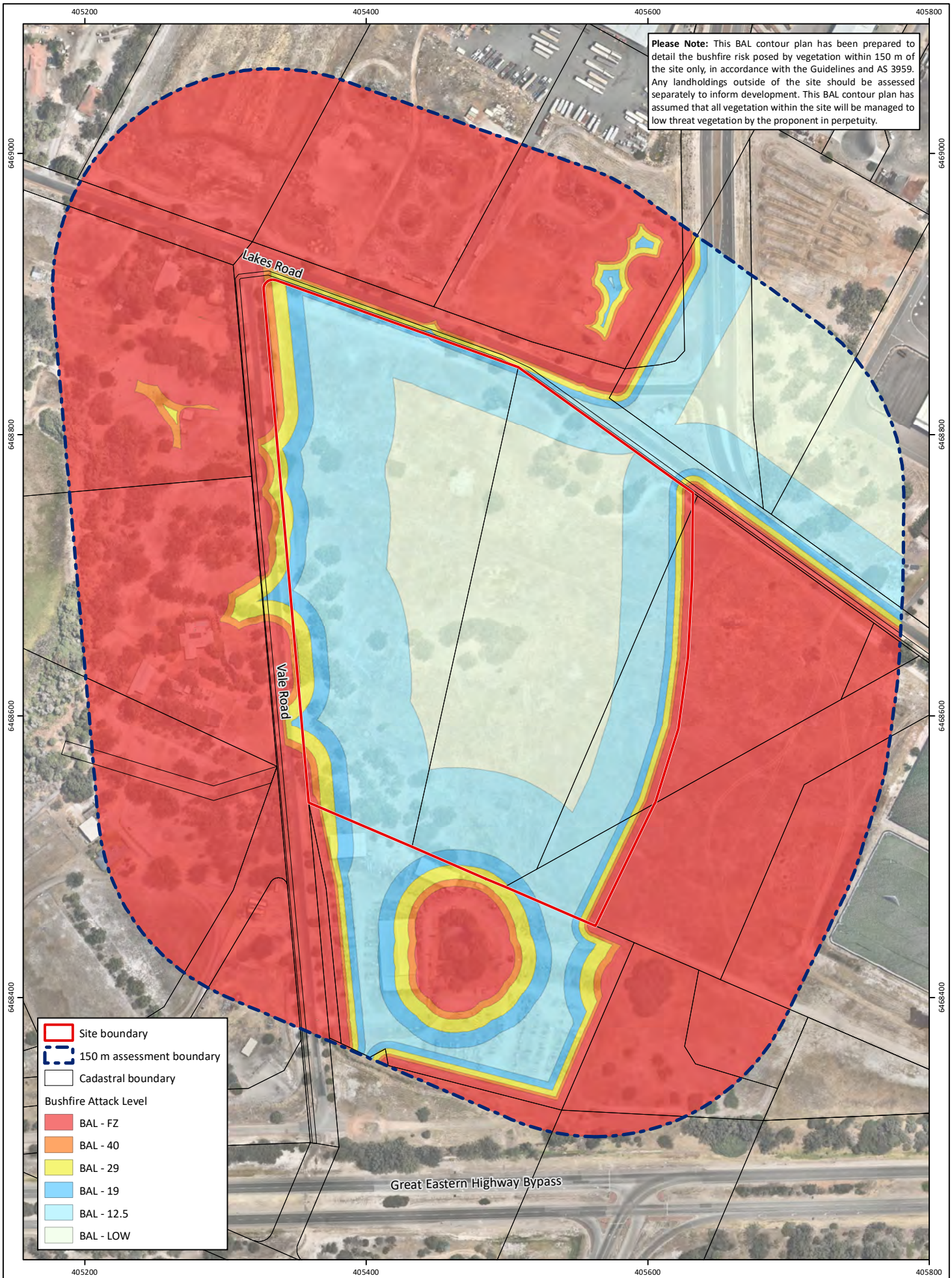


Figure 1: **Bushfire Attack Level Contour Plan**

Project: Bushfire Advice - Lots 118 and 119 and Portion of Lots 50 and 117 Lakes Road, Hazelmere

Client: Hesperia

Plan Number: EP20-081(02)--F04

Drawn:	GAR
Date:	02/03/2021
Checked:	SCM
Approved:	SCM
Date:	02/03/2021

N

0 2,900 5,800

Metres

Scale: 1:3,500@A4

GDA 1994 MGA Zone 50

emerge ASSOCIATES

Attachment 13

LOTS 119&808 LAKES ROAD

Landscape Masterplan | August 2024 [E]

VALE ROAD

LAKES ROAD

EXTENT OF WORK

DETAILED PLAN, REFER TO C1.106

DETAILED PLAN, REFER TO C1.103

FUTURE LLOYD STREET EXTENSION (FUTURE PLANTING BY MRWA)

EXTENT OF WORK

LEGEND

- A — LOW NATIVE GROUNDCOVER PLANTING TO STRIP DRAINS/ ATU WITH 75mm ORGANIC MULCH +10mm SOIL AMELIORANT
- B — MIXED NATIVE AND EXOTIC FEATURE TREES AND SHRUB AND GROUNDCOVERS TO CAR PARK SURROUNDS AND ISLANDS WITH 75mm HARDWOOD ORGANIC MULCH AND 10mm SOIL AMELIORANT
- C — VEGETATED LANDSCAPE RETENTION BASIN WITH NATIVE TREES, REEDS, SEDGE AND 40MM THICK (20mm DIAMETER) GRANITE BLUEMETAL MULCH (BASE TO +1000mm)
- D — VEGETATED LANDSCAPE RETENTION BASIN WITH NATIVE TREES, SHRUBS AND GROUNDCOVERS WITH 75mm THICK ORGANIC MULCH (OVER BASE +1000mm)
- E — 40mm THICK LATERITE GRAVEL (8-10mm DIAMETER) MULCH ONLY TO WATER TANKS, TRANSFORMER ACCESS AND UTILITIES
- F — NATIVE TREES, SHRUBS AND GROUNDCOVER SCREEN WITH 75mm HARDWOOD ORGANIC MULCH AND 10mm SOIL AMELIORANT
- G — MASS REVEGETATED STREET VERGE. REMOVE WEED SPECIES, PROTECT AND RETAIN NATIVE TREES AND GRASS TREES. WITH SMALL TO MEDIUM NATURE LAYERED SCREEN TREES, SHRUBS AND GROUNDCOVERS INCLUDING EUCALYPTUS PLATYPUS, CALLISTEMON CITRINUS, AND GREVILLEA THELEMANNIANA WITH 75mm HARDWOOD ORGANIC MULCH
- H — 500mm WIDE LATERITE GRAVEL SHOULDER 150mm THICK TO LAKES ROAD WITH PINE BOLLARDS AT 3m CENTRES, 3000mm WIDE TURF GRASS DRAINAGE SWALE (150mm DEEP)
- I — RAISED PLANTERS TO ENTRY & OUTDOOR AREA WITH BENCH SEATS AND TABLES, PLANTINGS AND SHADE SAILS OVER.
- J — VEGETATED DRAINAGE SWALE WITH NATIVE TREES AND SEDGES WITH 40mm THICK 20mm DIA BLUE METAL MULCH AND 10mm SOIL AMELIORANT
- K — TURF GRASS VERGE (3m WIDE UNO)
- L — TREE WELLS IN CARPARKS WITH 40mm THICK LATERITE GRAVEL MULCH (8-10mm DIAMETER) AND 10mm SOIL AMELIORANT

LOTS 119 & 808 LAKES ROAD, HAZELMERE

LANDSCAPE CONCEPT - LANDSCAPE MASTER PLAN
AUGUST 2024

JOB NO. 2411901
1:750 @ A1

C1.101 REV E

0 15 30 45 75m

PLAN E
LANDSCAPE ARCHITECTS
LEVEL 1, 278 RAILWAY PARADE
WEST LEEDERVILLE WA 6007
T: (08) 9388 9566 E: mail@plane.com.au

LEGEND

- LARGE TREE (>8M DIA)
- MEDIUM TREE (>5M DIA)
- SMALL TREE (>3M DIA)
- EXISTING STREET VERGE TREES TO BE RETAINED AND PROTECTED. MINOR CANOPY PRUNING
- EXISTING STREET VERGE XANTHORRHOEA (GRASS TREE) TO BE RETAINED AND PROTECTED
- WEEDY EXISTING STREET VERGE TREES AND SHRUBS SPECIES TO BE REMOVED

LOTS 119 & 808 LAKES ROAD, HAZELMERE

LANDSCAPE CONCEPT - TREE PLAN
AUGUST 2024

JOB NO. 2411901
1:750 @ A1

C1.102 REV E

0 15 30 45 75m

PLAN E
LANDSCAPE ARCHITECTS
LEVEL 1, 278 RAILWAY PARADE
WEST LEEDERVILLE WA 6007
T: (08) 9388 9566 E: mail@plane.com.au

LEGEND

- A — LOW NATIVE GROUNDCOVER PLANTING TO STRIP DRAINS/ ATU WITH 75mm ORGANIC MULCH +10mm SOIL AMELIORANT
- B — MIXED NATIVE AND EXOTIC FEATURE TREES AND SHRUB AND GROUNDCOVERS TO CAR PARK SURROUNDS AND ISLANDS WITH 75mm HARDWOOD ORGANIC MULCH AND 10mm SOIL AMELIORANT
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- D — VEGETATED LANDSCAPE RETENTION BASIN WITH NATIVE TREES, SHRUBS AND GROUNDCOVERS WITH 75mm THICK ORGANIC MULCH (OVER BASE +1000mm)
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- G — MASS REVEGETATED STREET VERGE. REMOVE WEED SPECIES, PROTECT AND RETAIN NATIVE TREES AND GRASS TREES. WITH SMALL TO MEDIUM NATURE LAYERED SCREEN TREES, SHRUBS AND GROUNDCOVERS INCLUDING EUCALYPTUS PLATYPUS, CALLISTEMON CITRINUS, AND GREVILLEA THELEMANNIANA WITH 75mm HARDWOOD ORGANIC MULCH
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- I — RAISED PLANTERS TO ENTRY & OUTDOOR AREA WITH BENCH SEATS AND TABLES, PLANTINGS AND SHADE SAILS OVER.
- J — VEGETATED DRAINAGE SWALE WITH NATIVE TREES AND SEDGES WITH 40mm THICK 20mm DIA BLUE METAL MULCH AND 10mm SOIL AMELIORANT
- K — TURF GRASS VERGE (3m WIDE UNO)
- L — TREE WELLS IN CARPARKS WITH 40mm THICK LATERITE GRAVEL MULCH (8-10mm DIAMETER) AND 10mm SOIL AMELIORANT

LAKES ROAD

VALE ROAD

FENCE

A–A′ B–B′

NOTE:

REFER TO C1.105 FOR SWALE SECTION A-A′
AND RAISED PLANTER TYPICAL SECTION B-B′

LOTS 119 & 808 LAKES ROAD, HAZELMERE

LANDSCAPE CONCEPT - DETAIL PLAN
AUGUST 2024

JOB NO. 2411901
1:250 @ A1

C1.103

REV E

0 5 10 15 25m

PLAN E
LANDSCAPE ARCHITECTS
LEVEL 1, 278 RAILWAY PARADE
WEST LEEDERVILLE WA 6007
T: (08) 9388 9566 E: mail@plane.com.au

LAKES ROAD

VALE ROAD

FENCE

LEGEND

- LARGE TREE (>8M DIA)
- MEDIUM TREE (>5M DIA)
- SMALL TREE (>3M DIA)
- EXISTING STREET VERGE TREES TO BE RETAINED AND PROTECTED. MINOR CANOPY PRUNING
- EXISTING STREET VERGE XANTHORRHOEA (GRASS TREE) TO BE RETAINED AND PROTECTED
- WEEDY EXISTING STREET VERGE TREES AND SHRUBS SPECIES TO BE REMOVED

LOTS 119 & 808 LAKES ROAD, HAZELMERE

LANDSCAPE CONCEPT - TREE PLAN
AUGUST 2024

JOB NO. 2411901
1:250 @ A1

C1.104

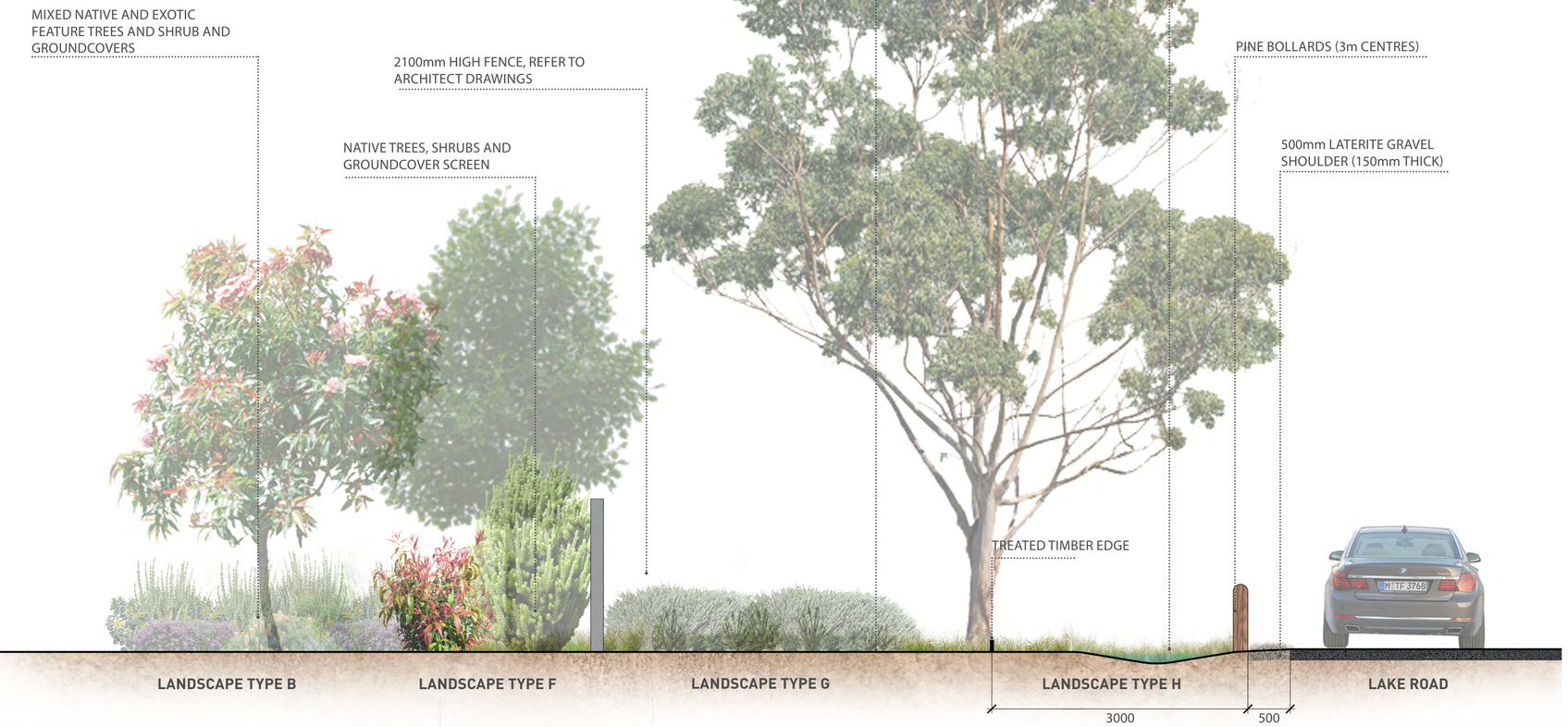
REV E

0 5 10 15 25m

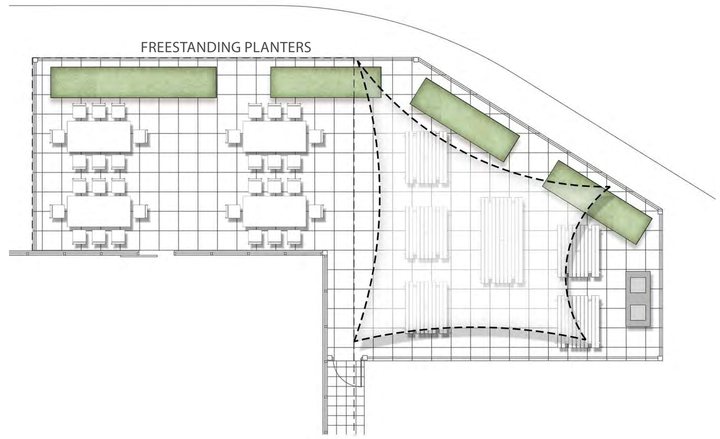
PLAN E

LANDSCAPE ARCHITECTS

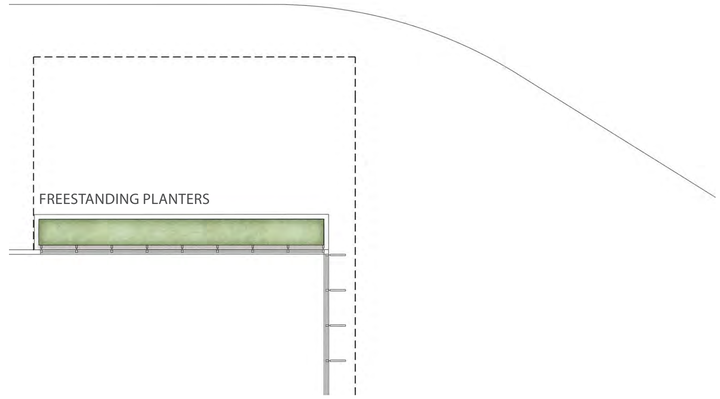
LEVEL 1, 278 RAILWAY PARADE
WEST LEEDERVILLE WA 6007
T: (08) 9388 9566 E: mail@plane.com.au



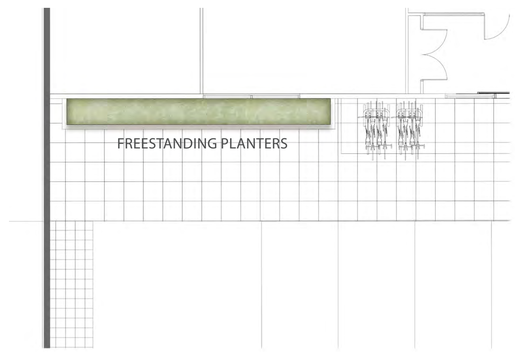
INDICATIVE SECTION A-A' , 1:30@A1



OUTDOOR GATHERING AREA



FIRST FLOOR PLANTER



ENTRY PLANTER

NOTES:
REFER TO C1.103 FOR SECTION LOCATION AND LEGEND DETAILS

LOTS 119 & 808 LAKES ROAD, HAZELMERE

LANDSCAPE CONCEPT - INDICATIVE SECTION A-A' & DETAIL PLANS
AUGUST 2024

JOB NO. 2411901 C1.105 REV E

PLAN E
LANDSCAPE ARCHITECTS
LEVEL 1, 278 RAILWAY PARADE
WEST LEEDERVILLE WA 6007
T: (08) 9388 9566 E: mail@plane.com.au

Document Set ID: 8333033
Version: 2, Version Date: 29/10/2024

LEGEND

- B — MIXED NATIVE AND EXOTIC FEATURE TREES AND SHRUB AND GROUNDCOVERS TO CAR PARK SURROUNDS AND ISLANDS WITH 75mm HARDWOOD ORGANIC MULCH AND 10mm SOIL AMELIORANT
- C — VEGETATED LANDSCAPE RETENTION BASIN WITH NATIVE TREES, REEDS, SEDGE AND 40MM THICK (20mm DIAMETER) GRANITE BLUEMETAL MULCH (BASE TO +1000mm)
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- J — VEGETATED DRAINAGE SWALE WITH NATIVE TREES AND SEDGES WITH 40mm THICK 20mm DIA BLUE METAL MULCH AND 10mm SOIL AMELIORANT

LOTS 119 & 808 LAKES ROAD, HAZELMERE

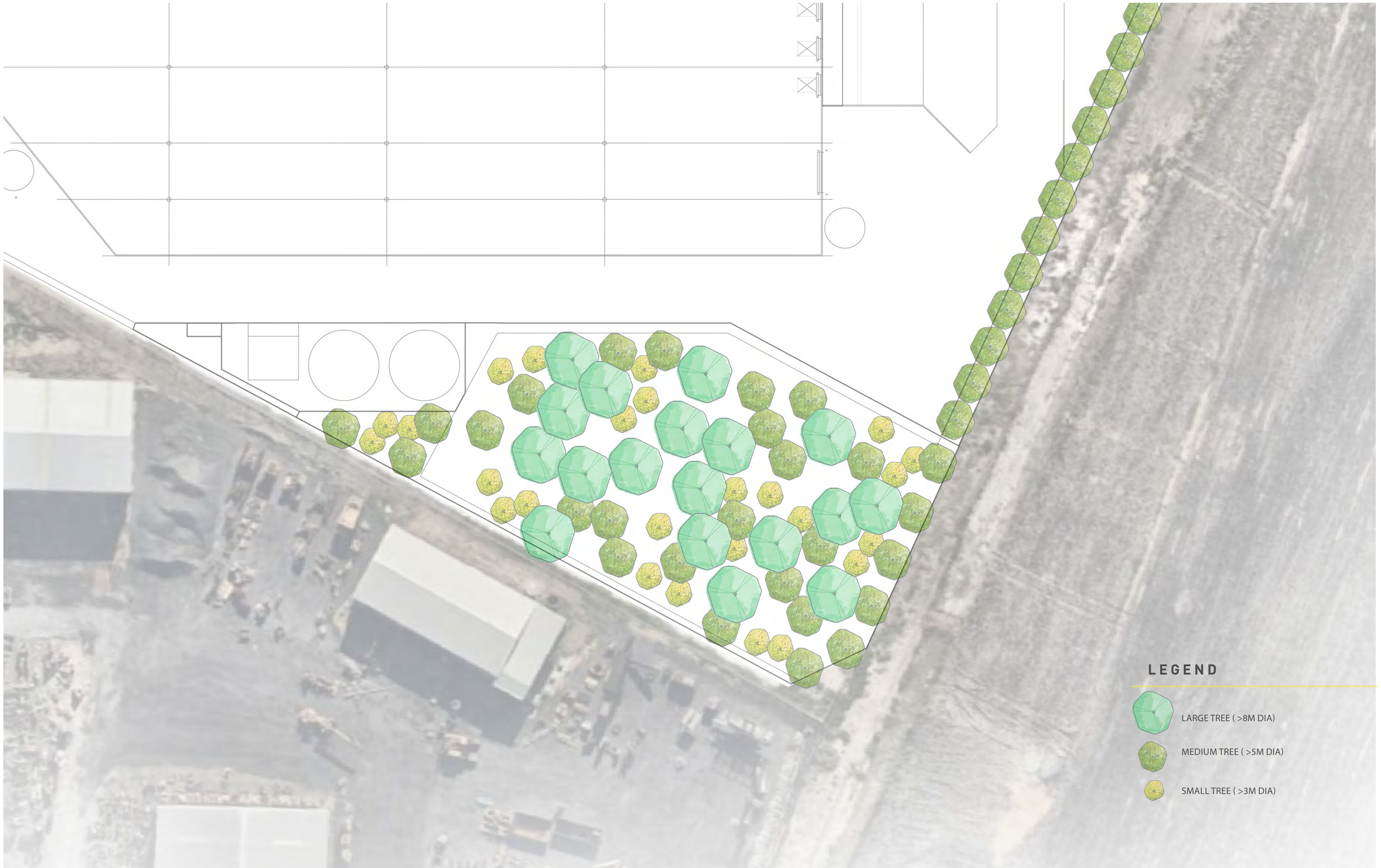
LANDSCAPE CONCEPT - LANDSCAPE MASTER PLAN
AUGUST 2024

JOB NO. 2411901
1:250 @ A1

C1.106 REV E

0 5 10 15 25m

PLAN E
LANDSCAPE ARCHITECTS
LEVEL 1, 278 RAILWAY PARADE
WEST LEEDERVILLE WA 6007
T: (08) 9388 9566 E: mail@plane.com.au



LOTS 119 & 808 LAKES ROAD, HAZELMERE

LANDSCAPE CONCEPT - TREE PLAN
AUGUST 2024

JOB NO. 2411901
1:250 @ A1

C1.107

REV E

0 5 10 15 25m

PLAN E
LANDSCAPE ARCHITECTS
West Leederville WA 6007
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PLANTING PALETTE

SHADE SCREEN AND SWALE TREES SPECIES

Eucalyptus spathulata -100L

Eucalyptus platypus -100L

Melaleuca leucandendra - 45L

Melaleuca viridifolia - 45L

Melaleuca preissiana - 45L

Eucalyptus lane poolei - 100L

Eucalyptus ovata - 100L

Hakea laurina - 45L

Callistemon 'King's Park Special' - 45L

Melaleuca laterita - 45L

FEATURE TREES SPECIES

Lagerstroemia 'Tuscarora' - 100L

Pyrus calleryana 'Capital' - 100L

NOTES:
ALL TREES ARE NOT PREFERRED OR NON REPRODUCTIVE HOSTS TO POLYPHAGOUS SHOT-HOLE BORER
(DEPARTMENT OF PRIMARY INDUSTRIES AND REGIONAL DEVELOPMENT - JUNE 2024)

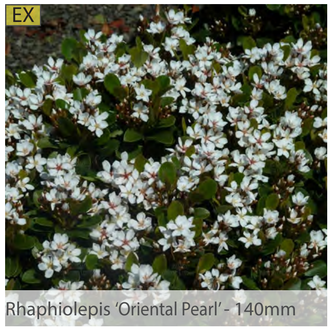
LI : LOCALLY INDIGENOUS
AN: AUSTRALIAN NATIVE
EX: EXOTIC

PLAN E
LANDSCAPE ARCHITECTS
LEVEL 1, 278 RAILWAY PARADE
WEST LEEDERVILLE WA 6007
T: (08) 9388 9566 E: mail@plane.com.au

PLANTING & MATERIAL PALETTE

FEATURE SHRUB SPECIES (4 PLANTS/ SQ.M)

Agapanthus 'Baby Pete' - 140mm



Rhaphiolepis 'Oriental Pearl' - 140mm

Westringia 'Aussie Box' - 140mm

Royena Lucida - 140mm

REED AND SEDGE SPECIES (6 PLANTS/ SQ.M)

Baumea juncea - 50mm tubes

Ficinia nodosa - 50mm tubes

Carex appressa - 50mm tubes

GROUNDCOVER AND SHRUB SPECIES (4 PLANTS/ SQ.M)

Grevillea thelemanniana 'Prostrate' -140mm

Hemiandra pungens -140mm

Eremophila 'amber carpet' - 140mm

Conostylis candicans -140mm

FEATURE PLANTS

Xanthorrhoea preissii -140mm

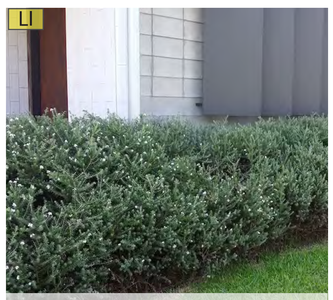
Banksia menzeisii dwarf -140mm

PERIMETER SCREEN PLANTS (4 PLANTS/ SQ.M)

Adenanthos sericeus - 140mm tubes

Callistemon citrinus 'red rocket' - 140mm tubes

Correa alba - 140mm tubes



Westringia fruiticosa - 140mm tubes

LOTS 119 & 808 LAKES ROAD, HAZELMERE

PLANTING PALETTE
AUGUST 2024

JOB NO. 2411901 C1.109 REV E

PLAN E
LANDSCAPE ARCHITECTS
LEVEL 1, 278 RAILWAY PARADE
WEST LEEDERVILLE WA 6007
T: (08) 9388 9566 E: mail@plane.com.au

PLANTING & MATERIAL PALETTE

PLANTER BOX FEATURE SPECIES (4 PLANTS/ SQ.M)

Agapanthus 'white' - 140mm

Kalanchoe Bronze - 140mm

Cordyline Red Fountain - 140mm

Alternanthera Little Ruby - 140mm

Aeonium Short Black - 140mm

TREE WELL SPECIES (4 PLANTS/ SQ.M)

Lomandra 'Tanika' - 140mm

Dianella Little Rev - 140mm

MATERIALS


Hardwood chip mulch


Grey insitu concrete footpath and pedestrian pavements


Laterite gravel mulch


Blue metal mulch

LOTS 119 & 808 LAKES ROAD, HAZELMERE

PLANTING PALETTE
AUGUST 2024

JOB NO. 2411901 C1.110 REV E

PLAN E
LANDSCAPE ARCHITECTS
LEVEL 1, 278 RAILWAY PARADE
WEST LEEDERVILLE WA 6007
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TREE CANOPY & DEEP SOIL CALCULATIONS

Tree Size	Proposed Trees (N0.)	Canopy Area / tree (m^2)	Total canopy cover (m^2)
Large (8m DIA +)	45	50.2	2259
Medium (5m DIA +)	210	19.6	4116
Small (3m DIA +)	146	7.0	1022
		Total canopy cover	**7397**
		Total lot area	**78702**
		% of site cover	**9.4%**

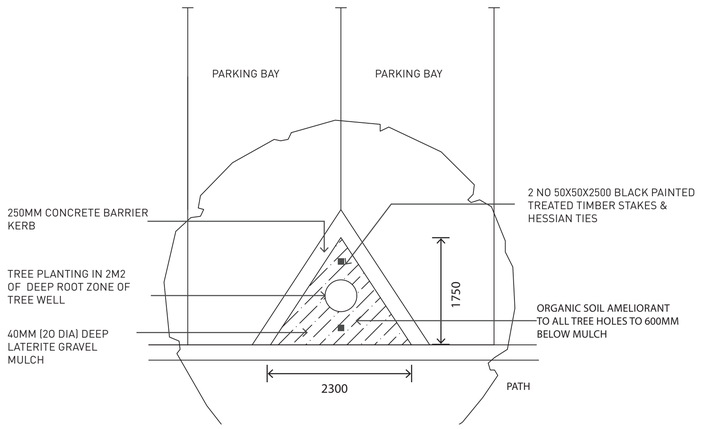
Site Area m^2	Total deep soil m^2	Total deep soil %
78702	8035	11.2

(EXCLUDES EXISTING TREES)
(EXCLUDES ROAD RESERVES)

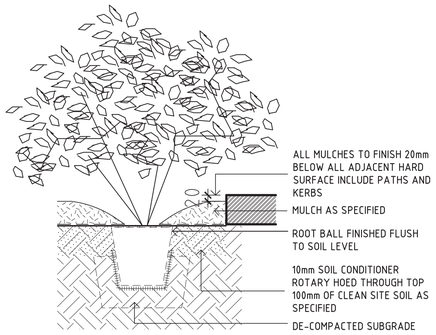
NOTES:

- DRIP IRRIGATION FROM SCHEME WATER SUPPLY TO ALL GARDEN BEDS, TREE PLANTING AND DRAINAGE SWALES
- TEMPORARY DRIP IRRIGATION FROM SCHEME WATER SUPPLY TO ALL LANDSCAPE IN DRAINAGE BASINS
- FIXED POP UP IRRIGATION FROM SCHEME WATER SUPPLY TO TURF GRASSING
- PLANTING DENSITY IS 6 PLANTS PER M^2 FOR DRAINAGE SWALES, AND BASINS (WITH 4 PLANTS PER M^2 SURVIVAL RATE AT END OF 12 MONTH MAINTENANCE PERIOD)
- ALL OTHER GARDEN BED PLANT DENSITY TO BE 4 PLANTS PER M^2
- SOIL AMELIORANT TO BE C-WISE HORTICULTURE ONLY, AND INSTALLED TO 10MM DEPTH TO ALL GARDEN BEDS AND TURF GRASSING AREAS
- ORGANIC MULCH TO BE COURSE HARDWOOD ONLY, AND INSTALLED TO 75MM DEPTH
- ALL LATERITE AND GRANITE MULCH TO BE WASHED, AND INSTALLED TO 40MM DEPTH

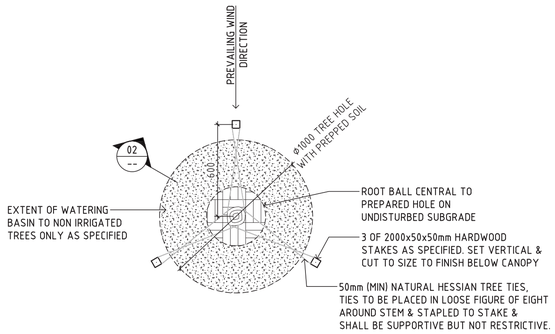
INDICATIVE LANDSCAPE DETAIL DRAWINGS



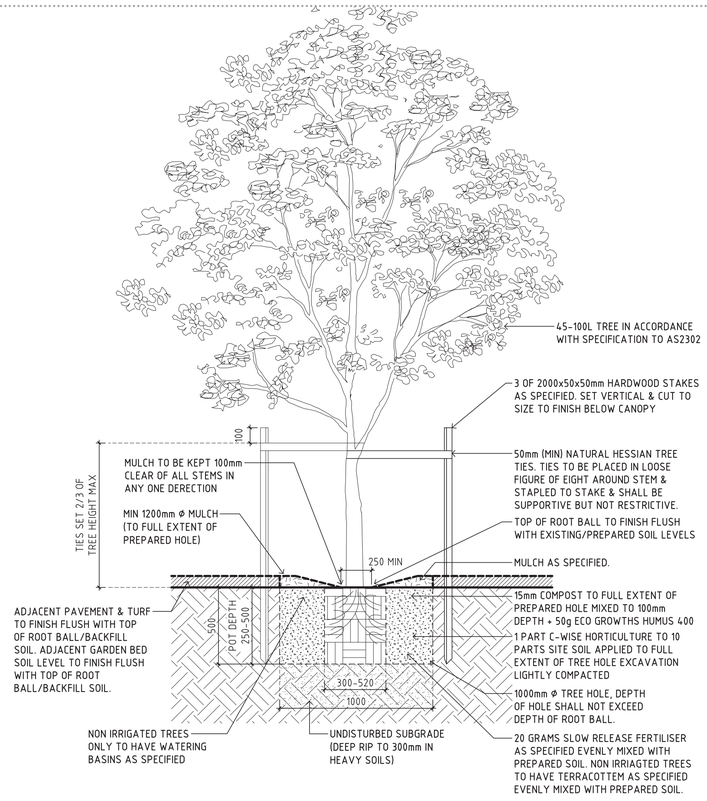
TYPICAL DETAIL 01 - TREE WELL IN CARPARK, NTS



