Oakdale West Estate SSD7348 – MOD 1, 2, 3

Consolidated Response to Submission

Oakdale West Estate SSD7348 – MOD1

Response to Submission

MATTERS RAISED	APPLICANT RESPONSE
NSW DEPARTMENT OF PLANNING, INDUSTRY, & ENVIRONMENT	
Sewerage Design 1. The proposed modification involves the increase of the Precinct 2 building pad level height by 2 metres to facilitate the sewerage servicing of Precinct 2. The Department notes Council have stated it is unable to support the proposed increase in pad level height in its submission made on the modification application. The Department requests that the proposed sewerage design be revisited to reduce the increase building pad level height of Precinct 2 and provide detailed justification for the final pad level height.	• Both Council and the Department's concerns with the increase in pad levels are noted. After significant consideration of alternative design and infrastructure options and at additional cost, Goodman will reduce the pad levels of 2E, 2F & 2G (or 3A, 3B, & 3C as they are described for MOD 3) back to the original approved SSD levels. This is in line with Council's request to reduce the pad levels west of Road 3 back to the approved SSD levels. • For clarity, we summarise the pad levels for MOD 1 and MOD 3 below (Note, these refer to the Finished Floor Level (FFL)).

SSD & MOD 1 pad level reference	MOD 3 pad level reference	SSD approved pad level	Original MOD 1 pad level	Proposed MOD 1 pad levels	Proposed MOD 3 pad levels
2A	2A	64.50	66.20	66.20	68.60
2B		64.50	66.20	66.20	68.60

MATTERS RAISED	APPLICANT RESPONSE

2E	3A	66.80	67.00	66.80	66.80
2F	3B	67.80	69.5	67.80	67.80
2G	3C	67.80	69.5	67.80	67.80
2H	3D, 3E, 3F, 3G	71.75	71.75	71.75	71.75
2J		71.75	71.75	71.75	71.75

- Refer to **Annexure A (pg.20)** for the updated civil masterplan confirming these levels.
- We summarise the pad levels for MOD 1 and MOD 3 below (Note, these refer to the Bulk Earthworks Levels (BEL)). Refer to **Annexure A (pg.20)** updated civil masterplan and memo from our civil engineers confirming these levels.

SSD & MOD 1 pad level reference	**MOD 3 pad level reference**	**SSD approved pad level**	**Original MOD 1 pad level**	**Proposed MOD 1 pad levels**	**Proposed MOD 3 pad levels**
2A	2A	64.20	66.20	66.20	68.30
2B		64.20	66.20	66.20	68.30
2E	3A	66.50	67.00	66.50	66.50
2F	3B	67.50	69.5	67.50	67.50

MATTERS RAISED	APPLICANT RESPONSE

2G	3C	67.50	69.5	67.50	67.50
2H	3D, 3E, 3F, 3G	71.75	71.75	71.75	71.75
2J		71.75	71.75	71.75	71.75

- Goodman does not propose to reduce the pad levels back to the SSD approved levels for Pad 2A & 2B (or 2A as described in MOD 3). The pad has been increased in height to accommodate one large flat pad for a shortlisted enquiry. The pad has also been increased to accommodate the change to road network in MOD 3. Pad 2A is offset 120m from the western boundary. The section included in **Annexure B (pg.27)** shows that there is appropriate buffer zone between the western boundary and the proposed building. Working from the western boundary adjacent to Pad 2A; a 80m landscape setback exists as well as a biodiversity conservation area that is heavily planted with 15m high mature trees, a 23m road corridor is proposed to built, and then each building pad will have appropriate landscape setbacks. The section included shows that the view from the western neighbours remains largely the same, despite the increase in pad level.
- To further mitigate any visual impacts resulting from the raised pad levels of Pad 2A, Goodman propose to include additional landscaping immediately to the west of Pad 2A, in addition to the existing extensive conservation area which exists as a highly mature tree area. Refer to the revised landscape drawing shown in **Annexure C (pg.29)** and sections highlighting the setbacks between the western boundary and the proposed building on Pad 2A (refer to **Annexure B (pg.27))**.

MATTERS RAISED	APPLICANT RESPONSE
Fill Importation 2. The Modification Report prepared by Urbis describes the development as only modifying the pad levels of Precinct 2 however, Table 3 of the Modification Report provides the net changes in cut and fill across each precinct of the Oakdale West Estate. The Modification Report should be updated to concisely describe all changes being sought under this modification.	• The only changes now to pad levels are to Pad 2A & 2B (2A) as described above. Refer to revised cut/fill table below based on MOD 3 (630,023m3 net import). PRECINCT / MOD 3 ORIGINAL CUT/FILL BALANCE / MOD 3 REVISED CUT/FILL BALANCE 1 — 78,999 — 78,999 2 — -276,343 — -276,343 3 — 320,304 — 270,706 4 — 490,773 — 490,773 5 — 149,220 — 149,220 WNSLR STOCKPILE — -83,332 — -83,332 TOTAL — 679,620 — 630,023
3. In respect to the comment above, the Department requests that changes to all building pad level heights be confirmed for Oakdale West site.	• Refer to point No. 1 above for the changes in pad levels and updated civil plans (**Annexure A**)(**pg.20**).

MATTERS RAISED	APPLICANT RESPONSE
Visual Impacts 4. The Modification Report should confirm if the increase in pad level height will result in changes to the height and slope of the western boundary landscape buffer. Furthermore, the Modification Report and Visual Impact Assessment should clarify if any changes to the western boundary landscape buffer have been considered in the impact assessment.	• There will be no changes to the proposed levels at the 40m western landscape buffer and conservation area. Goodman are proposing to install further landscaping as a mitigation measure adjacent to the conservation area. Refer to **Annexure C (pg.29)**.
PENRITH CITY COUNCIL	
Finished Ground Levels and Western Boundary Interface	
5. Retention of finished ground levels as approved, or similar to what is approved, is considered essential for all lots west of Road 3, with gradient transitions to be managed through future Development Applications within the confines of allotments, not additional imported fill presenting adverse visual impact external to the allotments.	• Refer to point No. 1 above (DPIE comment) (**pg.3**).
6. It is also noted that a landscape bund / mound is proposed south of the basin, with no indications of a landscape mound west and north of the basin. While the fill as proposed is not supportable, it would be recommended that any fill required within the western end of the precinct be separated from adjoining development by a suitable landscape mound where	• As the pad levels for Pad 2E, 2F, & 2G (3A & 3B) are proposed to remain as approved, the landscape bund / mound treatment therefore proposed to remain consistent with that already approved. • In addition to the reduction in pad levels (3A & 3B), further landscaping is proposed in the area to the west of Pad 2A (**Annexure B and C**)(**pg.27&29**). This will ensure that additional screening.

<table>
<tr><th>MATTERS RAISED</th><th>APPLICANT RESPONSE</th></tr>
<tr><td>canopy tree planting and layered shrub planting can ameliorate the bulk, scale and visual impacts of development, specifically noting Mod 2 and Mod 3 seeks approval for non- compliant building height well beyond the DCP limitation of 15m.</td><td>is provided to enhance visual presentation to the west. The visual impact assessment has been updated (Annexure D (pg.35)) to demonstrate this improvement.</td></tr>
<tr><td>7. It is also noted that the proposal seeks to partially manage level differences to the north through battered slopes adjacent to the pipeline. It would then stand to reason that a battered design treatment west should be provided rather than finished ground levels necessitating extensive retaining walls. Its is also unclear what the height of the proposed retaining walls will be, as the section drawings indicate “H” without a nominated wall height. Coupled with the suggestion of a 5.0m acoustic wall, the effective wall presentation as viewed from neighbouring properties is excessive. If the absence of mounding relates to stormwater management and discharge capability to the basin, then the stormwater strategy cannot sufficiently cater for the development form and arrangement sought through the current modification.</td><td>• Refer to Annexure B (pg.27) for sections confirming the retaining wall and noise walls positions and height, based on MOD 3 as this will supersede other Modifications. See below table summarising the change to the retaining walls and noise walls for MOD 1 and MOD 3 against the SSD approval. The below focuses on retaining wall and noise walls adjacent to Pad 2A (max height).

<table>
<tr><th>DESIGN PHASE</th><th>Retaining Wall 02 Maximum Height</th><th>Noise Walls Maximum Height</th></tr>
<tr><td>Initial SSD approval</td><td>12.7m</td><td>5m</td></tr>
<tr><td>MOD 1 (Proposed)</td><td>13.7m</td><td>5m</td></tr>
<tr><td>MOD 2 (Proposed)</td><td>13.7m</td><td>5m</td></tr>
<tr><td>MOD 3 (Proposed)</td><td>12.8m</td><td>5m</td></tr>
</table>
• A noise wall and retaining wall were approved under the initial SSD, and in fact they were approved closer to the western boundary. MOD 3 which will supersede MOD 1, requests approval for the retaining wall and noise wall to be further offset from the western</td></tr>
</table>

MATTERS RAISED	APPLICANT RESPONSE
	boundary. Refer to **Annexure B (pg.27)**. Further to this, the additional landscaping effectively screens both of the walls as to reduce the appearance of the bulk and scale.
8. The elevated nature of development within the allotments, is also likely necessitating acoustic walls of 5.0m on top of the retaining walls. This further reinforces that the fill activities are not only resulting in a poor interface and presentation outcomes as viewed from existing developments to the west, but the fill will also set up future acoustic management issues, as a 5.0m wall on top of an excessive retaining wall is not a suitable planning outcome given the zone and development interface.	• As demonstrated by the sections in **Annexure B (pg.27)**, the noise walls are generously setback from the site boundary and behind significant landscaping (of which Goodman is proposing to further add to within the conservation area). It will be presented as a terraced treatment rather than a single level change reducing the appearance of significant bulk. • The Noise Wall and Retaining Wall position has in fact improved from the sensitive receivers to the west, compared to that originally approved. Refer **Annexure B (pg.27)**.
9. The information submitted also suggests that neighbour engagement is ongoing for further 'receiver' mitigation measures which would suggest that those proposed measures may not be sufficient to address and manage noise impacts external to the site.	• No ongoing engagement is required for receivers to the west (N1). The noise assessment demonstrates that the noise mitigation measures are adequate for the N1 receiver. • The ongoing neighbour engagement refers to discussion with residential receivers N3, N4 and N5 to the south. Goodman confirms that Noise Agreements are in place with each of these receivers (no additional mitigation measures are required). These can be made available upon request, noting that these receivers have agreed to the noise impacts.
10. The scale relationship of this fill and the visual presentation of the proposed retaining wall and acoustic fence is best reflected on the landscape sections (AA) and (BB) which provided a finished ground level above the roof of the adjacent residential dwellings.	• The updated sections and landscaping drawings demonstrate that the noise walls and retaining walls are unlikely to be viewable from the west as a result of the significant landscape setback and embellishment. Refer to **Annexure B** and **C (pg.27&29)**.
Western Bund Maintenance Track	

MATTERS RAISED	APPLICANT RESPONSE
11. The design of the western bund maintenance track should include a requirement that the track be sealed to minimise the potential for scouring and erosion and to eliminate dust disturbance and to the adjoining school and retirement village. It is noted that this could be addressed as an additional / amended condition of consent if the modification application is supported.	• This track will be sealed with a bitumen spray seal which will reduce any dust impacts to the surround. Additionally, it is noted that the road will be used infrequently and only for landscape maintenance purposes.
Acoustic Impacts and Modelling Assumptions	
12. The proposal outlined within Mod 1 seeks to substantially change finished ground levels from that approved on the endorsed concept plan for this estate.	• Refer to point No. 1 above (DPIE comment).
13. In order to adequately assess acoustic implications resulting from the scope of works within Mod 1, the implications of works resulting from Modification 2 and Modification 3 (Stage 2 Construction) must be factored into the assessment to appreciate the cumulative acoustic implications of development (given they are proposed and substantially known at this point in time). This is also required as the acoustic report submitted in support of Mod 1 is predicated on modelling assumptions for noise generation, which are further refined and clarified as a consequence of Mod 2 and Mod 3 which both include building works and tenant occupation as part of the development.	• Noted. Cumulative impact assessment has been completed in MOD2 and MOD 3 (and Stage 2) acoustic assessment - see attached **Annexure E** & F (**pg.82 &112**). • Response to MOD2 and MOD3 noise impacts will be addressed under separate cover in the 'Response to Submissions' for these applications (pg. 419 & 560).

MATTERS RAISED	APPLICANT RESPONSE
14. It is also noted that Mod 2 and Mod 3 is modelled to result in noise levels in exceedance of the approved limits. This is not supportable when the exceedance is resulting from elevated finished ground and floor levels resulting from the additional fill activities proposed as part of Mod 1.	• Noted. Revised noise modelling has been completed based on the reduction in pad levels. The modelling demonstrates that the change in pad levels had almost no effect on the Noise Impact. • Refer to **Annexure G (pg155)**.

MATTERS RAISED	APPLICANT RESPONSE
15. Having regard to the above, the predicted noise levels within Mod 2 and Mod 3 are based on the assumption that the finished ground levels within Mod 1 are both suitable and supportable. As outlined above, the finished ground levels and visual impacts of the additional imported fill are not deemed suitable or supportable and the address of this matter will necessitate revised modelling predicated on suitable and supportable finished ground levels and associated finished floor levels. It is also noted that Mod 2 and Mod 3 is modelled to result in noise levels in exceedance of the approved limits. This is not supportable when the exceedance is resulting from elevated finished ground and floor levels resulting from the additional fill activities proposed as part of Mod 1. In the first instance it is requested that the concerns raised above with respect to fill and finished ground levels be resolved. Following this resolution, it is then recommended that revised modelling be undertaken as part of Mod 1, Mod 2 and Mod 3 that addresses the following:	• Refer above and below.
16. In considering the maximum noise level criteria in accordance with NPfI, it is requested that the	• Refer to **Annexure G** (**pg.155**)

MATTERS RAISED	APPLICANT RESPONSE
Department pursue further analysis with reference to the health impact data sourced from the World Health Organisation and enHealth as detailed in the Road Noise Policy. It is recommended that maximum noise levels be cumulatively assessed against the information provided in the Road Noise Policy, giving detailed consideration to the frequency and duration of elevated noise levels and demonstrating that long-term adverse health impacts will not likely result. Long-term health concerns may not necessary be linked only to the maximum noise level per event but may also be correlated with elevated noise over a long period. For example, the Road Noise Policy indicates that levels between 40 and 55dBA may be related to adverse health effects with many people needing to adapt to cope.	
17. Whilst the noise impact assessments refer to noise-enhancing weather conditions, the frequency of these conditions is not discussed. Given that temperature inversions are a feature of the Penrith Local Government Area, it is suggested that it is necessary for this aspect of the noise assessments to be considered further. If DPIE is not able to ascertain this, it is recommended that the EPA be engaged to consider the modelling assumptions and implications and the predicted noise levels.	• Refer to **Annexure G (pg.155)**

MATTERS RAISED	APPLICANT RESPONSE
The noise assessment accompanying Mod 3 effectively seeks to 'supersede' or ‘over-ride’ the separate acoustic assessment in support of Mod 2, specifically relating to revised sound power levels. The Wilkinson Murray assessment (supporting Mod 3) states that the sound power levels used in SLR's Report (for Mod 2) are overly conservative. It is not acceptable that one report is disregarding or changing the parameters of another report as a consistent approach to modelling that results in the predicted noised levels must be established to ensure that a consistent and cumulative impact analysis can be undertaken. The applicant should be requested to provide a single acoustic report, or separate acoustic reports that provide consistent adoption of modelling parameters and assumptions, to the inform the predicted noise level emissions. The assessments progressively should also consider the cumulative impacts of preceding development approved in combination with the current proposal. Alternatively, DPIE (or EPA) is requested to determine the appropriateness of the sound power level and other input data used in the noise modelling processes for address in the submitted acoustic reports for these applications and moving forward.	• The MOD3 assessment (pg.737) incorporates the MOD2 sound power levels with the exception of the sound power level applied to light vehicles. • During the MOD3 assessment, Wilkinson Murray (WM) undertook review (pg.737) of the light vehicle sound power levels in its database and with consideration to various acoustic assessments prepared by WM and other acoustic consultants. Following this review, the light vehicle sound power level of 96 dBA was considered somewhat overstated (overly conservative). Based on WM’s review a lower level of 90 dBA was adopted. WM maintains that this is considered to be more representative of a light vehicle travelling on the estate roads at a speed of 40 km/hr, particularly with respect to the higher proportion of modern vehicles that may be expected. • Refer to **Annexure G (pg.155)**.

MATTERS RAISED	APPLICANT RESPONSE
18. The Mod 3 acoustic assessment assumes that Lot 2B mechanical plant services can be attenuated by 10dB using noise mitigation methods. It is not clear how this can be achieved and further detail on the feasibility of this should be sought.	• It is expected that the necessary reductions can be achieved based on the exact same projects overseas. This will be confirmed within detailed design for Building 2B. Refer to **Annexure G (pg.155)**.
19. In recommending operational noise mitigation strategies, the surface construction of vehicular access ways and roads is not discussed in the noise impact assessments. It is requested that consideration be given to the type of road construction to ensure maximum acoustic benefit, should this not already have occurred.	• Refer to **Annexure G (pg.155)**.
20. As raised within the planning comments above, the reasonableness of a 5.0m acoustic wall on top of an elevated fill platform with extensive retaining wall is not supported. It also appears from the information submitted that further noise mitigation measures may still be required at receiver boundaries. It appears that negotiations are currently occurring with neighbouring properties and that 'at-receiver' noise mitigation measures are not yet finalised. The impacts of the completed development and the implications of necessary mitigation measures can only be assessed if the full extent of mitigation measures within the site and at receiver boundaries are included within the	• Refer above and to **Annexure G (pg.155)**. • Noise Agreements are in place with receivers to the south (N3, N4, and N5) who have accepted the Noise Impacts. N1 and N2 are deemed compliant with the proposed mitigation measures. • **Annexure B (pg.27)** demonstrates that the noise wall and retaining wall design are preferable to that already approved.

MATTERS RAISED	APPLICANT RESPONSE
assessment and plans. If the suggestion is made that the ultimate impacts are unknown due to current analysis being based on predications only, then the predications should be conservative in nature and include likely mitigation measures at receiver boundaries to understand what could be required after construction and occupation.	
Biodiversity Credit Requirements	
21. Appendix A (BBAM Credit Report) of Appendix G (Biodiversity Assessment Report) indicates a total of 173 ecosystem credits are required. The Statement of Environmental Effects however indicates 172 ecosystem credits. Given the requirements in Appendix G, Condition D90 should be amended to make reference to 173 credits and not that referenced within the Statement.	• Refer to **Annexure H (pg.165),** confirming 173 credits.
Transgrid	
22. TransGrid have requested 3D modelling to determine the vertical and horizontal clearance of changes within the transmission line easement (Bio-Retention Basins No.1 & 4).	• The level changes were discussed and agreed with Michael Platt from Transgrid. Refer to the 1000 series civil drawing package submitted to DPIE as part of the application. Refer to **Annexure A (pg.20)** for further detail.
Transport for NSW	
23. There have also been ongoing discussions between Goodman and Transport for NSW regarding corridor preservation for the Future Western Sydney Freight Line. The modification application needs to ensure preservation of	• Noted. This is consistent with the masterplan proposed for MOD 1.

the 60 metre wide corridor. Further information can be obtained from Mr Lee Farrell (Corridor Coordinator) on 02 8922 0877.	
24. With regard to any proposed construction access arrangements on Mamre Road via the Water NSW pipeline access route, please see the following comments: • The existing Water NSW pipeline access point on Mamre Road will require a left-in/left-out construction vehicle arrangement and road safety mitigation works to safely accommodate simultaneous entry/egress to the satisfaction of TfNSW. These works require concurrence from TfNSW in accordance with Section 138 of the Roads Act, 1993 and a Works Authorisation Deed. • Road safety mitigation works would need to adequately address TfNSW concerns regarding the merge point from two lanes into one lane located close to this access point. There are concerns that drivers focusing on the merge may not notice a construction vehicle slowing down just beyond the merge, potentially resulting in a rear-end crash. • The current posted speed limit is 80km/hr and a design speed of 90km/hr needs to be considered in road safety mitigation works for the construction vehicle access. • The developer will need to adequately address potential driver confusion for situations where construction vehicles are slowing down before the merge point whilst motorists are accelerating to merge at this location. • For occasional large deliveries of plant and material detailed traffic control plans need to be submitted to TfNSW's Network and Safety Section for review and approval.	• These requests have nothing to do with MOD 1, and instead relate to items that are more appropriately addressed via the Construction Environmental Management Plan (CEMP) approval for the initial SSD approval for Stage 1 construction. • Goodman will not be accessing the Water NSW pipelines via Mamre Road. Access will instead be via Old Wallgrove Road.

DEPARTMENT OF PLANNING, INDUSTRY AND DEVELOPMENT - CLIMATE CHANGE AND SUSTAINABILITY

25. To assist, EES has reviewed the response prepared by ecologique/environmental consultants dated 9 December 2020. It is noted that the proposed modification results in an overall 0.03 ha reduction in clearing and no change in the clearing of any one PCT of more than 0.03 ha.	• Noted. No response required.

MATTERS RAISED	APPLICANT RESPONSE
EES raise no objections to the following two statements made within the Biodiversity Assessment Report: • *"The small differences in clearing of the various PCTs do not affect the ecosystem credits required to offset native vegetation removal'.* • *"Amend references to the Biodiversity Offset Strategy (BOS) as Goodman propose to fulfil offsetting requirements through purchasing of ecosystem credits instead of establishing an onsite biodiversity offset area to create and retire ecosystem credits".* Further please be advised that there are no further comments in relation to flooding. Based on the information submitted EES has formed the view that the proposed modification is unlikely to increase the impacts on biodiversity values.	

Annexure A

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12/02/2020

Goodman Property Pty Ltd
Level 17, 60 Castlereagh St
SYDNEY NSW 2000

Your Ref:
Our Ref: L015-03-15-272 MOD3 Earthworks RTS.docx

Direct phone: (02) 9230 7169

Attention:
Stephanie Partridge

Dear Stephanie,

OAKDALE WEST ESTATE - SSDA 7348 - MOD 1 & MOD 2 Response to Submissions

This letter addresses the points raised in Item 1 of Council Submission to MOD 1 dated 28/01/2020. This response has been prepared considering the revised proposal for the MOD 3 design because it generally supersedes the design levels in MOD 1. It is provided to demonstrate the MOD 3 design provides an appropriate planning outcome.

1. Finished Ground Levels and Western Boundary Interface

a) Western Lots

PCC: Retention of finished ground levels as approved, or similar to what is approved, is considered essential for all lots west of Road 3, with gradient transitions to be managed through future Development Applications within the confines of allotments, not additional imported fill presenting adverse visual impact external to the allotments.

The proposed changes to the allotments west of Road 3 in MOD 1 (Lot 2E, Lot 2F&2G) are now reverted to the original levels approved in SSDA to address this item in the updated MOD 3 proposal (now Lot 3A, Lot 3B&3G). Refer Drawing C0001 updated and attached.

b) Earthworks Fill

PCC: The proposed finished ground levels provide a considerable increase in fill and finished ground levels which does not represent a better planning outcome than that previously proposed and approved through SSD 7348.

The net increase of imported fill in the MOD 3 design compared to SSDA is 183,787m3 which is only 7% of the total fill to be placed.

The proposed source of the imported fill is expected to originate from the State Government's major transport infrastructure projects underway across Sydney. As with Oakdale South, importing this abundant supply of sandstone has always been a driver for the development outcome although there are many other considerations when preparing the final design levels and optimising the development lots. These can include optimising drainage outcomes, vertically aligning the new intersection of Estate Road 3 with Estate Road 1, retaining wall heights and driveway access points from the estate roads.

In reducing the western pads levels in Item 1 above, the Net import (Mod 3) will reduce by about 50,000m3 to 134,189 or 5% of the total fill to be placed. The updated earthworks quantities are shown in Table 1 below.

Table 1 – Earthworks Quantities Comparison for MOD 3 Changes

PRECINCT	MOD 3 ORIGINAL CUT/FILL BALANCE	MOD 3 REVISED CUT/FILL BALANCE
1	78,999	78,999
2	-276,343	-276,343
3	320,304	270,706
4	490,773	490,773
5	149,220	149,220
WNSLR STOCKPILE	-83,332	-83,332
TOTAL	679,620	630,023

c) Developable Area

PCC: The amended fill extent seems to be driven by a desire for increased developable areas in the created allotments west of Road 1, without adequate site responsive consideration to natural topography, and the implications of the fill through the precinct and externally around the site.

MOD 3 primarily seeks to accommodate the user of the Lot 2B. This requires removal of roads and reconfiguration of the rest of the precinct to make it functional. In doing so, the development has also responded to the western corridor and reduced developable areas along this side of the site. These areas are highlighted in SKC306, which were previously development carpark/hardstand areas are now batters with native grasses and some planting.

The design has considered topography and finished ground levels. As you can see in Section 2 on SKC3087, the MOD 3 design has taken the opportunity to improve the shape of the development by removing as much as the vertical surfaces as possible and setting them further back from the property boundary by implementing a long batter to the bio basin. This particular location has a direct line of sight to the western neighbours and is an obvious improvement to the SSDA layout.

Section 1 on SKC307 also shows improvement in MOD3 where the retaining wall is moved further into the site and the plan SKC306 now shows a curved corner batter to the lot rather than a 12m high retaining wall corner. The overall height in this area has increased for the new road location, however the existing biodiversity trees block this area visually from the property to the west.

Section 3 on SKC307 also shows consideration to the finished ground levels where Lot 2B is exposed to view from the western boundary. The building in this area is now well set back in comparison to the SSDA position and the earthworks are lower in this area. A large on-lot retaining wall has been removed as part of the MOD 3 proposal.

The overall maximum height of the western retaining wall shown in the sections discussed above has returned to the original height approved in the SSD approval; and maximum height of the noise walls as been retained throughout the different modification proposals. Refer Table 2.

The MOD 3 proposed levels for all lots in Precinct 2 (2A, 2B, 2C&D&E) are recommended to be retained because they are appropriately addressing the planning outcomes raised comments in the Penrith Council submission.

Table 2 – Maximum Western Retaining Wall and Noise Wall Heights

DESIGN PHASE	Retaining Wall 02 Maximum Height	Noise Walls Maximum Height
Initial SSD approval	12.7m	5m
MOD 1 (Proposed)	13.7m	5m
MOD 2 (Proposed)	13.7m	5m
MOD 3 (Proposed)	12.8m	5m

d) Landscape

PCC: It is also noted that a landscape bund / mound is proposed south of the basin, with no indications of a landscape mound west and north of the basin. While the fill as proposed is not supportable, it would be recommended that any fill required within the western end of the precinct be separated from adjoining development by a suitable landscape mound where canopy tree planting and layered shrub planting can ameliorate the bulk, scale and visual impacts of development, specifically noting Mod 2 and Mod 3 seeks approval for non-compliant building height well beyond the DCP limitation of 15m.

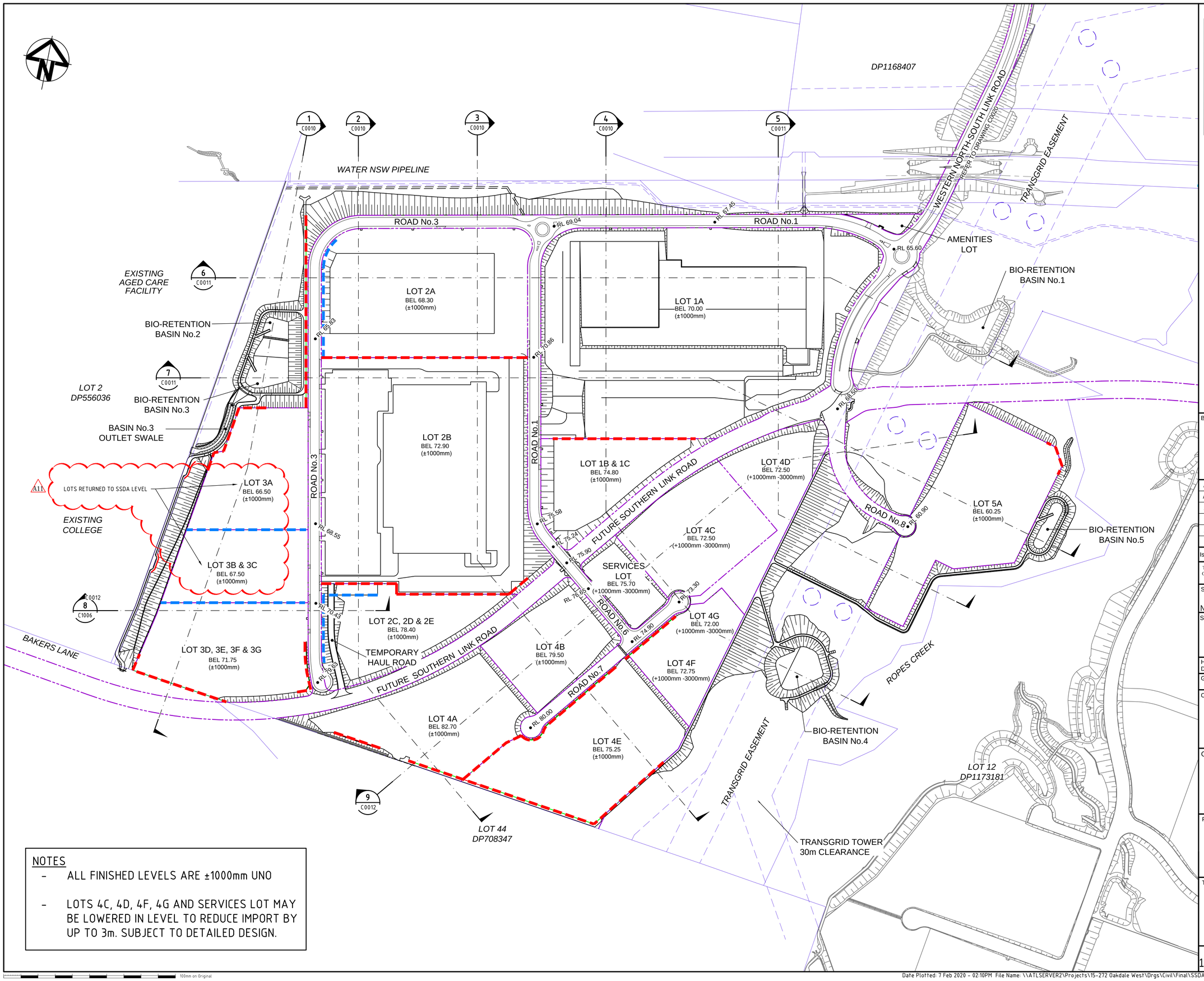
The area west and north of the basin is a biodiversity area that well established with 15m tall trees and is naturally regenerating where not dense. This area is not permitted to be disturbed under federal approval. As recommended by PCC, additional planting is proposed in the MOD 3 revised design in addition to the geometrical aspects above. This additional planting however is limited to new basin batter works outside the biodiversity area which (although is not a bund) does rise from the natural ground. Refer Scape Design's updated MOD 3 landscape drawings and sections, however extra planting is shown indicatively on sections within in SKC307.

Should you have any questions about the updated MOD 3 proposal, please don't hesitate to contact the undersigned.

Yours sincerely,

Alex Lohrisch
Senior Civil Engineer / Project Manager
0415 398 014

Encl. Drawings SKC306 [P4], SKC307 [P5], C0001 [A11]



LEGEND

- EXISTING BOUNDARY
- EXISTING EASEMENT
- PROPOSED BOUNDARY
- STAGE 1 RETAINING WALL
- FUTURE RETAINING WALL
- BEL 74.70 — AVERAGE BULK EARTHWORKS LEVEL

Bar Scales

0 50 100 150 200 250

1 : 3000 @ A1

NOTES

- ALL FINISHED LEVELS ARE ±1000mm UNO
- LOTS 4C, 4D, 4F, 4G AND SERVICES LOT MAY BE LOWERED IN LEVEL TO REDUCE IMPORT BY UP TO 3m. SUBJECT TO DETAILED DESIGN.

Issue	Description	Date
A11	ISSUED FOR INFORMATION	06-02-20
A10	ISSUED FOR SSD APPROVAL MOD 3	14-01-20
A9	ISSUED FOR SSD APPROVAL MOD 3	06-12-19
A8	ISSUED FOR INFORMATION MOD 3	19-11-19
A9	ISSUED FOR INFORMATION MOD 3	12-11-19
A8	ISSUED FOR SSD APPROVAL MOD 2	18-09-19

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Status: MOD 3 APPROVAL — NOT TO BE USED FOR CONSTRUCTION — A1

Scales	1 : 3000	15-272-C0001.dwg	
		Drawn	GB
		Designed	GB
Height Datum	AHD	Checked	AM
Grid	MGA	Approved	AM

Client: Goodman

Civil Engineers and Project Managers
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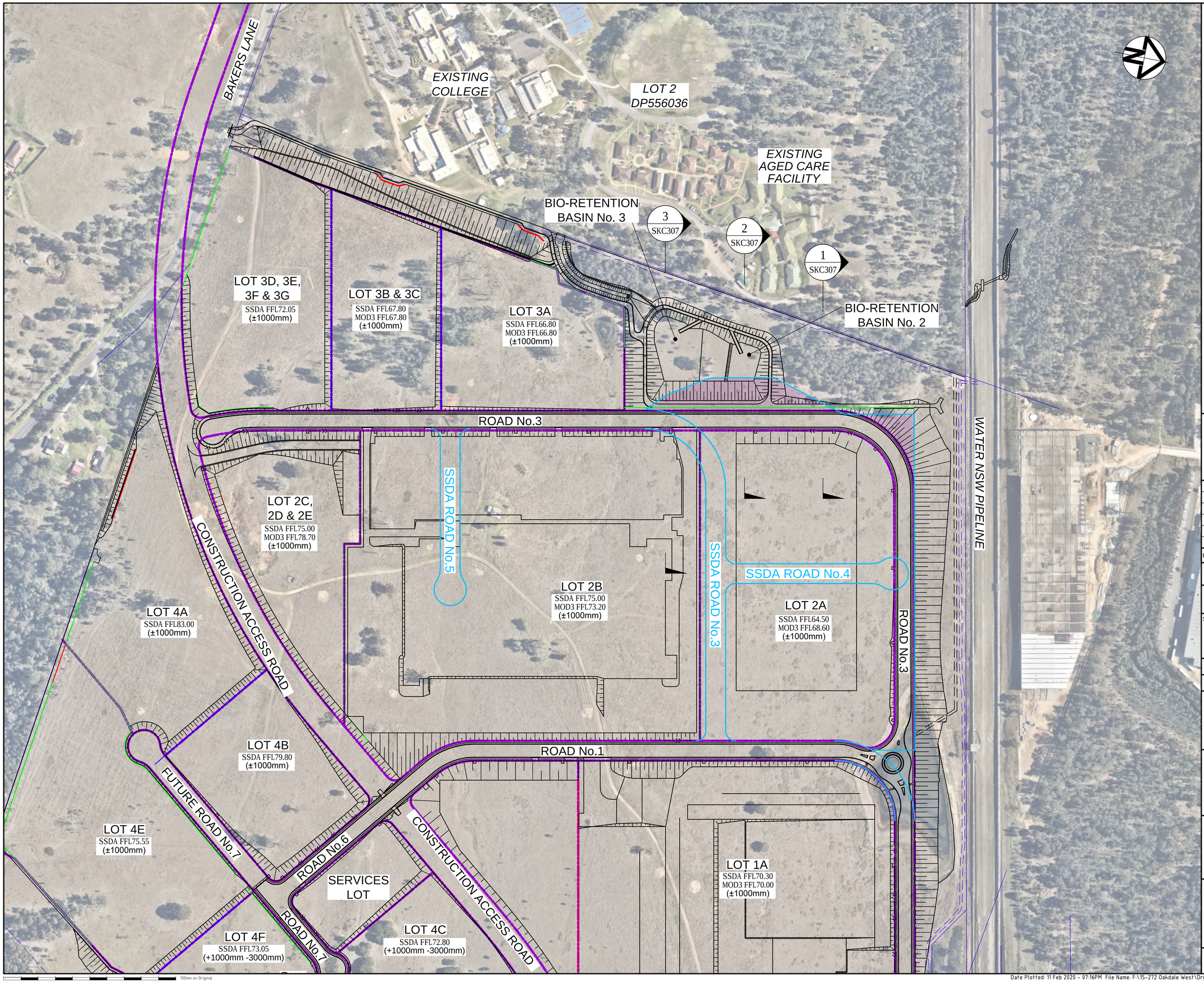
Project: PROPOSED INDUSTRIAL DEVELOPMENT OAKDALE WEST

Title: GENERAL ARRANGEMENT MASTER PLAN

Drawing No.	Project No.	Issue
15-272-C0001	15-272	A11



LEGEND:

DEVELOPMENT AREAS REDUCED

SSDA LAYOUT

Bar Scales

0 50 100 150m

1 : 2000 @ A1

Issue	Description	Date
P4	ISSUED FOR INFORMATION	11-02-20
P3	ISSUED FOR INFORMATION	06-02-20
P2	ISSUED FOR INFORMATION	04-02-20
P1	ISSUED FOR INFORMATION	03-02-20

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Status: PRELIMINARY ONLY
NOT FOR CONSTRUCTION

A1

Scales	SKC306 - SSD V MOD 3 OVERLAY.dwg		
	1 : 2000 @ A1	Drawn	GB
		Designed	GB
Height Datum	AHD	Checked	AMc
Grid	MGA	Approved	AMc

Client: Goodman

Civil Engineers and Project Managers
at&l
Level 7, 153 Walker Street
North Sydney NSW 2060
ABN 96 130 892 405
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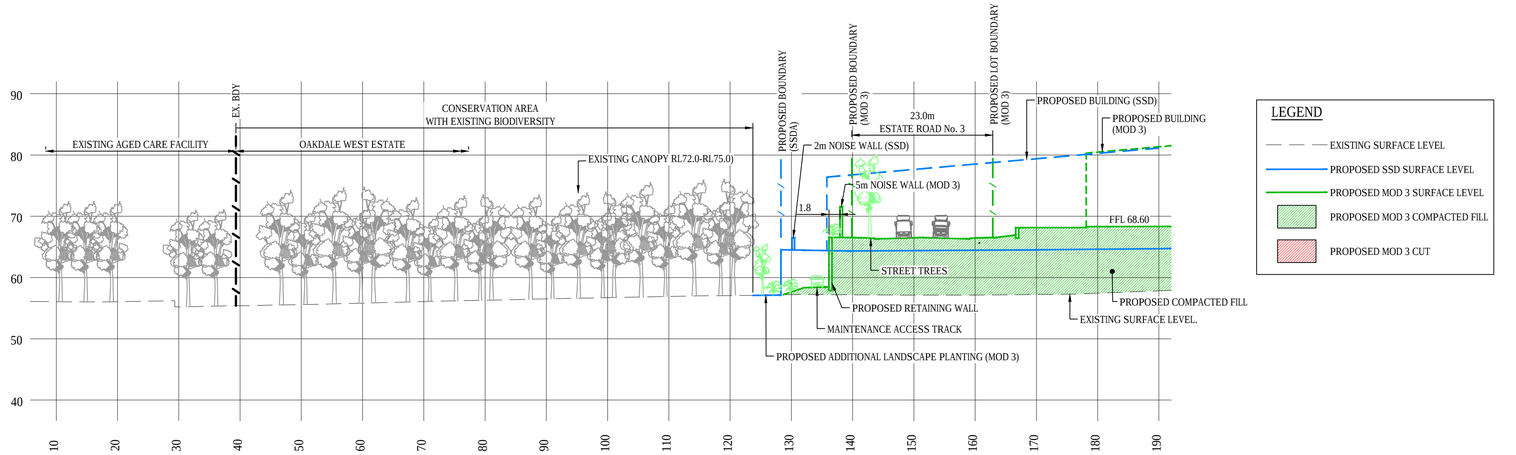
Project
PROPOSED INDUSTRIAL DEVELOPMENT
OAKDALE WEST

Title
MOD 3 LAYOUT
WITH SSD OVERLAY

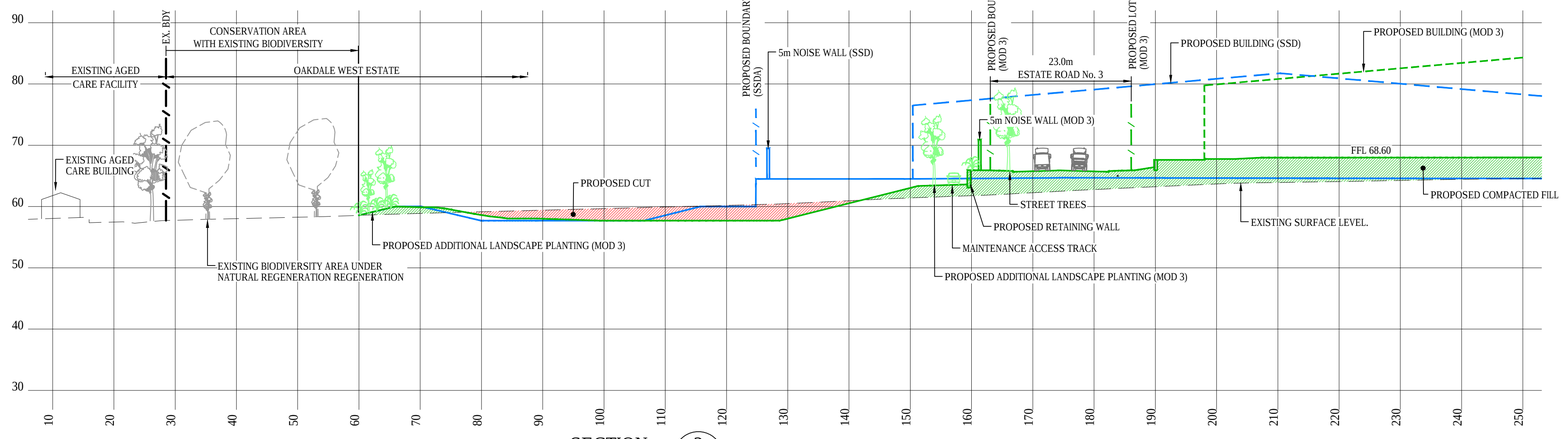
Drawing No.	Project No.	Issue
SKC306	15-272	P4

100mm on Original

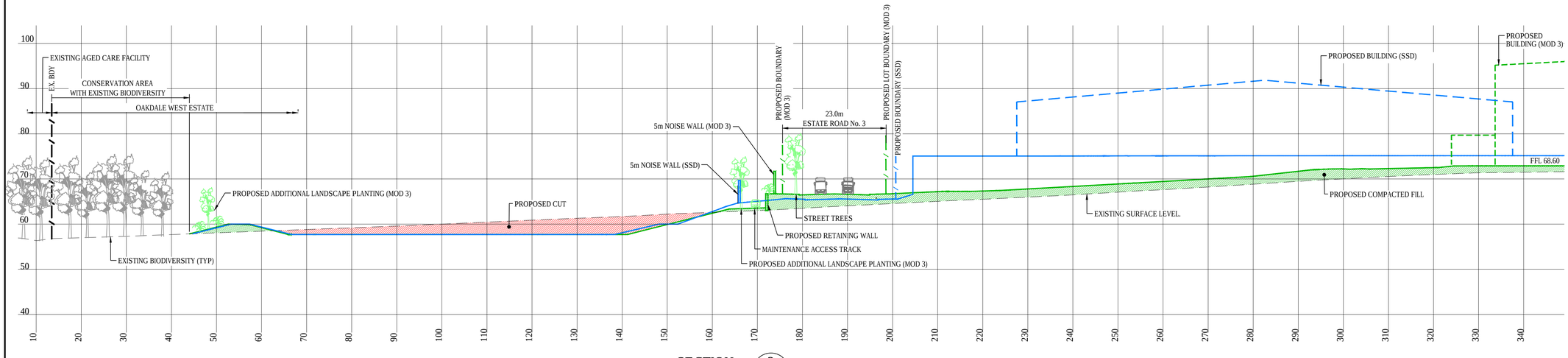
Date Plotted: 11 Feb 2020 - 07:16PM File Name: F:\15-272 Oakdale West\Drgs\Civil\Sketches\SKC306 - SSD V MOD 3 OVERLAY.dwg



SECTION 1 — SKC306
1 : 500



SECTION 2 — SKC306
1 : 500



SECTION 3 — SKC306
1 : 500

Bar Scales

0 10 20 30 40m

1 : 500 @ A1 1 : 1000 @ A3

Issue	Description	Date
P5	ISSUED FOR INFORMATION	11-02-20
P4	ISSUED FOR INFORMATION	08-02-20
P3	ISSUED FOR INFORMATION	06-02-20
P2	ISSUED FOR INFORMATION	04-02-20
P1	ISSUED FOR INFORMATION	03-02-20

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A1

Scales	SKC307 - SSD V MOD 3 SECTIONS.dwg		
	1 : 500 @ A1	Drawn	GB
		Designed	GB
Height Datum	AHD	Checked	AMc
Grid	MGA	Approved	AMc

Client: Goodman

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Project: PROPOSED INDUSTRIAL DEVELOPMENT OAKDALE WEST

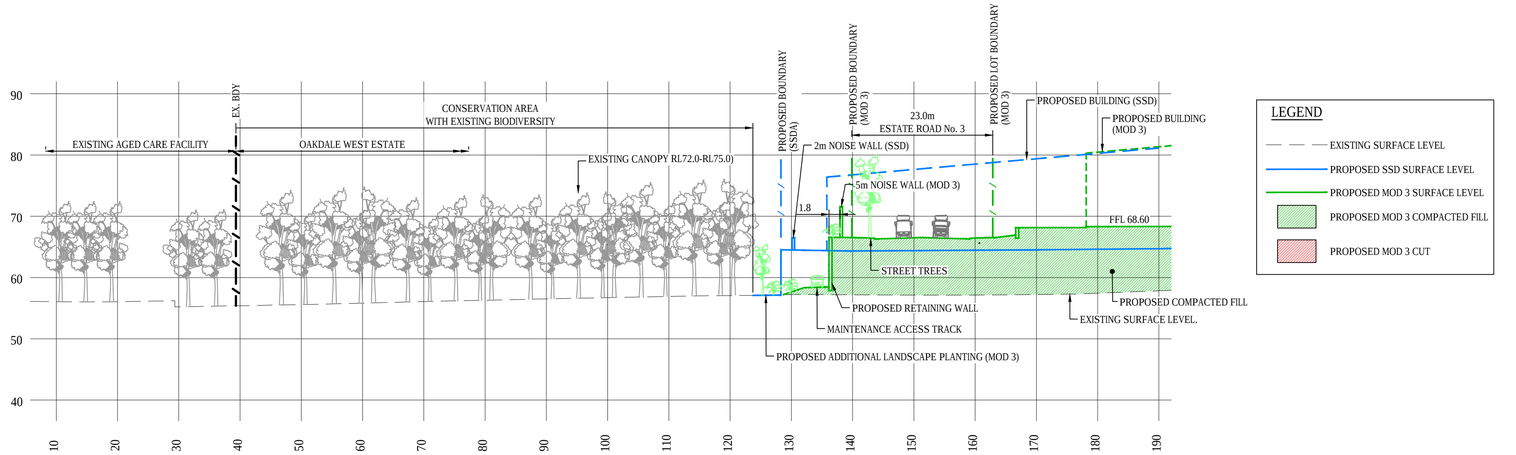
Title: SSD v MOD 3 SECTIONS

Drawing No.	Project No.	Issue
SKC307	15-272	P5

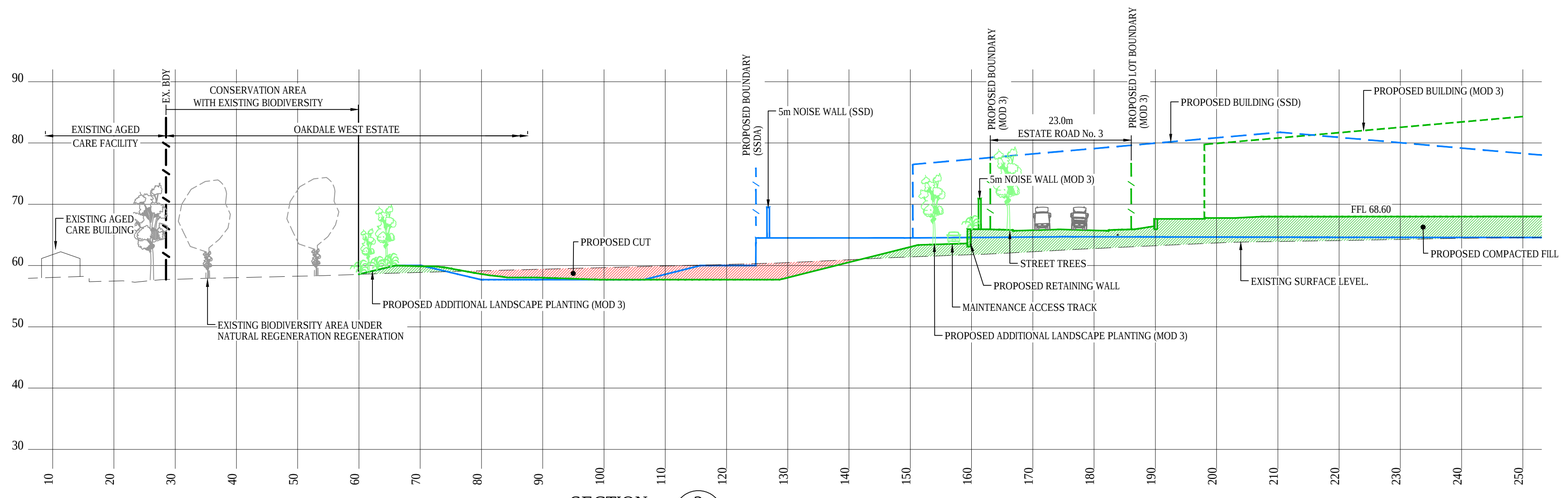
100mm on Original

Date Plotted: 11 Feb 2020 - 07:16PM File Name: F:\15-272 Oakdale West\Drgs\Civil\Sketches\SKC307 - SSD V MOD 3 SECTIONS.dwg

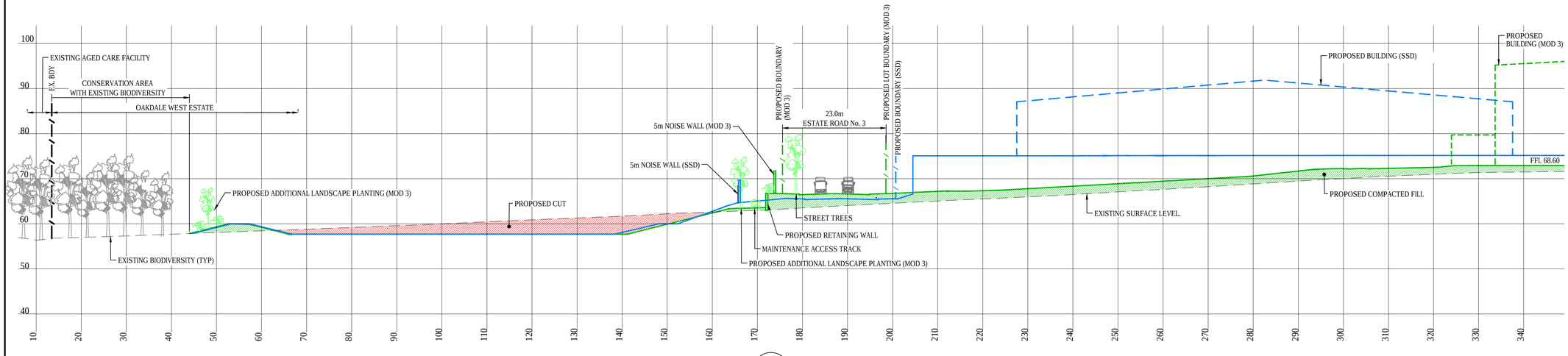
Annexure B



SECTION 1 — SKC306
1 : 500



SECTION 2 — SKC306
1 : 500



SECTION 3 — SKC306
1 : 500

Bar Scales

0 10 20 30 40m

1 : 500 @ A1 1 : 1000 @ A3

Issue	Description	Date
P5	ISSUED FOR INFORMATION	11-02-20
P4	ISSUED FOR INFORMATION	08-02-20
P3	ISSUED FOR INFORMATION	06-02-20
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A1

Scales	SKC307 - SSD V MOD 3 SECTIONS.dwg		
	1 : 500 @ A1	Drawn	GB
		Designed	GB
Height Datum	AHD	Checked	AMc
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Project: PROPOSED INDUSTRIAL DEVELOPMENT OAKDALE WEST

Title: SSD v MOD 3 SECTIONS

Drawing No.	Project No.	Issue
SKC307	15-272	P5

100mm on Original

Date Plotted: 11 Feb 2020 - 07:16PM File Name: F:\15-272 Oakdale West\Drgs\Civil\Sketches\SKC307 - SSD V MOD 3 SECTIONS.dwg

Annexure C

scape DESIGN

LANDSCAPE ARCHITECTURE

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Manly NSW 2095
Phone 02 9976 0756
email office@scapedesign.com.au
Web www.scapedesign.com.au

KEY MAP



PROJECT

Landscape Master Plan - SSD 7348 MOD 3

Oakdale West, NSW

Cover Sheet

PHASE

Development Application
Landscape Drawing Set

CLIENT

Goodman Property Services (AUST) PTY LTD

TRANSMITTAL

Dwg. Number	Dwg. Name	Revision	Date
L.SK.000	Cover Sheet	E	14/2/20
L.SK.100	Landscape Master Plan - OWE MOD 3	F	14/2/20
L.SK.101	Street Trees & Planting Masterplan	E	14/2/20
L.SK.102	Planting Schedule - OWE MOD 3	E	14/2/20
L.SK.200	Landscape Sections - OWE MOD 3	A	14/2/20

Note: All finished levels subject to change +/- 1000mm.

SSD 7348 MOD 3 Development Application

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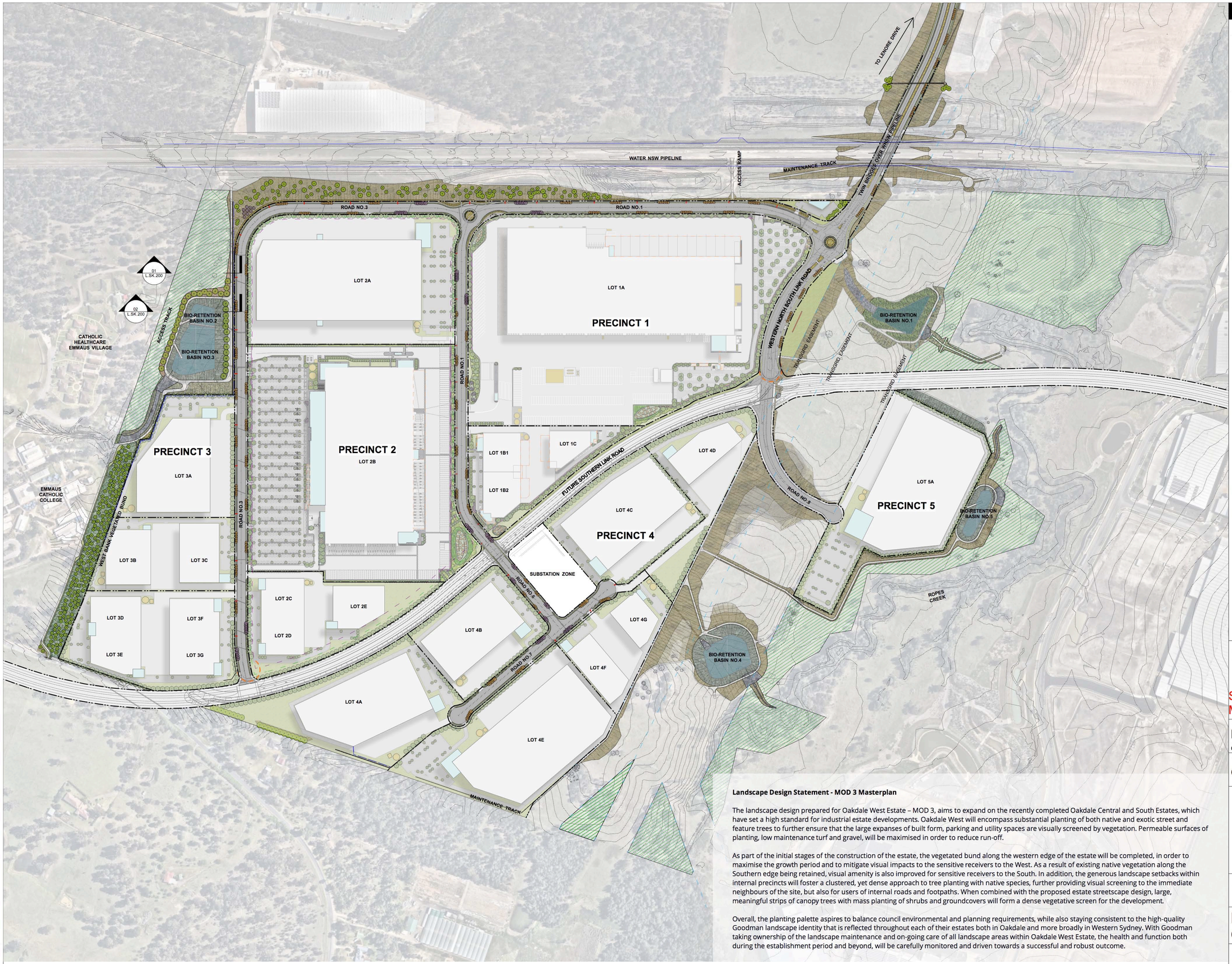

LEGEND

GENERAL

- Site Boundary
- Lot Boundary
- Temporary Roadworks
- Fence
- Retaining Wall
- Noise Wall
- Building
- Amenities Lot
- Proposed Biodiversity Offset Treatment and Regeneration Area
- Proposed Street Lighting

TREES

- Existing Tree to be Removed Refer ARBORISTS REPORT
- Existing Tree to be Transplanted/ original location
- Existing Tree to be Transplanted/ new location
- Existing Tree to be Retained
- Proposed Tree - General
- Proposed Tree - On Lot
- Proposed Tree - Street
- Proposed Tree - Feature

PREPERATION & GROUNDWORKS

- Services
- Mulch

WALLS

- Retaining Wall

PAVEMENTS

- Temporary Recycled Aggregate
- Coarse Aggregate
- Charcoal Ballast
- Sandstone Ballast
- Asphaltic Concrete
- Insitu Concrete
- Precast Concrete
- Rock pitching

WATER ELEMENTS

- Natural Grade

PLANTING

- TF1-General Turf
- TF2-Feature Turf
- PM1A-Car park edge mix-sun
- PM1B-Car park edge mix-shade
- PM2A-Car park island mix-sun
- PM2B-Car park island mix-shade
- PM3A-Site edge mix - sun
- PM3B-Site edge mix - shade
- PM4-Site markers mix
- PM5A-Feature planting mix-sun
- PM6A-Site hedge mix-sun
- PM9A-Climbers mix - sun
- PM10-Verge planting mix
- PM11-Mound planting mix
- PM12-Swale planting mix
- PM13-Western boundary planting mix
- RM1A-Native grasses on fill embankment
- RM1B-Native grasses on cut buffer
- RM3-Pasture grass revegetation mix

Landscape Design Statement - MOD 3 Masterplan

The landscape design prepared for Oakdale West Estate – MOD 3, aims to expand on the recently completed Oakdale Central and South Estates, which have set a high standard for industrial estate developments. Oakdale West will encompass substantial planting of both native and exotic street and feature trees to further ensure that the large expanses of built form, parking and utility spaces are visually screened by vegetation. Permeable surfaces of planting, low maintenance turf and gravel, will be maximised in order to reduce run-off.

As part of the initial stages of the construction of the estate, the vegetated bund along the western edge of the estate will be completed, in order to maximise the growth period and to mitigate visual impacts to the sensitive receivers to the West. As a result of existing native vegetation along the Southern edge being retained, visual amenity is also improved for sensitive receivers to the South. In addition, the generous landscape setbacks within internal precincts will foster a clustered, yet dense approach to tree planting with native species, further providing visual screening to the immediate neighbours of the site, but also for users of internal roads and footpaths. When combined with the proposed estate streetscape design, large, meaningful strips of canopy trees with mass planting of shrubs and groundcovers will form a dense vegetative screen for the development.

Overall, the planting palette aspires to balance council environmental and planning requirements, while also staying consistent to the high-quality Goodman landscape identity that is reflected throughout each of their estates both in Oakdale and more broadly in Western Sydney. With Goodman taking ownership of the landscape maintenance and on-going care of all landscape areas within Oakdale West Estate, the health and function both during the establishment period and beyond, will be carefully monitored and driven towards a successful and robust outcome.

scape DESIGN

LANDSCAPE ARCHITECTURE

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SSD 7348
MOD 3 DA

PROJECT
Landscape Master Plan - MOD 3
Oakdale West, NSW

CLIENT
Goodman Property Services

revision	revision description	by	date
F	DEVELOPMENT APPLICATION	MF	14/2/20
E	DEVELOPMENT APPLICATION	MF	13/1/20
D	FOR APPROVAL	MF	12/12/19
C	CLIENT REVIEW	MF	29/11/19
B	CLIENT REVIEW	MF	19/11/19

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Landscape Master Plan - OWE MOD 3

scale	1:3000@A1
drawn	MF/ZZ
checked	CH
project no.	163-18
project phase	Development Application

L.SK.100 F

Lagerstroemia indica 'Tuscarora'



Melaleuca decora



Eucalyptus moluccana



Callistemon viminalis

Corymbia maculata

Pyrus calleryana 'Bradford'



Eucalyptus fibrosa



Eucalyptus tereticornis



Magnolia grandiflora 'Exmouth'



0 30 60 90 120 150 M

Note: All finished levels subject to change +/- 1000mm.

LEGEND

GENERAL

- Proposed biodiversity offset treatment and regeneration area
- Temporary treatment

PLANTING

- TF1-General turf
- TF2-General turf
- PM10-Verge planting mix
- PM11-Mound planting mix
- PM12-Swale planting mix
- PM13-Western boundary planting mix
- RM1A-Native grasses on fill embankment
- RM1B-Native grasses on cut buffer
- RM3-Pasture grass revegetation mix
- TM1-Street trees-Eucalyptus tereticornis
- TM1-Street trees-Eucalyptus fibrosa
- TM1-Street trees-Corymbia maculata
- TM1-Street trees-Callistemon viminalis
- TM2-Native screening trees-Refer L.SK.102
- TM3-Feature trees-Lagerstroemia indica 'Tuscarora'
- TM3-Feature trees-Lagerstroemia indica 'Tuscarora'
- TM3-Feature trees-Lagerstroemia indica 'Tuscarora'
- TM4-General trees-Melaleuca decora
- TM5-Western boundary trees
- Mound trees-Refer OWES1

scape DESIGN

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SSD 7348
MOD 3 DA

PROJECT

Landscape Master Plan - MOD 3

Oakdale West, NSW

CLIENT

Goodman Property Services

revision	revision description	by	date
E	DEVELOPMENT APPLICATION	MF	14/2/20
D	DEVELOPMENT APPLICATION	MF	13/1/20
C	FOR APPROVAL	MF	12/12/19
B	CLIENT REVIEW	MF	29/11/19
A	CLIENT REVIEW	ZZ	19/11/19

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Street Trees & Planting Master Plan

scale	1:3000@A1
drawn	MF/ZZ
checked	CH
project no.	163-18
project phase	Development Application

L.SK.101 E

PLANTING SCHEDULE

Botanical Name	Common Name	Height (m)	Spread (m)	Pot Size	Rate (m2)	
TM1 - Street Trees						
Callistemon viminalis	Weeping Bottlebrish	6.0	5.0	45L	As Shown	
Corymbia maculata	Spotted Gum	30.0	10.0	75L	As Shown	
Eucalyptus fibrosa	Broad-leaved Ironbark	30.0	10.0	75L	As Shown	
Eucalyptus tereticornis	Forest Red Gum	30.0	10.0	75L	As Shown	
TM2 - Native Screening Trees						
Angophora floribunda	Rough-barked Apple	20.0	10.0	75L	As Shown	
Eucalyptus crebra	Narrow leaved Ironbark	30.0	10.0	75L	As Shown	
Eucalyptus moluccana	Grey Box	25.0	10.0	75L	As Shown	
Eucalyptus tereticornis	Forest Red Gum	30.0	10.0	75L	As Shown	
TM3 - Feature Trees						
Lagerstroemia indica 'Tuscarora'	Tuscarora Crepe Myrtle	6.0	4.5	75L	As Shown	
Magnolia grandiflora 'Exmouth'	Bull Bay Magnolia	12.0	7.0	75L	As Shown	
Pyrus calleryana 'Bradford'	Ornamental Pear	12.0	8.0	75L	As Shown	
TM4 - General Trees						
Melaleuca decora	White Feather Honeymyrtle	7.0	8.0	25L	As Shown	
TM5 - Western Boundary Trees						
Eucalyptus fibrosa	Broad-leaved Ironbark	30.0	10.0	75L	As Shown	
Eucalyptus moluccana	Grey Box	25.0	10.0	75L	As Shown	
Eucalyptus tereticornis	Forest Red Gum	30.0	10.0	75L	As Shown	
PM10 - Verge Planting Mix					Area =	11465 sq.m
Acmena smithii 'Minor'	Dwarf Lilly Pilly	4.0	1.8	140mm	2	
Callistemon 'White Anzac'	Bottlebrush	1.0	1.0	140mm	2	
Callistemon viminalis 'Little John'	Little John Bottlebrush	0.6	0.8	140mm	2	
Dianella longifolia	Pale Flax-lily	1.2	0.6	70mm	2	
Gazania tomentosa	Silver Gazania	0.3	1.5	140mm	2	
Hibbertia scandens	Climbing Guinea-Flower	2.0	2.0	140mm	2	
Lomandra longifolia	Spiny-headed Mat-Rush	0.8	1.0	70mm	2	
Lomandra longifolia 'Verday'	Lomandra 'Verday'	0.6	0.6	140mm	2	
Metrosideros thomasii	New Zealand Christmas Bush	4.0	4.0	140mm	2	
Myoporum parvifolium	Creeping boobialla	0.5	1.0	140mm	2	
Pennisetum alopecuroides 'Nafray'	Pennisetum Nafray	0.5	0.5	140mm	2	
Phormium cookianum 'Tricolour'	Tricolour Mountain Flax	1.5	1.2	200mm	2	
Photinia x fraseri 'Red Robin'	Red Robin	3.0	2.0	140mm	2	
Rhagodia spinescens	Creeping Saltbush	0.8	1.0	70mm	2	
Scaevola albida 'Blue Mist'	'Blue Mist' Fan Flower	0.3	1.0	140mm	2	
Trachelospermum jasminoides	Star Jasmine	0.9	0.3	140mm	2	
Viburnum odoratissimum	Sweet Viburnum	4.0	4.0	140mm	2	
Westringia fruticosa 'Wynyabbie Gem'	Westringia	2.0	2.0	140mm	2	
PM11 - Mound Planting Mix					Area =	12755 sq.m
Acacia falcata	Sickle Wattle	3.0	1.5	70mm	2	
Angophora floribunda	Rough-barked Apple	20.0	10.0	5L	2	
Aristida ramosa	Purple Wire Grass	1.2	1.0	70mm	2	
Bothriochloa decipens	Red Grass	1.0	1.0	70mm	2	
Bursaria spinosa	Australian Blackthorn	4.0	0.5	70mm	2	
Chloris ventricosa	Plump Windmill Grass	1.0	1.0	70mm	2	
Dianella revoluta	Spreading Flax Lily	1.0	1.5	70mm	2	
Dillwynia sieberi	Sieberi Parrot Pea	1.0	1.0	70mm	2	
Elymus scaber	Common Wheatgrass	1.0	1.0	70mm	2	
Eucalyptus crebra	Narrow leaved Ironbark	30.0	10.0	5L	2	
Eucalyptus moluccana	Grey Box	25.0	10.0	5L	2	
Eucalyptus tereticornis	Forest Red Gum	30.0	10.0	5L	2	
Hardenbergia violacea	Happy Wanderer	2.0	0.2	70mm	2	
Indigofera australis	Australian Indigo	1.8	1.8	70mm	2	
Lomandra longifolia	Spiny-headed Mat-Rush	0.8	1.0	70mm	2	
Poa labillardieri	Tussock Grass	1.3	0.7	70mm	2	
Themeda triandra	Kangaroo Grass	1.5	0.5	70mm	2	
PM12 - Swale Planting Mix					Area =	7295 sq.m
Carex appressa	Tall Sedge	0.7	0.5	70mm	2	
Dianella longifolia	Pale Flax-lily	1.2	0.6	70mm	2	
Imperata cylindrica	Blady Grass	0.5	0.6	70mm	2	
Juncus usitatus	Common Rush	1.0	0.7	70mm	2	
Lomandra longifolia	Spiny-headed Mat-Rush	0.8	1.0	70mm	2	
PM13 - Western Boundary Planting Mix					Area =	2324 sq.m
Acacia decurrens	Black Wattle	5.0	3.0	140mm	2	
Acacia implexa	Hickory Wattle	8.0	7.0	140mm	2	
Aristida ramosa	Purple Wire Grass	1.2	1.0	70mm	2	
Cymbopogon refractus	Barbed Wire Grass	0.6	0.4	70mm	2	
Dichelachne micrantha	Short-Hair Plume-Grass	0.6	0.6	70mm	2	
Eucalyptus crebra	Narrow leaved Ironbark	30.0	10.0	5L	2	
Eucalyptus moluccana	Grey Box	25.0	10.0	5L	2	
Eucalyptus tereticornis	Forest Red Gum	30.0	10.0	5L	2	
Melaleuca decora	White Feather Honeymyrtle	7.0	8.0	140mm	2	
Themeda triandra	Kangaroo Grass	1.5	0.5	70mm	2	
RM1A - Native Grasses on Fill Embankment					Area =	73384 sq.m
Aristida vagans	Three-awn Speargrass	0.8	0.5	Seed	1	
Austrostipa ramosissima	Stout Bamboo Grass	2.0	1.0	Seed	1	
Chloris truncata	Windmill Grass	0.5	0.2	Seed	1	
Cymbopogon refractus	Barbed Wire Grass	0.6	0.3	Seed	1	
Danthonia tenuior	Wallaby Grass	0.6	0.3	Seed	1	
Dichelachne micrantha	Short-Hair Plume-Grass	0.5	0.1	Seed	1	
Entolasia stricta	Wiry Panic	0.8	0.5	Seed	1	
Eragrostis brownii	Brown's Lovegrass	0.6	0.2	Seed	1	
Imperata cylindrica	Blady Grass	1.2	0.4	Seed	1	
Poa labillardieri	Tussock Grass	1.3	0.7	Seed	1	
Themeda australis	Kangaroo Grass	1.0	0.6	Seed	1	
RM1B - Native Grasses on Cut Batter					Area =	8911 sq.m
Aristida vagans	Three-awn Speargrass	0.8	0.5	Seed	1	
Austrostipa ramosissima	Stout Bamboo Grass	2.0	1.0	Seed	1	
Chloris truncata	Windmill Grass	0.5	0.2	Seed	1	
Cymbopogon refractus	Barbed Wire Grass	0.6	0.3	Seed	1	
Danthonia tenuior	Wallaby Grass	0.6	0.3	Seed	1	
Dichelachne micrantha	Short-Hair Plume-Grass	0.5	0.1	Seed	1	
Entolasia stricta	Wiry Panic	0.8	0.5	Seed	1	
Eragrostis brownii	Brown's Lovegrass	0.6	0.2	Seed	1	
Imperata cylindrica	Blady Grass	1.2	0.4	Seed	1	
Poa labillardieri	Tussock Grass	1.3	0.7	Seed	1	
Themeda australis	Kangaroo Grass	1.0	0.6	Seed	1	
RM3 - Pasture Grasses Mix					Area =	14842 sq.m
TF1 - General Turf					Area =	14514 sq.m
Stenotaphrum secundatum 'Sir Walter'	Sir Walter Buffalo			Turf Roll		
TF3 - RMS Specified Turf					Area =	12939 sq.m
Zoysia macrantha 'Nara'	Zoysia macrantha 'Nara'			Turf Roll		

NOTE:
1. Mass planting to be undertaken in large groupings of the same species to approval of landscape architect.
2. Hedging species are to be set out in linear arrangements of same speceies to approval of landscape architect.

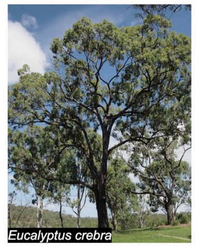
PLANTING PALETTE

Trees

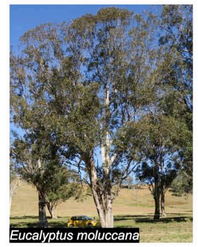

Angophora floribunda


Callistemon viminalis


Corymbia maculata


Eucalyptus crebra


Eucalyptus fibrosa

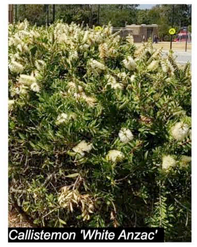

Eucalyptus moluccana

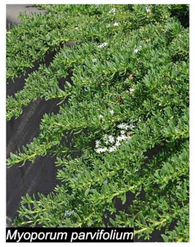

Eucalyptus tereticornis


Lagerstroemia indica 'Tuscarora'

PM10 - Verge Planting Mix


Acmena smithii 'Minor'


Callistemon 'White Anzac'

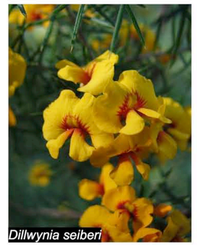

Myoporum parvifolium


Pennisetum alopecuroides 'Nafray'

PM11 - Mound Planting Mix


Aristida ramosa


Dianella revoluta


Dillwynia seiberi


Indigofera australis

PM12 - Swale Planting Mix


Carex appressa


Dianella longifolia


Imperata cylindrica

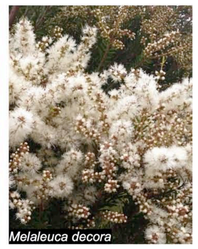

Juncus usitatus

PM13 - Western Boundary Planting mix

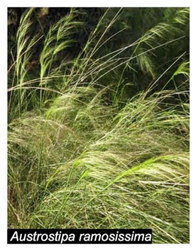

Acacia implexa


Aristida ramosa


Cymbopogon refractus


Melaleuca decora

RM1A/1B - Native Grasses on Fill Embankment / Cut batter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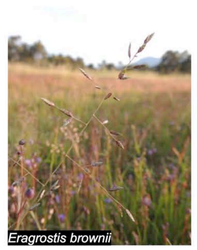
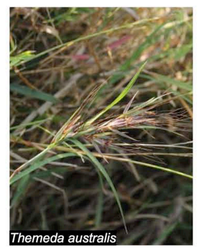
Cymbopogon refractus


Danthonia tenuior


Eragrostis brownii

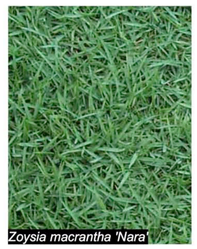

Poa labillardieri


Themeda australis

TF1 - General Turf


Stenotaphrum secundatum 'Sir Walter'

TF3 - RMS Specified Turf


Zoysia macrantha 'Nara'

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SSD 7348
MOD 3 DA

PROJECT
Landscape Master Plan - MOD 3
Oakdale West, NSW

CLIENT
Goodman Property Services

revision	revision description	by	date
E	DEVELOPMENT APPLICATION	MF	14/2/20
D	DEVELOPMENT APPLICATION	MF	13/1/20
C	FOR APPROVAL	MF	12/12/19
B	CLIENT REVIEW	MF	29/11/19
A	CLIENT REVIEW	ZZ	19/11/19

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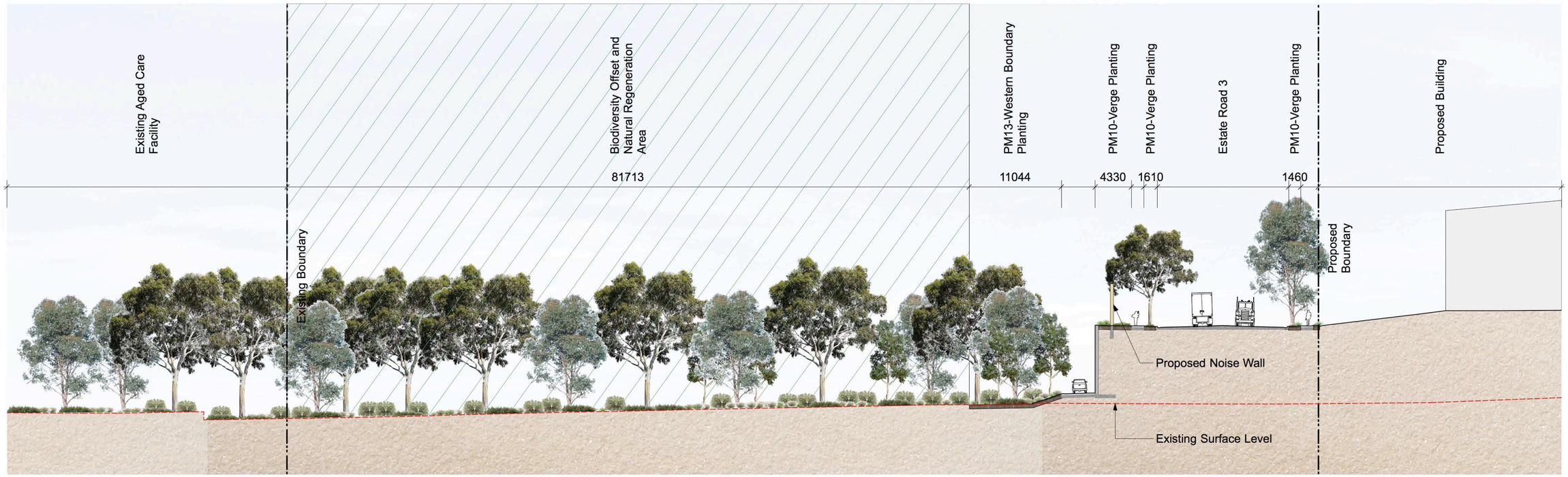
Verify services locations prior to commencement.
Verify all dimensions on site prior to construction.

Planting Schedule - MOD 3

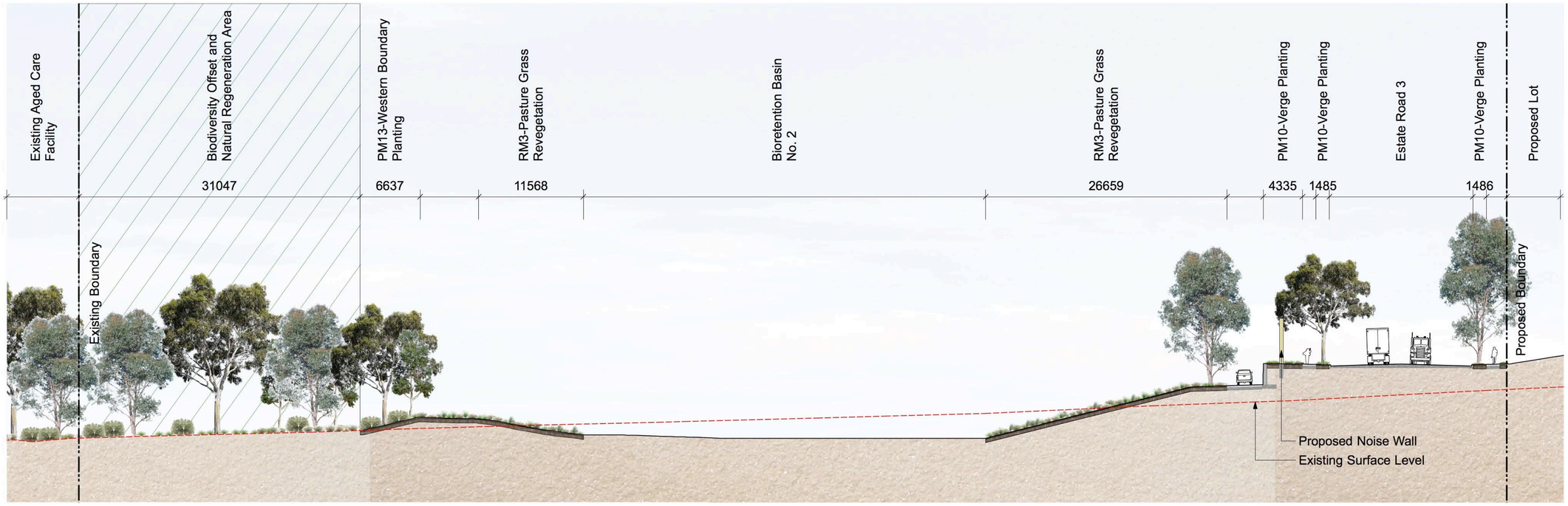
scale	NTS
drawn	MF/ZZ
checked	CH
project no.	163-18
project phase	Development Application

L.SK.102 E



01 Western Boundary Planting
Scale 1:500 @A1

0 5 10 15 20 25 M



02 Western Boundary Planting
Scale 1:500 @A1

0 5 10 15 20 25 M

SSD 7348
MOD 3 DA

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PROJECT
Landscape Master Plan - MOD 3
Oakdale West, NSW

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revision	revision description	by	date
A	DEVELOPMENT APPLICATION	MF	14/2/20

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Landscape Sections - OWE MOD 3

scale	1:500@A1
drawn	MF/ZZ
checked	CH
project no.	163-18
project phase	Development Application

L.SK.200 A

Annexure D

OAKDALE WEST ESTATE - PROPOSED PAD LEVEL AND HIGH BAY MODIFICATION

COMPARISON REPORT

e8urban

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NSW 2024

ACN 605717351

Oakdale West Estate - Proposed Pad Level and High Bay Modification Comparison Report

FEBRUARY 2020

Prepared by e8urban pty ltd for Goodman Property Group

Goodman

Issue	Revision	Purpose	By	Date
FINAL	11	FOR SUBMISSION	JR/JA	February 2010

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Contents

1.0	**Site and Context**	**6**
1.1	The Site	6
2.0	**Key Changes to the 2019 Approved Development**	**7**
2.1	Key Changes	8
3.0	**Updated Visual Impact Assessment**	**10**
3.1	View Locations and Assessment Considerations	10
3.2	View Location and Selection Rationale	11
3.3	View 01 - Greenway Place	13
3.4	View 02 - Capitol Hill Drive	17
3.5	View 03 - Adlington Road	21
3.6	View 04 - Barkers Lane Private Residence	25
3.7	View 05 - Emmaus Catholic College	30
3.8	View 06 - Emmaus Catholic College Classroom Block	34
3.9	View 07 - Emmaus Residential Aged Care	38
3.10	Summary of Findings	42
4.0	**Updated Master Plan Review**	**43**
5.0	**North South Link Road Character Assessment**	**44**
5.1	Precinct 1 North South Link Road Interface Assessment	44

Executive Summary

Introduction

e8urban has been appointed to undertake an updated Visual Impact Assessment (VIA) assessment of proposed changes (the Modifications) to the 2019 Approved Development for the Oakdale West Estate (OWE).

This assessment provides a comparison between the visual impacts assessed for the State Significant Development Application for the Master Plan lodged in 2017, and proposed modifications to the 2019 Approved Development that include development/building pad levels and a revised building envelop.

This VIA has been undertaken to support SSD7348 MOD 2 and specifically address the Department of Planning, Infrastructure and Environment (DPIE) environmental assessment requirements (EARs) issued on 15 November 2019.

The table below highlights how the VIA has responded to the EARs.

The OWE Site

The site is located within the Penrith LGA, at the south western end of Old Wallgrove Road in Western Sydney.

It is situated south of Lenore Drive, east of Mamre Road and will be accessed via the proposed new Western North South Link Road from Lenore Drive.

The site is a 154 hectare parcel of land and is located within the Western Sydney Employment Hub, as identified in the Metropolitan Strategy Site 8, 'Lands south of Sydney Water pipeline'.

The land is formally identified as Lot 11 of DP1178389.

The 2019 Approved Development

The 2019 Approved Development for OWE incorporates 22 warehouse buildings of varying sizes and 22 offices. Associated services, ancillary functions and site environmental considerations are also integrated.

Design and Layout

Planning for the OWE has been undertaken to optimise the potential of the site to provide for employment floor space, while also addressing the particular site constraints and interfaces on the edges of the site.

Key features of the 2019 Approved Development include:

- A public domain network that breaks the site down into a series of discreet interconnected precinct;
- Significant landscape buffers on the western and southern edge of the site that incorporate native tree planting and stormwater management;
- New site access points to the south, north and east of the site;
- A range of street typologies that reflect the movement and access needs within the Site; and
- A series of discreet Precincts that will be delivered along with associated public domain and infrastructure to provide for an orderly development to meet the evolving needs of employers in Western Sydney.

EARs Conformance Table

Environmental Assessment Requirements (EARs)	How the EAR has been addressed by this VIA
A detailed assessment (including photomontages and perspectives) of the modification (buildings and parking areas), including the proposed extension to the noise wall, including consideration of height, colour, scale, building materials and finishes, signage and lighting, particularly from nearby public receivers and significant vantage points of the broader public domain;	Photomontages all bee prepared for each view that provide the location of the both the Approved Development and Modification so that a visual comparison can be made. The selected views are from important public and private receivers around the Site.
A comparison of the finished ground levels, building heights, setbacks and landscaping of the existing approval and the proposed modification in the context of visual impacts at key receptors; and	The photomontages clearly differentiate between the height, form and scale of the Approved Development in comparison to the Modification so that a comparison can be made from the selected receivers.
An assessment of the adequacy of the proposed landscaping for minimising the overall visual impacts of the modification, which shows any landscaping over various periods of time.	For view 05, 06 and 07 the photomontages include an indication of the proposed landscape treatment at these important interfaces. For these views an indication of the likely height of the proposed buffer planting have been included to show growth after 5 years and 15 years.

The DPIE Assessment

The August 2019 Oakdale West Estate (SSD 7348) Assessment Report provides the following assessment recommendation in relation to the visual impacts of the 2019 Approved Development.

The development would transform the existing rural nature of the site into a fully developed warehouse and distribution estate, consistent with its industrial zoning and the objectives of the State Environmental Planning Policy (Western Sydney Employment Area) 2009 (WSEA SEPP). This transformation would have moderate to high visual impacts for the adjacent schools, retirement village and one rural residence. The visual impacts would be reduced to an acceptable level through early construction of earthen mounds and landscape planting along the western boundary which would have around 2 to 3 years to establish before buildings are constructed near the boundary.

(Page IV Oakdale West Estate (SSD 7348) Assessment Report)

The Department's assessment concludes the Concept Proposal and Stage 1 DA would result in permanent visual changes in the landscape that are consistent with the industrial zoning of the site and other industrial estates within the WSEA. The Department considers further detailed assessment is required in subsequent DAs for warehouses adjacent to the sensitive receivers on the western and southern boundaries to ensure the design and scale of future buildings is appropriate and compatible with the existing adjacent developments and an optimal visual outcome is achieved.

(Page 39 Oakdale West Estate (SSD 7348) Assessment Report)

Proposed Changes to the 2019 Approved Development

Goodman Group have proposed further refinements to the detailed layout and planning across the OWE as set out in the 2109 Approved Development.

These changes have primarily been driven by:

- Refinement of infrastructure design;
- Development of the servicing strategy;
- Market drivers and tenant requirements, and;
- Innovations in warehousing and distribution processes leading to new requirements for these building typologies.

Key Infrastructure Modifications

Precinct 1

- Road 2 will be removed;
- FFL of 69/70 for Lot 1A to remain in line with previous approval;
- FFL Lot 1B to be 79.8;
- Retaining wall to be included at for Lot 1B, and;
- Upgrade of stormwater infrastructure to support revised design.

Precinct 2

- FFL of 66.50 for Lot 2A & 2B;
- FFL changes to Lot 2E, 2F & 2G, and;
- Retaining wall changes to suit change in levels.

Other items;

- VMP and BAR to be updated to reflect change in biodiversity strategy.

Key Built Form and Public Domain Modifications

Precinct 1

- Building layouts changed to match new masterplan for Lot 1A and Lot 1B, and;
- Proposed building height of 30m for Lot 1A (increased form 13m).

Study Methodology

This report describes the work undertaken in the assessment of modifications to the 2019 Approved Development, and production of an updated VIA.

The following activities have been undertaken to prepare this report:

- Desktop review of the previous work undertaken;
- Meetings with Goodman Group and the appointed architectural, landscape and civil engineering consultants to understand the extent of changes across the OWE;
- Review of the refined OWE master plan, and;
- Production of updated photomontages to illustrate how the proposed changes to the relative levels and form of development on the site would be perceived from the surrounding context.

Photomontages

The photomontages presented in this report have been created to illustrate the relative location of the proposed built form from the receptors that have been assessed for visual impacts.

Some changes to the outlines in the photomontages are subtle. So, in order to assist in the clarity of the comparative analysis, the development outlines have been coloured so that changes can be understood.

For View 05, 06 and 07, located close to the western boundary of the Site, additional images have been provided to show the difference in expected growth of the boundary planting after 5 years and 15 years.

Findings

Pad Level Changes

The proposed changes to building pad levels in Precinct 2 will not contribute to any additional visual impacts from the surrounding public and private receivers assessed than those already stated and approved as per the DPIE assessment report.

The existing proposed landscape buffers will provide adequate mitigation once fully established, with mitigation strategies in place in the interim as stated in the DPIE assessment report.

Proposed High Bay

The proposed changes to the built form within Precinct 1 will not contribute to any additional visual impacts from the surrounding public and private receivers assessed, and that the existing proposed landscape buffers will provide adequate mitigation once fully established, with mitigation strategies in place in the interim as stated in the DPIE assessment report.

Master Plan And Public Domain Interfaces

The proposed detailed design development of the built form and landscape concept for Precinct 1 are consistent with the 2019 Approved Development concept design and will provide a character consistent with the character that is embodied in the 2019 Approved Development concept designs.

This study illustrates that the 2019 Proposed Modifications would not be a material change from the approval as assessed by DPIE and we recommend no further changes to the designs as assessed.

1.0 Site and Context

1.1 The Site

The site is bounded to the North by the existing Sydney Water Pipeline and industrial development.

It is bounded to the south by farmland and suburban development. To the east it is bounded by Ropes Creek and Oakdale South Estate and to the west by Emmaus Catholic College and Health Care facility.

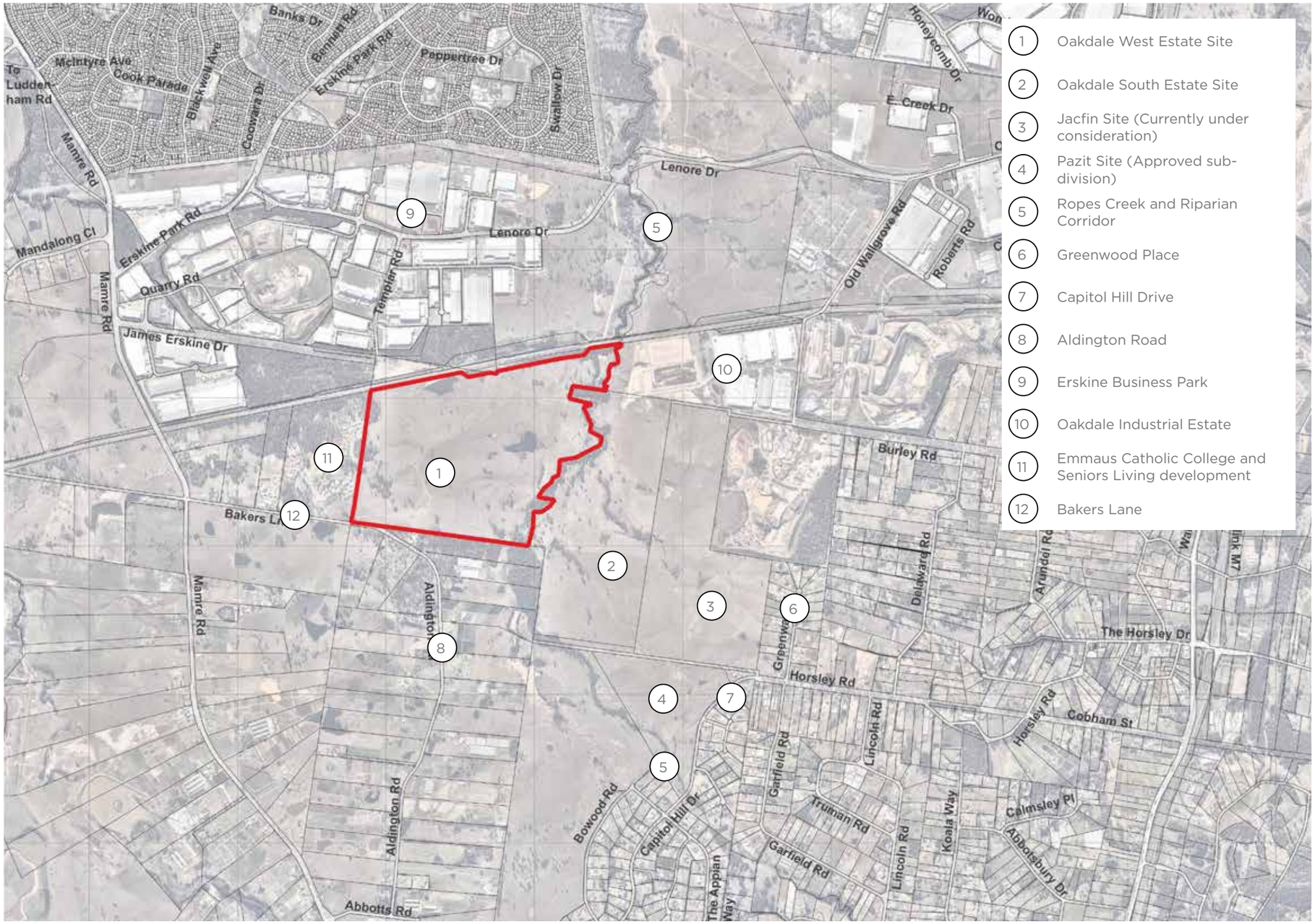
Ropes Creek to the east is a small meandering creek that has been assessed, classified and discussed in more detail in the biodiversity report by Aecom. The Site is located in an area that could be described as transitional, with the land to the south of the Sydney Water Pipeline having the greatest potential for future change from agricultural land and large lot rural residential to high quality employment land.

The land to the north of The Site comprises of established industrial and employment lands such as the Erskine Park Estate and further north the low density suburb of St Clair.

To the east are located a number of sites with applications and approvals for employment uses. Between these site and the M7 Motorway is the existing suburb of Horsley Park which generally comprises of large lot and semi-rural residential properties.

The land to the south and west of the site includes the Emmaus Catholic College and Residential Aged Care facility – located on the immediate western boundary – and large lot rural residential properties.

The Figure 1 highlights some of the key features around the site.



Site Location

Legend

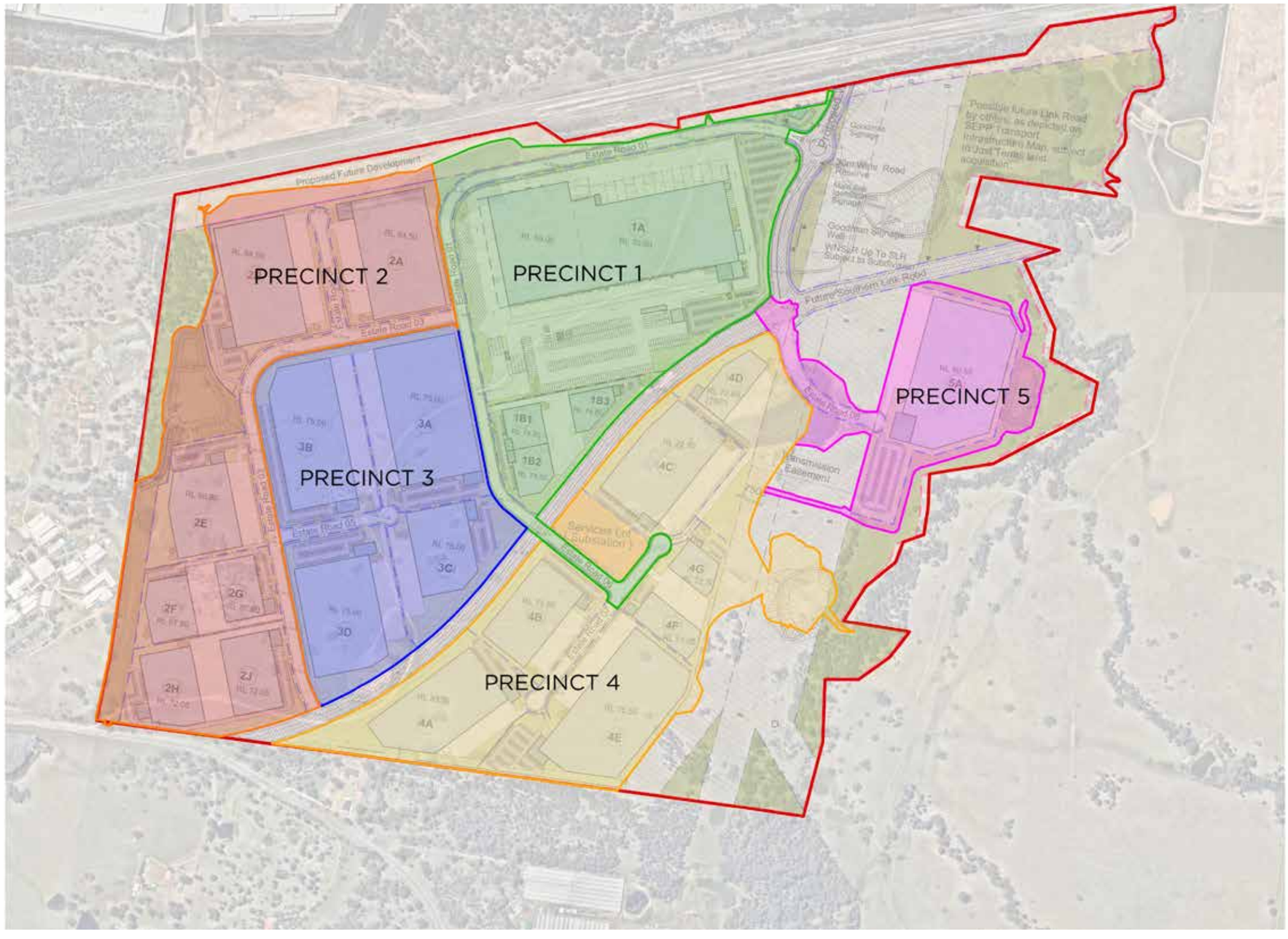
The Site

Figure 1: The Site

2.0 Key Changes to the 2019 Approved Development

Indicative Precincts

The 2019 Approved Development currently anticipates five development stages. The adjacent diagram highlights the location of the stages along with the proposed sub-station site which will be delivered based on agreed infrastructure requirements.



OWE Master Plan Precincts

Legend

- The Site
- Precinct 1
- Precinct 2
- Precinct 3
- Precinct 4
- Precinct 5

Figure 2: The OWE Precincts

1.1 Key Changes

Figures 3 and 4 below provide a graphic illustration of the development and changes to the OWE Master Plan between the 2019 Approved Development and the 2019 Proposed Modifications. The table on the following page lists these changes.

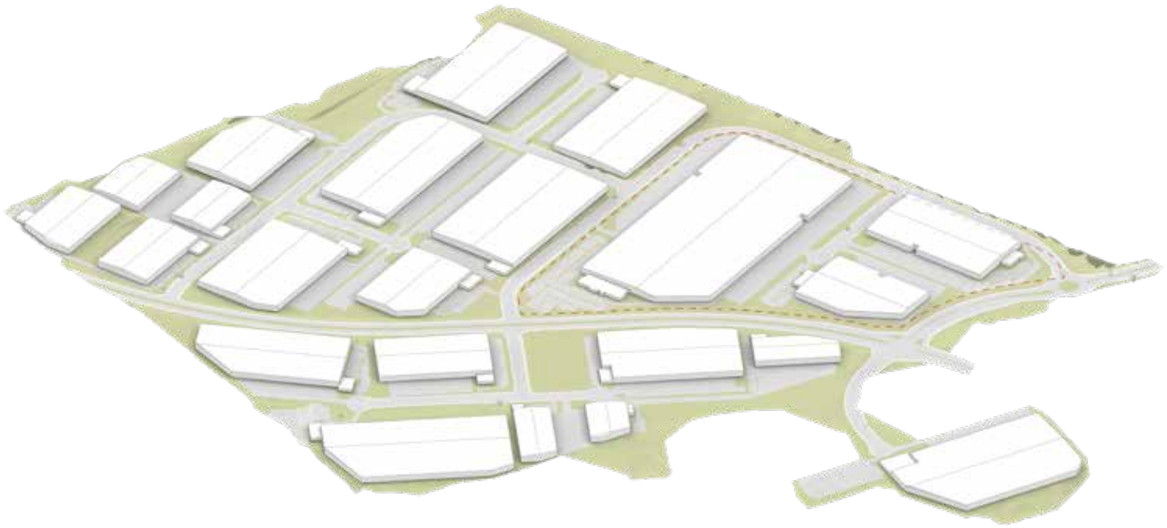


Figure 3: 2019 Approved Development- Axonometric View from the south east

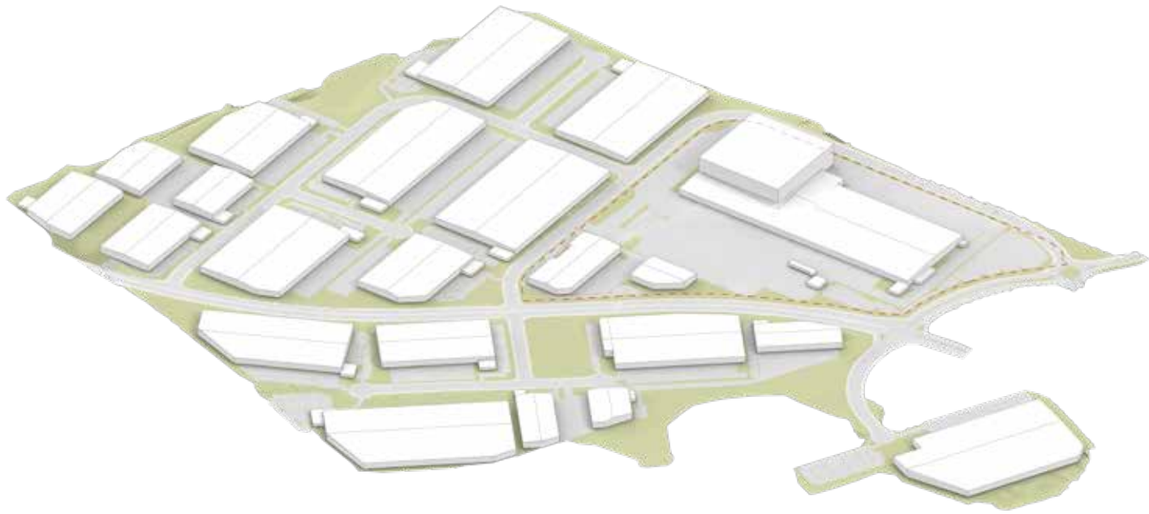


Figure 4: 2019 Proposed Modifications - Axonometric View from the south east

Precinct	Precinct 1	Precinct 2	Precinct 3	Precinct 4	Precinct 5
Key Infrastructure Changes	Upgrade of stormwater infrastructure to support revised design	Retaining wall changes to suit change in levels.	No changes proposed	No changes proposed	No changes proposed
Key Public Domain Changes	Road 2 to be removed	Access track through landscape area to be updated	No changes proposed	No changes proposed	No changes proposed
Key Built Form Changes	FFL of 69/70 for Precinct 1A FFL of 74.80 for Precinct 1B Retaining wall to be included at Precinct 1B Building layouts changed to match new masterplan for Potential future tenants and spec units	Some changes to sitting and foot prints of built form FFL of 66.50 for Lot 2A & 2B FFL changes to Lot 2E, 2F & 2G	No changes proposed	Some changes to sitting and foot prints of indicative built form	No changes proposed

3.0 Updated Visual Impact Assessment

1.1 View Locations and Assessment Considerations

View Location

As part of the development of the OWE master plan a Visual Impact Assessment (VIA) was undertaken during 2016 and 2017. The purpose of the VIA was to identify visual impacts from the proposed development on the site and identify mitigations to reduce potential impacts.

A total of seven view locations were selected and then assessed through a process of desktop studies, site inspections, surveying, 3D CAD modelling and the production of accurate photo-montages. The seven views that have been assessed are:

View 01 – Greenway Place at RL 99
View 02 – Capitol Hill Drive at RL 74.5
View 03 – Adlington Road at RL 81.1
View 04 – Private Residence Bakers Lane at RL 89.5
View 05 – Emmaus Catholic College at RL 76.9
View 06 - Emmaus College at RL 65.3
View 07 – Emmaus Residential Aged Care at RL 56.6

Figure 5 shoes the location of the seven views in relation to the OWE.

Assessment Considerations

In order to establish the value of the views being assessed, it is important to understand the context of the site, which sits in a transitional landscape that moves between sub-urban and rural and contains a mixture of residential, small scale agricultural and industrial uses.

A number of considerations were taken in to account when establishing the value of the views:

- The presence and prominence of features in the fore-ground, middle-ground and far distance that are distinct to the local environment;
- Expanse and openness;
- The nature and extent of the horizon;
- The natural land-form;
- Natural environmental features such as trees or water features;
- The degree to which the landscape has been modified by human interactions such as land clearance and construction; and
- The relative uniqueness.

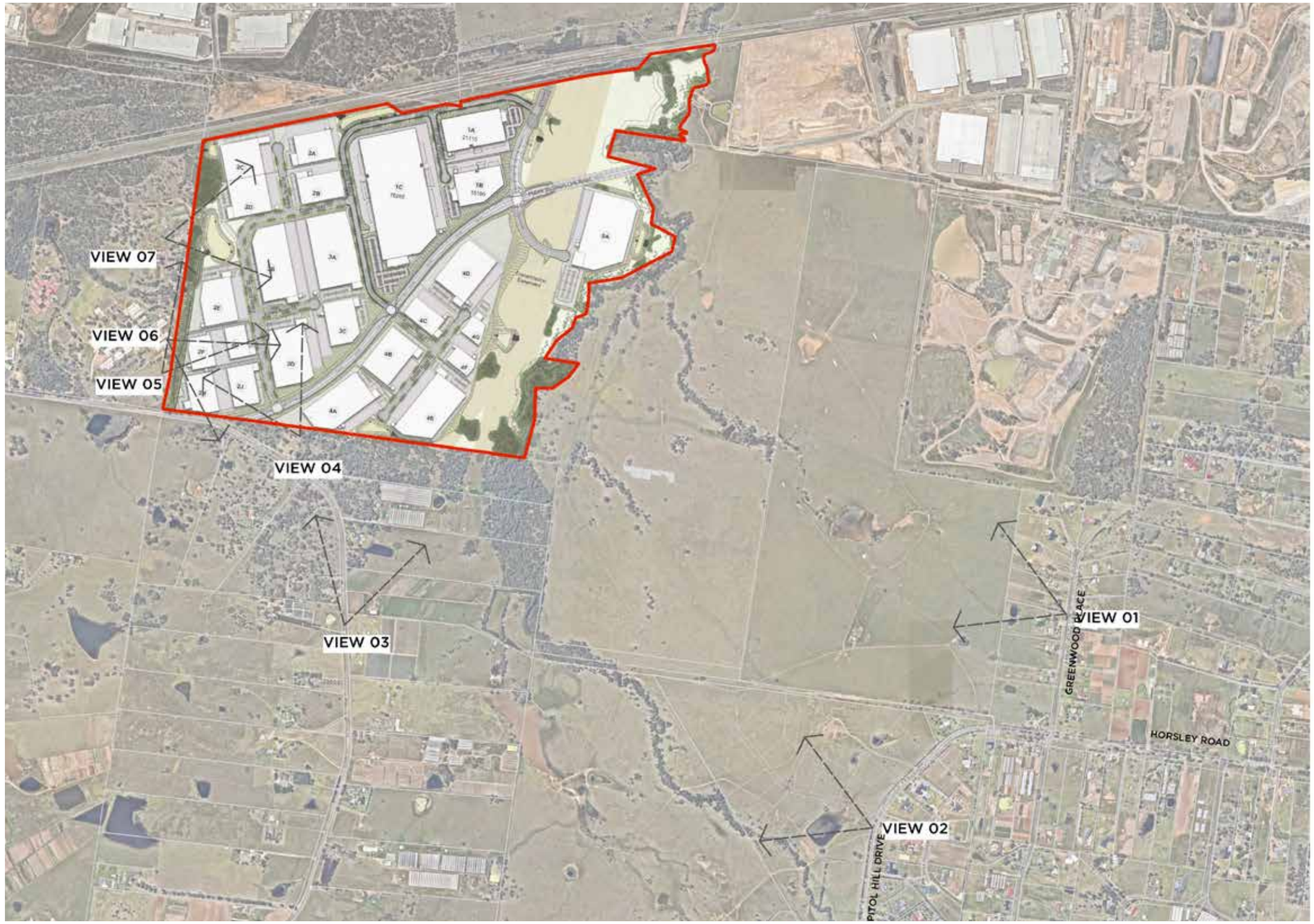


Figure 5: 2017 VIA view locations plan

1.1 View Location and Selection Rationale

Identification of Views

Public and private receivers are locations in the immediate vicinity of the site from where the new development would be visible. The locations were identified by the Department of Planning, Industry and Environment and the specific view points were selected by our team following site analysis and site visits.

Having previously undertaken a VIA for the neighbouring Oakdale South Estate development, the project team started from a basis of strong understanding of the view potential for public and private receivers.

In order to understand potential view points prior to the site inspection, a 3D topographical model was produced using 2 metre GIS contour data obtained from Land and Property Information NSW. This tool aided analysis and site visits confirmed the selection of the seven view points.

Figure 6 and Figure 7 highlight how the topographical and natural features of the locality influence the visibility of the OWE.

A number of considerations were taken in to account and informed the selection of the view points:

- That view points needed to be representative as much as possible of views from private land holdings such as existing and proposed development lots;
- That views represented areas where development would be most prominent. For example, high points, zones with clear lines of sight to the proposed development and places where the proposed development addresses public roads;
- That views from important public domain elements such as open space or landscape corridors were captured; and
- That consideration be made as to the location of existing approvals such as Oakdale South, the Jacfin Site and Pazit Lands along Capitol Hill Drive.

Views from the north were not considered as land to the north of the Site is primarily industrial, it is within the WSEA and is not sensitive to visual impacts of the proposed modifications. The Department focused on land uses to the west due to proximity and elevation.

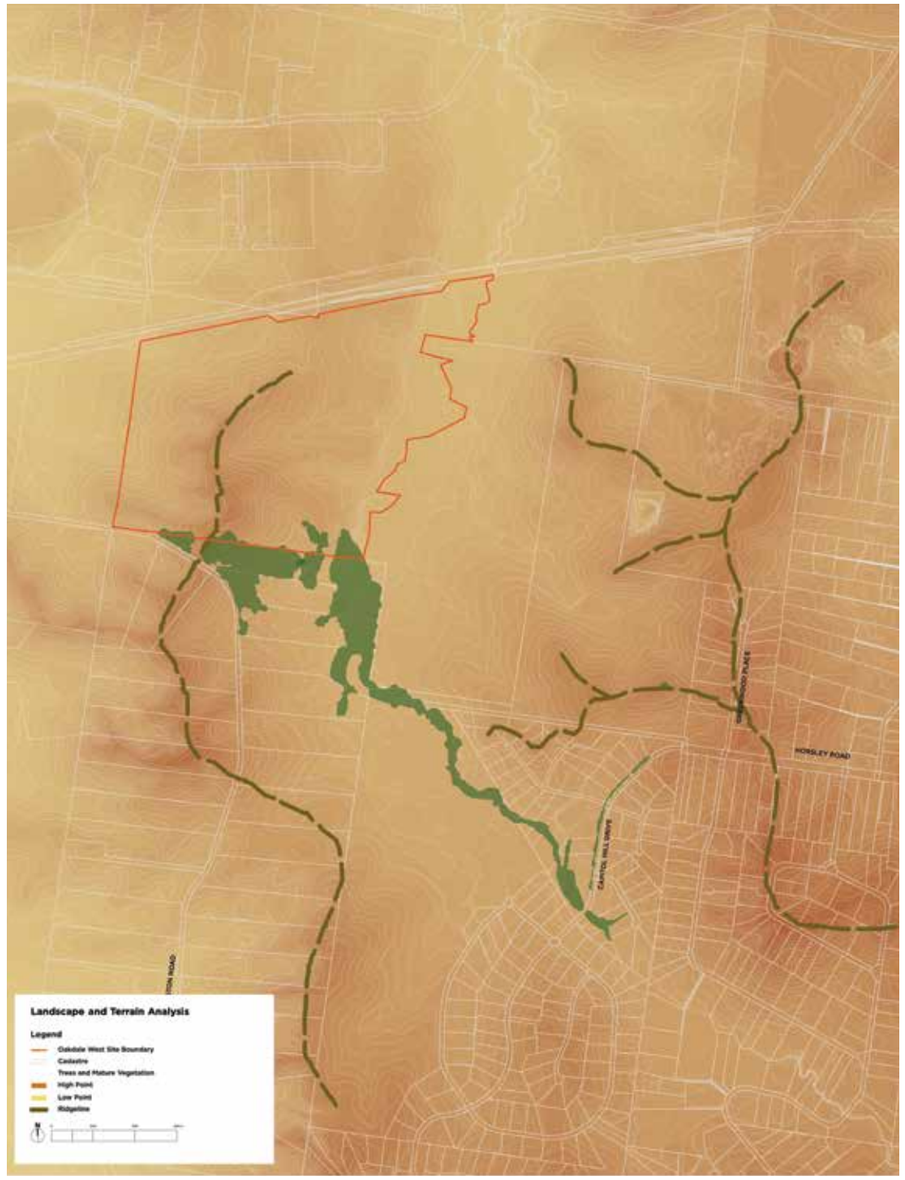


Figure 6: Topographic and vegetation analysis

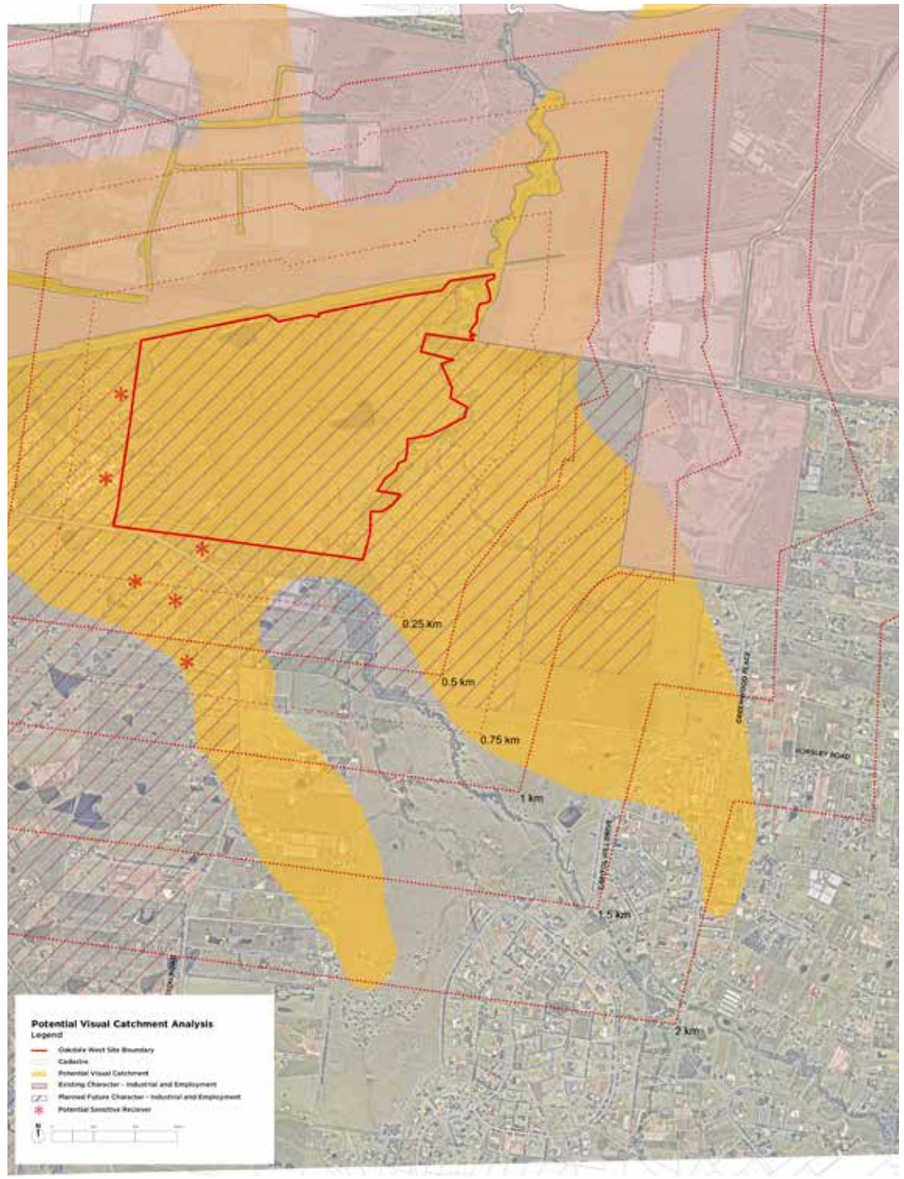


Figure 7: Potential visual catchment

Selected View Locations

View points were finalised following site visits and based on the topographical and landscape desktop analysis of the 2019 Approved Development and an understanding of the predominate land uses around the site.

View points to the west, south and east of the site were selected. View points from the north were discounted due to the consistency of its character (industrial / warehouse uses) to that which is proposed for the Oakdale West Estate.

The view locations were selected to address the need to assess the potential visual impacts from established non-employment land uses with an established character.

The table below provides a summary of the views selected and the rationale for selection.

View No.	Location	RL	Public / Private Receiver	Rationale for Selection	Potential for Visual Impacts	Additional Impacts due to Proposed Modification
1	Greenway Place	99	Public	Established residential area adjacent to WSEA with open aspect to the west	Low	No
2	Capitol Hill Drive	74.5	Public	Established residential area adjacent to WSEA with open aspect to the west	Low	No
3	Adlington Road	81.1	Public	Established residential area adjacent to WSEA	Moderate	No
4	Private Residence Bakers Lane	89.5	Private	Private home with direct boundary to OWE and an framed aspect to the north from the residence's garden	High	Yes
5	Emmaus Catholic College	76.9	Private	Education institute on the boundary with OWE, with open space and classrooms on the shared western boundary.	High	No
6	Emmaus Catholic College	65.3	Private	Education institute on the boundary with OWE, with open space and classrooms on the shared western boundary.	High	No
7	Emmaus Residential Aged Care	56.6	Private	Seniors Living / Aged Care facility adjacent to the western boundary with OWE	High	No

1.1 View 01 - Greenway Place

Description

Greenway Place is a residential street situated to the south east of the OWE. Two proposed industrial developments and a new residential sub division, the Oakdale South Estate and the Jacfin Site separate Greenwood Place and OWE.

Greenway Place is a recent sub-division with large lots that are generally between 1,000 sqm and 2,000 sqm located off a cul-de-sac road that runs north to south.

Greenway Place runs to the west of a parallel running ridge line to the east. Most of the properties on the western side of Greenway Place are located along this ridge line, whereas the properties on the eastern side are generally below the ridge line.

The rear gardens and habitable rooms within the properties along the western side Greenwood Place face west towards the Jacfin Site, the Oakdale South Estate and OWE.

Figure 8 identifies the view position in the local context and Figure 9 highlights some of the key features of View 01.

Local Character

The local immediate character within Greenwood Place is defined by the following features:

- A gently undulating topography;
- Recent single and two storey residential development with large houses on large plots;
- Building with traditional roof forms consisting of pitched roofs and over-hanging eaves;
- Sparse tree planting within private gardens and limited vegetation within the public domain;
- A semi rural landscape setting with some crop planting and other small scale agriculture, and;
- Outlooks from the street onto areas of open agricultural land with pockets of wooded areas;

The adjacent photos show typical built form and a view along Greenwood Place.

View 01 Selection

Greenwood Place is a predominantly residential area adjacent to WSE and therefore is a key receiver. Understanding any visual impacts is important, so any possible negative visual impacts can be understood and mitigated against.

The selected camera position for View 01 is located at the high point along Greenwood Place.

The height of the camera lens at this point is RL 99. This is approximately 15 metres above the proposed roofs on the OWE.

The view is towards the west and is representative of the outlook from the street, private gardens and rear habitable rooms and terraces to private properties along Greenwood Place.

Key Features of View 01

The view from Greenway Place is panoramic and expansive.

The following elements contribute the view:

- The dominant feature of the view looking west from Greenway Place being the Blue mountains which form a consistent band on the horizon;
- The land that falls away from the rear gardens of the properties on Greenwood Place is generally open agricultural and grazing land with small clusters of trees and dams, and;
- Ropes Creek runs parallel to Greenwood Place in the middle distance and the wooded areas that define the riparian corridor on each side of the creek form a strong horizontal element.



Figure 8: Composite Panorama of View 01 - Greenwood Place



Figure 9: Key Features of View 01 - Greenwood Place

Potential Visibility of the Proposed Modifications from View 01

Figure 10 provides a diagrammatic representation of the location of View 01 in relation to the OWE.

Impacts of the Proposed Modification on View 01

Figures 11 - 14 on the following page provide a sequential illustration of the spatial implication of the proposed Modifications.

The analysis shows that, due to the location and form of the landscape between this receiver and the OWE that:

1. The proposed changes on pad level are not discernible from View 01.
2. The proposed High Bay building would not be visible from View 01.

Accordingly, the extent of change between the 2019 approved development and the 2019 proposed modifications is negligible

View 01 Orientation

Legend

- The OWE
- 2019 Approved Development
- 2019 Proposed Modification Visible in View
- 2019 Buildings with Modified Pad Levels Visible in View
- 2019 High Bay Building Visible in View
- Field of View

Scale: NTS



Figure 10: View 01 orientation



Figure 11: 2019 Approved Development outlines



Figure 12: Indicative 2019 Approved Development outlines and 2019 Proposed Modification pad levels



Figure 13: Indicative 2019 Approved Development outlines and 2019 Proposed Modification pad levels and proposed High Bay building



Figure 14: Composite

2017 Landscape Character and Visual Impact Grading Matrix

Sensitivity \ Magnitude	High	Moderate	Low	Negligible
High	High-Impact	High-Moderate	Moderate	Negligible
Moderate	High-Moderate	Moderate	Moderate-Low	Negligible
Low	Moderate	Moderate-Low	Low	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Sensitivity of the View: Moderate

Magnitude of the Impact: Low

Assessed Visual Impact: Moderate-Low

Summary of Assessment Considerations

The key feature of the View west from the properties on Greenway Place is the panoramic expanse of the Blue mountains set against a foreground of open country and the horizontal band of trees that form the Ropes Creek corridor.

The location of the proposed development will potentially be visible for many of the properties along Greenway Drive. However, it is sitting on land that is below the elevated position of the properties and private open spaces. This means that the development will not impact on the panoramic western outlook.

Furthermore, the location of the approved Oakdale South and Jacfin developments will have the impact of screening large portions of the Oakdale West site, particularly the northern areas (refer to figure 18).

On this basis the visual impacts are considered acceptable.

Updated 2019 Landscape Character and Visual Impact Grading Matrix

Sensitivity \ Magnitude	High	Moderate	Low	Negligible
High	High-Impact	High-Moderate	Moderate	Negligible
Moderate	High-Moderate	Moderate	Moderate-Low	Negligible
Low	Moderate	Moderate-Low	Low	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Sensitivity of the View: Moderate

Magnitude of the Impact: Low

Assessed Visual Impact: Moderate-Low

Updated Summary of Assessment Considerations

The analysis provided in Figures 11 - 14 show that there will be no discernible change to View 01.

The assessed Visual Impact would not change.

1.1 View 02 - Capitol Hill Drive

Description

Capitol Hill Drive is a public road. It has a rural character, with development currently located on the eastern side of the road.

The land to the west of Capitol Hill Drive has an approval for a future sub division consisting large of lot rural properties.

Development consists of large homes on large lots that are well separated. The land to the west of Capitol Hill Drive is currently open grazing land.

Capitol Hill Drive falls from the north with a gentle bend. The land to the east rises away from the road.

Figure 15 identifies the view position in the local context and Figure 16 highlights some of the key features of View 01.

Local Character

The character within the area View 02 was taken is defined by the following features:

- A gently sloping and undulating landscape;
- An open aspect with obscured views to the west due to the undulating landscape;
- Large lot development with large single and two storey properties to the east of Capitol Hill Drive;
- Little mature or borrowed landscape within private properties making the housing highly prominent; and
- Rural landscape to the west of Capitol Hill Drive;

Figures 15 and 16 give an indication of the local character.

View 02 Selection

For much of the northern portion of Capitol Hill Drive the OWE is not visible, being obscured by modulations in the landscape and groups of mature trees.

From the central section of Capitol Hill Drive the OWE would be visible and the view point was selected as being the instance where the development would be most prominent, due to dips in the landscape in the foreground looking to the north west.

The height of the lens at the selected view point is RL 74.5. This is approximately 4 metres above the proposed ground level on the OWE site.

Key Features of View 02

While the view to the west from Capitol Hill Drive is panoramic and expansive, the landscape features (in particular the undulating landscape), often limits the depth of the view to the middle distance.

Key elements of the view include:

- Horizontal landscape elements to the east consisting of the Ropes Creek Riparian Corridor in the middle distance;
- The ridge of the Blue Mountains in the far distance, and;
- Open farm land with small water bodies, dams and clusters of mature trees.



Figure 15: Composite panorama of View 02 - Capitol Hill Drive

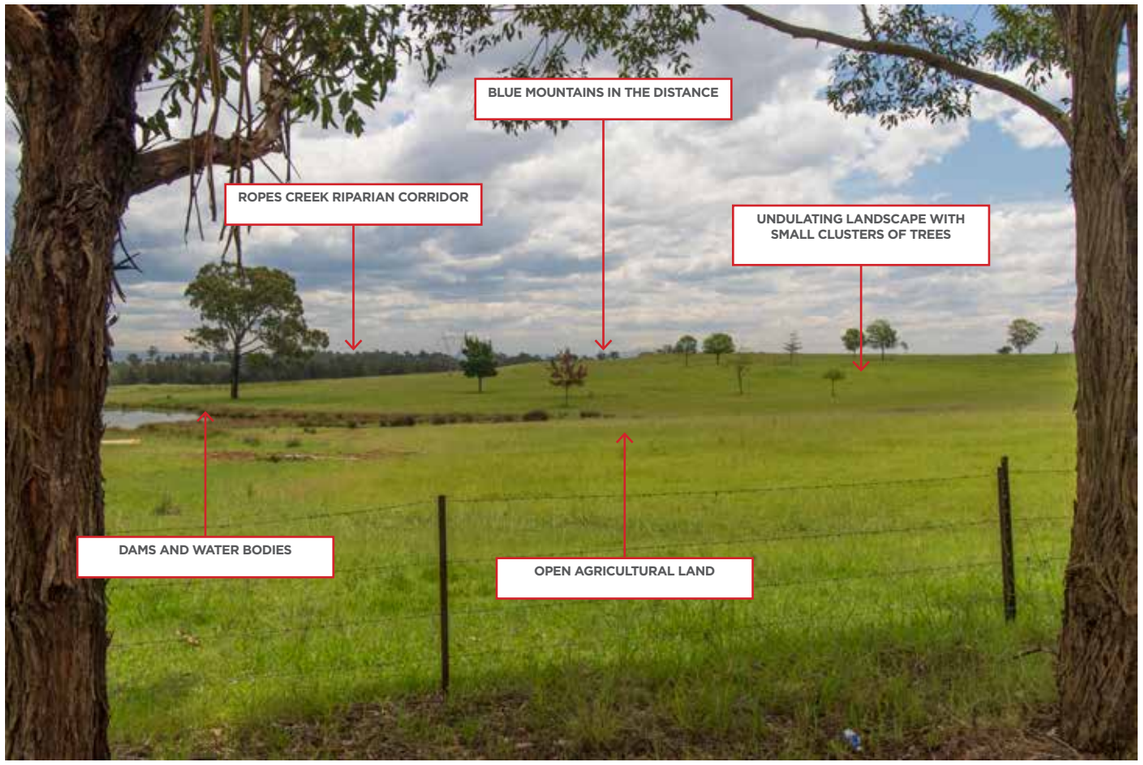


Figure 16: Key features of View 02 - Capitol Hill Drive

Potential Visibility of the Proposed Modifications from View 02

Figure 17 provides a diagrammatic representation of the location of View 02 in relation to the OWE.

Impacts of the Proposed Modification on View 02

Figures 18 - 21 on the following page provide a sequential illustration of the spatial implication of the proposed Modifications.

The analysis shows that, due to the location and form of the landscape between this receiver and the OWE that:

1. The proposed changes on pad level are not discernible from View 02;, and
2. The proposed High Bay building would not be visible from View 02, due to the existing hillock in the middle distance.

Accordingly, the extent of change between the 2019 approved development and the 2019 proposed modifications is negligible.

View 02 Orientation

Legend

- The OWE
- 2019 Approved Development
- 2019 Proposed Modification Visible in View
- 2019 Buildings with Modified Pad Levels Visible in View
- 2019 High Bay Building Visible in View
- Field of View

Scale: NTS



Figure 17: View 02 orientation

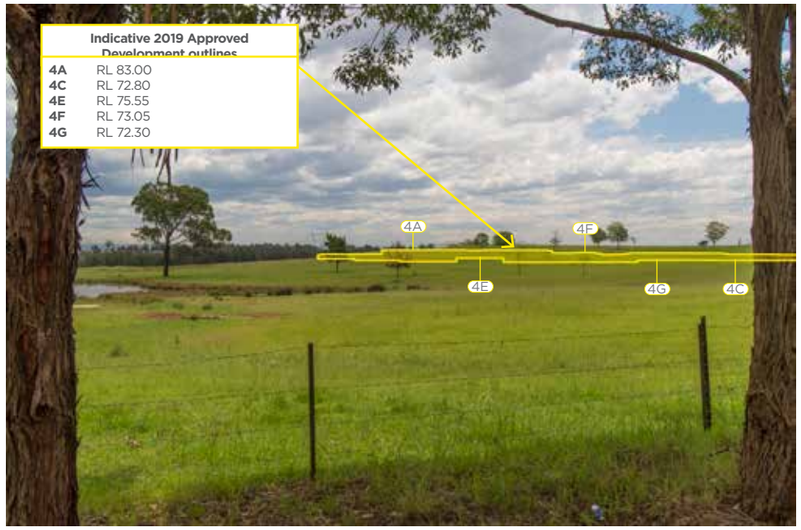


Figure 18: 2019 Approved Development outlines



Figure 19: Indicative 2019 Approved Development outlines and 2019 Proposed Modification pad levels



Figure 20: Indicative 2019 Approved Development outlines and 2019 Proposed Modification pad levels and proposed High Bay building



Figure 21: Composite

2017 Landscape Character and Visual Impact Grading Matrix

Sensitivity \ Magnitude	High	Moderate	Low	Negligible
High	High-Impact	High-Moderate	Moderate	Negligible
Moderate	High-Moderate	Moderate	Moderate-Low	Negligible
Low	Moderate	Moderate-Low	Low	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Sensitivity of the View: Moderate

Magnitude of the Impact: Negligible

Assessed Visual Impact: Negligible

Summary of Assessment Considerations

The Surveyed View analysis shows that the visibility of the proposed development is minimal for much of the land between Capitol Hill Drive and the Oakdale West site.

Therefore there is no visual impact on the view from this location and the majority vantage points along Capitol Hill Drive.

Updated 2019 Landscape Character and Visual Impact Grading Matrix

Sensitivity \ Magnitude	High	Moderate	Low	Negligible
High	High-Impact	High-Moderate	Moderate	Negligible
Moderate	High-Moderate	Moderate	Moderate-Low	Negligible
Low	Moderate	Moderate-Low	Low	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Sensitivity of the View: Moderate

Magnitude of the Impact: Negligible

Assessed Visual Impact: Negligible

Updated Summary of Assessment Considerations

The analysis provided in Figures 18- 21 show that there will be no discernible change to View 02.

The assessed Visual Impact would not change.

1.1 View 03 - Adlington Road

Description

Aldington Road and Bakers Lane form a loop road located off Mamre Road, together they services a number of large lot rural residential dwellings.

Residential properties are located either side of Aldington Road, with some of those to the west of the carriageway elevated above the road, and those to the south sited well below the road.

The properties along Aldington Road consist of a mix residential homes and small scale agricultural developments.

The adjacent photographs (Figures 22 and 23) identify the key features of view 03 as both a composite panorama and single image.

Local Character

Aldington Road has a rural character, the road crosses the varied local landscape and it both open and enclosed at different points due to its relationship to a north south running ridge line.

The residential properties along Aldington Road are generally large single and two storey properties set on large lots. There are pockets of mature landscape within private lots, and areas of crop planting.

View 03 selection

The residential properties along Aldington Road generally have an outlook to the east and north east.

The view location was selected as it is at the point along Aldington Road where the OWE would be most prominent.

The camera lens for the view was located at RL 81.1 with the camera oriented towards the north

Key Features of View 03

Because of the orientation of Aldington Road the properties do not have the same potential outlook to the Blue Mountains as View 01 or View 02.

Without this dominant feature framing the far distance, the middle ground of the view becomes the main visual feature.

Key elements of the view include:

- Horizontal landscape elements to the east consisting of the Ropes Creek Riparian Corridor framing the eastern portion of the view;
- Open farm land with small dams and clusters of trees, and;
- The electricity pylons and associated transmission lines that follow the Rope Creek Riparian Corridor.



Figure 22: Composite panorama of View 04 - Aldington Road



Figure 23: Key features of View 03 - Aldington Road

Potential Visibility of the Proposed Modifications from View 03

Figure 25 provides a diagrammatic representation of the location of View 03 in relation to the OWE.

Impacts of the Proposed Modification on View 03

Figures 26 - 29 on the following page provide a sequential illustration of the spatial implication of the proposed Modifications.

The analysis shows that, due to the location and form of the landscape between this receiver and the OWE that:

1. The proposed changes on pad level are not visible from View 03 due to the orientation of the view relative to OWE.
2. The proposed High Bay building would not be visible from View 03, due to the existing vegetation in the foreground of the view.

Therefore, the extent of change between the 2019 approved development and the 2019 proposed modifications is assessed to be negligible.

View 03 Orientation

Legend

- The OWE
- 2019 Approved Development
- 2019 Proposed Modification Visible in View
- 2019 Buildings with Modified Pad Levels Visible in View
- 2019 High Bay Building Visible in View
- Field of View

Scale: NTS



Figure 24: View 03 orientation



Figure 25: 2019 Approved Development outlines



Figure 26: Indicative 2019 Approved Development outlines and 2019 Proposed Modification pad levels



Figure 27: Indicative 2019 Approved Development outlines and 2019 Proposed Modification pad levels and proposed High Bay building

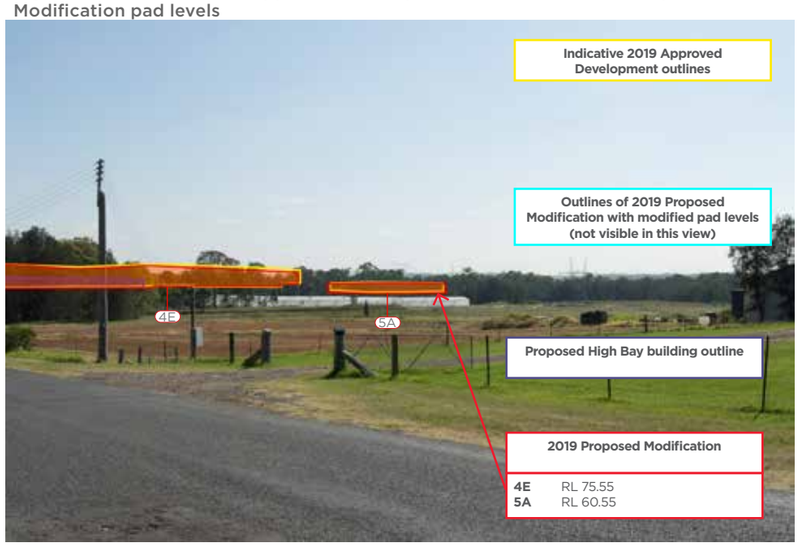


Figure 28: Composite

2017 Landscape Character and Visual Impact Grading Matrix

Sensitivity	Magnitude: High	Moderate	Low	Negligible
High	High-Impact	High-Moderate	Moderate	Negligible
Moderate	High-Moderate	Moderate	Moderate-Low	Negligible
Low	Moderate	Moderate-Low	Low	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Sensitivity of the View: Low

Magnitude of the Impact: Negligible

Assessed Visual Impact: Negligible

Summary of Assessment Considerations

While the eaves and roof line of the proposed development is visible from this location, the layering of the middle distance landscape means that much of the development is screened behind trees and existing buildings.