TYPICAL DETAIL 02 - SHRUB PLANTING, NTS



TYPICAL DETAIL 03 - 45-100L TREE PLANTING PLAN, NTS



TYPICAL DETAIL 04 - 45-100L TREE PLANTING SECTION, NTS

LOTS 119 & 808 LAKES ROAD, HAZELMERE

TREE CANOPY & DEEP SOIL CALCULATIONS & DETAILS
AUGUST 2024

JOB NO. 2411901 C1.111 REV E

PLAN E
LANDSCAPE ARCHITECTS
LEVEL 1, 278 RAILWAY PARADE
WEST LEEDERVILLE WA 6007
T: (08) 9388 9566 E: mail@plane.com.au

Attachment 14

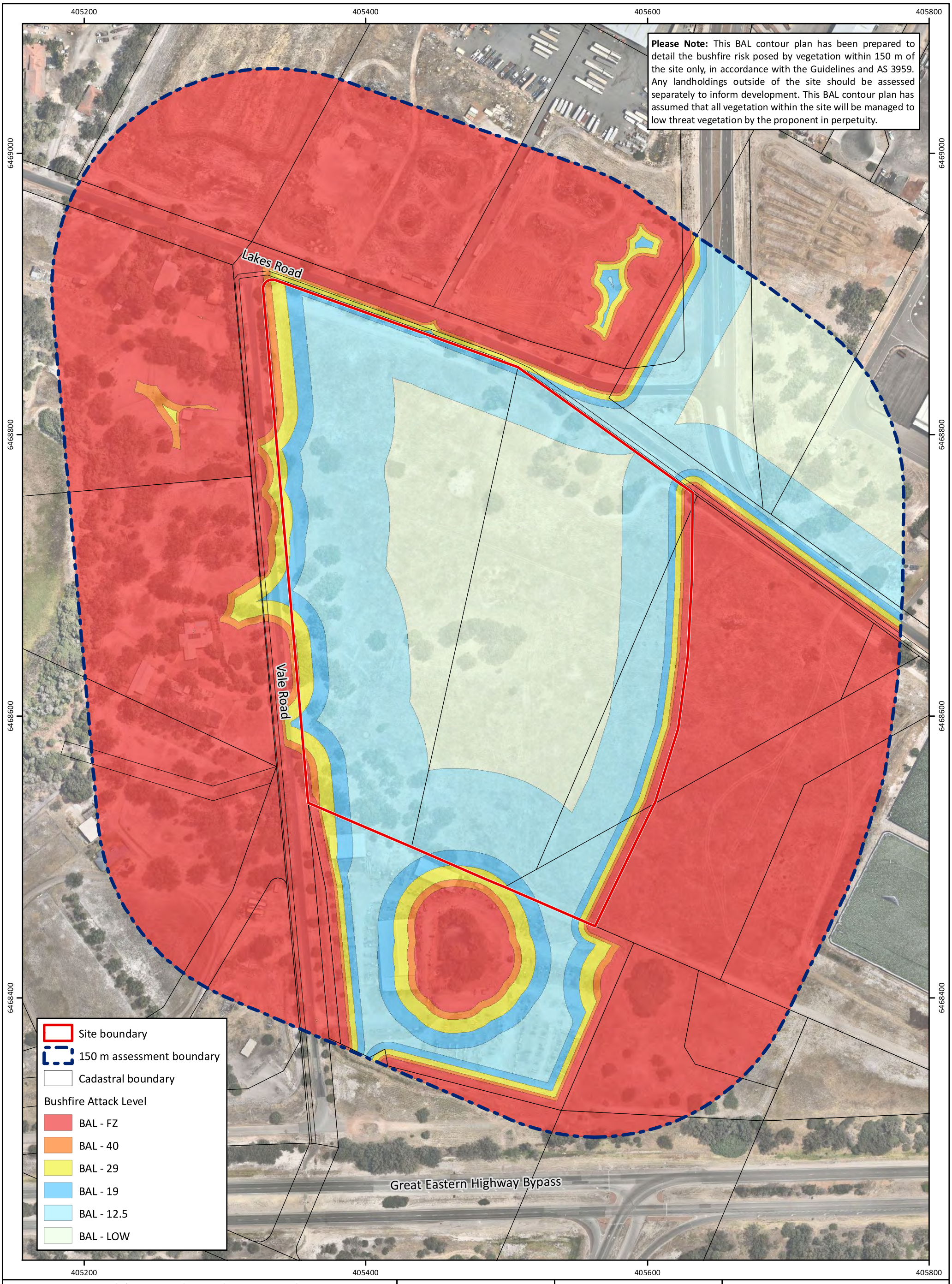


Figure 1: Bushfire Attack Level Contour Plan

Project:	Bushfire Advice - Lots 118 and 119 and Portion of Lots 50 and 117 Lakes Road, Hazelmere
Client:	Hesperia

Plan Number: EP20-081(02)--F04

Drawn:	GAR
Date:	02/03/2021
Checked:	SCM
Approved:	SCM
Date:	02/03/2021

N

0 2,900 5,800

Metres

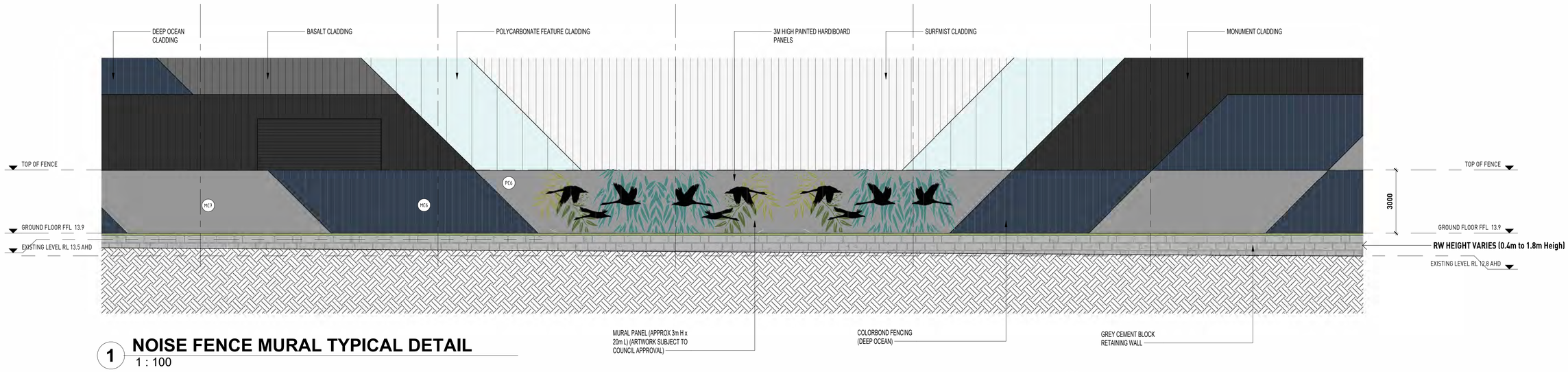
Scale: 1:3,500@A4

GDA 1994 MGA Zone 50

emerge ASSOCIATES

Attachment 15

FOR DEVELOPMENT APPLICATION ONLY
SUBJECT TO STATUTORY APPROVAL



1 NOISE FENCE MURAL TYPICAL DETAIL
1 : 100




NOTE: EVERY FOURTH TREE SHOWN (FOR CLARITY) (SOME GHOSTED)

NOISE WALL MATERIAL AND COLOUR SCHEDULE			
Material :Code	ITEM/ LOCATION	MATERIAL DESCRIPTION	FINISHES
MC6	METAL WALL CLADDING (VERTICAL)	METAL FENCE CLADDING IN COLORBOND 'DEEP OCEAN' FINISH OR EQUIVALENT	
MC7	METAL WALL CLADDING (VERTICAL)	WAREHOUSE METAL FENCE CLADDING IN COLORBOND 'BLUEGUM' FINISH OR EQUIVALENT	
MC8	METAL WALL CLADDING (VERTICAL)	METAL FENCE CLADDING IN COLORBOND 'BASALT' FINISH OR EQUIVALENT	
PC6	HARDIBOARD PANELS	HARDIBOARD IN 'BLUEGUM' PAINT FINISH OR EQUIVALENT	

NOTE:

- **This concept plan is intended for Development Application purposes only. All setbacks, site coverage, car parking numbers, landscape areas and the like are subject to statutory approval.**
- **No assurance is given as to the features, attributes, feasibility or accuracy of anything shown on or disclosed in this plan.**
- **All existing & proposed features, dimensions, areas and boundaries are approximate only and subject to verification via detailed site survey by licensed surveyor.**

CLIENT:
HESPERIA

concept
Suite 307
546 Collins Street
Melbourne VIC 3000
t: (03) 9978 9888
e: architect@concepty.com.au

PROPOSED DEVELOPMENT
LOTS 119 & 808, LAKES ROAD, HAZELMERE WA

NOISE FENCE MURAL
TYPICAL DETAIL

DRAWING TYPE: DEVELOPMENT APPLICATION
DRAWING NUMBER: 2411-169-DA-301
REVISION: A
DATE: 23.09.2024
SCALE: 1:100 @ A1 / 1:200 @ A3
0 5 10
SCALE BAR @ A1

MEMORANDUM

To: Laura O'Shea (City of Swan)
From: Malcolm Mackay (DRP Chair)
Date: 5th November 2024

Proposed Warehouse and Incidental Office at Lot 119 Lakes Road & Lot 808 (No. 54) Lakes Road, Hazelmere. DA-610/2024

In response to the letter and attached information from the Applicant regarding the need for a sustainability strategy, I offer the following comments:

The Applicant appears to have misunderstood what was being asked for. The Panel was not requiring a detailed ESD report or ESD certification (which is typically undertaken after occupation). All the Panel was asking for was a simple overarching strategy that summarised the broad range of initiatives that are being pursued and which of those are firm commitments.

The frustration from the Panel's perspective is that the sustainability information has been provide in a piecemeal fashion across numerous documents, which will make the initiatives and commitments hard for the City to keep track of. A singular strategy, even if it had the other documents attached would have been a simpler approach.

It is noted that the 'sustainability strategy' attached to the covering letter from TBB stated that a draft Greenstar pathway prepared by FCDS had been provided to the DRP. This was not the case. Had the Panel seen the FCDS document, it may have had more confidence in the sustainability outcome.

In summary, the Panel is supportive of the expressed sustainability intent for the project and acknowledges that it exceeds normal industry practice. The information provided by the Applicant across the various documents is sufficient to provide the DRP with a high level of confidence in the sustainability outcome (including the assumed content of the unsighted FCDS report).

The Panel was not seeking additional analysis work to be undertaken but seeking the information to be presented in a more integrated manner. To this end, if the Applicant were to reissue the 'sustainability strategy' attached to the covering letter with the other documents (including the FCDS report) as appendices, then I would suggest that the matter can be settled, and there would be no need for a condition of approval for a further sustainability strategy.

If you have any queries on any of the above, please feel free to get back to me …

Regards

Malcolm Mackay
City of Swan DRP Chair

PART C – CITY OF MANDURAH

1. Declarations of Due Consideration

2. Disclosure of Interests

3. Form 1 DAP Applications

3.1 Lots 187 & 186 (2 & 4) Third Avenue, Mandurah – Proposed Child Care Premises – DAP/24/02741

4. Form 2 DAP Applications

Nil.

5. Section 31 SAT Reconsiderations

Nil.

Part C - Item 3.1 - Lots 187 & 186 (2 & 4) Third Avenue, Mandurah - Proposed Child Care Premises

Form 1 – Responsible Authority Report
(Regulation 12)

DAP Name:	Metro Outer
Local Government Area:	City of Mandurah
Applicant:	Altus Planning
Owner:	Tierra Pty Ltd
Value of Development:	$2,100,000
Responsible Authority:	City of Mandurah
Authorising Officer:	Casey Mihovilovich Chief Executive Officer
LG Reference:	DA-11076
DAP File No:	DAP/24/02741
Application Received Date:	Lodged 26 July 2024
Report Due Date:	14 November 2024
Application Statutory Process Timeframe:	90 days An extension of 14 days approved by DAP
Attachment(s):	1. Development Report 2. Development Plans 3. Transport Impact Statement 4. Waste Management Plan 5. Environmental Acoustic Assessment 6. Landscape Design Plan 7. Landscape Planting Plan 8. Stormwater Management Plan 9. Contour and Feature Survey Plan 10. Traffic Modelling 11. Schedule of Submissions

Responsible Authority Recommendation

That the Metro Outer DAP resolves to:

1. Accept that the DAP Application reference DAP/24/02741 is appropriate for consideration as a Child Care Premises land use which is compatible with the

objectives of the Residential zone and Zoning Table of the City of Mandurah Local Planning Scheme No. 12.

2. Approve DAP Application reference DAP/24/02741 and accompanying plans , Germano Design Project No.24022, Version 7: Cover, DRW 1 of 13; 3D Perspectives, DRW 2 of 13; 3D Perspectives, DRW 3 of 13; Existing Site Survey, DRW 4 of 13; Site Plan, DRW 5 of 13; Amalgamation Plan, DRW 6 of 13; Context Plan, DRW 7 of 13; Aerial Plan, DRW 8 of 13; Ground Floor, DRW 9 of 13; Breeze Path Plan, DRW 10 of 13; Roof Plan, DRW 11 of 13; Elevations, DRW 12 of 13; Sections, DRW 13 of 13, and 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 Mandurah Local Planning Scheme No. 12, subject to the following conditions:

Conditions:

1. This decision constitutes planning approval only and is valid for a period of four (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.

2. The development shall be carried out and fully implemented in accordance with the details indicated on the stamped approved plan(s) unless otherwise required or agreed in writing by the City of Mandurah.

3. Prior to the commencement of site works, the subject lots shall be amalgamated to the satisfaction of the City of Mandurah.

4. Prior to the commencement of site works, an updated landscaping plan for the subject site and road verge(s) must be submitted to and approved to the satisfaction of the City of Mandurah. The plan, once approved, shall be implemented and maintained to the satisfaction of the City of Mandurah.

5. Prior to the commencement of site works, a Construction Management Plan shall be submitted to and approved by the City of Mandurah. The Plan must detail how the site will be managed during and after works are completed, in order to minimise issues associated with dust/sand, erosion, noise, vibration, traffic and general construction issues. The approved plan must thereafter be implemented to the satisfaction of the City of Mandurah.

6. Prior to the commencement of site works, a detailed stormwater and drainage plan must be submitted to City of Mandurah for approval showing all stormwater from roofed and paved areas being collected and disposed of on-site in landscaped areas in accordance with water sensitive design principles.

7. The development shall be constructed and operated in accordance with the requirements detailed in the acoustic assessment report, titled Proposed Child Care Centre 2-4 Third Avenue Mandurah – Environmental Acoustic Assessment prepared by Herring Storer Acoustics (ref. 33060-2-24252, dated July 2024).

8. Prior to the installation or construction of any signage on site, a signage plan shall be prepared and submitted to the City of Mandurah for approval. Once the signage plan has been approved signage shall then be installed in accordance with the approved signage plan.

9. Prior to occupancy, the proposed development shall be connected to sewer to the satisfaction of the City of Mandurah.

10. Prior to occupancy, vehicle parking, manoeuvring and circulation areas shall be suitably constructed, sealed, drained, kerbed, marked (including loading, staff and disabled bays), and thereafter maintained to the specification and satisfaction of the City of Mandurah.

11. Prior to occupancy, a vehicle crossover is to be constructed to the specification and satisfaction of the City of Mandurah. Once constructed, the vehicle cross over shall be maintained at all times to the satisfaction of the City of Mandurah. During construction, the existing landscaping, footpaths, infrastructure and associated brick paved areas within the road reserve shall be protected and/or re-instated to the satisfaction of the City of Mandurah.

12. Prior to occupancy redundant crossover shall be removed and the verge and kerb reinstated to the specification and satisfaction of the City of Mandurah.

13. Within three (3) months of occupancy, a verification report shall be provided to the City of Mandurah, by a suitably qualified person demonstrating compliance with the acoustic report prepared titled Proposed Child Care Centre 2-4 Third Avenue Mandurah – Environmental Acoustic Assessment by Herring Storer Acoustics (ref. 33060-2-24252, dated July 2024) and the *Environmental Protection (Noise) Regulations 1997.*

14. All services (e.g. air conditioners, water meters, hot water storage systems etc.) shall be designed to be integrated into the building design and/or screened from surrounding properties to the satisfaction of the City of Mandurah.

15. Security, building, signage and carpark lighting must be located, designed and installed to prevent excess light spillage from the development. The development shall be maintained to comply with AS4282 Control of the Obtrusive Effects of Outdoor Lighting.

16. The hours of operation shall be limited to 6:30am to 6:30pm Monday to Friday and Saturday 8.00am to 5.00pm.

17. The outdoor play area is not to be used before 7.00am on any day unless otherwise agreed in writing by the City of Mandurah.

18. No amplified music is permitted to be broadcast outside of the premises or be audible from the property boundary.

19. The mechanical plant shall be barriered to comply Environmental Acoustic Assessment by Herring Storer Acoustics (ref. 33060-2-24252, dated July 2024) *Environmental Protection (Noise) Regulations 1997.*

20. A 2200mm high masonry fence shall be provided on the northern and eastern boundaries and rendered finish to the satisfaction of the City of Mandurah.

21. The approved Waste Management Plan (Ref 24283W prepared by Salt dated 19 July 2024) must be implemented, constructed and thereafter maintained to the satisfaction of the City of Mandurah, for the life of the development.

22. All uncovered car parking bays to be in accordance with Australian Standard AS2890.1. Any bays adjacent to kerbs or for those bays that are to be used for disabled parking, shall be in accordance with Australian Standards AS1428.1.

23. Waste collection vehicles, deliveries vehicles, forklifts and similar equipment are only permitted between the period of 7:00am to 7:00pm Monday to Saturday and 9:00am and 7:00pm Sundays and Public Holidays, unless otherwise approved by the City of Mandurah. All delivery vehicles must be located within the property boundary and have the engine turned off during loading and unloading of goods associated with the use of the site to the satisfaction of the City of Mandurah.

24. Fences / walls fronting the street shall be of high quality and be visually permeable 1.2m above natural ground level unless otherwise approved in writing by the City of Mandurah.

Advice Notes

1. In relation to condition 4 the landscaping plan requires updating before approval including:

    a. Updated plant schedule.
    b. Details of materials proposed to be used as mulch.
    c. Planning for planting adjacent to hard surfaces.
    d. Information on vegetation and/or landscaped areas to be retained.
    e. Planning for water supply given groundwater abstraction in this area is fully allocated.
    f. An irrigation plan for reticulated landscaping within the verge.
    g. Pedestrian paths, paving and lighting treatments.
    h. Implementation schedule.
    i. Maintenance/management responsibilities.
    j. The fall zones for the play equipment are not shown, concerns with these potentially overlapping or being impeded by a concrete path.
    k. The finished playground pieces should be appropriately installed and inspected to meet relevant standards for operations.

2. In relation to condition 6, all stormwater generated on site is to be retained on site in accordance with the City's stormwater design guidelines. 1 in 20 Year event to be considered for drainage calculation.

3. In relation to condition 8, the signage plan shall provide detailed designs on each proposed sign, including dimensions, colours and the proposed location of each sign. The signage shall then be installed in accordance with the approved signage plan.

4. In relation to condition 10, the crossover shall be constructed in accordance with the City's industrial standard crossover guideline and to be submitted to the City's Technical Services team for approval prior to the construction.

5. Prior to any works commencing, an application for a building permit is to be submitted to and approved by the City of Mandurah.

6. Prior to occupancy of the building an occupancy permit is to be submitted, and approval obtained prior to use of the building from the City of Mandurah.

7. The applicant must submit an application for registration of a food business as required by the *Food Act 2008*. The business must not trade until a registration certificate has been issued by the City of Mandurah Health Services.

Details: outline of development application

Region Scheme	Peel Region Scheme
Region Scheme - Zone/Reserve	Urban
Local Planning Scheme	City of Mandurah Local Planning Scheme No.12
Local Planning Scheme - Zone/Reserve	Residential R25
Structure Plan/Precinct Plan	N/A
Structure Plan/Precinct Plan - Land Use Designation	N/A
Use Class and permissibility:	D – not permitted unless the LG has exercised its discretion by granting development approval
Lot Size:	2 x lots – Lot 187 – 791m^2 & Lot 186 - 809m^2
Existing Land Use:	2 x lots existing dwelling on each lot
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:
The proposal is to develop a child care premises to accommodate seventy-six (76) children, aged from 0-2 year to 3+ years. Twelve (12) staff members are proposed to be on site at any one time. Operating days and hours are proposed Monday to Friday 6.30am to 6.30pm, Saturdays 8.00am until 5.00pm. The business is closed on Sunday and public holidays.

Indoor and outdoor play areas are provided, with the outdoor play area orientated to the north to take advantage of a sunny aspect. Sixteen (16) parking bays are proposed along the northern boundary, accessed via Coolibah Avenue.

The lots will be required to be amalgamated to support the development.

Proposed Land Use	Child Care Premises
Proposed Floor Area	349m^2
Proposed No. Storeys	One
Proposed No. Dwellings	N/A

Background:
The site is located on the northeastern corner of Coolibah Avenue and Third Avenue and comprises two abutting lots. Lot 187 (2) Third Avenue (corner lot) has an area of 791m^2 and Lot 186 (4) Third Avenue an area of 809m^2, with a combined area of 1600m^2. The intersection of Coolibah Avenue and Third Avenue is controlled by a roundabout with the access to the proposed child care centre 28m north of this.
There is an existing dwelling on each lot which will be demolished prior to development.

Lots abutting the development site to the north and east are residential along with adjacent lots on the southern side of Third Avenue. Current access to Lots 187 and 186 is from Third Avenue.

R22204, the Mandurah Aquatic Recreation Centre (MARC) is located on the western side of Coolibah Avenue and R22188, the City's cemetery to the southwest of the roundabout on the corner of Coolibah Avenue and Cemetery Road the western extension of Third Avenue.

Figure 1. Site Aerial Plan

Legislation and Policy:

Legislation
Planning and Development Act 2005
Planning and Development (Local Planning Schemes) Regulations 2015
City of Mandurah Local Planning Scheme No.12

State Government Policies
Local Planning Policy 7.0 – Design of the Built Environment
Planning Bulletin 72 – Child Care Centres

Structure Plans/Activity Centre Plans
Nil

Local Policies
Local Planning Policy No.3 -Non-Residential Land Uses in Residential Zones **Consultation:**
Public Consultation
The development was referred to abutting property owners and to adjacent property owners on the southern side of Third Avenue. Referrals were undertaken by post and / or by email for a period of 14 days. At the close of advertising two submissions were received. One submission supporting the proposal and one submission strongly objecting to the proposal.

Matters Raised	**Officer comments**

The Coolibah Avenue entry is a safer and more sensible option. Third Avenue is a suburban Street that is regularly accessed by police vehicles and often at speed. An access on Third Avenue close to roundabout will cause vehicles to bank up at the roundabout particularly at peak periods in the early morning and late afternoon.	The City's Local Planning Policy No.3 – Non-Residential Land Uses in Residential zones advise '*Child Care premises would not be suitable where access is from a local street where there may be impacts on amenity due to traffic and parking',* unless the applicant can demonstrate otherwise. The City's Traffic Engineer notes future concerns as development intensifies in the immediate area associated with an access from Coolibah Avenue. 28m distance of the development access to the roundabout is of concern. This advice contrasts with that provided by the applicants Traffic Engineer.
The plans provided indicate there are only enough parking spaces for the 12 staff, no provision for a quick drop off zone so dropping off 72 young children will be a challenge.	Most children to attend this child care premises will be of age that will require guardians to personally deliver the children to the child care provider. Drop off zones would largely be unused. Car parking numbers provided comply with Scheme requirements.
Residential areas should be kept residential. This type of proposal should be located in a commercial zone where noise from the development does not impact on local residents. The proposal impacts the quiet enjoyment of the resident's properties. The play area which backs directly on to adjoining lots will be loud during the opening hours of the centre and even with a 2.2m high acoustic fence the noise will be significantly increased, particularly on Saturdays.	An objective of the Residential zone under the City of Mandurah Local Planning No.12 is *'to provide for a range of non-residential uses, which are compatible with and complementary to residential development'.* It is not uncommon to locate a child care premises in a Residential zone. Development in a Residential zone is required to comply with the *Environmental Protection (Noise) Regulations 1997* and the environmental acoustic report indicates this development will comply with the noise regulations subject to

	implementing measures to reduce the noise impact as conditioned. The City s Local Planning Policy No.3 Non-Residential in Residential zones allows child care premises to operate on a Saturday and is modelled to comply with legislated noise requirements subject to appropriate conditions.
Increased traffic flows will impact the quality of life for the residents.	The Traffic Impact Statement advises Coolibah Avenue will have sufficient capacity to accommodate the increased traffic from the development. It is noted concern has been raised about the 28m distance from the roundabout to the development access. In relation to increased traffic noise, the *Environmental Protection (Noise) Regulations 1997* advised vehicle noise (apart from closing vehicle doors is exempt from meeting the Regulation requirements. Other vehicle-based noise is modelled as being compliant during proposed operating hours.
With potential for many children to be dropped off and picked up in a short space of time, this will significantly increase the traffic flow on Second Avenue, Third Avenue and Coolibah Avenue there will be a backup of cars on Coolibah Avenue causing traffic congestion at peak times during the day	It is unlikely Second Avenue or Third Avenue will be majorly impacted by the traffic flows to and from the development as access from Coolibah Avenue to the site has been designed allow two-way access into and from the site ensuring free flow of traffic. It is noted that should future safety concerns be identified modifications to the access may be required.
Increased wear and tear of the road will impact the longevity and maintenance of the roads.	Increases in population will also have an impact on the wear and tear and longevity of Coolibah Avenue. Coolibah Avenue is an important local distributor and the City's scheduled road maintenance programs ensure the road is maintained.
No information has been provided in relation to effluent disposal upgrades and the capacity for the area to sustain effluent disposal upgrades.	The site will be required to connect to reticulated sewer therefore there will be no requirement to upgrade existing effluent disposal systems.

Referrals/consultation with Government/Service Agencies
Nil

Other Advice
The proposal was referred internally.

Engineering
Traffic Modelling
Access to the development is proposed from Coolibah Avenue (a Local Distributor/ Neighbourhood Connector) located approximately 28m north of the roundabout on the approaching lane from Pinjarra Road.

Coolibah Avenue is a local distributor which has a capacity of 7000 vehicle per day. Traffic data from 2021 indicates utilisation of Coolibah Avenue at 4690 vehicles per day. Manual counts from 5 September 2024 north of the roundabout on the corner of Coolibah and Third Avenue indicate at peak morning and afternoon, 7.30am9.00am there were 670 vehicles in both directions and at 2.30pm-4.00pm there were 795 vehicles. It should be noted there is significant disruption to the road network at this time associated with the duplication of the Estuary bridge which may have some impact on data.

Third Avenue is an access road which has the capacity to accommodate 3000 vehicles per day. Traffic data from 2019 indicates the road was utilised by 895 vehicles per day. Manual counts from 5th September 2024 for Third Avenue peak morning and afternoon were 201 vehicles (7:30am-9.00am and both directions) and 193 vehicles (2:30pm – 4:00 pm and both directions).

Strategic transport modelling indicates Coolibah Avenue will reach capacity (7000 vehicles per day) by 2041 should no action be taken now on the traffic numbers. No strategic transport modelling is available for Third Avenue however data available indicates Third Avenue has a lower traffic volume compared to Coolibah Avenue.

Concern is held for the safety of the right turn into the development travelling north along Coolibah Avenue, and the impact on traffic to the south and through the roundabout for the scenario when cars are queueing to enter the development.

Recommendation – Access to the development car park from Third Avenue is preferred.

The swept path diagrams provided for trucks indicate less than ideal operating conditions within the car park. Trucks follow entry and exit paths that cross through 5 parking bays on each side of the car park, which is unsafe and limits this movement to outside of operating hours. If cars are parked in these bays there is no extra room for turning, requiring the truck to reverse back onto Coolibah Avenue and increasing the risk of conflict with oncoming traffic.

Recommendation – Accommodate truck movements with an appropriately sized driveway and parking bay or provide separate access.

It is noted there are limited deliveries to a childcare facility that occur with a truck and such vehicles are limited to those involved in waste collection. The Waste Management Plan confirms collection will be made outside of the hours of operation to ensure there is no conflict with parked vehicles.

The dimensions of the parking bays are compliant with Australian Standards (AS2890.1).

On reviewing the traffic modelling report, the City's Traffic Engineers provided following comments:

While the traffic modelling report indicates that it achieves a Level of Service A, according to the City's Strategic Transport Model, Coolibah Avenue is projected to exceed its capacity by 2041 under the "Do Nothing" scenario.

Comparatively, Third Avenue is expected to carry a lower volume of traffic, which would help to reduce the chances for potential conflicts with other vehicles along Third Avenue. Additionally, Coolibah Avenue is projected to have higher volume, making it less suitable for direct access in the future.

Moreover, drivers will naturally reduce their speed when making the right turn onto Third Avenue, compared to maintaining a higher speed along the straight section of Coolibah Avenue. This reduction in speed on the turning can minimise the chances of accidents.

Landscaping
Should irrigation of the grassed verge or irrigation of the external landscaping be proposed, an irrigation plan is to be provided.

Verge areas are required to be left neat and tidy following construction works.

The plant schedule indicates incorrect mature plant sizes, and there appears to be a notation error of the verge area.

Further information is required on the materials proposed to mulch the landscaping adjacent to the footpath. Any mulch installed shall be no more than 10mm below finished levels. Materials used shall not constantly displace itself over the footpath, or cause a trip hazard, such as stone mulch.

Planting adjacent to hard surfaces such as the public footpath will need to have an offset of 1m with a 75mm deep mulch only offset to be installed up against the hard surface. Plants species planted outside this 1m offset are to be considered for their growth rates, to ensure they won't spill over the path and cause obstruction or injure pedestrians up in the future. This can be negotiated (the 1m offset) such as in the case of the skinny beds next to the car parking area, however the plant species proposed - Dianella revoluta, will grow too large and unruly for these small beds, they will need to be substituted for a smaller growing Dianella, that grows no more than 30 to 50cm when fully grown.

The fall zones for the play equipment are not shown, some concerns with these potentially overlapping or being impeded by a concrete path. The finished playground pieces and area should be appropriately installed and inspected to meet relevant standards for child care operations.

Waste
The waste management plan submitted for the development the proposed child care premises is satisfactory.

Environmental Health
The building must be constructed and managed in accordance with the requirements detailed in the acoustic assessment and report prepared titled Proposed Child Care Centre 2-4 Third Avenue Mandurah – Environmental Acoustic Assessment by Herring Storer Acoustics (ref. 33060-2-24252, dated July 2024).

There shall be no access by patrons to the outside play areas prior to 7.00am and no amplified music is permitted to be broadcast outside of the premises nor be audible from the property boundary.

The applicant must apply for registration of a food business as required by the *Food Act 2008*. The business must not trade until a registration certificate has been issued by the City's Health Services.

Building
Lots are to be amalgamated, preferably prior to commencement of building work, or otherwise, prior to occupation and use of the development. Building permit to be submitted and approval obtained required prior to commencing any building work. Occupancy permit application to be submitted and approval obtained prior to use of the building.

Planning Assessment:
The proposal has been assessed against the requirements of the City of Mandurah Local Planning Scheme No.12, State Planning Policy 7.0 Design Built Environment and Local Planning Policy No. 3 Non-Residential Uses in residential zones which includes requirements for child care premises.

Key considerations include the following:

Land Use
Under the City of Mandurah Local Planning Scheme No.12 (Scheme) Lots 187 (2) & 186 (4) Third Avenue are zoned Residential. The objectives of a residential zone are to:

'*provide for a range of housing and a choice of residential densities to meet the needs of the community in suburban areas; to facilitate and encourage high quality design, built form and streetscapes throughout suburban areas; and to provide for*

a range of non-residential uses, which are compatible with and complementary to residential development'.

Also, under the Scheme a child care premises means '*premises where 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*

'a childcare service as defined in the Child Care Services Act 2007 section 4 is provided'.

Under Table 3 of the Scheme a child care premises is a 'D' discretionary land use in a Residential Zone. A 'D' discretionary land use means the use is not permitted unless the local government has exercised its discretion by granting development approval.

A child care premises may be considered in a Residential zone.

Sensitive Land Uses

The proposed child care premises directly abuts residential lots to the north and east. A concern for residential properties which abut child care premises is noise. Development which has the potential to create noise, is required to comply with the *Environmental Protection (Noise) Regulations 1997* (Regulations).

An Environmental Acoustic Assessment provided with the application based its assessment on 76 children and normal operating hours, between 6.30am and 6.00pm, Monday to Friday (closed on public holidays) including 8.00am to 5pm on Saturday. The report noted the proposed child care premises would open before 7 am (ie during the night period), and the outdoor play area is not intended to be used until after 7am. The acoustic report also noted the mechanical plant is likely to operate all hours of the day.

The Assessment concluded:

- noise received at the neighbouring residences from the outdoor play area would comply during the day period, though the outdoor plan area would be limited to day period ie after 7am;
- noise received at neighbouring residences from mechanical plant would comply at all hours when barriered;
- Noise received at neighbouring residences from noise associated with vehicles would comply.

In relation to noise from vehicle movement and starting, the summary of the report advises vehicle noise is exempt from complying with the Regulations however vehicle doors shutting is not exempt. The summary further advises noise received at existing neighbouring residences from these noise sources would comply with Regulatory requirements subject to compliance with the recommendations of the assessment.

The conclusion further advised emissions from proposed development would be deemed to comply with the requirements of the *Environmental Protection (Noise) Regulations 1997* for the proposed hours of operation, with inclusion of the following.

1. A 2200mm acoustic fence separating the neighbours to the north and east is required, Colorbond is an acceptable material, and any other fence with a higher surface density would meet the requirements;
2. Mechanical plant would need to be barriered by a barrier at 500mm above the top of the plant for child care mechanical plant
3. No restriction to car parking during the nighttime period.

The Assessment recommended the child care premises adopt best practices in managing a child care premises to reduce noise including no amplified music to be played outside and favouring soft finishes in the outdoor play area.

The development, therefore, is capable of complying with the Environmental Protection (Noise) Regulations 1997 subject to adherence with the requirements and recommendations of the Environmental Acoustic Assessment.

Hours of Operation

The City's Local Planning Policy No.3 – Non-Residential Uses in Residential Zones advise the hours of operation should be limited to:

Monday – Friday	7.00am to 6.00pm
Saturday	8.00am to 5.00pm.

The proposal seeks the following operating hours:

Monday to Friday	6.30am to 6.30pm
Saturday	8.00am to 5.00pm

The earlier 6.30am start time, where 'nighttime' acceptable noise levels apply, could impact the adjoining property owners, should the outdoor living area be utilised prior to 7.00am. The application report, however, indicates the outdoor living area will not be utilised until 7.00am when the 'daytime' acceptable noise levels apply. This has been conditioned.

Given noise levels are close to permitted assigned levels and further specification of mechanical plant is required, it is recommended that a verification report be requested.

The City considers the likely amenity disturbance associated with cumulative noise sources including playground noise and mechanical plant to warrant the installation of a masonry fence. In addition, to ensure appropriate legislative compliance is being achieved a verification report should be submitted by suitably qualified person.

Built Form

The development design being single storey reflects the residential character of the area. The skillion roof is not out of place in this area as other older residences display a similar roof type. The development addresses both street frontage by providing large windows ensuring passive surveillance of the street and the design provides a clear entrance to the building.

The use of different materials, colours along with the articulation of the building lines provides an attractive building which will enhance and uplift the visual amenity of the area.

The preferred option of the entry of the building addressing Coolibah Avenue or Third Avenue has been given careful consideration in balancing access and built form outcomes.

Access and Traffic Management

Clause 3.3.2 of the City's Local Planning Policy No.3 – Non-Residential use in Residential Zones advises: '*child care premises would not be suitable at the following locations unless the applicant can demonstrate to the satisfaction of the local government that the following matters listed will not have detrimental impact on the child care premises':*

(b) access from a local street where there may be impacts on the amenity due to traffic and parking'.

The City's Local Planning Policy No.3 – Non-Residential use in Residential zones policy however also advises: '*the proposal should be approved only if it will have minimal impact on the functionality and amenity of an area and will not create or exacerbate any unsafe condition for pedestrians or road users'*.

The City's Traffic Engineers have raised concerns for traffic travelling north and turning right on Coolibah Avenue causing cars to queue on Coolibah Avenue and impacting traffic to the south and through the roundabout. The City's Traffic Engineers also advised that Third Avenue accommodates less traffic therefore is the preferred to the site and that long term (2041) modelling indicates that should no action be taken now to reduced traffic on Coolibah Avenue, the Coolibah Avenue will be at maximum capacity (7000 vehicles per day).

In response to the City's Traffic Engineer's comments, the applicant submitted additional traffic modelling, (SIDRA specific technology that models road lane-bylane traffic through roundabouts) and tested the traffic numbers provided by the City's Traffic Engineers which determined access to the site from Coolibah Avenue is the most appropriate outcome for the site in terms of safety and for minimising the impacts on the surrounding properties. The report advises access from Third Avenue would need to be placed in close proximity to the roundabout and would cause an increased risk for rear end crashes due to vehicles slowing down to enter the site.

The SIDRA results indicate the intersection of Coolibah Avenue and access to the site on Coolibah Avenue operates effectively long-term as all movements were found to operate with an 'excellent' level of service and minimal queuing is imposed to traffic on Coolibah Avenue. A maximum 95th percentile queue of 1.4m is to occur for through vehicles on Coolibah Avenue during the AM peak hour in the 2041 scenario which is less than the length of one vehicle. Also no delays are imposed to through vehicles on Coolibah Avenue under all scenarios.

As outlined above, Local Planning Policy No.3 – Non-Residential Uses in a Residential zone, indicates access to a child care premises should not be from local street where there may be impacts on the amenity due to traffic and parking. A landowner on the southern side of Third Avenue provided a submission supporting the development with access to the development from Coolibah Avenue.