Based on this analysis the visual impact from this location is minimal.

Updated 2019 Landscape Character and Visual Impact Grading Matrix

Sensitivity	Magnitude: High	Moderate	Low	Negligible
High	High-Impact	High-Moderate	Moderate	Negligible
Moderate	High-Moderate	Moderate	Moderate-Low	Negligible
Low	Moderate	Moderate-Low	Low	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Sensitivity of the View: Low

Magnitude of the Impact: Negligible

Assessed Visual Impact: Negligible

Updated Summary of Assessment Considerations

The analysis provided in Figures 26- 29 show that there will be no discernible change to View 03.

The assessed Visual Impact would not change.

1.1 View 04 - Barkers Lane Private Residence

Description

Bakers Lane is a continuation of Mamre Road and services a series of residential and rural dwellings, an education establishment and residential aged care facility both on a shared campus adjoining the western boundary of OWE.

The residential property from where this view is located is sited at a local high point.

The property is located on a ridge-line and falls to the east. The majority of the property is heavily wooded with the exception of a clearing close to Bakers Lane where a dwelling house and associated granny-flat are located.

The property is accessed via a steep drive way and while it is enclosed on the west and east by mature vegetation its rear northern boundary overlooks the OWE.

The adjacent photographs(Figures 30 and 31) identify the key features of View 04 as both a composite panorama and single image.

Local character

Bakers Lane has a rural character.

The residential properties along Bakers Lane generally consist of large single and two storey properties set on large lots. There are pockets of mature landscape within private lots, and areas of crop planting.

View 04 Selection

The selected view is taken from the garden of a private property on Bakers Lane.

The garden and associated granny flat/secondary dwelling has the potential for a direct view to the north across the OWE.

The camera lens for the view was located at RL 89.5, generally 5m above the predominant eaves line on the proposed development.

The view is oriented towards the north west away from vegetation to the east that screens the outlook to the north and east.

This orientation was selected as it captures the Blue Mountains in the far distance which form a strong horizontal framing element, the Blue Mountains are not as prominent looking directly north.

The view point is approximately 16 metres from the shared property boundary, which is similar to the boundary setback to the granny flat on the property.

Key Features of View 04

The view from the garden and associated granny flat is open and expansive due to the elevated position of the property. The Blue Mountains form a consistent band along the horizon.

Key elements of the view include:

- The Blue Mountains on the horizon;
- An elevated outlook across open farm land with small dams and clusters of trees, and;
- Clusters of mature vegetation that form an enclosure on the western and western edges of the property.



Figure 29: Composite Panorama of View 04 - Barkers Lane Private Residence

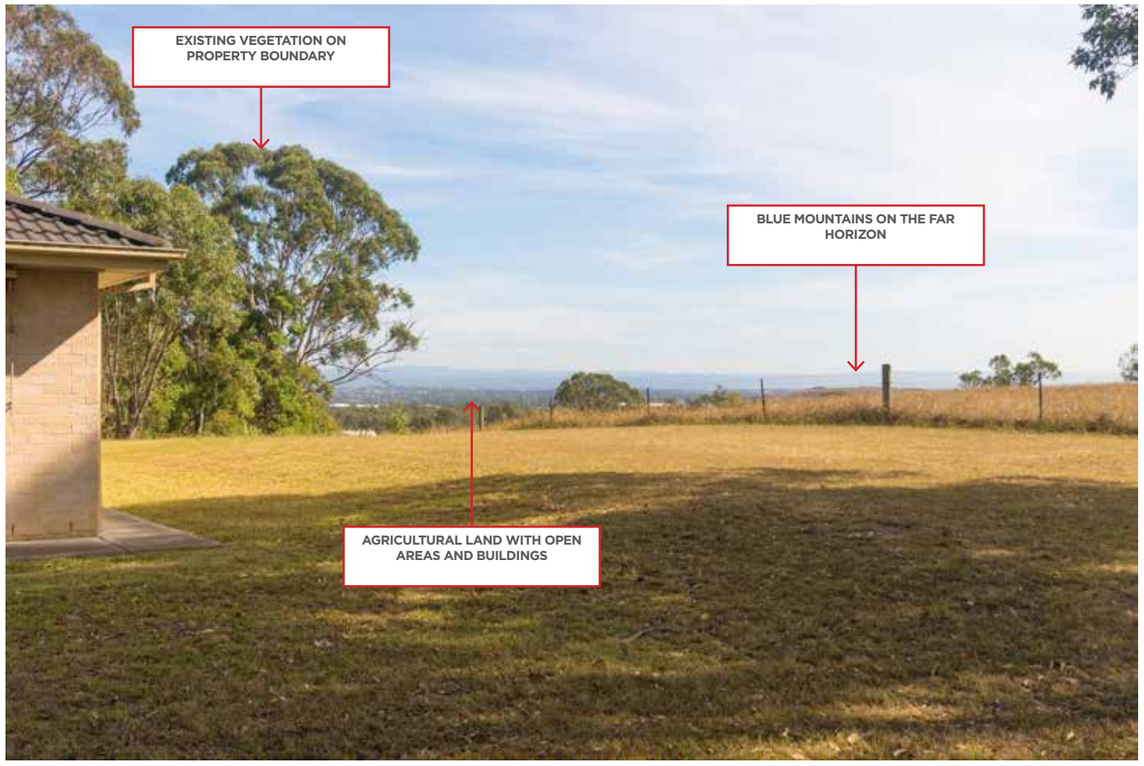


Figure 30: Key features of View 04 - Barkers Lane Private Residence

Potential Visibility of the Proposed Modifications from View 04

Figures 31 provides a diagrammatic representation of the location of View 04 in relation to the OWE.

Impacts of the Proposed Modification on View 04

Figures 32 to 35 on the following page provide a sequential illustration of the spatial implication of the proposed Modification

Figure 36 on page 28 shows the sectional relationship between the Proposed High Bay and the private residence on Barkers Lane. The section shows that the majority of the development on OWE would be below the private garden, but the Proposed High Bay would site above the horizon and be highly visible looking to the north.

Figures 37 and 38 provide a representation 3D view of the outlook towards the proposed High Bay building from the private open space on Bakers Lane. The 3D images indicate that while the High Bay would be visible from some parts of the private open space (those areas closest to the boundary with OWE) the changes to the profile of the roof scape are not significant and would be party obscured by the existing mature vegetation on the property and shared boundary.

The analysis shows that, due to the location of the receiver in relation to the OWE, and the existing mature vegetation that frames the northern outlook from the property that:

1. The proposed changes on pad level would not provide a significant difference to the visibility of the roof-forms of the proposed development on OWE, which are visible from the location of View 04.
2. The proposed High Bay building would be visible from the private garden of the residence on Bakers Lane at 20 Aldington Rd, but the distance between the receiver and the High Bay building attenuates any potential for significant visual impacts.

View 04 Orientation

Legend

- The OWE
- 2019 Approved Development
- 2019 Proposed Modification Visible in View
- 2019 Buildings with Modified Pad Levels Visible in View
- 2019 High Bay Building Visible in View
- Field of View

Scale: NTS



Figure 31: View 04 orientation



Figure 32: 2019 Approved Development outlines

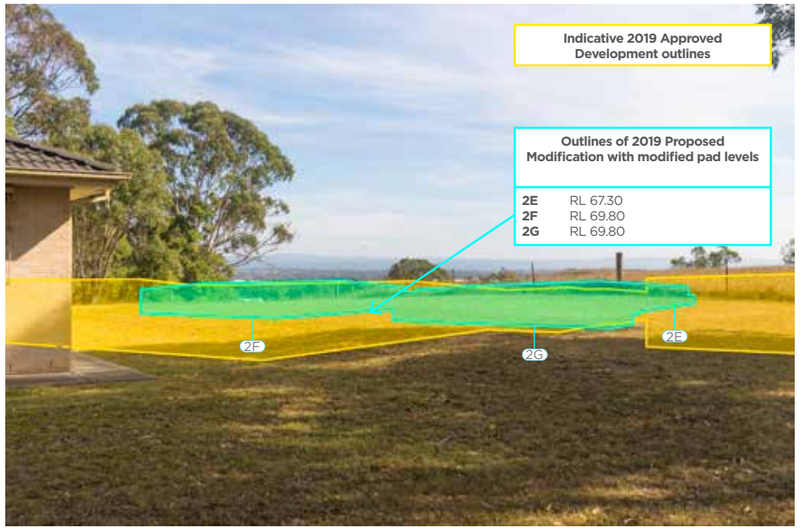


Figure 33: Indicative 2019 Approved Development outlines and 2019 Proposed Modification pad levels

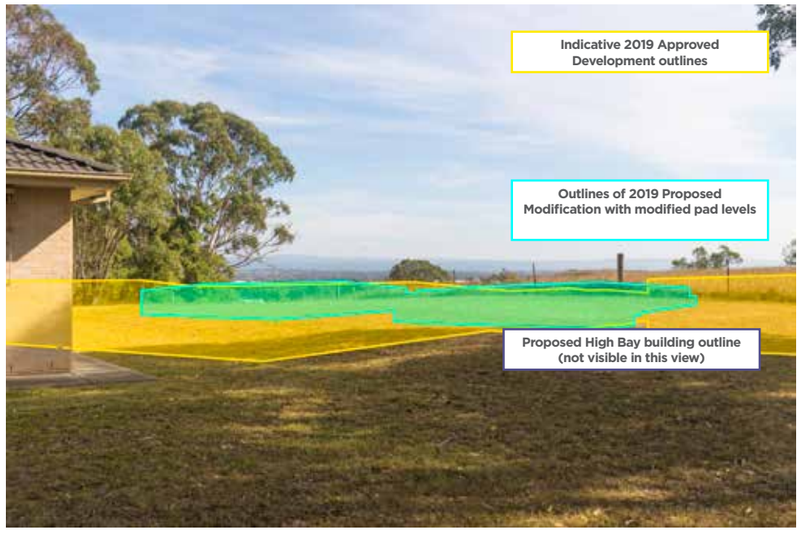


Figure 34: Indicative 2019 Approved Development outlines and 2019 Proposed Modification pad levels and proposed High Bay building

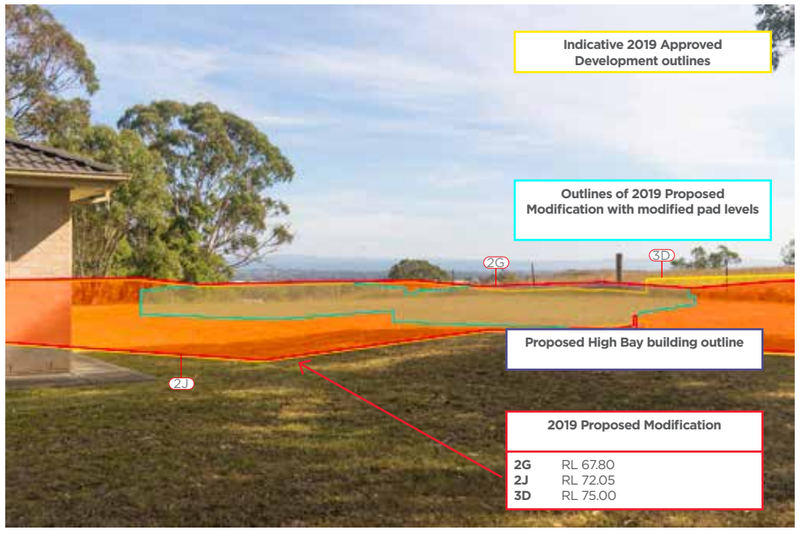


Figure 35: Composite

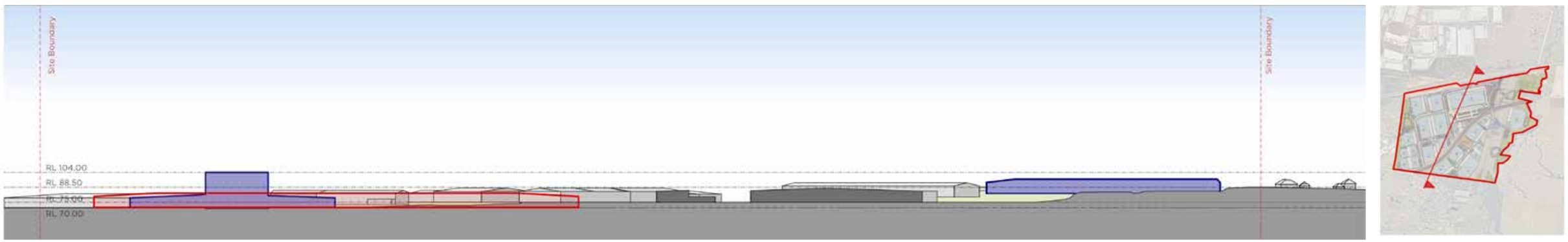


Figure 36: North south section to show the relationship between the high bay and the private residence on Barkers Lane



Figure 37: View towards Precinct 1 - 2019 Approved Development

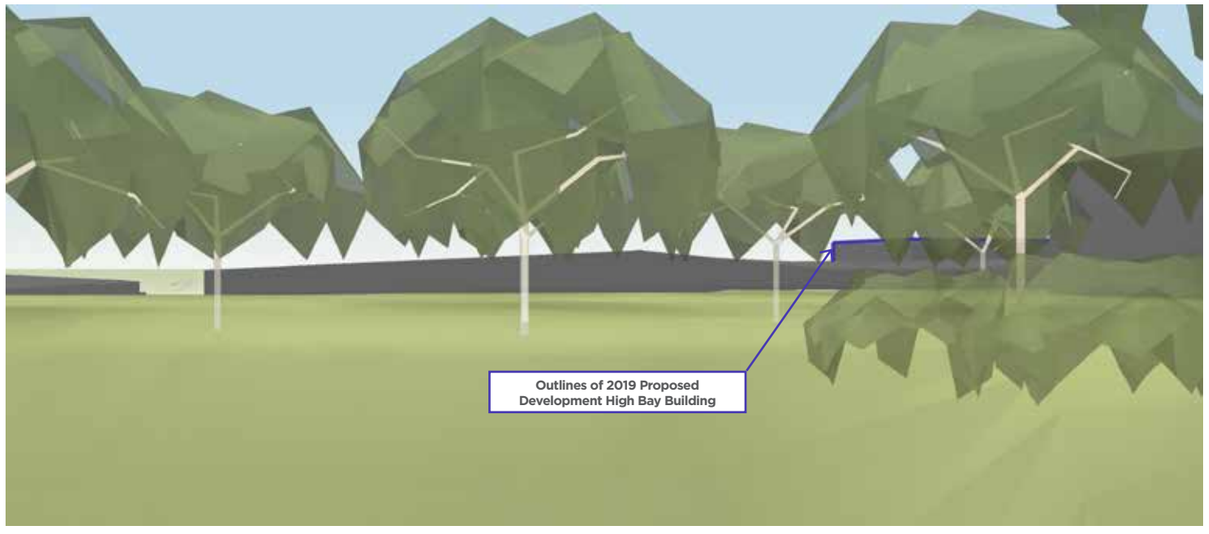


Figure 38: View towards Precinct 1 - 2019 Proposed Development with High Bay illustrated

2017 Landscape Character and Visual Impact Grading Matrix

Sensitivity \ Magnitude	High	Moderate	Low	Negligible
High	High-Impact	High-Moderate	Moderate	Negligible
Moderate	High-Moderate	Moderate	Moderate-Low	Negligible
Low	Moderate	Moderate-Low	Low	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Sensitivity of the View: High

Magnitude of the Impact: Moderate

Assessed Visual Impact: High-Moderate

Summary of Assessment Considerations

The analysis shows that due to the elevated position of the property, the outlook from the garden is above the roof-lines of the proposed Oakdale West development.

Generally the visibility of the proposed development will increase closer to the shared property boundary, however the proposed development will not impact the key features of the view - the expansive nature and Blue Mountains on the horizon.

On this basis the visual impacts can be considered acceptable given the proximity of the development to the shared boundary.

Updated 2019 Landscape Character and Visual Impact Grading Matrix

Sensitivity \ Magnitude	High	Moderate	Low	Negligible
High	High-Impact	High-Moderate	Moderate	Negligible
Moderate	High-Moderate	Moderate	Moderate-Low	Negligible
Low	Moderate	Moderate-Low	Low	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Sensitivity of the View: High

Magnitude of the Impact: Moderate

Assessed Visual Impact: High-Moderate

Updated Summary of Assessment Considerations

The analysis provided in Figures 32- 38 show that there will be no discernible change to View 04.

While there is potential for the proposed High Bay Building to be visible from the private open space within the residence on Bakers Lane the additional height would not change the character of the outlook which is a view across an industrial estate - consistent with the desired future character of WSEA.

1.1 View 05 - Emmaus Catholic College

Description

Emmaus Catholic College is located on the western boundary of the OWE.

The college consists of a number of one and two storey buildings set in landscaped grounds. The buildings are generally located in the center of the site with common open space areas and services zones located on the shared boundary with the OWE.

The natural topography of the site rises up to the shared boundary in the south, while in other areas it is flat with gentle undulations.

The adjacent photographs (Figures 39 and 40) identify the key features of View 05 as both a composite panorama and single image.

Local Character

Emmaus College is located off Bakers Lane which has a rural character generally consisting of large agricultural properties and homes on large lots.

View 05 Selection

View 05 is taken from the open space area associated with Emmaus Catholic College along the western (shared) boundary with the OWE.

The view is from the high point on the boundary. The open space from which it is taken is used for passive recreation by students of the college.

Alternate view points to the north from the areas closer to the shared boundary adjoining the existing college buildings were discounted as these areas are generally service zones, with the main usable open spaces being to the north of the college buildings.

The camera lens for the view was located at RL 76.9, which approximately 5 metres above the proposed pad levels for buildings within the OWE.

Key Features of View 05

The view from the open space area extends to the middle distance, with the natural topography, landscape features and existing buildings forming visual enclosures.

Key elements of the view include:

- A varied and rolling topography;
- Clusters of mature vegetation;
- Existing buildings and structures on the college campus, and;
- Industrial buildings and development on the near horizon framing the landscape portion of the view.



Figure 39: Composite Panorama of View 05 - Emmaus Catholic College



Figure 40: Key features of View 05 - Emmaus Catholic College

Potential Visibility of the Proposed Modifications from View 05

Figure 41 provides a diagrammatic representation of the location of View 05 in relation to the OWE.

Impacts of the Proposed Modification on View 05

Figures 42 - 47 on the following page provide a sequential illustration of the spatial implication of the proposed Modifications. Along with the outline representations presented for View 01 through View 04, we have included an additional photo montage that highlights how the proposed landscape treatment on the eastern edge of the OWE site would present 15 years after the works have been undertaken.

The analysis shows that, due to the relative location of the receiver in relation to the OWE, and the existing mature vegetation that frames the northern outlook from the property that:

1. The proposed changes on pad level would not provide a significant difference to the visibility of the proposed development on OWE.
2. The proposed High Bay building has the potential to be visible from the selected view point, but the development in the foreground on the OWE would obscure the taller elements of the development.
3. The proposed landscaping on the eastern boundary of the OWE, consisting of landscape bunds, shrubs, ground cover and mature trees would form a dense edge that screens large portions of the proposed built form on the OWE. Shown at 5 years and 15 years of expected growth.

Additionally, the visual impact of the intervening period prior to landscaping becoming fully mature at 15 years is covered in the DPIE assessment, which concludes:

The proposed landscaping works in Stage 1 will have time to establish before building works commence along the western boundary, providing some visual screening of construction impacts and ultimately of the buildings.

(Page 39 Oakdale West Estate (SSD 7348) Assessment Report)

View 05 Orientation

Legend

- The OWE
- 2019 Approved Development
- 2019 Proposed Modification Visible in View
- 2019 Buildings with Modified Pad Levels Visible in View
- 2019 High Bay Building Visible in View
- Field of View

Scale: NTS



Figure 41: View 05 orientation



Figure 42: 2019 Approved Development outlines



Figure 43: Indicative 2019 Approved Development outlines and 2019 Proposed Modification pad levels



Figure 44: Indicative 2019 Approved Development outlines and 2019 Proposed Modification pad levels and proposed High Bay building



Figure 45: Composite



Figure 46: Indicative 2019 Approved Development outlines and proposed boundary treatment with 5 years of plant and tree growth



Figure 47: Indicative 2019 Approved Development outlines and proposed boundary treatment with 15 years of plant and tree growth



Figure 48: Indicative 2019 Proposed Modification outlines in landscape

2017 Landscape Character and Visual Impact Grading Matrix

Sensitivity \ Magnitude	High	Moderate	Low	Negligible
High	High-Impact	High-Moderate	Moderate	Negligible
Moderate	High-Moderate	Moderate	Moderate-Low	Negligible
Low	Moderate	Moderate-Low	Low	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Sensitivity of the View: Moderate

Magnitude of the Impact: Moderate

Assessed Visual Impact: Moderate

Summary of Assessment Considerations

Proposed buildings 2E, 2F and 2G will be visible form the open space areas in the western grounds. These building are set back 40 metres from the shared boundary and within a proposed landscape buffer and bund.

Planting will provide screening to the proposed development and mitigate visual impacts.

Based on this visual assessment and production of surveyed views, in this instance while the magnitude of the change to the view can be considered high, the mitigation will reduce the visual impacts to produce an outcome that is acceptable.

Updated 2019 Landscape Character and Visual Impact Grading Matrix

Sensitivity \ Magnitude	High	Moderate	Low	Negligible
High	High-Impact	High-Moderate	Moderate	Negligible
Moderate	High-Moderate	Moderate	Moderate-Low	Negligible
Low	Moderate	Moderate-Low	Low	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Sensitivity of the View: Moderate

Magnitude of the Impact: Moderate

Assessed Visual Impact: Moderate

Updated Summary of Assessment Considerations

The analysis provided in Figures 40- 44 show that there will be no discernible change to the previous assessment of View 05.

The assessed Visual Impact would not change.

1.1 View 06 - Emmaus Catholic College Classroom Block

View 06 Selection

The second view point within the Emmaus College site is from the class room block closest to the College's eastern boundary.

The view is from the access point to the classrooms on a route used daily by staff and students.

The camera lens for the view was located at RL 65.3, this is approximately 5 metres below the proposed pad levels on the OWE.

The adjacent photographs (Figure 48) identify the key features of View 06.

Key Features of View 06

View 06 is from the external access-ways to two classrooms on the College's western boundary. The view is framed by the existing classrooms.

The area in the foreground is effectively 'out of bounds' to students, being a service area for the College.

Key elements of the view include:

- A varied and rolling topography, and;
- Clusters of mature vegetation.



Figure 49: Key features of View 05 - Emmaus Catholic College

Potential Visibility of the Proposed Modifications from View 06

Figure 49 provides a diagrammatic representation of the location of View 06 in relation to the OWE.

Impacts of the Proposed Modification on View 06

Figures 50 - 55 on the following page provide a sequential illustration of the spatial implication of the proposed Modifications. Along with the outline representations presented for View 01 through View 04, we have included an additional photo montage that highlights how the proposed landscape treatment on the eastern edge of the OWE site would present 15 years after the works have been undertaken.

The analysis shows that, due to the relative location of the receiver in relation to the OWE, and the proposed landscape treatment on the shared boundary that:

1. The proposed changes on pad level would not provide a significant difference to the visibility of the proposed development on OWE.
2. The proposed High Bay building would not visible from the selected view point.
3. The proposed landscaping on the eastern boundary of the OWE, consisting of landscape bunds, shrubs, ground cover and mature trees would form a dense edge that screens large portions of the proposed built form on the OWE.

Additionally, the visual impact of the intervening period prior to landscaping becoming fully mature at 15 years is covered in the DPIE assessment, which concludes:

The proposed landscaping works in Stage 1 will have time to establish before building works commence along the western boundary, providing some visual screening of construction impacts and ultimately of the buildings.

(Page 39 Oakdale West Estate (SSD 7348) Assessment Report)

View 06 Orientation

Legend

- The OWE
- 2019 Approved Development
- 2019 Proposed Modification Visible in View
- 2019 Buildings with Modified Pad Levels Visible in View
- 2019 High Bay Building Visible in View
- Field of View

Scale: NTS



Figure 50: View 06 orientation



Figure 51: 2019 Approved Development outlines

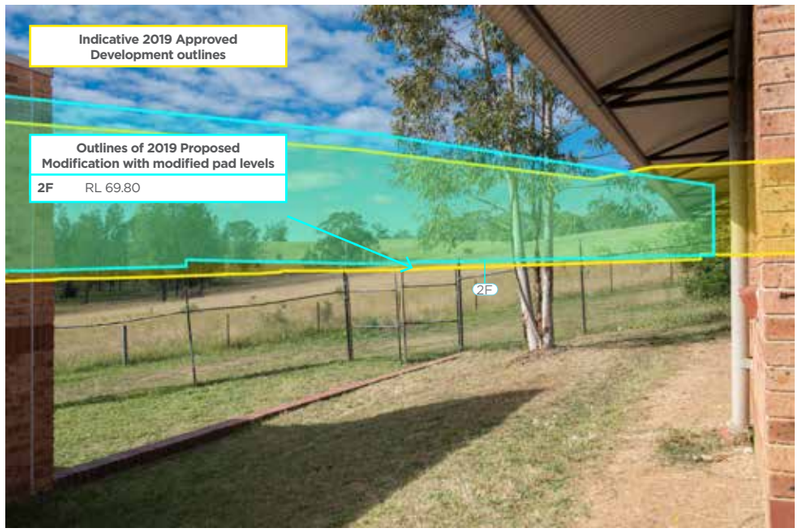


Figure 52: Indicative 2019 Approved Development outlines and 2019 Proposed Modification pad levels

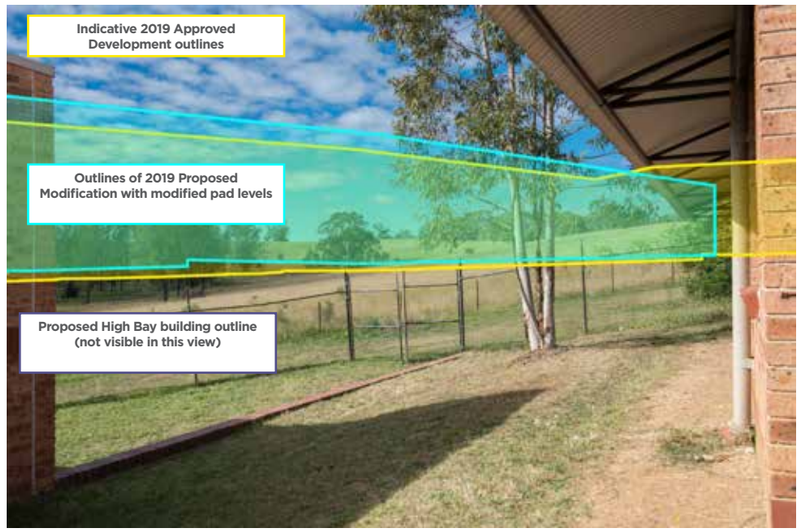


Figure 53: Indicative 2019 Approved Development outlines and 2019 Proposed Modification pad levels and proposed High Bay building

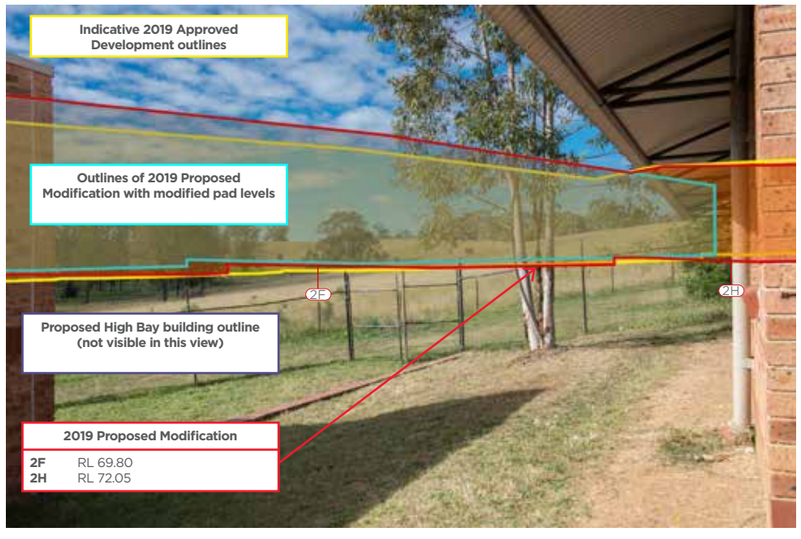


Figure 54: Composite



Figure 55: Indicative 2019 Approved Development outlines and proposed boundary treatment with 5 years of plant and tree growth

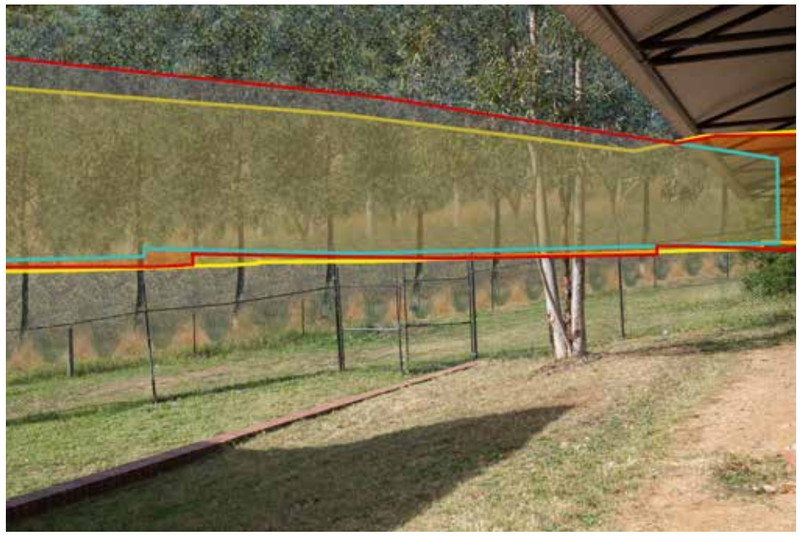


Figure 56: Indicative 2019 Approved Development outlines and proposed boundary treatment with 15 years of plant and tree growth



Figure 57: Indicative 2019 Proposed Modification outlines in landscape

2017 Landscape Character and Visual Impact Grading Matrix

Sensitivity \ Magnitude	High	Moderate	Low	Negligible
High	High-Impact	High-Moderate	Moderate	Negligible
Moderate	High-Moderate	Moderate	Moderate-Low	Negligible
Low	Moderate	Moderate-Low	Low	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Sensitivity of the View: Moderate

Magnitude of the Impact: High

Assessed Visual Impact: High-Moderate

Summary of Assessment Considerations

The view point is close to the shared boundary and the framing of the view from existing buildings provides a degree of visual enclosure.

The photo-montages show that unless mitigated, due to the framed nature of the view the new development would be highly visible and be a dominant visual feature. Therefore key to mitigating this visual impact is the formation of the bunding which runs parallel to the shared boundary and almost completely obscures the new development through a mixture of planting and landforms.

While the magnitude of the visual impacts can be considered to be high, the screening will mitigate a significant change in character provided that the planting and landforms achieves a naturalistic outcome.

Updated 2019 Landscape Character and Visual Impact Grading Matrix

Sensitivity \ Magnitude	High	Moderate	Low	Negligible
High	High-Impact	High-Moderate	Moderate	Negligible
Moderate	High-Moderate	Moderate	Moderate-Low	Negligible
Low	Moderate	Moderate-Low	Low	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Sensitivity of the View: Moderate

Magnitude of the Impact: High

Assessed Visual Impact: High-Moderate

Updated Summary of Assessment Considerations

The analysis provided in Figures 50- 55 show that there will be no discernible change to the previous assessment of View 06.

The assessed Visual Impact would not change.

1.1 View 07 - Emmaus Residential Aged Care

Description

The Emmaus Residential Aged Care facility is located to the north of Emmaus College and shares an access road.

Consisting of 64 beds the facility was built in 1993 and is organised as clustered single storey development in a landscape setting.

The facility shares a western boundary with the OWE.

The adjacent photographs (Figures 56 and 57) identify the key features of View 07 as both a composite panorama and single image.

Local character

Similarly to Emmaus Catholic College the local character is rural with the land around the facility a mixture of cleared and wooded areas with a varied and undulating topography.

View 07 selection

The assessed view point is located close to the main reception of the facility looking west towards the shared boundary with the Oakdale West site.

This is also the location for a small communal garden used by the residents of the facility, and a number of the small independent living units also look out towards the west.

Key Features of the view

The view from the open space area around the reception extends to the middle distance, with the existing mature vegetation creating a visual enclosure. The landscape is generally flat in this location.

Key elements of the view include:

- Clusters of mature vegetation;
- Parking areas in the foreground, and;
- Small single storey service buildings.



Figure 58: Composite Panorama of View 07 -Emmaus Residential Aged Care



Figure 59: Key features of View 07 -Emmaus Residential Aged Care

Potential Visibility of the Proposed Modifications from View 07

Figure 58 provides a diagrammatic representation of the location of View 07 in relation to the OWE.

Impacts of the Proposed Modification on View 07

Figures 59 - 64 on the following page provide a sequential illustration of the spatial implication of the proposed Modifications. Along with the outline representations presented for View 01 through View 04, we have included an additional photo montage that highlights how the proposed landscape treatment on the eastern edge of the OWE site would present 15 years after the works have been undertaken.

The analysis shows that while to the relative location of the receiver in relation to the OWE places the proposed High Bay in direct line of sight from the view position it would not be visible due to proposed landscape treatment on the shared boundary, therefore:

1. The proposed changes on pad level would not provide a significant difference to the visibility of the proposed development on OWE.
2. The proposed High Bay building, while in direct line of sight, would be screened by the proposed development on the OWE in the foreground.
3. The proposed landscaping on the eastern boundary of the OWE, consisting of landscape bunds, shrubs, ground cover and mature trees would form a dense edge that screens large portions of the proposed built form on the OWE.

View 07 Orientation

Legend

- The OWE
- 2019 Approved Development
- 2019 Proposed Modification Visible in View
- 2019 Buildings with Modified Pad Levels Visible in View
- 2019 High Bay Building Visible in View
- Field of View

Scale: NTS



Figure 60: View 07 orientation



Figure 61: 2019 Approved Development outlines



Figure 62: Indicative 2019 Approved Development outlines and 2019 Proposed Modification pad levels

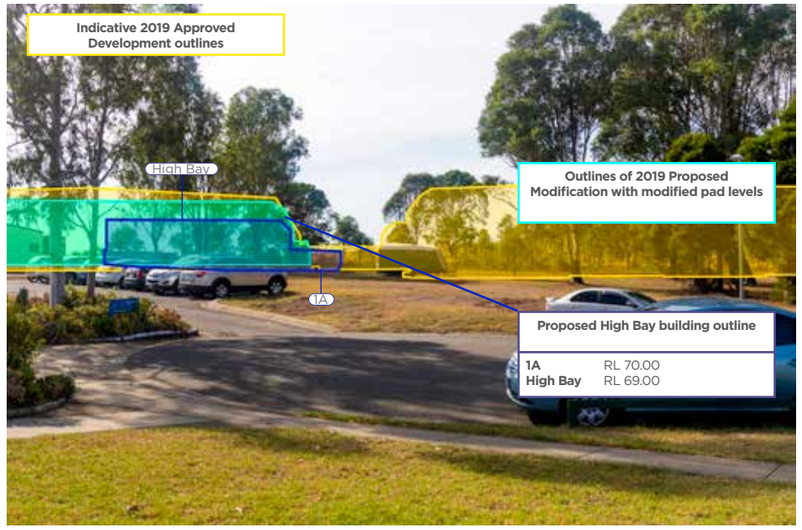


Figure 63: Indicative 2019 Approved Development outlines and 2019 Proposed Modification pad levels and proposed High Bay building

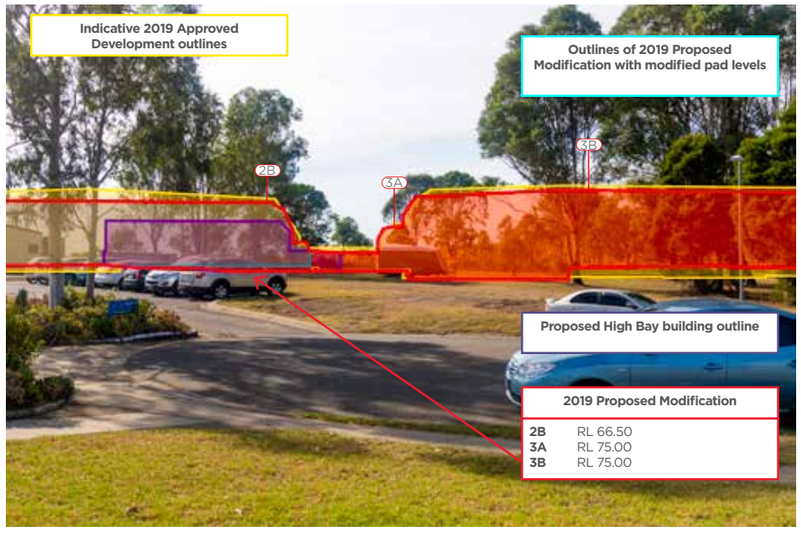


Figure 64: Composite



Figure 65: Indicative 2019 Approved Development outlines and proposed boundary treatment with 5 years of plant and tree growth



Figure 66: Indicative 2019 Approved Development outlines and proposed boundary treatment with 15 years of plant and tree growth



Figure 67: Indicative 2019 Approved Development outlines and 2019 Proposed Modification pad levels and proposed High Bay building



Figure 68: Indicative 2019 Approved Development outlines and proposed boundary treatment with 15 years of plant and tree growth

2017 Landscape Character and Visual Impact Grading Matrix

Sensitivity \ Magnitude	High	Moderate	Low	Negligible
High	High-Impact	High-Moderate	Moderate	Negligible
Moderate	High-Moderate	Moderate	Moderate-Low	Negligible
Low	Moderate	Moderate-Low	Low	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Sensitivity of the View: Low

Magnitude of the Impact: Moderate

Assessed Visual Impact: Moderate-Low

Summary of Assessment Considerations

Buildings 2C and 2D within the proposed Oakdale West development would be visible from the view location point, with the building set back a minimum of 60 metres from the shared boundary.

Analysis of the photo-montages shows that the existing vegetation on the sites boundary will provide significant screening to the proposed Oakdale West development, and the proposed landscape treatment will assist in the screening of the new development.

From this view point the outcome is acceptable because it does not overly impact the character of the existing situation.

Updated 2019 Landscape Character and Visual Impact Grading Matrix

Sensitivity \ Magnitude	High	Moderate	Low	Negligible
High	High-Impact	High-Moderate	Moderate	Negligible
Moderate	High-Moderate	Moderate	Moderate-Low	Negligible
Low	Moderate	Moderate-Low	Low	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Sensitivity of the View: Low

Magnitude of the Impact: Moderate

Assessed Visual Impact: Moderate-Low

Updated Summary of Assessment Considerations

The analysis provided in Figures 59- 64 show that there will be no discernible change to the previous assessment of View 06.

The assessed Visual Impact would not change.

1.1 Summary of Findings

The table below provides a summary of the updated Visual Impact Assessment for the proposed modifications to the OWE.

View No	Location	2017 VIA Assessment	Updated 2019 VIA Assessment	Comments
1	Greenway Place	Moderate-Low	Moderate-Low	The distance between the receiver and the OWE make any visual impact negligible.
2	Capitol Hill Drive	Negligible	Negligible	The distance between the receiver and the OWE make any visual impact negligible.
3	Adlington Road	Negligible	Negligible	The distance between the receiver and the OWE make any visual impact negligible.
4	Private Residence Bakers Lane	High-Moderate	High-Moderate	The orientation of the garden within the private residence faces due north and the proposed High Bay building would be visible but not alter the character of the 2019 Approved Development, and would not impact the view as previously assessed..
5	Emmaus Catholic College	Moderate	Moderate	The extent of the changes to the built form are minor in relation to the approved 2019 Approved Development. Furthermore the proposed landscape buffer would provide an effective screen mitigating the visual impacts.
6	Emmaus Catholic College	High-Moderate	High-Moderate	The extent of the changes to the built form are minor in relation to the approved 2019 Approved Development. Furthermore the proposed landscape buffer would provide an effective screen mitigating the visual impacts.
7	Emmaus Residential Aged Care	Moderate-Low	Moderate-Low	The extent of the changes to the built form are minor in relation to the approved 2019 Approved Development. Furthermore the proposed landscape buffer would provide an effective screen mitigating the visual impacts.

4.0 Updated Master Plan Review

The 2019 Approved Development Principles

A number of key Master Plan Principles were developed as part of the broader urban design strategy for OWE. The Principles were organised according to four themes:

- Land Use Integration;
- Landscape And Public Domain;
- Built From; and
- Place Making And Working Environment.

The Principles informed spatial planning for the OWE and were intended to contribute toward the detailed design in later stages.

Assessing the Proposed Modifications against the 2017 Principles

The table below provides an assessment of the proposed Modifications against the 2019 Approved Development Principles.

The assessment shows that the proposed Modifications would not impact the overarching urban design Principles as set out in the 2017 Urban Design Report for the OWE.

Principle	Conformance
Land Use Integration	
To foster a cohesive estate identity as a place of recognised class leading design in industrial/ distribution facilities.	N/A - Detailed Design
To promote the integration of the built form/ urban framework with a layered and detailed landscape master plan to encourage integration with the existing natural site features, reinforce the estate identity and provide a healthy, pleasant environment for the working population on the site.	Yes
To allow for careful scaling and subtle variety in the design of buildings to reflect a natural pattern of urban development and flexibility across the estate as it is occupied, within a controlled and coherent overall design language.	Yes
Create a strong master plan using key entries, intersections (nodes) and axes as organisation and place-making devices.	Yes
Landscape And Public Domain	
Create a pleasant working environment.	Yes
Cluster building address points to promote social interactions.	Yes
Promote legibility through well designed signage and way-finding.	N/A - Detailed Design
Ensure good identification of office building entries from streets	N/A - Detailed Design
Termination of views and vistas with active office frontages.	N/A - Detailed Design
Creation of active urban axes to form a ‘campus’ of office activity to each precinct which creates a commercial centre or ‘hub’ for each precinct.	N/A - Detailed Design
Promotion of a range of distinct characters or identities through the use of different materials and colours in each precinct.	N/A - Detailed Design
Built Form	

Principle	Conformance
Provide flexible large scale development lots to suit a range of uses.	Yes
Provide a rational, efficient road access system which is integrated with the future regional road network.	Yes
Maximise functional use of the land for employment generation development.	Yes
Provide land for a future zone substation in the location required by Endeavour Energy based on demand modelling.	N/A - Detailed Design
Estate divided into distinct development ‘Precincts’ to allow for flexibility in the detailed design and staging of development to respond to market demand.	Yes
Provide landscape setbacks and buffers at interfaces with existing developments on the Site boundary.	Yes
Place Making and Working Environment	
Respect existing water ways and environmentally sensitive land.	N/A - Detailed Design
Provide a high quality built form integrated with the landscape design.	N/A - Detailed Design
Subdivision to respond to the needs and requirements of relevant roads and drainage authorities for future dedication and management.	N/A - Detailed Design
Stormwater management for the The Site designed in accordance with Penrith Council requirements and WSUD principles.	N/A - Detailed Design
Management of riparian lands on the site.	N/A - Detailed Design
Landscaped nodes along estate roads providing publicly accessible open space.	N/A - Detailed Design
Open space along riparian corridor and around detention basins not publicly accessible.	N/A - Detailed Design
Use landscape to mitigate potential visual impacts on neighbouring properties.	N/A - Detailed Design

5.0 North South Link Road Character Assessment

1.1 Precinct 1 North South Link Road Interface Assessment

The North South Link Road is a key lateral road connection through WSEA, dissecting the OWE. It will be a key public domain element.

The interfaces between the development lots and the public road is a key consideration in the presentation of the OWE and the pubic amenity.

Figure 59 and Figure 60 provide a comparison of the 2017 concept design for the public domain interfaces and the subsequent 2019 design development for Precinct 1.

The adjacent table, highlights the differences between the 2019 Approved Development and 2019 Master Plan for Precinct 1.

Proposal	Interface with the North South Link road	Car Parking and Services Areas	Built Form Edges
2019 Approved Development	Vegetated landscape setback with planting and trees	Located around the buildings with trees interspersed with parking bays within car parking spaces	Building edges that follows the perimeter road alignment with edges setback behind landscape zones or car parking
2019 Master Plan	Vegetated landscape setback with planting and trees and landscape entry features	Located around the buildings with trees interspersed with parking bays within car parking spaces	Buildings located in north and south of Precinct 1 with a parking and services zone separating them

Visual Character

Figures 61 through 64 on the following page provide a visual comparison of the character of the North South Link Road within Precinct 1 for both the 2017 and 2019 Master Plans.

What this modelling shows is that while the building foot prints and configuration of the parking and service zones with Precinct 1 have changed the general character remains consistent.

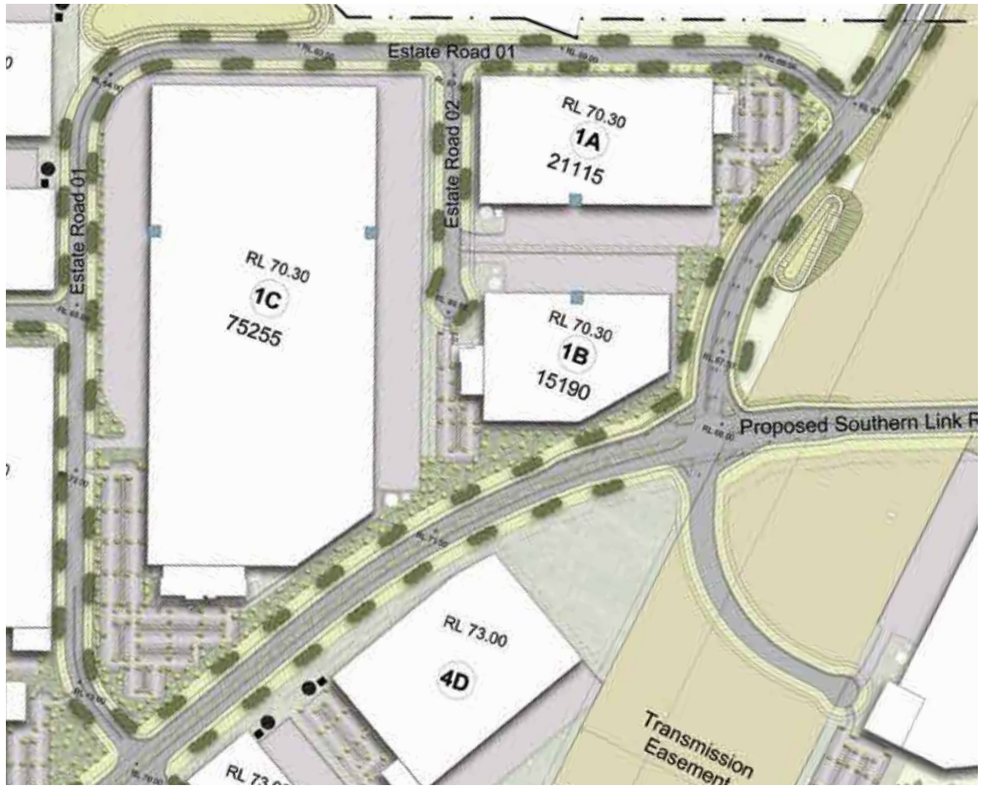


Figure 69: Indicative 2017 landscape and public domain concept design for the North South Link Road interface in Precinct 1 (source Site Image)



Figure 70: Indicative 2019 landscape and public domain design for the North South Link Road interface in Precinct 1 (source Scape Design)

Figure 71: Indicative view along the North South Link Road from the south - 2019 Approved Development concept design

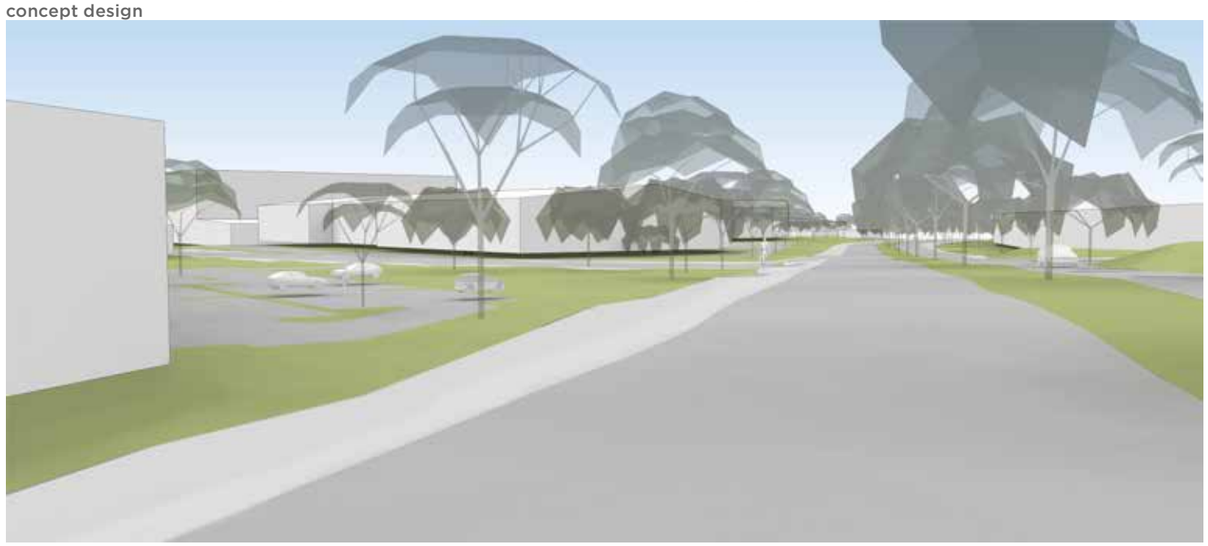


Figure 72: Indicative view along the North South Link Road from the south - 2019 master plan design development

Figure 73: Indicative view along the North South Link Road from the north - 2019 Approved Development concept design



Figure 74: Indicative view along the North South Link Road from the north - 2019 master plan design development

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Annexure E

12 December 2019

610.15617-L04-v2.2.doc

Goodman Property Services (Aust) Pty Ltd
Level 17
60 Castlereagh Street
Sydney NSW 2000

Attention: Stephanie Partridge

Dear Stephanie

Oakdale West Industrial Estate
SSD 7348 - MOD 2
Noise Impact Assessment

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Goodman Property Services (Aust) Pty Ltd (Goodman) to assess the potential noise impacts of the Oakdale West Industrial Estate (Oakdale West), located in Kemps Creek.

Goodman obtained Development Consent SSD 7348 from the Department of Planning, Industry and Environment (DPIE) for the Oakdale West 'Concept Proposal' and 'Stage 1 Development' on 13 September 2019. The Concept Proposal comprises a 'Master Plan' to guide the staged development of Oakdale West and core development controls that will form the basis for design and assessment of future development applications for the site. The Development Consent SSD 7348 was subsequently modified by submission of MOD 1 which is currently under assessment by DPIE.

The design of the development has been updated as part of a modification (MOD 2) to the Development Consent SSD 7348. Secretary's Environmental Assessment Requirements (SEARs) for MOD 2 were issued by DPIE on 15 November 2019.

This letter presents a review of the potential noise impacts for the MOD 2 design of the development and compares the predicted noise levels to the noise criteria for the site, as specified in the Development Consent SSD 7348.

Executive Summary

MOD 2 consists of changes to the layout of Precinct 1 to accommodate requirements of the future customer for Lot 1A. Noise impacts from Oakdale West have been modelled and assessed against the relevant criteria outlined in the Development Consent SSD 7348 and the relevant SEARs addressed.

Relevant guidelines and policies:

- *Industrial Noise Policy* (INP) (EPA, 2000) – the INP was used to determine the applicable noise criteria for the development during preparation of the SSDA noise impact assessment.

  The noise limits specified in the Development Consent SSD 7348 are based on the INP criteria.

  All operational noise impacts are assessed in this report against the Development Consent noise limits, and hence under the INP.

- *Noise Policy for Industry* (NPfI) (EPA, 2017) – the NPfI superseded the INP in 2017, after commencement of the SSDA noise impact assessment.

  The NPfI is used in this report to provide guidance on the potential for maximum noise levels to result in sleep disturbance as the NPfI has more recent studies in this area.

- *Road Noise Policy* (RNP) (EPA, 2011) – the RNP is used in this assessment to determine the potential for off-site operational road traffic noise impacts once vehicles move off the development estate and onto the public road network.

  The RNP is used in this report to provide guidance on the potential for maximum noise levels to result in sleep disturbance as the RNP has more recent studies in this area.

Operational Noise Mitigation Measures

The noise barriers in Precinct 2 in the western area of the development are proposed to be constructed prior to commencement of operations in Precinct 1. The increase in noise levels from Precinct 1 results in exceedances at receivers N1 to the west prior to the construction of the Warehouse 2B structure, which is located adjacent to the northern section of the barrier. A 60 m section at the northern end of the barrier is required to be increased to 5 m height from an approved height of 2 m, and extended for a further 30 m. All other sections of this barrier remain at an approved height of 5 m.

Acoustic screening is proposed to be installed around the rooftop plant in Lot 1A. The specifications and design for the acoustic screens, along with the proposed plant models and locations and any additional mitigation measures such as silencers, must be confirmed during the detailed design stage for Lot 1A.

The above mitigation measures have been applied in all predicted noise results.

Predicted Operational Noise Impacts – All Oakdale West Precincts Cumulative

Peak operational noise emissions from the development are predicted to comply with the relevant criteria at the surrounding sensitive receivers (noting that the criteria are not applicable at N3 in accordance with Condition C29 of the Development Consent).

Noise levels for the MOD 2 development are generally predicted to be higher than the approved development during the daytime and evening periods, and marginally higher during the night-time period under noise-enhancing weather conditions. The increase is limited by the separation distance between Precinct 1 and the receivers, along with the intervening shielding provided by structures and topography in the other lots.

Overall, the predicted operational noise impacts from the MOD 2 design are generally consistent with the approved design and comply with the relevant L_{Aeq} criteria at the surrounding receivers.

Predicted Operational Noise Impacts – Precinct 1 Only

The temporary scenario of Precinct 1 being operational while no structures have been built in other precincts of Oakdale West was modelled to assess potential noise impacts of this temporary scenario.

Peak operational noise emissions from Precinct 1 for the temporary scenario are predicted to comply with the relevant criteria at the surrounding sensitive receivers with the exception of N4/N5 during the night-time under noise-enhancing weather conditions (up to 2 dBA). No exceedance is predicted at these receivers during standard weather conditions or during other periods.

The EPA's *Noise Policy for Industry* (NPfI) notes that a residual impact of this magnitude is considered to be negligible. It is considered that this exceedance is minor and temporary in nature, and as such would be acceptable during construction of the estate.

Predicted Operational Maximum Noise Levels and Proposed Modification to Approved Noise Limits

The maximum noise levels are predicted to exceed the screening level at the most affected receivers in N1, N4 and N5 during the night-time period. It is noted that the SSDA Noise Impact Assessment for the approved development predicted exceedances of the sleep disturbance screening level at the Kemps Creek residences (N4/N5).

Guidance is provided in the EPA's *Road Noise Policy* (RNP) and *Noise Policy for Industry* (NPfI) on the potential for maximum noise events to result in sleep disturbance. The maximum noise level assessment concludes that the predicted noise levels are below the levels outlined in the RNP that would be considered to have potential to cause sleep disturbance, and would be similar in level to the existing ambient noise environment. As such, the predicted maximum noise levels would be unlikely to result in sleep disturbance.

As the $L_{A1(1minute)}$ noise limits specified in Development Consent SSD 7348 are lower than the sleep disturbance screening level specified in the NPfI, it is recommended that the $L_{A1(1minute)}$ noise limits be modified to be 52 dBA, as outlined below, consistent with the NPfI sleep disturbance screening level.

Location	Development Consent SSD 7348 Noise Limit – Night $L_{A1(1minute)}$ dBA	Proposed Noise Limit Night $L_{A1(1minute)}$ dBA
N1 Emmaus Village Residential	51	52
N3 Kemps Creek – nearest residential property	47	52
N4 & N5 Kemps Creek – other residences	47	52

Note: No change is proposed to the $L_{Aeq(15minute)}$ noise limits specified in the Development Consent SSD 7348.

Off-Site Operational Road Traffic Noise Impacts

Once vehicles leave the Oakdale West site and move onto public roads they are assessed under the RNP. The RNP requires noise mitigation to be considered where new land use developments increase road traffic noise by more than 2 dB. An increase of greater than 2 dB requires an increase in traffic volumes of approximately 60% or higher.

The main access route to Oakdale West is via the approved Western North-South Link Road (WNSLR) and the existing arterial road of Lenore Drive.

The Traffic Impact Assessment for MOD 2 (prepared by ASON) details the total daily traffic volumes for Oakdale West. The daily traffic equates to an increase in traffic volumes on Lenore Drive of less than 50%. Therefore an increase of greater than 2 dB is not considered likely and consideration of mitigation is not required as a result, consistent with the approved development.

Construction Noise and Vibration Impacts

Construction noise and vibration impacts for the approved development were assessed at a precinct and estate level in the SSDA NIA. The MOD 2 changes to the layout of Precinct 1 do not affect the assessed general construction activities and locations. As such, the construction noise and vibration impacts are considered to be consistent with those detailed in the SSDA NIA.

Details of monitoring, mitigation and management of construction noise and vibration will be detailed in construction noise and vibration management plans prepared separately to this report.

1 Environmental Assessment Requirements

Secretary's Environmental Assessment Requirements (SEARs) for MOD 2 were issued by DPIE on 15 November 2019. The SEARs relevant to this report have been considered and are addressed as outlined in **Table 1**.

Table 1 Secretary's Environmental Assessment Requirements (SEARs) – Noise and Vibration

Relevant SEARs – Noise and Vibration	Where addressed
An updated description of all potential noise and vibration sources during the construction and operational phases of the development, including on and off-site traffic noise.	Operational noise sources including onsite traffic are discussed in **Section 3.2**. Operational off-site traffic is discussed in **Section 3.4**. Construction noise and vibration impacts are discussed in **Section 4**.
An updated cumulative noise impact assessment of all potential noise sources in accordance with relevant Environment Protection Authority guidelines.	Assessment of all cumulative noise sources is detailed in **Section 3.3**.
Demonstration that the modification will comply with the noise limits set out in the existing approval.	The applicable noise criteria outlined in the Development Consent is detailed in **Section 3.1**. Assessment of predicted noise impacts against the approved noise criteria is detailed in **Section 3.3**.
Justification for any proposed changes to the approved noise limits.	Justification for proposed changes to the approved noise limits (where applicable) is detailed in **Section 3.3.1.2** and **Section 5**.
Updated details of noise mitigation, management and monitoring measures.	Updated mitigation measures are detailed in **Section 3.2.3**. Monitoring requirements will be detailed in operational and construction noise and vibration management plans prepared separately to this report.

Relevant guidelines and policies:

- *Industrial Noise Policy* (INP) (EPA, 2000) – the INP was used to determine the applicable noise criteria for the development during preparation of the SSDA noise impact assessment.

  The noise limits specified in the Development Consent SSD 7348 are based on the INP criteria.

  All operational noise impacts are assessed in this report against the Development Consent noise limits, and hence under the INP.

- *Noise Policy for Industry* (NPfI) (EPA, 2017) – the NPfI superseded the INP in 2017, after commencement of the SSDA noise impact assessment.

  The NPfI is used in this report to provide guidance on the potential for maximum noise levels to result in sleep disturbance as the NPfI has more recent studies in this area.

- *Road Noise Policy* (RNP) (EPA, 2011) – the RNP is used in this assessment to determine the potential for off-site operational road traffic noise impacts once vehicles move off the development estate and onto the public road network.

  The RNP is used in this report to provide guidance on the potential for maximum noise levels to result in sleep disturbance as the RNP has more recent studies in this area.

2 MOD 2 Design Plans

The MOD 2 design includes the following modifications from the approved design:

- Layout changes to Precinct 1 to accommodate requirements of the future customer for Lot 1A
- Increase in warehouse heights within Lot 1A to accommodate high bay (around 36.0 m height) and low bay (around 27.0 m height) warehousing
- Pad height of Lot 1B/1C area raised by around 4.5 m to a height of 74.8 m
- Revision of proposed traffic volumes for Precinct 1 to account for layout changes and requirements of the future customer for Lot 1A
- Revision of mechanical plant for Lot 1A to account for requirements of the future customer including temperature control for the high bay and low bay warehousing.

No other areas of Oakdale West have been modified by the MOD 2 design. Proposed traffic volumes for the other precincts of Oakdale West are not affected by the MOD 2 design.

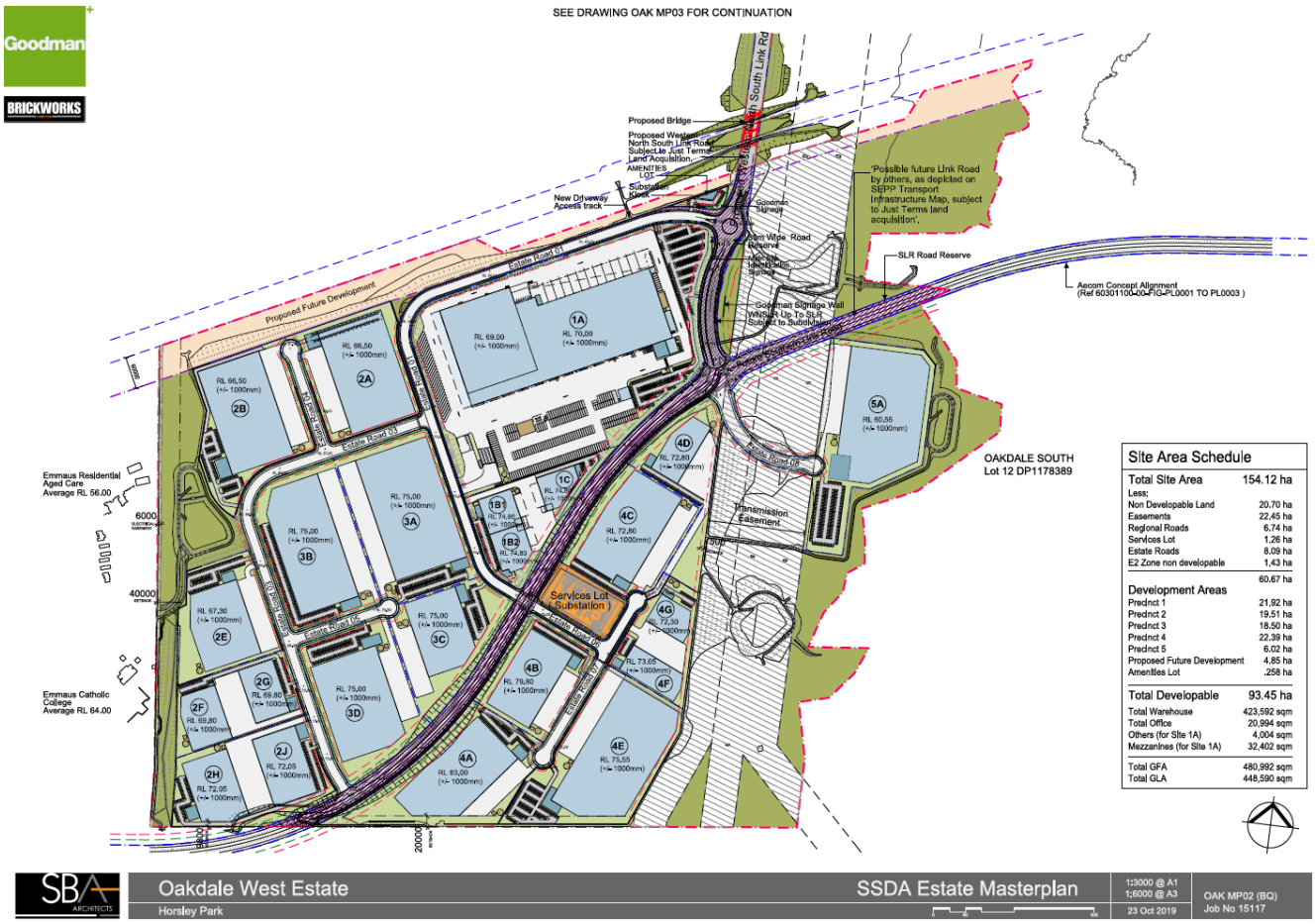
All assumptions in this assessment are consistent with the assumptions for the approved development noise impact assessment, unless stated otherwise.

The approved design is shown in **Figure 1**, and the MOD 2 design is shown in **Figure 2**.

Figure 1 Approved Design Plans



Figure 2 MOD 2 Design Plans



3 Operational Noise Impact Assessment

3.1 Operational Noise Criteria

The operational noise criteria applicable to Oakdale West are specified in Conditions B18 and B19 of the Development Consent SSD 7348. Conditions B18 and B19 are reproduced below:

B18 The Applicant shall ensure the Development does not exceed the noise limits in Table 3 at the receiver locations N1, N2, N3, N4 and N5 shown on the plan in Appendix 5.

Table 3: Noise Limits dB(A)

Location	***Day***	***Evening***	***Night***	
	LAeq(15 minute)	***LAeq(15 minute)***	***LAeq(15 minute)***	***LA1(1 minute)***
N1 Emmaus Village Residential	*44*	*43*	*41*	*51*
N3 Kemps Creek – nearest residential property	*39*	*39*	*37*	*47*
N4 & N5 Kemps Creek – other residences	*39*	*39*	*37*	*47*
N2 Emmaus Catholic College (school)	***When in use:*** *35 (internal)*			

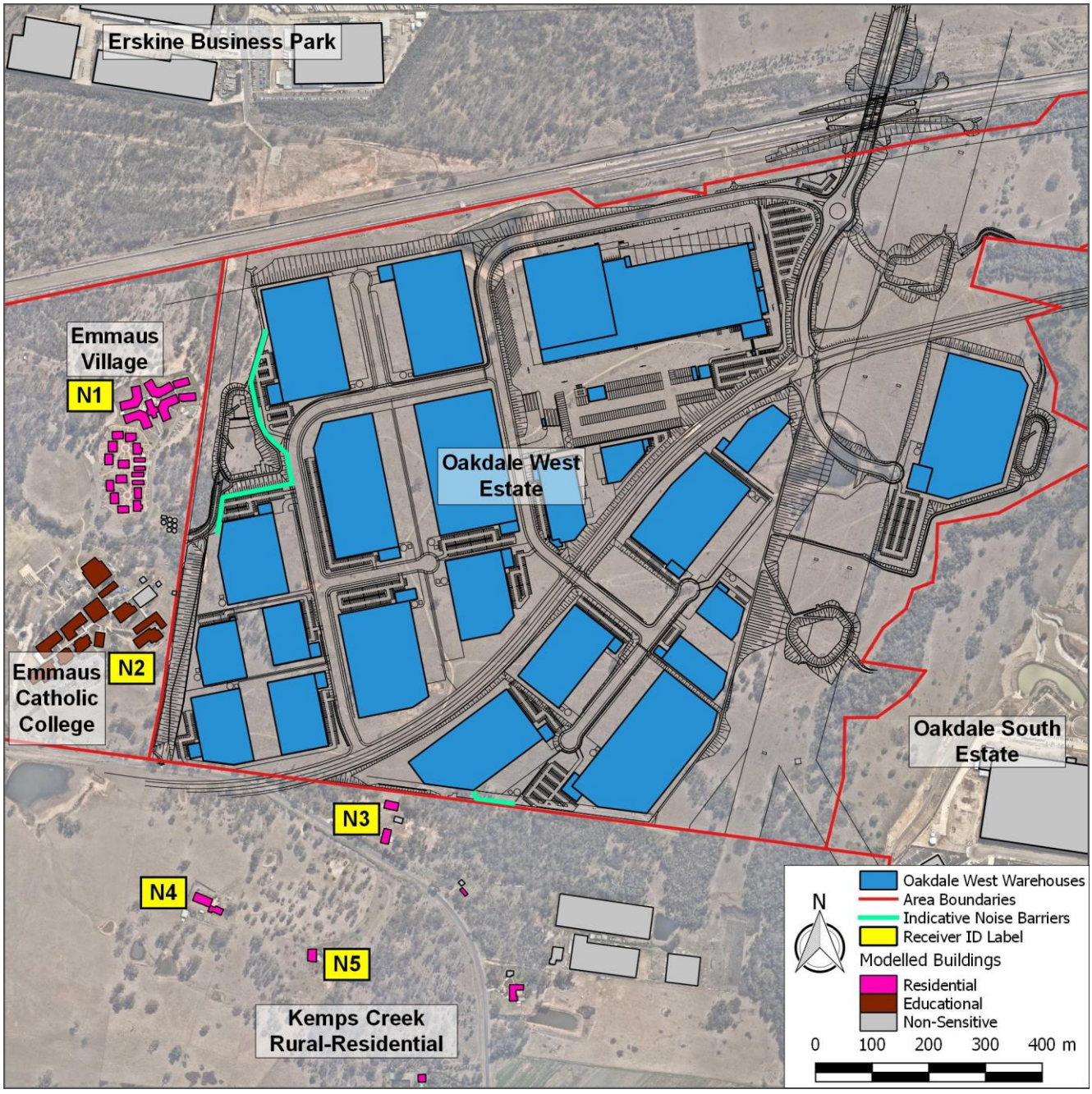
Note: Noise generated by the Development is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the Noise Policy for Industry (EPA 2017).

B19 The noise limits in Table 3 do not apply to receiver N3 if the Applicant has a Noise Agreement with the relevant landowner to exceed the noise limits, and the Applicant has provided written evidence to the Planning Secretary that an agreement is in place.

It is understood that a Noise Agreement with receiver N3 has been submitted to DPIE. As such, the criteria in Condition B18 of the Development Consent SSD 7348 are not applicable at receiver N3.

The locations of receivers N1, N2, N3, N4 and N5 are shown in Appendix 5 of the Development Consent SSD 7348. These locations are shown in **Figure 3**.

Figure 3 Receiver Locations



3.2 Noise Model Inputs and Assumptions

Operational noise from the development was modelled using the SoundPLAN noise model prepared for the approved development. This model was updated with the MOD 2 design changes as outlined in **Section 2**.

3.2.1 Vehicle Movements

Proposed light and heavy vehicle movements for Lot 1A were provided by Goodman and reflect the requirements of the future customer, including shift times for a standard day, and a peak day which would be expected to occur for around 6 weeks per year. Proposed vehicle movements for Lot 1A are summarised in **Table 2**.

Table 2 Proposed Vehicle Movements – Lot 1A

Period	Proposed Vehicle Movements		
	Light Vehicles	Heavy Vehicles	Total Movements
Standard Day			
24-hour	828	950	1,778
Day/Evening peak 1-hour	302	50	352
Night peak 1-hour	173	50	223
Peak Day (around 6 weeks per year)			
24-hour	1,034	1,188	2,222
Day/Evening peak 1-hour	377	54	431
Night peak 1-hour	216	54	270

Vehicle movements for other lots and precincts in Oakdale West were defined in the approved development noise impact assessment based on the following details:

- 24-hour – around 8,760 vehicles
- Day/evening peak 1-hour – around 750 vehicles
- Night peak 1-hour – around 225 vehicles (30% of day peak)
- Heavy vehicle percentage of around 25% of total movements.

These volumes were split across the lots based on the Gross Floor Area (GFA) of the lots, ie bigger lots have more vehicle movements assigned. Note that the above values included vehicle movements for Lot 1A. As such, the assigned Lot 1A vehicle movements were replaced with those provided by Goodman for a peak day (refer to **Table 2**) in accordance with the Traffic Impact Assessment for MOD 2 (prepared by ASON).

Based on the above assumptions, the peak 1-hour vehicle movements summarised in **Table 3** were modelled to determine noise emissions from the development. These volumes were further broken down into 15-minute volumes to assess against the applicable criteria.

Table 3 Peak 1-Hour Vehicle Volumes

Lot	Proposed Vehicle Volumes			
	Day/Evening Peak 1-Hour		Night Peak 1-Hour	
	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles
1A	377	54	216	54
1B/1C	28	10	8	2
2A	31	10	9	3
2B	34	11	10	3
2E	19	6	6	2
2F	9	3	3	1
2G	9	3	3	1
2H	14	5	4	1
2I	14	5	4	1
3A	41	14	12	4
3B	33	11	10	3
3C	18	6	5	2
3D	30	10	9	3
4A	28	9	8	3
4B	22	7	7	2
4C	27	9	8	3
4D	10	3	3	1
4E	32	11	10	3
4F	6	2	2	1
4G	6	2	2	1
5A	43	14	13	4

Sound power levels and speed assumptions for the modelled vehicle movements are shown in **Table 4**.

Table 4 Sound Power Levels for Onsite Vehicle Movements

Noise Source	Sound Power Level (SWL)	Average Speed
Heavy vehicles	103 dBA[1]	25 km/h
Light vehicles	96 dBA	40 km/h
Gas-powered forklifts[2]	93 dBA	n/a

Note 1: Based on SLR's noise measurement database, this sound power level is typical of trucks travelling at low speeds, such as within industrial estates.

Note 2: If electric forklifts are utilised instead of gas-powered forklifts, noise emissions from forklifts would be considerably lower.

External forklift movements have been modelled within the at-grade dock areas of the hardstands for each lot. It has been assumed that forklifts would operate continuously during the worst-case 15-minute period of all hardstand areas during the daytime and evening periods. No forklift movements within lots 2F, 2G, 2H, 2J, 3A, 3C, 4A, 4E and 5A have been modelled during the night time period. During later design stages when further information is known of the operations of these future lots, forklift movements would be further investigated should they be proposed during the night-time period on these lots.

In order to assess the possibility of sleep disturbance, in addition to the above noise sources, heavy vehicle brake releases and reverse alarms (non-tonal) have been modelled in the hardstand areas of the development with a sound power level (SWL) of 115 dBA.

3.2.2 Fixed Noise Sources

Proposed mechanical plant for Lot 1A has been provided by Goodman based on the future customers requirements including temperature control for the high bay and low bay warehouse areas. Major items of plant in terms of noise emissions are detailed in **Table 5** along with their manufacturer specified sound power levels. Note that at this stage of the development the proposed models and locations are indicative and must be confirmed during the detailed design of Lot 1A.

Table 5 Proposed Mechanical Plant – Lot 1A

Plant Ref	Plant Model	Location	Number of Units	SWL per Unit
BEF-MO	Fantech AP0806CA9/32Ex	Main office roof	1	83 dBA
GEF-DG	Fantech CHD564Ex	Dangerous goods roof	1	90 dBA
GEF-TR	Fantech HUD636	Trailer workshop roof	1	79 dBA
KEF-MO-R & KSF-MO-R	Fantech AP0714LA9/18	Main office roof	2	92 dBA
OAF-MO-G	Fantech PUE354ER	Main office ground	1	68 dBA
OAF-MO	Fantech PUE404ER	Main office roof	1	73 dBA
TEF-GH	Fantech RIL-1505W(Lo)	Gatehouse roof	1	60 dBA
TEF-MO-G	Fantech MME354/5	Main office ground	1	74 dBA
TEF-MO-R-1	Fantech GUE566V	Main office roof	1	75 dBA
TEF-MO-R-2	Fantech CE224D	Main office roof	1	59 dBA
SSF	Fantech APS1256CA6/30	High bay and low bay warehouse roof	24	100 dBA
PAC-WH	Temperzone OPA2000	Low bay warehouse roof	21	89 dBA
PAC-WH	Temperzone OPA1370	High bay warehouse roof	12	86 dBA
PAC-WH	Temperzone OPA705	Main office roof	1	85 dBA
CRAC-CU	Vertiv Liebert CRV CR035RA	Main office roof	2	76 dBA
CU-MO-1	Mitsubishi PURY-P700YSNW-A(-BS)	Main office roof	1	73 dBA
CU-MO-2	Mitsubishi PURY-P750YSNW-A(-BS)	Main office roof	1	75 dBA
CU-MO-3	Mitsubishi PURY-P850YSNW-A(-BS)	Main office roof	1	76 dBA
CU-MO-4	Mitsubishi PURY-P650YSNW-A(-BS)	Main office roof	1	73 dBA

Note 1: SSF units are smoke exhaust fans and are used only in emergency situations. As such, these have not been included in the noise model.

Acoustic screening has been modelled around each unit on the high bay and low bay warehouse roof, and around the plant areas on the main office roof, as instructed by Goodman. The acoustic screening has been modelled to a height of 0.5 m above the top of the mechanical units. Specifications for the acoustic screening must be confirmed during the detailed design stage for Lot 1A.

As details of specific items of plant are not yet known for the other lots within Oakdale West, an approach has been adopted that assumed fixed noise sources with a cumulative sound power level of 90 dBA per warehouse during the day and evening, which were modelled at rooftop locations around the development. All sources are assumed to operate continuously during the worst-case 15-minute period. This has been modelled throughout the estate with the exception of Lot 1A which has been modelled as noted above in **Table 5**.

A cumulative sound power level of 85 dBA per warehouse has been adopted for the night-time. This has been done to account for the lower mechanical load requirements typically required throughout the night-time period. No rooftop mechanical plant within lots 2E, 2F, 2G, 2H, 2J, 3C, 3D, 4A, 4B and 4E has been modelled during the night-time period. During later design stages when further information is known of the operations of the future lots, management measures regarding mechanical plant would be determined, if applicable. These measures could include selection of quieter plant, locating plant at ground level making use of the warehouse structures as shielding, or use of localised shielding around units to meet the noise limits, for example.

3.2.3 Summary of Operational Noise Mitigation Measures

3.2.3.1 Noise Barrier Extension

Preliminary noise model results for the 'Precinct 1 only' scenario indicated an exceedance of the criteria at N1 to the west, prior to construction of the noise barriers in Precinct 2 in the western area of the development. The noise barriers in Precinct 2 are now proposed to be constructed prior to the commencement of operations in Precinct 1. As such, the noise barriers in Precinct 2 have been included in the model to minimise noise impacts at these receivers prior to the construction of the Precinct 2 warehouses.

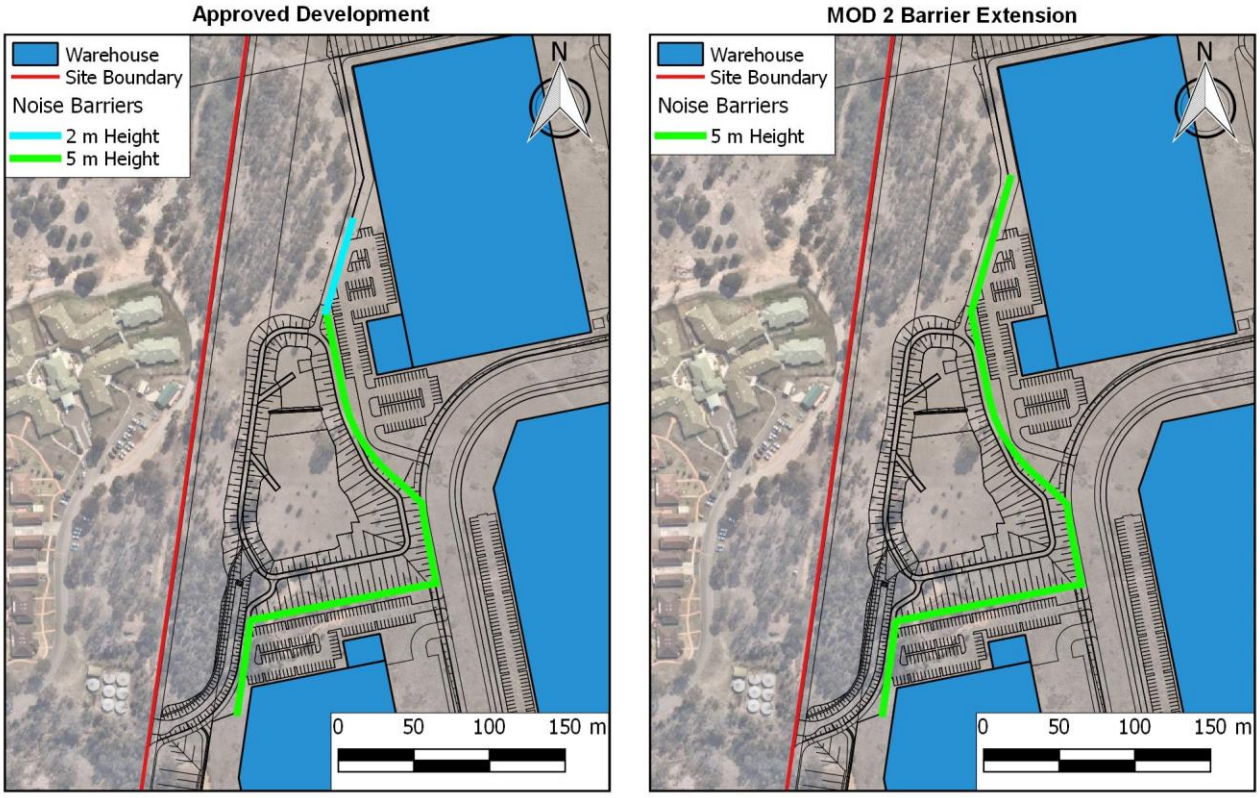
In addition to these barriers being constructed prior to the operation of Precinct 1, the preliminary noise model results found that an extension of the barriers is required to meet the criteria prior to the construction of Warehouse 2B, which is located adjacent to the northern section of the barrier.

Most of the approved noise barriers in Precinct 2 have a height of 5 m (refer to **Figure 4**). No modifications to these sections of barrier are proposed.

At the northern end of the approved barrier, a section approximately 60 m in length has an approved height of 2 m. This section is proposed to be increased to a height of 5 m and extended further to the north (approximately 30 m in additional length). The Precinct 2 noise barriers, including the extension, will be a permanent operational noise mitigation measure and will not be removed following construction of Warehouse 2B.

The approved Precinct 2 noise barriers are compared to the MOD 2 proposed barrier extension in **Figure 4**. Note that all section of the noise barriers in Precinct 2 are located on the warehouse pads, ie at the top of the retaining walls.

Figure 4 Proposed Precinct 2 Noise Barrier Extension



No changes to the height, location or timing of the noise barrier on the southern site boundary in Precinct 4 are proposed (refer to **Figure 3**). The specifications of this barrier will be confirmed during the detailed design of Precinct 4 and constructed during Precinct 4 construction.

3.2.3.2 Lot 1A Rooftop Plant Screening

As detailed in **Section 3.2.2**, acoustic screening is proposed to be installed around each temperature control unit on the high bay and low bay warehouse roof and around the main office rooftop plant area on Lot 1A. The acoustic screening should extend to a height of 0.5 m above the top of the mechanical units.

Specifications and design for the acoustic screens must be confirmed during the detailed design stage for Lot 1A.

Additionally, the proposed plant models and locations for all external fixed plant on Lot 1A, along with any additional mitigation measures such as silencers, must be confirmed during detailed design for Lot 1A.

3.3 Predicted Operational Noise Impacts

The operational noise levels predicted in this section include all noise model assumptions and mitigation measures outlined in **Section 3.2**.

Predicted cumulative noise impacts of all precincts within Oakdale West operating concurrently are detailed in **Section 3.3.1**.

Predicted noise impacts of Precinct 1 in isolation (prior to completion of construction of the other stages of Oakdale West) are detailed in **Section 3.3.2**.

All operational noise impacts are assessed in this report against the Development Consent noise limits derived under the INP.

3.3.1 Oakdale West – All Precincts

The predicted operational noise levels for the MOD 2 design are compared to the applicable criteria in **Table 6**. Noise contours are provided for day/evening in **Figure 5** and night-time in **Figure 6**.

Table 6 Predicted Operational Noise Levels – All Precincts

Receiver	Period (weather)[5]	LAeq(15 minute) Noise Level (dBA)					LA1(1 minute) Noise Level (dBA)				
		Criteria	SSDA NIA	Predicted	Exceedance	Compliance[3]	Criteria	SSDA NIA	Predicted	Exceedance	Compliance[3]
N1 – Emmaus Village Residential	Day (standard)	44	35	36	-	Yes	n/a[4]	n/a[4]	n/a[4]	n/a[4]	n/a[4]
	Evening (standard)	43	35	36	-	Yes	n/a[4]	n/a[4]	n/a[4]	n/a[4]	n/a[4]
	Night (standard)	41	30	30	-	Yes	51	47	50	-	Yes
	Night (noise-enhancing)	41	35	34	-	Yes	51	50	**55**	**4**	**No**
N2 – Emmaus Catholic College (school)	When in use	45 (external)[1]	37	39	-	Yes	n/a[4]	n/a[4]	n/a[4]	n/a[4]	n/a[4]
N3 – Kemps Creek – nearest residential property	Day (standard)	39	40	44	n/a[2]	n/a[2]	n/a[4]	n/a[4]	n/a[4]	n/a[4]	n/a[4]
	Evening (standard)	39	40	44	n/a[2]	n/a[2]	n/a[4]	n/a[4]	n/a[4]	n/a[4]	n/a[4]
	Night (standard)	37	35	37	n/a[2]	n/a[2]	47	50	56	n/a[2]	n/a[2]
	Night (noise-enhancing)	37	40	42	n/a[2]	n/a[2]	47	54	60	n/a[2]	n/a[2]
N4 – Kemps Creek – other residence	Day (standard)	39	34	39	-	Yes	n/a[4]	n/a[4]	n/a[4]	n/a[4]	n/a[4]
	Evening (standard)	39	34	39	-	Yes	n/a[4]	n/a[4]	n/a[4]	n/a[4]	n/a[4]
	Night (standard)	37	30	31	-	Yes	47	**48**	**52**	**5**	**No**
	Night (noise-enhancing)	37	35	37	-	Yes	47	**52**	**57**	**10**	**No**
N5 – Kemps Creek – other residence	Day (standard)	39	34	38	-	Yes	n/a[4]	n/a[4]	n/a[4]	n/a[4]	n/a[4]
	Evening (standard)	39	34	38	-	Yes	n/a[4]	n/a[4]	n/a[4]	n/a[4]	n/a[4]
	Night (standard)	37	30	31	-	Yes	47	46	47	-	Yes
	Night (noise-enhancing)	37	35	37	-	Yes	47	**50**	**52**	**5**	**No**

Note 1: Criteria for N2 is specified as an interior noise level. For the purpose of this assessment a conservative inside to outside correction of +10 dBA has been applied to the criteria for N2 in order to assess the external noise predictions against the criteria. An inside to outside correction of +10 dBA is typical of a building with open windows.

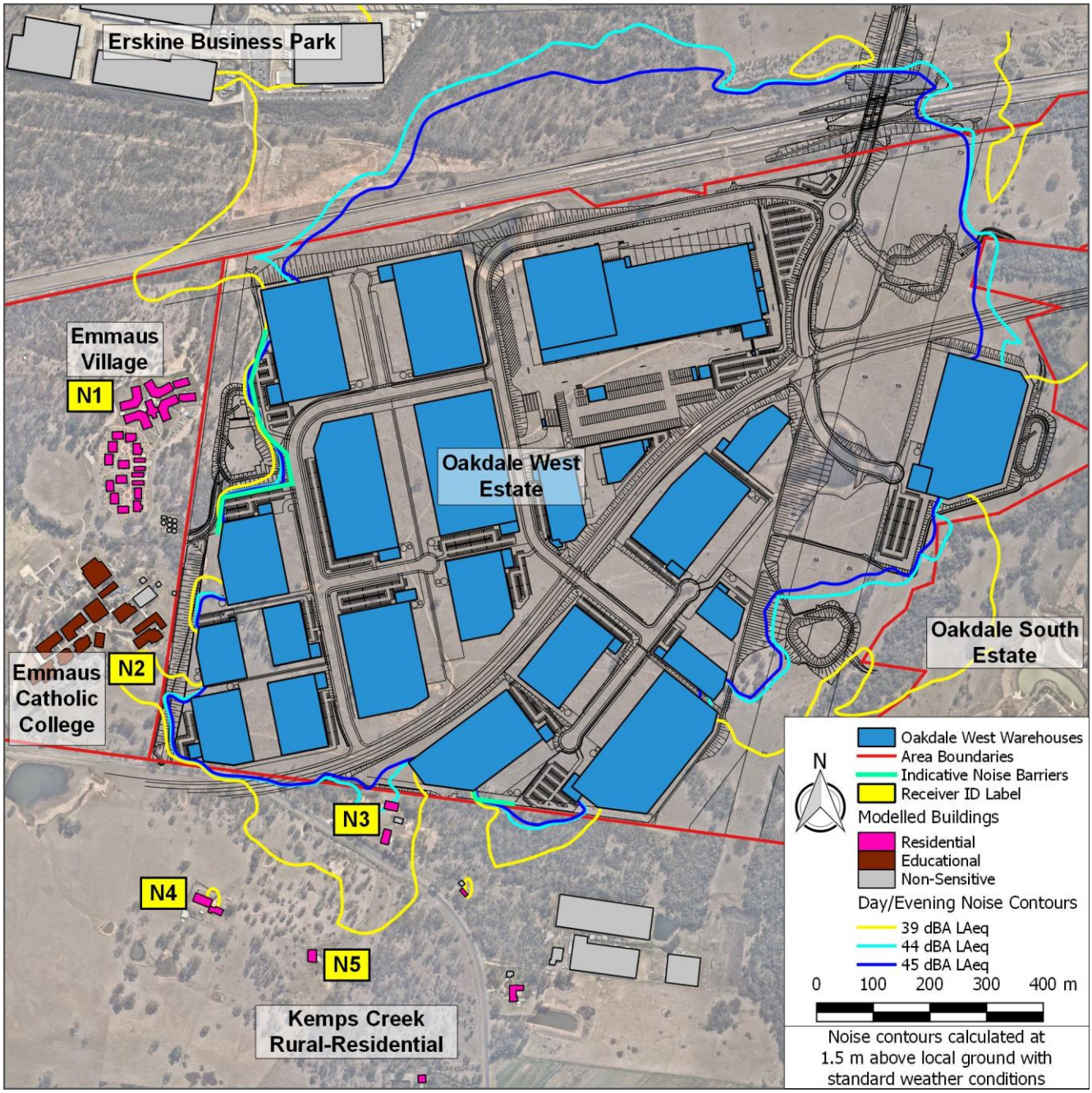
Note 2: As per Condition C19 of the Development Consent SSD 7348, the noise criteria does not apply at N3 (refer to **Section 3**).

Note 3: **Bold** text indicates an exceedance of the criteria.

Note 4: $L_{A1(1minute)}$ criteria is not applicable during this time period and/or to this receiver type.

Note 5: Noise-enhancing weather conditions during the daytime and evening periods have not been included in the assessment as it is not a prevailing feature of the site (refer to SSDA NIA).

Figure 5 Predicted Noise Levels – Daytime/Evening – Standard Weather Conditions – All Precincts

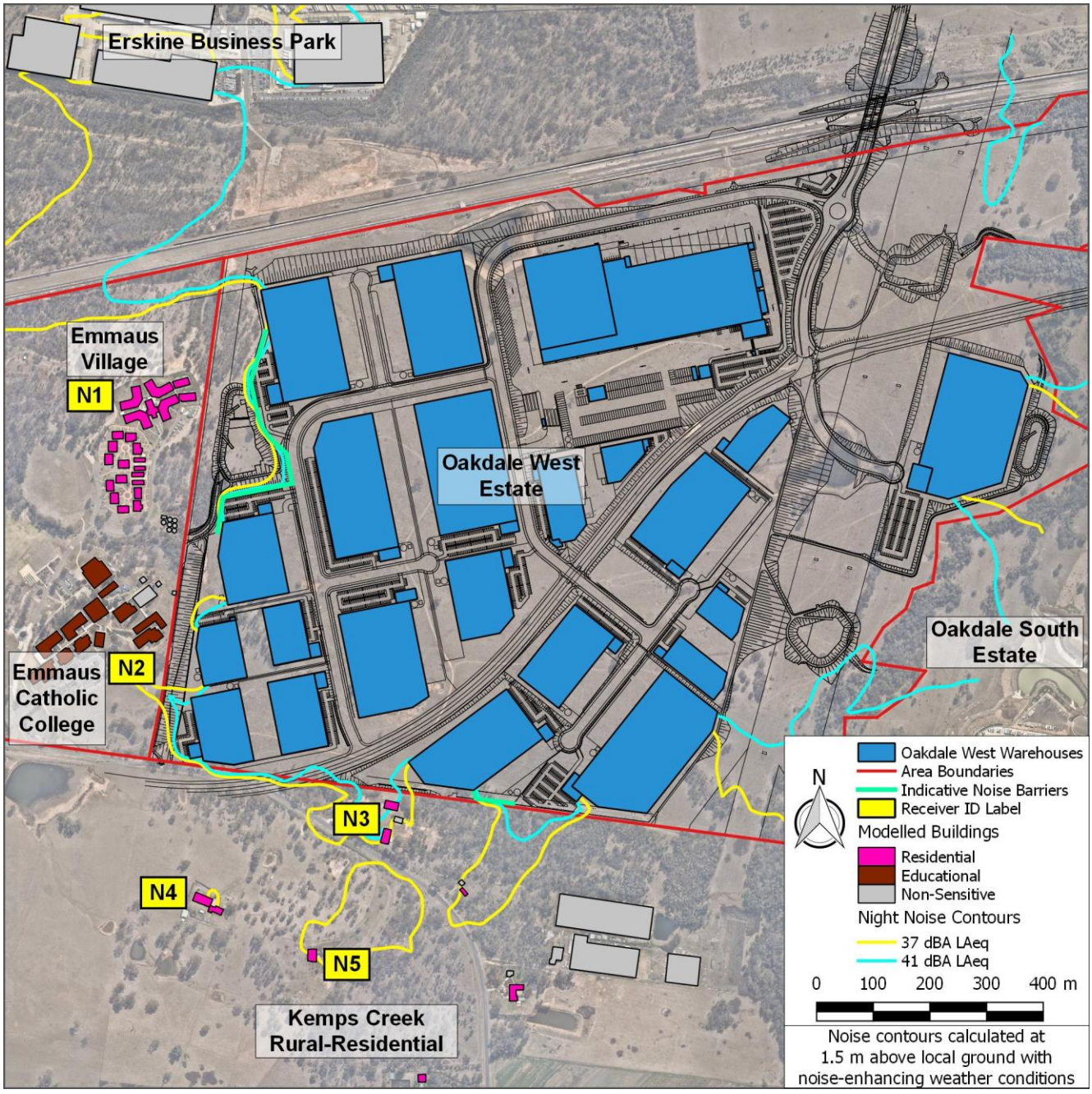


Note 1: 44 dBA LAeq noise contour (light blue) corresponds to the daytime noise criteria for N1 (Emmaus Village residential).

Note 2: 45 dBA LAeq noise contour (dark blue) corresponds to the daytime noise criteria for N2 (Emmaus Catholic College school).

Note 3: 39 dBA LAeq noise contour (yellow) corresponds to the daytime noise criteria for N3, N4 and N5 (Kemps Creek residential).

Figure 6 Predicted Noise Levels – Night-time – Noise-Enhancing Weather Conditions – All Precincts



Note 1: 41 dBA LAeq noise contour (light blue) corresponds to the night-time noise criteria for N1 (Emmaus Village residential).

Note 2: 37 dBA LAeq noise contour (yellow) corresponds to the night-time noise criteria for N3, N4 and N5 (Kemps Creek residential).

3.3.1.1 Peak L_{Aeq} Noise Levels

Peak operational noise emissions from the development are predicted to comply with the relevant L_{Aeq} criteria at the surrounding sensitive receivers.

Noise levels are predicted to be above the L_{Aeq} criteria at N3, which is consistent with the approved development, however as per Condition C19 of the Development Consent SSD 7348, the noise criteria do not apply at this residence (refer to **Section 3**).

Noise levels for the MOD 2 development are generally predicted to be higher than the approved development. Peak operational noise levels during the daytime and evening periods are predicted to be higher by up to 2 dBA at N1 and N2, up to 4 dBA at N3 and N5, and up to 5 dBA at N4. Peak operational noise levels during the night-time period under noise-enhancing weather conditions are typically up to 2 dBA higher for MOD 2 than the approved development.

While the operation of Lot 1A includes increased peak 1-hour heavy and light vehicle movements to that assessed in the approved design, the separation distance between Lot 1A and nearby sensitive receivers, along with the intervening shielding provided by structures and topography in the other lots limits the change in predicted noise levels at nearby receivers.

Overall, the predicted operational noise impacts from the MOD 2 design are generally consistent with the approved design and comply with the relevant L_{Aeq} criteria at the surrounding receivers.

3.3.1.2 Maximum Noise Levels

Subsequent to the commencement of the SSDA Noise Impact Assessment for Oakdale West (SSDA NIA) (SLR Report *610.15617-R02-Revision 4*) the EPA released the *Noise Policy for Industry* (NPfI) (EPA, 2017) which supersedes the *Industrial Noise Policy* (INP) (EPA, 2000).

The NPfI provides guidance on assessment of the potential for sleep disturbance from maximum noise level events during the night-time period.

The NPfI states that where L_{Amax} noise levels from the development at a residential location exceed 52 dBA or the prevailing RBL plus 15 dB, whichever is greater, a detailed maximum noise event assessment should be undertaken. The detailed assessment should discuss the level of events, the exceedance of the screening level, existing maximum noise levels, and consider guidance from current literature regarding sleep disturbance, such as the EPA's *Road Noise Policy* (RNP) (EPA, 2011).

The $L_{A1(1minute)}$ noise limits specified in the Development Consent SSD 7348 are based on the sleep disturbance screening level of RBL plus 15 dB as detailed in the SSDA NIA.

Worst-case $L_{A1(1minute)}$ noise levels for MOD 2 are predicted to be above the Development Consent $L_{A1(1minute)}$ at N4 under standard weather conditions, and at N1, N4 and N5 under noise-enhancing weather conditions, however, 52 dBA is only exceeded at N1 and N4 under noise-enhancing weather conditions.

The SSDA NIA for the approved development predicted exceedances of the sleep disturbance screening level at the Kemps Creek residences (N4/N5).

The EPA's *Road Noise Policy* (RNP) also provides context in relation to maximum noise levels and potential for sleep disturbance. The RNP concludes that maximum internal noise levels of 50-55 dBA are unlikely to awaken people, and one or two events per night with maximum internal noise levels of 65-70 dBA are not likely to affect health and wellbeing significantly. This results in corresponding external noise levels of 60-65 dBA and 75-80 dBA assuming a 10 dB loss through open windows. The worst-case $L_{A1(1minute)}$ noise levels are predicted to be below the noise levels likely to cause sleep disturbance based on the RNP guidance.

Noise monitoring undertaken at the site during preparation of the SSDA NIA (refer to the noise monitoring results in Appendix B of the SSDA NIA) measured typical existing maximum noise levels during the night-time of around 50-55 dBA near N1 and 50-60 dBA near N3/N4/N5. The highest night-time maximum noise levels at both monitoring locations exceeded 70 dBA numerous times during the monitoring period. The predicted maximum noise levels during the night-time period are similar to the existing typical maximum noise levels, and well below the highest noise levels measured during the monitoring period.

In summary, while the maximum noise levels are predicted to exceed the RBL plus 15 dB criteria, the noise levels are below the levels outlined in the RNP that would be considered to have potential to cause sleep disturbance, and would be similar in level to the existing ambient noise environment.

As the $L_{A1(1minute)}$ noise limits specified in Development Consent SSD 7348 are lower than the sleep disturbance screening level specified in the NPfI, it is recommended that the $L_{A1(1minute)}$ noise limits be modified to be 52 dBA, consistent with the NPfI sleep disturbance screening level. It is noted that the maximum noise levels are predicted to exceed the screening level during the night-time period, however only under noise-enhancing weather conditions. The maximum noise level assessment concludes that the predicted noise levels would be unlikely to result in sleep disturbance.

The recommended modification to the $L_{A1(1minute)}$ noise limits is detailed in **Table 7**.

Table 7 Recommended Modification to $L_{A1(1minute)}$ Noise Limits

Location	Development Consent SSD 7348 Noise Limit – Night $L_{A1(1minute)}$ dBA	Proposed Noise Limit Night $L_{A1(1minute)}$ dBA
N1 Emmaus Village Residential	51	52
N3 Kemps Creek – nearest residential property	47	52
N4 & N5 Kemps Creek – other residences	47	52

Note: No change is proposed to the $L_{Aeq(15minute)}$ noise limits specified in the Development Consent SSD 7348.

3.3.2 Oakdale West – Precinct 1 Only

In order to predict the operational noise levels for stage 1 of the development prior to the construction of further stages, noise emissions from Precinct 1 have been modelled with no structures or noise sources in the other precincts, with the exception of the noise barriers in Precinct 2 (refer to **Section 3.2.3.1**).

The predicted operational noise levels for the MOD 2 design of Precinct 1 are compared to the applicable criteria in **Table 8**. Noise contours are provided for day/evening in **Figure 7** and night-time in **Figure 8**.

Table 8 Predicted Operational Noise Levels – Precinct 1 Only

Receiver	Period (weather)[5]	LAeq(15 minute) Noise Level (dBA)				LA1(1 minute) Noise Level (dBA)			
		Criteria	Predicted	Exceedance	Compliance[3]	Criteria	Predicted	Exceedance	Compliance[3]
N1 – Emmaus Village Residential	Day (standard)	44	31	-	Yes	n/a[4]	n/a[4]	n/a[4]	n/a[4]
	Evening (standard)	43	31	-	Yes	n/a[4]	n/a[4]	n/a[4]	n/a[4]
	Night (standard)	41	31	-	Yes	51	40	-	Yes
	Night (noise-enhancing)	41	36	-	Yes	51	47	-	Yes
N2 – Emmaus Catholic College (school)	When in use	45 (external)[1]	35	-	Yes	n/a[4]	n/a[4]	n/a[4]	n/a[4]
N3 – Kemps Creek – nearest residential property	Day (standard)	39	38	n/a[2]	n/a[2]	n/a[4]	n/a[4]	n/a[4]	n/a[4]
	Evening (standard)	39	38	n/a[2]	n/a[2]	n/a[4]	n/a[4]	n/a[4]	n/a[4]
	Night (standard)	37	37	n/a[2]	n/a[2]	47	49	n/a[2]	n/a[2]
	Night (noise-enhancing)	37	**43**	n/a[2]	n/a[2]	47	55	n/a[2]	n/a[2]
N4 – Kemps Creek – other residence	Day (standard)	39	33	-	Yes	n/a[4]	n/a[4]	n/a[4]	n/a[4]
	Evening (standard)	39	33	-	Yes	n/a[4]	n/a[4]	n/a[4]	n/a[4]
	Night (standard)	37	33	-	Yes	47	44	-	Yes
	Night (noise-enhancing)	37	**39**	**2**	**No**	47	**51**	**4**	**No**
N5 – Kemps Creek – other residence	Day (standard)	39	31	-	Yes	n/a[4]	n/a[4]	n/a[4]	n/a[4]
	Evening (standard)	39	31	-	Yes	n/a[4]	n/a[4]	n/a[4]	n/a[4]
	Night (standard)	37	30	-	Yes	47	41	-	Yes
	Night (noise-enhancing)	37	37	-	Yes	47	**48**	**1**	**No**

Note 1: Criteria for N2 is specified as an interior noise level. For the purpose of this assessment a conservative inside to outside correction of +10 dBA has been applied to the criteria for N2 in order to assess the external noise predictions against the criteria. An inside to outside correction of +10 dBA is typical of a building with open windows.

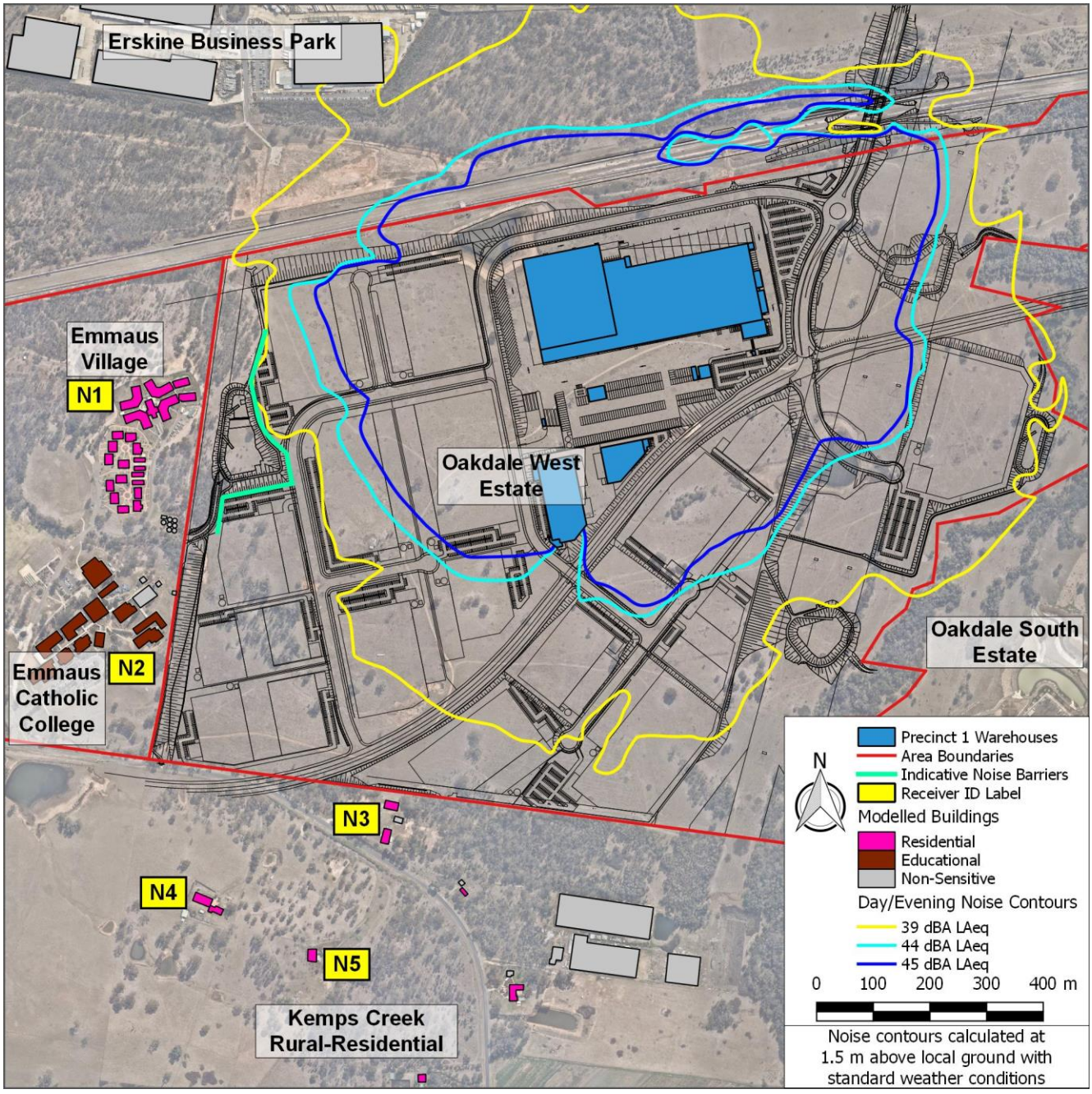
Note 2: As per Condition C19 of the Development Consent SSD 7348, the noise criteria does not apply at N3 (refer to **Section 3**).

Note 3: **Bold** text indicates an exceedance of the criteria.

Note 4: $L_{A1(1\ minute)}$ criteria is not applicable during this time period and/or to this receiver type.

Note 5: Noise-enhancing weather conditions during the daytime and evening periods have not been included in the assessment as it is not a prevailing feature of the site (refer to SSDA NIA).

Figure 7 Predicted Noise Levels – Daytime/Evening – Standard Weather Conditions – Precinct 1 Only

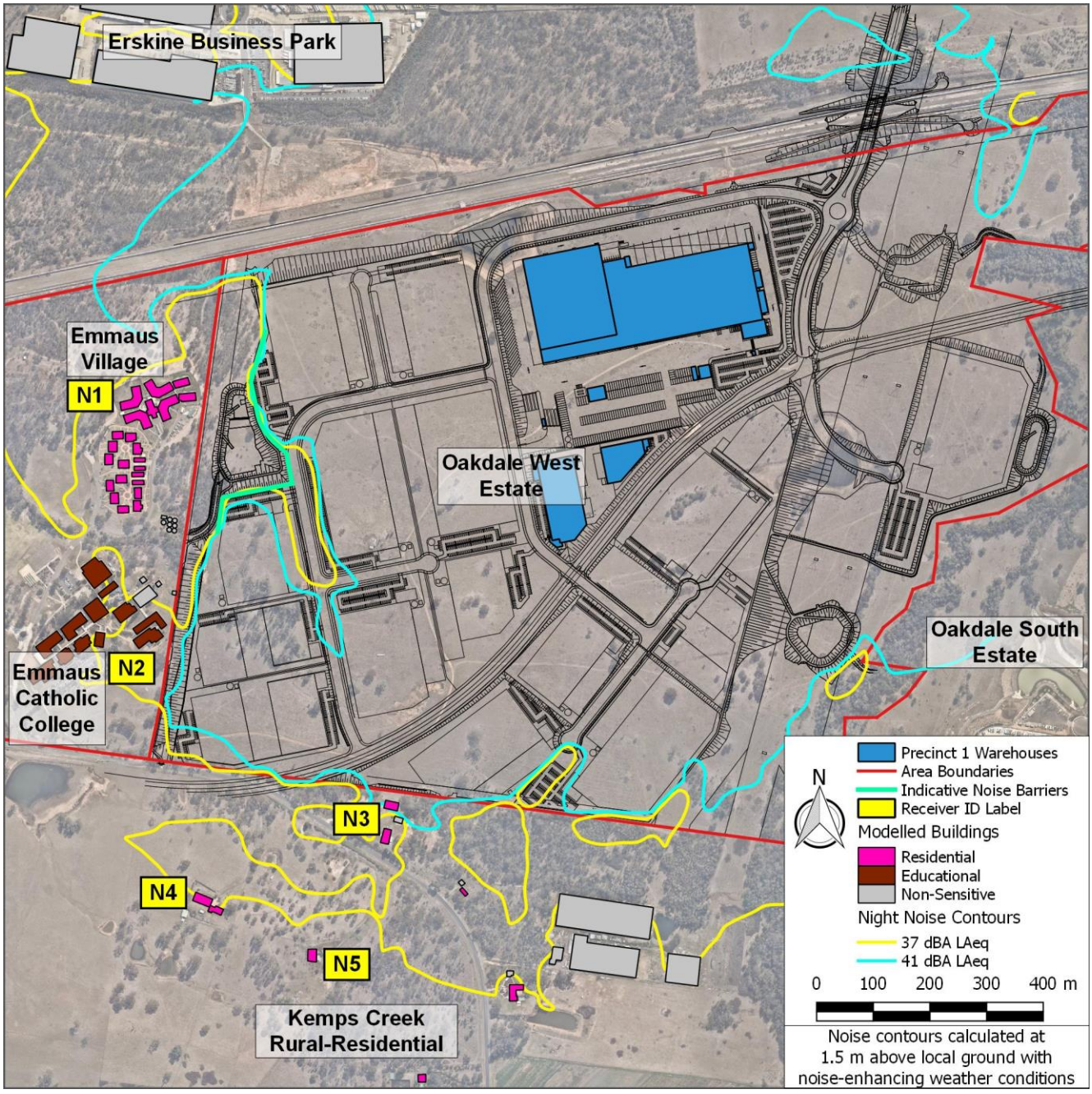


Note 1: 44 dBA LAeq noise contour (light blue) corresponds to the daytime noise criteria for N1 (Emmaus Village residential).

Note 2: 45 dBA LAeq noise contour (dark blue) corresponds to the daytime noise criteria for N2 (Emmaus Catholic College school).

Note 3: 39 dBA LAeq noise contour (yellow) corresponds to the daytime noise criteria for N3, N4 and N5 (Kemps Creek residential).

Figure 8 Predicted Noise Levels – Night-time – Noise-Enhancing Weather Conditions – Precinct 1 Only



Note 1: 41 dBA LAeq noise contour (light blue) corresponds to the night-time noise criteria for N1 (Emmaus Village residential).

Note 2: 37 dBA LAeq noise contour (yellow) corresponds to the night-time noise criteria for N3, N4 and N5 (Kemps Creek residential).

Peak operational noise emissions from Precinct 1 of the development are predicted to comply with the relevant L_{Aeq} criteria at receivers N1, N2 and N5 during all applicable periods.

Under noise-enhancing weather conditions during the night-time period, noise levels are predicted to above the L_{Aeq} criteria at N3, however as per Condition C19 of the Development Consent SSD 7348, the noise criteria do not apply at this residence (refer to **Section 3**).

Minor exceedance of the L_{Aeq} noise criteria of up to 2 dBA is predicted at N4 during the night-time period under noise-enhancing weather conditions. Noise levels are not predicted to exceed the criteria at N4 under standard weather conditions during the night-time period, or during the daytime or evening periods.

While an exceedance of the night-time L_{Aeq} criteria is predicted at N4 it is noted that this exceedance is minor (up to 2 dBA) and only occurs during noise-enhancing weather conditions. Section 4 of the EPA's *Noise Policy for Industry* (NPfI) discusses the significance of residual noise impacts following implementation of feasible and reasonable noise mitigation. It notes that a residual exceedance of up to 2 dBA is negligible in significance and would not warrant receiver-based treatments or controls.

Worst-case $L_{A1(1minute)}$ noise levels are predicted to be above the relevant criteria at N4 and N5 under noise-enhancing weather conditions. As per the discussion in **Section 3.3.1**, the predicted maximum noise levels are below the levels outlined in the RNP that would be considered to have potential to cause sleep disturbance, and would be similar in level to the existing ambient noise environment. Additionally, the predicted $L_{A1(1minute)}$ noise levels for the 'Precinct 1 Only' scenario are lower than the maximum noise levels predicted for the 'All Precincts' scenario.

This stage 1 development scenario is a temporary situation and noise levels at the surrounding receivers would be lower as additional structures are constructed in the other precincts of Oakdale West between Precinct 1 and these receivers. Goodman currently has advanced enquiries for the intervening lots and anticipates these structures to be constructed soon after completion of Precinct 1.

It is considered that these exceedances are minor and temporary in nature, and as such would be acceptable during construction of the estate.

3.4 Off-site Operational Traffic Noise Impacts

While light and heavy vehicle movements within the Oakdale West are classified as part of the operational site noise, once they move off the site and onto public roads they are assessed under the NSW *Road Noise Policy* (RNP).

The RNP requires noise mitigation to be considered where new land use developments increase road traffic noise by more than 2 dB. An increase of greater than 2 dB requires an increase in traffic volumes of approximately 60% or higher.

The main access route to the development site is via the approved Western North-South Link Road (WNSLR), then the existing arterial road of Lenore Drive.

The off-site operational traffic noise assessment for the approved development referenced the WNSLR noise impact assessment (refer to SLR Report 610.16083-R1) for the forecast daily traffic volumes on Lenore Drive at the opening of the WNSLR. The daily traffic on Lenore drive was forecast to be approximately 28,000 vehicles, including approximately 9,000 vehicles accessing Oakdale West, ie around 19,000 vehicles without Oakdale West traffic.

The Traffic Impact Assessment for MOD 2 (prepared by ASON) details that total daily traffic volumes for Oakdale West with the MOD 2 design would be slightly lower than the approved development (approximately 8,850 daily vehicle movements).

The daily traffic volume from Oakdale West equates to an increase in traffic volumes on Lenore Drive of approximately 47%. Therefore, an increase in traffic noise due to Oakdale West of greater than 2 dB is not considered likely. Consideration of mitigation is not required as a result. This is consistent with the approved development.

4 Construction Noise and Vibration Impacts

Construction noise and vibration impacts for the approved development were assessed at a precinct and estate level in the SSDA NIA. The MOD 2 changes to the layout of Precinct 1 do not affect the assessed general construction activities and locations. As such, the construction noise and vibration impacts are considered to be consistent with those detailed in the SSDA NIA.

Details of monitoring, mitigation and management of construction noise and vibration will be detailed in construction noise and vibration management plans prepared separately to this report.

5 Summary of Proposed Modification to Approved Noise Limits

Guidance is provided in the EPA's *Road Noise Policy* (RNP) and *Noise Policy for Industry* (NPfI) on the potential for maximum noise events to result in sleep disturbance. The maximum noise level assessment concludes that while the maximum noise levels are predicted to exceed the screening level at some receivers under noise-enhancing weather conditions, the predicted noise levels are below the levels outlined in the RNP that would be considered to have potential to cause sleep disturbance, and would be similar in level to the existing ambient noise environment. As such, the predicted maximum noise levels would be unlikely to result in sleep disturbance.

As the $L_{A1(1minute)}$ noise limits specified in Development Consent SSD 7348 are lower than the sleep disturbance screening level specified in the NPfI, it is recommended that the $L_{A1(1minute)}$ noise limits be modified to be 52 dBA, as outlined below, consistent with the NPfI sleep disturbance screening level.

Location	Development Consent SSD 7348 Noise Limit – Night $L_{A1(1minute)}$ dBA	Proposed Noise Limit Night $L_{A1(1minute)}$ dBA
N1 Emmaus Village Residential	51	52
N3 Kemps Creek – nearest residential property	47	52
N4 & N5 Kemps Creek – other residences	47	52

Note: No change is proposed to the $L_{Aeq(15minute)}$ noise limits specified in the Development Consent SSD 7348.

I trust that this letter covers your requirements.

Yours sincerely



JOSHUA RIDGWAY
Senior Consultant

Checked/
Authorised by: MR

APPENDIX A

Acoustic Terminology

1. Sound Level or Noise Level

The terms 'sound' and 'noise' are almost interchangeable, except that 'noise' often refers to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure. The human ear responds to changes in sound pressure over a very wide range with the loudest sound pressure to which the human ear can respond being ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms.

The symbols SPL, L or LP are commonly used to represent Sound Pressure Level. The symbol LA represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2×10^{-5} Pa.

2. 'A' Weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an 'A-weighting' filter. This is an electronic filter having a frequency response corresponding approximately to that of human hearing.

People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4,000 Hz), and less sensitive at lower and higher frequencies. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dB or 2 dB in the level of a sound is difficult for most people to detect, whilst a 3 dB to 5 dB change corresponds to a small but noticeable change in loudness. A 10 dB change corresponds to an approximate doubling or halving in loudness. The table below lists examples of typical noise levels.

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120	Heavy rock concert	Extremely noisy
110	Grinding on steel	
100	Loud car horn at 3 m	Very noisy
90	Construction site with pneumatic hammering	
80	Kerbside of busy street	Loud
70	Loud radio or television	
60	Department store	Moderate to quiet
50	General Office	
40	Inside private office	Quiet to very quiet
30	Inside bedroom	
20	Recording studio	Almost silent

Other weightings (eg B, C and D) are less commonly used than A-weighting. Sound Levels measured without any weighting are referred to as 'linear', and the units are expressed as dB(lin) or dB.

3. Sound Power Level

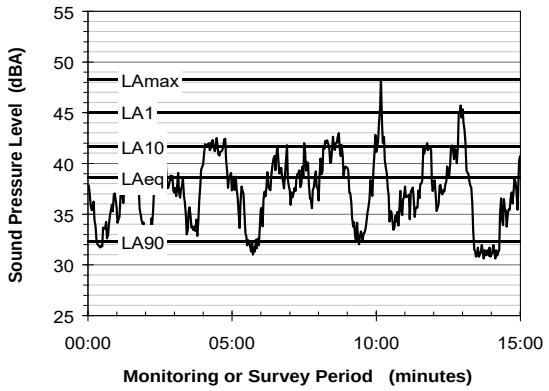
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or LW, or by the reference unit 10^{-12} W.

The relationship between Sound Power and Sound Pressure is similar to the effect of an electric radiator, which is characterised by a power rating but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

4. Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels LAN, where LAN is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the LA1 is the noise level exceeded for 1% of the time, LA10 the noise exceeded for 10% of the time, and so on.

The following figure presents a hypothetical 15 minute noise survey, illustrating various common statistical indices of interest.



Of particular relevance, are:

LA1 The noise level exceeded for 1% of the 15 minute interval.

LA10 The noise level exceeded for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.

LA90 The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

LAeq The A-weighted equivalent noise level (basically, the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

5. Frequency Analysis

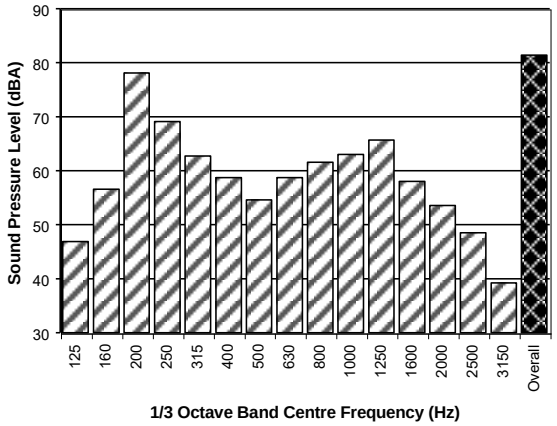
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal.

The units for frequency are Hertz (Hz), which represent the number of cycles per second.

Frequency analysis can be in:

- Octave bands (where the centre frequency and width of each band is double the previous band)
- 1/3 octave bands (three bands in each octave band)
- Narrow band (where the spectrum is divided into 400 or more bands of equal width)

The following figure shows a 1/3 octave band frequency analysis where the noise is dominated by the 200 Hz band. Note that the indicated level of each individual band is less than the overall level, which is the logarithmic sum of the bands.



6. Annoying Noise (Special Audible Characteristics)

A louder noise will generally be more annoying to nearby receivers than a quieter one. However, noise is often also found to be more annoying and result in larger impacts where the following characteristics are apparent:

- **Tonality** - tonal noise contains one or more prominent tones (ie differences in distinct frequency components between adjoining octave or 1/3 octave bands), and is normally regarded as more annoying than 'broad band' noise.
- **Impulsiveness** - an impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.
- **Intermittency** - intermittent noise varies in level with the change in level being clearly audible. An example would include mechanical plant cycling on and off.
- **Low Frequency Noise** - low frequency noise contains significant energy in the lower frequency bands, which are typically taken to be in the 10 to 160 Hz region.

7. Vibration

Vibration may be defined as cyclic or transient motion. This motion can be measured in terms of its displacement, velocity or acceleration. Most assessments of human response to vibration or the risk of damage to buildings use measurements of vibration velocity. These may be expressed in terms of 'peak' velocity or 'rms' velocity.

The former is the maximum instantaneous velocity, without any averaging, and is sometimes referred to as 'peak particle velocity', or PPV. The latter incorporates 'root mean squared' averaging over some defined time period.

Vibration measurements may be carried out in a single axis or alternatively as triaxial measurements (ie vertical, longitudinal and transverse).

The common units for velocity are millimetres per second (mm/s). As with noise, decibel units can also be used, in which case the reference level should always be stated. A vibration level V, expressed in mm/s can be converted to decibels by the formula 20 log (V/Vo), where Vo is the reference level (10^{-9} m/s). Care is required in this regard, as other reference levels may be used.

8. Human Perception of Vibration

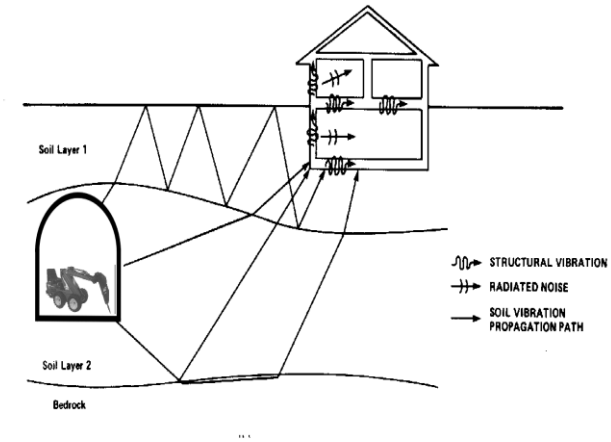
People are able to 'feel' vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience and expectations, and on other connotations associated with the perceived source of the vibration. For example, the vibration that a person responds to as 'normal' in a car, bus or train is considerably higher than what is perceived as 'normal' in a shop, office or dwelling.

9. Ground-borne Noise, Structure-borne Noise and Regenerated Noise

Noise that propagates through a structure as vibration and is radiated by vibrating wall and floor surfaces is termed 'structure-borne noise', 'ground-borne noise' or 'regenerated noise'. This noise originates as vibration and propagates between the source and receiver through the ground and/or building structural elements, rather than through the air.

Typical sources of ground-borne or structure-borne noise include tunnelling works, underground railways, excavation plant (eg rockbreakers), and building services plant (eg fans, compressors and generators).

The following figure presents an example of the various paths by which vibration and ground-borne noise may be transmitted between a source and receiver for construction activities occurring within a tunnel.



The term 'regenerated noise' is also used in other instances where energy is converted to noise away from the primary source. One example would be a fan blowing air through a discharge grill. The fan is the energy source and primary noise source. Additional noise may be created by the aerodynamic effect of the discharge grill in the airstream. This secondary noise is referred to as regenerated noise.

Annexure F

ACOUSTICS AND AIR

OAKDALE WEST ESTATE (OWE)
NOISE & VIBRATION ASSESSEMENT

SSD 7348 Modification 3 and
SSD 10397 Stage 2 Development Application

REPORT NO. 19440
VERSION F

JANUARY 2020

PREPARED FOR

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TABLE OF CONTENTS

Page

GLOSSARY OF ACOUSTIC TERMS

EXCECUTIVE SUMMARY 1

1 INTRODUCTION 4

1.1 Background 5

1.2 Modification 3 (SSD 7348 MOD 3) 5

1.3 Stage 2 Development Application (SSD 10397 Stage 2 DA) 6

1.4 Structure of this Report 7

2 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS 8

2.1 Assessment Guidelines 8

3 OPERATIONAL NOISE CRITERIA 9

3.1 Approved Noise Limits (SSD 7348) 9

3.2 Noise Criteria Considered by this Assessment 9

4 OPERATIONAL NOISE ASSESSMENT 10

4.1 On-Site Vehicle Movements 10

4.2 Mechanical Services & Fixed Plant 11

4.3 Loading Activities 15

4.4 Noise Barriers 15

4.5 Operational Noise Predictions – Considering All Precincts 16

4.6 Operational Noise Predictions – Staged Development 18

4.7 Managing Residual Exceedances 20

4.8 Sleep Disturbance Assessment – Considering All Precincts 20

4.9 Sleep Disturbance Assessment – Staged Development 21

4.10 Cumulative Operational Noise Assessment 22

4.11 Summary of Operational Noise Mitigation 25

5 OFF SITE TRAFFIC NOISE IMPACTS 26

5.1 Off-Site Traffic Noise Impact Assessment 26

6 CONSTRUCTION NOISE & VIBRATION ASSESSMENT 27

6.1 Construction Noise Criteria 27

6.2 Construction Noise Impact Assessment 28

6.3 Construction Noise Criteria Exceedances 31

6.4 Off-Site Construction Traffic Noise 32
6.5 Construction Noise Mitigation 33
6.6 Construction Vibration Impact Assessment 34
6.7 Construction Noise & Vibration Management Plan 34

7 CONCLUSION 35

GLOSSARY OF ACOUSTIC TERMS

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph below, are here defined.

Maximum Noise Level (L_{Amax}) – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

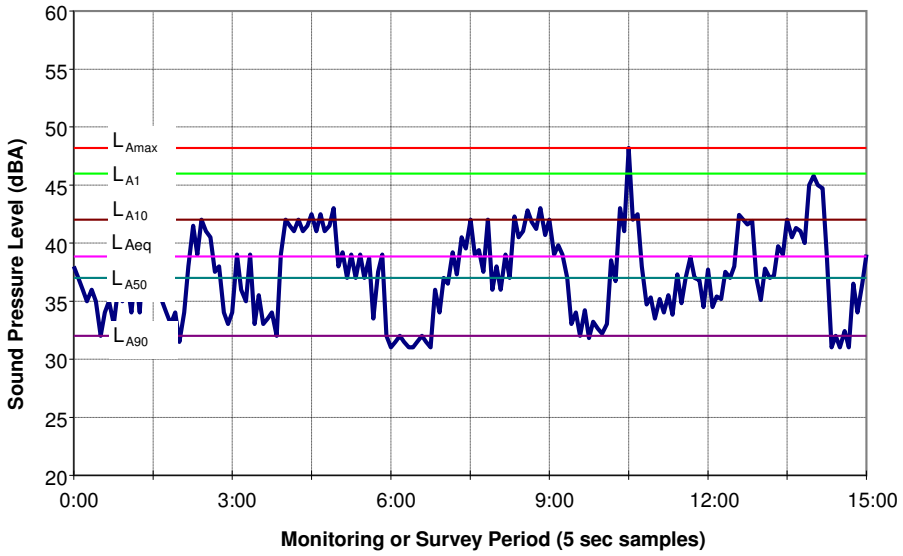
L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

ABL – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night-time) for each day. It is determined by calculating the 10th percentile (lowest 10th percent) background level (L_{A90}) for each period.

RBL – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period **–** daytime, evening and night-time.

Typical Graph of Sound Pressure Level vs Time



EXCECUTIVE SUMMARY

Wilkinson Murray Pty Limited (WM) has undertaken an operational noise and construction noise & vibration assessment incorporating the changes associated with the proposed SSD 7348 Modification 3 (MOD 3) and SSD 10397 Stage 2 Development Application (Stage 2 DA) on the approved Oakdale West Estate (OWE) in Kemps Creek, NSW.

The relevant MOD3 changes principally concern the use of Building 2B (previously referred to as Building 3A). Additionally, changes to the masterplan layout, including modifications to the Precinct 2 building layout, the on-site road network (Estate Road 3) and the site's civil design are proposed.

It is currently anticipated there would be a period of approximately 5-6 months where only Building 2B would operate at the estate. Thereafter, Precinct 1 would be developed and then operate concurrently with Building 2B for a period before the rest of the estate is fully developed. Accordingly, this assessment has considered operational noise impacts for Lot 2B; Lot 2B + Precinct 1; and All OWE Precincts.

The principal OWE operational noise sources comprise light and heavy vehicle movements, loading activities and fixed mechanical service plant. Noise modelling of these sources has been undertaken to determine potential noise impacts associated with the proposed staged operation of the modified OWE. The findings of this assessment are as follows:

- Unmitigated, noise emissions from the OWE are predicted to exceed the approved noise limits at sensitive receivers within the Emmaus Village (N1) and at the closest sensitive Kemps Creek locations (N4, N5).
- To reduce the exceedances feasible and reasonable noise mitigation measures have been investigated. Modelling indicates that with the modified noise barrier design (as discussed in Section 4.4 and shown in Figure 1-1) and acoustic treatment of the Lot 2B mechanical plant during detailed design, the approved $L_{Aeq,15min}$ noise limits may be met for typical and seasonal peak operations under all considered meteorological conditions at receivers the west of the site.
- Due to the elevation of the sensitive receivers to the south of the OWE (N4, N5), on-site noise barriers are expected to be of limited efficacy in reducing noise levels and therefore at these locations some residual noise exceedances have potential to arise.

The following residual operational noise exceedances have been predicted:

<u>All OWE Precincts Operating</u>

- For the fully developed OWE the residual exceedances generally represent negligible to marginal impacts.
- Negligible residual exceedances of the daytime and evening limits by 1-2 dB at the most exposed receiver are predicted.
- At night, residual exceedances are predicted only under the relatively rare noise enhancing meteorological conditions. Under such conditions and for typical OWE operations, exceedances of 2-3 dB are predicted at the closest sensitive receivers to the south. During seasonal peak operations exceedances of 3-4 dB are predicted at the closest sensitive receivers to the south.

Building 2B + Precinct 1 Operating

- Prior to the full development of the OWE, during the operation of only Building 2B + Precinct 1, residual exceedances are predicted to only occur at night and under noise enhancing meteorological conditions.

- During this phase of the OWE, for typical OWE operations exceedances of 3-4 dB are predicted at the closest sensitive receivers to the south. During seasonal peak operations moderate to significant exceedances of 5-6 dB are predicted at the closest sensitive receivers to the south, though these impacts would only be expected for relatively brief periods.

Building 2B Only Operating

- With respect to the operational phase where only Building 2B would operate, residual exceedances are predicted to only occur at night and under noise enhancing meteorological conditions.

- During this phase of the OWE, exceedances of 3-4 dB (typical) and moderate to significant exceedances of 5-6 dB (seasonal peak) are predicted at the closest sensitive receivers to the south. Again, these impacts would only be expected for relatively brief periods.

To manage these potential operational noise impacts, the following mitigation measures are proposed:

- Noise barriers possessing surface mass of no less than 15 kg/m^2 to be installed at the locations and to the heights identified in Figure 1-1;

- On-site speed limits of 25 km/hour for heavy vehicles and 40 km/hr for light vehicles to be imposed on the estate roads;

- During detailed design, Lot 2B rooftop mechanical services plant to be reviewed to ensure that cumulatively emissions are controlled to not exceed $L_{Aeq,15min}$ 37 dBA at the OWE site boundary. The inclusion of silencers/attenuators and/or barrier solutions may be considered to ensure these acoustic design standards are achieved, as confirmed by noise modelling;

- Goodman to consult with landowners (N4, N5) to address the matter of potential noise impacts during the development and operation of the OWE and would seek to enter into noise agreements with the potentially affected owners.

- Subject to agreement, Goodman to provide 'at-receiver' noise mitigation treatments, consistent with the recommendations of the *NPfI* at N4, N5. Taking into consideration the particular preferences of the landowners, the treatments considered would include upgraded glazing standards to further increase the ability of the building façade to reduce noise levels. The owners would be invited to participate in the mitigation selection process in a transparent, equitable and consistent way.

Construction Phase

Additionally, this assessment has considered construction noise and vibration impacts that have potential to arise during the Stage 2 DA development of Building 2B.

The key Building 2B construction works would involve site clearing and earthworks at the Building 2B location, pad and hardstand works, the construction of the Building 2B warehouse and office structures, and the use of the site access road for the delivery of materials to the site.

Noise modelling of the anticipated construction equipment and activities has been undertaken to determine potential construction noise impacts associated with the proposed Stage 2 DA development.

It is proposed to undertake the works between 3.00am to 10.00pm seven days a week, therefore standard and out-of-hours construction periods have been considered. The requirement to undertake works between 3.00am to 7.00am is principally so that concreting works can be undertaken before air temperatures become too high during the day.

During standard construction hours, no material noise impacts are predicted. However, some *ICNG* exceedances are expected during the out of hours works.

A number of measures have been identified to mitigate the potential out-of-hours noise impacts, including the following:

- Goodman would undertake pre-construction community consultation with receivers N1, N2, N3, N4 and N5 in order clearly and transparently explain the proposed works and the potential for construction noise impacts. Regular on-going updates would be provided throughout the works in order to understand and address as far as practicable any noise related concerns of the receivers; and
- Goodman to offer to provide temporary noise curtains to provide noise shielding to the N4 and N5 dwellings. It is estimated that these may achieve reductions of up to approximately 5 dB when positioned to break the acoustic line of sight between the noise source and the windows of the dwellings.

The identified measures would be carried out to ensure the works are undertaken with minimal noise impact.

The predicted maximum noise levels marginally exceed the $L_{A1,1min}$ 52 dBA level recognised by the *NPfI*, but would not be expected to result in material sleep disturbances.

Additionally, no vibration impacts are anticipated during the proposed works.

In accordance with Condition D73, a detailed Construction Noise and Vibration Management Plan (CNVMP) would be developed during the detailed design phase of the Proposal to manage impacts. The indicative construction noise and vibration mitigation measures identified by this report would be included in the CNVMP.

1 INTRODUCTION

Goodman Property Services (Aust) Pty Limited (Goodman) proposes to develop the Oakdale West Estate (OWE) on a currently vacant 154 ha site in Kemps Creek, NSW. The OWE would comprise warehousing and office facilities over five precincts totalling approximately 93.4 ha of developable area.