The applicant has indicated that their strong preference is for access to be from Coolibah Avenue. Landscaping will support reduced visual impact of the car park access

Consideration must given to future limitations on access from Coolibah Avenue due to the proximity of the traffic lights at the intersection of Pinjarra Road and Coolibah Avenue and safety concerns about the proximity of the development access to the roundabout.

The City's Traffic Engineers have advised their preference for the access to the development is from Third Avenue. While the City's Traffic Engineers preference has been considered the applicant has provided information indicating access from Coolibah Avenue can operate adequately.

The City will continue to monitor the traffic movements and demands on Coolibah Avenue and may, in time, require the median being closed, preventing a right turn into the site from north bound traffic. Should that occur, the site will only be accessible from a left in / left out arrangement.

Signage

Signage shown on the development plans are indicative only. Prior to the development of any signage on site, a signage plan shall be submitted to the City for approval.

Conclusion:

Under the City of Mandurah Local Planning Scheme No.12, a child care premises is a discretionary use in a Residential Zone. An objective of the Residential zone is to allow a range of non-residential land uses which are compatible with and complementary to residential development. A child care premises is a nonresidential use that would support families by providing child care and would

complement the area by providing employment opportunities. The use should also not unreasonably impact the local residents.

The applicant has demonstrated the child care premises can operate in manner that results in minimal impact on local residents. The use meets the objectives of the Residential zone and is considered an acceptable use on this site.

Access from Third Avenue is noted as the City's Traffic Engineers preference. In contrast the applicant's SDRA Intersection modelling has determined access from Coolibah Avenue is safe and this is the applicant's preferred orientation.

Built form complements the character the area being single story, the premises addresses both street frontages by providing large windows along with a clear entry to the building. The variety of materials and colours will contribute to an improved built form and streetscape. in the area.

The development is supported subject to conditions as outlined above.

ALTUS
PLANNING

Proposed Child Care Premises

Lot 186 (No. 4) and Lot 187 (No. 2) Third Avenue, Mandurah

July 2024

TOWN PLANNING | MEDIATION | ADVOCACY

Disclaimer:

Prepared for:

Devnani Property Holdings Pty Ltd

Prepared by:

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Document Version Control

Ver.	Date	Description	Author	Approved
1	26/07/2024	Initial for client review	JP	BL

Contents

1.0 Executive Summary

Altus Planning submits the following application for development approval on behalf of Devnani Property Holdings Pty Ltd in support of a Child Care Premises at Lot 186 (No. 4) and Lot 187 (No. 2) Third Avenue, Mandurah.

The proposed land use classification of 'Child Care Premises' is a 'D' discretionary use and therefore capable of approval within the 'Residential' zone of the City of Mandurah's Local Planning Scheme No. 12.

The facility is proposed to accommodate 76 children at any one time and 12 staff members. A total of 16 parking bays are proposed to the side of the proposed building, in line with the parking requirements of the City of Mandurah's Local Planning Policy No. 3 – Non-Residential Uses in Residential Zones.

The proposal has also been assessed as consistent with the objectives and requirements of the applicable local planning policies.

Accordingly, the proposal is considered to be one that will contribute positively to the immediate residential land uses and the broader commercial land uses within the vicinity of the area and will not result in any adverse amenity impacts. The proposal is therefore one that warrants approval under the City's local planning framework.

2.0 Background

2.1 Purpose

This submission has been prepared by Altus Planning on behalf of Devnani Property Holdings Pty Ltd (**landowner** and **Applicant**) to provide justification for the development application for a Child Care Premises (**proposed development** or **proposal**) at Lot 186 (No. 4) and Lot 187 (No. 2) Third Avenue, Mandurah (**the subject land** or **site**).

This application follows preliminary discussions held with senior officers of the City of Mandurah (**City**) on 12 June and 8 July 2024.

In accordance with the City's and Development Assessment Panel (**DAP**) requirements, the following items are also included with this application:

- The City's Application for Development Approval Form;
- DAP Form 1;
- Certificates of Title;
- Development Plans (**Appendix 1**);
- Transport Impact Statement (**Appendix 2**);
- Waste Management Plan (**Appendix 3**);
- Environmental Acoustic Assessment (**Appendix 4**);
- Landscape Design Plan (**Appendix 5**);
- Landscape Planting Plan (**Appendix 6**);
- Stormwater Management Plan (**Appendix 7**); and
- Contour and Feature Survey Plan (**Appendix 8**).

2.2 Site Description

The subject land comprises of two (2) adjoining freehold (green title) lots, which measure 809m^2 for Lot 186 and 791m^2 for Lot 187, for a combined site area of approximately 1,600m^2. These lots are located on the northeastern side of the Third Avenue, Cemetery Road and Coolibah Avenue intersection. Both lots currently contain single storey, original dwellings.

Both lots have their own crossover to Third Avenue.

Surrounding the site is residential dwellings to the north, east and south. To the west is a large reserve for recreation, including recreational facilities. It is also noted that

Mandurah Forum and other commercial land uses are located approximately 300m north of the site.

An aerial image of the subject land and the immediate locality is provided at Figure 1.

Figure 1: Locality Plan (Source: SLIP Locate 2024)

3.0 Proposal

The Applicant is seeking to obtain planning approval to construct and operate a Child Care Premises, utilising both lots. The specifics of the proposal are provided in the following table.

Outline of proposed works	Key components of the proposed design are as follows: • A portico to the front/western side of the development to provide for a definable entry point; • 0-2 year old room (Activity 1 and 53.53m^2) with adjoining cot room, nappy room, prep room, and the outdoor play area; • 2-3 year old room (Activity 2 and 66.01m^2) with adjoining cot room, nappy room, prep room, and the outdoor play area;

	• 3+ year old room (Activity 3 and 64.99m^2) with adjoining ablutions, prep room, and the outdoor play area; • 3+ year old room (Activity 4 and 65.33m^2) with adjoining ablutions, prep room, and the outdoor play area; • Office; • Reception; • Staff Room; • Waiting Room; • Kitchen; • A Store Room that is separated from the main building and located on the eastern side boundary; • Ablutions including a Universally Accessible Toilet; • Bin Store; • Laundry; • Courtyard; • Parking for sixteen (16) vehicles at the northern side of the site, including a designated, accessible drop-off bay at the front of the site; and • A dual width crossover providing access to and from the site and Coolibah Avenue. • Four (4) bicycles bays located to the rear of the carpark. The works will also result in the existing crossovers to Third Avenue being removed. Refer to **Appendix 1 – Development Plans**.
Operating hours	• 6:30am to 6:30pm on weekdays • 8:00am to 5:00pm on Saturdays • Closed on Sundays and public holidays It is noted that the Saturday operation is sought for future flexibility, though the likelihood is that the centre will only operate Monday to Friday.
Number of employees	12 staff members at any one time
Number of attendees	The facility has been designed for 76 children, with the breakdown as follows: • 0-2 year olds – 16 places • 2-3 year olds – 20 places • 3+ year olds – 40 places

Frequency and nature of deliveries	The proposed development will not generate significant delivery and service vehicle traffic and can be conducted during operating hours, albeit outside peak periods.
Loading/unloading area	No dedicated bay provided, nor required. Any deliveries can be conducted outside of peak operating hours and use any of the unoccupied standard car parking bays.
Parking area	16 on-site car parking bays are proposed to the northern side of the site, to be accessed via a single crossover and driveway along the western boundary of the site. These bays will be principally for use by staff. Should all of the staff use their own private vehicles, this would equate to 12 bays, with 4 bays remaining for visitors. Formal, line-marked staff parking bays are not proposed as in the instance where not all the 12 bays are used by staff (e.g. other mode of transportation), it allows for additional bays to be utilised for visitor bays. A formal reversing bay has been provided in the instance that no bays are available and for the manoeuvrability for the rear car bay.
Waste management details	The following bins are proposed in within the bin store: • 1 x 1,100L General waste bin • 1 x 1,100L Commingled recycling bin A private waste contractor will be engaged to undertake waste collection once per week and outside of operational hours to allow for adequate manoeuvrability on the site. Additionally, 2m^2 of bulky goods / hard waste storage space has been provided in the bin store. All bulky goods will be temporarily stored within this area prior to scheduled collections occurring. Building management will arrange for bulky goods collections to occur via a private contractor, as required. Refer to **Appendix 3 – Waste Management Plan**.
Signage details	All signs are indicative only. The operator of the development will submit a separate development application for signage (as required).

4.0 Planning Framework

4.1 Peel Region Scheme

The subject land is zoned 'Urban' pursuant to the Peel Region Scheme (**PRS**). It is submitted that the development is consistent with the purpose of the Urban zone, pursuant to clause 12(a) of the PRS.

4.2 City of Mandurah Local Planning Scheme No. 12

4.2.1 Land Use

The subject land is zoned 'Residential' pursuant to Local Planning Scheme No. 12 (**LPS12** or **the Scheme**) and assigned a density coding of 'R25'.

The objectives for the Residential zone are stated at clause 3.1.2, Table 2 – Zone Objectives of LPS12 as follows:

- *To provide for a range of housing and a choice of residential densities to meet the needs of the community in suburban areas.*
- *To facilitate and encourage high quality design, built form and streetscapes throughout suburban areas.*
- *To provide for a range of non-residential uses, which are compatible with and complementary to residential development.*

It is submitted that the proposed development is of a high quality design, and is considered compatible with and complementary to the existing residential development within the area, as discussed throughout this report.

In accordance with clause 6.2 of LPS12, the appliable land use classification is 'Child Care Premises' which is defined as:

> *premises where –*
>
> *(a) an education and care services as defined in the Education and Care Services National Law (Western Australia) Section 5(1), other than a family day care services 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.

Pursuant to clause 3.2, Table 3 – Zoning Table, the 'Child Care Premises' land use is a 'D' use. The land use is therefore capable of approval at the local government's discretion.

4.2.2 Car Parking Requirements

Pursuant to Schedule 2 – Parking Requirements of LPS12, the required number of car bays is calculated at 4.5 parking bays per 100m^2 of net lettable area (**NLA**). Therefore, as the proposed development has an area of 349.52m^2 NLA, the development requires 15.7 (rounded up to 16) car parking bays on site.

The proposed development contains 16 car parking bays and also includes a dedicated reversing bay. The development therefore complies in this regard.

4.3 City of Mandurah Local Planning Policy No. 3 – Non-Residential Uses in Residential Zones

In preparing this application, consideration has been given to the City's Local Planning Policy No. 3 – Non-Residential Uses in Residential Zones (**LPP3**).

An assessment of the proposed development against the relevant development requirements contained within the LPP is provided below/overleaf.

Development Requirement		Response
3.2 – Location		
3.2.1	The following locations may be appropriate for the establishment of a child care premises:	**Complies.** The development gains access from a Local Distributor Road (Coolibah Avenue) which directly links to a District Integrator Road (Pinjarra Road).
(a)	A site that fronts (through direct access or via a parallel local road) onto a Major Road, District Integrator Road or Neighbourhood Connector Road, as identified on Figure 1;	The site is within close proximity to the Mandurah Aquatic and Recreation Centre (to the west of the site) and is within walking distance to Mandurah Forum (to the north).
(b)	Part of or within easy walking distance of commercial, recreation or community nodes and education	The development is considered to be compatible with the surrounding residential

facilities (as generally identified on Figure 1); (c) In areas where adjoining uses are compatible with a child care premises (includes considering all permissible uses under the zoning of adjoining properties); or (d) A site well served by public transport.	area, and the recreational reserve (Mandurah Aquatic and Recreation Centre). Additionally, the site is serviced by three (3) different bus networks that traverse along Coolibah Avenue (the closest bus stop being less than 100m from the site).
3.2.2 Child care premises generally would not be suitable at the following locations, unless the applicant can demonstrate to the satisfaction of the local government that the following matters listed will not have a detrimental impact on the child care premises: (a) Access is from an arterial route or in close proximity to a major intersection, as identified on Figure 1 to an arterial route where there may be safety concerns; (b) Access is from a local street where there may be impacts on amenity due to traffic and parking; (c) The current use or any permissible use under the zoning of the adjoining premises produces unacceptable levels of noise, fumes or emissions or poses a potential hazard by reason of activities or materials stored on-site; (d) Noise produced by roads and railways are likely to have an adverse impact on the site; (e) The site may be subject to contamination, within close proximity to high-voltage electricity transmission lines, or subject to	**Complies.** The development is not within a close proximity to a major intersection or arterial route. Access is from a Local Distributor Road (Coolibah Avenue) and not the Local Road of Third Avenue. The adjoining properties are residential and do not produce unacceptable levels of noise, fumes or emissions, nor pose a potential hazard by reason of activities or materials stored on-site. The site is not located within an area that is subject to the requirements of State Planning Policy 5.4 – Road and Rail Noise. No adverse traffic noise is expected to the site. The site is not contaminated, nor within close proximity to high-voltage electricity transmission lines. The development site, when amalgamated, will be larger than 1,000m^2.

external impacts that may be harmful to the staff and children; or (f) A site less than 1,000 square metres in area.	
3.3 – Hours of Operation	
The hours of operation for a child care premises within a residential area should be limited to the following: • Monday to Friday 7:00am – 6:00pm • Saturday 8:00am – 5:00pm An application proposing to operate outside of these hours will be assessed based on the potential impact to the neighbouring residential amenity.	**Variation.** The proposed hours of operation will be Monday to Friday 6:30am – 6:30pm, and Saturday 8:00am – 5:00pm. Whilst this is a slight variation to that of the requirement of LPP3, it is submitted that there would be no adverse impacts to the residential amenity, as identified by the Transport Impact Statement (**TIS**) and the Environmental Acoustic Assessment (**EAA**). It is further submitted that the additional hours are required to accommodate pick-up/drop-off prior to/after work. This in turn will also allow for lesser traffic within the peak hour as there is more time to spread the traffic across.
3.4 – Built Form	
The built form of the proposed development shall be in accordance with the following: (a) The design of the development shall respect the character of the area having regard to land-use, building scale, built form and boundary setbacks; (b) The maximum building height, street walls/fences, street setbacks and lot boundary setbacks shall be in accordance with the R-Codes as for a residential dwelling; (c) Paths allowing pedestrian and universal access should be made with durable, non-skid surfaces and	**Complies.** The design of the development is proposed in such a way to respect the character of the immediate residential area, as well as the Mandurah Aquatic and Recreation Centre and commercial areas. The architectural rooves, large windows, articulation, and facebrick reflect the residential area; whilst the remaining design (including the awning and other materials/colours) reflect the commercial developments including Mandurah Forum and the bulky good show rooms along Pinjarra Road. The development is single storey in height, which not only satisfies the deemed-to-comply requirements of the R-Codes, but

continuously provided across driveways; (d) Signage shall be in accordance with LPP2; and (e) Where possible, outdoor and indoor play areas for a Child Care Centre should: (i) Be in a safe location on the site and away from any adjoining noise sensitive premises; (ii) Be north facing and/or accessible to the winter sun; (iii) Create opportunities for casual surveillance of the outdoor play area from the premises building(s), adjacent land uses and the public domain where appropriate; and (iv) Have a regular shape in order to avoid the creation of poorly surveyed spaces.	also reflects the single storey dwellings within close proximity of the site. The development includes large setbacks to side boundaries, with the exception of the storeroom (boundary wall). These setbacks would satisfy the deemed-to-comply requirements of the R-Codes. The primary street setback of the development would satisfy the deemed-to-comply requirements of the R-Codes through averaging/compensating areas. Further, the development is setback well over the minimum requirement of 1.5m from the secondary street. Whilst the proposed fence/signage wall would not satisfy the deemed-to-comply requirements of the R-Codes, it is submitted that the fence would comfortably demonstrate compliance with the relevant design principles. Only a small portion of the fence is solid within the street setback area, and still allows for adequate passive surveillance. A universally accessible path is provided from the footpath along Coolibah Avenue, as well as from the car parking area via the shared space. Signage is indicative only. Signage is not subject of this application. The indoor play areas are centrally located and not directly adjacent to the carpark. The outdoor play areas are located away from Coolibah Avenue which is the busier of the two (2) roads. Safety is of utmost importance with childcare facilities and it is considered the play areas are within safe locations.

	A majority of the outdoor play area is north facing. The indoor play areas (Activity 2 and 4) have openable highlight windows to maximise sunlight. Activity 3 also has openable windows/doors, including to the east. Activity 1, whilst no direct opening to the north, does contain large windows to the west. Casual surveillance of all outdoor play areas is provided from all Activity rooms. Additionally, casual surveillance is provided from the visually permeable fencing along Third Avenue. Whilst the development is not of a regular shape, the development allows for acceptable surveyed spaces, as discussed above.
3.5 – Landscaping	
Landscaping is to be in accordance with the following requirements: (a) A minimum of 10% of the site area shall be landscaped; (b) The landscaped area shall include a minimum strip of 1.5 metres wide adjacent to all street boundaries; and (c) Landscaping is to be of a high quality through the use of trees within parking areas, the street verge and around buildings, complimented by extensive low-rise native landscaping. The City's Locality Street Tree Master Plan should be considered in design of landscaping.	**Variation.** Approximately 30% of the site is proposed to be landscaped, as per the Landscaping Design Plan and the Planting Plan. In terms of soft landscaping alone, this is well in excess of 10%. A majority of the development contains a landscaping strip of more than 1.5m between the building and the street boundaries, with the exception of the carpark. The reasoning for this variation was for the development to include the required amount of parking bays. Should this landscaping occur, there would be a likely shortfall of parking of 1-2 bays. The development has therefore created a larger landscaping dimension (2m and greater) within the front setback area (between the building and Coolibah Avenue) as compensation. It is submitted that this variation is deemed acceptable.

	It is submitted that the development proposed a high-quality landscaping design, with reference to the Landscaping Design Plan (Attachment 5) and the Planting Plan (Attachment 6). Trees are proposed within street setback areas and provided at a rate within the car park of one (1) tree per four (4) bays. Importantly, the proposed landscaping principally comprises of natural elements and avoids the use of artificial turf.
3.6 – Car Parking	
The minimum car parking requirement for child care centres in the local planning scheme is 4.5 parking bays per 100m^2 of NLA. The design of on-site parking shall be as follows: (a) Parking of vehicles shall not visually dominate the street frontage, with some or all of the required on-site parking located behind the building line or sleeved within the development; (b) Safe vehicular and pedestrian access be from a road that is capable of handling additional traffic volumes and can accommodate the traffic generated by the use; (c) Vehicles will be required to enter and exit the site in a forward gear; and (d) The site layout and location shall minimise the impacts of noise and headlight glare of vehicles to bedrooms and major habitable rooms for adjacent or neighbouring dwellings.	**Complies.** Pursuant to 4.2.2 of this report, the development requires 15.7 (rounded up to 16) car parking bays on site. The proposed development contains 16 car parking bays and also includes a dedicated reversing bay. All parking is sleeved within the development – only the crossover and 2 parking bays will front Coolibah Avenue. Additionally, 15 out of the 16 bays are generally in line or behind the building line, with 13 bays being located behind the building line. Sufficient sightlines are provided for the adjacent footpath and Coolibah Avenue. Safe access and adequate traffic volumes are proposed, as identified within the TIS. Due to the presence of the dedicated reversing bay, all vehicles will be able to access and egress the site in forward gear. Cars will exit the site to Coolibah Avenue, whereby the land across this road is a reserve with no residential dwellings. No adverse impacts are expected.

3.7 – Traffic	
A traffic impact assessment and/or traffic management report, prepared by a suitably qualified Transport Consultant, may be required to be submitted with an application for development approval. (a) The site characteristics and surrounding area; (b) The proposal and its expected trip generation; (c) Parking requirements, including the design of parking areas, and any pick-up and drop off facilities; (d) Existing traffic conditions and any future changes expected to the traffic conditions; (e) Current road safety conditions, including an accident history in the locality; (f) The expected impact of the proposed development on the existing and future traffic conditions; and (g) The impact on surrounding verges and the management of parking overflow. The proposed use should be approved only if it will have a minimal impact on the functionality and amenity of an area and will not create or exacerbate any unsafe conditions for pedestrians or road users.	**Complies.** A TIS was prepared by the Applicant's expert traffic consultant, SALT, dated 19 July 2024. This TIS was prepared in accordance with the Western Australian Planning Commission's Transport Impact Assessment Guidelines: Volume 4 – Individual Development (**TIA Guidelines**). As the TIS was prepared in accordance with the TIA Guidelines, it is considered that the TIS is consistent with the intent of requirement. A summary of the key findings of the TIS is listed below. The development meets the City's car parking requirement. The car parking bays exceed the minimum required width of Australian Standard AS2890.1 at 2.6m. A turning bay is proposed to be provided at the end of the parking aisle to allow vehicles to turn around and exit the site in a forward direction, should the car park be fully occupied on their arrival. An aisle extension of 1.3m is proposed for the dead-end parking space (#8), exceeding the required 1.0m as per Australian Standard AS2890.1 and allowing vehicles to suitably enter and exit this space. Therefore, in each of the AM and PM peak hours, traffic is generated in the order of 60 trips, with 30 inbound and 30 outbound trips. A total of approximately 256 daily vehicle trips (weekdays) and significantly less on Saturdays.

	In the morning, 60% of traffic will arrive from the south and depart to the north, and 40% will arrive from the north and depart to the south. In the afternoon/evening, 40% of traffic will arrive from the south and depart to the north, and 60% will arrive from the north and depart to the south. The addition of up to 30 vehicles arriving or departing the site during the weekday peak hours equates to one vehicle entering or exiting the site every 2 minutes on average. It is anticipated that this can be readily accommodated by the surrounding road network. The site is accessible for pedestrians and cyclists. The site is also well serviced by public transport.
3.8 – Noise	
A Noise Assessment, prepared by a suitably qualified Acoustic Consultant, may be required for the development of a child care premises, where it is determined that the proposal may negatively impact the surrounding properties through the generation of noise. (a) Where a child care premises is located adjacent to a noise sensitive premises, the noise generating activities of the child care premises such as the outdoor play areas, parking areas and any plant and equipment are to be located away from the noise sensitive premises; (b) Where, due to design limitations or safety considerations, noise generating activities such as outdoor play areas are located close to noise sensitive premises, appropriate noise	**Complies.** The EAA as at Appendix 4 was prepared by Herring Storer Acoustics, dated 23 July 2024. Should the development be designed in accordance with the recommendations within the EAA, the proposed development would be deemed to comply with the requirements of the *Environmental Protection (Noise) Regulations 1997*, and therefore create no adverse noise impacts. A summary of the recommendations from the EAA is listed below: No outdoor play is permitted before 7:00am. A 2.2m high acoustic fence separating the neighbours to the north and east to be installed, at the cost of the Applicant. Colourbond is an acceptable material, and

attenuation measures are to be undertaken; and (c) The design and construction of buildings may include noise attenuation measures to reduce impact from external sources and to achieve accepted indoor noise limits.	any other fence with a higher surface density would meet also the requirements. Mechanical plant (roof mounted) would need to be barriered by a barrier at least 0.5m above the top of the plant for childcare mechanical plant. It is submitted that the Applicant is agreeable to such a condition whereby the development is to abide by the recommendations of the EAA.
3.9 – Waste Management	
A WMP is required to be prepared and submitted as part of the application for development approval. The WMP shall be prepared in accordance with the City's Commercial and Industrial Development Template and shall detail how bins will be stored and serviced in a way that protects the residential amenity of the area.	**Complies.** A WMP has been prepared and provided with this application. Reference should be made to section 3.0 of this report, and to Appendix 3 – Waste Management Plan.

Having regard to the above, the proposed development is considered to comply with the requirements specified in the LPP and remain consistent with the objectives of the policy, therefore warranting the exercise of discretion.

4.4 Planning and Development (Local Planning Schemes) Regulations 2015

Clause 67(2) of the Deemed Provisions contained in Schedule 2 of the *Planning and Development (Local Planning Schemes) Regulations 2015* sets out the relevant matters for consideration that the local government is to have due regard to in determining an application for development approval.

The following matters are considered relevant to the proposed development and are addressed in the following table.

Clause 67(2) Matter for Consideration	Justification
(a) the aims and provisions of this Scheme and any other local planning scheme operating within the Scheme area;	The proposed development is a discretionary land use within the 'Residential' zone and is therefore capable of approval.

Clause 67(2) Matter for Consideration	Justification
(b) the requirements of orderly and proper planning including any proposed local planning scheme or amendment to this Scheme that has been advertised under the *Planning and Development (Local Planning Schemes) Regulations 2015* or any other proposed planning instrument that the local government is seriously considering adopting or approving;	This Report has demonstrated the proposal's compliance with the applicable local and State planning framework documents. There are no known proposed planning instruments that the local government is seriously considering adopting or approving.
(f) any local planning policy for the Scheme area;	Section 4.3 of this Report has demonstrated the proposal's compliance with the City's LPP3.
(m) the compatibility of the development with its setting, including — (i) the compatibility of the development with the desired future character of its setting; and (ii) the relationship of the development to development on adjoining land or on other land in the locality including, but not limited to, the likely effect of the height, bulk, scale, orientation and appearance of the development;	The height, bulk and scale of the development is consistent with its surrounds, and therefore will not adversely impact the adjoining properties. In terms of land use, the area is currently includes a mixture of residential, commercial (bulky good showrooms and a shopping centre), and a recreation. It is considered that this development is compatible with all these uses.
(n) the amenity of the locality including the following – (i) Environmental impacts of the development; (ii) The character of the locality; (iii) Social impacts of the development;	The proposal is not considered to result in any adverse environmental impacts. Rather, the planting of significantly more trees and other plants will improve the current environmental amenity. As for the character of the locality, the design of the development is reflective of both the residential and the commercial uses nearby. This ensures the proposal's consistency with the existing character from a visual perspective. Furthermore, it is noted that the EAA, TIS and WMP have demonstrated the site's suitability

Clause 67(2) Matter for Consideration	Justification
	without adversely impacting on adjoining or surrounding properties. There are no negative social impacts considered to be associated with the proposal.
(p) whether adequate provision has been made for the landscaping of the land to which the application relates and whether any trees or other vegetation on the land should be preserved;	Approximately 30% of the site is proposed to be landscaped as per the Landscaping Design Plan and the Planting Plan. In terms of soft landscaping alone, this is well in excess of 10%. The sparse landscaping on site has been investigated to be retained, however due to design requirements, the existing vegetation is unable to be retained. It has therefore been identified that high quality landscaping and planting is required to counteract for this loss, to which has been provided. It is submitted that the proposal has duly considered the existing site conditions.
(s) the adequacy of – (i) the proposed means of access to and egress from the site; and (ii) arrangements for the loading, unloading, manoeuvring and parking of vehicles;	The proposal seeks to provide a single, double width crossover to provide access to the on-site parking areas, whilst removing the redundant crossovers and reinstating that area of the verge with grass. The TIS has demonstrated the acceptability of the proposed parking arrangements in terms of not only catering for demand but also enabling safe and efficient access.
(t) the amount of traffic likely to be generated by the development, particularly in relation to the capacity of the road system in the locality and the probable effect on traffic flow and safety;	The TIS has demonstrated that the surrounding network will successfully cater for the additional traffic generated by the proposal.
(u) the availability and adequacy for the development of the following – (i) public transport services; (ii) public utility services;	The TIS demonstrates the site's close proximity to high frequency public transport on Coolibah Avenue, as well as ample provision made for cyclists.

Clause 67(2) Matter for Consideration	Justification
(iii) storage, management and collection of waste; (iv) access for pedestrians and cyclists (including end of trip storage, toilet and shower facilities); (v) access by older people and people with disability;	A WMP has also been prepared to ensure adequate storage and collection of waste. Due to the nature of the facility, access by older people is not required. The facility will however comply with the national requirements for child care facilities. In addition, the proposal has made provision for the front drop-off bay to be an 'accessible bay' which will provide a very high level of functionality for a user with a disability, should it be required.
(w) the history of the site where the development is to be located;	The proposal utilises two (2) residential lots containing original single dwellings which will be demolished.

5.0 Conclusion

The Applicant is seeking development approval for a proposed 'Child Care Premises' for 76 children and 12 staff.

For the reasons outlined in this Report, our view is that the proposed development is suitable for the site and is consistent with the objectives and requirements of the applicable planning framework, specifically LPS12 and LPP3. Further, the proposal is considered consistent with the character and amenity of the area, both now and into the future, and will not result in any adverse impacts on the surrounding users and occupiers, as evidenced by the accompanying EAA, TIS and WMP.

We trust that this information is to your satisfaction and welcome the opportunity to review a draft suite of conditions of approval. We otherwise look forward to your prompt and favourable determination.

Altus Planning

Appendix 1 - Development Plans

Appendix 2 -
Transport Impact Statement

Appendix 3 -
Waste Management Plan

Appendix 4 -
Environmental Acoustic Assessment

Appendix 5 -
Landscape Design Plan

Appendix 6 -
Landscape Planting Plan

Appendix 7 -
Stormwater Management Plan

Appendix 8 -
Contour and Feature Survey Plan

Devnani Property Holdings

Address:2-4 Third Ave, Mandurah

Childcare Centre

Job Number: 24022

Drawing No	Description
01	Cover Page
02	3D Perspectives
03	3D Perspectives
04	Existing Site Survey
05	Site Plan
06	Amalgamation Plan
07	Context Plan
08	Aerial Plan
09	Ground Floor
10	Breeze Path Plan
11	Roof Plan
12	Elevations
13	Sections

GERMANO DESIGNS

Unit: 3/1 Mulgul Road, Malaga W.A 6090 (08) 9248 8392 germanodesigns.com.au

Revision	Description	Date
7.00	DRP	03.07.24
6.00	Re-Design	27.06.24
5.00	Carpark Changes	23.05.24
4.00	Concept	21.05.24
3.00	Concept	06.05.24
2.00	Concept	12.04.24
1.00	Concept	11.04.24

Project North:

Client
Devnani Property Holdings

Project Name
Childcare Centre

Project Address
2-4 Third Ave, Mandurah

Drawing Title:
3D Perspectives

Scale:	Sheet Size:
1:6.67	A1
Project No:	**Revision Number:**
24022	7.00

Drawing No.:
02 of 13

GERMANO DESIGNS
Unit: 3/1 Mulgul Road, Malaga W.A 6090
(08) 9248 8392 germanodesigns.com.au

Revision	Description	Date
7.00	DRP	03.07.24
6.00	Re-Design	27.06.24
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4.00	Concept	21.05.24
3.00	Concept	06.05.24
2.00	Concept	12.04.24
1.00	Concept	11.04.24

Project North:

Client
Devnani Property Holdings

Project Name
Childcare Centre

Project Address
2-4 Third Ave, Mandurah

Drawing Title:
3D Perspectives

Scale:	Sheet Size:
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Project No:	**Revision Number:**
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Drawing No.:
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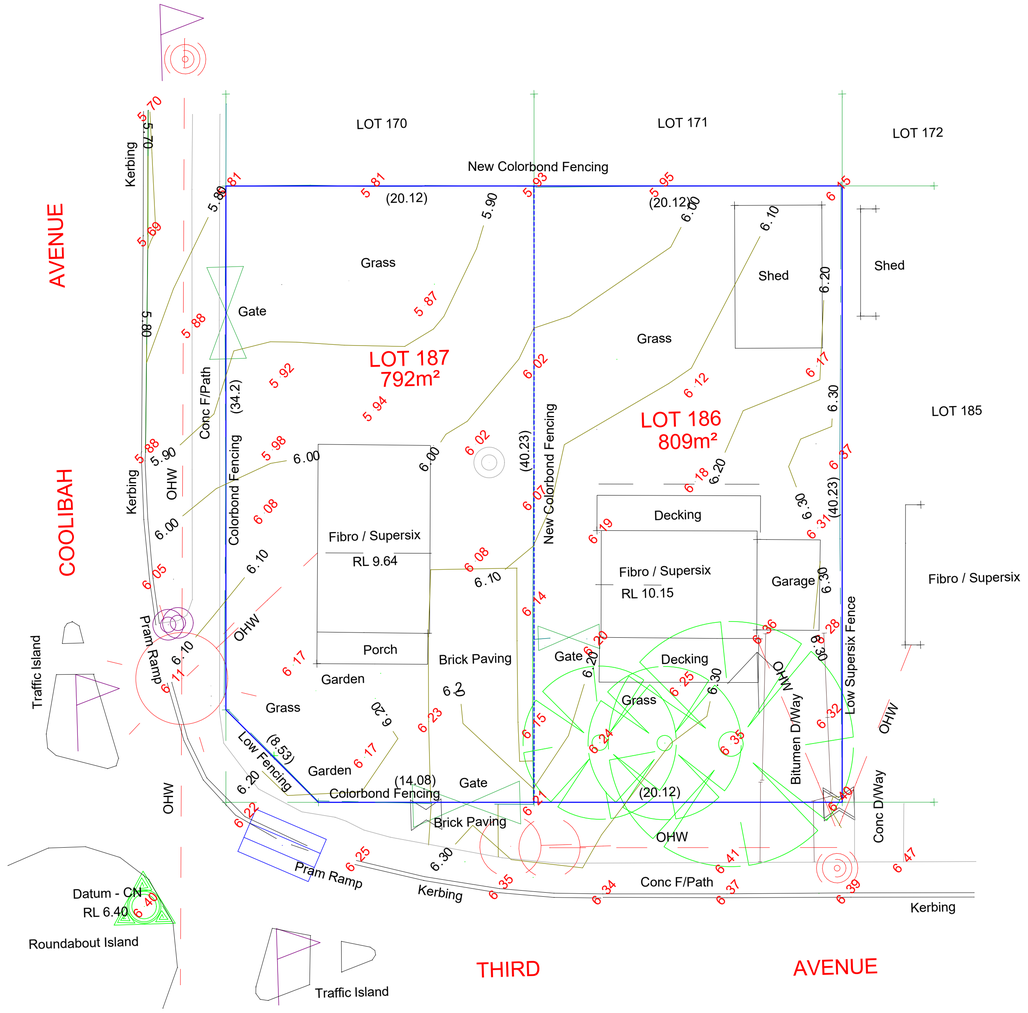

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	Datum
	SSM
	Survey Station
PG	Peg Gone
PF	Peg Found
PFD	Peg Fd Disturbed
N&P	Nail & Plate
GAS	Gas Meter
	GAS Marker
	Gas Valve
	Light Pole
	Electrical MH
	Power Pole
	Stay Pole
	Strainer Wire
	Power Dome
	Electric Pit
	Comms Pit
	TEL Pit
	Telecom Pilla r
	Camera
	Gate
	Litter Bin
	Letter Box
	Bollard
	Sign
	Multi Post Sign
	Traffic Signal Post
	Traffic Signal Box
	Gully Pit
	Drainage MH
	Hydrant Ground
	Hydrant Pillar
	Flushing Point
	Hydrant
	Stop Valve
	Water Meter
	Water Tap
	Bore
	Retic Box
	Sewer I.O.
	Sewer House Conn.
	Sewer MH
	Tree
	Finished Floor Level

0 1 2 3 4 5 10 15 20 25

REV.	DATE:	REVISION NOTE:	SURVEYED	DRAWN	CHECKED
0	19/7/24	Original	BM	BM	MG

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Suite 29 / 44 Kings Park Rd
West Perth WA 6005
ABN: 53 060 995 066

MANISH DEVNANI
2 and 4 Third Avenue Mandurah
Contour and Feature Survey

CLIENT:	Manish Devnani		
PROJECT:	2 and 4 Third Avenue Mandurah		
DESCRIPTION:	Contour and Feature Survey		
HORIZ. GRID:	NA	VERT. DATUM:	AHD
FIELDBOOK REF.:	BM010 - P54	TXT/GSI REF.:	NA
FILE NAME:	467-2602 Third-CF-mjo		
ISSUED PLAN:	467-2602 Third-CF.pdf		

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4.00	Concept	21.05.24
3.00	Concept	06.05.24
2.00	Concept	12.04.24
1.00	Concept	11.04.24

Project North:

Client
Devnani Property Holdings

Project Name
Childcare Centre

Project Address
2-4 Third Ave, Mandurah

Drawing Title:
Existing Site Survey

Scale:	Sheet Size:
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Project No:	Revision Number:
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Drawing No.:
04 of 13

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LEGEND	
	Peg
	Datum
	SSM
	Survey Station
PG	Peg Gone
PF	Peg Found
PFD	Peg Fd Disturbed
N&P	Nail & Plate
GAS	Gas Meter
	GAS Marker
	Gas Valve
	Light Pole
	Electrical MH
	Power Pole
	Stay Pole
	Strainer Wire
	Power Dome
	Electric Pit
	Comms Pit
	TEL Pit
	Telecom Pillar
	Camera
	Gate
	Litter Bin
	Letter Box
	Bollard
	Sign
	Multi Post Sign
	Traffic Signal Post
	Traffic Signal Box
	Gully Pit
	Drainage MH
	Hydrant Ground
	Hydrant Pillar
	Flushing Point
	Hydrant
	Stop Valve
	Water Meter
	Water Tap
	Bore
	Retic Box
	Sewer I.O.
S	Sewer House Conn.
	Sewer MH
	Tree
	Finished Floor Level

Zone	Area	Perim
Store	5.71	9,960
Portico	9.30	12,200
Bin Store	9.45	12,400
Childcare	467.25	110,160
	491.71 m²	144,720 mm

Site Calculations	
Site Area:	1,600.62m²
Building Footprint:	472.96m2
Site Coverage:	29.54%
Allowable Site Coverage:	50%
Zoning:	R25
Policies:	Scheme 12
Heritage:	NA
Bushfire:	NA
BAL:	NA
Acoustic:	TBC
Sewer:	Back Left Cnr
Power:	TBC
Coastal:	NA
Water:	2x Water Meter
Wind Rating:	TBC

Revision	Description	Date
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2.00	Concept	12.04.24
1.00	Concept	11.04.24

Project North:

Client
Devnani Property Holdings

Project Name
Childcare Centre

Project Address
2-4 Third Ave, Mandurah

Drawing Title:
Site Plan

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Drawing No.:
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REV.	DATE:	REVISION NOTE:	SURVEYED	DRAWN	CHECKED
0	19/7/24	Original	BM	BM	MG

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E: brad@mcgregorsurveys.com.au West Perth WA 6005
W: mcgregorsurveys.com.au ABN: 53 060 995 066

MANISH DEVNANI
2 and 4 Third Avenue Mandurah
Contour and Feature Survey

CLIENT:	Manish Devnani
PROJECT:	2 and 4 Third Avenue Mandurah
DESCRIPTION:	Contour and Feature Survey
HORIZ. GRID:	NA
VERT. DATUM:	AHD
FIELDBOOK REF.:	BM010 - P54
TXT/GSI REF.:	NA
FILE NAME:	467-2602 Third-CF-mjo
ISSUED PLAN:	467-2602 Third-CF.pdf

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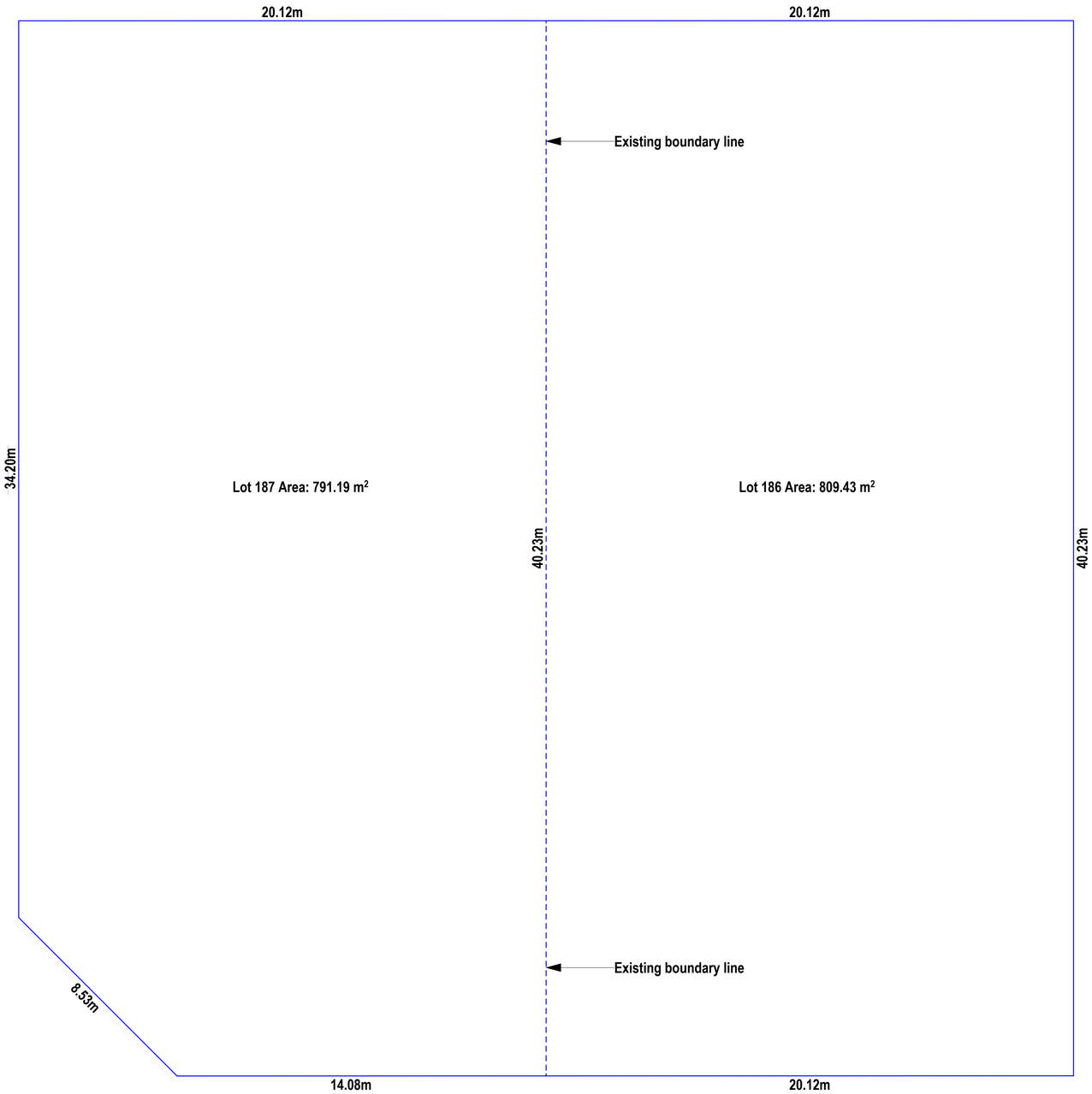

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Client
Devnani Property Holdings

Project Name
Childcare Centre

Project Address
2-4 Third Ave, Mandurah

Drawing Title:
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Project No:	**Revision Number:**
24022	7.00

Drawing No.:
06 of 13

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Commercial: 303 Pinjarra Road, Mandurah

Commercial: 313-315 Pinjarra Road, Mandurah

Residential Developments: Third Ave, Mandurah

Revision	Description	Date
7.00	DRP	03.07.24
6.00	Re-Design	27.06.24
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2.00	Concept	12.04.24
1.00	Concept	11.04.24

Project North:

Client
Devnani Property Holdings

Project Name
Childcare Centre

Project Address
2-4 Third Ave, Mandurah

Drawing Title:
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Project No:	Revision Number:
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Drawing No.:
07 of 13

GERMANO DESIGNS
Unit: 3/1 Mulgul Road, Malaga W.A 6090
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Revision	Description	Date
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1.00	Concept	11.04.24

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Client
Devnani Property Holdings

Project Name
Childcare Centre

Project Address
2-4 Third Ave, Mandurah

Drawing Title:
Aerial Plan

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Project No:	**Revision Number:**
24022	7.00

Drawing No.:
08 of 13

GERMANO DESIGNS
Unit: 3/1 Mulgul Road, Malaga W.A 6090
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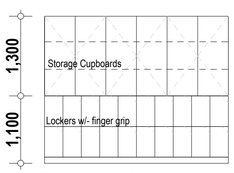
Childcare Calculations

Room	Age (Yrs)	Quant.	Size	Staff Req
Activity 1	*0-2*	*16*	*53.53m²*	*4*
Activity 2	*2-3*	*20*	*66.01m²*	*4*
Activity 3	*3-5*	*20*	*65.96m²*	*2*
Activity 4	*3-5*	*20*	*65.00m²*	*2*
Total Internal = (Min 3.25m² per child)		**76**	**250.50m²** (Min 247.00m² req)	**14**
Total External Play Area = (Min 7m² per child)		**76**	**548.97m²** (Min 532.00m² req)	

Parking Calculations

Description	NLA	Req	Provided
4.5 Bays per 100m² NLA	*349.52m²*	*15.70*	*16*



Typical Locker Setup 1

Zone	Area	Perim
Store	5.71	9.960
Portico	9.30	12.200
Bin Store	9.45	12.400
Childcare	467.25	110.160
	491.71 m²	144.720 mm

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Building Footprint:	472.96m2
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Bushfire:	NA
BAL:	NA
Acoustic:	TBC
Sewer:	Back Left Cnr
Power:	TBC
Coastal:	NA
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Wind Rating:	TBC

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Client
Devnani Property Holdings

Project Name
Childcare Centre

Project Address
2-4 Third Ave, Mandurah

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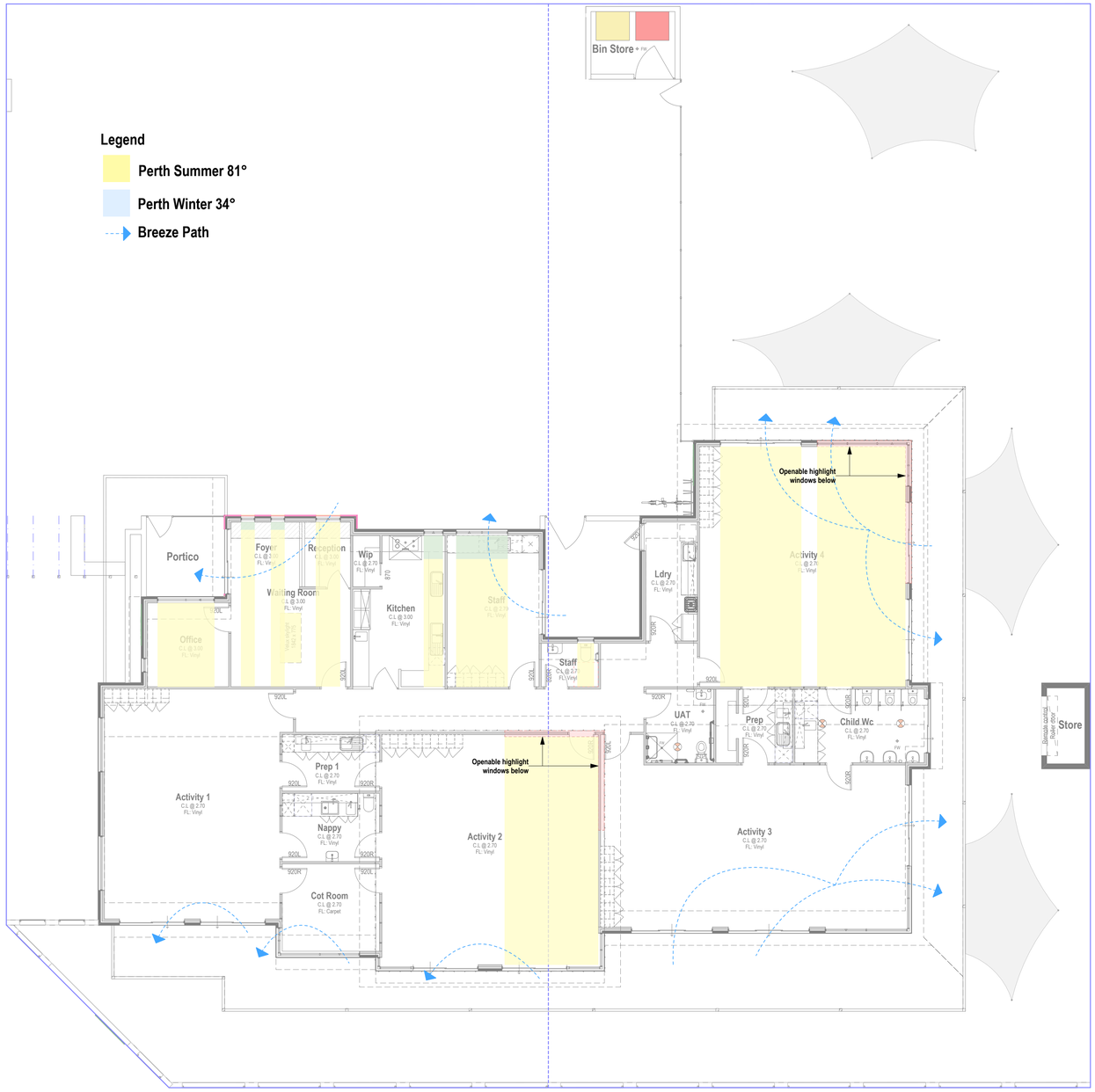

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2.00	Concept	12.04.24
1.00	Concept	11.04.24

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Client
Devnani Property Holdings

Project Name
Childcare Centre

Project Address
2-4 Third Ave, Mandurah

Drawing Title:
Breeze Path Plan

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GERMANO DESIGNS
Unit: 3/1 Mulgul Road, Malaga W.A 6090
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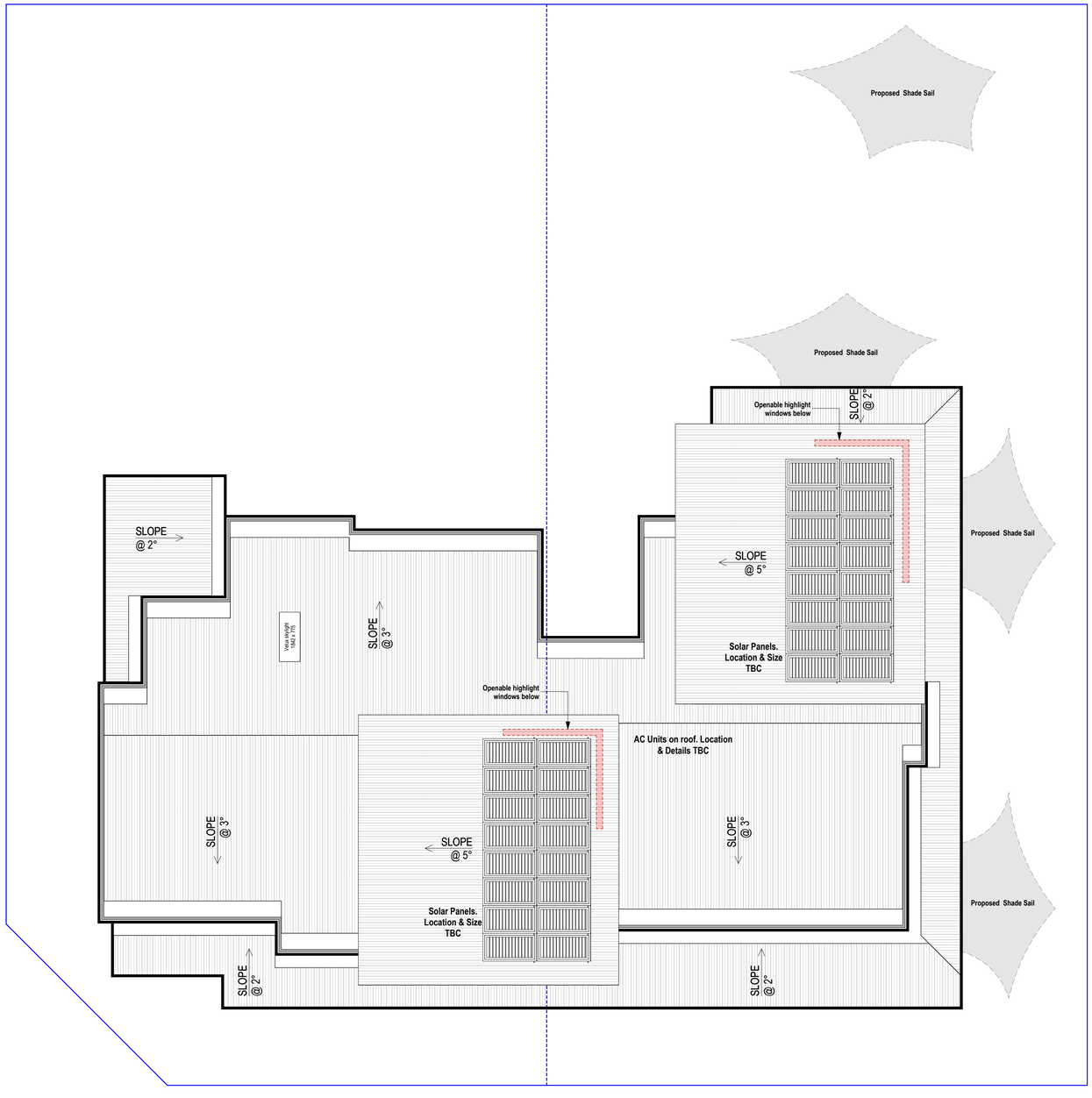

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1.00	Concept	11.04.24

Project North:

Client
Devnani Property Holdings

Project Name
Childcare Centre

Project Address
2-4 Third Ave, Mandurah

Drawing Title:
Roof Plan

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Project No:	**Revision Number:**
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Unit: 3/1 Mulgul Road, Malaga W.A 6090
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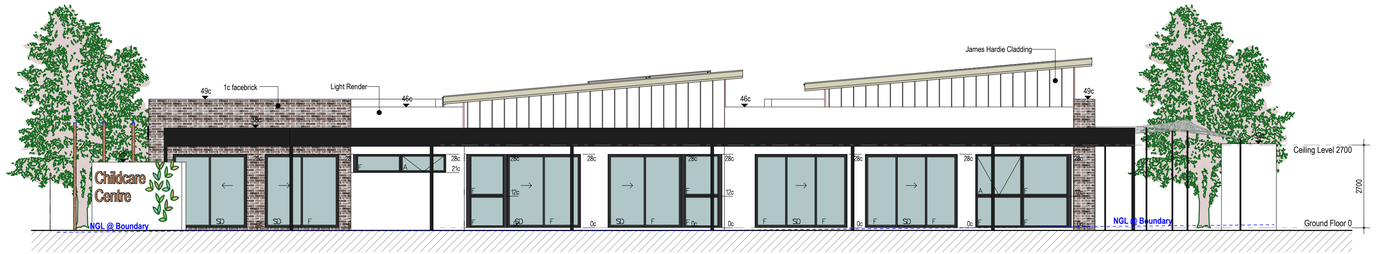

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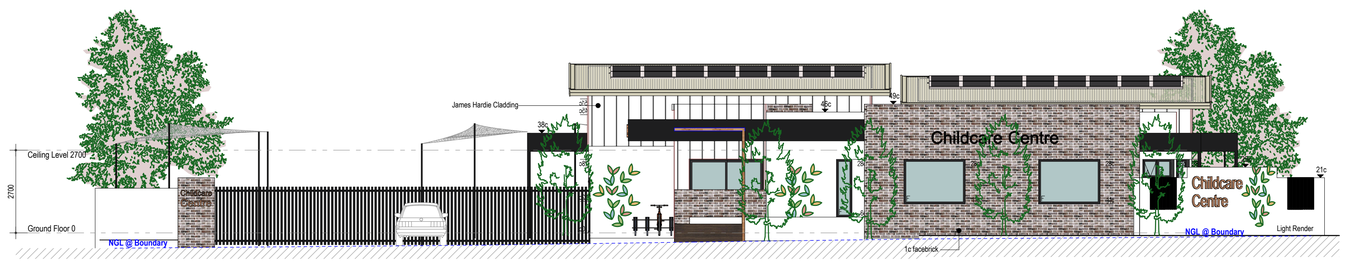

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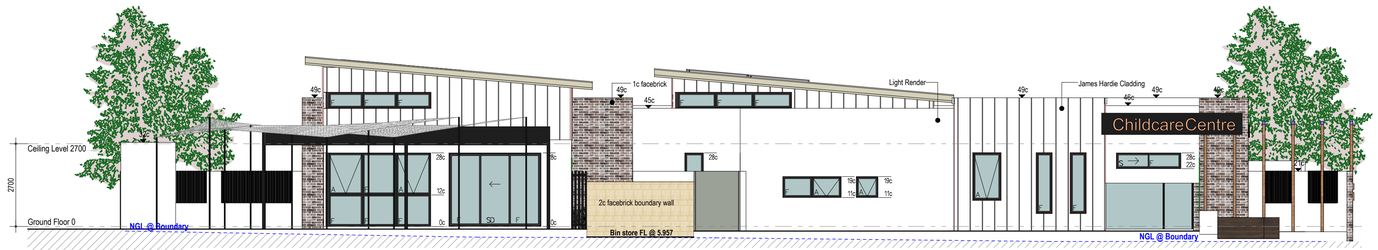

E3 North Elevation
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E4 East Elevation
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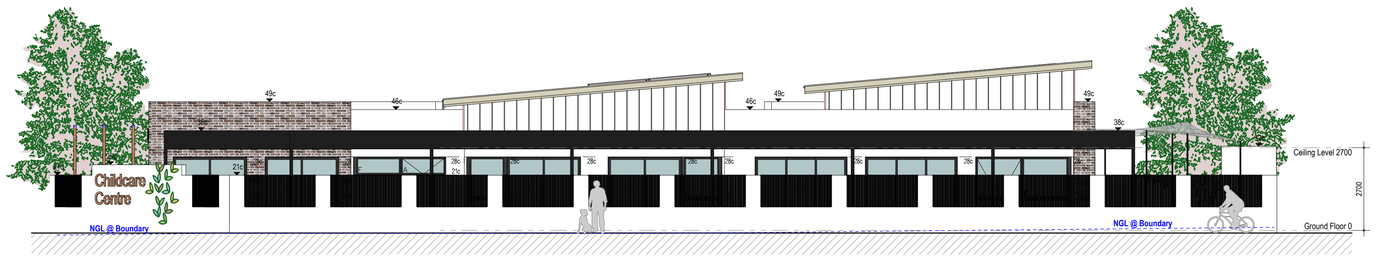

E5 Elevation
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Material & Colour Schedule

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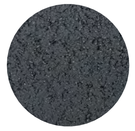
Charcoal Lustre"

Acrylic Render
Dulux "Mt Aspiring"

Powdercoated Gate

Facebrick
Midland Brick



Bitumen Driveway

Liquid Limestone Path

Roof
Colorbond "Surfmist"

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6.00	Re-Design	27.06.24
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1.00	Concept	11.04.24

Project North:

Client
Devnani Property Holdings

Project Name
Childcare Centre

Project Address
2-4 Third Ave, Mandurah

Drawing Title:
Elevations

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24022	7.00

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GERMANO DESIGNS
Unit: 3/1 Mulgul Road, Malaga W.A 6090
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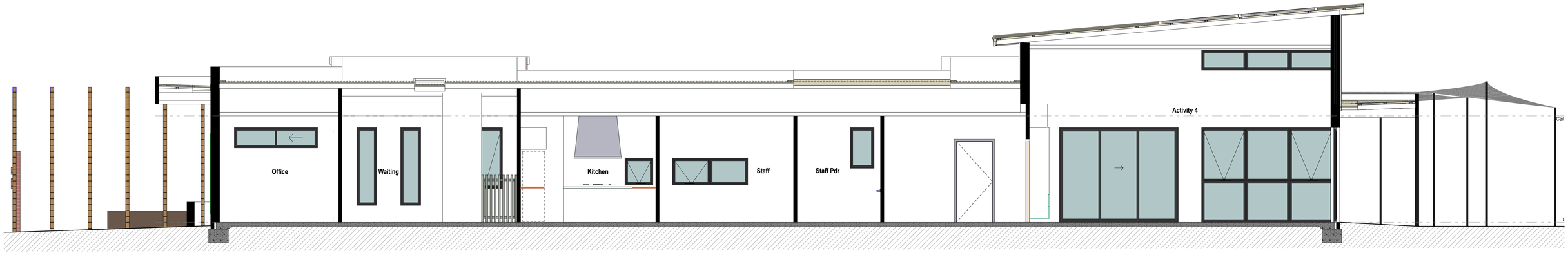

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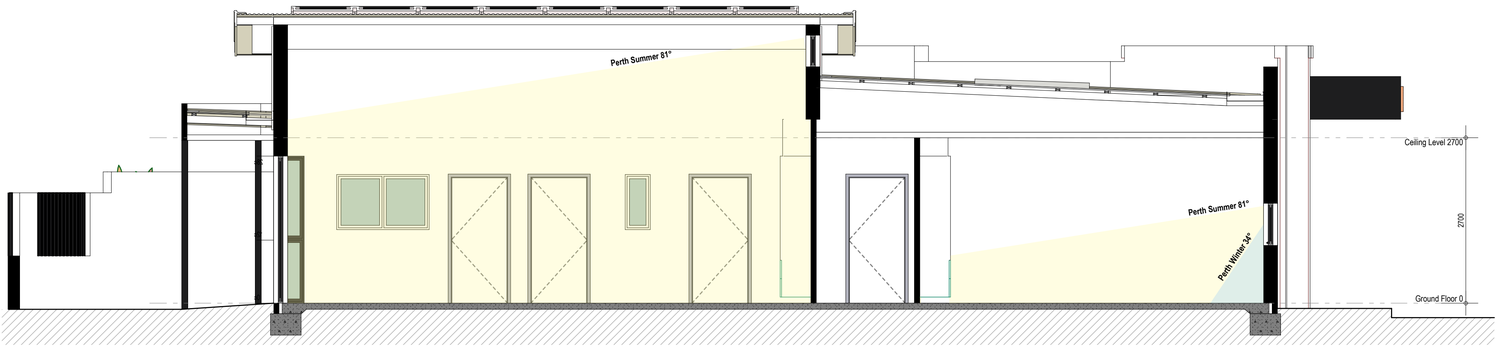

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1.00	Concept	11.04.24

Project North:

Client
Devnani Property Holdings

Project Name
Childcare Centre

Project Address
2-4 Third Ave, Mandurah

Drawing Title:
Sections

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Revision Number: 7.00
Drawing No.: 13 of 13

GERMANO DESIGNS
Unit: 3/1 Mulgul Road, Malaga W.A 6090
(08) 9248 8392 germanodesigns.com.au

PROPOSED CHILDCARE CENTRE

2-4 THIRD AVENUE, MANDURAH

TRANSPORT IMPACT STATEMENT

PROPOSED CHILDCARE CENTRE 2-4 THIRD AVENUE, MANDURAH

Client: **Devnani Property Holdings Pty Ltd**

Report Reference: 24283T

File Path: Y:\2024\24283 – 2-4 Third Avenue, Mandurah\08 Reports\24283TREP01F01.docx

Friday, July 19, 2024

Document Control

Version:	Prepared By:	Position:	Date:	Reviewed By:	Position:	Date:	Authorised By:	Position:	Date:
D01	Claudia Goodliffe	Project Traffic Engineer	15 July 2024	Jarrod Wicks	Director	15 July 2024	Jarrod Wicks	Director	15 July 2024
F01	Claudia Goodliffe	Project Traffic Engineer	19 July 2024	Jarrod Wicks	Director	19 July 2024	Jarrod Wicks	Director	19 July 2024

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Level 1 Suite 2A, 82 Smith St Darwin City NT 0800
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CONTENTS

LIST OF FIGURES

1 INTRODUCTION

SALT has been engaged by Devnani Property Holdings Pty Ltd to prepare a Transport Impact Statement (TIS) for the proposed childcare centre development to be located at 2-4 Third Avenue in Mandurah.

The subject site comprises two lots on the north-eastern corner of the roundabout intersection of Third Avenue and Coolibah Avenue. Each lot is currently occupied by a single dwelling, with vehicular access from Third Avenue.

The site is surrounding by various key destinations including Mandurah Forum shopping centre to the north, Mandurah Aquatic and Recreation Centre to the northwest, Mandurah Library to the east, Dudley Park Primary School to the south-west, and various parks nearby.

Figure 1 depicts the location of the subject site with respect to the surrounding road network and land uses. An aerial view of the site is provided in Figure 2.

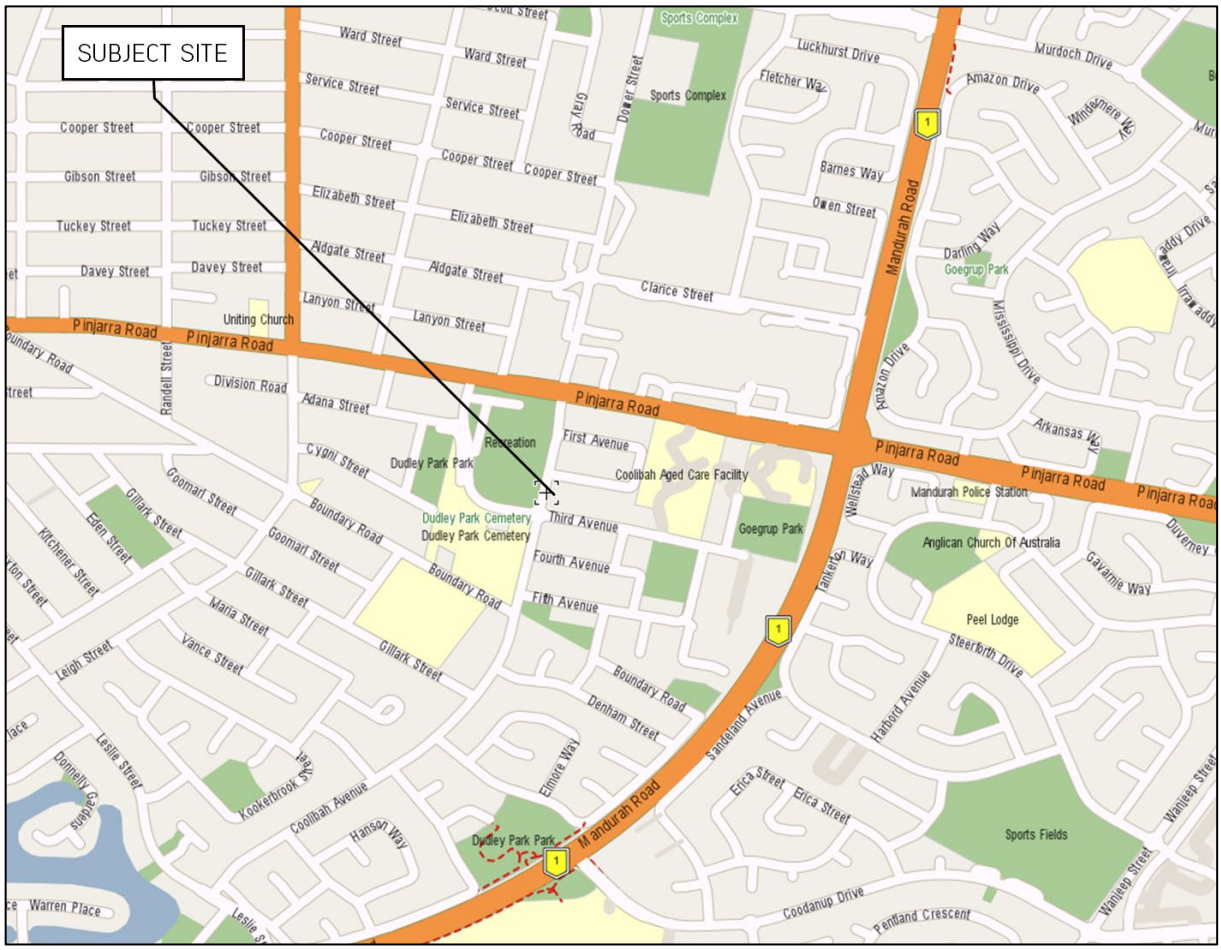

Figure 1 Subject site locality

Figure 2 Aerial view of subject site

As per the Transport Impact Assessment Guidelines (WAPC, Volume 4 – Individual Development), a TIS is required for developments that would be likely to generate moderate volumes of traffic (10–100 vehicular trips per hour), and therefore would have a moderate overall impact on the surrounding land uses and transport network.

The proposal is anticipated to generate a moderate amount of traffic as is calculated in Section 6 of this TIS. As such, a TIS is deemed appropriate for this development.

In the course of preparing this TIS, the following has been undertaken:

- Development plans and background information has been reviewed;
- Design advice has been provided to the project team;
- A desktop inspection of the subject site and its environs has been undertaken;
- Swept path analysis has been conducted; and
- The traffic and parking implications of the proposal have been assessed.

The following sets out SALT's findings with respect to the traffic engineering matters of the proposal

2 PROPOSED DEVELOPMENT

It is proposed to demolish the existing dwellings and develop the site to provide a single-storey childcare centre to cater for up to 76 children.

Vehicle access to the site is proposed via a new 6.1m wide crossover to Coolibah Avenue, situated toward the northern end of the site away from the roundabout. The existing crossovers on Third Avenue are to be removed and reinstated to kerb and channel.

It is proposed to provide an on-site car park of 16 spaces, including one (1) accessible parking space.

Four (4) bicycle parking spaces are proposed to be provided on-site.

An extract of the development plans assessed in this report are provided in Figure 3, with detailed plans provided in APPENDIX 1.

Figure 3 Development plans extract (source: Germano Designs)

3 VEHICLE ACCESS AND PARKING

3.1 VEHICLE ACCESS

Vehicular access to the site is to be provided via a new 6.1m wide crossover to Coolibah Avenue. This is to be constructed to Council standards.

The crossover is proposed to be situated toward the northern end of the site frontage, suitably distanced from the roundabout at Third Avenue.

The 6.1m wide crossover exceeds the requirement of Australian Standard AS2890.1 for access to a car park of this size and nature (Class 1A and 3, local frontage road and <25 parking spaces). It allows an Australian Standard B85 and B99 vehicle to pass simultaneously when entering and exiting the site, as demonstrated by turn paths, with diagrams provided in APPENDIX 2.

A pedestrian sight triangle 2.0m by 2.5m is proposed on the southern (exit) side of the driveway, complying with Australian Standard AS2890.1. This is to be kept clear of obstructions, to allow visibility between exiting drivers and any pedestrians present on Coolibah Avenue

3.2 CAR PARKING PROVISIONS

Schedule 2 of the Mandurah Planning Scheme specifies the rate of car parking to be provided to developments. For a childcare centre, a rate of 4.5 parking spaces per 100m^2 of net lettable floor (NLA) area is required.

As per the Planning Scheme definitions, NLA does not include toilets, tea rooms, plant rooms and other service areas. In this case, the proposal has a NLA of 349.54m^2.

Therefore, applying the above parking rate, the proposal has a statutory requirement for 16 parking spaces (rounding up to the nearest whole number as per the Planning Scheme). The proposal meets this requirement, with 16 spaces proposed on-site.

Further to the above, the Building Code of Australia specifies the rate of accessible (DDA) parking to be provided for various building types. A childcare centre has a requirement for one (1) DDA parking space per 100 car parking spaces or part thereof. The proposal includes one (1) DDA parking space, meeting this requirement.

3.3 CAR PARKING LAYOUT

Parking spaces are proposed to be 2.6m wide and 5.4m long, accessed via a 6.1m wide aisle. These dimensions exceed the requirement of Australian Standard AS2890.1 for both short-term (parent, User Class 3) parking and long-term (staff, User Class 1A) parking.

The DDA parking space is proposed to be 2.6m wide and 5.4m long, with a shared space of 2.4m wide and 5.4m long, exceeding the requirement of Australian Standard AS2890.6.

A turning bay is proposed to be provided at the end of the parking aisle to allow vehicles to turn around and exit the site in a forward direction, should the car park be fully occupied on their arrival.

An aisle extension of 1.3m is proposed for the dead-end parking space (#8), exceeding the required 1.0m as per Australian Standard AS2890.1 and allowing vehicles to suitably enter and exit this space.

Vehicle access to key parking spaces and the turning bay is demonstrated by turn paths, with diagrams provided in APPENDIX 2.

4 PROVISION FOR SERVICE VEHICLES

A childcare centre does not generate a significant demand for loading activity, and as such a dedicated loading bay is not required. Deliveries will occur via cars and vans that can park within the on-site car park on-street at the site frontage.

Waste is to be collected on-site by a private contractor likely using a standard 8.8m long waste truck (Medium Rigid Vehicle, MRV). The truck can enter and exit the site in a forward direction, using the vacant car park to turn around on-site if waste collection is scheduled outside of operating hours. Waste truck movements are demonstrated by turn path analysis, with diagrams provided in APPENDIX 2.