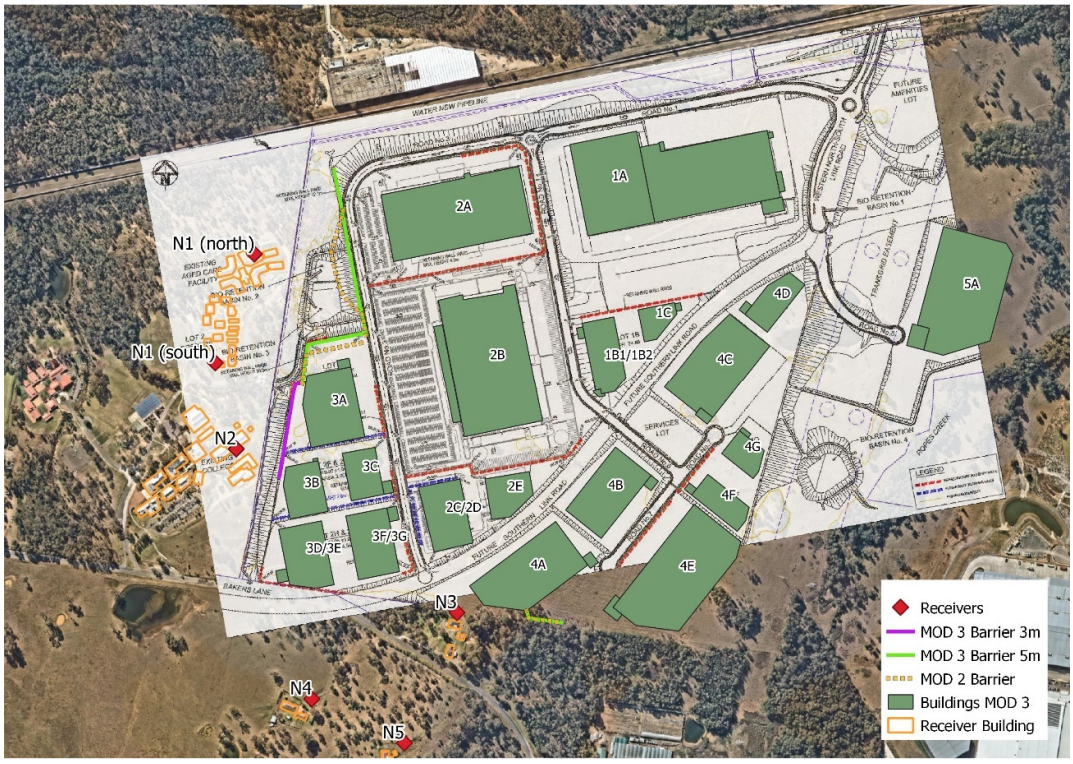
The OWE 'Concept Proposal' and 'Stage 1 Development' has been approved by the Department of Planning, Industry and Environment (DPIE), with Development Consent (SSD 7348) granted in September 2019. Additionally, two Modification submissions (MOD 1 and MOD 2) are currently under assessment by DPIE.

Wilkinson Murray Pty Limited (WM) has been commissioned by Goodman to undertake an operational and construction noise assessment incorporating the changes associated with the proposed SSD 7348 Modification 3 (MOD 3) and SSD 10397 Stage 2 Development Application (Stage 2 DA).

This assessment has been undertaken in accordance with the *Secretary's Environmental Assessment Requirements* (SEARS) and in general accordance with the NSW *Noise Policy for Industry* (NPfI) and other relevant NSW EPA guidelines.

Figure 1-1 shows the MOD3 site layout and closest sensitive receivers considered by this assessment. MOD3 principally relates to changes on Building 2B. The Stage 2 Development Application relates to Building 2B only.

Figure 1-1 Site Location Plan – MOD3



1.1 Background

SLR Consulting Australia Pty Ltd (SLR) prepared the OWE Noise & Vibration Impact Assessment (NVIA) for the State Significant Development Application (SSDA). The findings of this assessment are set out in the SLR report numbered *610.15617-R2*, dated 16 February 2017.

DPIE granted Development Consent SSD 7348 in September 2019 for the Oakdale West 'Concept Proposal' and 'Stage 1 Development'. The Concept Proposal comprises a 'Master Plan' to guide the staged development of Oakdale West and core development controls that will form the basis for design and assessment of future development applications for the site.

Modifications to Development Consent SSD 7348 have subsequently been proposed by submissions of MOD 1 and MOD 2 which are currently under assessment by DPIE.

WM's MOD 3 and Stage 2 DA assessment draws on the previous OWE assessments undertaken by SLR and incorporates the relevant updates as they relate to MOD 3 and Stage 2 DA.

An overview of the approvals sought is set out below in Sections 1.2 and 1.3.

1.2 Modification 3 (SSD 7348 MOD 3)

- A modification to the concept plan approval including the following is sought:
  - Rationalisation and re-sizing of buildings in Precinct 2 and 3 to accommodate future customers;
  - Reconfiguration of estate road network, particularly Estate Road 3 and the inclusion of a round-about at the intersection of Estate Road 1 and 3;
  - Change to the pad levels across Precinct 2 and 3;
  - Change to the retaining wall designs across Precinct 2 and 3 to accommodate the pad level changes;
  - Re-design of the acoustic wall to the north-west corner of the estate;
  - Re-design of basin 2 and 3;
  - Updated civil and servicing strategy;
  - Update to the staging plan and precinct numbering;
  - Change in the Gross Lettable Area;
  - Increase in building height for Building 3B only;
  - Change to acoustic criteria;

- A modification to the Stage 1 development approval including the following is sought:
  - Construction of Estate Road 3 including the construction of a round-about at the intersection of Estate Road 1 and 3;
  - Construction of associated retaining walls to support Estate Road 3;
  - Construction of the acoustic wall to the north-west corner of the estate;
  - Subdivision of estate roads;
  - Change to the pad levels across Precinct 2 and 3 and bulk-earthworks to that effect;
  - Construction of the retaining walls at Precinct 2 and 3 to accommodate the pad level changes;

- Construction of basins and changes to drainage and infrastructure;
- Landscaping;
- Night work for earthworks and infrastructure services;

1.3 Stage 2 Development Application (SSD 10397 Stage 2 DA)

- Stage 2 Development approval for the following is sought:
  - Construction, fit-out, and use approval of Building 2B;
  - 24 / 7 operation;
  - Warehouse and distribution use;
  - Racking, automation, and warehouse fit-out across four levels;
  - Single level office and fit-out;
  - Signage;
  - Subdivision of Lot 2B;
  - Landscaping;
  - Construction hours for building construction from 3am to 10pm seven days a week;
  - Staged handover of Building 2B to allow certain levels to be occupied and operational prior to completion of others;
  - Importation of building materials via Bakers lane, as primary access, and Aldington Road in school drop-off and pick-up periods.

1.4 Structure of this Report

Section 2 of this report sets out the relevant Secretary's Environmental Assessment Requirements (SEARs) and identifies where these have been addressed in the report.

Section 3 identifies the approved operational noise limits for the site and additional criteria considered by this assessment.

Section 4 outlines the operational noise assessment, including the sources considered, assumptions applied and predicted operational noise levels. Operational noise ($L_{Aeq,15min}$ predictions) and maximum noise ($L_{A1,1min}$ predictions) are provided for unmitigated and mitigated situations and recommended MOD3 operational mitigation measures are summarised. Additionally, an assessment of cumulative industrial noise effects is included.

Section 5 addresses the MOD3 potential off-site road traffic noise impacts associated with the operation of the OWE inclusive of MOD3.

Section 6 provides an assessment of construction noise impacts associated with the Stage 2 development.

WM has undertaken this assessment as a desktop exercise, relying on information provided by SLR in its previous reports in addition to MOD3 design change information provided by Goodman and the MOD3 design team.

2 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

Assessment requirements for the project are provided by the NSW Department of Planning and Environment by way of its *Secretary's Environmental Assessment Requirements* (SEARs). Those relevant to noise and vibration are set out Table 2-1.

Table 2-1 Relevant Secretary's Environmental Assessment Requirements – SEARs

SEARs relevant to Noise and Vibration	Where Addressed in this Report
Description of all potential noise and vibration sources during the construction and operational phases of the development, including on and off-site traffic noise	On-site operational noise sources considered by this assessment including on-site traffic movements are set out in Section 4
	Off-site traffic noise is addressed in Section 5
	On-site construction noise and vibration sources considered by this assessment are set out in Section 6
A cumulative assessment of all potential noise sources in accordance with relevant Environment Protection Authority guidelines	A cumulative noise assessment is provided in Section 4.10
Demonstration of compliance with the noise limits set out in Condition B18, Schedule B of the Development consent SSD 7348	The approved noise limits are set out in Section 3 Compliance with these limits is addressed in Section 4
Details of noise mitigation, management and monitoring measures	A summary of operational noise mitigation measures is provided in Section 4.11 A summary of construction noise mitigation measures is provided in Section 6.7

2.1 Assessment Guidelines

The following NSW Environment Protection Authority (EPA) guidelines, as required by the SEARs, have been adopted:

- Noise from on-site operations (including on-site vehicle movements) has been assessed in accordance with the NSW *Noise Policy for Industry* (NPfI), NSW EPA, 2000, with guidance on sleep disturbance criteria taken from this Policy.
- Noise from off-site vehicle movements has been assessed in accordance with guidance provided by the EPA in the NSW *Road Noise Policy* (RNP), NSW EPA, 2011.
- Construction noise has been assessed in accordance with the *Interim Construction Noise Guideline* (ICNG), DECC, 2009.
- Vibration from construction has been considered in accordance with *Assessing Vibration: A Technical Guideline*, DEC, 2006.

3 OPERATIONAL NOISE CRITERIA

3.1 Approved Noise Limits (SSD 7348)

Conditions B18 and B19 of SSD 7348 include operational noise limits for the site as follows:

B18 The Applicant shall ensure the Development does not exceed the noise limits in Table 3 at the receiver locations N1, N2, N3, N4 and N5 shown on the plan in Appendix 5.

Table 3: Noise Limits dB(A)

Location	Day	Evening	Night	
	LAeq(15 minute)	LAeq(15 minute)	LAeq(15 minute)	LA1(1 minute)
N1 Emmaus Village Residential	44	43	41	51
N3 Kemps Creek – nearest residential property	39	39	37	47
N4 & N5 Kemps Creek – other residences	39	39	37	47
Location	**When in Use**			
N2 Emmaus Catholic College (school)	35 (internal)			

Note: Noise generated by the Development is to be measured in accordance with the relevant procedures and exemptions (including certain meteorological conditions) of the Noise Policy for Industry, EPA 2017.

B19. The noise limits in Table 3 do not apply to receiver N3 if the Applicant has a Noise Agreement with the relevant landowner to exceed the noise limits, and the Applicant has provided written evidence to the Planning Secretary that an agreement is in place.

It is understood that a Noise Agreement between the applicant and receiver N3 has been put in place and submitted to DPIE. As such, the criteria in Condition B18 of the Development Consent SSD 7348 are not applicable at receiver N3.

The locations of receivers N1, N2, N3, N4 and N5 are shown in Appendix 5 of the Development Consent SSD 7348 and in Figure 1-1.

3.2 Noise Criteria Considered by this Assessment

The MOD 2 assessment proposed a variation to the $L_{A1,1min}$ night-time noise limits to accord with the provisions of the NSW *NPfI*, with a level of $L_{A1,1min}$ 52 dBA proposed for all residential receivers.

This assessment considers the $L_{A1,1min}$ levels set out under Approval Condition B18 in addition to the night-time maximum noise level criterion of $L_{A1,1min}$ 52 dBA proposed for all residential receivers.

4 OPERATIONAL NOISE ASSESSMENT

Operational noise emissions from the site have been predicted with a model prepared using the SoundPLAN V7.1 noise modelling software, implementing the CONCAWE prediction method. The model incorporates the OWE MOD 3 Masterplan design, including the updated civil design, buildings and sensitive receivers shown in Figure 1-1.

Operational noise sources included in the model comprise fixed rooftop plant, loading activities (forklifts) and on-site light and heavy vehicles movements.

Consistent with the previous MOD 2 assessment undertaken by SLR, predictions have been undertaken with consideration to neutral meteorological conditions for the daytime, evening and night-time periods and additionally under and adverse meteorological conditions during the night-time period (F-class temperature inversion with a 2 m/s source to receiver drainage flow).

4.1 On-Site Vehicle Movements

The Traffic Impact Assessment prepared by Ason Group (Report No: P1086r01) identifies the estimated OWE traffic generation that may be expected following MOD3, as set out in Table 4-1.

The traffic volumes shown in brackets in Table 4-1 represent the 'seasonal peak' demand. It is understood that these higher volumes would occur only for a short period of time in advance of busy consumer periods (e.g. Christmas and other special days).

For the purposes of assessment both 'typical peak hour' and 'seasonal peak hour' movements have been considered and applied in the noise modelling.

Sound power levels of 90 dBA for light vehicles travelling at 40 km/hr and 103 dBA for heavy vehicles travelling at 25 km/hr have been applied per vehicle movement. It has been assumed that maximum peak vehicle movements in every precinct of the OWE would occur concurrently.

The identified vehicle movements have been apportioned across the relevant estate roads. Consistent with previous assessments, for the precincts unaffected by MOD 3, the night-time vehicle volumes have been assumed to comprise 30% of day peak volume and heavy vehicles have been assumed to comprise 25% of total movements.

With respect to Building 2B, detailed operational information (hourly traffic generation for light and heavy vehicles, with separated inbound/outbound movements) has been provided. This information has been reviewed and used to determine the worst case hourly periods with respect to noise generation from the OWE, with consideration to the 'typical' and 'seasonal peak' operations, within the daytime (7.00am-6.00pm), evening (6.00pm-10.00pm) and night-time (10.00pm-7.00am) timeframes.

Table 4-1 MOD 3 Precinct Traffic Generation

Precinct	GFA (m^2)	AM Peak	PM Peak	Daily
Precinct 1[1]	122,082	94 (103)[2]	74 (78)	2,059 (2,503)
Precinct 2	266,186	677 (920)[2]	468 (629)	3,797 (4,901)
Precinct 3	57,819	94	94	1,094
Precinct 4	113,693	185	185	2,151
Precinct 5	35,640	58	58	674
Total	**595,765**	**1,108 (1,360)**	**879 (1,044)**	**9,776 (11,324)**

Note 1: Detailed first principles traffic generation assessment of Building 1A is included in MOD 2 TIA.
Note 2: Figures in bracket shows peak seasonal changes. These traffic figures demonstrate the maximum possible traffic generation for Buildings 1A and 2B during their peak seasonal periods.
Note 3: The Total GFA includes 345 m^2 for amenities Lot GFA.

4.2 Mechanical Services & Fixed Plant

Based on information provided by Goodman, Table 4-2 sets out the mechanical services / fixed plant noise sources considered for Lot 2B. The rooftop locations of the Lot 2B sources are shown indicatively in Figure 4-1.

For the other OWE Lots, mechanical services/fixed plant noise source assumptions are consistent with the MOD2 assessment, including detailed mechanical services inventory of Lot 1A and assumed cumulative mechanical services sound power levels for the remaining Lots, as set out in Table 4-3.

Table 4-2 Lot 2B Mechanical Services/Fixed Plant Sound Power Levels

ID (refer Figure 4-1)	Source	Sound Power Level (SWL dBA)	Observation	Location	Assumed Operating Condition		
					Day (7am-6pm)	Evening (6pm-10pm)	Night (10pm-7am)
1	Temp 01	66.8	Emitted	Rooftop	On	On	On
		88	External Air Duct				
		89.5	External Discharge Duct				
2	Temp 02	63.4	Emitted	Rooftop	On	On	On
		84.2	External Air Duct				
		86.3	External Discharge Duct				

ID (refer Figure 4-1)	Source	Sound Power Level (SWL dBA)	Observation	Location	Assumed Operating Condition		
					Day (7am-6pm)	Evening (6pm-10pm)	Night (10pm-7am)
3	Temp 03	67.6	Emitted	Office Rooftop	On	On	On
		84.6	External Air Duct				
		91.8	External Discharge Duct				
4	Temp 04	65.1	Emitted	Rooftop	On	On	On
		87.4	External Air Duct				
		86.7	External Discharge Duct				
5	Temp 05	61.6	Emitted	Office Rooftop	On	On	On
		79.6	External Air Duct				
		85.6	External Discharge Duct				
6	Temp 06	64.4	Emitted	Rooftop	On	On	On
		82.1	External Air Duct				
		88.5	External Discharge Duct				
7	Temp 07	66.2	Emitted	Rooftop	On	On	On
		84.2	External Air Duct				
		90.2	External Discharge Duct				
8	Temp 08	67.4	Emitted	Rooftop	On	On	On
		88.6	External Air Duct				
		90.1	External Discharge Duct				
9	Temp 09	66.6	Emitted	Rooftop	On	On	On
		88.6	External Air Duct				
		88.6	External Discharge Duct				
10	Temp 10	65.4	Emitted	Rooftop	On	On	On
		83	External Air Duct				
		89.5	External Discharge Duct				
11	Rooftop	99.6	On the deck of Warehouse	Rooftop	On	On	On
12	Temp AP1	68.4	Emitted	Rooftop	On	On	On
		89.2	External Air Duct				
		91.3	External Discharge Duct				

ID (refer Figure 4-1)	Source	Sound Power Level (SWL dBA)	Observation	Location	Assumed Operating Condition		
					Day (7am-6pm)	Evening (6pm-10pm)	Night (10pm-7am)
13	Temp AP2	64.1	Emitted	Rooftop	On	On	On
		83.8	External Air Duct				
		87.6	External Discharge Duct				
14	Temp AP3	68.4	Emitted	Rooftop	On	On	On
		87.4	External Air Duct				
		92.2	External Discharge Duct				
15	Temp AP4	65.4	Emitted	Rooftop	On	On	On
		84	External Air Duct				
		89.3	External Discharge Duct				
16	Units Ext.	77	Various Equipment Maximum Sound Level	Rooftop	On	On	On
17	Groups SDMO J-77K	91	Soundproof Equipment within the CT-1W y CT-5W	Ground Level	On	On	On
18	Groups SDMO J-130K	93	Soundproof Equipment within the CT-3E	Ground Level	On	On	On
19	Groups SDMO D-330	101	Soundproof Equipment within the CT-2N y CT-4	Ground Level	On	On	On

Note: The details set out in this table have been provided by Goodman.

Figure 4-1 Lot 2B Mechanical Services/Fixed Plant Layout

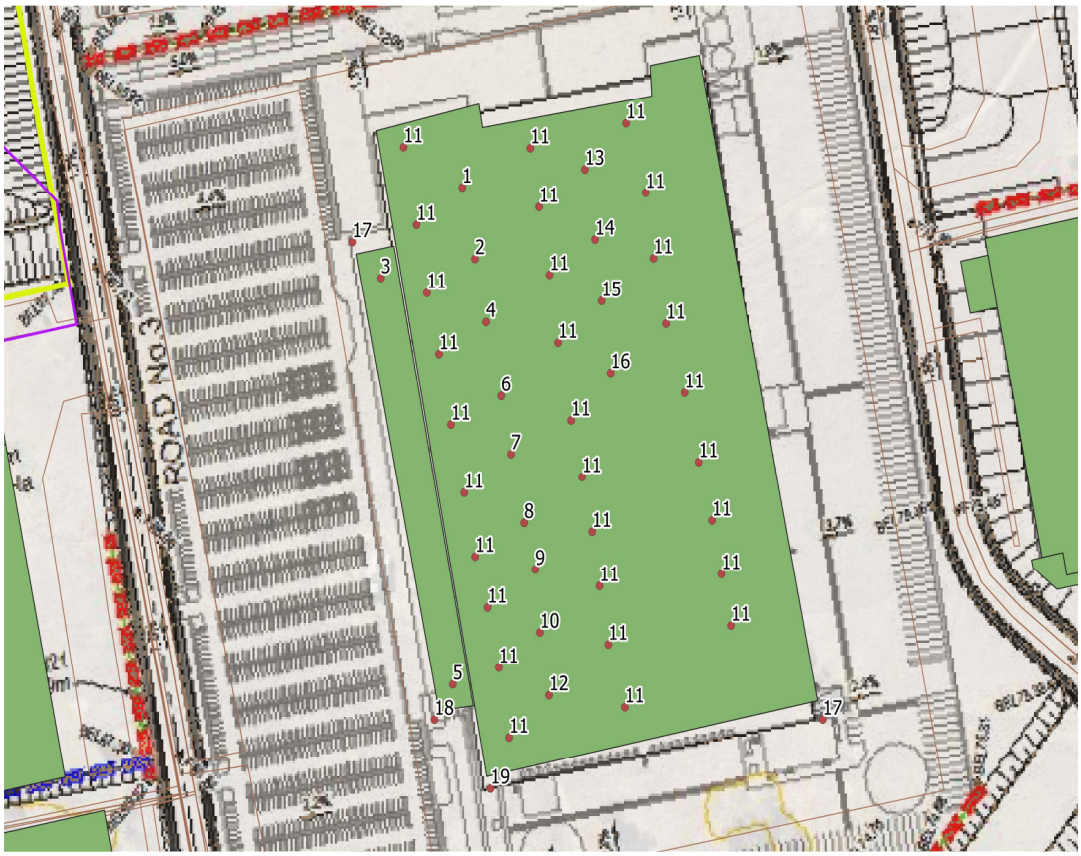


Table 4-3 Mechanical Services/Fixed Plant Noise Sources throughout OWE

Precinct	Lot	Day (7am -6pm)	Evening (6pm-10pm)	Night (10pm -7am)
Precinct 1	1A	See Footnote	See Footnote	See Footnote
	1B1	SWL 90 dBA Cumulative	SWL 90 dBA Cumulative	SWL 85 dBA Cumulative
	1B2	SWL 90 dBA Cumulative	SWL 90 dBA Cumulative	SWL 85 dBA Cumulative
	1C	SWL 90 dBA Cumulative	SWL 90 dBA Cumulative	SWL 85 dBA Cumulative
Precinct 2	2A	SWL 90 dBA Cumulative	SWL 90 dBA Cumulative	SWL 85 dBA Cumulative
	2B	Refer Table 4-2	Refer Table 4-2	Refer Table 4-2
	2C	SWL 90 dBA Cumulative	SWL 90 dBA Cumulative	No Operation
	2D	SWL 90 dBA Cumulative	SWL 90 dBA Cumulative	No Operation
	2E	SWL 90 dBA Cumulative	SWL 90 dBA Cumulative	No Operation

Precinct	Lot	Day (7am -6pm)	Evening (6pm-10pm)	Night (10pm -7am)
Precinct 3	3A	SWL 90 dBA Cumulative	SWL 90 dBA Cumulative	No Operation
	3B	SWL 90 dBA Cumulative	SWL 90 dBA Cumulative	No Operation
	3C	SWL 90 dBA Cumulative	SWL 90 dBA Cumulative	No Operation
	3D	SWL 90 dBA Cumulative	SWL 90 dBA Cumulative	No Operation
	3E	SWL 90 dBA Cumulative	SWL 90 dBA Cumulative	No Operation
Precinct 4	4A	SWL 90 dBA Cumulative	SWL 90 dBA Cumulative	No Operation
	4B	SWL 90 dBA Cumulative	SWL 90 dBA Cumulative	No Operation
	4C	SWL 90 dBA Cumulative	SWL 90 dBA Cumulative	SWL 85 dBA Cumulative
	4D	SWL 90 dBA Cumulative	SWL 90 dBA Cumulative	SWL 85 dBA Cumulative
	4E	SWL 90 dBA Cumulative	SWL 90 dBA Cumulative	No Operation
	4F	SWL 90 dBA Cumulative	SWL 90 dBA Cumulative	SWL 85 dBA Cumulative
	4G	SWL 90 dBA Cumulative	SWL 90 dBA Cumulative	SWL 85 dBA Cumulative
Precinct 5	5A	SWL 90 dBA Cumulative	SWL 90 dBA Cumulative	SWL 85 dBA Cumulative

Note: For the OWE Lots unaffected by MOD 3, the mechanical services/fixed plant noise source assumptions are consistent with the MOD2 assessment, including detailed mechanical services inventory of Lot 1A. Details of the Lot 1A mechanical services plant are set out in Table 4 of the MOD 2 noise assessment prepared by SLR (SLR Ref: 610.15617-L04-v1.5.doc). Assumptions for night-time plant operation has been based off estates in the surrounding area, as advised by Goodman.

4.3 Loading Activities

On-site forklift loading activities have been assumed to be consistent with the MOD2 assessment. This assumes for 1 to 4 forklifts operating per lot for all periods, with the exception of Lots 2C, 2D, 2E, 3B, 3C, 3D, 3E, 4A, 4E and 5A. On these Lots, forklift operations are assumed only during the daytime and evening periods with none at night. Goodman has advised that this assumption has been based off estates in the surrounding area. Additionally, Goodman has confirmed that there would be no external forklift operations on Lot 2B.

Forklift sound power levels of 96 dBA have been assumed.

4.4 Noise Barriers

The MOD2 noise assessment determined that noise walls to the west and south of the site should be installed as indicated in Figure 1-1 and described in the MOD2 assessment.

Due to the MOD3 change in the civil design of Bio Retention Basin No 2 to the west of the site, it is necessary to relocate the noise barrier (on the western side of the site) marginally to the east of the redesigned basin. Given the MOD3 changes to the on-site road layout, for the barrier to be effective, it is also necessary to extend its length and height to ensure satisfactory screening of on-site vehicle movements is achieved.

The noise barrier to the west will have a maximum height of 5 meters.

The proposed MOD3 barrier layouts are shown in Figure 1-1. The MOD3 barrier design is intended to supersede the approved designs.

4.5 Operational Noise Predictions – Considering All Precincts

With consideration to the operation of the fully developed OWE as outlined above, Table 4-4 sets out the MOD3 $L_{Aeq,15min}$ operational noise predictions in comparison with the MOD 2 predictions and the approved noise limits.

As shown, without mitigation noise emissions from the OWE are predicted to exceed the approved noise limits at sensitive receivers within the Emmaus Village (N1) and at the closest sensitive Kemps Creek locations (N4, N5) during worst-case peak operations.

To reduce these exceedances feasible and reasonable noise mitigation measures have been investigated. Modelling indicates that with the modified barrier design (as discussed in Section 4.4) and acoustic treatment of the Lot 2B mechanical plant during detailed design, the approved $L_{Aeq,15min}$ noise limits would be met for typical and peak operations and all considered meteorological conditions at N1 and N2 to the west of the site.

At N4, general compliance is predicted, with residual exceedances of 2 dB (typical) and 3 dB (peak season) predicted at night under noise enhancing meteorological conditions.

At N5 for typical operations, 1 dB residual exceedances of the day and evening limits are predicted, with a 3 dB exceedance of the night limit predicted under noise enhancing meteorological conditions. With respect to the seasonal peak, exceedances of 2 dB (day), 1 dB (evening), and 4 dB (night, noise enhancing conditions) are predicted.

In the context of the *NPfI* residual exceedances of up to 2 dB are generally considered negligible. The exceedances above 2 dB are defined by the *NPfI* as marginal to moderate in nature, however with consideration to the relatively rare occurrence i.e. during peak season operations and under noise enhancing conditions, these exceedances are not considered to be of great significance.

Table 4-4 Predicted $L_{Aeq,15min}$ Operational Noise Levels – All Precincts

Receiver	Period (weather)	$L_{Aeq,15min}$ Noise Level (dBA)				
		Approved Noise Limits	Predicted MOD2	Predicted MOD3 Unmitigated	Predicted MOD3 Mitigated	
					Typical	Peak Season
N1 – Emmaus Village Residential	Day	44	36	**45**	38	39
	Eve	43	36	**45**	37	38
	Night	41	30	**44**	35	36
	Night(Adverse)	41	34	**45**	38	39
N2 – Emmaus Catholic College (School)	Day	45	39	45	40	41
	Eve	n/a	n/a	45	40	40
	Night	n/a	n/a	45	37	38
	Night(Adverse)	n/a	n/a	45	40	42
N3 – Kemps Creek – nearest residential property	Day	n/a	44	51	46	48
	Eve	n/a	44	51	46	47
	Night	n/a	37	51	42	44
	Night(Adverse)	n/a	42	52	45	48
N4 – Kemps Creek – other residence	Day	39	39	**44**	39	39
	Eve	39	39	**44**	39	39
	Night	37	31	**44**	36	36
	Night(Adverse)	37	37	**46**	**39**	**40**
N5 – Kemps Creek – other residence	Day	39	38	**45**	**40**	**41**
	Eve	39	38	**45**	**40**	**40**
	Night	37	31	**44**	36	37
	Night(Adverse)	37	37	**46**	**40**	**41**

Note 1: The approved noise limit for N2 is L_{Aeq} 35 dBA which applies internally and is only applicable when the school is in use. For the purpose of this assessment a conservative inside to outside correction of +10 dBA has been applied to the internal limit for N2 to allow for comparison with the external noise predictions. An inside to outside correction of +10 dBA is typical of a building with partially open windows.
Note 2: As per Condition C19 of the Development Consent SSD 7348, the predicted noise levels at N3 have not been compared against the approved noise limits, as a noise agreement is in place between the residential landowner and the applicant. Note, however, that the predicted noise levels have increased with respect to the MOD2 assessment.
Note 3: Bold text indicates an exceedance of the approved noise limits.
Note 4: Consistent with the MOD2 assessment, noise-enhancing weather conditions during the daytime and evening periods have not been included in the assessment as these are not considered prevailing conditions for the site.
Note 5: This assessment has applied a revised sound power level of 90 dBA to represent a light vehicle movement. MOD2 applied a sound power level of 96 dBA, which is considered overly conservative.
Note 6: The 'Unmitigated MOD3' predictions assume the noise controls recommended by the MOD2 noise assessment. This includes the restriction of mechanical services use during the night-time period on Lots 3A, 3B, 3C, 3D, 3E, 2C, 2D, 2E, 4A, 4B, 4E; restriction of the use of forklifts during the night-time period on Lots 3B, 3C, 3D, 3E, 2B, 2C, 2D, 2E, 4A, 4E, 5A; and the installation of noise walls to the west and south of the site as described in the MOD2 assessment. However, due to the MOD3 change in the civil design of the Bio Retention Basin No 2 to the west of the site, the noise barrier has been relocated marginally to the east of the basin.
Note 6: The 'Mitigated MOD3' predictions have assumed that the Lot 2B mechanical services plant can be attenuated by 10 dB by inclusion of silencers/attenuators and/or barrier solutions. This would need to be addressed with the mechanical services engineers during detailed design. Note this assessment has assumed that all mech services plant would operate concurrently, at all times - this assumption would also be reviewed at detailed design.
Note 7: The 'Mitigated MOD3' predictions assume the barrier to the west of the site is extended to the extent and heights shown in Figure 1-1.

4.6 Operational Noise Predictions – Staged Development

It is currently anticipated there would be a period of approximately 5-6 months where only Building 2B would operate due to other commitments on the site. Thereafter, Precinct 1 would be developed and then operate concurrently with Building 2B for a period before the rest of the estate is fully developed.

Table 4-5 shows the $L_{Aeq,15min}$ operational noise predictions in comparison with the approved noise limits for Lot 2B; Lot 2B + Precinct 1; and All Precincts.

The predictions in Table 4-5 show that during the identified site development stages, the operational noise levels to the west of the site would be expected to remain in compliance with the approved noise limits. However, to the south of the site, some further temporary exceedances have potential to occur.

At N4, residual exceedances of up to 4 dB (typical) and 6 dB (peak season) are predicted at night under noise enhancing meteorological conditions.

At N5, residual exceedances of up to 3 dB (typical) and 5 dB (peak season) are predicted at night under noise enhancing meteorological conditions.

The residual exceedances of up to 5 dB are defined as moderate by the *NPfI* , whilst the 6 dB exceedance is defined by the *NPfI* as significant. However, again it is noted that this is only predicted to occur under relatively rare conditions (during peak season operations and under noise enhancing conditions).

Table 4-5 Predicted $L_{Aeq,15min}$ Operational Noise Levels – Staged Development

Receiver	Period (weather)	$L_{Aeq,15min}$ Noise Level (dBA)						
		Approved Noise Limits	Lot 2B		Lot 2B + Precinct 1		All Precincts	
			Typical	Peak Season	Typical	Peak Season	Typical	Peak Season
N1 – Emmaus Village Residential	Day	44	35	37	36	37	38	39
	Eve	43	34	35	34	37	37	38
	Night	41	35	36	35	36	35	36
	Night(Adverse)	41	39	39	39	41	38	39
N2 – Emmaus College (School)	Day	45	40	45	40	45	40	41
	Eve	n/a	42	42	42	43	40	40
	Night	n/a	39	43	39	43	37	38
	Night(Adverse)	n/a	44	47	44	48	40	42
N3 – Kemps Creek – residence	Day	n/a	42	45	43	45	46	48
	Eve	n/a	43	43	42	43	46	47
	Night	n/a	42	43	42	43	42	44
	Night(Adverse)	n/a	46	48	46	48	45	48
N4 – Kemps Creek – residence	Day	39	36	39	37	40	39	39
	Eve	39	37	37	36	38	39	39
	Night	37	36	38	36	38	36	36
	Night(Adverse)	37	**41**	**43**	**41**	**43**	**39**	**40**
N5 – Kemps Creek – residence	Day	39	36	39	36	39	**40**	**41**
	Eve	39	37	37	36	37	**40**	**40**
	Night	37	36	37	36	37	36	37
	Night(Adverse)	37	**40**	**42**	**40**	**42**	**40**	**41**

Note 1: The approved noise limit for N2 is L_{Aeq} 35 dBA which applies internally and is only applicable when the school is in use. For the purpose of this assessment a conservative inside to outside correction of +10 dBA has been applied to the internal limit for N2 to allow for comparison with the external noise predictions. An inside to outside correction of +10 dBA is typical of a building with partially open windows.
Note 2: As per Condition C19 of the Development Consent SSD 7348, the predicted noise levels at N3 have not been compared against the approved noise limits, as a noise agreement is in place between the residential landowner and the applicant. Note, however, that the predicted noise levels have increased with respect to the MOD2 assessment.
Note 3: Bold text indicates an exceedance of the approved noise limits.
Note 4: Consistent with the MOD2 assessment, noise-enhancing weather conditions during the daytime and evening periods have not been included in the assessment as these are not considered prevailing conditions for the site.
Note 5: This assessment has applied a revised sound power level of 90 dBA to represent a light vehicle movement. MOD2 applied a sound power level of 96 dBA, which is considered overly conservative.
Note 6: The 'Unmitigated MOD3' predictions assume the noise controls recommended by the MOD2 noise assessment. This includes the restriction of mechanical services use during the night-time period on Lots 3A, 3B, 3C, 3D, 3E, 2C, 2D, 2E, 4A, 4B, 4E; restriction of the use of forklifts during the night-time period on Lots 3B, 3C, 3D, 3E, 2B, 2C, 2D, 2E, 4A, 4E, 5A; and the installation of noise walls to the west and south of the site as described in the MOD2 assessment. However, due to the MOD3 change in the civil design of the Bio Retention Basin No 2 to the west of the site, the noise barrier has been relocated marginally to the east of the basin.
Note 6: The 'Mitigated MOD3' predictions have assumed that the Lot 2B mechanical services plant can be attenuated by 10 dB by inclusion of silencers/attenuators and/or barrier solutions. This would need to be confirmed with the mechanical services engineers during detailed design.
Note 7: The 'Mitigated MOD3' predictions assume the barrier to the west of the site is extended to the extent and heights shown in Figure 1-1.

4.7 Managing Residual Exceedances

Modelling indicates that due to the elevations of Receivers N4 and N5 and their lines of sight to the OWE, on-site barriers have limited efficacy in reducing the identified residual noise exceedances.

Section 4.2 of the *NPfI* discusses the acceptability of residual noise impacts, where all source and pathway feasible and reasonable noise mitigation measures have been applied. With respect the fully developed site, in accordance with the provisions of the *NPfI,* the exceedances may be considered generally marginal to moderate in nature.

However, given the current expectation that Lot 2B and Precinct 1 would operate for a substantial period prior to the full development of the OWE, it is considered appropriate to consider the exceedances identified in Table 4-5. The *NPfI* defines the identified temporary residual exceedance at N4 of up to 6 dB as significant.

With consideration to the potential impacts, Goodman proposes to consult with the affected landowners (N4, N5) to address the matter of potential noise impacts during the development and operation of the OWE and would seek to enter into noise agreements with the potentially affected owners.

Subject to their agreement, Goodman proposes to offer to provide 'at-receiver' noise mitigation treatments, consistent with the recommendations of the *Noise Policy for Industry* (*NPfI*).

Taking into consideration the particular preferences of the landowners, the treatments considered would include upgraded glazing standards to further increase the ability of the building façade to reduce noise levels. The owners would be invited to participate in mitigation selection process in a transparent, equitable and consistent way.

4.8 Sleep Disturbance Assessment – Considering All Precincts

An assessment of potential sleep disturbance has been undertaken considering heavy vehicle brake releases and reverse alarms (non-tonal) modelled in the hardstand areas of the development with a sound power level of SWL 115 dBA.

Table 4-6 identifies the MOD3 $L_{A1,1min}$ maximum operational noise predictions in comparison with the adopted $L_{A1,1min}$ noise criteria.

Table 4-6 Predicted Maximum Operational Noise Levels – All Precincts

Receiver	Period (weather)	$L_{A1,1min}$ Noise Level (dBA)	
		Adopted Criteria (Approved Limit)	Predicted MOD3 Mitigated
N1 – Emmaus Village – Residential	Night	52 (51)	43
	Night(Adverse)	52 (51)	49
N2 – Emmaus College (School)	Night	n/a	n/a
	Night(Adverse)	n/a	n/a
N3 – Kemps Creek – Residence	Night	n/a	60
	Night(Adverse)	n/a	61
N4 – Kemps Creek – Residence	Night	52 (47)	49
	Night(Adverse)	52 (47)	**53**
N5 – Kemps Creek – Residence	Night	52 (47)	46
	Night(Adverse)	52 (47)	52

The modelling indicates the potential for $L_{A1,1min}$ noise emissions to marginally exceed the adopted criteria by 1 dB at N4 (adverse meteorological conditions). It is noted that with respect to the approved limit, this represents a 6 dB exceedance. However, as discussed in Section 3, this assessment principally considers the guidance from the *NPfI* with respect to the sleep disturbance.

4.9 Sleep Disturbance Assessment – Staged Development

Table 4-7 shows the $L_{A1,1min}$ maximum operational noise predictions in comparison with the approved noise limits for Lot 2B; Lot 2B + Precinct 1; and All Precincts. This shows no further impacts beyond those identified by Table 4-6.

Table 4-7 Predicted Maximum Operational Noise Levels – Staged Development

Receiver	Period	$L_{A1,1min}$ Noise Level (dBA)			
		Adopted Criteria (Approved Limit)	Lot 2B	Lot 2B + Precinct 1	All Precincts
N1 – Emmaus Village Residential	Night	52 (51)	46	46	43
	Night^{Adverse}	52 (51)	51	46	49
N2 – Emmaus College (School)	Night	n/a	n/a	n/a	n/a
	Night^{Adverse}	n/a	n/a	n/a	n/a
N3 – Kemps Creek – residence	Night	n/a	52	52	60
	Night^{Adverse}	n/a	56	52	61
N4 – Kemps Creek – residence	Night	52 (47)	44	44	49
	Night^{Adverse}	52 (47)	50	44	**53**
N5 – Kemps Creek – residence	Night	52 (47)	43	43	46
	Night^{Adverse}	52 (47)	49	43	52

The 'at receiver' treatments proposed for N4 and N5, as discussed in Section 4.7, would be expected to fully mitigate against the potential for sleep disturbances at these receivers.

4.10 Cumulative Operational Noise Assessment

As required by the SEARS, the cumulative effect of noise from all industrial sources has been considered in assessing potential noise impacts.

The *NPfI* identifies recommended Amenity Noise Levels (ANLs) for various land uses that cumulative industrial noise levels should remain below where feasible and reasonable. The residential receivers considered by this assessment fall within the 'Rural' *NPfI* land use category, to which ANLs of $L_{Aeq,Day}$ 50 dBA, $L_{Aeq,Evening}$ 45 dBA and $L_{Aeq,Night}$ 40 dBA apply. For the Emmaus College school classrooms, an internal ANL of $L_{Aeq,Day}$ 35 dBA applies, which for assessment purposes is considered equivalent to an external ANL of $L_{Aeq,Day}$ 45 dBA.

The intention is for all industrial sites in combination to comply with these ANLs.

The SSDA noise assessment (610.15617-R2) considered the potential cumulative noise impacts associated with the operation of the Oakdale Central, Oakdale South and Jacfin industrial sites which are currently either partially operational, under construction or undergoing approval. This determined that the combined industrial noise levels from these sites are expected to be >6 dB below the daytime ANL, up to 6 dB below the evening ANL, and up to 2 dB below the night ANL.

In accordance with the *NSW Industrial Noise Policy (INP)*, the SSDA noise assessment identified that to ensure cumulative industrial noise remains within the identified ANLs, the OWE should not contribute noise level of more than $L_{Aeq,Day}$ 50 dBA, $L_{Aeq,Evening}$ 44 dBA and $L_{Aeq,Night}$ 36 dBA at the residential sites or $L_{Aeq,Day}$ 45 dBA at the school site.

The *INP* was the current policy at the time of the development application and therefore the provisions of the *INP* (and the approved noise limits based thereon) have been considered for the purposes of this assessment. However, the *INP* was officially superseded by the *Noise Policy for Industry (NPfI)* in October 2017 and it is noted that the *NPfI* recommends that to ensure cumulative industrial noise levels remain within the recommended ANLs, a Project Amenity Noise Level 5 dB below the ANL should apply.

Applying the *NPfI* methodology results in the Project Amenity Noise Levels for the OWE shown in Table 4-8.

Table 4-8 *NPfI* Project Amenity Noise Levels

Receiver Type	Receiver	Day (7am -6pm)	Evening (6pm -10pm)	Night (10pm -7am)
		$L_{Aeq,Day}$ (dBA)	$L_{Aeq,Evening}$ (dBA)	$L_{Aeq,Night}$ (dBA)
Sensitive Residential Receivers	N1, N4, N5	45	40	35
School	N2	45 (External)	-	-

Note 1: The Project Amenity Noise Level for N2 is L_{Aeq} 35 dBA which applies internally and is only applicable when the school is in use. For the purpose of this assessment a conservative inside to outside correction of +10 dBA has been applied to the internal limit for N2 to allow for comparison with the external noise predictions. An inside to outside correction of +10 dBA is typical of a building with partially open windows.
Note 2: Applying the *NPfI* approach results in more onerous Project Amenity Noise Levels than determined by the SSDA noise assessment, undertaken in accordance with the NSW Industrial Noise Policy (INP). The SSDA noise assessment identified that to ensure cumulative industrial noise remains within the identified ANLs, the OWE should not contribute noise level of more than $L_{Aeq,Day}$ 50 dBA, $L_{Aeq,Evening}$ 44 dBA and $L_{Aeq,Night}$ 36 dBA at the residential sites or $L_{Aeq,Day}$ 45 dBA at the school site.

Table 4-9 shows the $L_{Aeq,Period}$ operational noise predictions in comparison with the identified Project Amenity Noise Levels for Lot 2B; Lot 2B + Precinct 1; and All Precincts.

At N1, at night under noise enhancing meteorological conditions an OWE noise contribution in the range $L_{Aeq,Period}$ 37-41 dBA is predicted. This exceeds the Project Amenity Noise Level by 2 to 6 dB. However, when consideration is given to the screening effects of the OWE and the additional separation distance to the other industrial sites located further to the east (Oakdale Central, Oakdale South and Jacfin), it would be expected that the *NPfI* recommended ANLs (for cumulative industrial noise) would be generally achieved at N1, apart from a potential negligible 1 dB exceedance under the 'Lot 2B + Precinct 1' scenario.

At N4, at night the OWE is predicted to contribute levels in the range $L_{Aeq,Period}$ 36-38 dBA (standard meteorological conditions) and $L_{Aeq,Period}$ 39-43 dBA (noise enhancing meteorological conditions). These levels exceed the Project Amenity Noise Level by up to 3 dB (standard) and by up to 8 dB (noise enhancing).

At N5, at night the OWE is predicted to contribute levels in the range $L_{Aeq,Period}$ 35-37 dBA (standard meteorological conditions) and $L_{Aeq,Period}$ 39-42 dBA (noise enhancing meteorological conditions). These levels exceed the Project Amenity Noise Level by up to 2 dB (standard) and by up to 7 dB (noise enhancing).

The 'at receiver' treatments proposed for N4 and N5, as discussed in Section 4.7, would be expected to mitigate against the potential for cumulative industrial noise impacts at these receivers.

Table 4-9 Predicted $L_{Aeq,Period}$ Operational Noise Levels – Staged Development

Receiver	Period (weather)	$L_{Aeq,Period}$ Noise Level (dBA)						
		NPfI Project Amenity Noise Levels (SSDA Levels shown in brackets)	Lot 2B		Lot 2B + Precinct 1		All Precincts	
			Typical	Peak	Typical	Peak	Typical	Peak
N1 – Emmaus Village Residential	Day	45 (50)	34	35	35	36	37	38
	Eve	40 (44)	34	35	35	37	37	37
	Night	35 (36)	34	35	34	36	35	36
	Night(Adverse)	35 (36)	37	38	38	41	38	39
N2 – Emmaus College (School)	Day	45	39	42	40	42	39	40
	Eve	n/a	39	43	40	43	39	39
	Night	n/a	39	42	39	43	36	38
	Night(Adverse)	n/a	43	46	40	47	40	41
N3 – Kemps Creek – residence	Day	n/a	42	43	42	43	45	47
	Eve	n/a	42	43	42	43	45	45
	Night	n/a	41	43	41	43	42	43
	Night(Adverse)	n/a	45	47	45	47	45	47
N4 – Kemps Creek – residence	Day	45 (50)	36	37	36	37	38	39
	Eve	40 (44)	36	38	36	38	38	38
	Night	35 (36)	36	37	36	38	36	36
	Night(Adverse)	35 (36)	**40**	**42**	**39**	**43**	**39**	**40**
N5 – Kemps Creek – residence	Day	45 (50)	36	36	36	37	**39**	**40**
	Eve	40 (44)	36	37	36	37	**39**	40
	Night	35 (36)	35	37	35	37	36	37
	Night(Adverse)	35 (36)	**39**	**41**	**40**	**42**	**40**	**42**

Note 1: The Project Amenity Noise Level for N2 is L_{Aeq} 35 dBA which applies internally and is only applicable when the school is in use. For the purpose of this assessment a conservative inside to outside correction of +10 dBA has been applied to the internal limit for N2 to allow for comparison with the external noise predictions. An inside to outside correction of +10 dBA is typical of a building with partially open windows.
Note 2: As per Condition C19 of the Development Consent SSD 7348, the predicted noise levels at N3 have not been compared against the approved noise limits, as a noise agreement is in place between the residential landowner and the applicant.
Note 3: Bold text indicates an exceedance of the Project Amenity Noise Levels.
Note 4: Consistent with the MOD2 assessment, noise-enhancing weather conditions during the daytime and evening periods have not been included in the assessment as these are not considered prevailing conditions for the site.
Note 5: This assessment has applied a revised sound power level of 90 dBA to represent a light vehicle movement. MOD2 applied a sound power level of 96 dBA, which is considered overly conservative.
Note 6: The predictions assume the noise controls recommended by the MOD2 noise assessment. This includes the restriction of mechanical services use during the night-time period on Lots 3A, 3B, 3C, 3D, 3E, 2C, 2D, 2E, 4A, 4B, 4E; restriction of the use of forklifts during the night-time period on Lots 3B, 3C, 3D, 3E, 2B, 2C, 2D, 2E, 4A, 4E, 5A; and the installation of noise walls to the west and south of the site as described in the MOD2 assessment. However, due to the MOD3 change in the civil design of the Bio Retention Basin No 2 to the west of the site, the noise barrier has been relocated marginally to the east of the basin.
Note 6: The predictions have assumed that the Lot 2B mechanical services plant can be attenuated by 10 dB by inclusion of silencers/attenuators and/or barrier solutions. This would need to be confirmed with the mechanical services engineers during detailed design.
Note 7: The predictions assume the barrier to the west of the site is extended to the extent and heights shown in Figure 1-1.
Note 8: The Project Amenity Noise Levels determined by the SSDA noise assessment are shown in brackets.

4.11 Summary of Operational Noise Mitigation

In order to ensure the levels identified in Tables 4-4 to 4-7 are achieved, and that internal residential amenity standards are maintained the following operational noise mitigation controls have been identified and are recommended:

- Noise barriers possessing surface mass of no less than 15 kg/m^2 to be installed at the locations and to the heights identified in Figure 1-1;
- On-site speed limits of 25 km/hour for heavy vehicles and 40 km/hr for light vehicles to be imposed on the estate roads;
- During detailed design, Lot 2B rooftop mechanical services plant to be reviewed to ensure that cumulatively emissions are controlled to not exceed $L_{Aeq,15min}$ 37 dBA at the OWE site boundary. The inclusion of silencers/attenuators and/or barrier solutions may be considered to ensure these acoustic design standards are achieved, as confirmed by noise modelling;
- Goodman to consult with landowners (N4, N5) to address the matter of potential noise impacts during the development and operation of the OWE and would seek to enter into noise agreements with the potentially affected owners.
- Subject agreement, Goodman to provide 'at-receiver' noise mitigation treatments, consistent with the recommendations of the *NPfI* at N4, N5. Taking into consideration the particular preferences of the landowners, the treatments considered would include upgraded glazing standards to further increase the ability of the building façade to reduce noise levels. The owners would be invited to participate in mitigation selection process in a transparent, equitable and consistent way.

5 OFF SITE TRAFFIC NOISE IMPACTS

5.1 Off-Site Traffic Noise Impact Assessment

The *RNP* requires noise mitigation where new land use developments increase road traffic noise by more than 2 dB. An increase of greater than 2 dB requires an increase in traffic volumes of approximately 60% or higher.

The main access route to the development site is via the proposed Western North-South Link Road (WNSLR) then the arterial road of Lenore Drive. The forecast traffic daily traffic volumes on Lenore Drive at opening of the WNSLR is approximately 28,000 vehicles (refer to SLR report 610.16083-R1), including vehicle movements from the OWE. The daily traffic volume from the OWE is estimated to be approximately 11,324 vehicles, which equates to an increase in traffic volumes of approximately 45%.

Therefore, an increase in traffic noise due to the OWE of greater than 2 dB is not considered likely. No mitigation is likely to be required as a result.

6 CONSTRUCTION NOISE & VIBRATION ASSESSMENT

Construction noise and vibration impacts from the OWE have previously been assessed by SLR (610.15617-R2). With respect to Stage2 DA, this assessment considers the potential for construction noise and vibration impacts from the development of Building 2B.

The Building 2B construction works are proposed to be undertaken between 3.00am to 10.00pm seven days a week, therefore standard and out-of-hours construction periods have been considered.

The following scenarios have been assessed:

- Site clearing and earthworks at Building 2B location;
- Pad and hardstand works, including concrete pours at Building 2B location;
- Construction of Building 2B warehouse and office structures; and
- The use of the site access road for the delivery of materials to the site.

6.1 Construction Noise Criteria

Condition D70 of SSD 7348 limits noise generating construction works to within standard construction hours (7.00am – 6.00pm Monday to Friday and 8.00am – 1.00pm Saturdays), with the exceptions identified by Condition D71 as follows:

D71. Works outside of the hours identified in Condition D70 may be undertaken in the following circumstances:
a) works that are inaudible at the nearest sensitive receivers;
b) works agreed to in writing by the Planning Secretary;
c) for the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons; or
d) where it is required in an emergency to avoid the loss of lives, property or to prevent environmental harm.

Condition D72 requires the following:

D72. Stage 1 must be constructed with the aim of achieving the construction noise management levels detailed in the Interim Construction Noise Guideline (DECC, 2009) (as may be updated or replaced from time to time). All feasible and reasonable noise mitigation measures must be implemented and any activities that could exceed the construction noise management levels must be identified and managed in accordance with the Construction Noise and Vibration Management Plan required by Condition D73.

Adopting the measured background noise levels determined by SLR (SLR report *610.15617-R2*), the Construction Noise Management Levels NMLs derived for the project in accordance with the NSW *Interim Construction Noise Guideline* (*ICNG)* are detailed in Table 6-1.

Table 6-1 *ICNG* Construction Noise Management Levels (CNMLs)

Receiver	Period	$L_{Aeq,15min}$ Construction NMLs (dBA)		
		Standard Hours	Out of Hours	Highly Noise Affected
N1 – Emmaus Village Residential	Day	49	44	75
	Evening	n/a	43	75
	Night	n/a	41	75
N2 – Emmaus Catholic College (School)	Day	55*	n/a	n/a
	Evening	n/a	n/a	n/a
	Night	n/a	n/a	n/a
N3 – Kemps Creek – residence	Day	n/a	39	75
	Evening	n/a	39	75
	Night	n/a	37	75
N4 – Kemps Creek – residence	Day	44	39	75
	Evening	n/a	39	75
	Night	n/a	37	75
N5 – Kemps Creek – residence	Day	44	39	75
	Evening	n/a	39	75
	Night	n/a	37	75

* An internal CNML of L_{Aeq} 45 dBA applies internally for school classrooms. For the purpose of assessment an external noise level of L_{Aeq} 55 dBA has been adopted, with consideration to the generally accepted 10 dB noise reduction typically achieved through a partially open window.

6.2 Construction Noise Impact Assessment

For the identified construction activities, this assessment considers the construction equipment and sound power levels set out in Table 6-2.

Predicted $L_{Aeq,15min}$ construction noise levels are compared with the *ICNG* criteria in Table 6-3. Maximum night-time construction noise levels are set out in Table 6-4. The predictions assume the western site boundary noise wall, as shown in Figure 1-1, is constructed prior to the commencement of the works approved under this DA.

Table 6-2 Sound Power Levels for Construction Equipment

Construction Activity	Equipment	Operating minutes in 15-min period	No of Items in same location	Sound Power Level (dBA)		
				$L_{Aeq,15min}$		L_{Amax}
				Item	Activity	Activity
Site Clearing and Earthworks	Dozer	15	1	110	116	121
	Dump Truck	15	3	100		
	Excavator	15	1	102		
	Front End Loader (FEL) 962	15	1	112		
	Grader	15	1	108		
Pad and Hardstand Works	Concrete Pump	7.5	1	106	113	118
	Concrete Truck / Agitator	7.5	1	106		
	Concrete Vibrator	15	1	102		
	Paving Machine	15	1	104		
	Plate Compactor	5	1	108		
	Vibratory Roller (12 tonne)	15	1	109		
Construction of Warehouse and Office Structures	Elevated Working Platform	15	2	97	107	112
	Flatbed Truck	15	1	100		
	Hand Tools (electric)	15	4	96		
	Mobile Crane (100 tonne)	15	1	101		
	Welding Equipment	15	1	97		
Use of Access Road for Deliveries	13 HV & 4 LV Movements per Hour (Daytime) 4 HV & 4 LV Movements per Hour (Evening) 5 HV & 4 LV Movements per Hour (Night)			115 (Heavy Vehicle) 90 (Light Vehicle)		

Note 1: In accordance with the *ICNG*, for activities identified as particularly annoying (such as jackhammering, rock breaking and power saw operations), a 5 dB 'penalty' is added to the source sound power level when predicting noise using the quantitative method.

Table 6-3 Predicted $L_{Aeq,15min}$ Construction Noise Levels

Receiver	Period (weather)	$L_{Aeq,15min}$ Noise Level (dBA)					
		CNML	Highly Affected NML	Predicted			
				Earthworks	Hardstand	Warehouse	Access Road
N1 – Emmaus Village Residential	Day (Standard)	49	75	38	35	47	36
	Day (Out of Hours)	44	n/a	38	35	**47**	36
	Eve	43	n/a	38	35	**47**	36
	Night	41	n/a	38	35	**47**	36
	Night(Adverse)	41	n/a	40	37	**49**	38
N2 – Emmaus Catholic College (School)	Day (Standard)	55*	n/a	47	44	48	41
	Day (Out of Hours)	n/a	n/a	47	44	48	41
	Eve	n/a	n/a	47	44	48	41
	Night	n/a	n/a	47	44	48	41
	Night(Adverse)	n/a	n/a	49	46	50	43
N3 – Kemps Creek – residence	Day (Standard)	n/a	n/a	48	45	49	51
	Day (Out of Hours)	n/a	n/a	48	45	49	51
	Eve	n/a	n/a	48	45	49	51
	Night	n/a	n/a	48	45	49	51
	Night(Adverse)	n/a	n/a	50	47	51	53
N4 – Kemps Creek – residence	Day (Standard)	44	75	43	40	42	40
	Day (Out of Hours)	39	n/a	**43**	**40**	**42**	**40**
	Eve	39	n/a	**43**	**40**	**42**	**40**
	Night	37	n/a	**43**	**40**	**44**	**40**
	Night(Adverse)	37	n/a	**45**	**42**	**42**	**42**
N5 – Kemps Creek – residence	Day (Standard)	44	75	43	40	42	38
	Day (Out of Hours)	39	n/a	**43**	**40**	**42**	38
	Eve	39	n/a	**43**	**40**	**42**	38
	Night	37	n/a	**43**	**40**	**42**	**38**
	Night(Adverse)	37	n/a	**45**	**42**	**44**	**40**

Note 1: The *ICNG* criterion for N2 is L_{Aeq} 45 dBA which applies internally and is only applicable when the school is in use. For the purpose of this assessment a conservative inside to outside correction of +10 dBA has been applied to the internal limit for N2 to allow for comparison with the external noise predictions. An inside to outside correction of +10 dBA is typical of a building with partially open windows.
Note 2: As per Condition C19 of the Development Consent SSD 7348, the predicted noise levels at N3 have not been compared against the approved noise limits, as a noise agreement is in place between the residential landowner and the applicant.
Note 3: Bold text indicates an exceedance of the *ICNG* CNML.
Note 4: Noise-enhancing weather conditions during the daytime and evening periods have not been included in the assessment as these are not considered prevailing conditions for the site.
Note 5: The predictions assume the western site boundary noise wall, as shown in Figure 1-1, is constructed prior to the commencement of the works approved under this DA.

Table 6-4 Predicted L_{Amax} Construction Noise Levels

Receiver	Period (weather)	L_{Amax} Noise Level (dBA)				
		CNML	Predicted			
			Earthworks	Hardstand	Warehouse	Access
N1 – Emmaus Village Residential	Night	52	42	40	52	41
	Night(Adverse)	52	44	42	**54**	43
N2 – Emmaus Catholic College (School)	Night	n/a	52	49	53	46
	Night(Adverse)	n/a	54	51	55	48
N3 – Kemps Creek – residence	Night	n/a	53	50	54	56
	Night(Adverse)	n/a	55	52	56	58
N4 – Kemps Creek – residence	Night	52	48	45	49	45
	Night(Adverse)	52	50	47	47	47
N5 – Kemps Creek – residence	Night	52	48	45	47	43
	Night(Adverse)	52	50	47	49	45

Note 1: As per Condition C19 of the Development Consent SSD 7348, the predicted noise levels at N3 have not been compared against the approved noise limits, as a noise agreement is in place between the residential landowner and the applicant.
Note 3: Bold text indicates an exceedance of the *ICNG* CNML.
Note 4: Noise-enhancing weather conditions during the daytime and evening periods have not been included in the assessment as these are not considered prevailing conditions for the site.
Note 5: The predictions assume the western site boundary noise wall, as shown in Figure 1-1, is prior to the commencement of the works approved under this DA.

6.3 Construction Noise Criteria Exceedances

The predictions indicate general compliance with the *ICNG* standard hours criteria without any focussed mitigation requirements.

The out of hours works have potential to exceed the *ICNG* criteria as follows:

Daytime Out of Hours

- N1 – by up to 3 dB;
- N4 – by up to 1-4 dB;
- N5 – by up to 1-4 dB;

Evening Out of Hours

- N1 – by up to 4 dB;
- N4 – by up to 1-4 dB;
- N5 – by up to 1-4 dB;

Night (Standard Meteorology)

- N1 – by up to 6 dB;
- N4 – by up to 3-7 dB;
- N5 – by up to 1-6 dB;

Night (Noise Enhancing Meteorology)

- N1 – by up to 8 dB;
- N4 – by up to 5-8 dB;
- N5 – by up to 3-8 dB.

The daytime out-of-hours exceedances, being < 5dB above the CNML are considered to be marginal only and are not considered to warrant any particular focused noise mitigation.

The evening exceedances, being < 5dB above the NML are also not considered to be particularly significant or intrusive.

At night, with exceedances of up to 7 dB (standard meteorology) and 8 dB (noise enhancing meteorology) the works may be expected to be clearly audible, but not highly intrusive.

The predicted maximum noise levels marginally exceed the for $L_{A1,1min}$ 52 dBA level recognised by the *NPfI*, but would not be expected to result in material sleep disturbances.

6.4 Off-Site Construction Traffic Noise

The Traffic Impact Assessment (TIA - Report No. P1086r01) notes that OWE Stage 2 DA construction traffic would access the site from Bakers Lane, via Mamre Road outside of network peak hours. During the network peak periods the OWE construction traffic would be rerouted to Aldington Road/Abbotts Road, via Mamre Road. The Aldington Road/Abbotts Road route would only be used during the Emmaus School peak traffic hours, which are between 8.00am-10.00am and 2.00pm-4.00pm Monday to Friday.

It should be noted that the Bakers Lane and Aldington Road/Abbotts Road routes would only be used temporarily, until the WNSLR is constructed which is expected in Q4 2020.

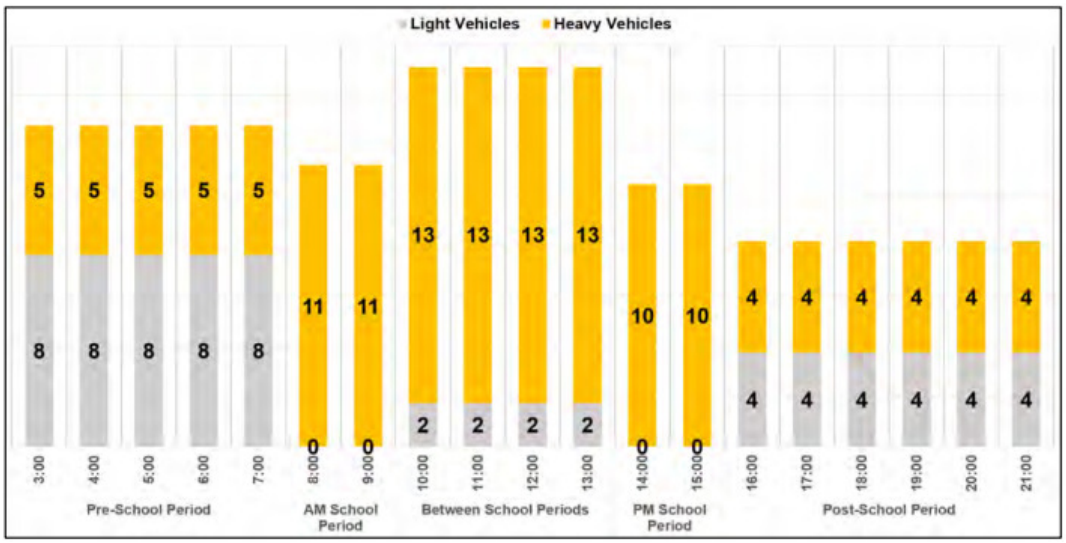
Whilst not specifically applicable to construction traffic movements, the road traffic noise criteria recognised by the *NSW Road Noise Policy* (*RNP*) have been conservatively considered in the assessment of off-site construction traffic noise effects. The *RNP* recommends that for existing residences on local roads, additional traffic generated by land use developments should not result in levels exceeding:

- $L_{Aeq,1\ hour}$ 55 dBA during the daytime (7.00am-10.00pm); or
- $L_{Aeq,1\ hour}$ 50 dBA during the night (10.00pm-7.00am).

The construction traffic movements shown in Figure 6-1 identified by the TIA have been considered in the assessment of off-site construction traffic noise effects.

With consideration of these movements, traffic noise levels at dwellings located within approximately 100m of the routes have been calculated and compared against the *RNP* criteria.

Figure 6-1 Hourly Construction Traffic Movements



Calculations undertaken applying the CoRTN (*Calculation of Road Traffic Noise*, UK Department of Transport, 1988) methodology indicate that during the Stage 2 construction, traffic noise levels would not be expected to exceed the identified *RNP* criteria at residences located on Bakers Lane or Aldington Road /Abbotts Road.

Notwithstanding, consultation has been undertaken with the immediate neighbours located on the route.

6.5 Construction Noise Mitigation

As noted, the predictions indicate general compliance with the *ICNG* standard hours criteria without any focussed mitigation requirements

However, where exceedances of the out-of-hours NMLs are predicted, construction noise mitigation should be considered where feasible and reasonable to reduce the potential noise impacts on the surrounding sensitive receivers.

The *ICNG* describes strategies for construction noise mitigation and control that are applicable to this proposal. The strategies are designed to minimise, to the fullest extent practicable, noise during construction.

The following construction noise mitigation measures would be applied during the works:

- Minimising the coinciding use of multiple noisy plant items;
- Equipment which is used intermittently is to be shut down when not in use;
- Equipment with directional noise emissions would be oriented away from sensitive receivers as much as practicable;
- Regular compliance checks on the noise emissions of all plant and machinery used for the proposal would indicate whether noise emissions from plant items were higher than predicted. This also identifies defective silencing equipment on the items of plant;

- Non-tonal reversing alarms should be used on all items of plants and heavy vehicles used for construction;
- Permanent noise walls located to the west of the site would be constructed as early as practicable and prior to the commencement of the works approved under this DA to assist in reducing construction noise impacts;
- Where practicable, temporary acoustic hoarding may be installed as close to the noise source as feasible aiming to block direct line of sight between the receiver position and the noise source. This measure typically suits dominant single items of plant, such as rockbreakers, concrete saws and jackhammers where the source of noise is typically near the ground.
- Goodman would undertake pre-construction community consultation with receivers N1, N2, N3, N4 and N5 in order clearly and transparently explain the proposed works and the potential for construction noise impacts. Regular on-going updates would be provided throughout the works in order to understand and address as far as practicable any noise related concerns of the receivers; and
- Goodman to offer to provide temporary noise curtains to provide noise shielding to the N4 and N5 dwellings. It is estimated that these may achieve reductions of up to approximately 5 dB when positioned to break the acoustic line of sight between the noise source and the windows of the dwellings.

The identified measures would be carried out to ensure the works are undertaken with minimal noise impact.

6.6 Construction Vibration Impact Assessment

The vibration generating plant items would be set back from the site boundaries by several hundreds of metres. Given this setback distance, vibration levels would not be discernible off-site, therefore no vibration impacts would be expected.

6.7 Construction Noise & Vibration Management Plan

In accordance with Condition D73, a detailed Construction Noise and Vibration Management Plan would be developed during the detailed design phase of the Proposal to manage impacts. Indicative construction noise and vibration mitigation measures have been recommended in Section 5 of SLR report *610.15617-R2* and above.

7 CONCLUSION

Wilkinson Murray Pty Limited (WM) has undertaken an operational and construction noise assessment incorporating the changes associated with the proposed Modification 3 (MOD 3) & Stage 2 DA on the approved Oakdale West Estate (OWE) in Kemps Creek, NSW.

The relevant MOD 3 changes principally concern the use of Building 2B (previously referred to as Building 3A). Additionally, changes to the masterplan layout, including modifications to Precinct 2 buildings, the on-site road network and site's civil design are proposed.

It is currently anticipated there would be a period of approximately 5-6 months where only Building 2B would operate. Thereafter, Precinct 1 would be developed and then operate concurrently with Building 2B for a period before the rest of the estate is fully developed. Accordingly, this assessment has considered operational noise impacts for Lot 2B; Lot 2B + Precinct 1; and All OWE Precincts.

The principal OWE operational noise sources comprise light and heavy vehicle movements, loading activities and fixed mechanical service plant. Noise modelling of these sources has been undertaken to determine potential noise impacts associated with the proposed staged operation of the modified OWE. The findings of this assessment are as follows:

- Unmitigated, noise emissions from the OWE are predicted to exceed the approved noise limits at sensitive receivers within the Emmaus Village (N1) and at the closest sensitive Kemps Creek locations (N4, N5).
- To reduce the exceedances feasible and reasonable noise mitigation measures have been investigated. Modelling indicates that with the modified noise barrier design (as discussed in Section 4.4 and shown in Figure 1-1) and acoustic treatment of the Lot 2B mechanical plant during detailed design, the approved $L_{Aeq,15min}$ noise limits may be met for typical and seasonal peak operations under all considered meteorological conditions at receivers the west of the site.
- Due to the elevation of the sensitive receivers to the south of the OWE (N4, N5), on-site noise barriers are expected to be of limited efficacy in reducing noise levels and therefore at these locations some residual noise exceedances have potential to arise.

The following residual operational noise exceedances have been predicted:

<u>All OWE Precincts Operating</u>

- For the fully developed OWE the residual exceedances generally represent negligible to marginal impacts.
- Negligible residual exceedances of the daytime and evening limits by 1-2 dB at the most exposed receiver are predicted.
- At night, residual exceedances are predicted only under the relatively rare noise enhancing meteorological conditions. Under such conditions and for typical OWE operations exceedances of 2-3 dB are predicted at the closest sensitive receivers to the south. During seasonal peak operations exceedances of 3-4 dB are predicted at the closest sensitive receivers to the south.