Refer to the Waste Management Plan prepared by SALT for further details on waste collection arrangements.

5 HOURS OF OPERATION

The childcare centre is proposed to operate between 6:30am-6:30pm Monday to Friday and 8am-5pm on Saturdays. We note that Saturday operation is sought for future flexibility, though the likelihood is that the centre will only operate Monday to Friday.

6 DAILY TRAFFIC VOLUMES AND VEHICLE TYPES

6.1 TRAFFIC GENERATION

The critical assessment periods for traffic impacts for a childcare centre are the weekday morning and evening peak periods typically from 7:00am-9:00am and 4:00pm-6:00pm.

Based on case study data collected at other childcare centres, a peak hour trip generation rate of 0.8 trips per child is adopted. This is also in line with the rate provided by the RTA Guide to Traffic Generating Developments. When applied to the 76-place childcare centre, this results in a traffic generation of 60 trips per hour.

It is assumed that the proportion of inbound and outbound trips in each peak period would be 50% / 50% considering the short stay nature of childcare drop-off and pick-up activity.

Therefore, in each of the AM and PM peak hours, traffic is generated in the order of 60 trips, with 30 inbound and 30 outbound trips.

With regard to daily trip generation, a first principles assessment is considered appropriate. Assuming some children have siblings at the centre and that some children are walked (say 10% in total), this would equate to 60 x 0.9 x 4 = 216 daily vehicle trips. This includes trips both to and from the centre. Adding an estimated 40 daily trips for staff/deliveries/visitors equates to a total of approximately 256 daily vehicle trips.

If the centre chooses to open on Saturdays, traffic generation would be significantly lower as it is expected there would be a much reduced number of children in attendance.

6.2 TRAFFIC DISTRIBUTION

Estimating the distribution of traffic to and from the childcare centre requires consideration of the road layout and locations of nearby residential and employment catchments.

In this case, there is a large residential catchment area to the south and south-west, and a good connection to/from the north on Coolibah Avenue which connects to Pinjarra Road at a signalised intersection, which then provides connectivity to a major arterial being Mandurah Road. Therefore, it is estimated that:

- In the morning, 60% of traffic will arrive from the south and depart to the north, and 40% will arrive from the north and depart to the south; and
- In the afternoon/evening: 40% of traffic will arrive from the south and depart to the north, and 60% will arrive from the north and depart to the south.

The resulting estimated traffic distribution is presented diagrammatically in Figure 4.

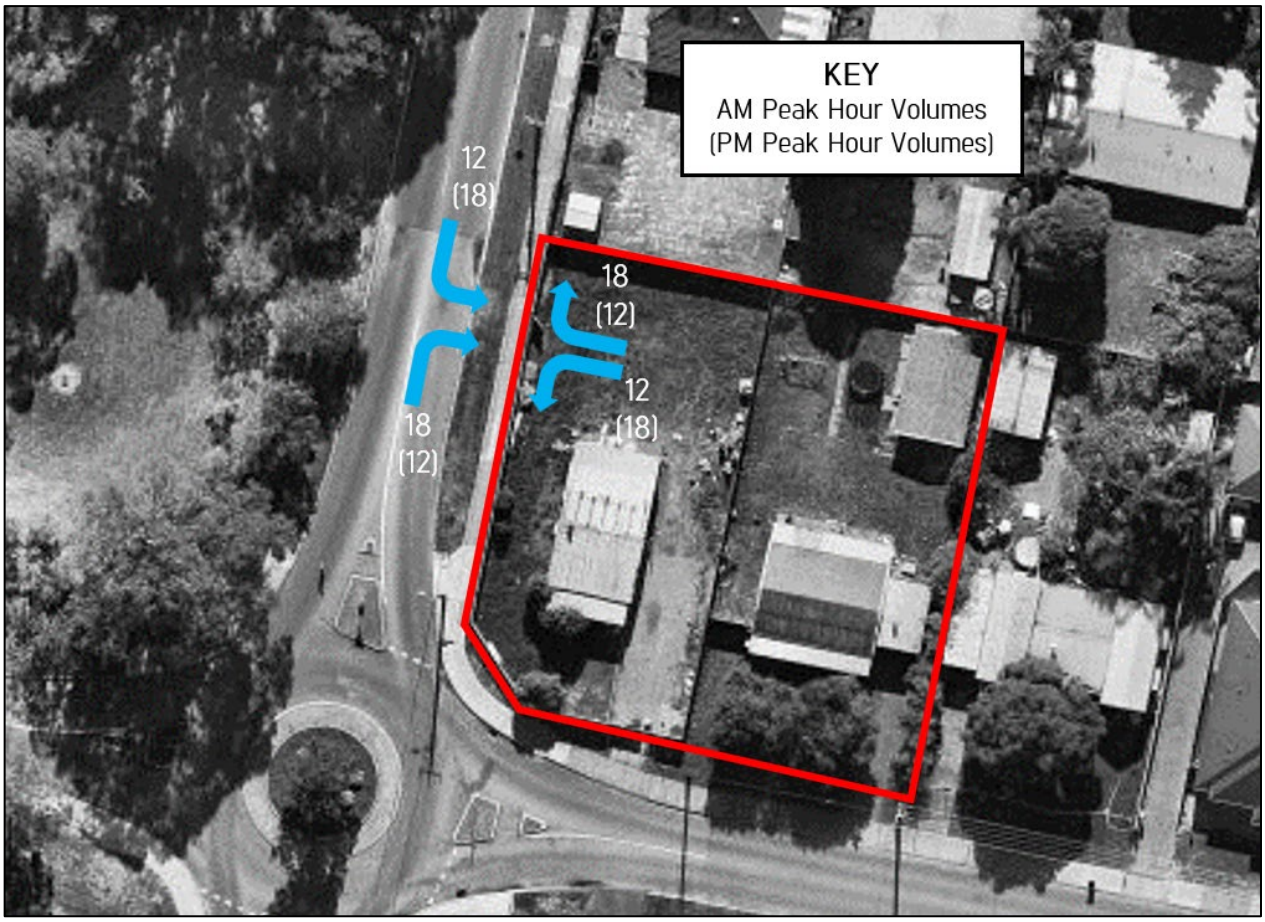

Figure 4 Estimated traffic distribution

6.3 TRAFFIC IMPACTS

The addition of up to 30 vehicles arriving or departing the site during the weekday peak hours equates to one vehicle entering or exiting the site every 2 minutes on average. It is anticipated that this can be readily accommodated by the surrounding road network.

It is noted that these will not all be new trips added to the road network. Some trips will occur by drivers already on the road network that will now make a stop at the subject site. For example, residents of nearby catchment areas or workers at the nearby Mandurah Aquatic and Recreation Centre and Mandurah Forum Shopping Mall.

The site access has been designed to allow vehicles to simultaneously enter and exit the site to reduce the risk of delays or queues at the site entrance.

If some drivers happen to be delayed turning right out of the site, the roundabout located just south of the subject site provides a convenient means of being able to U-turn and head towards the north.

Further, the WAPC Transport Impact Assessment Guidelines provides the following guidance regarding traffic impacts:

As a general guide, an increase in traffic of less than 10 per cent of capacity would not normally be likely to have a material impact on any particular section of road but increases over 10 per cent may. All sections of road with an increase greater than 10 per cent of capacity should therefore be included in the analysis. For ease of assessment, an increase of 100 vehicles per hour for any lane can be considered as equating to around 10 per cent of capacity. Therefore, any section of road where the structure plan traffic would increase flows by more than 100 vehicles per hour for any lane should be included in the analysis.

The proposal is anticipated to generate significantly fewer than 100 vehicles per lane. therefore, the additional traffic associated with the proposal is not anticipated to have any major adverse impact on the operation of the surrounding roads.

7 TRAFFIC MANAGEMENT ON THE FRONTAGE ROADS

The subject site is bound by Third Avenue to the south and Coolibah Avenue to the west. The two road intersect at a roundabout at the south-west corner of the subject site. Details of the road network are provided as follows:

7.1 THIRD AVENUE

Third Avenue is a local street that extends in a generally east-west alignment along the southern boundary of the site. It has a carriageway width of approximately 7.5m, allowing two-way vehicle movements.

Kerbside parking is permitted and unrestricted along both sides of the road.

The default speed limit of 50km/hr applies.

7.2 COOLIBAH AVENUE

Coolibah Avenue extends in a generally north-south alignment along the western boundary of the site. It has a carriageway width of approximately 9.0m and provides one traffic lane in each direction.

Kerbside parking is permitted and unrestricted along both sides of the road.

A posted speed limit of 50km/hr applies.

8 PUBLIC TRANSPORT ACCESS

The subject site is accessible by public transport, with bus routes operating on Coolibah Avenue. The nearest bus stop is located at Coolibah Avenue / Second Avenue, accessible via a 140m (2-minute) walk from the subject site. This is serviced by the following bus routes:

- 592 between Mandurah Station and Wannanup via Peelwood Parade;
- 593 between Mandurah Station and Dawesville West via Old Coast Road;
- 594 between Mandurah Station and Dawesville East via Old Coast Road;

These routes provide access to key destinations and the greater public transport network.

Mandurah station is situated approximately 2km (28-minute walk) from the subject site

Refer to Figure 5 for a map of the local public transport options.

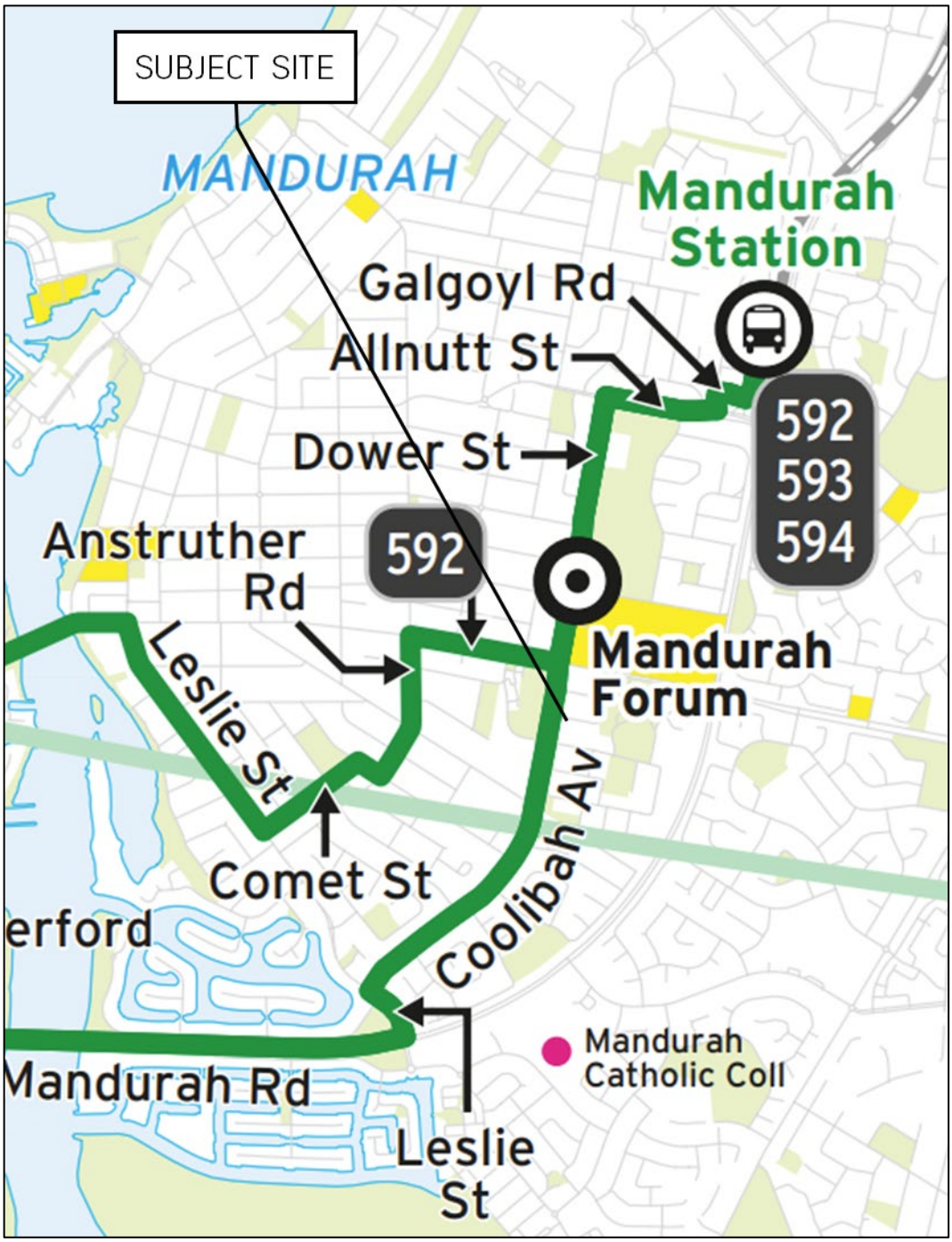

Figure 5 Public transport map (source: Transperth Maps)

9 PEDESTRIAN ACCESS

Pedestrian access is proposed via a separate pathway just over 1.5m wide from Coolibah Avenue to the building entrances. A kerb ramp is proposed within the DDA shared area to the pedestrian path, providing an accessible pedestrian connection.

The subject site has good walking facilities in place with pedestrian footpaths provided on the majority of surrounding streets and various destinations situated within a convenient walking distance.

The site achieves a 'Walk Score' of 74 out of a possible 100 at www.walkscore.com.au, indicating that it is 'very walkable' and that 'most errands can be accomplished on foot'.

10 CYCLE ACCESS

Figure 6 depicts the local cycling map. This includes shared paths on Coolibah Avenue and Pinjarra Road in the vicinity of the site, connecting to the greater cycling network.

The proposal includes four (4) bicycle parking spaces to accommodate any staff or visitors who many choose to cycle to the site.

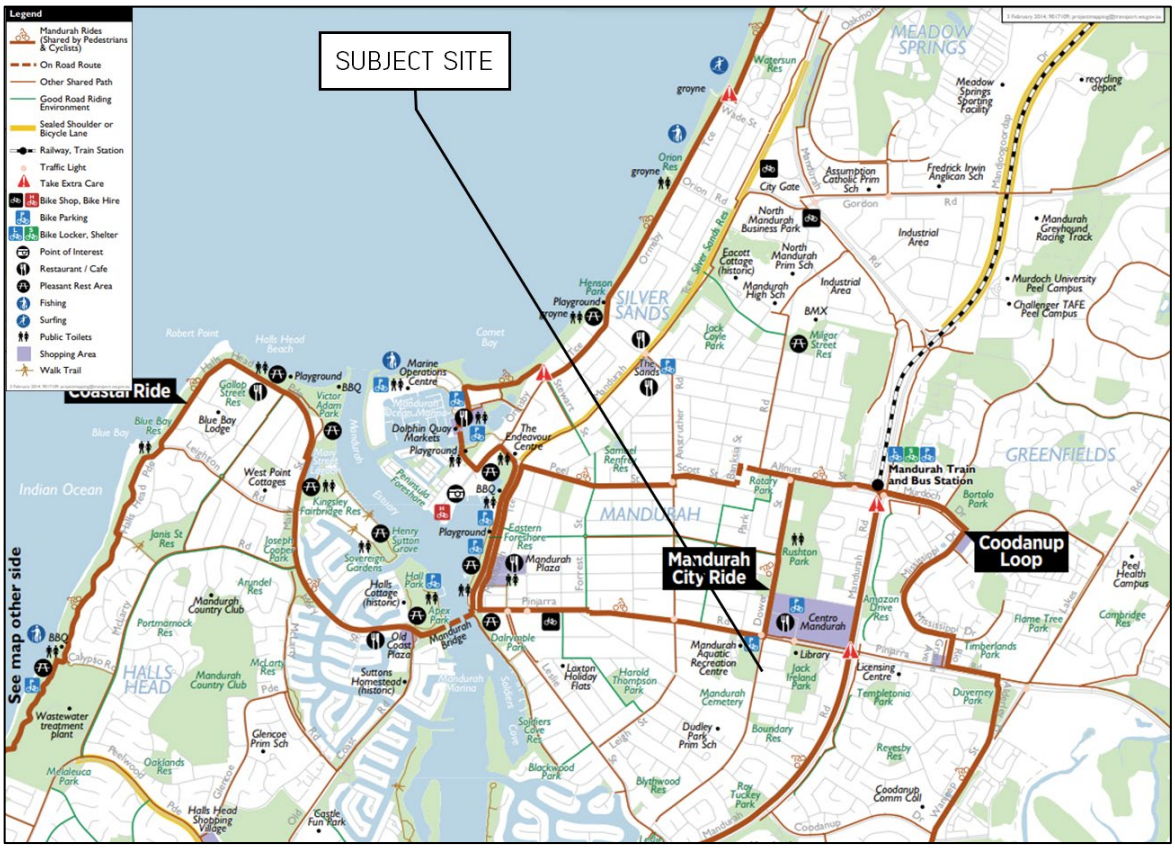

Figure 6 Local cycling map

11 SITE SPECIFIC ISSUES

No site-specific issues have been identified for the proposed childcare centre.

12 SAFETY ISSUES

No particular safety issues have been identified for the proposed childcare centre. The site has been designed such that vehicular access is suitably distanced from the roundabout to maximise safety of vehicle movements into and out of the site.

13 CONCLUSION

Based on the preceding assessment, the following can be concluded:

- It is proposed to demolish the existing dwellings and develop and childcare centre to accommodate 76 children;
- The proposal includes 16 car parking spaces on-site, complying with the requirements of the Mandurah Planning Scheme;
- The proposal includes one (1) accessible parking space, complying with the Building Code of Australia;
- It is proposed to provide four (4) bicycle parking spaces on-site, and separate pedestrian access;
- The proposal car park and access arrangement comply with the relevant requirements of the Australian Standards and will facilitate convenient and efficient parking for staff, parents and visitors;
- Loading and waste collection can be suitably accommodated on-site; and
- The level of traffic generated by the proposal is not expected to have any major adverse impact on the surrounding road environment.

Therefore, the proposal is supported from a traffic engineering perspective.

APPENDIX 1 DEVELOPMENT PLANS

Revision	Description	Date
7.00	DRP	03.07.24
6.00	Re-Design	27.06.24
5.00	Carpark Changes	23.05.24
4.00	Concept	21.05.24
3.00	Concept	06.05.24
2.00	Concept	12.04.24
1.00	Concept	11.04.24

Project North:

Client
Devnani Property Holdings

Project Name
Childcare Centre

Project Address
2-4 Third Ave, Mandurah

Drawing Title:
Aerial Plan

Scale:	Sheet Size:
1:200	A1
Project No:	**Revision Number:**
24022	7.00

Drawing No.:
08 of 12

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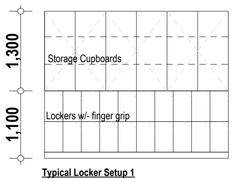
Childcare Calculations

Room	Age (Yrs)	Quant.	Size	Staff Req
Activity 1	*0-2*	*16*	*53.53m²*	*4*
Activity 2	*2-3*	*20*	*66.01m²*	*5*
Activity 3	*3-5*	*20*	*65.96m²*	*2*
Activity 4	*3-5*	*20*	*65.00m²*	*2*
Total Internal = (Min 3.25m² per child)		**76**	**250.50m²** (Min 247.00m² req)	**13**
Total External Play Area = (Min 7m² per child)		**76**	**549.18m²** (Min 532.00m² req)	

Parking Calculations

Description	NLA	Req	Provided
4.5 Bays per 100m² NLA	*349.52m²*	*15.70*	*16*



Typical Locker Setup 1

Zone	Area	Perim
Store	5.71	9.960
Portico	9.30	12.200
Bin Store	9.80	12.600
Childcare	467.25	110.160
	492.06 m²	**144.920 mm**

Site Calculations	
Site Area:	1,600.89m2
Building Footprint:	472.96m2
Site Coverage:	29.54%
Allowable Site Coverage:	50%
Zoning:	R25
Policies:	Scheme 12
Heritage:	NA
Bushfire:	NA
BAL:	NA
Acoustic:	TBC
Sewer:	Back Left Cnr
Power:	TBC
Coastal:	NA
Water:	2x Water Meter
Wind Rating:	TBC

Revision	Description	Date
7.00	DRP	03.07.24
6.00	Re-Design	27.06.24
5.00	Carpark Changes	23.05.24
4.00	Concept	21.05.24
3.00	Concept	06.05.24
2.00	Concept	12.04.24
1.00	Concept	11.04.24

Project North:

Client
Devnani Property Holdings

Project Name
Childcare Centre

Project Address
2-4 Third Ave, Mandurah

Drawing Title:
Ground Floor

Scale:	Sheet Size:
1:100	A1
Project No:	**Revision Number:**
24022	7.00

Drawing No.:
09 of 12

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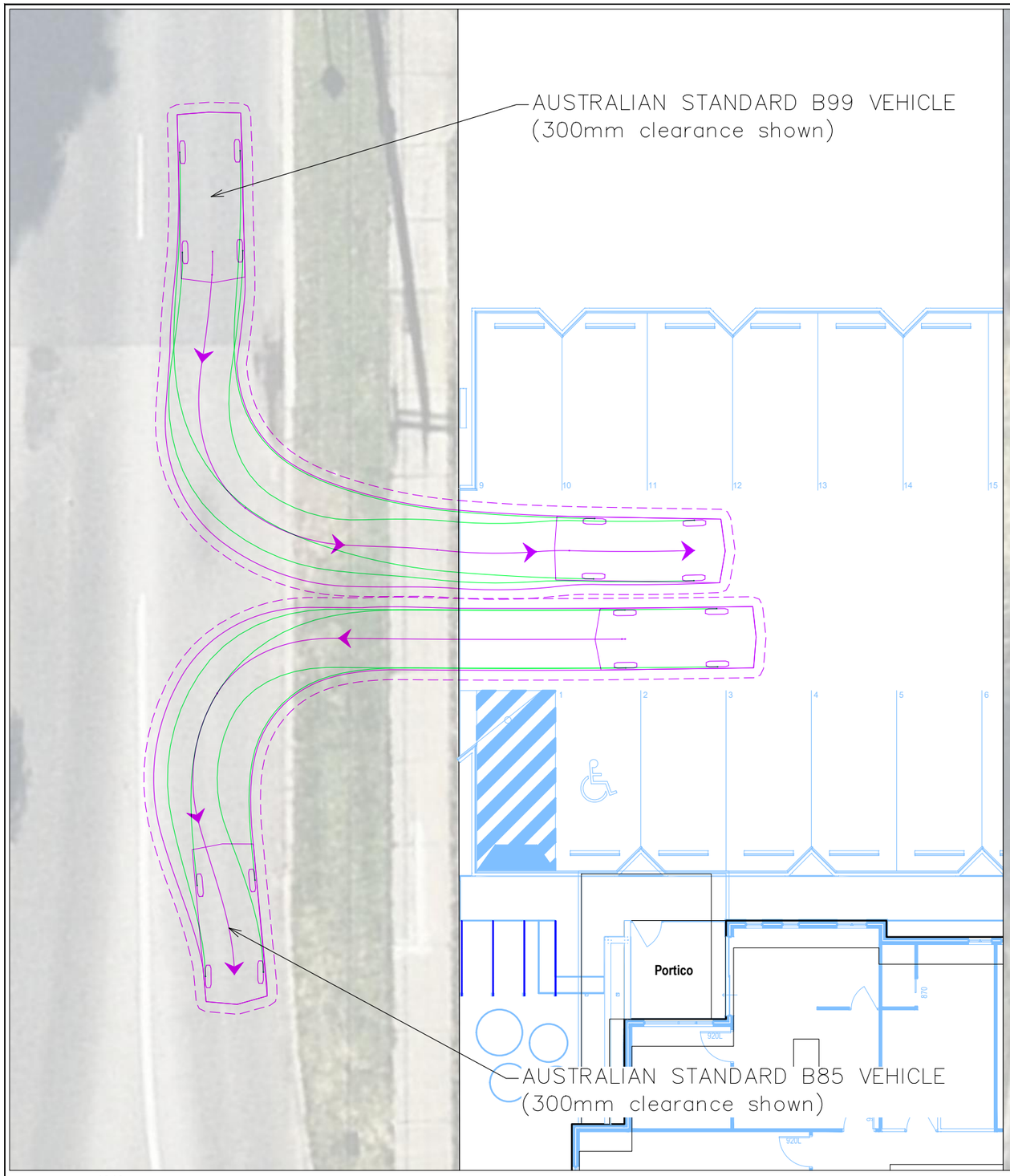
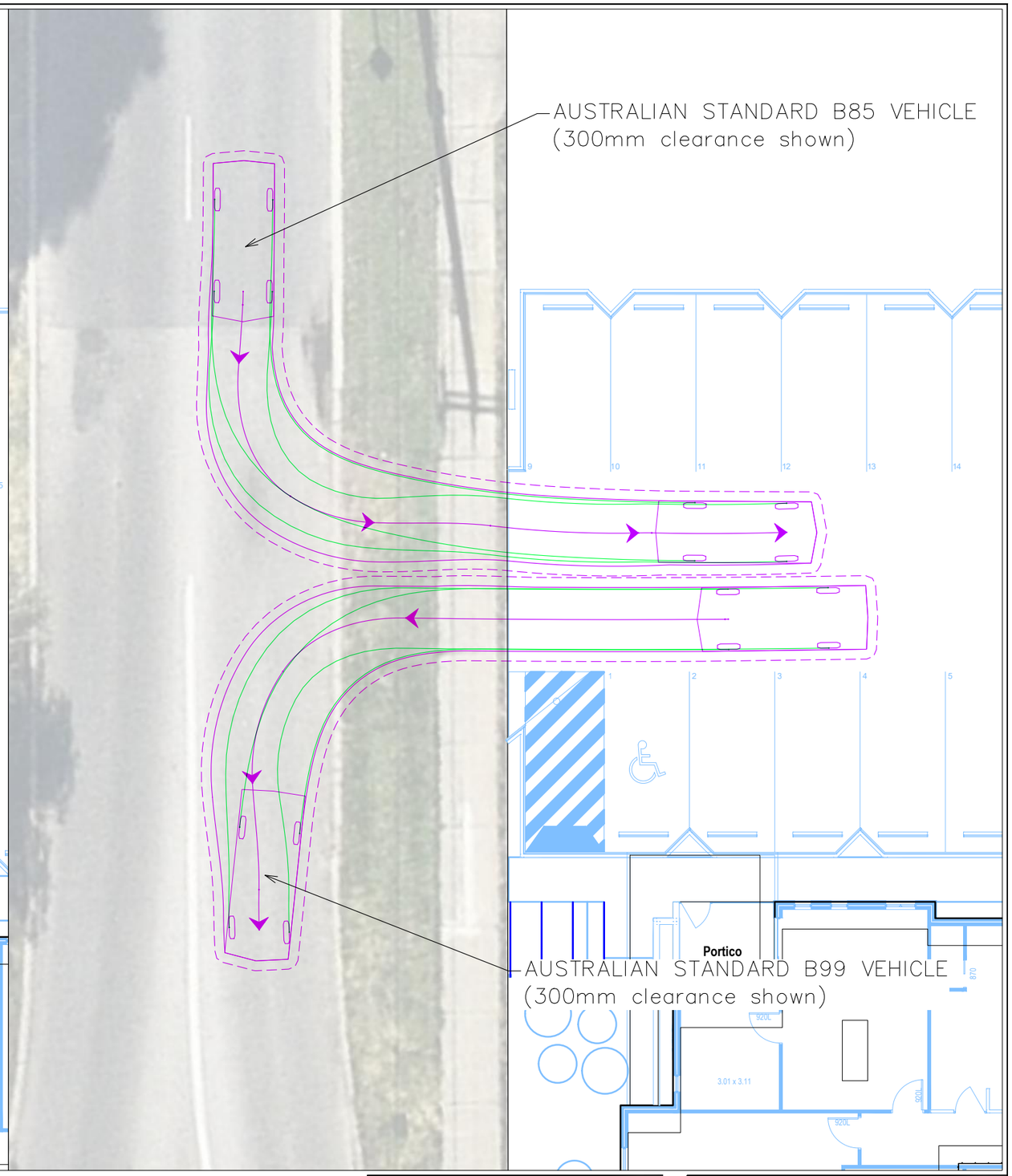
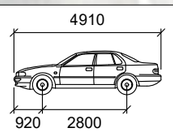
APPENDIX 2 SWEPT PATH DIAGRAMS







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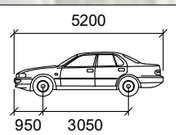

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DEVNANI PROPERTY HOLDINGS PTY LTD

PROPOSED CHILDCARE CENTRE

2-4 THIRD AVENUE

MANDURAH

SWEPT PATH DIAGRAM

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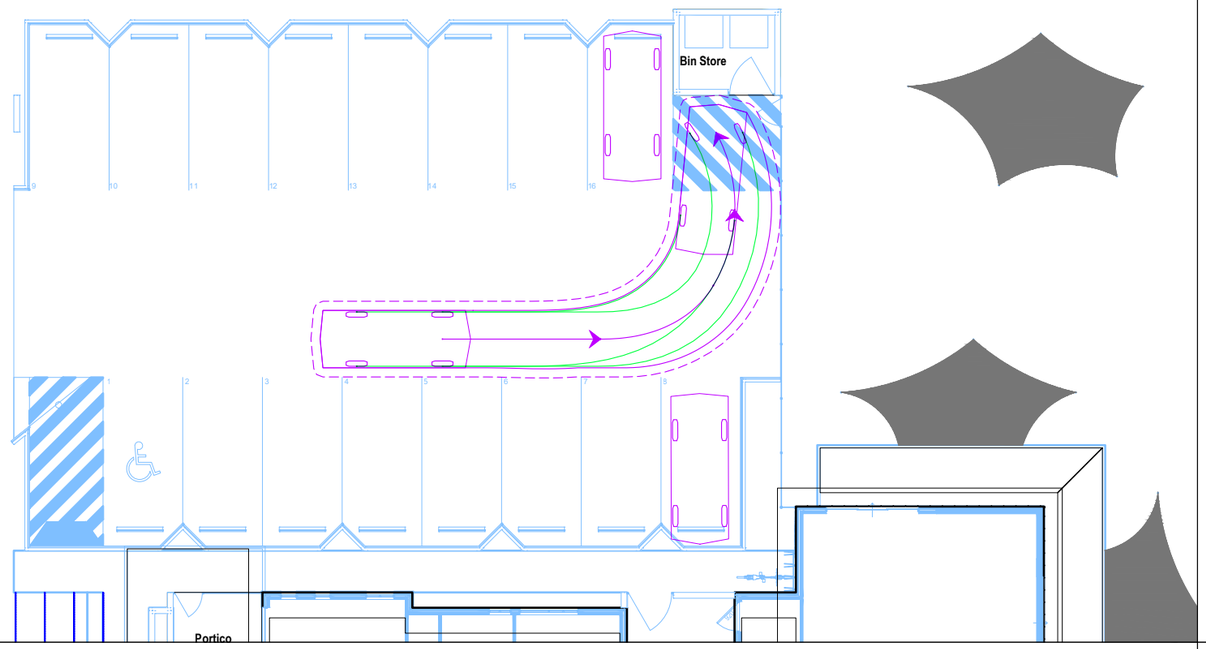
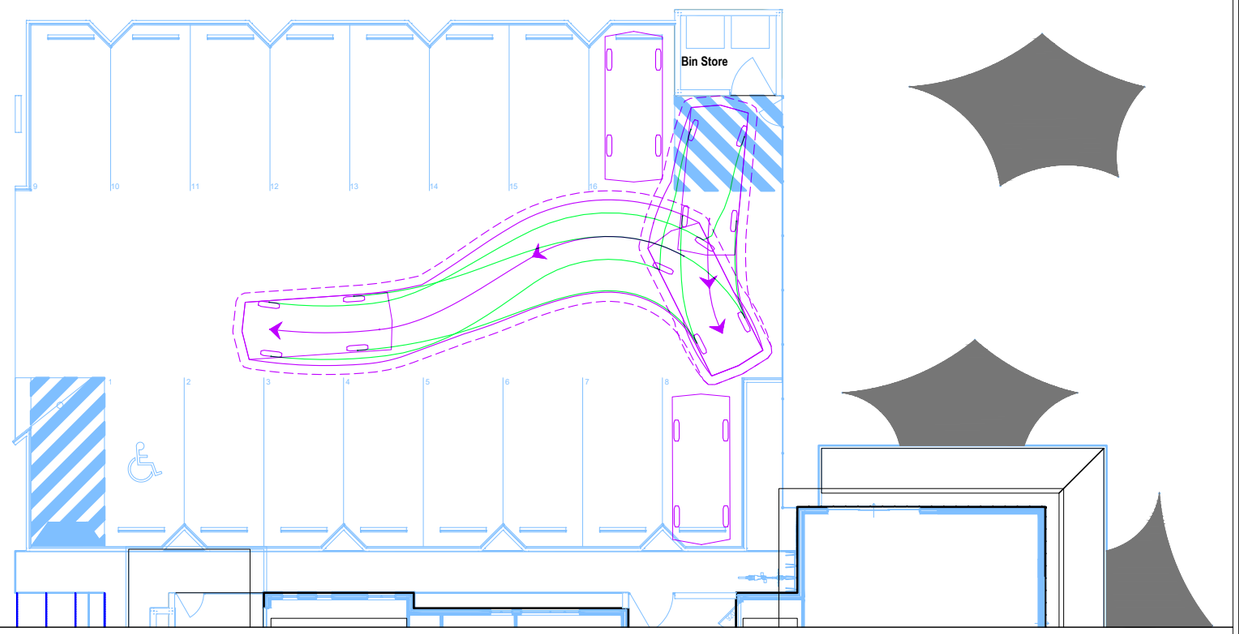
0 0.75 1.5 3
SCALE: 1:150 @ A3