Building 2B + Precinct 1 Operating

- Prior to the full development of the OWE, during the operation of only Building 2B + Precinct 1, residual exceedances are predicted only to occur at night and under noise enhancing meteorological conditions.

- During this phase of the OWE, for typical OWE operations exceedances of 3-4 dB are predicted at the closest sensitive receivers to the south. During seasonal peak operations moderate to significant exceedances of 5-6 dB are predicted at the closest sensitive receivers to the south, though these impacts would only be expected for relatively brief periods.

Building 2B Only Operating

- With respect to the operational phase where only Building 2B would operate, residual exceedances are predicted only to occur at night and under noise enhancing meteorological conditions.

- During this phase of the OWE, exceedances of 3-4 dB (typical) and moderate to significant exceedances of 5-6 dB (seasonal peak) are predicted at the closest sensitive receivers to the south. Again, these impacts would only be expected for relatively brief periods.

To manage these potential operational noise impacts, the following mitigation measures are proposed:

- Noise barriers possessing surface mass of no less than 15 kg/m^2 to be installed at the locations and to the heights identified in Figure 1-1;

- On-site speed limits of 25 km/hour for heavy vehicles and 40 km/hr for light vehicles to be imposed on the estate roads;

- During detailed design, Lot 2B rooftop mechanical services plant to be reviewed to ensure that cumulatively emissions are controlled to not exceed $L_{Aeq,15min}$ 37 dBA at the OWE site boundary. The inclusion of silencers/attenuators and/or barrier solutions may be considered to ensure these acoustic design standards are achieved, as confirmed by noise modelling;

- Goodman to consult with landowners (N4, N5) to address the matter of potential noise impacts during the development and operation of the OWE and would seek to enter into noise agreements with the potentially affected owners.

- Subject to agreement, Goodman to provide 'at-receiver' noise mitigation treatments, consistent with the recommendations of the *NPfI* at N4, N5. Taking into consideration the particular preferences of the landowners, the treatments considered would include upgraded glazing standards to further increase the ability of the building façade to reduce noise levels. The owners would be invited to participate in the mitigation selection process in a transparent, equitable and consistent way.

Construction Phase

Additionally, this assessment has considered construction noise and vibration impacts that have potential to arise during the Stage 2 DA development of Building 2B.

The key Building 2B construction works would involve site clearing and earthworks at Building 2B location, pad and hardstand works, the construction of the Building 2B warehouse and office structures, and the use of the site access road for the delivery of materials to the site.

It is proposed to undertake the works between 3.00am to 10.00pm seven days a week, therefore standard and out-of-hours construction periods have been considered. The requirement to undertake works between 3.00am to 7.00am is principally so that concreting works can be undertaken before air temperatures become too high during the day.

During standard construction hours, no material noise impacts are predicted. However, some *ICNG* exceedances are expected during the out of hours works.

A number of measures have been identified to mitigate the potential out-of-hours noise impacts, including the following:

- Goodman would undertake pre-construction community consultation with receivers N1, N2, N3, N4 and N5 in order clearly and transparently explain the proposed works and the potential for construction noise impacts. Regular on-going updates would be provided throughout the works in order to understand and address as far as practicable any noise related concerns of the receivers; and
- Goodman to offer to provide temporary noise curtains to provide noise shielding to the N4 and N5 dwellings. It is estimated that these may achieve reductions of up to approximately 5 dB when positioned to break the acoustic line of sight between the noise source and the windows of the dwellings.

The identified measures would be carried out to ensure the works are undertaken with minimal noise impact.

The predicted maximum noise levels marginally exceed the for $L_{A1,1min}$ 52 dBA level recognised by the *NPfI*, but would not be expected to result in material sleep disturbances.

Additionally, no vibration impacts are anticipated.

In accordance with Condition D73, a detailed Construction Noise and Vibration Management Plan (CNVMP) would be developed during the detailed design phase of the Proposal to manage impacts. The indicative construction noise and vibration mitigation measures identified by this report would be included in the CNVMP.

Annexure G

WILKINSON MURRAY

13 February 2020

WM Project Number: 19440
Our Ref: OWE_MOD3_19440_130220
Email: stephanie.partridge@goodman.com

Stephanie Partridge
Goodman Property Services (Australia) Pty Ltd
Level 17, 60 Castlereagh St
SYDNEY NSW 2000

Dear Stephanie

Re: OWE MOD3 Noise & Vibration Assessment
Responses to Penrith City Council Submissions

Wilkinson Murray (WM) has reviewed the Penrith City Council (PCC) submissions relating to the Oakdale West Estate (OWE) MOD3 Noise & Vibration Assessment as set out in the PCC letter dated 28 January 2020 (reference: ECM: 8974312). WM's responses to these are set out below.

PCC Comments Concerning OWE Ground Levels

…the predicted noise levels within Mod 2 (as well as Mod 3) are based on the assumption that the finished ground levels within Mod 1 are both suitable and supportable. As outlined within the separate submission to Mod 1, the finished ground levels and visual impacts of the additional imported fill in Mod 1 are not deemed suitable or supportable and the address of this matter will necessitate revised modelling predicated on suitable and supportable finished ground levels and associated finished floor levels.

It is also noted that Mod 2 and Mod 3 result in noise levels in exceedance of the approved limits. This is not supportable when the exceedance is resulting from elevated finished ground and floor levels resulting from the additional fill activities proposed as part of Mod 1. While the filling concerns relate to future development subject of Mod 3, as oppose to Mod 2, a decision on finished ground levels is still required through Mod 1 to inform if the current modelling assumptions are reliable to assess Mod 2.

In the first instance it is requested that the concerns raised in the Mod 1 submission with respect to fill and finished ground levels be resolved. Following this resolution, it is then recommended that revised modelling be undertaken as part of Mod 1, Mod 2 and Mod 3…

WM Response

The MOD3 operational noise model has been updated to reflect the return to SSDA pad levels of Lot 3A (66.5m) and Lots 3B & 3C (67.5m). The predicted $L_{Aeq,15min}$ operational noise levels for the staged development are set out in Table 1. The noise predictions shown in brackets are the levels previously determined by the MOD3 assessment. As shown in Table 1 the change in pad levels is predicted to result in only minor (<1 dB) differences.

Table 1 Predicted $L_{Aeq,15min}$ Operational Noise Levels – Staged Development

Receiver	Period (weather)	$L_{Aeq,15min}$ Noise Level (dBA)							
		Approved Noise Limits	Lot 2B		Lot 2B + Precinct 1		All Precincts	
			Typical	Peak Season	Typical	Peak Season	Typical	Peak Season
N1 – Emmaus Village Residential	Day	44	35 (35)	37 (37)	36 (36)	37 (37)	38 (38)	39 (39)
	Eve	43	34 (34)	36 (35)	34 (34)	37 (37)	37 (37)	38 (38)
	Night	41	35 (35)	36 (36)	35 (35)	36 (36)	35 (35)	36 (36)
	Night(Adverse)	41	39 (39)	39 (39)	39 (39)	41 (41)	38 (38)	39 (39)
N2 – Emmaus College (School)	Day	45	40 (40)	45 (45)	40 (40)	45 (45)	40 (40)	42 (41)
	Eve	n/a	42 (42)	42 (42)	42 (42)	43 (43)	40 (40)	41 (40)
	Night	n/a	39 (39)	43 (43)	39 (39)	43 (43)	37 (37)	38 (38)
	Night(Adverse)	n/a	44 (44)	47 (47)	44 (44)	48 (48)	40 (40)	42 (42)
N3 – Kemps Creek – residence	Day	n/a	42 (42)	45 (45)	43 (43)	45 (45)	46 (46)	48 (48)
	Eve	n/a	43 (43)	43 (43)	42 (42)	43 (43)	46 (46)	47 (47)
	Night	n/a	42 (42)	43 (43)	42 (42)	43 (43)	42 (42)	44 (43)
	Night(Adverse)	n/a	46 (46)	48 (48)	46 (46)	48 (48)	46 (45)	48 (48)
N4 – Kemps Creek – residence	Day	n/a	36 (36)	39 (39)	37 (37)	40 (40)	39 (39)	39 (39)
	Eve	n/a	37 (37)	37 (37)	37 (36)	38 (38)	39 (39)	39 (39)
	Night	n/a	36 (36)	38 (38)	36 (36)	38 (38)	36 (36)	36 (36)
	Night(Adverse)	n/a	41 (41)	43 (43)	41 (41)	43 (43)	39 (39)	40 (40)
N5 – Kemps Creek – residence	Day	n/a	36 (36)	39 (39)	36 (36)	39 (39)	40 (40)	41 (41)
	Eve	n/a	37 (37)	37 (37)	36 (36)	37 (37)	40 (40)	40 (40)
	Night	n/a	36 (36)	37 (37)	36 (36)	37 (37)	36 (36)	37 (37)
	Night(Adverse)	n/a	40 (40)	42 (42)	40 (40)	42 (42)	40 (40)	41 (41)

Note: The noise predictions shown in brackets are the levels previously determined by the MOD3 assessment.

With respect to exceedances of the approved noise limits, the following should be noted:

- At the time of the MOD3 assessment a noise agreement was in place with receiver N3 and Goodman had also commenced discussions with receivers N4 and N5, but the outcome of these discussions had yet to be confirmed.
- Goodman has since confirmed that fully executed noise agreements are now in place with receivers N3, N4 and N5 and as such noise exceedances at these locations are effectively waived.
- The current operational noise assessment, subsequent to the identified return to SSDA pad levels, predicts that with mitigation, compliance with the approved operational noise limits can be achieved at the receivers to the west (N1, N2).

Considering the above, effectively this leaves no operational noise non-compliances. This is based on acceptance of the noise modelling assumptions, which are further discussed below.

PCC Comments Concerning Maximum Noise Level Criteria and Long-Term Health Impacts

In considering the maximum noise level criteria in accordance with NPfI, it is requested that the Department pursue further analysis with reference to the health impact data sourced from the World Health Organisation and enHealth as detailed in the Road Noise Policy. It is recommended that maximum noise levels be cumulatively assessed against the information provided in the Road Noise Policy, giving detailed consideration to the frequency and duration of elevated noise levels and demonstrating that long-term adverse health impacts will not likely result. Long-term health concerns may not necessary be linked only to the maximum noise level per event but may also be correlated with elevated noise over a long period. For example, the Road Noise Policy indicates that levels between 40 and 55dBA may be related to adverse health effects with many people needing to adapt to cope.

WM Response

The PCC submission identifies that the *NSW Road Noise Policy* (RNP) includes a synopsis on subjective reaction to noise, including health impacts and sleep disturbance. The RNP notes the following:

> *The disruption of a person's normal sleep patterns, or sleep disturbance, due to road traffic noise, has been the subject of numerous research studies conducted over the last 30 years. Despite intensive research, the triggers for and effects of sleep disturbance have not yet been conclusively determined.*
>
> *A summary of the current literature concerning sleep disturbance due to noise indicates that the main noise characteristics that influence sleep disturbance are the number of noisy events heard distinctly above the background level, the emergence of these events and the highest noise level.*
>
> *The L_{Aeq}, which is the energy average level of the noise signal, accounts for the number and level of the louder events in a signal, due to the high amount of energy such events carry. However, the consensus is that L_{Aeq} by itself is an inadequate predictor of the potential of a varying noise to disturb sleep. For continuous traffic flow, L_{Aeq} appears to be acceptably correlated with sleep disturbance, since under these conditions there are few emergent noise events above the main hum of the traffic. However, for intermittent traffic flow, which often occurs at night, some other measure that takes into account the emergence, described by measures such as (L_{AFmax}–L_{Aeq}) or (L_{AFmax}–L_{AF90}), the highest level of noise and the number events may be needed to obtain a better correlation with sleep disturbance.*

The World Health Organisation guidelines (World Health Organisation 1999) recommended that:

> *'where noise is continuous, the equivalent sound pressure level should not exceed 30 dB(A) indoors, if negative effects on sleep are to be avoided'.*

The enHealth Council report (2004) states that:

> *'as a rule for planning for short-term or transient noise events, for good sleep over 8 hours the indoor sound pressure level measured as a maximum instantaneous value should not exceed approximately 45 dB(A) LA, (Max) more than 10 or 15 times per night'.*

The night noise guidelines for Europe (World Health Organisation 2009) comprehensively reviewed policy and research on:

- *methods and criteria for measuring night-time noise*
- *the relationship between sleep and health*
- *the effects of night-time noise on sleep*
- *the effects of night-time noise on health and wellbeing.*

Long-term effects, such as cardiovascular disorders, are more correlated with noise indicators summarising the situation over a long period, such as $L_{Anight,outside}$ whereas instantaneous effects such as sleep disturbance are better linked to the maximum noise level per event (L_{Amax}).

The World Health Organisation report (2009) uses $L_{Anight,outside}$ as a primary measure of night-time noise. This is the yearly average of outside façade noise levels during the night-time period, and roughly equivalent to the $L_{Aeq9hour}$ night-time descriptor.

Groups vulnerable to night noise exposure include the elderly.

The report concluded that, although individual responses may vary:

- *at $L_{Anight,outside}$ levels of <30 dB(A), no substantial biological effects are observed;*
- *at $L_{Anight,outside}$ levels between 30 dB(A) and 40 dB(A), a number of effects are observed, but their impact is modest*
- *at $L_{Anight,outside}$ levels between 40 dB(A) and 55 dB(A), adverse health effects are observed, with many people needing to adapt their lives to cope; vulnerable groups* [such as the elderly] *are more severely affected*
- *at $L_{Anight,outside}$ levels above 55 dB(A), adverse health effects occur frequently, and a sizeable proportion of the population is highly annoyed and sleep disturbed. Cardiovascular disease risk rises, and public health is also threatened.*

The report recommends a long-term $L_{Anight,outside}$ noise guideline level of 40 dB(A), with an interim $L_{Anight,outside}$ target level of 55 dB(A). The interim target is only intended as an intermediate step in localised situations as health impacts, particularly on vulnerable groups, are apparent at this noise level.

From the research on sleep disturbance to date it can be concluded that:

- *maximum internal noise levels below 50–55 dB(A) are unlikely to awaken people from sleep*
- *one or two noise events per night, with maximum internal noise levels of 65–70 dB(A), are not likely to affect health and wellbeing significantly.*

> *The Environmental criteria for road traffic noise (Environment Protection Authority NSW 1999) discussed a guideline aimed at limiting the level of sleep disturbance due to environmental noise – that the $L_{AF1, 1minute}$ level of any noise should not exceed the ambient L_{AF90} noise level by more than 15 dB. This guideline takes into account the emergence of noise events, but does not directly limit the number of such events or their highest level, which are also found to affect sleep disturbance.*
>
> *Triggers for, and effects of sleep disturbance from, exposure to intermittent noise such as noise from road traffic are still being studied. There appears to be insufficient evidence to set new indicators for potential sleep disturbance due to road traffic noise.*
>
> *DECCW will continue to review research on sleep disturbance as it becomes available.*

WM has undertaken a review of the OWE operational noise levels predicted to arise at the Emmaus Village aged care facility against the identified WHO and enHealth guidelines.

It is considered that with respect to potential night-time noise impacts on the Emmaus Village, the paramount consideration is the internal noise amenity within the sensitive areas, particularly bedrooms.

The internal noise levels that would prevail would principally depend on whether receiver windows are open or closed. The National Construction Code (formally Building Code of Australia) requires that for new residential buildings adequate ventilation must be provided to habitable spaces. If ventilation is achieved by opening windows, the building façade would normally only be expected to a achieve a noise reduction of approximately 10 dB. However, if ventilation can be provided mechanically, allowing windows to remain closed, then the building façade may be expected to provide significantly more attenuation, resulting in lower internal noise levels.

An inspection of the Emmaus Village buildings has determined the dwellings are constructed with brick facades and tiled roofs. Acoustically, the weakest component of the external building envelope would be the windows of the dwellings. Considering the age and construction of the dwellings, it is reasonable to assume a 4mm float glass glazing standard, with standard window seals. For this construction, it would be expected that the façade including windows would achieve a sound transmission loss of at least 25 dBA, with windows closed.

The dwellings appear to be provided with reverse cycle air-conditioning systems, which are assumed to be sufficient to provide adequate ventilation, whilst allowing for windows to kept closed.

With consideration to the OWE operational noise levels predicted externally and the attenuating performance of the Emmaus Village building facades, it is predicted that the internal noise standards recommended by WHO and enHealth would generally be achieved, as per the summary set out in Table 2. In particular, it should be noted that whilst the enHealth Council guideline allows for up to 10 to 15 discrete emergences above the internal noise level of L_{Amax} 45 dBA during the night, it is predicted that the identified guideline level would be achieved at all times with windows open or closed.

Additionally, it should be noted that the MOD3 assessment applied a more onerous maximum noise level criterion than identified in Table 2 and no exceedances of this have been predicted.

It is predicted that the L_{Aeq} based WHO guideline levels would be met with the exception of a minor 1 dB exceedance under noise enhancing conditions (and only during the seasonal peak Lot 2B + Precinct 1 scenario), if windows are open. However, as it is expected that ventilation can be achieved with the windows closed, satisfactory internal noise levels are anticipated.

The identified 1 dB emergence above the external WHO guideline is considered minor. In this regard, Section 4 of the NPfI discusses the significance of residual noise impacts following implementation of

feasible and reasonable noise mitigation. It notes that a residual exceedance of up to 2 dB is negligible in significance and would not warrant receiver-based treatments or controls.

In summary, considering the synopsis set out in the RNP, noise-based sleep disturbances or long-term adverse health impacts are not considered likely to result from the OWE operation.

Table 2 Compliance with WHO and enHealth Guidelines at Emmaus Village

Guideline	Internal Noise Level	Equivalent External Noise Level – Windows Open[1]	Equivalent External Noise Level - Windows Closed[2]	OWE Operational Noise Predicted to Comply?	
				Windows Open	Windows Closed
WHO 1999	L_{Aeq} 30 dBA	L_{Aeq} 40 dBA	L_{Aeq} 55 dBA	Typically, Yes[3]	Yes
enHealth 2004	L_{Amax} 45 dBA (No more than 10-15 times per night)	L_{Amax} 55 dBA (No more than 10-15 times per night)	L_{Amax} 70 dBA (No more than 10-15 times per night)	Yes	Yes
WHO 2009	-	$L_{Anight,outside}$ 40 dBA (Roughly equivalent to $L_{Aeq,9Hr}$ 40 dBA)	$L_{Anight,outside}$ 55 dBA (Roughly equivalent to $L_{Aeq,9Hr}$ 55 dBA)	Typically, Yes[3]	Yes

Note 1: Equivalent external noise level assumes a 10 dB reduction through an open window.
Note 2: Equivalent external noise level assumes a 25 dB reduction through façade with closed windows.
Note 3: It is predicted that the WHO levels would be met with the exception of a minor 1 dB exceedance under noise enhancing conditions during the seasonal peak Lot 2B + Precinct 1 scenario.

PCC Comments Concerning Noise-Enhancing Weather Conditions

Whilst the noise impact assessments refer to noise-enhancing weather conditions, the frequency of these conditions is not discussed. Given that temperature inversions are a feature of the Penrith Local Government Area, it is suggested that it is necessary for this aspect of the noise assessments to be considered further. If DPIE is not able to ascertain this, it is recommended that the EPA be engaged to consider the modelling assumptions and implications and the predicted noise levels.

WM Response

The MOD3 assessment has considered the noise-enhancing effects of temperature inversions that can occur at night and predicted noise levels under such conditions have been included in the MOD3 report.

It is accepted that this condition occurs at a significant frequency – i.e. in accordance with the NPfI, this condition has been included in the assessments as it occurs for more than 30% of winter nights.

This is consistent with the SSDA noise assessment that based on analysis of meteorological data determined that temperature inversions of Pasquill Gifford Stability Class F or Class G occur more than 30% of the night-time period during all four seasons.

The resultant impacts under night-time noise enhancing meteorological conditions for the current site configuration, subsequent to the revised pad levels, at various site development stages are set out in Table 1.

PCC Comments Concerning Light Vehicle Sound Power Levels

The noise assessment accompanying Mod 3 effectively seeks to 'supersede' or 'over-ride' the separate acoustic assessment in support of Mod 2, specifically relating to revised sound power levels. The Wilkinson Murray assessment (supporting Mod 3) states that the sound power levels used in SLR's Report (for Mod 2) are overly conservative. It is not acceptable that one report is disregarding or changing the parameters of another report as a consistent approach to modelling that results in the predicted noised levels must be established to ensure that a consistent and cumulative impact analysis can be undertaken. The applicant should be requested to provide a single acoustic report, or separate acoustic reports that provide consistent adoption of modelling parameters and assumptions, to the inform the predicted noise level emissions. The assessments progressively should also consider the cumulative impacts of preceding development approved in combination with the current proposal. Alternatively, DPIE (or EPA) is requested to determine the appropriateness of the sound power level and other input data used in the noise modelling processes for address in the submitted acoustic reports for these applications and moving forward.

WM Response

The MOD3 operational noise assessment holistically assesses operational noise emissions from the entire OWE based on the current OWE configuration, with the inclusion of the MOD2 noise sources.

The MOD3 assessment incorporates the MOD2 sound power levels, with the exception of the sound power level applied to light vehicles.

During the MOD3 assessment, WM undertook review of the light vehicle sound power levels in its database and with consideration to various acoustic assessments prepared by WM and other acoustic consultants. Following this review, the existing light vehicle sound power level of 96 dBA was considered somewhat overstated (overly conservative) for a light vehicle travelling on an estate road at a speed of 40 km/hr. Based on WM's review a lower level of 90 dBA was adopted for MOD3.

WM maintains that this level is still considered to be conservatively representative of a light vehicle travelling on the estate roads at a speed of 40 km/hr, particularly with respect to the proportion of modern vehicles with even lower noise emissions that may be expected.

Notably, WM has recently undertaken measurements of light vehicles approaching a commuter car park at speeds of approximately 40 km/hr and the sound power levels determined from these measurements accord with the level applied in the OWE MOD3 assessment.

PCC Comments Concerning Attenuation of Lot 2B Mechanical Services Noise Levels

The Mod 3 acoustic assessment assumes that Lot 2B mechanical plant services can be attenuated by 10dB using noise mitigation methods. It is not clear how this can be achieved and further detail on the feasibility of this should be sought.

WM Response

Mechanical services noise can readily be reduced with the inclusion of silencers/attenuators and/or barrier solutions to achieve the identified level of attenuation. The Lot 2B rooftop mechanical services attenuation would be achieved through the detailed design process to ensure compliance with the approved noise limits.

PCC Comments Concerning Pavement Treatments

In recommending operational noise mitigation strategies, the surface construction of vehicular access ways and roads is not discussed in the noise impact assessments. It is requested that consideration be given to the type of road construction to ensure maximum acoustic benefit, should this not already have occurred.

WM Response

On smooth road surfaces engine noise is generally accepted as being the dominant factor in vehicle noise generation at speeds below about 40 km/h and tyre noise tends to become the dominant factor at greater speeds.

The restriction of on-site vehicle speeds is the primary 'at source' control with respect to OWE vehicle noise. Given the imposed speed limits of 40 km/hr for light vehicles and 25 km/hr for heavy vehicles, the inclusion of Open Grade Asphalt (OGA) or Stone Mastic Asphalt (SMA) low noise pavements has not been nominated on the OWE estate roads. This treatment is more usually applied on highways where vehicles travel at higher speeds than they would on the OWE. At the relatively lower speeds on the OWE, this treatment would be expected to provide little benefit.

In this regard, the ENMM notes that:

- *'at typical urban speeds most vehicle noise is emitted by the engine, cooling fan, transmission and exhaust';* and
- *'for traffic as a whole, road tyre noise appears to dominate at around 70 km/h. This means that in areas with posted speeds of 70 km/h or more, the reduction of road tyre noise can be a useful noise reduction treatment'*.

The roads on the OWE are proposed to be paved with Dense Grade Asphalt (DGA).

PCC Comments Concerning Mitigation Measures

As raised within the planning comments above, the reasonableness of a 5.0m acoustic wall on top of an elevated fill platform with extensive retaining wall is not supported. It also appears from the information submitted that further noise mitigation measures may still be required at receiver boundaries. It appears that negotiations are currently occurring with neighbouring properties and that 'at-receiver' noise mitigation measures are not yet finalised. The impacts of the completed development and the implications of necessary mitigation measures can only be assessed if the full extent of mitigation measures within the site and at receiver boundaries are included within the assessment and plans. If the suggestion is made that the ultimate impacts are unknown due to current analysis being based on predications only, then the predications should be conservative in nature and include likely mitigation measures at receiver boundaries to understand what could be required after construction and occupation.

WM Response

The MOD3 operational noise model has been updated to reflect the return to SSDA pad levels of Lot 3A (66.5m) and Lots 3B & 3C (67.5m). The predicted $L_{Aeq,15min}$ operational noise levels for the staged development are set out in Table 1.

As noted above, Goodman has confirmed that fully executed noise agreements are now in place with receivers N3, N4 and N5 and as such no noise impacts on these receivers are anticipated.

The current operational noise assessment predicts that with the inclusion of on-site barriers and detailed design of the Lot 2B mechanical services, compliance with the approved operational noise limits can be achieved at the receivers to the west (N1, N2), without any additional 'at-receiver' noise mitigation measures. This is based on the current site configuration, the assumptions identified above which are considered reasonable and conservative and the application of standard acoustic principles in the prediction process.

I trust this information is sufficient. Please contact us if you have any further queries.

Yours faithfully
WILKINSON MURRAY



Sean Flaherty
Senior Acoustic Engineer

Note
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AAAC
This firm is a member firm of the Association of Australasian Acoustical Consultants and the work here reported has been carried out in accordance with the terms of that membership.

Annexure H

Client
Goodman Property Services (Aust) Pty Ltd

Project
Oakdale West Estate

OWE SSD7348 MOD 1 response to submissions

Prepared by
Kat Duchatel
BSc. Env. BAAS17054
CEnvP EIANZ #691

Distribution
Stephanie Partridge, Kym Dracopoulos, Alasdair Cameron, Luke Ridley, David Bulbrook

February 01, 2020

Dear Stephanie,

I confirm review of the submissions emailed on 1 February 2020.

Relevant to Biodiversity as follows:

- DPIE Environment Energy and Science (EES) (Reference: DOC20/46333): EES raised no objections to amendments proposed in the MOD Biodiversity Assessment Report, with no further action required.
- Penrith Council (Reference: ECM: 8974312 28): Biodiversity Credit Requirements as follows:

  Appendix A (BBAM Credit Report) of Appendix G (Biodiversity Assessment Report) indicates a total of 173 ecosystem credits are required. The Statement of Environmental Effects however indicates 172 ecosystem credits. Given the requirements in Appendix G, Condition D90 should be amended to make reference to 173 credits and not that referenced within the Statement.

Actions completed:

- Amend all references of 172 ecosystem credits to 173 ecosystem credits in Biodiversity Assessment Report (BAR) of 172 ecosystem credits to 173 ecosystem credits

Actions required:

- Amend all references of 172 ecosystem credits to 173 ecosystem credits Statement of Environmental Effects as per BAR

A hightail link has been sent today for download of amended BAR.

Yours faithfully



Kat Duchatel

Appendix 1. BAR écologique (2018)

Oakdale West Estate

SSD 7348 Biodiversity Assessment Report - amended

prepared for

Goodman Property Services

(Aust.) Pty Ltd

SSD 7348 Biodiversity Assessment Report - amended

prepared for

Goodman Property Services

(Aust.) Pty Ltd

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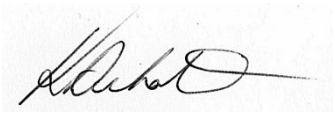
Document control

Prepared by		
Kathryn Duchatel BSc. Env. CEnvP EIANZ #691 BAM Accreditation No.BAAS17054		01/10/2018

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Revision Schedule

Rev No	Date	Description	Issued to
1	30/04/2018	SSD 7348 RTS Submission 1	Goodman
2	26/07/2018	SSD 7348 RTS Submission 2	Goodman
3	01/10/2018	SSD 7348 RTS Submission 3	Goodman

Executive Summary

Goodman Property Services (Aust) Pty Ltd (Goodman) are seeking approval for the Oakdale West Estate State Significant Development Masterplan (SSD 7348). SSD 7348 involves the staged development of a warehouse and distribution complex.

Goodman commissioned Cumberland Ecology to prepare a Biodiversity Assessment Report (BAR) for the development. In conjunction with the Biodiversity Offset Strategy (BOS), the BAR formed part of the Environmental Impact Statement (EIS) prepared for Goodman to support the SSD 7348 application for State Significant Development Consent under Division 4.1 of Part 4 of the New South Wales (NSW) Environmental Planning and Assessment Act 1979 (EP&A Act).

During the public exhibition period of the SSD 7348 application the NSW Department of Planning and Environment (the Department) received submissions from the public, relevant State and local agencies.

Subsequently a number of amendments were made to the Oakdale West masterplan which have altered the extent of biodiversity attributes and values assessed in the BAR prepared by Cumberland Ecology (2017).

The most significant amendments required include:

- Identification of the northern boundary of the Oakdale West site as one of several preferred sites for the future Western Sydney Freight Line Corridor (WSFL). The masterplan has been amended to preserve a 60 m wide corridor in order to provide Transport for NSW (TfNSW) with the option of using this land should it be determined as the preferred alignment of the WSFL. This has resulted in:
    - A reduction in the developable area of Oakdale West and relocation of roads and ancillary infrastructure, and
    - Amendments made to the extent of native vegetation to be cleared and also that which will be retained within the Oakdale West site.
- As part of the SSD 7348, Goodman will be facilitating the construction of the Western North South Link Road (WNSLR), which will involves the construction of a bridge over WaterNSW land (i.e. over the Warragamba Pipeline) and the embankment of the bridge traversing Erskine Park Biodiversity Conservation land (immediately north of WaterNSW land).

  Unconsolidated fill either side of the Warragamba Pipeline will be excavated to enable geotechnical investigations for the WNSLR bridge construction. As a consequence the extent of native vegetation to be cleared on land north of the Oakdale West site has increased.
- Masterplan amendments to the development footprint within Oakdale West that were necessary as the WNSLR bridge design evolved, to accommodate relocation of bio-retention basins and various services. As a consequence the extent of native vegetation to be cleared within Oakdale West site has been reduced.

Other amendments have been made to the extent of native vegetation being cleared as a result of the following:

- More recent survey of the Oakdale West boundaries have identified the existing boundary fencing do not accurately following the southern and western boundary alignments.

  In order to facilitate the construction of new fencing along these boundaries (where marginal native vegetation occurs) a 1.5 metre width buffer has conservatively been included in the extent of native vegetation to be cleared. This will ensure that (a) any tree trimming, shrub

and small tree removal required is included in the offsetting requirements for the development; and (b) the fence construction is approved under the SSDA 7348.

- Surveys also more accurately identified the extent of the proposed lot boundaries, retention walls and ancillary infrastructure, which required amendments to the extent of native vegetation that would both being retained and cleared.
- Civil drainage design of stormwater outlet structures and alignment of bioretention basins located within the electricity easement (eastern side of Oakdale West) have been amended to avoid crossing through the neighbouring Oakdale South's biodiversity offset area. This has resulted in an increase to the extent of native vegetation that would be cleared at these locations.

Purpose of this amended BAR

This amended BAR has been prepared to provide:

- An updated impact assessment and BioBanking credit calculation in response to the masterplan amendments;
- Amend and clearly define the BAR study area in relation to the Oakdale West development site and Water NSW land and that which is subject to the SSDA;
- Identify associated development activities that are located within the Erskine Park Biodiversity Conservation lands, which will be subject to Ministerial approval, but are not a component of this amended BAR.

Contents

1 Introduction 1
1.1 Background 1
1.2 Biodiversity Assessment Report (2017) 2
1.2.1 Objectives 2
1.2.2 Plant Community Types 2
1.2.3 Threatened Species 3
1.3 Biodiversity Assessment Report Amended (2018) 3
2 Biodiversity Assessment 5
2.1 Landscape assessment 5
2.1.1 Assessment circles 5
2.1.2 Landscape features 5
2.2 Landscape value score 7
2.2.1 Percent Native Vegetation Cover 7
2.2.2 Connectivity Value 7
2.2.3 Patch Size 8
2.2.4 Loss in Landscape Value Score 8
2.3 Native Vegetation 8
3 Avoidance and Minimisation of Impacts 11
3.1 Avoidance of Impacts 11
3.2 Measures to Minimise Impacts 11
4 Impacts of the Development 17
4.1 Summary of impacts 17
4.2 Impacts that require further consideration 17
4.3 Ecosystem credit requirements 18
4.4 Impacts that do not require further assessment 11
4.4.1 WaterNSW Land 11
4.4.2 Erskine Park Biodiversity Conservation Land 11
5 Avoidance and Minimisation of Impacts 12
5.1 Avoidance of Impacts 12
5.2 Measures to Minimise Impacts 12
6 References 13
Appendix A. BBAM Credit Report 14
Appendix B. BAR Cumberland Ecology (2017) 15
Appendix C. DoEE Notification 16

Tables

Table 1-1 Summary of impacts to PCTs from the development of Oakdale West 2
Table 2-1 Landscape features used in this assessment 5
Table 2-2 Summary of amended current and future percentage of native vegetation 7
Table 4-1 PCTs to be cleared 17
Table 4-2 Other native vegetation to be cleared 17
Table 4-3 Summary of impacts to PCTs that require further consideration 18
Table 4-4 Summary of ecosystem credit requirements 14

Figures

Figure 1-1. Site map 4
Figure 2-1. Location map 6
Figure 2-2. Limiting connectivity widths 10
Figure 4-1. Extent of PCT and other native vegetation clearing 19

1 Introduction

1.1 Background

Cumberland Ecology was commissioned by Goodman Property Services (Aust) Pty Ltd (Goodman) to prepare a Biodiversity Assessment Report (BAR) for the Oakdale West Estate State Significant Development Masterplan (SSD 7348). SSD 7348 involves the staged development of a warehouse and distribution complex. In conjunction with the Biodiversity Offset Strategy (BOS), the BAR formed part of the Environmental Impact Statement (EIS) prepared for Goodman to support the SSD 7348 application for State Significant Development Consent under Division 4.1 of Part 4 of the New South Wales (NSW) Environmental Planning and Assessment Act 1979 (EP&A Act).

During the public exhibition period of the SSD 7348's development assessment the NSW Department of Planning and Environment (the Department) received submissions from the public, relevant State and local agencies. Matters raised of relevance to the BAR prepared by Cumberland Ecology (2017) relate to the following:

- **Transport for NSW (TfNSW)**

The Oakdale West development site has been identified as one of several potential sites for the future Western Sydney Freight Line Corridor (WSFL). The WSFL is one of four critical long term infrastructure corridors in western Sydney currently under investigation and protecting potential corridors is a first step toward meeting future growth in western Sydney (WSP 2018).

Following consultation with TfNSW, Goodman has amended the Oakdale West masterplan to preserve a 60m wide corridor in order to provide TfNSW with the option of using this land should it be determined as the preferred alignment of the WSFL in the future.

Key changes include a reduction in the developable area of Oakdale West and subsequent amendments to lot boundaries, road and ancillary infrastructure alignments. These changes have affected the extent of native vegetation, which contribute to the amendments made in this amended BAR.

- **Western North South Link Road (WNSLR)**

As part of the SSD 7348, Goodman will be facilitating the construction of the WNSLR on neighbouring property to the north of Oakdale West (Fitzpatrick land).

Amendments to the development footprint within Oakdale West and on adjacent WaterNSW land were necessary as the WNSLR bridge design evolved. As a consequence the extent of native vegetation that will be cleared has been amended in the BAR. Relevant to the BAR are the following amendments:

  - The necessity to clear unconsolidated fill either side of the Warragamba Pipeline to enable geotechnical investigations for the WNSLR bridge construction; and
  - General amendments to road alignments and lot boundaries and the location of bioretention basins within Oakdale West.

- **Other Amendments**

  - More recent survey of the Oakdale West boundaries have identified the existing boundary fencing does not accurately following the southern and western boundary alignments.

    In order to facilitate the construction of new fencing along these boundaries (where marginal native vegetation occurs) a 1.5 metre width buffer has conservatively been

included in the extent of native vegetation to be cleared. This will ensure that (a) any tree trimming, shrub and small tree removal required is included in the offsetting requirements for the development; and (b) the fence construction is approved under the SSDA 7348.

- Surveys also more accurately identified the extent of the proposed lot boundaries, retention walls and ancillary infrastructure, which requires minor amendments to the extent of native vegetation that will be cleared.
- Civil drainage design of stormwater outlet structures and alignment of bioretention basins located within the electricity easement (eastern side of Oakdale West) have been amended to avoid crossing through the neighbouring Oakdale South's biodiversity offset area. This has resulted in an increase to the extent of native vegetation that would be cleared.

1.2 Biodiversity Assessment Report (2017)

1.2.1 Objectives

The BAR prepared by Cumberland Ecology (2017) assessed the potential impacts of the Oakdale West development on the site's flora and fauna in accordance with the NSW Framework for Biodiversity Assessment (FBA) and responds to the Secretary's Environmental Assessment Requirements (SEARs) as they relate to flora and fauna specifically:

- Identification of the quantity and type of vegetation to be cleared;
- An assessment of direct and indirect impacts on threatened species, populations and ecological communities, and their habitats in accordance with the FBA; and
- Proposed measures to avoid, mitigate or offset any significant impacts in accordance with the NSW Biodiversity Offset Policy for Major Projects.

1.2.2 Plant Community Types

Cumberland Ecology (2017) identified four Plant Community Types (PCTs) with Oakdale West, which include two ecological communities listed under the NSW *Biodiversity Conservation Act 2016* (BC Act) and two ecological communities listed under both the BC Act and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (see Table 1-1).

Table 1-1 Summary of impacts to PCTs from the development of Oakdale West

PCT ID	Vegetation to be removed	Status	
		TSC Act	EPBC Act
835	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin (HN526)	EEC	
849	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin (HN528)	CEEC	CEEC
850	Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin (HN529)	CEEC	CEEC
1234	Swamp Oak floodplain forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion (HN594)	EEC	

Impacts of the development that fall into the FBA's threshold of impacts (that require further consideration) are detailed within *Section 7* of the BAR (Cumberland Ecology 2017) and include the removal of HN528 and HN529. HN528 and HN529, which conform to the NSW critically endangered

ecological community (CEEC) Cumberland Plain Woodland and the nationally (CEEC) Cumberland Plain Shale Woodland.

The removal of Cumberland Plain Shale Woodland is able to be assessed under assessment bilateral agreement with NSW (refer Section 4.2 and EPBC 2017/7952 Appendix C of this amended BAR) and is being offset through the retirement of the required ecosystem credits in accordance with the FBA, which is the relevant NSW bilateral agreement method of assessment (refer Section 4.3).

1.2.3 Threatened Species

The potential for threatened species to occur within the development was assessed through a review of existing data, habitat assessment and targeted surveys in accordance with the FBA and as described in *Section 5* of the BAR (Cumberland Ecology 2017).

1.3 Biodiversity Assessment Report Amended (2018)

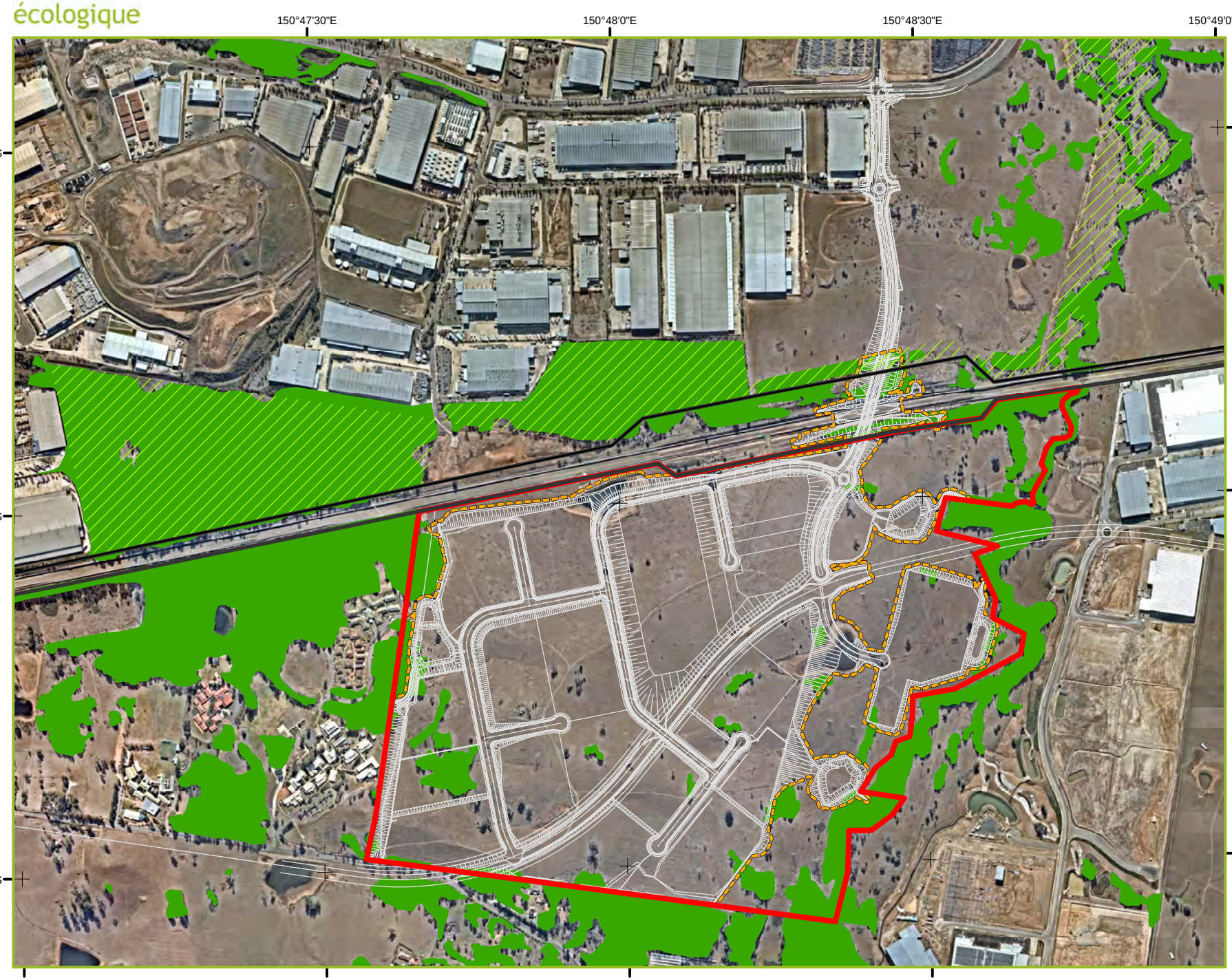
This amended BAR provides an updated impact assessment and BioBanking Credit Report in response to the masterplan amendments as well as providing a clearer BAR study area in relation to the Oakdale West development site and additional works associated with Water NSW and Fitzpatrick land (i.e. that on which future development activities may occur and were future development activities have been approved under separate provisions).

The objectives and contents of the 2017 BAR (provided in Appendix B) remain largely unchanged. The following sections provide a summary of each component of the BAR, which has been the subject of amendments and what these amendments entail.

The development footprint assessed by Cumberland Ecology (2017) has been modified due to:

- The need to preserve a 60m corridor following consultation with TfNSW for the WSFL;
- The clearing of vegetation on unconsolidated fill either side of the Warragamba Pipeline that must be removed to enable geotechnical investigations for the WNSLR bridge construction;
- Various amendments to the development footprint within Oakdale West that have evolved during design phase;
- The inclusion of a 6m construction zone around the final development (post construction) footprint; and
- Errors in mapping and reporting found within the BAR (Cumberland Ecology 2017).

Figure 1-1 shows the areas that this amended BAR applies to.



Oakdale West Estate

Biodiversity Assessment Report

- Native Vegetation
- EP Biodiversity Corridor
- Oakdale West
- WaterNSW Land
- Construction footprint

Figure 1-1. Site map

Coordinate System:
MGA Zone 56 (GDA 94)

Image sources:
Nearmap 9 September 2018

N

0 65 130 260 390 520 m

2 Biodiversity Assessment

2.1 Landscape assessment

2.1.1 Assessment circles

No amendments made.

A 1,000 ha outer assessment circle and 100 ha inner assessment circle were established by Cumberland Ecology (2017) to identify landscape features associated with the biodiversity assessment areas. The inner assessment circle was centred on the portion of the development area that will be most impacted upon by the development.

2.1.2 Landscape features

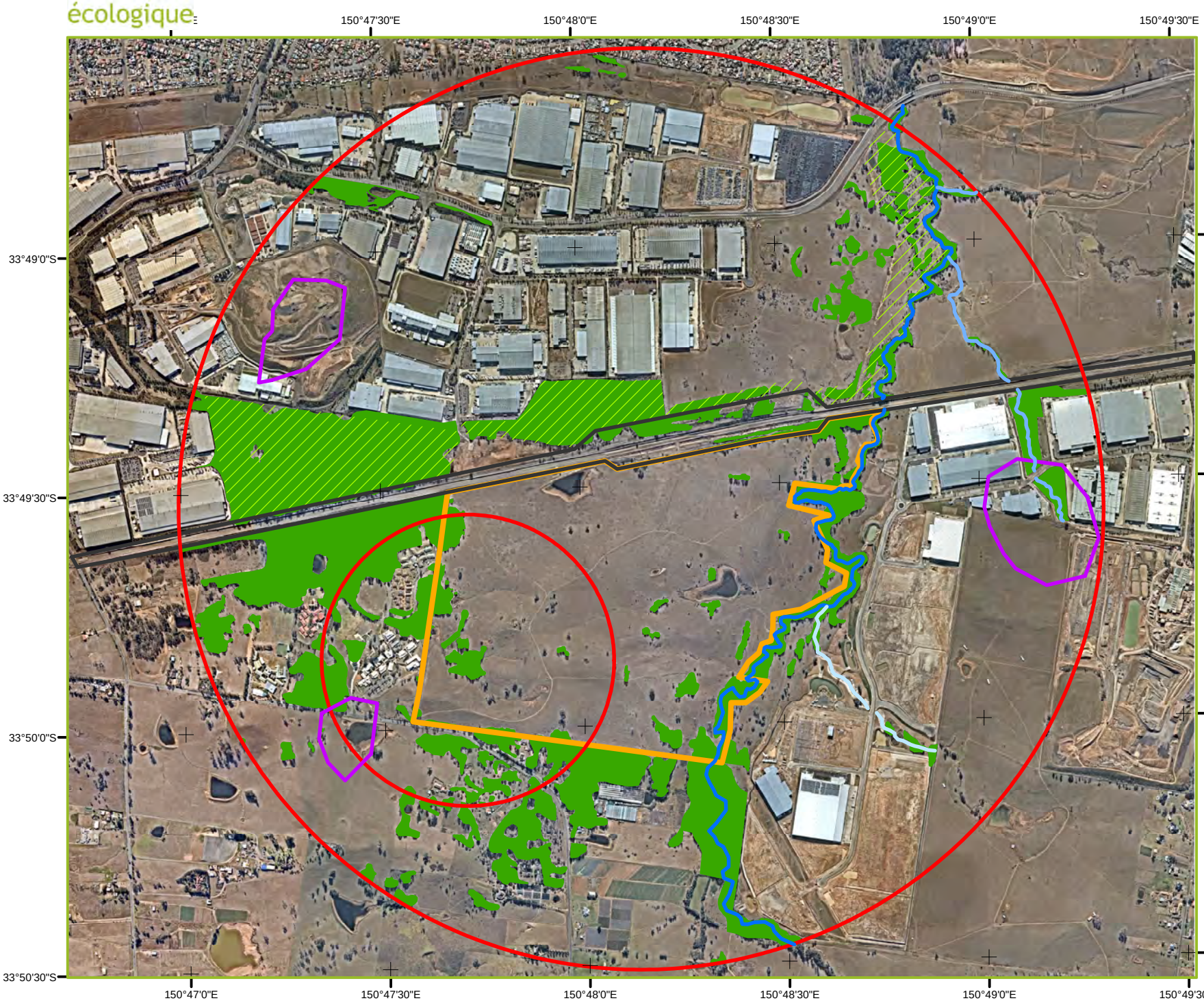
Amendments made:

- Development site: Sydney Basin Bioregion at has been increased from 118.78 ha to 154.12 ha due to the inclusion of the WNSLR construction footprint within WaterNSW and Erskine Park Biodiversity Conservation Area land;
- NSW Mitchell landscape in outer assessment circle: percentage of Cumberland Plain decreased from 98% to 97% and percentage of Sydney Basin Diatremes increased to 3% (correction made to 2017 assessment).
- NSW Mitchell landscape in inner assessment circle: percentage of Cumberland Plain landscape decreased from 100% to 98.1% and percentage of Sydney Basin Diatremes landscape increased from 0% to 2.9% (correction made to 2017 assessment).
- As found by Cumberland Ecology (2017) no state or regionally significant biodiversity links occur within the development site or inner assessment circle. A sub-regional conservation corridor occurs within the outer assessment circle. This corridor is directly to the north of the development site on land owned by Fitzpatrick and also overlaps with the Erskine Park Biodiversity Conservation Area (refer Figure 2-1).
- Rivers and streams: amended to include two 2nd order streams (both tributaries to Ropes Creek) (correction made to 2017 assessment).

The extent of the landscape features within the assessment circles and development site are summarised in Table 2-1and shown in Figure 2.1.

Table 2-1 Landscape features used in this assessment

Landscape feature	Outer assessment circle	Inner assessment circle	Oakdale West development site
IBRA bio-region: Sydney Basin	100%	100%	100%
IBRA sub-region: Cumberland Plain	100%	100%	100%
NSW Mitchell landscape: Cumberland Plain	97%	98.1%	100%
NSW Mitchell landscape: Sydney Basin Diatremes	3%	2.9%	0%
Ropes Creek 3rd order stream, Ropes Creek tributary 1st and 2nd order streams	Present	Nil	Nil



Oakdale West Estate

Biodiversity Assessment Report

- Assessment Circles
- Oakdale West
- WaterNSW Land
- EP Biodiversity Corridor
- Native Vegetation
- Sydney Basin Diatremes
- Ropes Creek
- 2nd order tributary
- 1st order tributary

Figure 2-1. Location map

Coordinate System:
MGA Zone 56 (GDA 94)

Image sources:
Nearmap 9 September 2018
NSW (Mitchell) Landscapes - version 3.1

N

0 100 200 400 600 800 m

2.2 Landscape value score

2.2.1 Percent Native Vegetation Cover

Amendments made:

- Outer assessment circle: marginal decrease from 161.61 ha to 161.02 ha due to vegetation clearing evident on 2018 aerial photography.
- Outer assessment circle: decrease in future extent from 160.4 ha to 154.51 due to additional clearing of native vegetation associated with the WNSLR on WaterNSW land.
- Inner assessment circle: decrease in future extent from 19.41 ha to 17.23 ha due to amendments made to the masterplan and allowances for fence construction.

A summary of the amended current and future percentage of native vegetation cover in the inner and outer assessment circles is provided in Table 2-2.

Table 2-2 Summary of amended current and future percentage of native vegetation

Assessment circle	Current extent of native vegetation		Future extent of native vegetation	
BAR amended, 2018	Area (ha)	% Cover Class	Area (ha)	% Cover Class
Outer assessment circle	161.02	16-20	154.51	11-15
Inner assessment circle	20.72	16-20	17.23	16-20

Based on these values, the development has a native vegetation cover score of 1.25.

2.2.2 Connectivity Value

From Appendix 4 of the FBA, native vegetation on a development site is part of a connecting link when it is linked to adjoining vegetation and the native vegetation on the development site:

- Is in moderate to good condition, and
- Has a patch size >1 ha, and
- Is separated by a distance of <100 m (or <30 m for non-woody ecosystems), and
- Is not separated by a large water body, dual carriageway, wider highway or similar hostile link.

The most limiting width identified and shown on Figure 1.2 of the BAR (Cumberland Ecology 2017) is by definition not a connecting link due to:

- Its location adjacent Sydney Water's Warragamba Pipeline which by definition in Appendix 4 of the BAM (OEH 2016) represents a hostile link (i.e. it is equal to or greater in width as the Great Western Motorway, the M4 Motorway and the M7 Motorway), and
- The native vegetation within this location is not in moderate to good condition.

Amendments made:

- The most limiting width located within Oakdale West is that which runs along the western boundary of the development site, which is >5 and <30m before and after development
- Further connecting links are identified along the southern boundary within Oakdale West and

along the eastern side of the construction development boundary.

All connecting links were considered when determining the condition of PCTS within each link before and after development.

Figure 2-2 illustrates the location of limiting widths within the development construction footprint.

2.2.3 Patch Size

No amendments made:

For a site-based development, patch size was determined in accordance with Appendix 4 of the FBA. The development site occurs within the Cumberland Plain Mitchell Landscape which has a cleared native vegetation value of 91%.

The largest patch of native vegetation, of which a portion occurs within the development site, is 224.15 ha in size. Based on these variables, the patch size class is categorised as 'Extra large' which has a corresponding patch size score of 12.

2.2.4 Loss in Landscape Value Score

Amendment made:

Using the results from the amended assessment of landscape attributes and Equation 4 in Appendix 1 of the FBA, the loss in landscape value score for the development site increased from 12.80 to 13.20.

2.3 Native Vegetation

Native vegetation within the Oakdale West development site was assessed through a review of existing data and collecting of floristic plot and transect plot data in accordance with the FBA and as described in *Section 4* of the BAR (Cumberland Ecology 2017).

Four PCTs were identified by Cumberland Ecology (2017):

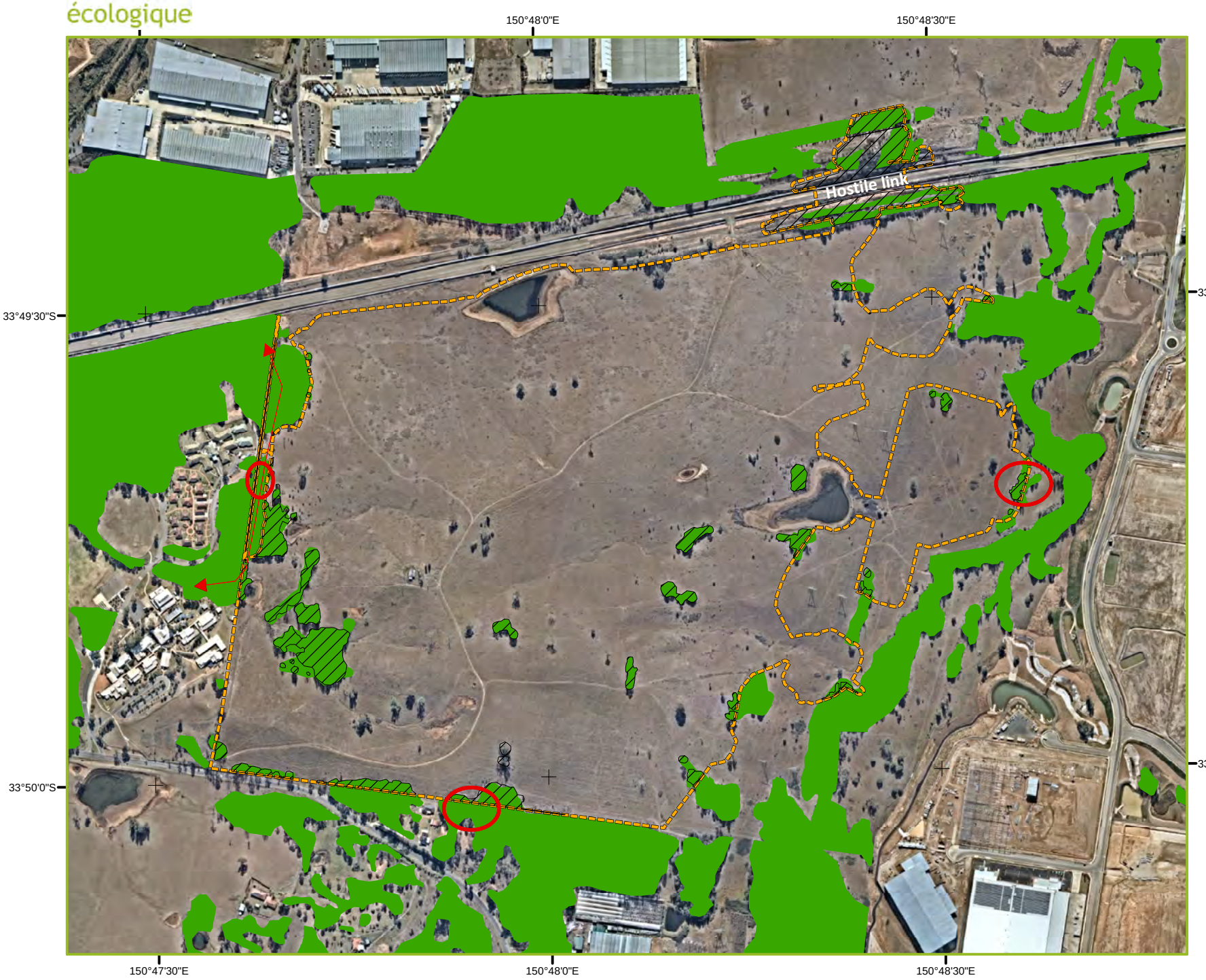
1. HN526: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin
2. HN528: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin
3. HN529: Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin
4. HN594: Swamp Oak floodplain forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion

Amendments have been made as follows:

- Decrease in HN594 to be removed as a result of non-PCT native vegetation incorrectly included in total extent of this PCT in 2017 reporting as follows:
    - Vegetation assessed by Cumberland Ecology (2017) as non-PCT vegetation located with WaterNSW land,
    - This was confirmed during site investigations for this amended BAR which found vegetation comprised of immature growth of small trees and saplings (predominantly *Casuarina glauca*) which has colonised unconsolidated fill removed for the construction of the Warragamba Pipelines, and

- Additional changes in extent of all PCTs as a result of changes to the masterplan.

- Areas of planted native vegetation to the north of the Oakdale West boundary (situated on land owned by WaterNSW and Fitzpatrick – including a section of the Erskine Park Biodiversity Conservation Land) which increased as a result of:
  - The revised bridge proposal for the WNSLR as amended to provide sufficient space for future TfNSW needs, and
  - The necessity to remove unconsolidated fill either side of the Warragamba Pipelines for geotechnical investigations and WNSLR construction enabling works.
- Increase in exotic vegetation to be removed, as a result of changes to the masterplan.



Oakdale West Estate

Biodiversity Assessment Report

Figure 2-2. Connectivity

Coordinate System:
MGA Zone 56 (GDA 94)

Image sources:
Nearmap 9 September 2018
NSW (Mitchell) Landscapes - version 3.1

3 Avoidance and Minimisation of Impacts

3.1 Avoidance of Impacts

No amendments made.

A summary of site selection considerations are detailed in *Table 6.2 of the BAR* (Cumberland Ecology 2017) with key avoidance strategies including:

- Locating the development site on existing farmland
- Avoiding most areas of native vegetation which will be left intact to the west of the site and within the riparian corridor of Ropes Creek to the east of the site.
- 95% of the vegetation within the development area comprises revegetation areas or exotic low diversity grassland.
- The remaining 5% does include EECs or CEECs, they mostly consist of remnant patches of fragmented, degraded and/or isolated vegetation. It is unlikely that the impacted areas of EECs or CEECs are viable in the future if left in their current state.
- There are no 4th order or higher streams, wetlands or estuaries within the locality. Indirect impacts to Ropes Creek (a 3rd order stream that will receive stormwater runoff from the development will be minimised through several bio-retention basins, swales and storm water management during construction.

3.2 Measures to Minimise Impacts

No amendments made.

Measures to minimise impacts during construction and operation of the development are described in *Tables 6.4, 6.5 and 6.6 of the BAR* (Cumberland Ecology 2017) with key minimisation measures including:

- Implementation of all reasonable measures to avoid and minimise any impacts that may occur during the construction and operational phase of the proposed development, that are additional to the impacts which occurred during the site selection and planning phases.
- Minimisation of impacts to biodiversity during construction with regards to methods and protocols for clearing (pre-clearance surveys and supervision of felling operations) and timing of construction; sediment and erosion controls, noise and spill management; feral pest, weed and/or pathogen prevention.
- As part of the proposed development a Biodiversity Management Plan will be created in order to guide all facets of biodiversity management and mitigation for the proposed development

4 Impacts of the Development

4.1 Summary of impacts

The proposal will unavoidably remove 4.41 ha of native plant community types (PCTs) from the development site as summarised in Table 4-1 and shown on Figure 4-1. Approximately 3 ha of non-PCT native vegetation would be removed as summarised in Table 4-2

Table 4-1 PCTs to be cleared

Zone	BVT_Code	Condition	Area (ha)		Change
			2017	2018	
1	HN526	Mod_Good	0.57	0.49	-0.08
2	HN526	Mod_Good_Medium	0.23	0.31	+0.08
3	HN526	Mod_Good_High	0.32	0.28	-0.04
4	HN528	Mod_Good	0.89	0.97	+0.08
5	HN528	Mod_Good_Medium	0.05	0.10	+0.05
6	HN528	Mod_Good_High	0.10	0.05	-0.05
7	HN529	Mod_Good	1.07	0.84	-0.23
8	HN529	Mod_Good_High	0.10	0.10	0.00
9	HN594	Mod_Good	1.62	1.26	-0.36
			4.95	**4.41**	**-0.55**

Table 4-2 Other native vegetation to be cleared

Land ownership	Area (ha)
WaterNSW	1.335
WaterNSW	1.243
Subtotal	**2.578**
Erskine Park Biodiversity Conservation Area	0.419
Subtotal	**0.419**
Total	**2.997**

In addition to the native vegetation summarised in Table 4-1 and Table 4-2 approximately 146.71 ha of exotic grassland and four farm dams will also be removed for the development of Oakdale West.

4.2 Impacts that require further consideration

In accordance with the FBA, impacts that require further consideration by OEH include any impact on a CEEC (unless specifically excluded in the SEARs) if it is likely to:

- Cause the extinction of the CEEC from the IBRA subregion, or
- Significantly reduce the viability of the CEEC.

HN528 and HN529 both conform to the BC Act listed CEEC of Cumberland Plain Woodland in the Sydney Basin Bioregion and the EPBC Act listed CEEC of Cumberland Plain Shale Woodland.

Impacts of the development that fall into the threshold of impacts that require further consideration comprise the removal of two hectares of Cumberland Plain Woodland (Table 4-3). The impacts to

HN528 and HN529 were assessed through consideration of the information provided in *Section 7.4* of the BAR (Cumberland Ecology 2017).

Table 4-3 Summary of impacts to PCTs that require further consideration

Zone	BVT_Code	Condition	Area (ha)	BC Act	EPBC Act
4	HN528	Moderate/ Good	0.97	CEEC	CEEC
5	HN528	Moderate/ Good_Medium	0.10	CEEC	
6	HN528	Moderate/ Good_High	0.05	CEEC	
		Subtotal	**1.12**		
7	HN529	Moderate/ Good	0.84	CEEC	CEEC
8	HN529	Moderate/ Good_High	0.10	CEEC	
		Subtotal	**0.94**		
TOTAL Cumberland Plain Woodland			**2.06**		

As shown in Table 4-3, 0.97 ha of HN528 and 0.84 ha of HN529 conform to the EPBC Act listed Cumberland Plain Shale Woodland (i.e. >0.5ha).

The Australian Department of Environment and Energy (DoEE) determined that removal of Cumberland Plain Shale Woodland is a controlled action requiring assessment and approval under the EPBC Act. DoEE provided an assessment notice (EPBC 2017/7952), which stated that the controlled action is able to be assessed under the assessment bilateral agreement with NSW (refer Appendix c).

It should be noted that the referral made to DoEE under the EPBC Act referred to a marginally larger extent of the listed Cumberland Plain Shale Woodland (1.96 ha which has been decreased to 1.81 ha). As such further consultation in relation to the amendments made relevant to this CEEE under the EPBC Act is not required.

EPBC Act listed Cumberland Plain Shale Woodland (HN528 and HN529) will be offset through the retirement of the required ecosystem credits in accordance with the FBA, which is the relevant NSW bilateral agreement method of assessment (refer Section 4.3).

4.3 Ecosystem credit requirements

Offset requirements were calculated using the BioBanking Credit Calculator, which are summarised in Table 4-4. The BioBanking Credit Calculator reporting is provided in Appendix A.



Oakdale West Estate

Biodiversity Assessment Report

Figure 4-1. Impacted Native Vegetation

Coordinate System:
MGA Zone 56 (GDA 94)

Image sources:
Nearmap 9 September 2018

Table 4-4 Summary of ecosystem credit requirements

PC type code	Plant community type name	Management zone area (ha)	Loss in LandScape Value	Loss in site value score	EEC Offset Multiplier	Credits req for TS	TS with highest credit req	TS offset multiplier	Ecosystem credits required
HN526	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	0.49	13.2	45.83	3	18	Powerful Owl	3	18
HN526	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	0.31	13.2	28.65	3	8	Powerful Owl	3	8
HN526	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	0.28	13.2	28.65	3	7	Powerful Owl	3	7
HN528	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	0.97	13.2	44.2	3	35	Powerful Owl	3	35
HN528	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	0.05	13.2	38.41	3	2	Powerful Owl	3	2
HN528	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	0.1	13.2	38.41	3	3	Powerful Owl	3	3
HN529	Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	0.84	13.2	38.41	3	27	Powerful Owl	3	27

PC type code	Plant community type name	Management zone area (ha)	Loss in LandScape Value	Loss in site value score	EEC Offset Multiplier	Credits req for TS	TS with highest credit req	TS offset multiplier	Ecosystem credits required
HN529	Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	0.1	13.2	38.41	3	3	Powerful Owl	3	3
HN594	Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion	1.26	13.2	68.12	3	69	Powerful Owl	3	69
									172

4.4 Impacts that do not require further assessment

The development site includes 146.71 of revegetated, exotic or cleared land that is not considered to comprise of a PCT or habitat for threatened species and populations. In accordance with Section 9.5.1.1 of the FBA this area of land does not require further assessment.

The revised bridge proposal for the WNSLR over the Warragamba Pipeline has been amended to provide sufficient space for future TfNSW needs (should they eventuate). The area of clearing has consequently increased to approximately 3 ha: 0.42 ha within the Erskine Park Biodiversity Conservation Land and 2.58 ha within WaterNSW land (refer Figure 4-1).

4.4.1 WaterNSW Land

Native vegetation within WaterNSW land was assessed by Cumberland Ecology (2017) as not being commensurate with any PCT. However the scope of the Cumberland Ecology (2017) assessed a smaller area of impact.

Ground truthing investigations were conducted for this amended BAR, which confirmed that the additional native vegetation to be cleared within WaterNSW does not conform to any PCT. As this area is not considered to comprise of a PCT or habitat for threatened species and populations. In accordance with Section 9.5.1.1 of the FBA this area of land does not require further assessment.

The areas that would be cleared comprise steep embankments of unconsolidated soils located either side of the Warragamba Pipelines. Anecdotally it is believed this to be spoil from excavations for the pipeline installation. The immaturity and depauperate nature of the vegetation growing on the embankments supports this theory. It is likely that excavations displaced the natural soil strata, with topsoils buried under deeper subsoils and as a consequence resulting in a hostile growth medium for vegetation to establish on.

For the purpose of this Biodiversity Assessment, the extent of native vegetation clearing within the Erksine Park Biodiversity Conservation Land has been included within the landscape and site values of the BAM calculator – specifically the extent of native vegetation before and after development within the outer assessment circle, and the limiting corridor width assessment.

4.4.2 Erskine Park Biodiversity Conservation Land

Offsetting of vegetation clearing within the Erksine Park Biodiversity Conservation Land is being addressed within the SSD 7348 application through separate provisions being subject to Ministerial approval.

At the time of preparation of this amended BAR, Goodman has proposed to construct a dedicated fauna tunnel within the bridge embankment of the proposed WNSLR (within the Erksine Park Biodiversity Conservation Land). The fauna tunnel would be designed and constructed following NSW Roads and Maritime Services guidelines for dedicated fauna tunnels.

It is anticipated that a dedicated fauna tunnel or other offsetting arrangement will be conditioned by the Department.

For the purpose of this Biodiversity Assessment, the extent of native vegetation clearing within the Erksine Park Biodiversity Conservation Land has been included within the landscape and site values of the BAM calculator (as per vegetation within WaterNSW land discussed in Section 4.4.1).

5 Avoidance and Minimisation of Impacts

5.1 Avoidance of Impacts

No amendments made.

A summary of site selection considerations are detailed in *Table 6.2 of the BAR* (Cumberland Ecology 2017) with key avoidance strategies including:

- Locating the development site on existing farmland
- Avoiding most areas of native vegetation which will be left intact to the west of the site and within the riparian corridor of Ropes Creek to the east of the site.
- 95% of the vegetation within the development area comprises revegetation areas or exotic low diversity grassland.
- The remaining 5% does include EECs or CEECs, they mostly consist of remnant patches of fragmented, degraded and/or isolated vegetation. It is unlikely that the impacted areas of EECs or CEECs are viable in the future if left in their current state.
- There are no 4th order or higher streams, wetlands or estuaries within the locality. Indirect impacts to Ropes Creek (a 3rd order stream that will receive stormwater runoff from the development will be minimised through several bio-retention basins, swales and storm water management during construction.

5.2 Measures to Minimise Impacts

No amendments made.

Measures to minimise impacts during construction and operation of the development are described in *Tables 6.4, 6.5 and 6.6 of the BAR* (Cumberland Ecology 2017) with key minimisation measures including:

- Implementation of all reasonable measures to avoid and minimise any impacts that may occur during the construction and operational phase of the proposed development, that are additional to the impacts which occurred during the site selection and planning phases.
- Minimisation of impacts to biodiversity during construction with regards to methods and protocols for clearing (pre-clearance surveys and supervision of felling operations) and timing of construction; sediment and erosion controls, noise and spill management; feral pest, weed and/or pathogen prevention.
- As part of the proposed development a Biodiversity Management Plan will be created in order to guide all facets of biodiversity management and mitigation for the proposed development

6 References

Cumberland Ecology (2017) Oakdale West State Significant Development Application Biodiversity Assessment Report (BAR), prepared for Goodman Property Services (Aust.) Pty Ltd, March 2017.

NSW Government (2014a). Framework for Biodiversity Assessment. NSW Biodiversity Offsets Policy for Major Projects. Office of Environment and Heritage for the NSW Government, Sydney.

NSW Government (2014b). NSW Biodiversity Offsets Policy for Major Projects. Office of Environment and Heritage for the NSW Government, Sydney.

WSP (2018) Draft Western Sydney Freight Line Corridor Draft Strategic Environmental Assessment Transport for NSW, February 2018

Appendix A. BioBanking Credit Report

Biodiversity credit report

This report identifies the number and type of biodiversity credits required for a major project.

Date of report: 1/10/2018 Time: 12:11:53PM Calculator version: v4.0

Major Project details

Proposal ID:	195/2017/4226MP
Proposal name:	Oakdale West SSD 7348 _AMENDED
Proposal address:	Bakers Lane Kemps Creek NSW
Proponent name:	Goodman (Aust) Pty Ltd
Proponent address:	Level 17 60 Castlereagh Street Sydney NSW 2000
Proponent phone:	+61 2 9230 7225
Assessor name:	Kat Duchatel
Assessor address:	12 WANGANELLA ST Bowgowlah NSW 2093
Assessor phone:	0437 821 110
Assessor accreditation:	195

Summary of ecosystem credits required

Plant Community type	Area (ha)	Credits created
Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	1.08	33.46
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	1.12	40.57
Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	0.94	30.21
Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion	1.26	69.00
Total	4.40	173

Credit profiles

1. Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion, (HN528)

Number of ecosystem credits created	41
IBRA sub-region	Cumberland - Hawkesbury/Nepean

Offset options - Plant Community types	Offset options - IBRA sub-regions
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion, (HN528)	Cumberland - Hawkesbury/Nepean and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

2. Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion, (HN529)

Number of ecosystem credits created	30
IBRA sub-region	Cumberland - Hawkesbury/Nepean

Offset options - Plant Community types	Offset options - IBRA sub-regions
Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion, (HN529) Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion, (HN528)	Cumberland - Hawkesbury/Nepean and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

3. Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion, (HN526)

Number of ecosystem credits created	33
IBRA sub-region	Cumberland - Hawkesbury/Nepean

Offset options - Plant Community types	Offset options - IBRA sub-regions
Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion, (HN526)	Cumberland - Hawkesbury/Nepean and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

4. Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion, (HN594)

Number of ecosystem credits created	69
IBRA sub-region	Cumberland - Hawkesbury/Nepean

Offset options - Plant Community types	Offset options - IBRA sub-regions
Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion, (HN594) Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion, (HN595)	Cumberland - Hawkesbury/Nepean and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

Appendix B. BAR Cumberland Ecology (2017)

OAKDALE WEST ESTATE STATE SIGNIFICANT DEVELOPMENT

Biodiversity Assessment Report

For:

Goodman Property Services (Aust) Pty Ltd

March 2017

Final Report

PO Box 2474
Carlingford Court 2118

Report No. 15122RP1

The preparation of this report has been in accordance with the brief provided by the Client and has relied upon the data and results collected at or under the times and conditions specified in the report. All findings, conclusions or recommendations contained within the report are based only on the aforementioned circumstances. The report has been prepared for use by the Client and no responsibility for its use by other parties is accepted by Cumberland Ecology.

Version	Date Issued	Amended by	Details
001	15/02/2016	LH	First Draft
002	15/04/2016	LH	Second Draft
003	02/06/2016	GK	Final Draft
004	22/09/2016	GK	Draft – peer review comments
005	25/10/2016	GK	Final draft
006	5/11/2016	GK	Final – updated masterplan amendments
007	1/12/2016	GK	Final draft: Fitzpatrick land amendments
008	5/12/2016	GK	Final: Fitzpatrick land amendments
009		GK	Final draft: Western Boundary amendments
010	31/03/2017	VO	Final – Peer Review Amendments

Approved by: David Robertson

Position: Director

Signed: David Robertson

Date: *31 March, 2017*

Table of Contents

EXECUTIVE SUMMARY

1 INTRODUCTION

1.1 Purpose 1.1

1.2 Project Description 1.2

1.2.1 Location 1.2

1.2.2 Overview 1.2

1.2.3 Identification of Development Site Footprint 1.3

1.3 General Description of Development Site 1.4

1.4 Information Sources 1.5

1.4.1 Database Analysis 1.5

1.4.2 Literature Review 1.5

1.4.3 Aerial Photography 1.6

2 LEGISLATION AND POLICIES

2.1 Commonwealth 2.1

2.1.1 Environment Protection and Biodiversity Conservation Act 1999 2.1

2.1.2 Environmental Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy 2.2

2.2 New South Wales 2.2

2.2.1 Environmental Planning and Assessment Act 1979 2.2

2.2.2 Threatened Species Conservation Act 1995 2.3

2.2.3 Fisheries Management Act 1994 2.3

2.2.4 NSW Biodiversity Offsets Policy for Major Projects 2.4

2.2.5 State Environmental Planning Policy (Western Sydney Employment Area) 2009 2.4

3 LANDSCAPE FEATURES

3.1 Landscape Features 3.1

3.1.1 IBRA Bioregions and IBRA Subregions 3.1

3.1.2 Mitchell Landscapes 3.2

Table of Contents *(Cont'd)*

	3.1.3	Rivers and Streams	*3.2*
	3.1.4	Wetlands	*3.3*
	3.1.5	Native Vegetation Extent	*3.3*
	3.1.6	State or Regionally Significant Biodiversity Links	*3.3*
	3.1.7	Other Landscape Features	*3.4*
3.2		Landscape Value Score	*3.4*
	3.2.1	Attributes	*3.4*
	3.2.2	Score	*3.5*
4	**NATIVE VEGETATION**		
4.1		Review of Existing Data	*4.1*
4.2		Surveys	*4.1*
	4.2.1	Overview	*4.1*
	4.2.2	Plot-based Full Floristic Survey	*4.2*
	4.2.3	Plot and Transect Surveys	*4.3*
4.3		Native Vegetation Extent	*4.4*
4.4		Identification of Plant Community Types	*4.5*
4.5		Description of Plant Community Types	*4.8*
	4.5.1	Overview	*4.8*
	4.5.2	Threatened Ecological Communities	*4.8*
	4.5.3	Description of Plant Community Types within the Development Site	*4.12*
4.6		Vegetation Zones	*4.21*
4.7		Groundwater Dependent Ecosystems	*4.24*
5	**THREATENED SPECIES AND POPULATIONS**		
5.1		Review of Existing Data	*5.1*
5.2		Field Surveys	*5.1*
	5.2.1	Habitat Assessment	*5.1*
	5.2.2	Threatened Frog Habitat Suitability Assessment	*5.2*
	5.2.3	Targeted Threatened Species Surveys	*5.2*

Table of Contents *(Cont'd)*

	5.2.4	Weather Conditions	*5.5*
	5.2.5	Survey Limitations	*5.5*
5.3		Fauna Habitats within the Development Site	*5.6*
	5.3.1	Woodland Habitat	*5.6*
	5.3.2	Aquatic Habitat	*5.8*
	5.3.3	Grassland Habitat	*5.8*
	5.3.4	Revegetation Area Habitat	*5.9*
5.4		Ecosystem Credit Species	*5.10*
	5.4.1	Predicted Ecosystem Credit Species	*5.10*
5.5		Species Credit Species	*5.14*
	5.5.1	Candidate Species Credit Species	*5.14*
	5.5.2	Candidate Species for Further Assessment	*5.14*
	5.5.3	Presence of Candidate Species	*5.28*
6		**AVOID AND MINIMISE IMPACTS**	
6.1		Measures to Avoid	*6.1*
	6.1.1	Avoidance of Direct Impacts	*6.1*
	6.1.2	Site Selection	*6.3*
	6.1.3	Incorporating Principles of Avoidance and Minimising Impacts to Biodiversity	*6.6*
6.2		Measures to Minimise Impacts	*6.6*
	6.2.1	Minimising Impacts During Construction Phase	*6.6*
	6.2.2	Minimising Impacts During Operational Phase	*6.10*
6.3		Summary of Measures	*6.13*
6.4		Assessment of Impacts	*6.21*
	6.4.1	Direct Impacts	*6.21*
	6.4.2	Indirect Impacts	*6.21*
6.5		Identification of Final Project Footprint	*6.21*
7		**IMPACT SUMMARY**	
7.1		Introduction	*7.1*

Table of Contents *(Cont'd)*

7.2	Summary of Impacts	*7.1*
7.2.1	Direct Loss of Native Vegetation	*7.2*
7.2.2	Direct Loss of Fauna Habitat	*7.3*
7.3	Thresholds for Assessing Unavoidable Impacts	*7.4*
7.4	Impacts that Require Further Consideration	*7.8*
7.4.1	Landscape Features	*7.8*
7.4.2	Native Vegetation	*7.8*
7.4.3	Species and Populations	*7.10*
7.5	Impacts Requiring Offsetting	*7.12*
7.5.1	Landscape Features	*7.12*
7.5.2	Native Vegetation	*7.12*
7.5.3	Species and Populations	*7.13*
7.6	Impacts not Requiring Offsetting	*7.13*
7.6.1	Native Vegetation	*7.13*
7.6.2	Species and Populations	*7.13*
7.7	Impacts that do not Require Further Assessment	*7.14*

REFERENCES

List of Appendices

A. PLOT AND TRANSECT DATA

B. FLORA SPECIES LIST

C. FAUNA SPECIES LIST

D. BIODIVERSITY CREDIT REPORT

List of Tables

1.1	Relevant SEARS addressed in the BAR	1.1

List of Tables

3.1	Current and future native vegetation cover within the assessment circles	3.4
3.2	Current and future connecting links within the assessment circles	3.5
4.1	Plot and transect survey effort	4.3
4.2	Justification for selection of PCTs within the development site	4.6
4.3	Summary of PCTs occurring within the development site	4.8
4.4	TECs associated with PCTs occurring within the development site	4.9
4.5	Evaluation of Vegetation Zone 4 (HN528) at development site against EPBC Act listing advice thresholds	4.10
4.6	Evaluation of Vegetation Zone 7 (HN529) at development site against EPBC Act listing advice thresholds	4.11
4.7	Vegetation zones within the development site	4.23
5.1	Fauna survey effort	5.4
5.2	Weather conditions during survey	5.5
5.3	Ecosystem credit species with the highest Tg value in each vegetation zone	5.11
5.4	Predicted ecosystem credit species	5.12
5.5	Assessment of potential presence of species credit species	5.16
5.6	Summary of surveys undertaken for candidate species credit species	5.28
6.1	Avoidance of direct impacts on biodiversity values at the development site	6.1
6.2	Consideration of the proposed development during site selection	6.4
6.3	Considerations to minimise direct impacts of the proposed development during construction	6.8
6.4	Proposed measures to minimise indirect impacts to biodiversity during construction	6.10
6.5	Consideration of measures to minimise direct impacts the proposed development during operation	6.11
6.6	Measures to be implemented to mitigate the impacts on biodiversity	6.14
7.1	Summary of Impacts	7.1
7.2	Summary of areas directly impacted by the Project	7.2
7.3	Thresholds for the assessment and offsetting of unavoidable impacts of the Project	7.5
7.4	Impacts that require further consideration	7.8
7.5	Ecosystem Credit requirement of the Project	7.12
A.1	Plot and Transect Data from the Development Site	A.1
B.1	Flora species list from development site	B.1
C.1	Fauna species list from the development site	C.1

List of Figures

1.1	Site map	1.7
1.2	Location map	1.8
1.3	Indicative layout of the development site	1.9
4.1	Plot-based full floristic survey and plot and transect survey sites	4.25
4.2	PCTs within the development site	4.26
4.3	TSC Act TECs within the development site	4.27
4.4	EPBC Act TECs within the development site	4.28
4.5	Vegetation zones within the development site	4.29
4.6	Groundwater dependent ecosystems within the development site	4.30
5.1	Targeted species credit species survey locations	5.30
5.2	Locations of Threatened Species	5.31
7.1	Location of impact thresholds	7.11

List of Photographs

4.1	HN526 within the development site	4.13
4.2	HN528 within the development site	4.14
4.3	HN529 within the development site	4.15
4.4	HN594 within the development site	4.17
4.5	*Casuarina glauca* dominating the mound top of revegetation area	4.18
4.6	*Eucalyptus tereticornis* below mound top to the north	4.19
4.7	Exotic Grassland and Shrubby Regrowth within the proposed Western North/South Link Road Alignment	4.20
4.8	Exotic Grassland at the Oakdale West Estate development site	4.21
5.1	Woodland habitat on the western edge of the development site	5.7
5.2	Large dam on the eastern boundary of the development site	5.8
5.3	Grassland habitat within the development site	5.9
5.4	Revegetation area within the development site	5.10

Glossary of Terms

BAR	Biodiversity Assessment Report
BBAM	BioBanking Assessment Methodology
BBCC	BioBanking Credit Calculator
BOS	Biodiversity Offset Strategy
CEEC	Critically Endangered Ecological Community
DoE	Commonwealth Department of the Environment
DP&E	NSW Department of Planning and Environment
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
FBA	Framework for Biodiversity Assessment
FM Act	NSW *Fisheries Management Act 1994*
GDE	Groundwater Dependent Ecosystem
GIS	Geographic Information System
GPS	Global Positioning System
LGA	Local Government Area
MNES	Matters of National Environmental Significance
NSW	New South Wales
OEH	NSW Office of Environment and Heritage
PCT	Plant Community Type
Penrith DCP 2014	Penrith Development Control Plan 2014
the Project	The staged development of a warehouse and distribution complex within the Oakdale West precinct of the broader Oakdale Estate which is located within the Western Sydney Employment Area
SEARs	Secretary's Environmental Assessment Requirements
SSD	State Significant Development
SSDA	State Significant Development Application
TEC	Threatened Ecological Community
TSC Act	NSW *Threatened Species Conservation Act 1995*
WSEA SEPP	NSW *State Environmental Planning Policy (Western Sydney Employment Area) 2009*

Executive Summary

S1 Introduction

Cumberland Ecology was commissioned by Goodman Property Services (Aust) Pty Ltd (Goodman) to prepare a Biodiversity Assessment Report (BAR) for Oakdale West Estate State Significant Development (the 'Project') Masterplan. The Project involves the staged development of a warehouse and distribution complex. This BAR, in conjunction with the Biodiversity Offset Strategy (BOS) will form part of the Environmental Impact Statement (EIS) being prepared for Goodman to support an application for State Significant Development Consent under Division 4.1 of Part 4 of the New South Wales (NSW) *Environmental Planning and Assessment Act 1979* (EP&A Act).

The purpose of this BAR is to assess the potential impacts of the proposed development on flora and fauna. This BAR has been prepared in accordance with the New South Wales (NSW) *Framework for Biodiversity Assessment* (NSW Government, 2014a) and responds to the Secretary's Environmental Assessment Requirements (SEARs) as they relate to flora and fauna.

S2 Project Description

The Project is located within the Oakdale West precinct of the broader Oakdale Estate which is located within the Western Sydney Employment Area as identified under the NSW *State Environmental Planning Policy (Western Sydney Employment Area) 2009* (WSEA SEPP). The project is located within Penrith Local Government Area (LGA) and the nearest town centres are Erskine Park and Horsley Park which are both approximately 6 km west and east respectively from the Project.

The Project seeks to facilitate the development of the Oakdale West precinct and represents the third stage of development of the broader Oakdale Estate into a regional warehousing and distribution hub. The Project also involves the construction of a North/South Link Road between the proposed Oakdale West Warehouse hub and the Erskine Park East-West Link Road as identified in the WSEA SEPP.

The Project comprises a State Significant Development (SSD) and has been assessed in accordance with the requirements of the *NSW Biodiversity Offsets Policy for Major Projects* and associated Framework for Biodiversity Assessment (FBA).

The main warehouse hub of the Oakdale West development is located on land owned by Goodman while the North/South Link Road runs through lands to the north of the Goodman land. The majority of the North/South Link Road passes though land owned by Fitzpatrick Investments Pty Ltd (Fitzpatrick) which forms part of the Erskine Park Employment Area. As the Fitzpatrick land has previously been assessed for ecological impacts and has received

approval for development subject to the creation of a conservation zone, the area of the SSD Application that lies within the Fitzpatrick lands is not considered as part of the development site in this BAR.

S3 Summary of Impacts of the Project

The development site is largely located within grassland used for cattle grazing so as to minimise environmental impacts to vegetation. Approximately 95% of the vegetation within the development area comprises low diversity/exotic grassland or planted native vegetation that does not meet the determination of a native Plant Community Type (PCT) with the remaining 5% comprising Critically Endangered and Endangered Ecological Communities (C/EECs). These C/EECs consist of remnant patches of fragmented, degraded and isolated vegetation. As such; it is unlikely that such small areas of C/EECs are viable in the future if left in their current state.

The proposal will unavoidably remove 4.93 ha of native vegetation and 111.31 ha of immature planted vegetation and exotic vegetation from the development site. The native vegetation conforms to four PCTs that are threatened ecological communities listed under the *NSW Threatened Species Conservation Act 1995* (TSC Act) and *Commonwealth Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act):

- HN526 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin (TSC Act EEC);
- HN528 Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin (TSC Act CEEC and EPBC Act CEEC);
- HN529 Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (TSC Act CEEC and EPBC Act CEEC); and
- HN594 Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion (TSC Act EEC).

A total of 24 *Grevillea juniperina* subsp. *juniperina* (Juniper-leaved Grevillea) individuals, listed as vulnerable under the TSC Act, were located within the Link Road footprint on Fitzpatrick land. The offsetting for the removal of these individuals forms part of the approvals for the development of the Fitzpatrick land and further offsetting of these individuals is not considered in this BAR.

The impacts of the Project on CEECs and EECs are to be offset by a combination of establishment of a Biobank site and purchase and retirement of credits not generated at the Biobank site. These measures are detailed in the BOS for the Project (Cumberland Ecology, 2017)

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Chapter 1

Introduction

Cumberland Ecology was commissioned by Goodman Property Services (Goodman) to prepare a Biodiversity Assessment Report (BAR) of the Masterplan of the Oakdale West Estate Project (the 'Project').

1.1 Purpose

This BAR has been prepared to inform a State Significant Development (SSD) Application for the staged development of the Project. The aim of the BAR is to assess the potential impacts of the proposed development on flora and fauna and has been prepared in accordance with the New South Wales (NSW) *Framework for Biodiversity Assessment* (NSW Government, 2014a). The report responds to the Secretary's Environmental Assessment Requirements (SEARs) as they relate to flora and fauna. The SEARs relevant to this SSD have been considered and are addressed in this report are shown in **Table 1.1**.

This report supports an Environmental Impact Statement (EIS) prepared for the Project and should be read in conjunction with the EIS and development plans submitted with the SSDA.

Table 1.1 Relevant SEARS addressed in the BAR

Relevant SEARS	Response
Details of the quantity and type of any vegetation to be cleared	This report includes identification and description of plant community types that exist within the Project detailed in Section 4.4 and 4.5.
An assessment of impacts (direct or indirect) on threatened species, populations, ecological communities (including groundwater dependent ecosystems) and their habitat, critical habitat (including riparian habitat) and native vegetation in accordance with the Framework for Biodiversity Assessment (Oct 2014)	An assessment of impacts on threatened species, populations, ecological communities and their habitat in accordance with the Framework for Biodiversity Assessment has been undertaken and are included in Chapter 5.
Proposed measures to avoid, mitigate or offset any significant impacts in accordance with the NSW Biodiversity Offset Policy for Major Projects	Proposed measures to avoid, mitigate or offset any significant impacts in accordance with the NSW Biodiversity Offset Policy for Major Projects is provided in Chapter 6.

1.2 Project Description

1.2.1 Location

The Project is located within the Oakdale West precinct of the broader Oakdale Estate which is located within the Western Sydney Employment Area as identified under the NSW *State Environmental Planning Policy (Western Sydney Employment Area) 2009* (WSEA SEPP). The project is located within Penrith Local Government Area (LGA) and the nearest town centres are Erskine Park and Horsley Park which are both approximately 6 km west and east respectively from the Project. The Project is accessed currently via Bakers Lane and is proposed to be accessed via the proposed Western North-South Link Road that is a part of this development application. There are several other developments adjoining the Project within a broader industrial precinct.

The Project comprises the staged construction of a warehousing hub as well as a North/South Link Road between the proposed Oakdale West Warehouse hub and the Erskine Park East-West Link Road as identified in the WSEA SEPP.

The development footprint assessed in the BAR covers approximately 117.82 ha on Lot 11 DP1178389 and an additional 0.94 ha of land which passes from south to north through Lot 3 DP85393, Lot 2 DP84578, Lot 6 DP229784 and Lot 2 DP1215268 (which will facilitate future access to the proposed Western North South Road Link (WNSRL)).

The proposed WNSLR will connect in the north-eastern part of the site, providing a link north to Lenore Drive and the broader external road network. Construction of the WNSLR between the site and Lenore Drive forms part of the proposed Stage 1 works.

Most of the WNSLR link north to Lenore Drive is located on Lot 2 DP1215268, which is owned by Fitzpatrick Investments Pty Ltd (Fitzpatrick) and forms part of the Erskine Park Employment Area.

The Fitzpatrick land has already been assessed for ecological impacts and has received approval for development subject to the creation of a conservation zone (KMA, 2016), the area of the SSD Application that lies within the Fitzpatrick lands is not considered as part of the development site in this BAR.

The location of the various components of the SSD Application area – namely the development site and the link road are shown in **Figure 1.1** and **Figure 1.2**.

1.2.2 Overview

The Project represents the third stage of development within the broader Oakdale Estate. The land within the Oakdale West Estate is owned by a Goodman to develop the Oakdale Estate into a regional warehousing and distribution hub. Goodman is the applicant for the Project. The Project seeks to facilitate the development of the Oakdale West precinct. The Project itself is being assessed as a staged development under Division 2A of the EP&A Act.

The SSD Application for the Project seeks approval for:

- An overarching planning framework to guide the staged development of the Project including:
  - An Indicative Master Plan and Structure Plan;
  - Development Controls for the Project;
  - Western North/South Link Road;
  - A Biodiversity Offset Strategy.
- Stage 1 Development of the Estate including:
  - A package of estate-wide site preparation works to be implemented in stages including:
    - Subdivision;
    - Bulk earthworks (including construction of detention basins); and
    - Construction of retaining walls, road and utility infrastructure/services.
    - Environmental management measures and protocols for the site.
  - Development for the purposes of warehousing and distribution including:
    - The construction of warehouse buildings in Precincts 1, 2, 3, 4 and 5;
    - The construction of hardstand, loading, car parking and landscaping in Precincts 1, 4 and 5;
  - The fit out and use of buildings in Precincts 1, 2, 3, 4 and 5 for generic warehousing and distribution uses.

A detailed description of the Project components is provided within the EIS. The conceptual layout of the Project is shown in **Figure 1.3**.

1.2.3 Identification of Development Site Footprint

The extent of the construction and operational footprints are shown in **Figure 1.3**. The construction footprint of the Project will encompass all works associated with the Project and is wholly contained within the development site. The construction footprint includes all roads, precincts, earthworks, set down areas, bio-retention basins, access tracks and temporary fencing. The operational footprint of the Project for this assessment will include Precinct 1, 2, 3, 4 and 5, the Services Lot, and all earthworks, roadways, utility infrastructure, batters, and bio-retention basins.

1.3 General Description of Development Site

i. Landform, Geology and Soils

Landform at the development site is relatively uniform, with undulating rises and alluvial flats bisected by narrow ridge running from the south west to the north east of the development site. The topography does not have any large variances like mountains or cliff lines, with high elevations within the development site of 88m above sea level and the lowest point of the development site being approximately 50m above sea level.

Underlying geology of the site is best described as an alluvial plain with high clay content on shaly soils. The soil landscape is described as Cumberland Plain (DECCW, 2008) which is present on low rolling hills and valleys in a rain shadow area between the Blue Mountains and the coast on horizontal Triassic shales and lithic sandstones forming a down-warped block on the coastal side of the Lapstone monocline (DECCW, 2008).

ii. Vegetation

Native vegetation comprises approximately 5% of the vegetated cover of the development site. The majority of the development site is cleared for agriculture and is dominated by exotic pasture grasses. Native vegetation within the development site is primarily limited to small remnant patches and sparsely scattered trees through the paddocks. There are also areas of regenerating woodland that connect to larger patches of woodland to the west and south of the development site. These regenerating areas largely comprise of juvenile, regenerating *E. tereticornis* but the understorey in these patches is largely absent due to heavy grazing by cattle and Eastern Grey Kangaroo. The condition of vegetation across the whole development site is degraded due to persistent impacts from grazing even within areas of native vegetation, the ground layer is frequently dominated by exotic species, and the shrub layer is almost absent.

One small patch of planted native vegetation exists within parts of the proposed North South Link Road contained within the development site and continues northwards into Fitzpatrick lands. This vegetation has been planted as tubestock and comprises immature vegetation dominated by juvenile trees.

iii. Hydrology

The development site occurs within the Hawkesbury-Nepean Catchment. The development site occurs at the headwaters of the alluvial plain and is bisected by a number of depressions that drain into Ropes Creek, a third order stream, which flows into South/Wianamatta Creek approximately 13 km north of the development site. The drainage system within the development site (i.e. the depressions) is in relatively poor condition, due to erosion and trampling by cattle.

iv. Land Uses

The development site has previously been utilised for the purpose of cattle grazing. This land use has resulted in the majority of the development site being extensively cleared of

vegetation which has resulted in a significant loss of flora and fauna habitats. Land surrounding the development site has also historically been utilised for agricultural purposes.

The development site and adjoining land is zoned IN1 – General Industrial and E2 – Environmental Conservation under the WSEA SEPP. The objective of the IN1 - General Industrial zoning is to facilitate a wide range of employment-generating development including industrial, manufacturing, warehousing, storage and research uses and ancillary office space. The objectives of E2 – Environmental Conservation are to protect, manage and restore areas of high ecological, scientific, cultural or aesthetic values; and to prevent development that could destroy, damage or otherwise have an adverse effect on those values.

Two converging power easements meet in the south east of the development site and run through the eastern portion of the lot and Sydney Water Mains Pipelines run immediately to the north of the development site. Other nearby land uses includes industrial buildings within Oakdale Central, brick and roofing quarry and rural living.

The land to the north of the development site that North South Link Road will run through is owned by Fitzpatrick Investments Pty Ltd and has concept plan approval (Application Number: MP 06_0166) for the Link Road. This area is predominantly cleared for the purpose of cattle grazing but has a conservation corridor that runs along the southern boundary of the site that has been revegetated by Greening Australia. The conservation corridor through the Fitzpatrick land is contained within parts of the Cumberland Conservation Corridor shown in **Figure 1.2**. The specifics of the conservation corridor through Fitzpatrick land are outlined in the ecological documentation for the Erskine Park Erskine Park Employment Area.

1.4 Information Sources

1.4.1 Database Analysis

A number of databases were utilised as part of this assessment, including:

- Atlas of NSW Wildlife;
- Threatened Species Profile Database;
- VIS Classification Database;
- Department of Primary Industries Threatened and protected species - records viewer; and
- BoM Atlas of Groundwater Dependent Ecosystems.

1.4.2 Literature Review

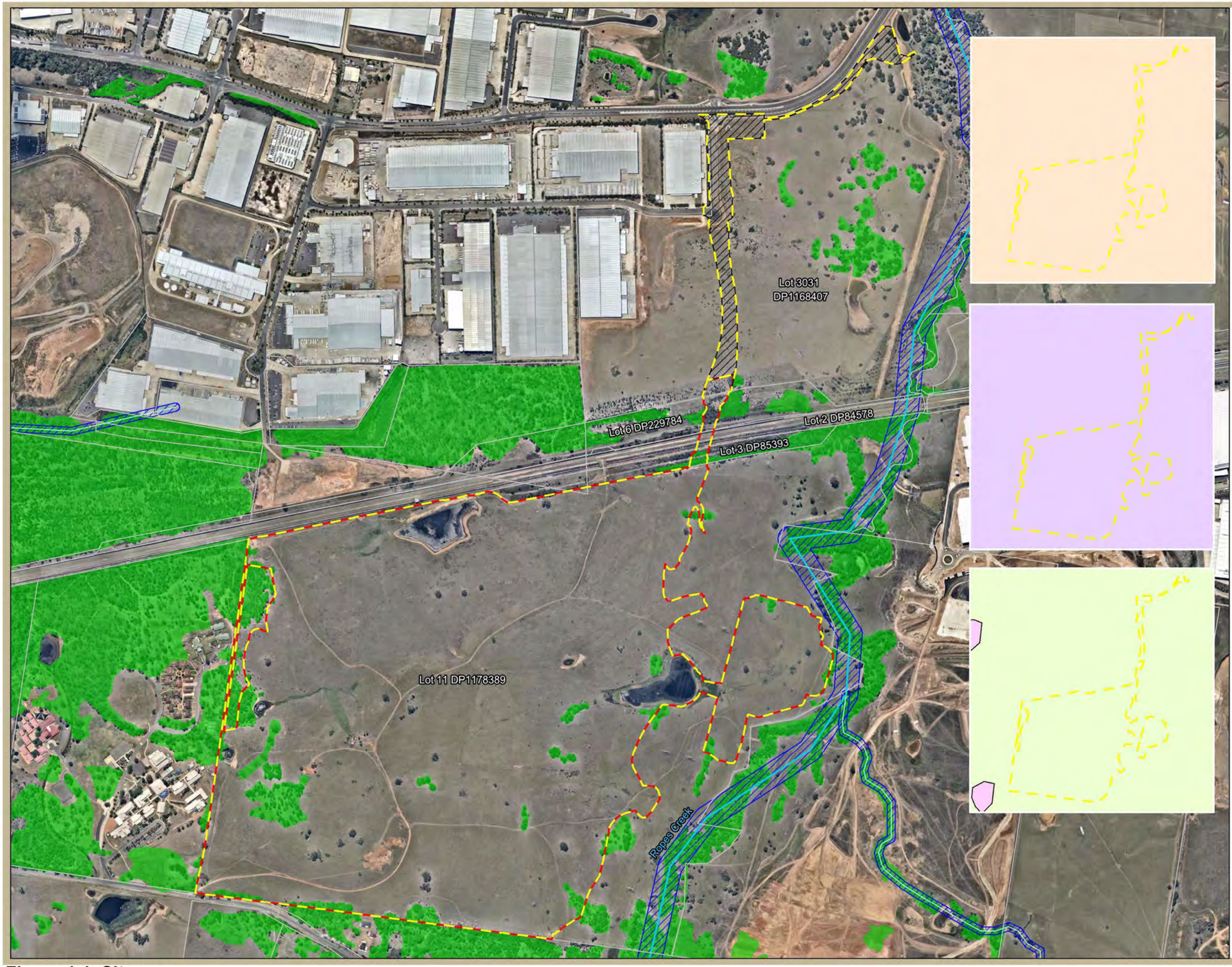
A review of ecological literature relevant to the development site was undertaken as part of this assessment to evaluate the biodiversity values associated with the development site. Key documents reviewed for this BAR include:

- Oakdale South Estate Biodiversity Assessment Report (Cumberland Ecology, 2016);
- Ecological Assessment - Oakdale Concept Plan (Cumberland Ecology, 2007);
- Cumberland Plain Vegetation Mapping (DECCW, 2007);
- Erskine Park Link Road Network Concept Plan (NSW Department of Planning, 2009); and
- Revised Biodiversity Management Plan Erskine Park Employment Area: 2007 (HLA-Envirosciences, 2007).

1.4.3 Aerial Photography

The aerial imagery used was taken from Nearmap. This aerial is dated 11-02-2017. SIXmaps imagery managed by the Department of Lands was also utilised. The SIXmaps aerial was dated 4-01-2014.

Coordinate System: MGA Zone 56 (GDA 94)



Legend

- Development Site
- SSD Application Area
- Additional North-South Link Road Area
- Cadastral boundaries
- Native vegetation extent

Rivers and Streams

- 1st Order Stream
- 3rd Order Stream
- Riparian Buffer Areas

IBRA Bioregion

- Sydney Basin

IBRA Subregion

- Cumberland

Mitchell Landscapes

- Cumberland Plain
- Sydney Basin Diatremes

Grid North

Scale: 1:9,130 @ A3 page
Date prepared: 31/03/2017

Image Source:
Image © Nearmap
(dated 11-02-2017)

Data Source:
Remnant Vegetation of the western Cumberland subregion, 2013 Update. VIS_ID 4207, OEH 2013.
Change in the distribution of Cumberland Plain Woodland VIS_ID 3785. DECCW 2008.
Interim Biogeographic Regionalisation for Australia (IBRA) version 7, 2012;
DECC (2008), Landscapes (Mitchell) of NSW - Version 3;
© Copyright Commonwealth of Australia (Geoscience Australia) 2006;
Copyright © Land and Property Information NSW (LPI)

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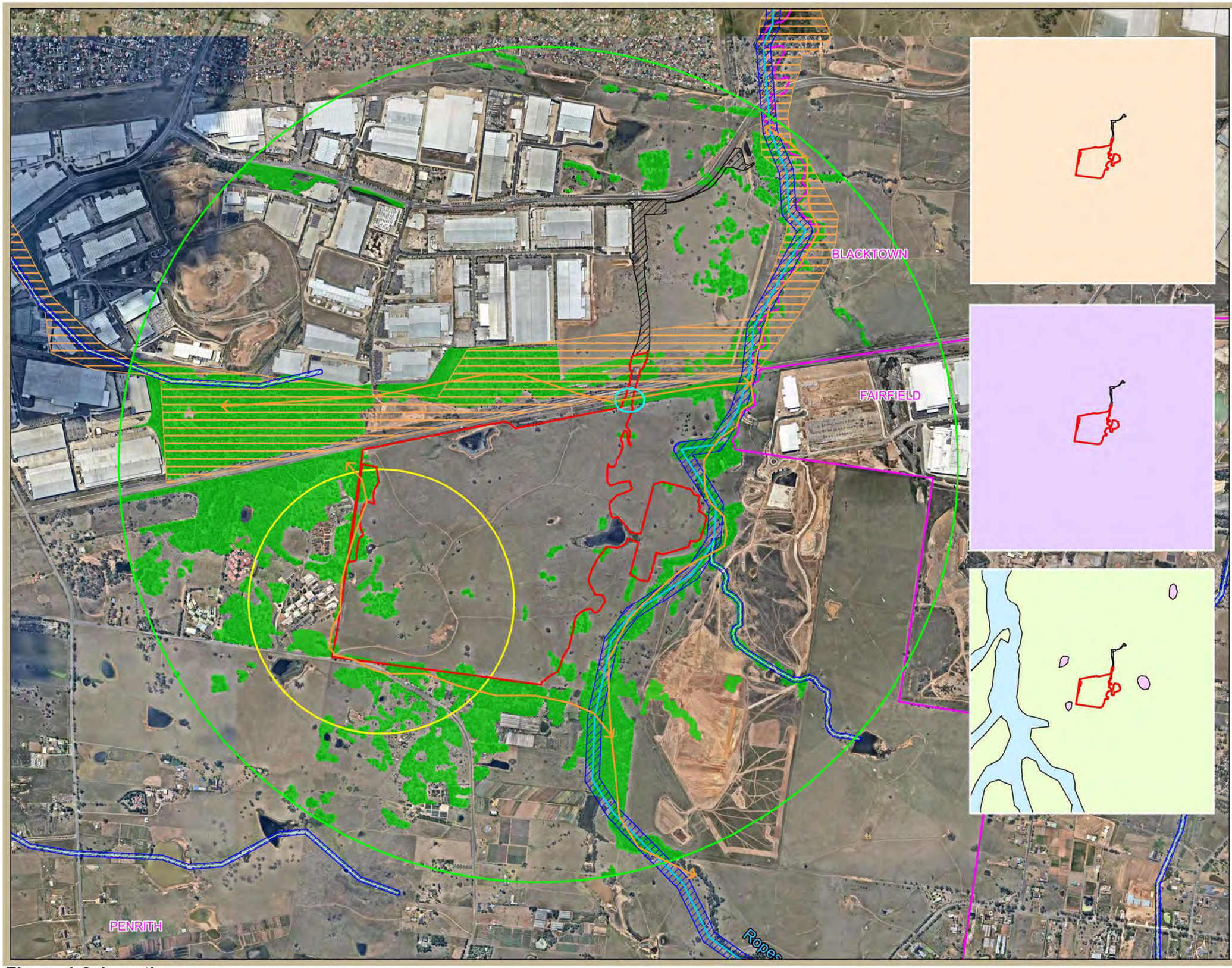
I:\...\15122\Figures\RP1_BAR\20170331\Figure 1.1. Site Map

Figure 1.1. Site map

100 0 100 200 300 400 m

Coordinate System: MGA Zone 56 (GDA 94)



Legend

- Development Site
- Additional North-South Link Road Area
- Inner Assessment Circle (100 ha)
- Outer Assessment Circle (1000 ha)
- Native vegetation extent
- Local Government Area

Connectivity

- Biodiversity Link
- Most limiting width

Regional Biodiversity Link

- Cumberland Conservation Corridor

Rivers and Streams

- 1st Order Stream
- 3rd Order Stream

IBRA Bioregion

- Sydney Basin

IBRA Subregion

- Cumberland

Mitchell Landscapes

- Cumberland Plain
- Sydney Basin Diatremes
- Hawkesbury - Nepean Channel and Floodplains

Grid North

Scale : 1:15,534 @ A3 page
Date prepared: 31/03/2017

Image Source:
Image © Nearmap
(dated 11-02-2017)

Data Source:
Remnant Vegetation of the western Cumberland subregion, 2013 Update. VIS_ID 4207, OEH 2013.
Change in the distribution of Cumberland Plain Woodland VIS_ID 3785. DECCW 2008.
Interim Biogeographic Regionalisation for Australia (IBRA) version 7, 2012;
DECC (2008), Landscapes (Mitchell) of NSW - Version 3;
Copyright © Land and Property Information NSW (LPI);
© Copyright Commonwealth of Australia (Geoscience Australia) 2006;
LPI (2001). New South Wales DCDB Local Governement Area Boundaries.

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I:\...\15122\Figures\RP1_BAR\20170331\Figure 1.2. Location Map

Figure 1.2. Location map

250 0 250 500 750 1000 m

Coordinate System: MGA Zone 56 (GDA 94)

Grid North

Legend

- Development Site
- Operational Footprint
- Construction Footprint

Development Layout

- Services Lot (Substation)
- Precinct
- Bio-retention Basin
- Road
- Batter

Precinct 1
Precinct 2
Precinct 2
Precinct 3
Precinct 4
Precinct 5

Scale: 1:8,980 @ A3 page
Date prepared: 31/03/2017

Image Source:
Image © Nearmap
(dated 11/02/2017)

Data Source:
Image © 2015
NSW Land and Property
Management Authority,
SIX Viewer

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I:\...\15122\Figures\RP1_BAR\20170331\Figure 1.3. Indicative Layout_Development Site

Figure 1.3. Indicative layout of the development site

100 0 100 200 300 400 m

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Chapter 2

Legislation and Policies

2.1 Commonwealth

2.1.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Australian Government's principal piece of environmental legislation and is administered by the Commonwealth Department of the Environment and Energy (DoEE). It is designed to protect national environmental assets, known as Matters of National Environmental Significance (MNES), which include threatened species of flora and fauna, endangered ecological communities, migratory species as well as other protected matters. Among other things, it defines the categories of threat for threatened flora and fauna, identifies key threatening processes and provides for the preparation of recovery plans for threatened flora, fauna and communities.

Under the EPBC Act, any action (which includes a development, project or activity) that is considered likely to have a significant impact on MNES must be referred to the Commonwealth Minister for the Environment. The following MNES were identified within the development site at the time of survey:

- Cumberland Plain Woodland – Critically Endangered Ecological Community (CEEC); and
- Cattle Egret (*Ardea ibis*) – Migratory.

A preliminary assessment of the MNES present within the development site indicated that there is an impact on remnant Cumberland Plain Woodland CEEC and, as such, a referral to DoEE was required for further consideration. It is noted that the Cattle Egret has been delisted effective 9 June 2016 but has been retained in the referral assessment due to this species being listed at the time of survey.

A referral to DoEE has been prepared and is to be submitted following the submission of the DA. It is recommended that the impacted CEEC's are low quality remnant patches that would likely not survive in the long-term; therefore, in the presence of on-site vegetation enhancement and biodiversity offsets, the Project should not be considered a controlled action.

2.1.2 Environmental Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy

Under the *Environmental Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy*, environmental offsets are actions taken to counterbalance significant residual impacts on MNES. Offsets are used as a last resort in instances where an action will give rise to residual impacts, even after the application of management measures.

The policy came into force in October 2012 and provides guidance on the role of offsets in environmental impact assessments and how DoEE considers the suitability of a proposed offset package (SEWPaC, 2012). According to the policy, an offsets package is a "*suite of actions that a proponent undertakes in order to compensate for the residual significant impact of a project"* (SEWPaC, 2012b). It can comprise a combination of direct offsets and other compensatory measures.

A preliminary assessment of the MNES present within the development site indicated that there is an impact on remnant Cumberland Plain Woodland CEEC and, as such, a referral to DOEE was required for further consideration.

A referral to DOEE has been prepared and is to be submitted following the submission of the DA. The referral recommends that in the presence of existing offset requirements under the *NSW Biodiversity Offsets Policy for Major Projects* no further biodiversity offsets should be required under the *Environmental Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy*.

2.2 New South Wales

2.2.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) is the overarching planning legislation in NSW that provides for the creation of planning instruments that guide land use. The EP&A Act also provides for the protection of the environment, including the protection and conservation of native animals and plants. This includes threatened species, populations and ecological communities, and their habitats of biodiversity values, as listed in the NSW *Threatened Species Conservation Act 1995* (TSC Act) and NSW *Fisheries Management Act 1994* (FM Act). The protection of the environment is addressed in Section 5A of the EP&A Act - Significant effect on species, populations or ecological communities or their habitats.

The applicant is seeking State Significant Development (SSD) Consent under Division 4.1 of Part 4 of the EP&A Act. The Project is to be a staged development made under Clause 83B, Division 2A of Part 4 of the EP&A Act. A SSD can be declared under the *State Environmental Planning Policy (State and Regional Development) 2011* or by the Minister for Planning. The Development Application submitted for the SSD must be accompanied by an EIS, which is to be prepared in accordance with the SEARs.

The SEARs for the Project were issued by the NSW Department of Planning and Environment (DP&E) on 26 November 2015. The provisions that are relevant to this BAR are reproduced below.

The EIS must address the following specific matters that relate to the Masterplan and Stage 1 works:

- *Flora and fauna – including:*
  - *details of the quantity and type of any vegetation to be cleared;*
  - *an assessment of impacts (direct or indirect) on threatened species, populations, ecological communities (including groundwater dependant ecosystems) and their habitat, critical habitat (including riparian habitat) and native vegetation in accordance with the Framework for Biodiversity Assessment (Oct 2014); and*
  - *proposed measures to avoid, mitigate or offset any significant impacts in accordance with the draft Biodiversity Offset Policy for Major Projects.*

An assessment of the quantum and type of impacts resulting from the Project on biodiversity values and measures to avoid and mitigate these impacts is presented within this BAR. A separate Biodiversity Offset Strategy (BOS) to address offset measures has been prepared for the Project and is provided as part of the EIS documentation.

2.2.2 Threatened Species Conservation Act 1995

The *Threatened Species Conservation Act 1995* (TSC Act) is the key piece of legislation in NSW relating to the protection and management of biodiversity and threatened species. The TSC Act aims to protect and encourage the recovery of threatened species, populations and communities that are listed under the Act through threat abatement and species recovery programs. The TSC Act requires consideration of whether a development (Part 4) or an activity (Part 5) is likely to significantly impact threatened species, populations, communities or their habitat. The potential impacts of any developments, land use changes or activities do not need to undergo an "Assessment of Significance" under Section 5A of the EP&A Act as the Project has been declared a SSD. The impacts of the Project are therefore assessed within this BAR.

2.2.3 Fisheries Management Act 1994

The FM Act provides for the protection, conservation and recovery of fish stocks, key fish habitats, threatened species, populations and ecological communities of fish and marine vegetation as well as management of threats to threatened species, populations and ecological communities defined under the Act. In particular, the FM Act has mechanisms for the protection of fish, fish habitats, mangroves, seagrasses and seaweeds on public water land and foreshores.

2.2.4 NSW Biodiversity Offsets Policy for Major Projects

The *NSW Biodiversity Offsets Policy for Major Projects* was adopted in September 2014 and applies to SSD and State Significant Infrastructure designated under the EP&A Act. The policy provides a standard method for assessing impacts of major projects on biodiversity and determining offsetting requirements (NSW Government, 2014b). The policy is underpinned by six principles, which must be considered when assessing offsets for major projects.

The Framework for Biodiversity Assessment (FBA) has been developed in conjunction with the policy to provide a method for determining the quantum of impacts. The FBA provides rules and software for calculating the number and type of credits that a development site will require in order to offset its impacts and thus improve or maintain biodiversity values. "Credits" are the currency used within FBA and they are not specifically area measurements. Rather, they are a measure of the current quality of habitat. Where a proponent is proposing to establish an offset site as part of the BOS, the BioBanking Assessment Methodology (BBAM) must be used to assess the biodiversity values of the offset site and to identify the number and type of credits that may be created on the offset site (NSW Government, 2014a).

The FBA requires the preparation of the following documents:

- Biodiversity Assessment Report: To describe the biodiversity values present within the development site and the impact of the project on these values; and
- Biodiversity Offset Strategy: To outline how the proponent intends to offset the impacts of the project.

These reports are required to be submitted as part of the EIS.

As the FBA applies predominantly to terrestrial biodiversity, the *NSW Offsets Policy for Major Projects* and FBA refers to the NSW Department of Primary Industries *Policy and Guidelines for Fish Habitat Conservation and Management (Update 2013)* for guidance on assessing and offsetting aquatic impacts. Offsets for identified key fish habitats are required once avoidance and mitigation measures have been implemented. No key fish habitats have been identified within the Penrith LGA. The development site does not include any streams or waterbodies that are considered fish habitat.

2.2.5 State Environmental Planning Policy (Western Sydney Employment Area) 2009

The development site is located within Precinct 8 (South of Sydney Catchment Authority Warragamba Pipelines) of the Western Sydney Employment Area designated under the WSEA SEPP. The development site is located within the Oakdale West sub-precinct of the Oakdale Estate within Precinct 8. The WSEA SEPP requires that a consent authority must not grant consent to development unless a development control plan has been prepared for that land. The *Penrith Development Control Plan 2014* (Penrith DCP 2014) applies to the land within the development site. However, pursuant to Clause 11 of the NSW *State*

Environmental Planning Policy (State and Regional Development) 2011, development control plans do not apply to SSDs. As such, the provisions of the Penrith DCP 2014 are not relevant to the Project; however, development controls for the Project will form part of the masterplan and will be ultimately incorporated into the Penrith DCP 2014.

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Chapter 3

Landscape Features

3.1 Landscape Features

As the Project is being assessed as a site based assessment, assessment circles were established to identify landscape features associated with the Project. For the purposes of this BAR a 100 ha inner assessment circle and 1,000 ha outer assessment circle have been utilised for this assessment and the locations are shown in **Figure 1.2**. A 1,000 ha outer assessment circle was selected as it was the minimum size to encompass the entire extent of the development site. The 100 ha inner assessment circle is centred on the portion of the development site that contains the highest percent native vegetation cover impacted by the Project.

3.1.1 IBRA Bioregions and IBRA Subregions

i. Bioregions

Development site: Sydney Basin Bioregion (118.78 ha)

Outer assessment circle: Sydney Basin Bioregion (1,000 ha)

The development site and outer assessment circle are wholly contained within the Sydney Basin Bioregion. This bioregion occupies approximately 3.6 million hectares (approximately 4.5% of NSW) and extends from just north of Batemans Bay to Nelson Bay on the central coast, and almost as far west as Mudgee (NSW NPWS, 2003). The Sydney Basin Bioregion is one of the most species diverse in Australia, which is the result of the variety of rock types, topography and climates in the bioregion (NSW NPWS, 2003). This bioregion contains significant flora, fauna and wetlands.

The extent of the Sydney Basin bioregion within the development site is shown in **Figure 1.1**. The extent of the bioregion within the outer assessment circle is shown in **Figure 1.2**.

ii. Subregions

Development site: Cumberland Subregion (118.78 ha)

Outer assessment circle: Cumberland Subregion (1,000 ha)

The development site and outer assessment circle are wholly contained within the Cumberland Subregion. This subregion is typified by low rolling hills and wide valleys in the rain shadow below the Blue Mountains (NSW NPWS, 2003). The underlying geology of this

subregion predominately comprises Triassic Wianamatta group shales and sandstones (NSW NPWS, 2003). Vegetation communities of this subregion that occur in the vicinity of the development site include: Grey Box, Forest Red Gum, Narrow-leaved Ironbark woodland with some Spotted Gum on the shale hills; and Broad-leaved Apple, Cabbage Gum and Forest Red Gum with abundant Swamp Oak on river flats (NSW NPWS, 2003).

The extent of the Cumberland subregion within the development site is shown in **Figure 1.1**. The extent of the subregion within the outer assessment circle is shown in **Figure 1.2**.

3.1.2 Mitchell Landscapes

Development site: Cumberland Plain (118.78 ha)

Outer assessment circle: Cumberland Plain (1,000 ha)

The extent of the Cumberland Plain Mitchell Landscape within the development site is shown in **Figure 1.1**. The extent of the Mitchell Landscapes within the outer assessment circle is shown in **Figure 1.2**.

The development site is wholly contained within the Cumberland Plain Mitchell Landscape. This landscape is characterised by low rolling hills and valleys in a rain shadow area between the Blue Mountains and the coast on horizontal Triassic shales and lithic sandstones (DECC, 2002). There are some occurrences of volcanic vents and is partly covered by Tertiary river gravels and sands with main streams containing quaternary alluvium. The general elevation of this Mitchell Landscape is between 30 and 120 m. Woodlands and open forest consist of *Eucalyptus moluccana* (Grey Box), *Eucalyptus tereticornis* (Forest Red Gum), *Eucalyptus crebra* (Narrow-leaved Ironbark), *Eucalyptus eugenioides* (Thin-leaved Stringybark), *Eucalyptus amplifolia* (Cabbage Gum) *and Angophora subvelutina* (Broad-leaved Apple) (DECC, 2002). This vegetation has grassy to shrubby understorey often dominated by *Bursaria spinosa* (Australian Boxthorn), poorly drained valley floors, often salt affected with *Casuarina glauca* (Swamp Oak) *and Melaleuca sp.* (DECC, 2002).

3.1.3 Rivers and Streams

The development site and outer assessment circle occurs within the Hawkesbury-Nepean Catchment. No rivers or streams are present within the development site. One first order stream, Ropes Creek Tributary, and one third order stream, Ropes Creek, have been identified within the outer assessment circle, only. Stream data was obtained from Geoscience Australia, with stream orders defined using the Strahler stream ordering system. A buffer of 10 m and 30 m either side of the waterway were applied to first and third order streams, respectively. Ropes Creek Tributary is located in the Oakdale South Estate and flows west through the estate into Ropes Creek, which flows north, eventually reaching South/Wianamatta Creek which is located 13 km north of the development site. Ropes Creek had a small amount of flowing water (<10cm) at the time of survey.

The extent of the streams and their associated buffers within the inner and outer assessment circle is shown in **Figure 1.2**.

3.1.4 Wetlands

No important or local wetlands occur within the development site or outer assessment circle. The closest wetlands to the development site are located more than 19 km to the north near Windsor Downs, where South/Wianamatta Creek and Eastern Creek merge.

3.1.5 Native Vegetation Extent

The outer assessment circle, which is 1,000 ha in size, occurs within an area in which a number of broad-scale vegetation mapping projects have been undertaken. To map the extent of native vegetation within the outer assessment circle, 2013 update to the vegetation mapping of the Cumberland Plain (DECCW, 2007) was overlain on a 2014 aerial available through the Department of Lands SIXmaps application.

The extent of native vegetation cover was then revised through aerial photographic interpretation and surveys of the development site. Amendments to the extent of native vegetation were made using a Geographic Information System (GIS), MapInfo Professional 12.5. Additional mapping updates were done during a peer review process, using ArcGIS v10.5 and 2017 aerial photography, and further ground truthing of boundaries, undertaken in March 2017.

The boundaries of native vegetation were reduced in areas that have been cleared since the previous vegetation mapping was prepared and the boundaries were extended in areas where the previous vegetation mapping did not have mapped vegetation that are now subsequently mapped or can be predicted to contain native vegetation using aerial imagery.

Native vegetation occurring in the outer assessment circle is shown in **Figure 1.2**. Native vegetation occupies approximately 165.61 ha, which represents approximately 16% of the outer assessment circle. Native vegetation within the outer assessment circle is predominately confined to riparian corridors and a large patch of native woodland to the north west of the development site. The remaining land within the outer assessment circle comprises cleared land and built environments. It is considered that there are no significant differences between the mapped vegetation extent and aerial imagery utilised by this assessment.

3.1.6 State or Regionally Significant Biodiversity Links

No state or regionally significant biodiversity links occur within the development site or inner assessment circle. Cumberland Conservation Corridor occurs within the outer assessment circle, directly to the north of the development site and is shown on **Figure 1.2**. The Cumberland Conservation Corridor links Priority Conservation Sites identified within the Approved Cumberland Plain Recovery Plan (DECCW, 2011).

3.1.7 Other Landscape Features

No other landscape features within the development site, inner assessment circle or outer assessment circle were identified in the SEARs.

3.2 Landscape Value Score

3.2.1 Attributes

i. Percent Native Vegetation Cover

The current and future percentage of native vegetation cover within the inner and outer assessment circles was determined in increments of 5% using GIS. These calculations utilised the native vegetation extent identified in ***Section 3.1.5*** and considered the condition of the vegetation. The Project will result in the loss of 4.89 ha of native vegetation within the development site. A summary of the current and future percentage of native vegetation cover in the inner and outer assessment circles is provided in **Table 3.1**. Based on these values, the Project has a native vegetation cover score of 0.75.

Table 3.1 Current and future native vegetation cover within the assessment circles

Assessment Circle	Current Extent of Native Vegetation		Future Extent of Native Vegetation	
	Area (ha)	% Cover Class	Area (ha)	% Cover Class
Inner assessment circle	22.86	21-25	19.41	16-20
Outer assessment circle	165.61	16-20	160.40	16-20

ii. Connectivity Value

The one connecting link has been identified within the development site running from the southern boundary, through the south west of the development site eventually connecting to Ropes Creek to the north of the development site. The following connecting link conditions have been identified:

- Linkage width class: Narrow (>5-30m);
- Over-storey condition: % foliage cover within benchmark; and
- Mid-storey or groundcover condition: % foliage cover of mid-storey or ground cover within benchmark.

Figure 1.2 shows the location of the connecting link within the development site. The vegetation within these corridors is in moderate to good condition, has a patch size of greater than one hectare, is separated by less than 100 m and is not separated by a hostile link. All vegetation within the identified connecting link has been assessed as having overstorey and midstorey or groundcover percent foliage cover within benchmark. A summary of the current and future width class and condition class values of the only connecting link within the development site is shown in **Table 3.2**. The final connectivity score for the Project is 0.

Table 3.2 Current and future connecting links within the assessment circles

Connecting Link	Linkage Width Class			Linkage Condition Class			Connectivity Value
	Current	Future	Classes Crossed	Current	Future	Classes Crossed	
1	Narrow (>5-30m)	Narrow (>5-30m)	0	3	3	0	0

iii. Patch Size

As the Project is a site-based development, patch size has been determined in accordance with Appendix 4 of the FBA. The development site occurs within the Cumberland Plain Mitchell Landscape which has a cleared native vegetation value of 91%. The native vegetation within the development site and assessment circles has been identified in ***Section 3.1.5***. Of this vegetation, the largest patch of native vegetation, of which a portion occurs within the development site, is 224.15 ha in size. Based on these variables, the patch size class is categorised as 'Extra large' which has a corresponding patch size score of 12.

3.2.2 Score

Using the results from the assessment of landscape attributes in ***Section 3.2.1*** and Equation 4 in Appendix 1 of the FBA, the landscape value score for the development site is 12.80.

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Chapter 4

Native Vegetation

4.1 Review of Existing Data

The following primary sources of information were consulted as part of a desktop assessment of the native vegetation within the development site:

- VIS Classification Database;
- Cumberland Plain Vegetation Mapping (DECCW, 2007), including 2013 updates;
- Ecological Assessment – Oakdale Concept Plan (Cumberland Ecology, 2007); and
- Oakdale South Estate Biodiversity Assessment Report (Cumberland Ecology, 2015).
- Oakdale South Biodiversity Assessment Report – Section 96 (Cumberland Ecology, 2016)

Information obtained during the review of existing data was utilised in conjunction with field data collected by Cumberland Ecology to assess native vegetation within the development site.

4.2 Surveys

4.2.1 Overview

Surveys of the vegetation within the development site and adjoining land were conducted on 12 October 2015, 15 – 20 October 2015 and 8 April 2016. The first round of survey was conducted to obtain an overview of the nature and extent of vegetation not just within the development site but also within adjacent lands owned by the proponent, as well as mapping of vegetation communities and establishing the required number of floristic plots required. Once the likely Plant Community Types (PCTs) were identified, full floristic plots and plot and transect surveys were conducted to verify the PCTs and collect site value data from the identified vegetation zones. As the development site contains a number of scattered trees, for the purposes of this assessment, only patches that contained greater than three mature trees, were assigned to a vegetation community and subsequent PCT.

These surveys were undertaken following the SSD determination and were designed to meet the requirements of the FBA. Areas of native vegetation were generally delineated using a

handheld Global Positioning System (GPS) unit, aerial photograph interpretation and site notes.

For the purposes of assigning PCTs to native vegetation communities, plot based full floristic survey was undertaken in accordance with Table 1 of the FBA at 13 sites across the development site. This number of sites was required to ensure the appropriate assessment of observed environmental variation was completed and to fill gaps in previous mapping.

Vegetation of the same PCT and broad condition state was initially classified as one vegetation zone in accordance with the rules of FBA and surveyed for the required number of plots/transect for the particular vegetation zone.

Due to the fragmented nature of the development site and the distance between vegetation patches, for the purposes of this assessment the initial vegetation zones for each PCT were subsequently split into multiple vegetation zones based on distance of the more isolated patches (>100m from another patch of native vegetation) for the purpose of filtering predicted ecosystem credit species, given that patch size influences predicted ecosystem credits. This resulted in the creation of nine vegetation zones as summarised in **Table 4.1**.

As the different vegetation zones for each PCT occur in the same broad condition and zonation was based on the level of fragmentation rather than vegetation being in different conditions, the same sites were used for plot and transect surveys across the vegetation zones for each PCT.

4.2.2 Plot-based Full Floristic Survey

Thirteen full floristic plots surveyed within the development site on 15 – 20 October 2015 have been utilised in this assessment. The following information was collected at each of the thirteen 20 x 20 m full floristic plots in accordance with Table 1 of the FBA:

- Stratum (and layer): stratum and layer in which each species occurs;
- Growth form: growth form for each recorded species;
- Species name: scientific name and common name;
- Cover: a measure or estimate of the appropriate cover measure for each recorded species; recorded from 1–5% and then to the nearest 5%. If the cover of a species is less than 1% and the species is considered important, then the estimated cover should be entered (e.g. 0.4); and
- Abundance rating: a relative measure of the number of individuals or shoots of a species within the plot. Use the following intervals; numbers above about 20 are estimates only: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 20, 50, 100, 500, or 1,000, or specify a number greater than 1,000 if required.

The locations of these plots are shown in **Figure 4.1**. The locations of the full floristic plots were determined by randomly marking a point within each observable PCT within adjoining

land to the development site that would enable an appropriate assessment of expected environmental variation.

4.2.3 Plot and Transect Surveys

Thirteen plot and transect sites surveyed within the development site on 15-20 October 2015. The additional two plot and transect sites surveyed on 8 April 2016 have not been utilised in this assessment as these largely occur within the Fitzpatrick land that does not form part of this BAR. The following information was collected at each of the 20 x 50 m plot and transect sites in accordance with Section 5.3.2 of the FBA:

- Native species richness recorded within each stratum of a 20 m x 20 m sub-plot;
- Native overstorey cover recorded at 10 points along a 50 m transect;
- Native midstorey cover recorded at 10 points along a 50 m transect;
- Native ground cover recorded at 50 points along a 50 m transect for three life forms (shrubs, grasses and other);
- Exotic plant cover expressed as a total percent cover across all strata (each strata measured using the same method for native overstorey, midstorey and ground cover);
- Number of trees with hollows visible from the ground within the 20 m x 50 m plot;
- The total length of fallen logs >10 cm in diameter within the 20 m x 50 m plot; and
- The proportion of regenerating overstorey species within the vegetation zone.

The locations of the plot and transect sites are shown in **Figure 4.1**. The locations of the plot and transect sites were determined by randomly marking a point within each observable PCT within the development site.

Table 4.1 summarises the plot and transect survey effort undertaken for the Project. The minimum number of plot and transect surveys have been conducted for the initial vegetation zones (based on the broad-condition/PCT) and have been utilised for the assessment of the refined vegetation zones. Data collected from all plot and transect sites was utilised to determine the site value score for each vegetation zone.

Table 4.1 Plot and transect survey effort

Vegetation Zone	PCT Code	Condition*	Area (ha)	Minimum Plot and Transect Sites Required	Number of Plot and Transect Sites Sampled
1	HN526	Moderate/Good	0.57	1	1

Table 4.1 Plot and transect survey effort

Vegetation Zone	PCT Code	Condition*	Area (ha)	Minimum Plot and Transect Sites Required	Number of Plot and Transect Sites Sampled
2	HN526	Moderate/Good_High	0.22	1	1
3	HN526	Moderate/Good_Medium	0.32	1	1
4	HN528	Moderate/Good	0.89	1	2
5	HN528	Moderate/Good_High	0.05	1	2
6	HN528	Moderate/Good_Medium	0.10	1	2
7	HN529	Moderate/Good	1.07	1	3
8	HN529	Moderate/Good_High	0.10	1	3
9	HN594	Moderate/Good	1.62	1	3

** Condition names reflect options available within the BioBanking Credit Calculator rather than on-ground condition.*

4.3 Native Vegetation Extent

The development site is 118.78 ha in size which includes 4.93 ha of remnant native vegetation, 0.51 ha of planted native revegetation, 110.80 ha of exotic vegetation and 2.54 ha of cleared/developed areas. The extent of native vegetation extent within the development site is shown in **Figure 1.1**. This extent has been determined through aerial photograph interpretation and field surveys. It is considered that there are no significant differences between the mapped vegetation extent and aerial imagery utilised by this assessment.

The 0.51 ha revegetation area within the North/South Link Road alignment of the development site lies either side of the Warragamba Pipeline. This vegetation does not comprise a naturally occurring PCT but has been included within the mapped native vegetation extent for the purposes of landscape value as it comprises native Australian plant species. However, as it cannot be assessed against benchmark data for a PCT, it has been excluded from the patch size calculations for the identified vegetation zones. The quadrat data from this patch (Q14) has also not been utilised for any of the vegetation zones.

The remaining areas of the development site comprise cleared land, which include exotic grassland (see ***Section 4.5.3***) and dams. In accordance with Section 5.1.1.3 of the FBA, these areas of revegetation and cleared land do not require further assessment unless they provide habitat for species credit species.

4.4 Identification of Plant Community Types

Identification of the PCTs occurring within the development site was guided by the results of the review of existing data (see ***Section 4.1***) and surveys of the development site (see

Section 4.2). The data collected during surveys of the development site was analysed in conjunction with a review of the PCTs held within the VIS Classification Database. Consideration was given to the following:

- Occurrence within the Cumberland IBRA subregion;
- Vegetation formation;
- Landscape position;
- Dominant upper, mid and ground strata species.

The analysis determined that the vegetation within the development site aligned with four PCTs held within the VIS Classification Database. **Table 4.2** lists the PCTs that have been identified within the development site and the justification for their selection.

Table 4.2 Justification for selection of PCTs within the development site

PCT Code	PCT Name	Evidence Used for Identification	Species Relied upon for Identification
HN526	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin	**IBRA Subregion:** Occurs within the Cumberland IBRA subregion	**Upper stratum species**: *Eucalyptus tereticornis , Eucalyptus amplifolia subsp. amplifolia,*
		Vegetation formation: Coastal Valley Grassy Woodlands	**Mid stratum species**: *Acacia parramattensis, Bursaria spinosa*
		Landscape position: Occurs on stream banks and alluvial flats on the Cumberland Plain	**Ground stratum species**: *Dichondra repens, Echinopogon ovatus, Entolasia marginata, Microlaena stipoides, Solanum prinophyllum, Veronica plebeia*
HN528	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin	**IBRA Subregion:** Occurs within the Cumberland IBRA subregion	**Upper stratum species**: *Eucalyptus tereticornis, Eucalyptus moluccana, Eucalyptus eugenioides*
		Vegetation formation: Coastal Valley Grassy Woodlands	**Mid stratum species**: *Bursaria spinosa*
		Landscape position: Occurs on clay/loam soils derived from Wianamatta Shales on the Cumberland Plain at low altitudes (mainly below 150m).	**Ground stratum species**: *Cheilanthes sieberi, Dichelachne micrantha, Dichondra repens, Eragrostis leptostachya, Lomandra filiformis, Microlaena stipoides, Paspalidium distans*
HN529	Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	**IBRA Subregion:** Occurs within the Cumberland IBRA subregion	**Upper stratum species**: *Acacia implexa, Eucalyptus moluccana, Eucalyptus tereticornis*
		Vegetation formation: Coastal Valley Grassy Woodlands	**Mid stratum species**: *Bursaria spinosa, Rubus parvifolius*
		Landscape position: Occurs on clay soils with iron-indurated gravel derived from Tertiary alluvium or shale in the Castlereagh-Holsworthy area.	**Ground stratum species**: *Dichondra repens, Brunoniella australis, Desmodium gunni, Aristida ramosa, Microlaena stipoides, Carex inversa, Themeda australis, Cyperus gracilis, Dichelachne micrantha, Asperula conferta, Oxalis perennans, Cheilanthes sieberi, Desmodium brachypodum, Sporobolus creber, Wahlenbergia gracilis*

Table 4.2 Justification for selection of PCTs within the development site

PCT Code	PCT Name	Evidence Used for Identification	Species Relied upon for Identification
HN594	Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion	**IBRA Subregion:** Occurs within the Cumberland IBRA subregion **Vegetation formation:** Coastal Floodplain Wetlands **Landscape position:** Occurs on sandy saline sediments fringing the high tide mark in coastal estuaries below 5m.	**Upper stratum species**: *Casuarina glauca* **Mid stratum species**: *Melaleuca styphelioides* **Ground stratum species**: *Microlaena stipoides, Centella asiatica*

4.5 Description of Plant Community Types

4.5.1 Overview

Table 4.3 provides a summary of the PCTs occurring within the development site, including vegetation formation, percent cleared within the Hawkesbury/Nepean catchment and extent within the development site. The distribution of these PCTs within the development site is shown in **Figure 4.2**.