DRAWN / CHECKED	DATE	SIZE
CG / JW	10-07-2024	A3
DRAWING NUMBER		REVISION
SALT-24283-SK-001		1

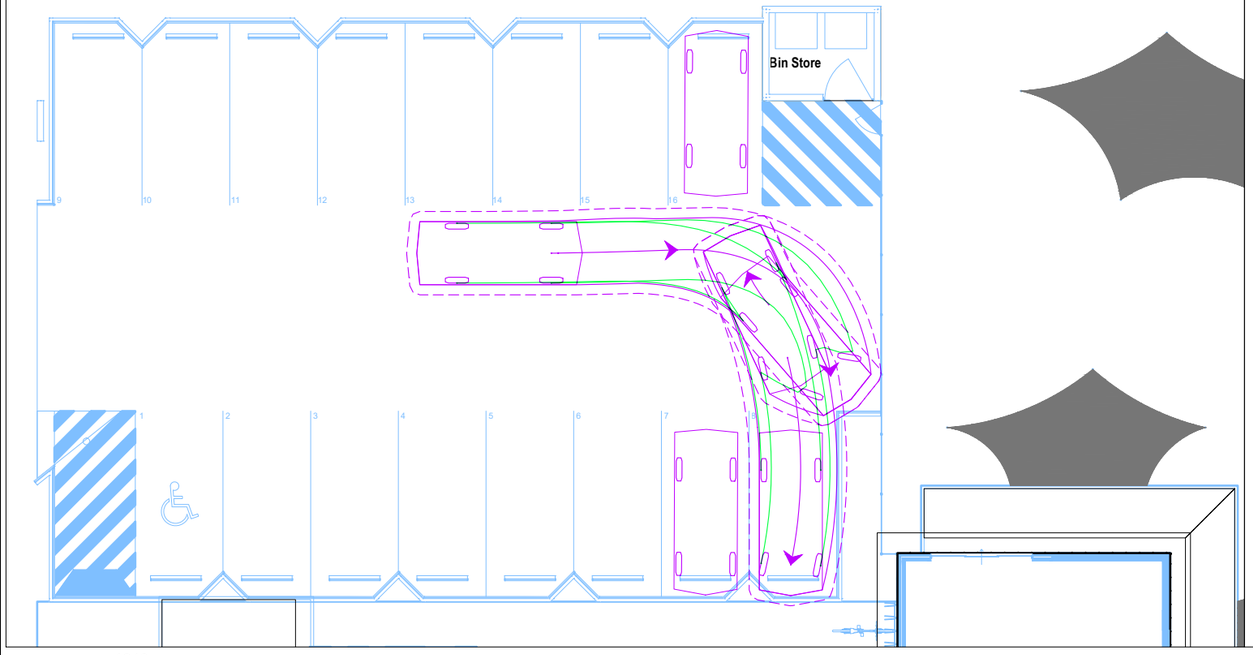
TURNING BAY ACCESS



TURNING BAY EGRESS



PARKING SPACE #8 ACCESS



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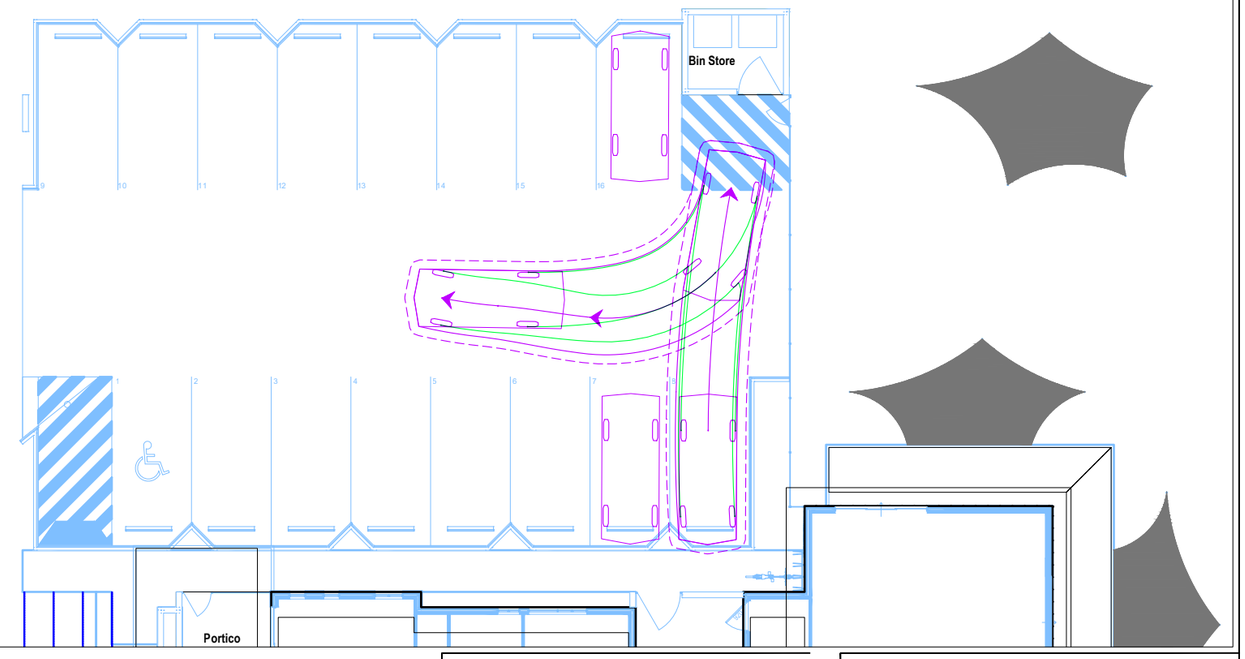

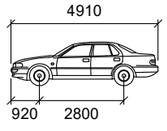

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PROPOSED CHILDCARE CENTRE

2-4 THIRD AVENUE

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SWEPT PATH DIAGRAM

0 1 2 4

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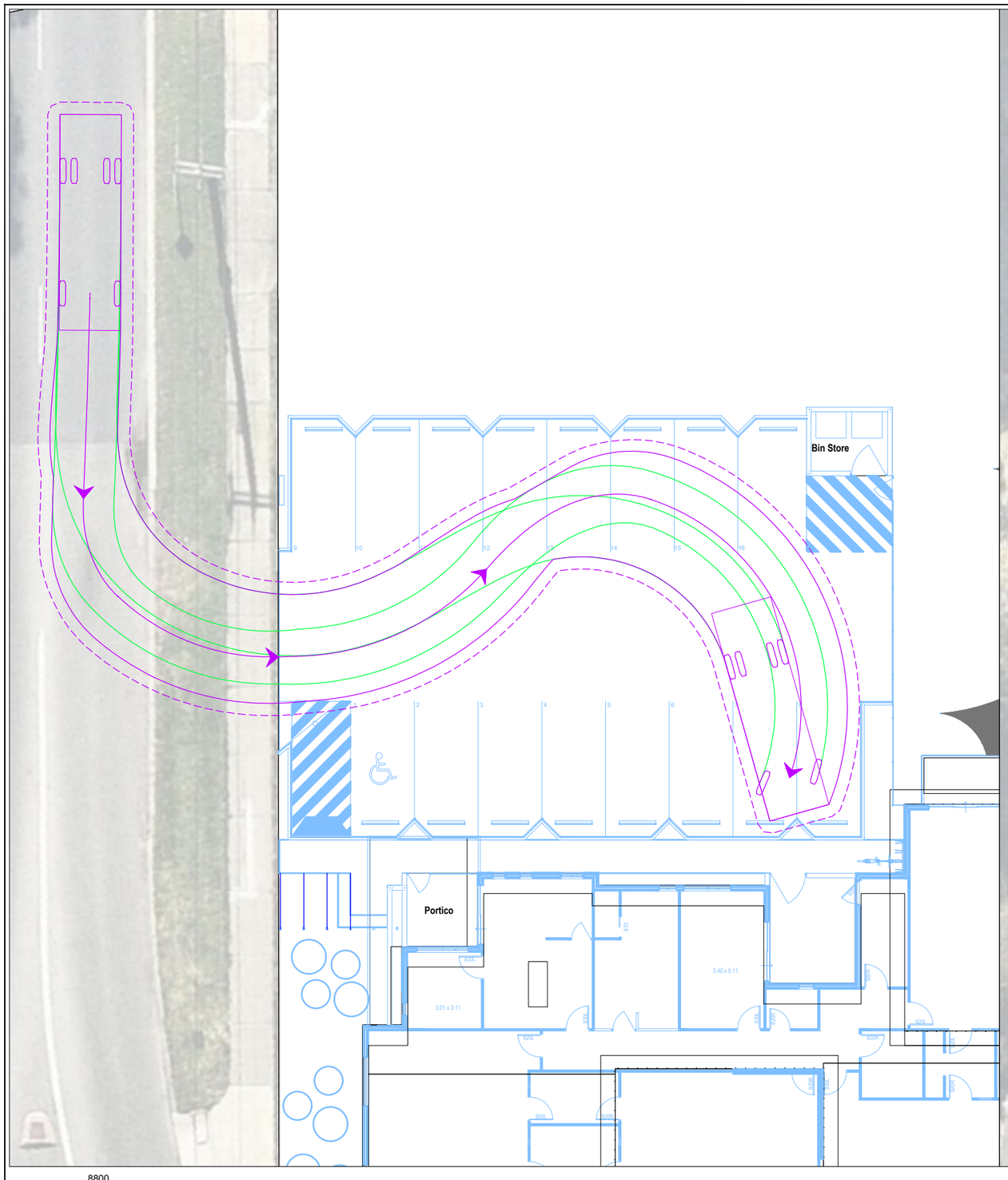
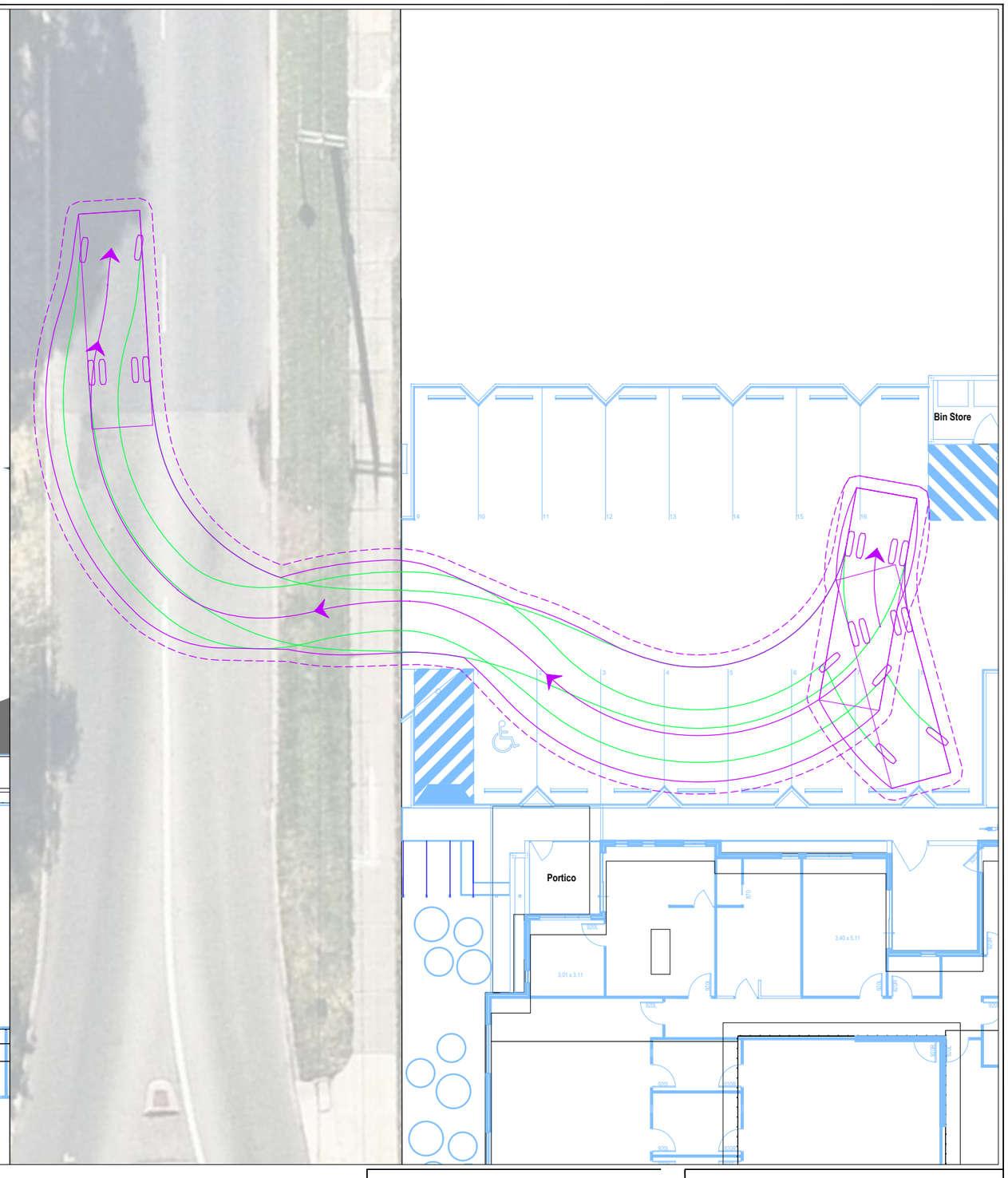
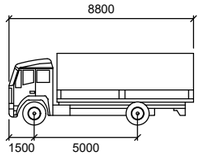
SALT-24283-SK-002		1







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Steering Angle	: 34.0

DEVNANI PROPERTY HOLDINGS PTY LTD

PROPOSED CHILDCARE CENTRE

2-4 THIRD AVENUE

MANDURAH

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DRAWING NUMBER		REVISION
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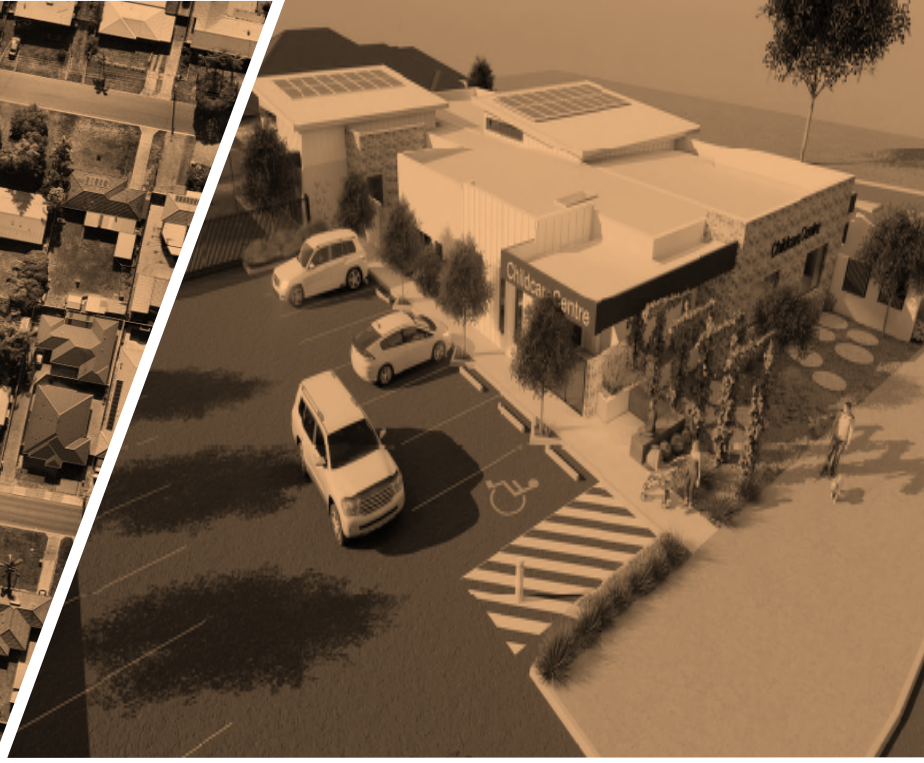

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PROPOSED CHILDCARE CENTRE
2-4 THIRD AVENUE, MANDURAH

WASTE MANAGEMENT PLAN

PROPOSED CHILDCARE CENTRE, WASTE MANAGEMENT PLAN

Client: Devnani Property Holdings
Report Reference: 24283W
File Path: Y:\2024\24283 – 2-4 Third Avenue, Mandurah\08 Reports

Friday, July 19, 2024

Document Control

Version:	Prepared By:	Position:	Date:	Reviewed By:	Position:	Date:	Authorised By:	Position:	Date:
D01	Harry Goodman	Environmental Consultant – Waste & ESD	12 July 2024	Tom Bloomfield	Director	12 July 2024	Tom Bloomfield	Director	12 July 2024
F01	Harry Goodman	Environmental Consultant – Waste & ESD	16 July 2024	Tom Bloomfield	Director	16 July 2024	Tom Bloomfield	Director	16 July 2024
F02	Jasreena Kaur	Senior Environmental Consultant	19 July 2024	Jarrod Wicks	Director	19 July 2024	Jarrod Wicks	Director	19 July 2024

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TRAFFIC ENGINEERS / WASTE ENGINEERS / TRANSPORT PLANNERS / ROAD SAFETY AUDITORS

EXECUTIVE SUMMARY

SALT has been engaged by Devnani Property Holdings to prepare a Waste Management Plan (WMP) for a proposed Childcare development located at 2-4 Third Avenue, Mandurah.

SALT understands that the proposal involves the development of a childcare centre, consisting of early learning areas, activity rooms, office and staff planning spaces, with outdoor play areas to support the daily operations of the subject site.

Waste would be stored on-site in the bin storage area located at within ground level carpark.

Waste would be collected by private contractor, with the following requirements:

- 1 x 1,100L garbage bin collected once per week (if centre opens Mon-Fri) or twice per week (if centre opens Saturdays as well);
- 1 x 1,100L commingled recycling bin collected once per week; and
- 2m^2 of bulky waste area collected on an as required basis.

Waste collection vehicles would enter site in a forward motion via the vehicle entrance located off Coolibah Avenue, to travel and stop safely at the bin storage area, located within the onsite carpark space.

Vehicle operators would ferry waste bins from the refuse area and return upon emptying, before exiting the subject via a forward motion site onto Coolibah Avenue.

Waste collections for the subject site would be scheduled outside of operational hours and on weekend periods to avoid conflict with child drop-off and pick-up activity and to ensure collection vehicles have access the carpark area to perform collections as required.

In the opinion of SALT, the enclosed Waste Management Plan would provide efficient waste management for the proposed development. This report must be read in detail prior to implementation of the waste management strategy.

CONTENTS

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

SALT has been requested by Devnani Property Holdings to prepare a Waste Management Plan for a proposed Childcare development located at 2-4 Third Avenue, Mandurah.

This Waste Management Plan (WMP) has been prepared based on industry best practice, City of Mandurah *Waste Management Plan Commercial and Industrial Development Template*, WALGA *Better Practice Guideline Resource Recovery from Multiple Dwelling Developments* (2022), and the applicable Waste Authority and EPA guidelines, with reference to the waste generation rates, service standards and design criteria enclosed within.

In the circumstance that the development plans are amended, or new legal requirements are introduced, a revision of the enclosed WMP may be required by the Responsible Authority. The developer would be responsible for engaging with a waste consultant or engineer to prepare the updated report accordingly.

2 INCLUDED IN THIS REPORT

Enclosed is the Waste Management Plan for the proposed development at 2-4 Third Avenue. Included are details regarding:

- Land use;
- Waste generation;
- Waste systems;
- Bin quantity, size and colour;
- Collection frequency;
- Bin storage area;
- Signage;
- Waste collection;
- Responsibilities;
- Ventilation, washing and vermin-prevention;
- Noise reduction;
- DDA compliance;
- Supplier contact information; and
- Scaled waste management drawings.

3 LAND USE

Planning application number: to be allocated

Land Zone: Urban (Zone)

Land use type: Commercial

Number of levels: 1

Commercial Space:

- 249.8m^2 childcare activity rooms; and
- 31.3m^2 office space.

Childcare Centre's Operating Hours:

- 6:30am-6:30pm Mon-Fri
- 8:00am-5:00pm Sat

4 WASTE MANAGEMENT PLAN

4.1 WASTE GENERATION

Commercial waste generation rates are shown in Table 1. Calculations are based on a 5 day per week operation, Monday to Friday. It is noted that Saturday operation is also sought for future flexibility; however, the likelihood of this eventuating is low and even if the centre did operate on Saturdays, there would be minimal children present on-site and thus minimal volumes of waste would be generated.

Generation rates have been adopted based on commercial waste generation rates enclosed in the WALGA *Better Practice Guideline Resource Recovery from Multiple Dwelling Developments* (2022). These rates are considered appropriate for a childcare development located within the City of Mandurah, with an assessment per the WALGA waste generation calculator demonstrated in Appendix 2 below.

SALT understands that the adopted waste generation rates for the proposed childcare centre have only included calculations of the indoor activity areas and other usable spaces. As such, only indoor childcare activity and office spaces have been considered within the following waste generation assessment provided below.

Any common spaces to the commercial areas foyers, storage, waiting areas and circulation spaces, have not been included in these calculations as any waste generated in these areas is generated in service of the commercial areas and therefore incorporated into the below rates.

Table 1 Waste Generation Rates

Use	Garbage (L/100m²/week)	Commingled Recycling (L/100m²/week)	Organics Recycling (L/100m²/week)
Childcare activity rooms	360L	240L	120L
Office	770L	105L	35L

A commercial waste generation assessment is provided in Table 2.

Table 2 Waste Generation Assessment

Use	Area	Waste Per Week		
		Garbage	Recycling	Organics
Childcare activity rooms	249.8m²	899L	600L	300L
Office	31.3m²	241L	33L	11L
Total Waste Generated per Week		**1140L**	**890.1L**	**311L**

4.2 WASTE SYSTEMS

Waste would be sorted on-site by staff and cleaners as appropriate into the following streams:

- Garbage (General Waste);
- Commingled Recycling; and
- Bulky Goods / Hard Waste.

4.2.1 BIN STATIONS

Based on Method *Westpac NZ Case Study*, the use of bin stations throughout their office spaces have reduced waste to landfill by 40%. The case study discusses the significance of accountability in ensuring diversion of waste from landfill. It is therefore recommended that bin stations are provided throughout commercial, office and public spaces.

Each bin station should be equipped with one bin for each waste stream. This would encourage the user to make a conscious decision before depositing their waste product into a specific bin and encourage appropriate segregation especially when bins are placed within an area open to public view.

An example bin station with vertical signage is shown in Figure 1. The vertical signage is recommended to be implemented at each bin station to educate the users on the appropriate separation methods. This would allow for maximum diversion of waste from landfill and recovery of the respective waste streams to be achieved.

Figure 1 Example Bin Station with vertical signage

4.2.2 GARBAGE (GENERAL WASTE)

Childcare areas would be furnished with plastic lined bins for the temporary holding of garbage waste, to have a minimum cumulative capacity of 70 litres per 100m^2 of floor area. This capacity is based on the transfer of waste to the bin room occurring once per day.

Office spaces would be furnished with plastic lined bins for the temporary holding of garbage waste, to have minimum cumulative capacity of 10 litres per 100m^2 of floor area. This capacity is based on the transfer of waste to the bin room occurring once per day.

Staff/cleaners would dispose of waste from these bins directly into the appropriate 1,100L bin provided within the ground level bin storage area, accessed via the onsite carpark space (refer to Appendix 1).

Garbage is to be disposed of bagged.

4.2.3 COMMINGLED RECYCLING

Childcare areas would be furnished with unlined bins for the temporary holding of commingled recyclables, to have a minimum cumulative capacity of 70 litres per 100m^2 of floor area. This capacity is based on the transfer of recyclables to the bin room occurring once per day.

Office spaces would be furnished with unlined bins for the temporary holding of commingled recyclables, to have a minimum cumulative capacity of 10 litres per 100m^2 of floor area. This capacity is based on the transfer of recyclables to the bin room occurring once per day.

Staff/cleaners would dispose of waste from these bins directly into the appropriate 1,100L bin provided within the ground level bin storage area, accessed via the onsite carpark space (refer to Appendix 1).

Commingled recyclables would be disposed of loosely.

4.2.4 FOOD ORGANICS AND GARDEN ORGANICS

As noted by the WA Waste Authority *Waste Avoidance and Resource Recovery Strategy* (2030), organic recycling and separation services will come into effect by 2025. In preparation of future changes to waste stream requirements, additional space for two 240L organic recycling bins has been calculated into the onsite refuse area to accommodate for organic recycling service to be implemented if or when required.

When introduced, childcare and office spaces would be furnished with unlined bins for the temporary holding of glass recyclables, to have a minimum cumulative capacity of 60 litres per 100m^2 of floor area. This capacity is based on the transfer of organic recyclables to the bin room once per day or as required.

Staff and cleaners would dispose of waste from these bins directly into the appropriate 240L bins provided (when required/mandated) within the onsite refuse area of the proposed childcare centre.

Organics waste is to be disposed of loosely or in compostable bags that have been approved by the waste contractor.

These compostable bags should be marked with the Australian Standard compostable logo as shown in Figure 2 below. It should be noted that non-compostable bags should not be placed into the organics bins as it cannot be composted and thus will affect the quality of the organic product.

Figure 2 Australian Standard Compostable Logo

Green waste generated by the maintenance of communal landscaped areas would be disposed of via the engaged landscaper.

Alternatively, a composting solution or a worm farm would be provided on-site to ensure that any food organics which can be composted will be diverted from landfill and recycled as a fertiliser. Please note that only certain types of food organics can be decomposed within a composter or worm farm solution (i.e. citrus, meat and dairy should not be disposed into a worm farm and bones cannot be composted).

It is recommended that a compositing solution or worm farm is provided as part of an education program or initiative to encourage participation in food waste diversion and source separation practices.

Some worm farms and composter that may be considered are shown in Figure 3 to Figure 5 below.

Figure 3 Wormfarm: Hungry Bin

Figure 4 Tumbleweed Can-O-Worms

Figure 5 Jora Compost Tumbler

Further information on the above products is available at the links provided below:

Wormfarm (Hungry Bin): https://compostrevolution.com.au/products/worm-farms/hungry-bin-worm-farm/?council=melbourne&q=hungry%20bin

Tumbleweed Can-O-Worms: https://www.bunnings.com.au/tumbleweed-can-o-worms_p3160015

Jora Compost Tumbler: https://compostingwarehouse.com/product/jora-compost-tumbler-270/).

All users of the child care centre would dispose of organics directly into the composter or worm farm provided within the outdoor play area. The centre management will be responsible for supplying and managing the composter.

Food waste is to be disposed of loosely.

4.2.5 HARD WASTE

2m^2 of bulky goods / hard waste storage space has been provided within the bin area. All bulky goods will be temporarily stored within this area prior to scheduled collections occurring.

Building management would arrange for bulk goods collections to occur via a private contractor as required.

4.2.6 E-WASTE

As per the recent Western Australia Government ban on e-waste disposal in landfills, enacted from July 2024. Building management, staff and visitors should be made aware of the available e-waste deposit points located across the Council region. E-waste must not be disposed into general waste streams or allocated recycling bins at any time.

Any e-waste generated within the development can be deposited at one of Council's or an alternate drop off point. These locations are listed here:

- https://recycleright.wa.gov.au/find-my-nearest/
- https://www.mandurah.wa.gov.au/live/waste-and-recycling/management-and-disposal-of-other-waste

4.3 BIN QUANTITY, SIZE AND COLLECTION FREQUENCY

The bin quantity, size and the frequency of collection are shown below in Table 3 and Table 4.

One collection per week is recommended for the garbage stream given the volume and nature of the waste generated per the daily and weekly use of the proposed childcare facility. It should be noted that the generated waste volume exceeds the capacity volume by 3.73%. Due to the conservative nature of the waste generation estimates this minor exceedance of the bin capacity is considered negligible, and as such the above collection frequency is considered appropriate by SALT.

Further, as specified in Table 3 below, there is also the option to collect garbage twice weekly which would allow for storage of any additional volumes of waste that may be generated on Saturdays, if the centre is utilised. The proposed recycling bin provisions allow for storage of additional volumes that may be generated if the centre is utilised on Saturdays.

Table 3 Bin Size and Collection Frequency

Waste Stream	Collections per Week	Bin Size	No. Bins	Weekly Capacity	Weekly Volume
Garbage	1 (if centre operates Mon-Fri) 2 (if centre opens Sat as well)	1,100L	1	1,100L (if centre operates Mon-Fri) 2,200L (if centre opens Sat as well)	1,141L
Commingled Recycling	1	1,100L	1	1,100L	632L

Table 4 Typical Waste Bin Dimensions

Capacity (L)	Width (mm)	Depth (mm)	Height (mm)	Area (m^2)
1,100	1240	1070	1330	1.33
240	585	730	1060	0.43
Note: The above dimensions are based on SULO's flat lid bin specifications				

4.4 BIN COLOUR AND SUPPLIER

All bins would be provided by private supplier. The below bin colours are specified by Australian Standard AS4123.7-2006, however due the private nature of the collection, these are only recommendations and are not mandatory:

- Garbage (general waste) shall have red lids with dark green or black body;
- Recycle shall have yellow lids with dark green or black body;
- Organics shall have green lids with dark green or black body (when introduced and or mandated)

Note, private contractors often supply bins for collection.

4.5 WASTE STORAGE AREA

Table 5 demonstrates the cumulative space requirements and provision of waste areas for the proposed development.

Please refer to scaled drawing shown in Appendix 1.

Table 5 Waste Area Space Requirements

Stream	Space Required (excluding circulation)	Space Provided
General Waste	1.32m^2	8m^2
Commingled Recycling	1.32m^2	
Bulky Goods / Hard Waste	2m^2	
Organics Recycling	0.85m^2	
TOTAL	**5.49m^2**	**8m^2**

Waste management would be overseen by building management.

4.6 WASTE COLLECTION

Commercial waste would be collected by private contractor as follows:

- 1 x 1,100L garbage bin collected once per week (if centre opens Mon-Fri) or twice per week (if centre opens Saturdays as well);
- 1 x 1,100L commingled recycling bin collected once per week; and
- 2m^2 of bulky waste area collected on an as required basis.

All waste bins would be stored on-site in the bin storage area located within ground level carpark.

Waste collections would occur between 7am to 7pm on Mondays to Saturdays and between 9am to 7pm on Sundays and public holidays, in accordance with EPA WA Environmental Protection (Noise) Regulations 1997. This is to ensure minimal noise impacts to the neighboring properties.

Waste collections are to be scheduled outside of operational hours and on weekend periods to avoid conflict with child drop-off and pick-up activity and to ensure waste vehicles can access the carpark area to perform collections as required, per the swept path assessment shown in Appendix 3.

All waste collections would occur via a standard medium rigid (MRV) collection vehicle.

Bulky goods / hard waste collections would be performed by a utility vehicle or AustRoads B99 design vehicle equivalent.

Waste collection vehicles would enter site in a forward motion via the vehicle entrance located off Coolibah Avenue, to travel and stop safely at the bin storage area, located within the onsite carpark space.

Vehicle operators would ferry waste bins from the refuse area and return upon emptying, before exiting the subject via a forward motion site onto Coolibah Avenue.

Please refer to the swept path analysis attached in Appendix 3, which demonstrates access by the waste collection vehicle.

Building management would ensure that waste vehicle operators are able to access the bin room.

5 RESPONSIBILITIES

Building management would be responsible for overseeing waste management within the development. Responsibilities would include:

- Providing a copy of the endorsed Waste Management Plan to the appropriate building management and relevant personnel;
- Ensure all signages and waste education materials should be based on the latest available information from WA Waste Authority or the equivalent. guidelines on waste management in multi-unit developments are available at WALGA *Better Practice Guideline Resource Recovery from Multiple Dwelling Developments* (2022).
- Providing staff/cleaners and management with an information package which would include the following information:
  (a) A copy of this Waste Management Plan which includes information on waste storage areas and management methods onsite;
  (b) Methods and techniques for waste reduction and minimization;
  (c) Information regarding bin collection days and requirements;
  (d) Staff members' responsibilities with regard to bin usage, storage, and collection
- Ensure that all bins throughout the site and the bin room are equipped with appropriate signages to guide users on appropriate segregation methods for their waste and recyclables;
- Inspecting waste stores;
- Reviewing contamination within bins;
- Investigating incidents of inappropriate waste storage (or aggregation).

Building management would ensure anyone found responsible for inappropriate waste disposal would be appropriately educated and made aware of correct waste disposal techniques.

It is recommended that building management conducts a waste audit if waste is found to be inappropriately deposited by users or if the bin capacities need to be reviewed.

6 SIGNAGE

Waste storage areas and bins would be clearly marked and signed with the industry standard signage approved by the WA Waste Authority or the design equivalent. The typical signage to be supplied is demonstrated in Figure 6 below, with reference to Sustainability Victoria signage that incorporates the same colour code per waste stream as standardised by the WA Waste Authority.

Figure 6 Typical Waste Signage

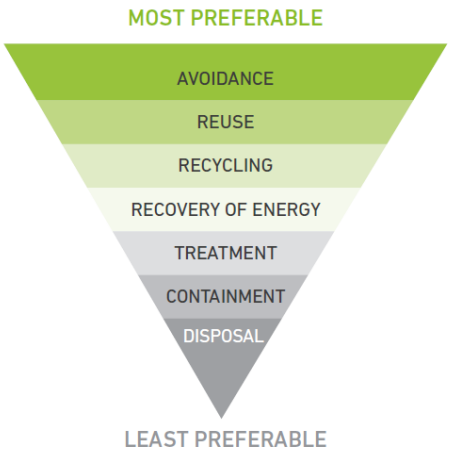
Signage within the waste disposal areas should inform staff members, management and occupants on the significance of sorting waste correctly and practicing better resource recovery behaviours. To help communicate this message, building management and relevant staff would deliver onsite waste signages in accordance to the resources and education tools provided per the Waste Authority 'WasteSorted Schools' initiative, which is applicable to the age demographic of early learning centres and childcare facilities, more information is provided in the link here: https://www.wastesorted.wa.gov.au/schools/resources

7 SUSTAINABILITY ACTION PLAN AND INITIATIVES

The importance of restructuring institutional waste management methods in developments is becoming more apparent as we experience the adverse impacts of increasing waste volumes and declining recycling rates. Developments such as the proposed subject site can contribute towards the prevention and reduction of nationwide waste generation volumes as well as to promote a local circular economy system.

Building management should encourage users by demonstrating a commitment towards waste avoidance and minimisation initiatives. The waste hierarchy as detailed in the *Environmental Protection Act* 2017 should be observed in order of preference (refer to Figure 7).

Figure 7 Waste Hierarchy



In addition to the waste management strategy detailed in the enclosed report, building management can establish landfill diversion and recycling targets and conduct periodic waste audits to monitor contamination levels in recycling bins. The results of the audit could be shared with staff and management to encourage and improve

waste separation practices. The audit may also be beneficial from a cost perspective as it would inform building management of opportunities to reduce bin numbers or collection frequencies.

Staff, cleaners and management should be inducted on on-site waste management practices and on the development's sustainability action plan via the provision of a handbook or in-person training, as deemed necessary.

8 WASTE AREA DESIGN REQUIREMENTS

8.1 VENTILATION

Ventilation would be provided in accordance with Australian Standard AS1668.

The waste room will be equipped with tight fitting doors and impervious flooring. Any openings within the waste room will be fitted with vermin-proof mesh.

8.2 LITTER MANAGEMENT, WASHING AND STORMWATER POLLUTION PREVENTION

An appropriately drained wash down area would be provided within the bin room or onsite, in which each bins would be washed regularly by building management. Bin washing areas or bin wash bays must discharge to a litter trap. Bin wash areas should not discharge into stormwater drainage.

Alternatively, a third-party bin washing service can be engaged to perform this service. Bin washing suppliers must retain all waste water to within their washing apparatus so as to not impact on the drainage provisions of the site.

Building management and cleaners would be responsible in ensuring the following to prevent or minimise the dispersion of litter throughout the site:

- Prevent overfilling of bins by ensuring bin lids are closed at all times;
- Require waste contractor to remove any spillage that may occur during waste collections; and
- Ensure anyone found responsible for inappropriate waste disposal or dumping would be appropriately educated and made aware of correct waste disposal techniques.

8.3 NOISE REDUCTION

All waste areas would meet EPA, BCA and AS2107 acoustic requirements as appropriate within operational hours assigned to minimise acoustic impact on surrounding premises.

Waste collection timings in accordance with EPA WA Environmental Protection (Noise) Regulations 1997, which have been stipulated in the waste collection section (4.6) above.

Waste contractors should also abide by the following regulations to ensure minimal noise impacts to the neighboring properties:

- Compaction only to be carried while on the move;
- Bottles should not be broken up at the point of collection
- Routes that service entirely residential areas should be altered to reduce early morning disturbances; and
- Noisy verbal communication between operators should be avoided where possible.

8.4 DDA COMPLIANCE

All waste areas to be accessed by commercial staff, cleaners and management would comply with AS1428.1:2009.

9 RISK AND HAZARD ANALYSIS

Table 6 shows the potential risks, severity and suggested control methods that could be considered to avoid the risks from occurring during waste collections.

Note that this is a preliminary risk assessment and does not replace the need for the building management and collection contractors to complete their respective OHS assessment for waste collections.

The information provided below have been adopted from WorkSafe Western Australia *Checklist – Waste and Recycling Industry* (2019). The severity of each risk has been determined based on the risk rating table enclosed in Department of the Environment *Environmental Management Plan Guidelines* 2014.

Table 6 Potential Risks and Control Methods During Waste Collections

Area	Risk	Severity	Suggested controls
Waste collection	Incidents during waste collection vehicle ingress or egress movements	Low	Vehicle operators would be trained in ensuring the following Tailgate is closed after clearing waste area Move vehicle slowly when tailgate or body is raised Clear waste from tailgate seal and from rear of machine before departure from the subject site Ensure tailgate is locked after unloading operation Vehicle operators should not exit the vehicle body unless engine is switched off, ignition key is removed, safety prop is in position and the vehicle body is well ventilated. Regular safety checks and inspection of vehicles should be conducted.
	Incidents during manual handling of bins	High	Vehicle should meet relevant Australian Design Rules. Ensure that vehicles with low bowl height are used to avoid lifting of bins above shoulder height. Vehicle operator should be clear of the equipment before activation of packing or tipping controls.
	Slip and trip hazards in moving into and out of the vehicle	Medium	Maintain sufficient and frequent communication between driver and runner. The hose should not be used as handholds when mounting or dismounting.
	Slips and trips while transporting bins	Low	As the car parking area is at the same grade with that of the waste storage area, there are no hazards presented from the presence of slopes or steps. The car parking and waste storage area would also be well lit at all times to ensure good visibility to staff/vehicle operators. However, to ensure that any other potential risks are mitigated, frequent communication should be maintained between the driver and runner and the runner should only transfer one bin at a time.
Surrounding traffic	Conflict with other vehicle operators, staff management and visitors within the car park during collection	Medium	Ensure that collection is to occur only at off-peak hours. The collection area should also be well-lit to allow for better visibility of oncoming traffic and pedestrians.
Waste bins	Type of wastes handled – risk associated in contact with unknown hazardous substances or sharp objects	Medium	Staff, management and relevant personnel should be educated on safe disposal of hazardous substances and sharp objects. Waste vehicle operators should be trained and informed on safe handling of unknown substances. Operators could be provided with PPE to avoid infections and to assist in handling of waste bins.

Area	Risk	Severity	Suggested controls
Waste Bins	Overflowing bins affecting the transport of bins to the waste collection vehicle or presenting as a trip hazard.	Low	The recommended number of bins enclosed in this WMP provides sufficient weekly capacities for the volumes generated, for all waste streams hence there would be a low likelihood of this occurring.

10 SUPPLIER CONTACT INFORMATION

Table 7 provides a list of equipment specified by this waste management plan.

Below is a complimentary listing of contractors and equipment suppliers. You are not obligated to procure goods/services from these companies. This is not, nor is it intended to be, a complete list of available suppliers.

SALT does not warrant (or make representations for) the goods/services provided by these suppliers.

Table 7 High Level Purchasing Schedule

Item	Quantity	Supplier	Notes
1,100L Bins	2	Private Supplier*	1 x 1,100L general waste bin 1 x 1,100L commingled recycling
240L Bins	2	Private Supplier*	2 x 240L organic recycling bins (to be purchased as required or when mandates/service changes are introduced)
Bin Station(s)	As required	Private Supplier	Internal and external bin stations. Each bin station will contain one bin per waste stream.

**Private waste collection contractors often supply their own bins for collection.*

10.1 EQUIPMENT SUPPLIERS

10.1.1 COMPACTOR AND BIN ROTATION SYSTEM

- Bucher Municipal – 03 9314 8928
- Wastech Engineering – 03 8787 1600
- Elephant's Foot – 02 9780 3500

10.2 WASTE COLLECTORS

10.2.1 GARBAGE, RECYCLING AND ORGANICS

- Cleanaway – (08) 9587 4600
- JJ Richards – 08 6278 1000
- Instant Waste Management – 08 9379 2111
- D&M Waste Management – 08 6336 7223
- Remondis – 13 73 73
- Tidy Up – 08 6397 7532

10.2.2 HARD WASTE

- Rubbish Removal Mandurah – 6117 5777
- Rubbish Rangers – 0427 018 966
- Mandurah Mobile Skip – 0426 282 248
- Peel Rubbish Removal – 1300 733 533

10.3 BIN WASHING SERVICES

- Bin Bath – 08 9493 4622

- Kevs Wheelie Kleen – 0401 758 113
- Wheelie Bin Guy – 0419 961 082

11 PURPOSE AND LIMITATIONS

This Waste Management Plan has been prepared to form a part of the development application. The report is prepared to:

- Demonstrate that an effective waste management system is compatible with the design of the development. An effective waste management system comprises of a system that is hygienic, clean, tidy, minimises waste being landfilled and maximises recycling and resource recovery;
- Ensure stakeholders are well informed of the design, roles and responsibilities required to implement the system;
- Provide supporting scaled drawings to confirm that the final design and construction is compliant with the report;
- Define the relevant stakeholders involved in ensuring the implementation of the waste management system; and
- Ensure tenants are not disadvantaged in access to recycling and other sustainable waste management options.

The following should be noted regarding the enclosed information:

- The waste generation volumes provided are estimates based on the best available waste generation rates. The actual waste volumes generated on-site may differ slightly from that estimated as it would depend on the operational capacity of the subject site.
- The report does not discuss management of construction and demolition waste for the proposed development hence a separate report discussing the management of these waste streams would be required; and
- The equipment specifications and any information provided regarding the recommended equipment are provided for reference purposes only and should not be relied upon for procurement. SALT recommends that the developer attains the latest specifications of the required equipment and service provisions from the respective contractor(s) prior to engaging them or purchasing the relevant equipment.
- The report should be updated if the development plans are amended or if new legal requirements are introduced.

APPENDIX 1 DESIGN DRAWINGS

Revision	Description	Date
7.00	DRP	03.07.24
6.00	Re-Design	27.06.24
5.00	Carpark Changes	23.05.24
4.00	Concept	21.05.24
3.00	Concept	06.05.24
2.00	Concept	12.04.24
1.00	Concept	11.04.24

Project North:

Client
Devnani Property Holdings

Project Name
Childcare Centre

Project Address
2-4 Third Ave, Mandurah

Drawing Title:
Aerial Plan

Scale:	Sheet Size:
1:200	A1
Project No:	**Revision Number:**
24022	7.00

Drawing No.:
08 of 12

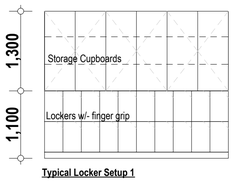
GERMANO DESIGNS
Unit: 3/1 Mulgul Road, Malaga W.A 6090
(08) 9248 8392 germanodesigns.com.au

Childcare Calculations

Room	Age (Yrs)	Quant.	Size	Staff Req
Activity 1	*0-2*	*16*	*53.53m²*	*4*
Activity 2	*2-3*	*20*	*66.01m²*	*5*
Activity 3	*3-5*	*20*	*65.96m²*	*2*
Activity 4	*3-5*	*20*	*65.00m²*	*2*
Total Internal = (Min 3.25m² per child)		**76**	**250.50m²** (Min 247.00m² req)	**13**
Total External Play Area = (Min 7m² per child)		**76**	**549.18m²** (Min 532.00m² req)	

Parking Calculations

Description	NLA	Req	Provided
4.5 Bays per 100m² NLA	*349.52m²*	*15.70*	*16*



Typical Locker Setup 1

Zone	Area	Perim
Store	5.71	9.960
Portico	9.30	12.200
Bin Store	9.80	12.600
Childcare	467.25	110.160
	492.06 m²	**144.920 mm**

Site Calculations

Site Area:	1,600.89m2
Building Footprint:	472.96m2
Site Coverage:	29.54%
Allowable Site Coverage:	50%
Zoning:	R25
Policies:	Scheme 12
Heritage:	NA
Bushfire:	NA
BAL:	NA
Acoustic:	TBC
Sewer:	Back Left Cnr
Power:	TBC
Coastal:	NA
Water:	2x Water Meter
Wind Rating:	TBC

Revision	Description	Date
7.00	DRP	03.07.24
6.00	Re-Design	27.06.24
5.00	Carpark Changes	23.05.24
4.00	Concept	21.05.24
3.00	Concept	06.05.24
2.00	Concept	12.04.24
1.00	Concept	11.04.24

Project North:

Client
Devnani Property Holdings

Project Name
Childcare Centre

Project Address
2-4 Third Ave, Mandurah

Drawing Title:
Ground Floor

Scale:	Sheet Size:
1:100	A1
Project No:	**Revision Number:**
24022	7.00

Drawing No.:
09 of 12

GERMANO DESIGNS
Unit: 3/1 Mulgul Road, Malaga W.A 6090
(08) 9248 8392 germanodesigns.com.au

APPENDIX 2 WALGA WASTE CALCULATOR

GOVERNMENT OF WESTERN AUSTRALIA

WASTE AUTHORITY
WA...TOO GOOD TO WASTE

This project is supported by the Government of Western Australia and administered by the Waste Authority

Multi-Dwelling Development (MDD) and Mixed-Use Development (MUD) Waste Calculator

The below is a tool to assist Local Governments and industry in estimating the amount of general waste; food organics, garden organics (FOGO) and recyclables generated by a proposed development. Users simply need to enter the required values. It should be noted that this tool should be used in combination with the WALGA guidelines.

- ○ 2 Bin System
- ◉ 3 Bin System

Clear Form | Recalculate

Other Commercial

Type	Number of Occupied Bedrooms
Serviced Apartment / Boarding House / Backpacker	0
Hotel / Motel Accommodation	0

Type	Area in Square Meters
Offices / Medical / Consulting	31.3
Licensed Club	0
Education / Training	0
Childcare	249.8
Function Room	0
Gym	0
Community Centre / Sports Centre / Place of Worship / Recreation	0

Type	Number of Occupied Apartments
Retirement Village	0
Independent Living	0

Results - Weekly Waste Generation

Residential Dwellings

General Waste	Food & Garden Organics	Comingled Recyclables	Total
0L	0L	0L	0L

Commercial Food & Beverage

General Waste	Food & Garden Organics	Comingled Recyclables	Total
0L	0L	0L	0L

Retail

General Waste	Food & Garden Organics	Comingled Recyclables	Total
0L	0L	0L	0L

Other Commercial

General Waste	Food & Garden Organics	Comingled Recyclables	Total
830L	311L	633L	1773L

Totals

General Waste	Food & Garden Organics	Comingled Recyclables	Total
830L	311L	633L	1773L

WALGA wishes to acknowledge Talis Consultants and the Waste Authority for assistance with the development of this online calculator.

GOVERNMENT OF WESTERN AUSTRALIA

WASTE AUTHORITY
WA...TOO GOOD TO WASTE

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Multi-Dwelling Development (MDD) and Mixed-Use Development (MUD) Waste Calculator

The below is a tool to assist Local Governments and industry in estimating the amount of general waste; food organics, garden organics (FOGO) and recyclables generated by a proposed development. Users simply need to enter the required values. It should be noted that this tool should be used in combination with the WALGA guidelines.

- ◉ 2 Bin System
- ○ 3 Bin System

Clear Form | Recalculate

Other Commercial

Type	Number of Occupied Bedrooms
Serviced Apartment / Boarding House / Backpacker	0
Hotel / Motel Accommodation	0

Type	Area in Square Meters
Offices / Medical / Consulting	31.3
Licensed Club	0
Education / Training	0
Childcare	249.8
Function Room	0
Gym	0
Community Centre / Sports Centre / Place of Worship / Recreation	0

Type	Number of Occupied Apartments
Retirement Village	0
Independent Living	0

Results - Weekly Waste Generation

Residential Dwellings

General Waste	Food & Garden Organics	Comingled Recyclables	Total
0L	0L	0L	0L

Commercial Food & Beverage

General Waste	Food & Garden Organics	Comingled Recyclables	Total
0L	0L	0L	0L

Retail

General Waste	Food & Garden Organics	Comingled Recyclables	Total
0L	0L	0L	0L

Other Commercial

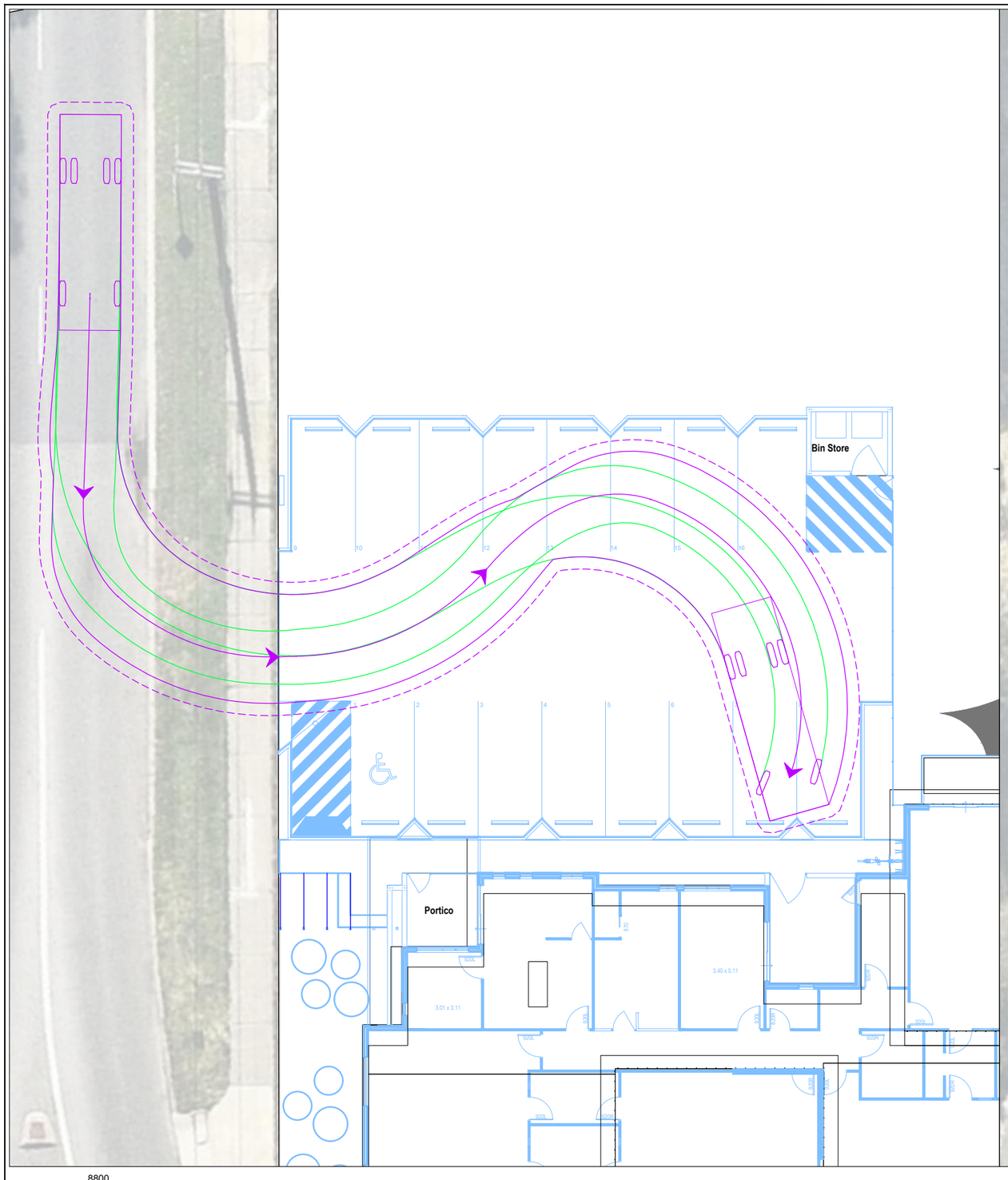
General Waste	Food & Garden Organics	Comingled Recyclables	Total
1141L	0L	633L	1773L

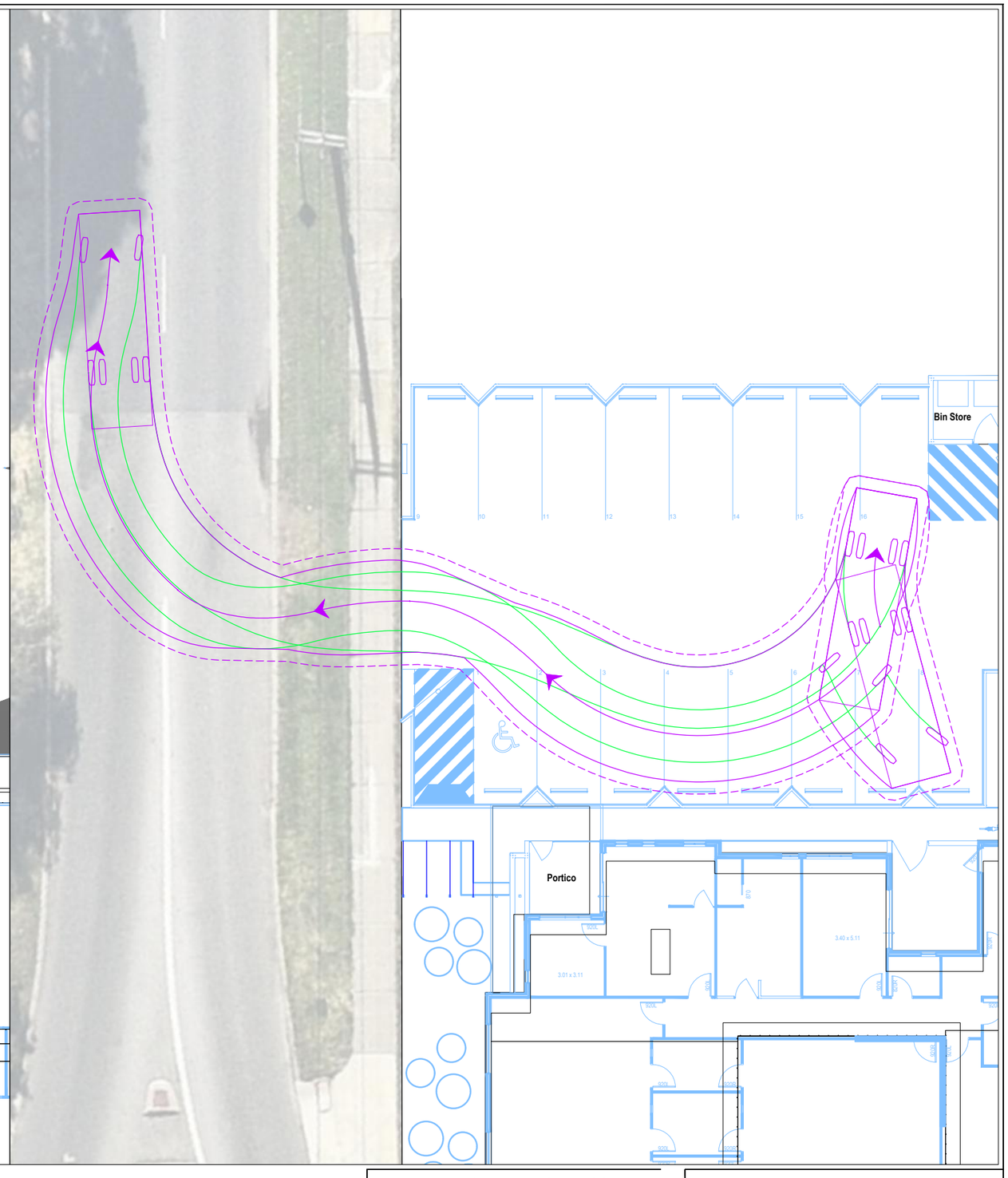
Totals

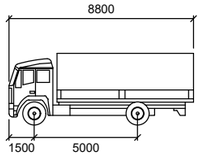
General Waste	Food & Garden Organics	Comingled Recyclables	Total
1141L	0L	633L	1773L

WALGA wishes to acknowledge Talis Consultants and the Waste Authority for assistance with the development of this online calculator.

APPENDIX 3 SWEPT PATH ANALYSIS







MRV

	mm
Width	: 2500
Track	: 2500
Lock to Lock Time	: 6.0
Steering Angle	: 34.0

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PROPOSED CHILDCARE CENTRE

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MANDURAH

SWEPT PATH DIAGRAM

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ENVIRONMENTAL ACOUSTIC ASSESSMENT

JULY 2024

OUR REFERENCE: 33060-2-24252

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ENVIRONMENTAL ACOUSTIC ASSESSMENT

PROPOSED CHILD CARE CENTRE
MANDURAH

Job No: 24252

Document Reference: 33060-2-24252

FOR

MANISH DEVNANI

DOCUMENT INFORMATION			
Author:	Geoff Harris	**Checked By:**	Paul Daly
Date of Issue:	22 July 2024		

REVISION HISTORY

Revision	Description	Date	Author	Checked
1	Original Issue	22/07/24	GH	PLD
2	New Plans	23/07/24	GH	PLD

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CONTENTS

APPENDICIES

1. INTRODUCTION

Herring Storer Acoustics were commissioned by Manish Devnani to undertake an acoustic assessment of noise emissions associated with the proposed child care to be located at 2-4 Third Avenue, Mandurah.

The report considers noise received at the neighbouring premises from the proposed development for compliance with the requirements of the *Environmental Protection (Noise) Regulations 1997.* This report considers noise emissions from:

- Children playing within the outside play areas of the centre.
- Mechanical Plant

We note that from information received from DWER, the bitumised area would be considered as a road, thus noise relating to motor vehicles is exempt from the *Environmental Protection (Noise) Regulations 1997*. We note that these noise sources are rarely critical in the determination of compliance. However, as requested by council and for completeness, they have been included in the assessment, for information purposes only.

For simplicity the mechanical plant from all operations have been considered together.

For information, a plan of the proposed development is attached in Appendix A.

2. SUMMARY

Noise received at the neighbouring residences from the outdoor play areas would comply with the requirements of the *Environmental Protections (Noise) Regulations 1997*, provided outdoor play is limited to the day period (ie after 7am).

Noise from the mechanical services has also been assessed to comply with the relevant criteria given the implementation of a barrier. However, as the design of the mechanical services has not been undertaken at this stage of the project, it is recommended that the mechanical services design be reviewed for compliance with the Regulatory requirements.

It is noted that noise associated with cars movements and cars starting are exempt from complying with the Regulations. However, noise emissions from car doors is not strictly exempt from the Regulations. Noise received at the existing neighbouring residences from these noise sources would comply with the Regulatory requirements, at all times given the conditions listed below.

Thus, noise emissions from the proposed development, would be deemed to comply with the requirements of the *Environmental Protection (Noise) Regulations 1997* for the proposed hours of operation, with the inclusion of the following:

1 Although the proposed facility would open before 7 am (ie during the night period), the outdoor play area would not be used until after 7am. Thus, noise received at the neighbouring existing residences from the outdoor play area needs to comply with the assigned day period noise level.

2 A 2200mm acoustic fence separating the neighbours to the north and east is required. For childcares, colourbond is an acceptable material, and any other fence with a higher surface density would meet the requirements.

3 Mechanical plant associated with the childcare would need to be barriered by a barrier at least 500mm above the top of the plant.

4 No car bays would need to be restricted.

3. CRITERIA

The allowable noise level at the surrounding locales is prescribed by the *Environmental Protection (Noise) Regulations 1997*. Regulations 7 & 8 stipulate maximum allowable external noise levels. For highly sensitive area of a noise sensitive premises this is determined by the calculation of an influencing factor, which is then added to the base levels shown below in Table 3.1. The influencing factor is calculated for the usage of land within two circles, having radii of 100m and 450m from the premises of concern. For other areas within a noise sensitive premises, the assigned noise levels are fixed throughout the day, as listed in Table 3.1.

TABLE 3.1 - BASELINE ASSIGNED OUTDOOR NOISE LEVEL

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises: highly sensitive area	0700 - 1900 hours Monday to Saturday (Day)	45 + IF	55 + IF	65 + IF
	0900 - 1900 hours Sunday and Public Holidays (Sunday / Public Holiday Day)	40 + IF	50 + IF	65 + IF
	1900 - 2200 hours all days (Evening)	40 + IF	50 + IF	55 + IF
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays (Night)	35 + IF	45 + IF	55 + IF
Commercial Premises	All Hours	60	75	80
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80

Note: L_{A10} is the noise level exceeded for 10% of the time.
L_{A1} is the noise level exceeded for 1% of the time.
L_{Amax} is the maximum noise level.
IF is the influencing factor.

Under the Regulations, a highly sensitive area means that area (if any) of noise sensitive premises comprising –

(a) A building, or a part of a building, on the premises that is used for a noise sensitive purpose; and

(b) Any other part of the premises within 15 m of that building or that part of the building.

It is a requirement that received noise be free of annoying characteristics (tonality, modulation and impulsiveness), defined below as per Regulation 9.

"impulsiveness" means a variation in the emission of a noise where the difference between L_{Apeak} and $L_{Amax(Slow)}$ is more than 15 dB when determined for a single representative event;

"modulation" means a variation in the emission of noise that –

(a) is more than 3 dB L_{AFast} or is more than 3 dB L_{AFast} in any one-third octave band;

(b) is present for more at least 10% of the representative assessment period; and

(c) is regular, cyclic and audible;

"tonality" means the presence in the noise emission of tonal characteristics where the difference between –

(a) the A-weighted sound pressure level in any one-third octave band; and

(b) the arithmetic average of the A-weighted sound pressure levels in the 2 adjacent one-third octave bands,

is greater than 3 dB when the sound pressure levels are determined as $L_{Aeq,T}$ levels where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as L_{ASlow} levels.

Where the noise emission is not music, if the above characteristics exist and cannot be practicably removed, then any measured level is adjusted according to Table 3.2 below.

TABLE 3.2 - ADJUSTMENTS TO MEASURED LEVELS

Where **tonality** is present	Where **modulation** is present	Where **impulsiveness** is present
+5 dB(A)	+5 dB(A)	+10 dB(A)

Note: These adjustments are cumulative to a maximum of 15 dB.

The neighbouring locations have been identified as

- R1 – Residents to the South on Third Avenue.
- R2 – Residents to the East on Third Avenue.
- R3 – Residents to the North on Second Avenue.
- R4 – Commercial to the West (Mandurah Aquatic and Recreation Centre)

Locations R1 to R3 would have an influencing factor of +4 dB due to being within 100m of Hale Road and 20% commercial in the inner and 20% commercial in the outer circle, as well as a sporting facility 100m.

TABLE 3.3 - ASSIGNED OUTDOOR NOISE LEVEL

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
R1-R3	0700 - 1900 hours Monday to Saturday (Day)	49	59	69
	0900 - 1900 hours Sunday and Public Holidays (Sunday / Public Holiday Day)	44	54	69
	1900 - 2200 hours all days (Evening)	44	54	59
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays (Night)	39	49	59
Commercial	All Hours	60	75	80

Note: L_{A10} is the noise level exceeded for 10% of the time.
L_{A1} is the noise level exceeded for 1% of the time.
L_{Amax} is the maximum noise level.

4. PROPOSAL

From information supplied, we understand that the child care centre normal hours of operations would likely between 0630 and 1800 hours, Monday to Friday (closed on public holidays) as well as 0800 to 1700 on Saturday. It is understood that the proposed childcare centre will cater for 76 children.

It is noted that although the proposed child care centre would open before 7 am (ie during the night period), the outdoor play area would not be intended to be used until after 7am.

Similarly, mechanical plant would possibly operate all hours of the day.

5. MODELLING

To assess the noise received at the neighbouring premises from the proposed development, noise modelling was undertaken using the noise modelling program SoundPlan.

Calculations were carried out using the DWER's weather conditions, which relate to worst case noise propagation, as stated in the Department of Environment Regulation *"Draft Guidance on Environmental Noise for Prescribed Premises"*. These conditions include winds blowing from sources to the receiver(s).

Calculations were based on the sound power levels used in the calculations are listed in Table 5.1, as well as plans and contours provide by the client.

TABLE 5.1 – SOUND POWER LEVELS

Item	Sound Power Level, dB(A)
Children Playing	<24 months 78 (per 10 children) Between 24 and 36 months 85 (per 10 children) >36 months 87 (per 10 children)
Car Moving in Car Park	79
Car Starting	85
Door Closing	87
Kitchen/Bathroom Exhaust (2x)	74 each
Childcare Air conditioning condensing Unit (4x)	71 each

Notes:

1 Acoustic modelling of outdoor play noise was made, based on 76 children within the outdoor play area (ie worst case scenario) broken down as follows:

0-2 years – 16 places
2-3 years – 20 places
3+ years – 40 places

2 The noise level for the mechanical plant has been based on the sound power levels used for previous assessment of child care centres. From other studies, we understand that the noise associated with the condensing units would be conservative.

3 For this child care centre, the mechanical plant units have been considered roof mounted with a barrier at least 500mm above top of units for childcare units.

4 A 2200mm acoustic fence separating the neighbours to the north and east is required. For childcares, colourbond is an acceptable material, and any other fence with a higher surface density would meet the requirements.

5 To determine the restriction to the parking, a point noise source was located in each car bay.

6 Modelling shows that noise received at the neighbouring residences from car doors closing would comply with the assigned noise level for both day and night period.

7 With only staff arriving before 7am, there would be no car starts before 7am.

8 Calculations were undertaken for the receivers at 1.5 metres above the ground level.

9 Noise modelling was undertaken to a number of different receiver locations for each of the neighbouring residences. However, to simplify the assessment, only the noise level in the worst case location (ie highest noise level), have been listed.

6. ASSESSMENT

The tables below show the assessment of noise emissions of concern from the operation. Standard building construction will be sufficient to ensure that noise from inside the building will meet the regulations.

The resultant noise levels at the neighbouring residence from children playing outdoors and mechanical plant are tabulated in Table 6.1.

From previous measurements, noise emissions from children playing does not contain any annoying characteristics, however mechanical plant emissions would be considered tonal and attract a +5 dB(A) Penalty. Noise emissions from outdoor play needs to comply with the assigned L_{A10} noise levels.

**TABLE 6.1 - ACOUSTIC MODELLING RESULTS FOR L_{A10} CRITERIA
OUTDOOR PLAY AREAS AND MECHANICAL PLANT**

Neighbouring Premises	Calculated Noise Level (dB(A))	
	Children Playing	Mechanical Plant
R1 Residential	49	28 (33)
R2 Residential	48	25 (30)
R3 Residential	43	31 (36)
R4 Commercial	37	21 (26)

( ) Includes +5 dB(A) penalty for tonality

With regards to noise associated with cars within the parking area, resultant noise levels are tabulated in Tables 6.2 and 6.3. It is noted that noise emissions from a moving car being an L_{A1} noise level, with noise emissions from cars starting and doors closing being an L_{Amax} noise level.

Based on the definitions of tonality, noise emissions from car movements and car starts, being an L_{A1} and L_{AMax} respectively, being present for less than 10% of the time, would not be considered tonal. Thus, no penalties would be applicable, and the assessment would be as listed in Table 6.2 (Car Moving) and Table 6.3 (Car Starting). However, noise emissions from car doors closing could be impulsive, hence the +10dB penalty has been included in the assessment.

**TABLE 6.2 - ACOUSTIC MODELLING RESULTS L_{A1} CRITERIA
CAR MOVING**

Neighbouring Premises	Calculated Noise Level (dB(A))
R1 Residential	26
R2 Residential	36
R3 Residential	36
R4 Commercial	33

**TABLE 6.3 - ACOUSTIC MODELLING RESULTS L_{Amax} CRITERIA
CAR STARTING / DOOR CLOSING**

Neighbouring Premises	Calculated Noise Level (dB(A))			
	Car Start		Car Door	
	Day Period	Night Period	Day Period	Night Period
R1 Residential	24	N/A	22 [32]	22 [32]
R2 Residential	35	N/A	34 [44]	34 [44]
R3 Residential	36	N/A	35 [45]	35 [45]
R4 Commercial	37	N/A	33 [43]	33 [43]

[ ] Includes +10 dB(A) penalty for impulsiveness.

Tables 6.4 to 6.9 summarise the applicable Assigned Noise Levels, and assessable noise level emissions for each identified noise.

**TABLE 6.4 – ASSESSMENT OF L_{A10} NOISE LEVEL EMISSIONS
OUTDOOR PLAY (DAY PERIOD)**

Location	Assessable Noise Level dB(A)	Applicable Assigned Noise Level (dB(A))	Exceedance to Assigned Noise Level
R1 Residential	49	49	Complies
R2 Residential	48	49	Complies
R3 Residential	43	49	Complies
R4 Commercial	37	60	Complies

TABLE 6.5 – ASSESSMENT OF L_{A10} NIGHT PERIOD NOISE LEVEL EMISSIONS MECHANICAL PLANT

Location	Assessable Noise Level dB(A)	Applicable Assigned Noise Level (dB(A))	Exceedance to Assigned Noise Level
R1 Residential	33	39	Complies
R2 Residential	30	39	Complies
R3 Residential	36	39	Complies
R4 Commercial	26	60	Complies

TABLE 6.6 – ASSESSMENT OF L_{A1} NIGHT PERIOD NOISE LEVEL EMISSIONS CAR MOVEMENTS

Location	Assessable Noise Level dB(A)	Applicable Assigned Noise Level (dB(A))	Exceedance to Assigned Noise Level
R1 Residential	26	49	Complies
R2 Residential	36	49	Complies
R3 Residential	36	49	Complies
R4 Commercial	33	75	Complies

TABLE 6.7 – ASSESSMENT OF L_{Amax} DAY PERIOD NOISE LEVEL EMISSIONS CAR STARTING

Location	Assessable Noise Level dB(A)	Applicable Assigned Noise Level (dB(A))	Exceedance to Assigned Noise Level
R1 Residential	24	69	Complies
R2 Residential	35	69	Complies
R3 Residential	36	69	Complies
R4 Commercial	37	80	Complies

TABLE 6.8 – ASSESSMENT OF L_{Amax} DAY PERIOD NOISE LEVEL EMISSIONS CAR DOOR

Location	Assessable Noise Level dB(A)	Applicable Assigned Noise Level (dB(A))	Exceedance to Assigned Noise Level
R1 Residential	32	69	Complies
R2 Residential	44	69	Complies
R3 Residential	45	69	Complies
R4 Commercial	43	80	Complies

TABLE 6.9 – ASSESSMENT OF L_{Amax} NIGHT PERIOD NOISE LEVEL EMISSIONS CAR DOOR

Location	Assessable Noise Level dB(A)	Applicable Assigned Noise Level (dB(A))	Exceedance to Assigned Noise Level
R1 Residential	32	59	Complies
R2 Residential	44	59	Complies
R3 Residential	45	59	Complies
R4 Commercial	43	80	Complies

7. CONCLUSION

Noise received at the neighbouring residences from the outdoor play area would comply during the day period, thus, outdoor play would be limited to the day period (ie – after 7am).

Noise received at the neighbouring residences from the mechanical plant would comply at all hours, when barriered.

Noise received at the neighbouring residences from noise associated with vehicles would also comply at all hours.

Thus, noise emissions from the proposed development, would be deemed to comply with the requirements of the *Environmental Protection (Noise) Regulations 1997* for the proposed hours of operation, with the inclusion of the following:

1 A 2200mm acoustic fence separating the neighbours to the north and east is required. For childcares, colourbond is an acceptable material, and any other fence with a higher surface density would meet the requirements.

2 Mechanical plant would need to be barriered by a barrier at least 500mm above the top of the plant for childcare mechanical plant.

3 No restriction to car parking during the night time period.

Finally, it is recommended to adopt best practices in managing a child care centre to reduce noise, including but not limited to no amplified music to be played outside, and favouring soft finishes in the outdoor play area.

APPENDIX A

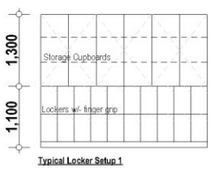
PLANS

Childcare Calculations

Room	Age (Yrs)	Quant.	Size	Staff Req
Activity 1	*0-2*	*16*	*53.53m²*	*4*
Activity 2	*2-3*	*20*	*66.01m²*	*5*
Activity 3	*3-5*	*20*	*65.96m²*	*2*
Activity 4	*3-5*	*20*	*65.00m²*	*2*
Total Internal = (Min 3.25m² per child)		**76**	**250.50m²** (Min 247.00m² req)	**13**
Total External Play Area = (Min 7m² per child)		**76**	**549.18m²** (Min 532.00m² req)	

Parking Calculations

Description	NLA	Req	Provided
4.5 Bays per 100m² NLA	*349.52m²*	*15.70*	*16*



Typical Locker Setup 1

Zone	Area	Perim
Store	6.71	9,960
Portico	9.30	12,200
Bin Store	9.80	12,600
Childcare	407.25	150,560
	432.06 m²	184.52.0 m

Site Calculations

Site Area:	1,600.00m2
Building Footprint:	472.36m2
Site Coverage:	29.54%
Allowable Site Coverage:	50%
Zoning:	R25
Policies:	Scheme 12
Heritage:	NA
Bushfire:	NA
EAL:	NA
Acoustic:	TBC
Sewer:	Back Left On
Power:	TBC
Gas/oil:	NA
Water:	2x Water Meter
Wind Rating:	TBC

7.00	DRP	03.07.24
6.00	Re-Design	27.06.24
5.00	Carpark Changes	22.06.24
4.00	Concept	21.06.24
3.00	Concept	06.06.24
2.00	Concept	12.04.24
1.00	Concept	11.04.24
Revision	Description	Date

Project North:

Client
Devnani Property Holdings

Project Name
Childcare Centre

Project Address
2-4 Third Ave, Mandurah

Drawing Title:
Ground Floor

Scale:	Sheet Size:
1:100	A1
Project No:	Revision Number:
24022	7.00

Drawing No.:
09 of 12

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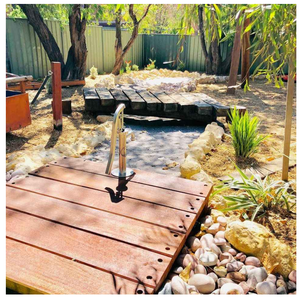
DOUBLE SLIDE

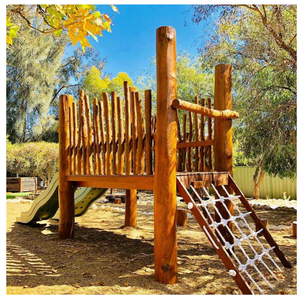
CREEK

TEEPEE



TAP

CLIMBING HOLDS



CLIMBING NET

NEST SWING

SAND KITCHEN

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PROJECT	DRAWING	ISSUE
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CLIENT	DRAWING N0	SCALE	SHEET	REVISION	DRAWN	DATE
-	L-01	1:100	A1	0	NK	14/07/24

REVISIONS

No	DATE	DRAWN	DETAILS
0	14/07/24	NK	CONCEPT- ISSUED FOR FEEDBACK

PLANT SCHEDULE

	SPECIES	SPACINGS	SIZE	MATURE SIZE	QTS
TREES					
Afl	AGONIS FLEXUOSA	AS SHOWN	AS SHOWN	10 M	7
Cfi	CORYMBIA FICIFOLIA	AS SHOWN	AS SHOWN	10 M	11
Evi	EUCALYPTUS VICTRIX	AS SHOWN	AS SHOWN	10 M	1
SHRUBS					
Hsc	HIBBERTIA SCANDENS	600 MM	140 MM	1 M	27
Hvi	HARDENBERGIA VIOLACEA	600 MM	140 MM	1 M	5
Rof	ROSEMARY OFFICINALIS	600 MM	140 MM	1 M	30
Lof	LAVANDULA OFFICINALIS	600 MM	140 MM	1 M	28
Dre	DIANELLA REVOLUTA	600 MM	140 MM	1 M	34

*Verge existing grass 238,70m²

NOTES

1. LANDSCAPE WORKS

1.1 All areas are to be fine graded to conform with kerb levels and surrounding surfaces.

1.2 Surfaces shall be free from depressions, irregularities, and noticeable changes in grade.

2. SOIL PREPARATION

2.1 Planted areas shall be spread with min of 50mm soil conditioner ripped into soil to a min depth of 200mm.

2.2 Trees in carpark shall have a 2000x2000x600mm deep pit filled with Eclipse structural soil and compacted every 150mm as per specification.

3.PLANTING

3.1 Planted areas shall be mulched with pine chip mulch to a minimum of 75mm.

3.2 Tree locations are as shown please refer to plan.

3.3 Shrubs & groundcovers in mixed planting areas are to be planted in random groupings.

3.4 All garden beds to be mulched with pine chip at a min of 50mm depth.

4.IRRIGATION

4.1 All planting and turf areas are to be irrigated via a fully automatic system from the mains.

4.2 All garden beds within playspace to be irrigated with 300mm pop up risers, trees with bubblers on 100mm pop ups, sub surface drip irrigation may be used in skinny harden beds to prevent excessive overspray.

4.3 All garden beds in the carpark and verge shall be irrigated with sub surface drip irrigation and 100mm pop ups with bubblers to each tree.

4.4 As constructed irrigation plans shall be submitted on completion of works.

4.5 Irrigation controller must be dual program.

TREES:

EUCALYPTUS VICTRIX

CORYMBIA FICIOLIA

AGONIS FLEXUOSA

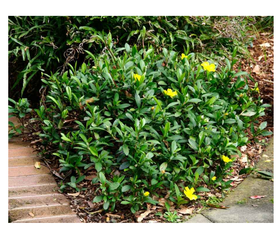
SHRUBS:

LAVANDULA OFFICINALIS

ROSEMARY OFFICINALIS

DIANELLA REVOLUTA

HARDENBERGIA VIOLACEA



HIBBERTIA SCANDENS

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PROJECT	DRAWING	ISSUE
MANDURAH	PLANTING PLAN	ISSUED FOR FEEDBACK

CLIENT	DRAWING N0	SCALE	SHEET	REVISION	DRAWN	DATE
-	L-02	1:125	A1	1	NK	15/07/24

REVISIONS

No	DATE	DRAWN	DETAILS
0	14/07/24	NK	PLANTING- ISSUED FOR FEEDBACK
1	15/07/24	NK	PLANTING- ISSUED FOR FEEDBACK

STORMWATER SIZING CALCULATIONS & WORKINGS:

IMPERVIOUS AREA OF SITE:
- BUILDING FOOTPRINT AND ROOF AREA - 690M²
- CARPARK AREA - 430M²
- TOTAL - 1,120M²

VOLUME TO BE RETAINED:
IMPERVIOUS AREA X FIRST 15MM OF RAIN = VOLUME
1,120M² X 0.015 = 16.8M³

SOAKWELL CALCULATIONS:
AN 1800Ø X 1500 DEEP SOAKWELL ALLOWS FOR 3.82M³ OF STORAGE VOLUME

16.8M³ / 3.82M³ = 4.4 SOAKWELLS

SITE REQUIREMENTS:
TO ALLOW FOR SUFFICENT RETENTION 5 INTERCONNECTED SOAKWELLS 1800Ø X 1500MM DEEP HAVE BEEN PROPOSED WITH OVERFLOW DRAINAGE PROVISIONS CONNECTED TO THE SHIRES STORMWATER SYSTEM

Zone	Area	Perim
Store	5.71	9.960
Portico	9.30	12.200
Bin Store	9.80	12.600
Childcare	467.25	110.160
	492.06 m²	144.920 mm

Site Calculations	
Site Area:	1,600.89m2
Building Footprint:	472.96m2
Site Coverage:	29.54%
Allowable Site Coverage:	50%
Zoning:	R25
Policies:	Scheme 12
Heritage:	NA
Bushfire:	NA
BAL:	NA
Acousstic:	TBC
Sewer:	Back Left Cnr
Power:	TBC
Coastal:	NA
Water:	2x Water Meter
Wind Rating:	TBC

Revision	Description	Date

Project North:

Client
Devnani Property Holdings

Project Name
Childcare Centre

Project Address
2-4 Third Ave, Mandurah

Drawing Title:
Ground Floor

Scale: 1:100
Sheet Size: A1
Project No:
Revision Number:
Drawing No.:

H01_A - STORMWATER MANAGEMENT PLAN
10/07/2024

OTG
HYDRAULIC DESIGN

Note:

SITE SURVEY only. The information shown on this drawing is current as at the Date of Survey.
Boundary information, Easements etc. to be verified from the Certificate of Title,
Plan/Diagram or a Boundary Repeg. Boundary position approximate only.
Location of boundary pegs or fences in relation to the boundary lines are not guaranteed.
Sewer/Drainage may vary from schematic presentation, clearances
to be checked on site. Services information to be confirmed with relevant AUTHORITIES.

For underground services - ring "DIAL BEFORE YOU DIG" for confirmation of those services.

COOLIBAH AVENUE

LOT 170
LOT 171
LOT 172
LOT 185
LOT 187
792m²
LOT 186
809m²
New Colorbond Fencing
(20.12)
Grass
Gate
Shed
Kerbing
Conc F/Path
(34.2)
Colorbond Fencing
OHW
(40.23)
New Colorbond Fencing
Fibro / Supersix
RL 9.64
Porch
Brick Paving
Garden
Decking
Fibro / Supersix
RL 10.15
Garage
Low Supersix Fence
Traffic Island
Pram Ramp
Low Fencing
(8.53)
(14.08)
Colorbond Fencing
Bitumen D/Way
Conc D/Way
Datum - CN
RL 6.40
Roundabout Island
Traffic Island
Conc F/Path
Kerbing
THIRD AVENUE

LEGEND

- Peg
- Datum
- SSM
- Survey Station
- PG Peg Gone
- PF Peg Found
- PFD Peg Fd Disturbed
- N&P Nail & Plate
- Gas Meter
- GAS Marker
- Gas Valve
- Light Pole
- Electrical MH
- Power Pole
- Stay Pole
- Strainer Wire
- Power Dome
- Electric Pit
- Comms Pit
- TEL Pit
- Telecom Pillar
- Camera
- Gate
- Litter Bin
- Letter Box
- Bollard
- Sign
- Multi Post Sign
- Traffic Signal Post
- Traffic Signal Box
- Gully Pit
- Drainage MH
- Hydrant Ground
- Hydrant Pillar
- Flushing Point
- Hydrant
- Stop Valve
- Water Meter
- Water Tap
- Bore
- Retic Box
- Sewer I.O.
- Sewer House Conn.
- Sewer MH
- Tree
- Finished Floor Level

0 1 2 3 4 5 10 15 20 25

REV.	DATE:	REVISION NOTE:	SURVEYED	DRAWN	CHECKED
0	19/7/24	Original	BM	BM	MG

McGREGOR SURVEYS
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West Perth WA 6005
ABN: 53 060 995 066

MANISH DEVNANI
2 and 4 Third Avenue Mandurah
Contour and Feature Survey

CLIENT:	Manish Devnani			JOB No.:	467-2602
PROJECT:	2 and 4 Third Avenue Mandurah			DRAWING No.:	1
DESCRIPTION:	Contour and Feature Survey				
HORIZ. GRID:	NA	VERT. DATUM:	AHD	SCALE:	1:250 A3
FIELDBOOK REF.:	BM010 - P54	TXT/GSI REF.:	NA	SHEET No.:	1
FILE NAME:	467-2602 Third-CF-mjo			REV.:	0
ISSUED PLAN:	467-2602 Third-CF.pdf				

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Sustainable Transport Surveys Pty Ltd
ABN: 18 439 813 274
www.salt3.com.au

2 October 2024

Manish Devnani
Senior Mortgage Broker
Deals Mortgage
1341 Dandenong Road
Chadstone VIC 3148

Dear Manish,

Re: **2 & 4 THIRD AVENUE, MANDURAH – TRAFFIC MODELLING**
Project No: **24283**

I refer to your request for additional traffic engineering services regarding the proposed childcare centre at 2 & 4 Third Avenue in Mandurah.

SALT has previously prepared a Traffic Impact Statement for the proposed development (24283TREP01F01 dated 19 July 2024).

It is understood that comments have been received from City of Mandurah's Traffic and Transport Engineering team, as follows:

The City requires the access to the carpark for the Childcare Centre to be from Third Avenue. Please provide amended plans that show modification.

- *The proposed entrance to the development is from Coolibah Avenue (a Local Distributor), which is located approximately 28m north of the roundabout on the approaching lane from Pinjarra Road.*
  - *Early traffic data (2021 Data) indicates the utilisation of Coolibah Avenue is 4690 vehicles / day which is within the capacity of the road (Local Distributor – 7000 vehicles/day) at the time of the survey.*
  - *Early traffic data (2019 Data) indicates the utilisation of Third Avenue is 895 vehicles / day which is within the capacity of the road (Access Road– 3000 vehicles/day) at the time of the survey.*
  - *Manual Traffic Counts (from 05/09/2024) for Coolibah Avenue (North side of the roundabout) at peak morning and afternoon were 670 vehicles (7:30 am–9 am and both directions) and 795 vehicles (2:30pm – 4:00 pm and both directions).*
  - *Manual Traffic Counts (from 05/09/2024) for Third Avenue at peak morning and afternoon were 201vehicles (7:30 am–9 am and both directions) and 193 vehicles (2:30pm – 4:00 pm and both directions).*
  - *Concerns is held for the right turn into the development on a north heading along Coolibah, and the impact on traffic to the south and through the roundabout for the scenario when cars are queueing to enter the development*
  - *According to the Strategic Transport Model (STM), the volume is predicted to reach 7000 vehicles by 2041 (Do Nothing scenario) and the Volume Capacity ratio reaches 1.05 (2041 – Do Nothing scenario).*
  - *A Volume Capacity ratio of 1.05 generally indicates a Level of Service of 'F', which is an over capacity operating condition leading to delays and congestion.*
  - *For Third Avenue – Currently awaiting to get more clarity on the Strategic Transport Model data provided by Stantec. However, based on the data that we have Third Avenue experiences lower traffic volumes compared to Coolibah Avenue.*

Recommendation – Access to the development car park from Third Avenue is preferred.

- *The swept path diagrams provided for trucks indicate less than ideal operating conditions within the car park. Trucks follow entry and exit paths that cross through 5 parking bays on each side of the car park, which is unsafe and limits this movement to outside of operating hours. If cars are parked in these bays there is no extra room for turning, requiring the truck to reverse back onto Coolibah Avenue and increasing the risk of conflict with oncoming traffic.*

Recommendation – Accommodate truck movements with an appropriately sized driveway and parking bay or provide separate access.

- *The dimensions of the parking bays are compliant with Australian Standards (AS2890.1).*

SALT is of the opinion that the proposed access location on Coolibah Avenue is the most appropriate outcome for the site in terms of safety and minimising impacts to surrounding residents. The access has been situated as far from the adjacent roundabout as possible to ensure adequate visibility of oncoming vehicles when entering and exiting the site.

This report includes a detailed assessment of the site access arrangement and response to the comments received from Council.

1 TRAFFIC VOLUMES

1.1 COOLIBAH AVENUE TRAFFIC VOLUMES

City of Mandurah have provided more details on the Manual Traffic Count data refenced in their comments. The data involved collection of traffic volumes at Coolibah Avenue / Third Avenue / Cemetery Road between 7:30am–9:00am and 2:30pm–4:00pm on Thursday 5 September 2024.

By analysis of the data, the peak hours occurred between 8:00am–9:00am and 3:00pm–4:00pm. The peak hour volumes during these hours were:

- AM peak hour:
  - Northbound = 330 vehicles per hour
  - Southbound = 183 vehicles per hour
- PM peak hour:
  - Northbound = 266 vehicles per hour
  - Southbound = 256 vehicles per hour

The future (2041) traffic volumes are estimated by multiplying by a growth factor, calculated as the ratio of the 2041 daily volume provided (7,000 vehicles per day) over the 2021 daily volume provided (4,690 vehicles per day). The resulting growth factor is 1.49. We note that it is not typical practice to forecast this far into the future for the purposes of traffic modelling for new developments, and instead a 10-year timeframe is the norm. However, in the interest of conservatism a 2041 estimate is adopted.

The resulting traffic volumes are summarised in Table 1.

Table 1 Coolibah Avenue traffic volumes

	2024 Volumes	2041 Volumes
AM Peak Hour		
Northbound	330 vehicles per hour	493 vehicles per hour
Southbound	183 vehicles per hour	273 vehicles per hour
PM Peak Hour		
Northbound	266 vehicles per hour	397 vehicles per hour
Southbound	256 vehicles per hour	382 vehicles per hour

1.2 SITE TRAFFIC GENERATION

Traffic generation of the proposed childcare centre was estimated within the original Traffic Impact Statement, provided below for reference:

The critical assessment periods for traffic impacts for a childcare centre are the weekday morning and evening peak periods typically from 7:00am–9:00am and 4:00pm–6:00pm.

Based on case study data collected at other childcare centres, a peak hour trip generation rate of 0.8 trips per child is adopted. This is also in line with the rate provided by the RTA Guide to Traffic Generating Developments. When applied to the 76–place childcare centre, this results in a traffic generation of 60 trips per hour.

It is assumed that the proportion of inbound and outbound trips in each peak period would be 50% / 50% considering the short stay nature of childcare drop–off and pick–up activity.

Therefore, in each of the AM and PM peak hours, traffic is generated in the order of 60 trips, with 30 inbound and 30 outbound trips.

Estimating the distribution of traffic to and from the childcare centre requires consideration of the road layout and locations of nearby residential and employment catchments.

In this case, there is a large residential catchment area to the south and south–west, and a good connection to/from the north on Coolabahs Avenue which connects to Pinjarra Road at a signalised intersection, which then provides connectivity to a major arterial being Mandurah Road. Therefore, it is estimated that:

- In the morning, 60% of traffic will arrive from the south and depart to the north, and 40% will arrive from the north and depart to the south; and
- In the afternoon/evening: 40% of traffic will arrive from the south and depart to the north, and 60% will arrive from the north and depart to the south.

The resulting estimated traffic distribution is presented diagrammatically in Figure 1.

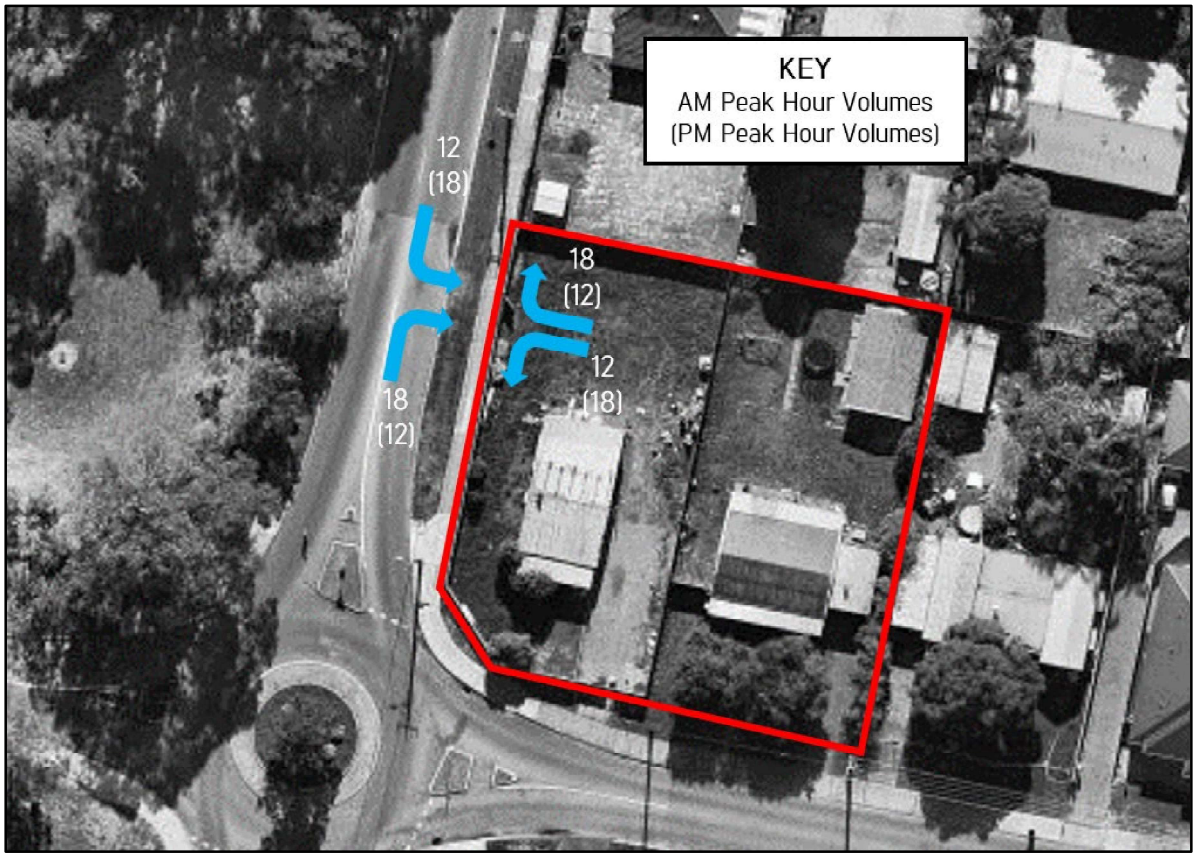


Figure 1 Estimated traffic distribution

2 SIDRA ANALYSIS

The operation of the intersection of the site access and Coolibah Avenue has been assessed using SIDRA Intersection v9.1. SIDRA is an advanced micro-analytical traffic evaluation tool that provides estimates of capacity and performance statistics (delay, queue lengths etc) on a lane-by-lane basis.

The intersection has been analysed for the AM and PM peak hours under post development conditions and in the long-term (2041) scenario.

Key performance criteria include:

Degree of Saturation (DOS): This represents the ratio of traffic volume to capacity. Generally speaking, a DOS of below 0.9 indicates acceptable performance. A DOS of over 1.0 indicates that capacity has been exceeded.

Level of Service (LOS): An index of the operational performance of traffic based on service measures such as delay, degree of saturation, density and speed during a given flow period. A guide to LOS ratings is provided in **Table 2.**

Average Delay: The average delay time that can be expected for a given movement.

95th Percentile Queue: The maximum queue length that can be expected in 95% of all observed queue lengths during the hour.

Table 2 Level of Service Ratings

Level of Service		Degree of Saturation		
		Unsignalised Intersection	Signalised Intersection	Roundabout
A	Excellent	<=0.60	<=0.60	<=0.60
B	Very Good	0.60-0.70	0.60-0.70	0.60-0.70
C	Good	0.70-0.80	0.70-0.90	0.70-0.90
D	Acceptable	0.80-0.90	0.90-0.95	0.90-0.95
E	Poor	0.90-1.00	0.95-1.00	0.95-1.00
F	Very Poor	>=1.0	>=1.0	>=1.0

The default SIDRA settings have been adopted for the analysis, aside from an extra bunching of 15% applied to the northern leg of Coolibah Avenue to account for the effect of the upstream signals at Pinjarra Road / Coolibah Avenue.

The results of the SIDRA analysis are presented below, with detailed outputs provided in APPENDIX 1.

Table 3 SIDRA results – AM peak hour

Leg	Turn	Post Development Scenario (2024)				Long Term Scenario (2041)			
		DOS	LOS	Delay (s)	95th %ile Queue (m)	DOS	LOS	Delay (s)	95th %ile Queue (m)
Coolibah Ave (south)	T	0.180	A	0.0	1.2	0.263	A	0.0	1.4
	R	0.180	A	6.5	1.2	0.263	A	7.9	1.4
Site Access	L	0.034	A	5.1	0.8	0.043	A	5.5	1.0
	R	0.034	A	7.0	0.8	0.043	A	9.1	1.0
Coolibah Ave (north)	L	0.099	A	4.6	0.0	0.144	A	4.6	0.0
	T	0.099	A	0.0	0.0	0.144	A	0.0	0.0

Table 4 SIDRA results – PM peak hour

Leg	Turn	Post Development Scenario (2024)				Long Term Scenario (2041)			
		DOS	LOS	Delay (s)	95th %ile Queue (m)	DOS	LOS	Delay (s)	95th %ile Queue (m)
Coolibah Ave (south)	T	0.144	A	0.0	0.8	0.211	A	0.0	1.0
	R	0.144	A	7.3	0.8	0.211	A	9.5	1.0
Site Access	L	0.031	A	5.4	0.8	0.039	A	6.0	1.0
	R	0.031	A	6.9	0.8	0.039	A	8.8	1.0
Coolibah Ave (north)	L	0.139	A	4.6	0.0	0.203	A	4.6	0.0
	T	0.139	A	0.0	0.0	0.203	A	0.0	0.0

From the above SIDRA results, it can be concluded that the intersection of the site access and Coolibah Avenue operates well post-development and in the long-term scenario. The following can be concluded:

- All movement are found to operate with an 'excellent' level of service.
- Very minimal queuing is imposed to traffic on Coolibah Avenue. A maximum 95th percentile queue of 1.4m is to occur for through vehicles on Coolibah Avenue during the AM peak hour in the 2041 scenario. This is far less than the length of one vehicle.
- No delays are imposed to through vehicles on Coolibah Avenue under all scenarios.

Therefore, the proposed childcare centre is found to have very minimal impact on the operation of Coolibah Avenue post development and in the long-term (2041) scenario.

3 RESPONSE TO COUNCIL COMMENTS

SALT's response to the comments received from Council are summarised in Table 5 below.

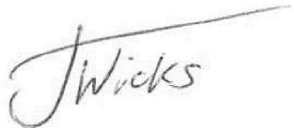
Table 5 SALT response to Council comments

COUNCIL COMMENT / RECOMMENDATION	SALT RESPONSE
The proposed entrance to the development is from Coolibah Avenue (a Local Distributor), which is located approximately 28m north of the roundabout on the approaching lane from Pinjarra Road. *Recommendation – Access to the development car park from Third Avenue is preferred.*	It is understood that Council's concern comes from the projected traffic volumes on Coolibah Avenue. The preceding SIDRA assessment demonstrates that the proposed access on Coolibah Avenue is found to have very minimal impact on the operation of Coolibah Avenue including in the long-term (2041) scenario. Vehicle access to the site from Coolibah Avenue is a more appropriate outcome than on Third Avenue. Access on Third Avenue would have to be placed in close proximity to the adjacent roundabout. This would impose safety concerns for vehicles turning into and out of the site and oncoming vehicles particularly from the northern leg of the roundabout, with an increased risk of rear-end crashes as drivers suddenly slow to enter the site. Furthermore, placing the site access on Coolibah Avenue would have lesser impacts on to surrounding residents compared to Third Avenue.
The swept path diagrams provided for trucks indicate less than ideal operating conditions within the car park. *Recommendation – Accommodate truck movements with an appropriately sized driveway and parking bay or provide separate access.*	The Traffic Impact Statement specifies that waste collection is to be scheduled outside of operating hours when the on-site car park will be vacant. This is a typical arrangement for such a development. SALT has also prepared a Waste Management Plan to detail this arrangement.
The dimensions of the parking bays are compliant with Australian Standards (AS2890.1).	No comment necessary.

I trust the above adequately addresses Councils concerns.

Please do not hesitate to contact me should you have any queries.

Yours sincerely,



Jarrod Wicks
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SALT
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APPENDIX 1 SIDRA RESULTS

MOVEMENT SUMMARY

Site: 101 [Coolibah / Site - 2024 AM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Coolibah Avenue															
2	T1	All MCs	347	0.0	347	0.0	0.180	0.0	LOS A	0.2	1.2	0.05	0.05	0.05	49.7
3	R2	All MCs	19	0.0	19	0.0	0.180	6.5	LOS A	0.2	1.2	0.05	0.05	0.05	48.4
Approach			366	0.0	366	0.0	0.180	0.3	NA	0.2	1.2	0.05	0.05	0.05	49.6
East: Site Access															
4	L2	All MCs	13	0.0	13	0.0	0.034	5.1	LOS A	0.1	0.8	0.37	0.57	0.37	48.1
6	R2	All MCs	19	0.0	19	0.0	0.034	7.0	LOS A	0.1	0.8	0.37	0.57	0.37	48.0
Approach			32	0.0	32	0.0	0.034	6.3	LOS A	0.1	0.8	0.37	0.57	0.37	48.0
North: Coolibah Avenue															
7	L2	All MCs	13	0.0	13	0.0	0.099	4.6	LOS A	0.0	0.0	0.00	0.03	0.00	48.5
8	T1	All MCs	193	0.0	193	0.0	0.099	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	49.8
Approach			205	0.0	205	0.0	0.099	0.3	NA	0.0	0.0	0.00	0.03	0.00	49.7
All Vehicles			603	0.0	603	0.0	0.180	0.6	NA	0.2	1.2	0.05	0.07	0.05	49.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Coolibah / Site - 2041 AM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Coolibah Avenue															
2	T1	All MCs	519	0.0	519	0.0	0.263	0.0	LOS A	0.2	1.4	0.04	0.05	0.04	49.8
3	R2	All MCs	19	0.0	19	0.0	0.263	7.9	LOS A	0.2	1.4	0.04	0.05	0.04	48.4
Approach			538	0.0	538	0.0	0.263	0.3	NA	0.2	1.4	0.04	0.05	0.04	49.7
East: Site Access															
4	L2	All MCs	13	0.0	13	0.0	0.044	5.5	LOS A	0.1	1.0	0.49	0.64	0.49	44.3
6	R2	All MCs	19	0.0	19	0.0	0.044	9.1	LOS A	0.1	1.0	0.49	0.64	0.49	44.2
Approach			32	0.0	32	0.0	0.044	7.6	LOS A	0.1	1.0	0.49	0.64	0.49	44.2
North: Coolibah Avenue															
7	L2	All MCs	13	0.0	13	0.0	0.144	4.6	LOS A	0.0	0.0	0.00	0.02	0.00	48.6
8	T1	All MCs	287	0.0	287	0.0	0.144	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	49.8
Approach			300	0.0	300	0.0	0.144	0.2	NA	0.0	0.0	0.00	0.02	0.00	49.8
All Vehicles			869	0.0	869	0.0	0.263	0.5	NA	0.2	1.4	0.04	0.06	0.04	49.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Coolibah / Site - 2024 PM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Coolibah Avenue															
2	T1	All MCs	280	0.0	280	0.0	0.144	0.0	LOS A	0.1	0.8	0.05	0.05	0.05	49.7
3	R2	All MCs	13	0.0	13	0.0	0.144	7.3	LOS A	0.1	0.8	0.05	0.05	0.05	48.4
Approach			293	0.0	293	0.0	0.144	0.3	NA	0.1	0.8	0.05	0.05	0.05	49.7
East: Site Access															
4	L2	All MCs	19	0.0	19	0.0	0.031	5.4	LOS A	0.1	0.8	0.38	0.56	0.38	45.1
6	R2	All MCs	13	0.0	13	0.0	0.031	6.9	LOS A	0.1	0.8	0.38	0.56	0.38	45.0
Approach			32	0.0	32	0.0	0.031	6.0	LOS A	0.1	0.8	0.38	0.56	0.38	45.1
North: Coolibah Avenue															
7	L2	All MCs	19	0.0	19	0.0	0.139	4.6	LOS A	0.0	0.0	0.00	0.04	0.00	48.5
8	T1	All MCs	269	0.0	269	0.0	0.139	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	49.7
Approach			288	0.0	288	0.0	0.139	0.3	NA	0.0	0.0	0.00	0.04	0.00	49.7
All Vehicles			613	0.0	613	0.0	0.144	0.6	NA	0.1	0.8	0.04	0.07	0.04	49.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [Coolibah / Site - 2041 PM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Coolibah Avenue															
2	T1	All MCs	418	0.0	418	0.0	0.211	0.0	LOS A	0.1	1.0	0.04	0.05	0.04	49.8
3	R2	All MCs	13	0.0	13	0.0	0.211	9.5	LOS A	0.1	1.0	0.04	0.05	0.04	48.4
Approach			431	0.0	431	0.0	0.211	0.3	NA	0.1	1.0	0.04	0.05	0.04	49.7
East: Site Access															
4	L2	All MCs	19	0.0	19	0.0	0.039	6.0	LOS A	0.1	1.0	0.48	0.63	0.48	44.5
6	R2	All MCs	13	0.0	13	0.0	0.039	8.8	LOS A	0.1	1.0	0.48	0.63	0.48	44.4
Approach			32	0.0	32	0.0	0.039	7.1	LOS A	0.1	1.0	0.48	0.63	0.48	44.5
North: Coolibah Avenue															
7	L2	All MCs	19	0.0	19	0.0	0.203	4.6	LOS A	0.0	0.0	0.00	0.02	0.00	48.6
8	T1	All MCs	402	0.0	402	0.0	0.203	0.1	LOS A	0.0	0.0	0.00	0.02	0.00	49.8
Approach			421	0.0	421	0.0	0.203	0.3	NA	0.0	0.0	0.00	0.02	0.00	49.7
All Vehicles			883	0.0	883	0.0	0.211	0.5	NA	0.1	1.0	0.04	0.06	0.04	49.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

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Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Schedule of Submissions

Proposed Child Care Premises

No.	Submitter	Submitter Comments	Applicant comments	Officer Comments
Landowners				
1	24 Coolibah Avenue	We would be very pleased to see development on the site. <u>Access</u> My only reservation is regarding the entry to their carpark, currently shown as off Coolibah Ave but with the comment that it could be changed. My concern is if the entry was to be from Third Ave, immediately after a roundabout, into a suburban street, a street that already has police vehicles exiting regularly and often at speed. With the childcare centre there will likely be a large amount of activity early morning and late afternoon and it is easy to see that cars will bank up at the roundabout or on the street. <u>Car Parking</u> On the drawing provided there appear to be only enough parking spaces for the 12 staff, no provision for a quick dropoff zone so dropping	The submitter's support to this development application is noted and appreciated. The Applicant agrees that the current design (access off Coolibah Avenue) is the better design outcome having regard to all relevant considerations, particularly traffic and amenity issues. This has been comprehensively detailed throughout all our reporting. With respect to car parking numbers, it is submitted that the proposal complies with the City's requirement of 16 bays – 16 car parking bays have been provided. At the worst case, but unlikely, scenario of 12 employees arriving in 12 separate vehicles, there is still a provision of 4 parking bays, which given the nature of the development, are generally only used for only a few minutes at a time.	Applicant has detailed to the City;s satisfaction the justification for Access from Coolibah Avenue.

		off 72 young children will be a challenge. The Coolibah Ave entry is a safer and more sensible option in my opinion		
2	3 Second Avenue	**<u>Strongly Object</u>** to the proposed development directly backs onto 3 Second Avenue. This proposal is ill thought out and not appropriate for residential zoning and until such time that these issues, particularly around the proposed opening hours and the massive increase in noise that can be expected is addressed I will not be for the proposed development. <u>Impact on resident's enjoyment time</u> <u>R</u>esidents expect quiet enjoyment particularly on Saturdays (outside normal business hours. Even with a 2.2m high acoustic fence that is proposed to be built, the noise levels will be significantly increased particularly on Saturday. Increased traffic flows at peak times will affect quality of life of residents. <u>Use should be located within Commercial zoning</u>	The Applicant notes this submission. <u>Zoning:</u> It is submitted that the Residential zoning is appropriate for a development of this nature. The land use is a 'D' use pursuant to the City's Local Planning Scheme No. 12 (**LPS12**). The land use is therefore capable of approval at the local government's discretion. If the land use was not appropriate for the Residential zone, a 'Child Care Premises' would be a not permitted 'X' use under LPS12. <u>Operating hours/Impacts on Amenity:</u> Pursuant to section 3.3 of the City's Local Planning Policy No 3 – Non-Residential Uses in Residential Zones (**LPP3**), the operating hours permitted are: • Monday to Friday 7:00am – 6:00pm • Saturday 8:00am – 5:00pm	The City is satisfied amenity impacts can be effectively managed subject to appropriate conditions. Note childrens play is the primary noise impact. External areas not to be used prior to 7:00am. Set down an pick up will be compliant at the earlier start and reduce traffic congestion

		This type of proposal should ideally be proposed for a commercial zoning, where the expected noise coming from the running of such a development does not affect the quiet enjoyment of local residents. <u>Increased Traffic</u> The development will significantly affect traffic flows on Second, Third and Coolibah Avenue. Should all the children be dropped off and/or picked up at the same time this will cause vehicles to back up on Coolibah Avenue causing congestion at peak times. Increased traffic will impact the longevity and maintenance of roads. <u>Effluent Disposal/Waste</u> No information was provided for upgrades to septic pipes as most dwellings in this area were built late 60s-early 70s and would be inadequate for a child care centre and far beyond the coping capacity of the area.	The proposed hours of operation will be: • Monday to Friday 6:30am – 6:30pm • Saturday 8:00am – 5:00pm. Whilst this is a slight variation to the weekdays of LPP3, it is submitted that there would be no adverse impacts to the residential amenity, as identified by the Transport Impact Statement (**TIS**) and the Environmental Acoustic Assessment (**EAA**). It is noted however that the submitter is objecting to the hours of operation on the Saturday only, which is compliant. It is further submitted that the additional hours are required to accommodate pick-up/drop-off prior to/after work. This in turn will also allow for lesser traffic within the peak hour as there is more time to spread the traffic across a broader spectrum. <u>Increase to Traffic:</u> Detailed reporting was conducted by expert traffic consultants through the submitted TIS and the extensive traffic modelling reporting provided as part of the City's request for further information. This reporting has adequately justified that while there is an increase to overall traffic numbers,	Applicant has satisfied the City that traffic volumes can be accommodated within the road network.

			the level of traffic generated by the proposal can be accommodate by the surrounding road environment and it will not have any adverse impacts on the residents and users of it. <u>Effluent Disposal/Waste:</u> Lot 187 (No. 2) and Lot 186 (No. 4) Third Avenue both have existing access to reticulated sewer located on the northern most boundary. The development will have the capacity to utilise the existing sewer arrangements. Any upgrades required will be dealt with through liaison with the Water Corporation. The City have the ability to recommend a condition for such arrangements to be finalised, prior to the occupation of the development.	Applicant's comments supported.

PART D – OTHER BUSINESS

1. State Administrative Tribunal Applications and Supreme Court Appeals

2. Meeting Closure