Table 4.3 Summary of PCTs occurring within the development site

PCT Code	PCT Name	Vegetation Formation	Vegetation Class	% Cleared within Catchment	Area within Development Site (ha)
HN526	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin	Grassy Woodlands	Coastal Valley Grassy Woodlands	95	1.11
HN528	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin	Grassy Woodlands	Coastal Valley Grassy Woodlands	95	1.03
HN529	Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	Grassy Woodlands	Coastal Valley Grassy Woodlands	90	1.17
HN594	Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion	Forested Wetlands	Coastal Floodplain Wetlands	95	1.62

4.5.2 Threatened Ecological Communities

All PCTs identified within the development site are associated with a Threatened Ecological Community (TEC) according to the VIS Classification Database. As shown in **Table 4.4**, HN526, HN528 and HN529 are associated with only one TEC, whilst HN594 is associated with three. Assessment of HN594 within the development site has indicated that the PCT comprises Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions. The distribution of TECs within the development site is shown in **Figure 4.3**.

Table 4.4 TECs associated with PCTs occurring within the development site

PCT Code	PCT Name	TEC Name	TEC Status	Assessed as Associated TEC?
HN526	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered	Yes
HN528	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin	Cumberland Plain Woodland in the Sydney Basin Bioregion	Critically Endangered	Yes
HN529	Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	Cumberland Plain Woodland in the Sydney Basin Bioregion	Critically Endangered	Yes
HN594	Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered	Yes
		Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Endangered	No
		River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Part)	Endangered	No

The vegetation condition of HN528 and HN529 at the development site was assessed against the listing advice for Cumberland Plain Shale Woodland and Shale-Gravel Transition Forest, which is listed as a CEEC under the EPBC Act. Only parts of vegetation zone 4 of HN528 (see **Table 4.5**) and vegetation zone 7 of HN529 (see **Table 4.6**) within the development site were determined as conforming to this CEEC as listed under the EPBC Act as vegetation zones 5, 6 and 8 and an isolated patch of zone 4 near the eastern boundary of the development all have patch sizes of less than 0.5 ha. The extent of the EPBC Act listed CEEC is shown in **Figure 4.4**. A referral has been prepared for submission to DoEE which includes consideration of this CEEC.

Table 4.5 Evaluation of Vegetation Zone 4 (HN528) at development site against EPBC Act listing advice thresholds

Category and Rationale	Threshold	Development site details
Core thresholds that apply under most circumstances: patches with an understorey dominated by natives and consistent with the minimum mapping unit size applied in NSW.	Minimum patch size is ≥ 0.5 ha; AND ≥ 50% of the perennial understorey vegetation cover is made up of native species	The patch size at the development site is 0.80 ha with understorey vegetation is approximately 50% native. Patches within the development site are connected to a wider 224 ha patch of native vegetation with a separation of <100m.
OR		
Larger patches which are inherently valuable due to their rarity.	The patch size is ≥ 5 ha; AND ≥ 30% of the perennial understorey vegetation cover is made up of native species.	
OR		
Patches with connectivity to other larger native vegetation remnants in the landscape.	The patch size is ≥ 0.5 ha; AND ≥ 30% of the perennial understorey vegetation cover is made up of native species; AND The patch is contiguous with a native vegetation remnant (any native vegetation where cover in each layer present is dominated by native species) that is ≥ 5ha in area.	
OR		
Patches that have large mature trees or trees with hollows (habitat) that are very scarce on the Cumberland Plain.	The patch size is ≥ 0.5 ha in size; AND ≥ 30% of the perennial understorey vegetation cover is made up of native species; AND The patch has at least one tree with hollows per hectare or at least one large tree (≥80 cm dbh) per hectare from the upper tree layer species outlined in the Description and Appendix A (of the EPBC listing advice:	

Table 4.5 Evaluation of Vegetation Zone 4 (HN528) at development site against EPBC Act listing advice thresholds

Category and Rationale	Threshold	Development site details
	Threatened Species Scientific Committee, 2008)	

Table 4.6 Evaluation of Vegetation Zone 7 (HN529) at development site against EPBC Act listing advice thresholds

Category and Rationale	Threshold	Development site details
Core thresholds that apply under most circumstances: patches with an understorey dominated by natives and consistent with the minimum mapping unit size applied in NSW.	Minimum patch size is ≥ 0.5 ha; AND ≥ 50% of the perennial understorey vegetation cover is made up of native species	The patch size at the development site is 1.07 ha with understorey vegetation is approximately 50% native exotic. Patches within the development site are connected to a wider 224 ha patch of native vegetation with a separation of <100m.
OR		
Larger patches which are inherently valuable due to their rarity.	The patch size is ≥ 5 ha; AND ≥ 30% of the perennial understorey vegetation cover is made up of native species.	
OR		
Patches with connectivity to other larger native vegetation remnants in the landscape.	The patch size is ≥ 0.5 ha; AND ≥ 30% of the perennial understorey vegetation cover is made up of native species; AND The patch is contiguous with a native vegetation remnant (any native vegetation where cover in each layer present is dominated by native species) that is ≥ 5ha in area.	
OR		
Patches that have large	The patch size is ≥ 0.5 ha in size;	

Table 4.6 Evaluation of Vegetation Zone 7 (HN529) at development site against EPBC Act listing advice thresholds

Category and Rationale	Threshold	Development site details
mature trees or trees with hollows (habitat) that are very scarce on the Cumberland Plain.	AND ≥ 30% of the perennial understorey vegetation cover is made up of native species; AND The patch has at least one tree with hollows per hectare or at least one large tree (≥80 cm dbh) per hectare from the upper tree layer species outlined in the Description and Appendix A (of the EPBC listing advice: Threatened Species Scientific Committee, 2008)	

4.5.3 Description of Plant Community Types within the Development Site

i. HN526: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin

HN526 occurs in the central area of the development site as small, degraded patches associated with drainage lines, and moist areas surrounding a large dam. A representative photograph of this PCT is included as **Photograph 4.1**.

The upper stratum consists predominately of scattered *Eucalyptus crebra* (Narrow-leaved Ironbark) individuals, and to a lesser extent, occurrences of *Eucalyptus tereticornis* (Forest Red Gum). A mid-storey consisting of a small tree layer of *Melaleuca decora* and some regrowth occurrences of the canopy species is present. The shrub layer is mostly absent, with the only shrubs recorded within the community regrowth individuals of *Eucalyptus crebra* (Narrow-leaved Ironbark).

The ground layer is dominated by exotic species, the most prevalent being the exotic grass *Cynodon dactylon* (Couch), which made up over half of the ground layer at the time of the site survey. Other exotic grasses present include *Bromus catharticus* (Prairie Grass), *Chloris gayana* (Rhodes Grass), and *Paspalum dilatatum* (Paspalum). Exotic forbs are common in the ground layer, and species recorded include *Senecio madagascariensis* (Fireweed), *Lactuca saligna* (Willow-leaved Lettuce), *Cirsium vulgare* (Spear Thistle) and *Cotula coronopifolia* (Water Buttons).

The most common native species present in the ground layer is *Microlaena stipoides* (Weeping Grass) which is dominant in some small patches within the ground layer, and *Lachnagrostis filiformis* is present in smaller numbers. No other native grasses were recorded in a 20 x 20 m quadrat within the community. Diversity of native forbs is similarly

lacking, due to the dominance of suppressive exotic weed species, and historical cattle grazing. Species recorded include *Cotula australis* (Annual Buttonweed), *Plantago debilis*, and *Rumex brownii* (Swamp Dock).



Photograph 4.1 HN526 within the development site

ii. HN528: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin

HN528 occurs as a small number of scattered patches in the eastern half of the development site, and along the southern boundary. The patches are degraded, with significant coverage of exotic species in the shrub and ground layer, however retain some diversity of native herbs, and the ground layer is dominated by a native grass. A representative photograph of this PCT is included as **Photograph 4.2**.

The upper stratum consists of remnant trees of *Eucalyptus crebra* (Narrow-leaved Ironbark), *Eucalyptus eugenioides* (Thin-leaved Stringybark), and *Eucalyptus tereticornis* (Forest Red Gum). *Eucalyptus moluccana* (Grey Box) is also present within the community, though is not common. The small tree layer is mostly absent, with the exception of a small number of regrowth individuals of the canopy species. The shrub layer consists of sparse occurrences of *Bursaria spinosa* (Blackthorn), and exotic species such as *Cestrum parqui* (Green Cestrum) and *Lycium ferocissimum* (African Boxthorn).

The ground layer is dominated by the native grass *Microlaena stipoides* (Weeping Grass). Other native grasses including *Aristida ramosa* (Purple Wiregrass), *Eragrostis leptostachya*

(Paddock Lovegrass) and *Chloris ventricosa* (Plump Windmill Grass) occur in lesser abundances. Native herbs present include *Einadia trigonos* (Fishweed), *Geranium solanderi* (Native Geranium), *Tricoryne elatior* (Yellow Autumn-lily) and *Poranthera microphylla*.

Exotic grasses and forbs are common in the ground layer. Grasses include *Briza subaristata* (Chilean Quaking Grass), *Axonopus fissifolius* (Carpet Grass), *Paspalum dilatatum* (Paspalum) and *Bromus catharticus* (Prairie Grass). Forbs include *Senecio madagascariensis* (Fireweed), *Sida rhombifolia* (Paddy's Lucerne) and *Modiola caroliniana* (Red-flowered Mallow).



Photograph 4.2 HN528 within the development site

iii. HN529 Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion

HN529 is present within the development site as woodland patches along the western edge of the site and in the south-eastern corner. Some patches of the community have moderate levels of weed invasion in the ground layer, however this layer is reasonably intact across the site. A representative photograph of this PCT is included as **Photograph 4.3**.

The dominant tree species in the community across the site is *Eucalyptus tereticornis* (Forest Red Gum). *Eucalyptus moluccana* (Grey Box) and *Eucalyptus eugenioides* (Thin-leaved Stringybark), are also present, though not common. A small tree layer is present, comprised predominately of regrowth individuals of the canopy species, with isolated instances of *Acacia parramattensis* (Sydney Green Wattle).

The shrub layer across the site is comprised predominately of *Bursaria spinosa* (Blackthorn). The species occurs in some areas as scattered individuals, and in other areas in high densities in the understorey. Native shrub species that occur less frequently include *Ozothamnus diosmifolius* (Rice Flower) and *Dillwynia sieberi* (Prickly Parrot Pea), and regrowth individuals of the canopy species. The exotic shrub *Lycium ferocissimum* (African Boxthorn) is present within the community, and within the southernmost patch along the western boundary of the site, the exotic shrub *Dovyalis caffra* (Kei-apple) is common.

The native grass *Microlaena stipoides* (Weeping Grass) is dominant in the ground layer of all patches of the woodland on the site. Other native grasses present include *Aristida ramosa*, *Dichelachne micrantha* (Shorthair Plumegrass), *Paspalidium distans* and *Bothriochloa macra* (Red-leg Grass). Native forbs present include *Solanum prinophyllum* (Forest Nightshade), *Brunoniella australis* (Blue Trumpet), *Lomandra multiflora* (Many-flowered Mat-rush) and *Arthropodium sp B.* The presence of dense *Bursaria spinosa* (Blackthorn) in some areas provides shelter for the native sub-shrubs *Hibbertia diffusa* (Wedge Guinea Flower) and *Bossiaea prostrata,* which are not present in areas with an open understorey.

Exotic species make up a significant proportion of the ground layer within the community in most areas, though are not dominant. Exotic grasses present within the community include *Cynodon dactylon* (Couch), *Paspalum dilatatum* (Paspalum), *Ehrharta erecta* (Panic Veldtgrass) and *Briza subaristata*. Forbs include *Linum trigynum* (French Flax), *Cirsium vulgare* (Spear Thistle), *Hypochaeris radicata* (Catsear) and *Bidens pilosa* (Cobbler's Pegs).



Photograph 4.3 HN529 within the development site

iv. HN594: Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion

HN594 is associated with lower lying areas of the development site associated with drainage lines, and Ropes Creek. It occurs as a single patch in the west of the site, which is highly degraded, and as patches along the eastern boundary of the site. A representative photograph of this PCT is included as **Photograph 4.4**.

The canopy of the community across the development site is dominated by *Casuarina glauca* (Swamp Oak). A small tree layer of younger individuals of this species is present across the site, and *Melaleuca styphelioides* (Prickly-leaved Paperbark) also occurs in the small tree layer in the eastern patches.

The shrub stratum in the western patch of the site contains common occurrences of the exotic *Dovyalis caffra* (Kei-apple). Other exotic shrubs species within the community include *Lycium ferocissimum*, *Rosa rubiginosa* (Sweet Briar), and *Cestrum parqui* (Green Cestrum). Native shrubs recorded include juveniles of the tree and small tree layer species, along with *Bursaria spinosa* (Blackthorn), *Acacia parramattensis* (Sydney Green Wattle) and *Melaleuca linariifolia* (Flax-leaved Paperbark).

The ground layer is dominated in all patches by the native grass *Microlaena stipoides* (Weeping Grass). Other native grasses such as *Oplismenus aemulus* (Basket Grass), *Lachnagrostis filiformis*, and *Bothriochloa macra* (Red-leg Grass) are present in lesser abundances. Native forbs occurring within the community include *Einadia nutans* subsp. *linifolia* (Climbing Saltbush), *Plantago debilis*, *Carex inversa*, *Galium leptogonium, Scutellaria humilis* (Dwarf Skullcap) and *Plectranthus parviflorus* (Cockspur Flower).

Exotic species are common in the ground layer. Exotic sedges and grasses present within the community include *Juncus acutus* (Spiny Rush), *Cyperus eragrostis* (Umbrella Sedge), *Cynodon dactylon* (Couch), *Setaria parviflora* (Pigeon Grass) and *Paspalum dilatatum* (Paspalum). Exotic herbs such as *Solanum pseudocapsicum* (Jerusalem Cherry), *Sherardia arvensis* (Field Madder), *Rumex crispus* (Curled Dock) and *Plantago lanceolata* (Lamb's Tongues) are also present.



Photograph 4.4 HN594 within the development site

v. *Other Vegetation*

a. Native Revegetation Area

This section forms part of the proposed North South Link Road alignment that extends northwards into Fitzpatrick lands and historically is part of a revegetation area planted out by Greening Australia. Part of the community is present within the development site with a further patch is located within the Additional North South Link Road area on Fitzpatrick lands.

As it is an area of planted native vegetation within the development site, it does not conform to a PCT and, as such, does not require further assessment under the FBA.

The landform is a large mound, likely to have been created during construction of the adjacent pipelines that disect the proposed link road alignment. The vegetation on the top of the mound is dominated by a small tree layer of *Casuarina glauca* (Swamp Oak), and scattered individuals of *Acacia decurrens* (Black Wattle) occur in this area. The *Casuarina glauca* in this area may be growth from seed of individuals from Swamp Oak Forest which may have occurred at lower elevations to the south where the pipelines are currently situated, which were excavated, and seed along with soil piled up during construction works. Swamp Oak Forest does not naturally occur at this elevation (90 m ASL).

Further downslope of the revegetation area heading north along the link road alignment are several small tree-sized *Eucalyptus tereticornis* (Forest Red Gum), and a lesser number of *Eucalyptus amplifolia* (Cabbage Gum) which have been planted.

Shrub species present include juvenile *Casuarina glauca*, which is dominant, and *Eucalyptus tereticornis*. Other species present include *Callistemon salignus* (Willow Bottlebrush), *Acacia falcata* (Sickle Wattle), and *Dillwynia sieberi*.

The ground layer is dominated in the upper areas by native grasses, though exotic species are present in significant numbers, and exotic grass species increase in prevalence downslope to the north. Native species include *Eragrostis brownii* (Brown's Lovegrass), *Microlaena stipoides* (Weeping Grass), *Aristida ramosa* (Purple Wiregrass), and *Bothriochloa decipiens* (Pitted Bluegrass). Dominant exotic species include *Chloris gayana* (Rhodes Grass), *Eragrostis curvula* (African Lovegrass), and *Cynodon dactylon* (Couch).

Native forbs are uncommon with species recorded including *Fimbristylis dichotoma* (Common Fringe-sedge), *Lomandra longifolia* (Spiny Mat-rush), *Vittadinia cuneata* (Fuzzweed), and *Oxalis perennans*. Exotic forb species such as *Conyza sumatrensis* (Tall Fleabane), *Bidens subaristata* (Greater Beggar's Ticks), *Senecio madagascariensis* (Fireweed), and *Solanum sisymbriifolium* (Red Buffalo-bur), and *Cirsium vulgare* (Spear Thistle) are prevalent in the ground layer.



Photograph 4.5 *Casuarina glauca* dominating the mound top of revegetation area



Photograph 4.6 *Eucalyptus tereticornis* below mound top to the north

b. Exotic Grassland and Shrubby Regrowth

The majority of the proposed Western North/South Link Road alignment consists of exotic grassland, with occurrences of scattered, shrubby regrowth. Grassland areas are dominated by exotic species such as *Axonopus fissifolius* (Carpet Grass), *Cynodon dactylon*, and *Eragrostis curvula*. Native grass species are scattered throughout the area and include *Eragrostis brownii*, *Bothriochloa macra* (Redleg Grass), *Microlaena stipoides*, and *Sporobolus creber* (Rat's Tail Grass). Common exotic forb species include *Hypochaeris radicata* (Catsear), *Gamochaeta americanum* (Cudweed), *Conyza sumatrensis*, and *Hypochaeris microcephala* (White Flatweed). Native forbs occur less commonly and include *Fimbristylis dichotoma*, *Carex inversa,* and *Juncus usitatus*.

Shrubby regrowth growing throughout the exotic grassland consists of native species, likely to be regrowth occurrences of species present prior to historical clearing of the land. The dominant species is *Melaleuca nodosa* (Prickly-leaved Paperbark), and other shrubs such as *Callistemon pinifolius* (Pine-leaved Bottlebrush), *Melaleuca erubescens,* and the vulnerable species *Grevillea juniperina* subsp. *juniperina* occur less frequently.



Photograph 4.7 Exotic Grassland and Shrubby Regrowth within the proposed Western North/South Link Road Alignment

c. Exotic Grassland

The remaining vegetation within the wider Oakdale West development site is non-native and requires no further assessment unless it provides habitat for species credit species. The non-native vegetation within the development site comprises exotic grassland and does not conform to the determination for the derived native grassland component of Cumberland Plain Woodland CEEC due to its high percentage of exotic species cover and lack of native species present in the ground storey. The vegetation condition is a result of historic degradation due to past and present grazing of the development site and pasture improvement. A representative photograph of exotic grassland is shown in **Photograph 4.5.**

Exotic grasses are dominant in all areas, although some native grass species are present. Dominant exotic grasses include *Cynodon dactylon* (Couch), *Axonopus fissifolius* (Carpet Grass), *Briza subaristata* (Chilean Quaking Grass) and *Paspalum dilatatum* (Paspalum), with *Vulpia bromoides* (Squirrel Tail Fescue) and *Chloris gayana* (Shivery Grass) occurring less frequently. The most commonly occurring native grass is *Aristida ramosa*. Other native grasses present include *Dichelachne micrantha* (Shorthair Plume Grass), *Bothriochloa macra* (Red-leg Grass), *Lachnagrostis filiformis* and *Sporobolus creber* (Slender Rat's Tail Grass). Common exotic herbs include *Senecio madagascariensis* (Fireweed), *Hypochaeris radicata* (Catsear), *Lotus uliginosus* (Greater Birds-foot Trefoil) and *Anagallis arvensis* (Scarlet Pimpernel). Native herbs recorded in grassland areas include *Asperula conferta* (Common Woodruff), *Wahlenbergia gracilis* (Native Bluebell), *Juncus usitatus* and *Oxalis*

perennans (Wood Sorrel).Scattered trees are present within the grassland, which are representative of the PCTs that are may have historically occurred across the development site prior to grassland improvement. Scattered tree species include *Eucalyptus fibrosa* (Red Ironbark), *Eucalyptus moluccana* (Grey Box) and *Eucalyptus tereticornis* (Forest Red Gum).



Photograph 4.8 Exotic Grassland at the Oakdale West Estate development site

4.6 Vegetation Zones

All PCTs identified within the development site were assessed as being in moderate-good condition. Each of the four PCTs was assessed as being within one broad condition state and was initially assessed as a single vegetation zone. Each of these initial vegetation zones was assessed using plot and transect surveys to determine the site value score. Plot and transect data collected from the vegetation zones are provided in **Appendix A.**

Due to the fragmented nature of the development site and the distance between vegetation patches, for the purposes of this assessment, each PCT was subsequently split into multiple vegetation zones based on the connectivity of the patches. This was where the more isolated patches within the development site were a distance >100m from another patch of native vegetation. This was for the purpose of filtering predicted ecosystem credit species, resulting in the creation of nine vegetation zones.

As the different vegetation zones for each PCT occur in the same broad condition and zonation was based on the level of fragmentation rather than vegetation being in different conditions, the quadrat data collected for each PCT (based on the initial vegetation zones) were used to calculate the site value score for each of the vegetation zones for that PCT.

A summary of the vegetation zones and their calculated site value score within the development site is provided in **Table 4.7** and their distribution is shown in **Figure 4.5**. All of the vegetation zones within the development site have a site value score of ≥17 and therefore, must be further assessed.

Table 4.7 Vegetation zones within the development site

Vegetation Zone	PCT	Condition*	Area (ha)	Site Value Score	Patch Size (ha)
1	HN526: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	Moderate/Good	0.57	28.65	224
2	HN526: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	Moderate/Good_High	0.23	28.65	1
3	HN526: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	Moderate/Good_Medium	0.32	28.65	1
4	HN528: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Moderate/Good	0.89	53.86	224
5	HN528: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Moderate/Good_High	0.05	53.86	1
6	HN528: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Moderate/Good_Medium	0.10	53.86	1
7	HN529: Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	Moderate/Good	1.07	39.86	224
8	HN529: Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	Moderate/Good_High	0.10	39.86	1
9	HN594: Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion	Moderate/Good	1.62	65.22	224

** Condition names reflect options available within the BioBanking Credit Calculator rather than on-ground condition.*

4.7 Groundwater Dependent Ecosystems

Groundwater dependent ecosystems (GDEs) were initially assessed by reviewing the Groundwater Dependent Ecosystem Atlas (BOM, 2015) for the development site.

One GDE was identified within the development site as Cumberland River Flat Forest, which corresponds to the PCT HN526: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin and HN594: Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion previously identified within ***Section 4.6***. The impacts to both PCTs that are identified as GDEs within the development site will be assessed in **Chapter 7**. A figure showing the location of all GDEs identified within the development site is shown in **Figure 4.6**.

Coordinate System: MGA Zone 56 (GDA 94)



Legend

- Development Site
- Additional North-South Link Road Area
- Lot Boundary
- Flora Plot Location

Grid North

Scale: 1:9,847 @ A3 page
Date prepared: 31/03/2017

Image Source:
Image © Nearmap
(dated 11/02/2017)

Data Source:
Image © 2015
NSW Land and Property Management Authority,
SIX Viewer

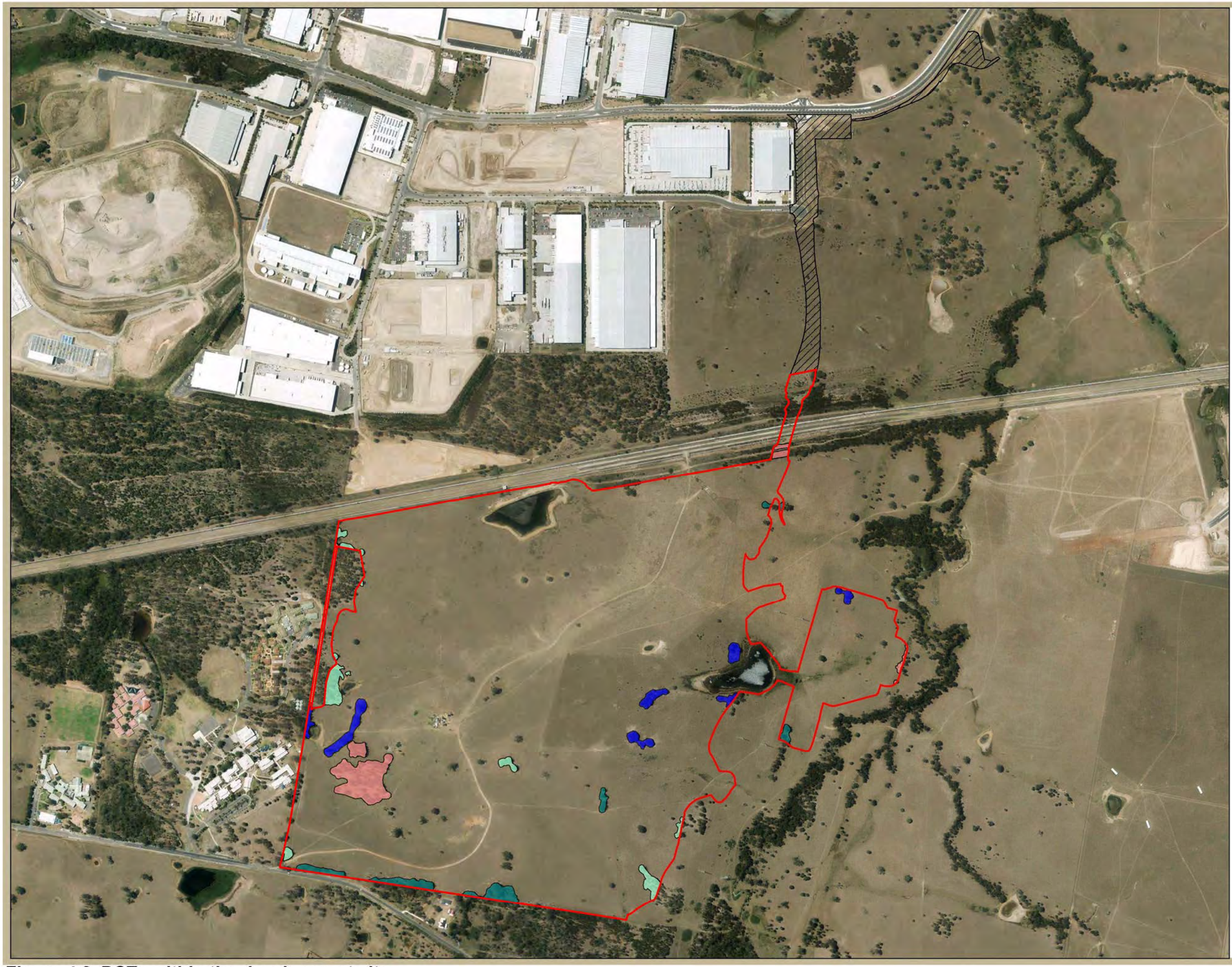
cumberland ecology

I:\...\15122\Figures\RP1_BAR\20170331\Figure 4.1. Floristic Plot Survey Sites

Figure 4.1. Plot-based full floristic survey and plot and transect survey sites

100 0 100 200 300 400 m

Coordinate System: MGA Zone 56 (GDA 94)



Legend

Development Site

Additional North-South Link Road Area

PCT

- Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion (HN526)
- Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (HN529)
- Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (HN528)
- Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion (HN594)

N

Grid North

Scale: 1:9,339 @ A3 page
Date prepared: 31/03/2017

Image Source:
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(dated 11/02/2017)

Data Source:
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NSW Land and Property Management Authority,
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I:\...\15122\Figures\RP1_BAR\20170331\Figure 4.2. PCTs_Development Site

Figure 4.2. PCTs within the development site

100 0 100 200 300 400 m

Coordinate System: MGA Zone 56 (GDA 94)



Legend

Development Site

Additional North-South Link Road Area

TEC (TSC Act)

Cumberland Plain Woodland in the Sydney Basin Bioregion

River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions

Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregions

N

Grid North

Scale: 1:9,339 @ A3 page
Date prepared: 31/03/2017

Image Source:
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NSW Land and Property Management Authority,
SIX Viewer

cumberland ecology

I:\...\15122\Figures\RP1_BAR\20170331\Figure 4.3. TSC Act TECs_Development Site

Figure 4.3. TSC Act TECs within the development site

100 0 100 200 300 400 m

Coordinate System: MGA Zone 56 (GDA 94)



Legend

Development Site

Additional North-South Link Road Area

TEC (EPBC Act)

Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest

Grid North

Scale: 1:9,339 @ A3 page
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I:\...\15122\Figures\RP1_BAR\20170331\Figure 4.4. EPBC Act TECs_Development Site

Figure 4.4. EPBC Act TECs within the development site

100 0 100 200 300 400 m

Coordinate System: MGA Zone 56 (GDA 94)



Legend

- Development Site
- Additional North-South Link Road Area

Vegetation Zone

- Zone 1: HN526 (Mod/Good)
- Zone 2: HN526 (Mod/Good_High)
- Zone 3: HN526 (Mod/Good_Medium)
- Zone 4: HN528 (Mod/Good)
- Zone 5: HN528 (Mod/Good_High)
- Zone 6: HN528 (Mod/Good_Medium)
- Zone 7: HN529 (Mod/Good)
- Zone 8: HN529 (Mod/Good_High)
- Zone 9: HN594 (Mod/Good)

N
Grid North

Scale: 1:9,339 @ A3 page
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I:\...\15122\Figures\RP1_BAR\20170331\Figure 4.5. Vegetation Zones_Development Site

Figure 4.5. Vegetation zones within the development site

100 0 100 200 300 400 m

Coordinate System: MGA Zone 56 (GDA 94)



Legend

- Development Site
- Additional North-South Link Road Area

Groundwater Dependent Ecosystems

- Cumberland River Flat Forest

Grid North

Scale: 1:9,339 @ A3 page
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I:\...\15122\Figures\RP1_BAR\20170331\Figure 4.6. GDEs_Development Site

Figure 4.6. Groundwater dependent ecosystems within the development site

100 0 100 200 300 400 m

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Chapter 5

Threatened Species and Populations

5.1 Review of Existing Data

The following primary sources of information were consulted as part of a desktop assessment of potentially occurring threatened species and populations within the development site:

- Office of Environment and Heritage (OEH) Atlas of NSW Wildlife (OEH, 2015);
- Threatened Species Profile Database;
- Ecological Assessment – Oakdale Concept Plan (Cumberland Ecology, 2007);
- Oakdale South Estate Biodiversity Assessment Report (Cumberland Ecology, 2016);
- Oakdale South Biodiversity Assessment Report – Section 96 (Cumberland Ecology, 2016)
- Erskine Park Link Road Network Concept Plan (NSW Department of Planning, 2009); and
- Revised Biodiversity Management Plan Erskine Park Employment Area: 2007 (HLA-Envirosciences, 2007).

Information obtained during the review of existing data was utilised in determining candidate ecosystem credits species and species credit species.

5.2 Field Surveys

5.2.1 Habitat Assessment

A general fauna habitat assessment was undertaken within the Oakdale West Estate development site and adjoining land on 15 October 2015 and within the proposed Western North/South Link Road on 8 April 2016. Fauna habitat assessments were undertaken in conjunction with flora surveys during the development site assessment. Fauna habitat assessments included consideration of important indicators of habitat condition and complexity including the occurrence of microhabitats such as tree hollows, fallen logs, bush rock and wetland areas such as creeks and soaks and the presence of mistletoe and

flowering trees for nectivorous bird species. Hollows were used as a general indication of habitat quality for arboreal fauna, and hollow dwelling birds and bats.

5.2.2 Threatened Frog Habitat Suitability Assessment

Threatened frog habitat suitability assessment and diurnal surveys were conducted on 22 October 2015 during suitable weather conditions.

The habitat suitability assessment and diurnal search within the development site included five farm dams and surrounding vegetation (see **Figure 5.1**) and surveys were aimed at:

- Determining the range of frog species on the site; and
- Determining whether any threatened frogs may be present.

The assessment carried out at each dam to determine the suitability of the dam to support this species based on the following parameters:

- Cover of fringing vegetation;
- Cover of emergent vegetation;
- Type of vegetation around the dam;
- Presence of shallow dam edges;
- Varying water depth;
- Presence of submerged rocks and logs;
- Presence/absence of Gambusia; and
- Water turbidity.

Using these parameters as a guide for the suitability of the dam, the dams could then be considered either suitable or unsuitable for supporting threatened frog species. As a result of the habitat suitability assessments four of the five dams present within the impact area were considered to contain suitable features to support populations of Green and Golden Bell Frogs but none of the dams were considered suitable for Giant Burrowing Frogs.

5.2.3 Targeted Threatened Species Surveys

i. Flora

Targeted threatened flora searches were undertaken via random meanders during field surveys. Targeted searches were undertaken by a botanist within areas of vegetation suitable for supporting threatened species found in the locality on the 15 October 2015 within the Oakdale West Estate and on 8 April 2016 within the proposed North/South Link Road alignment. A total of 14 person hours were spent traversing the development site and

proximate sections of the Additional North South Link Road area within areas of suitable habitat for each threatened flora species assessed as a candidate species credit species.

ii. Fauna

The following targeted threatened fauna surveys were undertaken within the development site and adjoining land for species credit species that are candidate species or those that are candidate species for further assessment:

- Amphibian surveys: Green and Golden Bell Frog (*Litoria aurea*) and Giant Burrowing Frog (*Heleioporus australiacus*);
- Diurnal bird surveys: Regent Honeyeater (*Anthochaera phrygia*) and Black Bittern (*Ixobrychus flavicollis*);
- Spotlighting and call playback: Koala (*Phascolarctos cinereus*) and Squirrel Glider (*Petaurus norfolcensis*); and
- Cumberland Plain Land Snail (*Meridolum corneovirens*) searches.

The locations of targeted threatened fauna surveys are shown in **Figure 5.1**. Further details of each survey method utilised for this assessment are provided below. A summary of survey effort is shown in **Table 5.1**.

a. Amphibian Surveys

In accordance with the Commonwealth *Survey guidelines for Australia's threatened frogs* (DEWHA, 2010) surveys were conducted at the development site for a minimum of four nights.

Frog surveys were carried out on 22, 26, 27 and 28 October 2015. Weather conditions on all four surveys were dry and warm. The last rains before the commencement of the surveys had occurred on 14 October 2015 and heavy rains then occurred on 23 and 27 October 2015. Such conditions are suitable for frog surveys.

All potential frog sites were visited firstly during the day as part of basking surveys and tadpoles surveys for one visit. Following the first visit, each of the dams were visited at night for a further three nights to listen for calling frogs. Calling frogs were noted and non-calling frogs were detected using headlamps. Breeding call imitation and sound stimulation was used in each of the potential habitat areas of the Green and Golden Bell Frog to try to evoke calling by sheltering frogs. A listening period of two minutes followed each calling session.

b. Diurnal Bird Surveys

Visual observation and call identification of diurnal birds was carried out during each survey period within development site. Two (2) 30-minute diurnal bird census points were surveyed between two ecologists equating to a total of 60 minutes survey effort at each diurnal bird census survey point. Diurnal birds were also identified and recorded as they were encountered throughout the development site during all other surveys.

c. Arboreal Mammals Surveys

Although not required for this assessment, nocturnal spotlighting was conducted for arboreal mammals using a hand-held spotlight while walking around suitable habitat for arboreal mammals. During spotlighting surveys, call playback of taped Squirrel Glider and Koala calls were broadcast using a megaphone to illicit a response from targeted threatened nocturnal species. Calls were played for two minute periods at five minute intervals. This was followed by a period of quiet listening and spotlighting.

d. Cumberland Plain Land Snail Searches

Within suitable patches of woodland within the impact area, the bases of trees that had leaf litter present were searched for the presence of Cumberland Plain Land Snail. Approximately five minutes was spent at each tree hand searching through the leaf litter and around exposed root systems for the presence of live snails or shells.

e. Incidental Observations

Any incidental vertebrate fauna species that was observed, heard calling, or otherwise detected on the basis of tracks or signs were recorded and listed in the total species list for the development site.

f. Survey Effort

Fauna survey methods and survey effort are summarised in **Table 5.1**.

Table 5.1 Fauna survey effort

Survey Technique	Survey Dates	Total Survey Effort	Survey Effort within Development Site
Amphibian surveys	22 October, 26-28 October 2015	12 person hours (5 nights at 4 sites)	12 person hours (4 nights at 5 sites)
Diurnal bird surveys	22 and 23 October 2015 8 and 13 April 2016	20 person hours (10 sites)	20 person hours (10 sites)
Spotlighting and call playback	26-28 October 2015	4 sites for 3 nights	6 sites for 3 nights
Cumberland Plain Land Snail searches	15 October 2015	4 person hours (4 sites)	4 person hours (4 sites)
Incidental observations	Throughout survey periods	n/a	n/a

5.2.4 Weather Conditions

Weather conditions during flora and fauna surveys were generally appropriate for detection of a wide variety of flora and fauna. A summary of the weather conditions during surveys is shown in **Table 5.2**.

The weather conditions at the time of the flora surveys were generally favourable for plant growth and production of features required for identification of most species.

Conditions during the fauna survey were hot sunny days with clear, cool nights. Daytime maximums were generally between 25 – 32 ºC, with still evenings dropping to as low as 11.1 ºC. Conditions were deemed suitable for amphibians with recent rain prior to survey.

Table 5.2 Weather conditions during survey

Date	Minimum Temperature (ºC)*	Maximum Temperature(ºC)*	Rainfall (mm)**
12/10/2015	14.6	32.2	4.0
15/10/2015	13.8	29.6	0.0
16/10/2015	13.9	34.4	0.0
19/10/2015	17.7	28.8	0.0
20/10/2015	15.4	33.5	0.0
22/10/2015	16.9	22.1	2.0
23/10/2015	13.8	19.7	15.0
26/10/2015	14.0	25.2	0.0
27/10/2015	14.0	18.3	12.0
28/10/2015	11.1	21.2	0.0
08/04/2016	16.7	20.8	0.0
13/04/2016	14.2	25.0	0.0

* *Data obtained from the Horsley Park Equestrian Centre station (Bureau of Meteorology, 2015)*

** *Data obtained from the Erskine Park Reservoir (Bureau of Meteorology, 2015)*

5.2.5 Survey Limitations

i. Flora

The field surveys have produced reliable information regarding flora species occurrences within the development site and are considered to be adequate to support the assessment of the Project impacts. Notwithstanding this, the data produced by the surveys is intended only to be indicative of the types of species that could occur and not an absolute census of all flora species of the development site. Although many species were detected during field surveys, additional species are likely to be present that have not been observed. Factors such as seasonality, population density and cryptic life histories can all affect the ability to detect species on ground.

To address the above limitations, surveys were conducted to best account for flowering schedules and other variations that may affect detectability. In addition to this, a precautionary approach was used to assess threatened species impacts. Presence of suitable habitat was considered when assessing the potential occurrence of a given threatened species; where potential habitat was present and the species was known to occur at other locations in the locality, it was assumed that the species had potential to occur and were thus assessed accordingly.

ii. Fauna

Fauna surveys relied on literature review, database analysis, fauna habitat assessment and on site fauna surveys. In common with the flora surveys, the fauna surveys were undertaken in a short period of time and therefore the fauna species recorded are a "snapshot" only, of species that were active at the time. It is likely that additional species would be recorded with more survey effort. Taking into consideration all the ecological survey effort that has been spent on the development site and adjacent land, it is considered that the fauna surveys were adequate, and that all threatened species with potential to occur are known and have been satisfactorily assessed.

iii. Additional North South Link Road area

The surveys conducted included areas of the Additional North South Link Road area as a precautionary measure. Subsequent to the conduction of surveys, confirmation was received that further surveys and assessments were not required for areas contained within Fitzpatrick land as this area as previously been assessed in detail for ecological impacts (KMA, 2016) and has received approval for development subject to the creation of a conservation zone. Therefore areas within the Fitzpatrick land are excluded from the development site for this BAR.

5.3 Fauna Habitats within the Development Site

The majority of the development site is highly disturbed by activities associated with cattle grazing and forms mostly degraded and unsuitable habitat for many native fauna species. At the time of survey approximately 95% of the development site was exotic grassland.

5.3.1 Woodland Habitat

The intact woodland areas on the western edge of the development site contain mostly immature trees with some large mature trees scattered through the vegetation communities. The mid-storey and ground layer has been heavily grazed by cattle and Eastern Grey Kangaroos (*Macropus giganteus*). The majority of bird species were found in this habitat type. A greater diversity would be expected if this zone was wider and structurally more complex. Some regeneration is taking place in remnant patches of woodland and some areas also have a developing shrub layer of *Bursaria spinosa* (Blackthorn).

The majority of trees within the development site are young and do not contain hollows; however, several old trees have been retained within paddocks and several stags also occur

on site. The hollows of two of these stags were observed to be used by Red-rumped Parrots (*Psephotus haematonotus*) which would preclude them being used by any of the other threatened bird species recorded in the locality as roosting/nesting habitat.

No 'camps' or other roosting habitat is available for the Grey-headed Flying-fox (*Pteropus poliocephalus*) on or near the development site and there is little suitable habitat present to support roosting or breeding microbat species.

Foraging habitat does occur within the woodland remnants on the development - six native tree species were identified that produce blossoms and nectar:

- Rough-barked Apple (*Angophora floribunda*);
- Cabbage Gum (*Eucalyptus amplifolia*);
- Narrow-leaved Ironbark (*Eucalyptus crebra*);
- Broad-leaved Ironbark (*Eucalyptus fibrosa*);
- Grey Box (*Eucalyptus moluccana*); and
- Forest Red Gum (*Eucalyptus tereticornis*).



Photograph 5.1 Woodland habitat on the western edge of the development site

5.3.2 Aquatic Habitat

On the edges of these woodland areas are two small farm dams that have been eroded by cattle but does provide some habitat for wetland birds and frogs. In addition, two large dams and one smaller dam are present within the paddocks which also provide habitat for invertebrates, fish species, amphibians, reptiles and wetland birds. Some suitable habitat for Green and Golden Bell Frog occurs on the study area in and around un-shaded dams, particularly in areas containing reeds, bulrushes (*Typha* spp.) or spike rushes (*Eleocharis* spp.).



Photograph 5.2 Large dam on the eastern boundary of the development site

5.3.3 Grassland Habitat

Grassland habitats comprise the majority of the available habitat at the development site. Grassland habitats are devoid of logs, rocks, caves and outcrops, and are more suited to grazing macropods and introduced herbivores. Grassland habitat across the development site is relatively uniform with no features such as burrows observed during site inspections.



Photograph 5.3 Grassland habitat within the development site

5.3.4 Revegetation Area Habitat

The revegetation area is devoid of logs, rocks, caves and outcrops, and is more suited to grazing macropods. The revegetation area habitat within the development site is juvenile with no features such as hollows observed during site inspections.



Photograph 5.4 Revegetation area within the development site

5.4 Ecosystem Credit Species

5.4.1 Predicted Ecosystem Credit Species

The BioBanking Credit Calculator (BBCC) generates a list of predicted ecosystem credit species utilising a number of variables. **Table 5.3** shows the ecosystem credit species have the highest Tg value in each vegetation zone and **Table 5.4** lists the predicted ecosystem credit species for the development site, which has been based on the following:

- IBRA subregion: Cumberland;
- Associated PCTs: HN526, HN528, HN529 and HN594;
- Percent native vegetation in outer assessment circle: 16.09%;
- Condition of vegetation: moderate to good (all vegetation zones);
- Patch size: 224.15 ha (Vegetation Zones 1, 4, 7 and 9);
- Credit type: Ecosystem.

No additional assessment of habitat components for the predicted ecosystem credit species has been undertaken for this assessment.

Table 5.3 Ecosystem credit species with the highest Tg value in each vegetation zone

Vegetation Zone	Scientific Name	Common Name	Tg Value
1	*Tyto novaehollandiae*	Masked Owl	3.0
2	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	2.2
3	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	2.2
4	*Ninox connivens*	Barking Owl	3.0
5	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	2.2
6	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	2.2
7	*Ninox connivens*	Barking Owl	3.0
8	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	2.2
9	*Tyto novaehollandiae*	Masked Owl	3.0

Table 5.4 Predicted ecosystem credit species

Scientific Name	Common Name	Tg Value	Predicted to occur within PCT/Vegetation Zone?								
			Zone 1 (HN526)	Zone 2 (HN526)	Zone 3 (HN526)	Zone 4 (HN528)	Zone 5 (HN528)	Zone 6 (HN528)	Zone 7 (HN529)	Zone 8 (HN529)	Zone 9 (HN594)
Rostratula australis	Australian Painted Snipe	1.3									Yes
Ninox connivens	Barking Owl	3.0	Yes			Yes			Yes		Yes
Melithreptus gularis subsp. gularis	Black-chinned Honeyeater (eastern subspecies)	1.3	Yes			Yes			Yes		
Climacteris picumnus subsp. victoriae	Brown Treecreeper (eastern subspecies)	2.0	Yes			Yes			Yes		
Burhinus grallarius	Bush Stone-curlew	2.6	Yes			Yes			Yes		Yes
Stagonopleura guttata	Diamond Firetail	1.3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Falsistrellus tasmaniensis	Eastern False Pipistrelle	2.2	Yes			Yes			Yes		
Mormopterus norfolkensis	Eastern Freetail-bat	2.2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Petroica phoenicea	Flame Robin	1.3	Yes			Yes			Yes		
Stictonetta naevosa	Freckled Duck	1.3									Yes
Callocephalon fimbriatum	Gang-gang Cockatoo	2.0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Calyptorhynchus lathami	Glossy Black-Cockatoo	1.8									Yes
Scoteanax rueppellii	Greater Broad-nosed Bat	2.2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Melanodryas cucullata subsp. cucullata	Hooded Robin (south-eastern form)	1.7	Yes			Yes			Yes		
Hieraaetus morphnoides	Little Eagle	1.4	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 5.4 Predicted ecosystem credit species

Scientific Name	Common Name	Tg Value	Predicted to occur within PCT/Vegetation Zone?								
			Zone 1 (HN526)	Zone 2 (HN526)	Zone 3 (HN526)	Zone 4 (HN528)	Zone 5 (HN528)	Zone 6 (HN528)	Zone 7 (HN529)	Zone 8 (HN529)	Zone 9 (HN594)
Glossopsitta pusilla	Little Lorikeet	1.8	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tyto novaehollandiae	Masked Owl	3.0	Yes			Yes			Yes		Yes
Grantiella picta	Painted Honeyeater	1.3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Ninox strenua	Powerful Owl	3.0	Yes			Yes			Yes		Yes
Petroica boodang	Scarlet Robin	1.3	Yes			Yes			Yes		
Chthonicola sagittata	Speckled Warbler	2.6	Yes			Yes			Yes		
Circus assimilis	Spotted Harrier	1.4	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Dasyurus maculatus	Spotted-tailed Quoll	2.6	Yes			Yes			Yes		Yes
Lophoictinia isura	Square-tailed Kite	1.4	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lathamus discolor	Swift Parrot	1.3	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Neophema pulchella	Turquoise Parrot	1.8	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Daphoenositta chrysoptera	Varied Sittella	1.3	Yes			Yes			Yes		Yes
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	2.2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

5.5 Species Credit Species

5.5.1 Candidate Species Credit Species

The BBCC generates a list of candidate species credit species utilising a number of variables including classification of the species as a species credit species, the distribution of the species within the same IBRA subregion as the development site and the presence of habitat features or components associated with the species. The habitat features that have been assessed as present within the development site are as follows:

- Swamps, swamp margins or creek edges;
- Land within 40m of heath, woodland or forest;
- Land within 40 m of freshwater and estuarine wetlands, in areas of permanent water and dense vegetation or emergent aquatic vegetation;
- Land within 100 m of emergent aquatic or riparian vegetation;
- Wet and damp areas only;
- Land situated in damp, disturbed sites;
- Land containing bark or leaf litter accumulation;
- Alluvial soils; and
- Periodically waterlogged sites (including table drains and farm dams).

Species credit species that have been generated within the BBCC as candidate species for this assessment are listed in **Table 5.5**. This includes 21 flora species or populations and 10 fauna species.

5.5.2 Candidate Species for Further Assessment

Table 5.5 lists the candidate species credits generated within the credit calculator and an assessment of their potential presence within the development site based on habitat components and review of species distributions. The following species credit species have been considered as potentially occurring and are required to be further assessed:

- Flora species:
  - *Acacia pubescens*;
  - *Cynanchum elegans*;
  - *Dillwynia tenuifolia*;
  - *Dillwynia tenuifolia - endangered population Kemps Creek*;

- *Eucalyptus benthamii*;
- *Grevillea juniperina* subsp. *juniperina*;
- *Hypsela sessiliflora*;
- *Marsdenia viridiflora subsp. viridiflora - endangered population*;
- *Persicaria elatior*;
- *Persoonia bargoensis*;
- *Pilularia novae-hollandiae*;
- *Pimelea spicata*;
- *Pomaderris brunnea*; and
- *Wahlenbergia multicaulis - endangered population*.

➢ Fauna species:

- Cumberland Plain Land Snail;
- Green and Golden Bell Frog; and
- Regent Honeyeater.

Table 5.5 Assessment of potential presence of species credit species

Scientific name	Common name	Associated PCTs within the Development Site	Required Habitat Components	Assessment of Habitat Within the Development Site	Requires Further Assessment?
Flora					
Acacia bynoeana	Bynoe's Wattle	HN528, HN529	Occurs in heath or dry sclerophyll forest on sandy soils. Associated overstorey species include Red Bloodwood, Scribbly Gum, Parramatta Red Gum, Saw Banksia and Narrow-leaved Apple.	Unlikely to occur. No sandy soil and/or associated overstorey species present. No records of the species within a 10 km radius of the development site.	No
Acacia pubescens	Downy Wattle	HN528, HN529	Occurs on alluviums, shales and at the intergrade between shales and sandstones. The soils are characteristically gravely soils, often with ironstone. Occurs in open woodland and forest, in a variety of plant communities, including Cooks River/ Castlereagh Ironbark Forest, Shale/ Gravel Transition Forest and Cumberland Plain Woodland.	Potential to occur. Cumberland Plain Woodland is present within the development site. 7 records of the species within a 10 km radius of the development site.	Yes
Cynanchum elegans	White-flowered Wax Plant	HN526, HN528, HN529	Usually occurs on the edge of dry rainforest vegetation. Other associated vegetation types include littoral rainforest; Coastal Tea-tree–Coastal Banksia coastal scrub; Forest Red Gum aligned open forest and woodland; Spotted Gum aligned open forest and woodland; and Bracelet	Potential to occur. Woodland containing Forest Red Gum present within the development site. No records of the species within a 10 km radius of the development site.	Yes

Table 5.5 Assessment of potential presence of species credit species

Scientific name	Common name	Associated PCTs within the Development Site	Required Habitat Components	Assessment of Habitat Within the Development Site	Requires Further Assessment?
			Honeymyrtle scrub to open scrub.		
Dillwynia tenuifolia	Dillwynia tenuifolia	HN528, HN529	May be locally abundant particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays. May also be common in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland.	Potential to occur. Some marginal habitat present within HN528. 56 records of the species within a 10 km radius of the development site.	Yes
Dillwynia tenuifolia - endangered population Kemps Creek	Dillwynia tenuifolia (a shrub) population, Kemps Creek	HN528, HN529	Occurs on a small outlier of the Berkshire Park Soil Landscape. The site supports a transition from Castlereagh Ironbark Forest to Castlereagh Scribbly Gum Woodland. Portions of the site contain a form of Shale Gravel Transition Forest	Potential to occur. Some marginal habitat present within HN528. 26 records of the species within a 10 km radius of the development site.	Yes
Eucalyptus benthamii	Camden White Gum	HN526, HN528, HN529	Occurs on the alluvial flats of the Nepean River and its tributaries. Requires a combination of deep alluvial sands and a flooding regime that permits seedling establishment. Associated canopy species include *Eucalyptus elata, E. bauerina, E. amplifolia, E. deanei, Angophora subvelutina, E. crebra, E. deanei, E. punctata.*	Potential to occur. *Eucalyptus amplifolia* present within HN526 and HN594. No records of the species within a 10 km radius of the development site.	Yes

Table 5.5 Assessment of potential presence of species credit species

Scientific name	Common name	Associated PCTs within the Development Site	Required Habitat Components	Assessment of Habitat Within the Development Site	Requires Further Assessment?
Grevillea juniperina subsp. juniperina	Juniper-leaved Grevillea	HN528, HN529	Grows on reddish clay to sandy soils derived from Wianamatta Shale and Tertiary alluvium (often with shale influence), typically containing lateritic gravels. Recorded from Cumberland Plain Woodland, Castlereagh Ironbark Woodland, Castlereagh Scribbly Gum Woodland and Shale/Gravel Transition Forest.	Potential to occur. Suitable habitat present in HN528. 96 records of the species within a 10 km radius of the development site.	Yes
Hibbertia sp. Bankstown	Hibbertia sp. Bankstown	HN526, HN529	Remnant vegetation at the known location (Bankstown Airport) and soil type (silty sandy alluvium) are consistent with an inferred pre-settlement cover of Castlereagh Ironbark Forest although some remnant vegetation at and near the site (along the channel in particular) suggests Castlereagh Scribbly Gum equally valid.	Unlikely to occur. Neither Castlereagh Scribbly Gum Forest nor Castlereagh Ironbark Forest are present on the soil, and associated sandy alluvium soils and soils containing laterites are not present. No records of the species within a 10 km radius of the development site.	No
Hypsela sessiliflora	Hypsela sessiliflora	HN526, HN528, HN529, HN594	Damp places	Potential to occur. Damp areas in HN526, HN528 and HN594 are present. 7 records of the species within a 10 km radius of the development site.	Yes
Marsdenia	Marsdenia viridiflora	HN526, HN528,	Grows in vine thickets and open shale	Potential to occur. Open Shale Woodland	Yes

Table 5.5 Assessment of potential presence of species credit species

Scientific name	Common name	Associated PCTs within the Development Site	Required Habitat Components	Assessment of Habitat Within the Development Site	Requires Further Assessment?
viridiflora subsp. viridiflora - endangered population	subsp. viridiflora in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	HN529	woodland.	(HN528, HN529 and HN526) is present. 3 records of the species within a 10 km radius of the development site.	
Melaleuca biconvexa	Biconvex Paperbark	HN594	Swamps, swamp margins or creek edges. Generally grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects.	Unlikely to occur. Suitable habitat in sheltered areas of HN526 and HN595 besides creek lines. However species is not known to occur in the Sydney Region. No records of the species within a 10 km radius of the development site.	No
Persicaria elatior	Tall Knotweed	HN526	Grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance.	Potential to occur. Damp places in creek lines in HN526 are present. No records of the species within a 10 km radius of the development site.	Yes
Persoonia bargoensis	Bargo Geebung	HN528, HN529	Occurs in woodland or dry sclerophyll forest on sandstone and on heavier, well drained, loamy, gravelly soils of the Wianamatta Shale and .Hawkesbury Sandstone.	Potential to occur. Dry Sclerophyll Forest on Wianamatta Shale derived soils is present on the site. No records of the species within a 10 km radius of the	Yes

Table 5.5 Assessment of potential presence of species credit species

Scientific name	Common name	Associated PCTs within the Development Site	Required Habitat Components	Assessment of Habitat Within the Development Site	Requires Further Assessment?
				development site.	
Pilularia novae-hollandiae	Austral Pillwort	HN526	Periodically waterlogged sites (including table drains). Grows in shallow swamps and waterways, often among grasses and sedges.	Potential to occur. Suitable habitat present within a first order stream within the development site. No records of the species within a 10 km radius of the development site.	Yes
Pimelea curviflora var. curviflora	*Pimelea curviflora var. curviflora*	HN528, HN529	Occurs on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands.	Unlikely to occur. Lateritic soils are not present, nor are transitional areas between shale and sandstone. No records of the species within a 10 km radius of the development site.	No
Pimelea spicata	Spiked Rice-flower	HN528, HN529	On the Cumberland Plain sites it is associated with Grey Box communities (particularly Cumberland Plain Woodland variants and Moist Shale Woodland) and in areas of ironbark.	Potential to occur. A grey box community is present on the site (HN528). 13 records of the species within a 10 km radius of the development site.	Yes
Pomaderris brunnea	Brown Pomaderris	HN526	Grows in moist woodland or forest on clay and alluvial soils of flood plains and creek lines.	Potential to occur. Moist woodland (HN526) associated with shale derived clay and alluvial soils are present along creek lines. No records of the species within a 10 km radius of the development	Yes

Table 5.5 Assessment of potential presence of species credit species

Scientific name	Common name	Associated PCTs within the Development Site	Required Habitat Components	Assessment of Habitat Within the Development Site	Requires Further Assessment?
				site.	
Pterostylis saxicola	Sydney Plains Greenhood	HN528, HN529	Typically in shallow /skeletal soils on rock shelves and platforms. The vegetation communities above the shelves where *Pterostylis saxicola* occurs are sclerophyll forest or woodland on shale/sandstone transition soils or shale soils.	Unlikely to occur. Site does not contain rock platforms, or associated skeletal soils. No records of the species within a 10 km radius of the development site.	No
Pultenaea pedunculata	Matted Bush-pea	HN526, HN528, HN529	In the Cumberland Plain the species favours sites in clay or sandy-clay soils (Blacktown Soil Landscape) on Wianamatta Shale-derived soils, usually close to patches of Tertiary Alluvium (Liverpool area) or at or near the Shale-Sandstone interface (Appin). All sites have a lateritic influence with ironstone gravel (nodules) present	Unlikely to occur. Site does not contain sandstone influenced soil. No records of the species within a 10 km radius of the development site.	No
Wahlenbergia multicaulis - endangered population	Wahlenbergia multicaulis (Tadgells Bluebell) population, Auburn, Bankstown, Baulkham Hills, Canterbury,	HN526	Found in disturbed sites and grows in a variety of habitats including forest, woodland, scrub, grassland and the edges of watercourses and wetlands. Typically occurs in damp, disturbed sites (with natural or human disturbance of	Potential to occur. Suitable habitat in the form of damp areas along creek lines, disturbed by cattle grazing, is present in patches of HN526. No records of the species within a 10 km radius of the	Yes

Table 5.5 Assessment of potential presence of species credit species

Scientific name	Common name	Associated PCTs within the Development Site	Required Habitat Components	Assessment of Habitat Within the Development Site	Requires Further Assessment?
	Hornsby, Parramatta and Strathfield local government areas		various forms), typically amongst other herbs rather than in the open.	development site.	
Fauna					
Anthochaera phrygia	Regent Honeyeater	HN526, HN528, HN529, HN594	The Regent Honeyeater is a generalist forager, which mainly feeds on the nectar from a wide range of eucalypts and mistletoes. Key eucalypt species include Mugga Ironbark, Yellow Box, Blakely's Red Gum, White Box and Swamp Mahogany. Also utilises: *Eucalyptus microcarpa, E. punctata, E. polyanthemos, E. moluccana, Corymbia robusta, E. crebra, E. caleyi, C. maculata, E. mckieana, E. macrorhyncha, E. laevopinea*, and *Angophora floribunda*. Nectar and fruit from the mistletoes *Amyema miquelii, A. pendula* and *A. cambagei* are also eaten during the breeding season.	Potential to occur. Occurrences of *Eucalyptus crebra* and *E. moluccana* may provide habitat for this species. One record of the species within a 10 km radius of the development site.	Yes
Botaurus poiciloptilus	Australasian Bittern	HN526, HN594	Occurs in terrestrial freshwater wetlands and, rarely, estuarine habitats. It favours wetlands with tall, dense vegetation, where it forages in	Unlikely to occur. No densely vegetated wetlands occur within the development site. No records of the species within a	No

Table 5.5 Assessment of potential presence of species credit species

Scientific name	Common name	Associated PCTs within the Development Site	Required Habitat Components	Assessment of Habitat Within the Development Site	Requires Further Assessment?
			still, shallow water up to 0.3 m deep, often at the edges of pools or waterways, or from platforms or mats of vegetation over deep water. The species favours permanent and seasonal freshwater habitats, particularly those dominated by sedges, rushes and/or reeds (e.g. *Phragmites, Cyperus, Eleocharis, Juncus, Typha, Baumea, Bolboschoenus*) or cutting grass (*Gahnia*) growing over muddy or peaty substrate	10 km radius of the development site.	
Callocephalon fimbriatum population in the Hornsby and Ku-ring-gai Local Government Areas	Gang-gang Cockatoo population, Hornsby and Ku-ring-gai Local Government Areas	HN528, HN529, HN594	Occurs within a variety of forest and woodland types. Usually frequents forested areas with old growth attributes required for nesting and roosting purposes. Requires hollows with diameter ≥ 10 cm and >9m above the ground in eucalypts	Unlikely to occur. Limited suitable habitat present. Percent native vegetation within the outer assessment circle is below the requirement of this species. No records of the species within a 10 km radius of the development site.	No
Cercartetus nanus	Eastern Pygmy-possum	HN526, HN528, HN529	Associated PCTs with an understorey containing heath, banksias or myrtaceous shrubs including Leptospermum spp. Trees with hollows >2cm, loose bark of eucalypts or accumulations of shredded bark in tree forks for nesting. As per	Unlikely to occur. No suitable habitat in the form of heath, banksias or myrtaceous shrubs. Percent native vegetation within the outer assessment circle is below the requirement of this	No

Table 5.5 Assessment of potential presence of species credit species

Scientific name	Common name	Associated PCTs within the Development Site	Required Habitat Components	Assessment of Habitat Within the Development Site	Requires Further Assessment?
			breeding and abandoned bird-nests, Ringtail Possum (*Pseudocheirus peregrinus*) dreys or thickets of vegetation, (e.g. grass-tree skirts) for shelter	species. No records of the species within a 10 km radius of the development site.	
Heleioporus australiacus	Giant Burrowing Frog	HN526, HN594	Heath, woodland or forest, on most soils except not generally found where there is a grassy ground layer. Often forage along tracks and roads during warm evenings. Soaks or pools in 1st or 2nd order streams, ponded sections of unmarked drainage lines, culverts and other ridge top structures containing water, upland swamps. Deep leaf litter and/or loose soil, burrow structures that they construct.	Unlikely to occur. No first order streams occur within the development site and the dams on site are devoid of bank vegetation. Percent native vegetation within the outer assessment circle is below the requirement of this species. No records of the species within a 10 km radius of the development site.	No
Ixobrychus flavicollis	Black Bittern	HN526, HN528, HN529, HN594	Associated PCTs bordering water bodies or watercourses. Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. During the day, roosts in trees or on the ground amongst dense reeds.	Unlikely to occur. No first order streams occur within the development site and the dams have little reed cover. No records of the species within a 10 km radius of the development site.	No
Litoria aurea	Green and Golden Bell	HN526, HN528,	Amongst emergent aquatic or riparian	Potential to occur. Five dams are	Yes

Table 5.5 Assessment of potential presence of species credit species

Scientific name	Common name	Associated PCTs within the Development Site	Required Habitat Components	Assessment of Habitat Within the Development Site	Requires Further Assessment?
	Frog	HN529, HN594	vegetation and amongst vegetation, fallen timber adjacent to and within 500m of breeding habitat, including grassland, cropland and modified pastures. Still or slow flowing natural waterbodies with some aquatic emergent vegetation such as Typha spp. or Eleocharis spp. Will use artificial waterbodies and non-native emergent vegetation. Vegetation, rocks and fallen timber, leaf litter, man-made ground cover, debris and in soil cracks up to 1km from breeding habitat.	present within the development site which have some ephemeral/emergent vegetation. Three records of the species within a 10 km radius of the development site.	
Meridolum corneovirens	Cumberland Plain Land Snail	HN526, HN528, HN529	Bark or leaf litter accumulation. Primarily inhabits Cumberland Plain Woodland, and also known from Shale Gravel Transition Forests, Castlereagh Swamp Woodlands and the margins of River-flat Eucalypt Forest.	Potential to occur. Some suitable habitat exists within the intact woodland in the west of the development site. However, due to the highly modified nature of the ground flora, the constant and long-term disturbance of the base of trees and tree roots by grazing cattle and the fragmentation of the vegetation communities in the development site from any nearby connecting habitat, much of	Yes

Table 5.5 Assessment of potential presence of species credit species

Scientific name	Common name	Associated PCTs within the Development Site	Required Habitat Components	Assessment of Habitat Within the Development Site	Requires Further Assessment?
				the development site is considered unsuitable for support this species. 153 records of the species within a 10 km radius of the development site.	
Petaurus norfolcensis	Squirrel Glider	HN526, HN528, HN529	Associated PCTs with mature, mix-age eucalypts with flowering shrubs and wattles in the understorey. Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Tree hollows >5 cm diameter in eucalypt forests and woodlands.	Unlikely to occur. Some habitat features for this species is present within the intact woodland areas; however, much of the site does not contain vegetation typical for this species. No records of the species within a 10 km radius of the development site.	No
Phascolarctos cinereus	Koala	HN526, HN528, HN529	As per Koala Food Tree Species listed in Appendix 2 of the NSW State Koala Recovery Plan.	Unlikely to occur. Although two primary feed trees occur within the development site (*Eucalyptus tereticornis* and *E. amplifolia*), much of the habitat present within the development site is significantly fragmented from any nearby connecting habitat. Potential habitat in the intact woodland on the western edge of the development site is juvenile,	No

Table 5.5 Assessment of potential presence of species credit species

Scientific name	Common name	Associated PCTs within the Development Site	Required Habitat Components	Assessment of Habitat Within the Development Site	Requires Further Assessment?
				regenerating woodland not suitable for Koala. As such potential habitat within HN526, HN528 and HN529 is considered unsuitable for support this species. No records of the species within a 10 km radius of the development site.	

5.5.3 Presence of Candidate Species

Table 5.6 outlines the surveys that were undertaken for each of the candidate species that were assessed as requiring further assessment. Surveys for each of these species were undertaken at an appropriate time of year and weather conditions (see ***Section 5.2.2.i*** and **Table 5.5**).

During the threatened flora surveys of the proposed Western North/South Link Road, 24 Juniper-leaved Grevillea (*Grevillea juniperina subsp. juniperina*), a species credit species, were encountered within Fitzpatrick land. The location of each individual is provided in **Figure 5.2**. These individuals are located outside the development site and therefore are not considered further in this BAR as the offsetting for the removal of these individuals forms part of the approvals for the development of the Fitzpatrick land.

A list of flora and fauna species recorded during surveys is provided in **Appendix B** and **Appendix C**, respectively.

Table 5.6 Summary of surveys undertaken for candidate species credit species

Scientific Name	Common Name	Survey Type	Survey Timing
Flora			
Acacia pubescens	Downy Wattle	Random meanders in HN528 and HN529	15 October 2015 and 8 April 2016
Cynanchum elegans	White-flowered Wax Plant	Random meanders in HN526, HN528 and HN529	15 October 2015 and 8 April 2016
Dillwynia tenuifolia	Dillwynia tenuifolia	Random meanders in HN528 and HN529	15 October 2015 and 8 April 2016
Dillwynia tenuifolia - endangered population Kemps Creek	Dillwynia tenuifolia (a shrub) population, Kemps Creek	Random meanders in HN528 and HN529	15 October 2015 and 8 April 2016
Eucalyptus benthamii	Camden White Gum	Random meanders in HN526, HN528 and HN529	15 October 2015 and 8 April 2016
Grevillea juniperina subsp. juniperina	Juniper-leaved Grevillea	Random meanders in HN528 and HN529	15 October 2015 and 8 April 2016
Hypsela sessiliflora	Hypsela sessiliflora	Random meanders in HN526, HN528, HN529 and HN594	15 October 2015 and 8 April 2016
Marsdenia viridiflora subsp. viridiflora - endangered population	Marsdenia viridiflora subsp. viridiflora in the Bankstown, Blacktown, Camden, Campbelltown,	Random meanders in HN526, HN528 and HN529	15 October 2015 and 8 April 2016

Table 5.6 Summary of surveys undertaken for candidate species credit species

Scientific Name	Common Name	Survey Type	Survey Timing
	Fairfield, Holroyd, Liverpool and Penrith local government areas		
Persicaria elatior	Tall Knotweed	Random meanders in HN526 and HN594	15 October 2015 and 8 April 2016
Persoonia bargoensis	Bargo Geebung	Random meanders in HN528 and HN529	15 October 2015 and 8 April 2016
Pilularia novae-hollandiae	Austral Pillwort	Random meanders in HN526	15 October 2015 and 8 April 2016
Pimelea spicata	Spiked Rice-flower	Random meanders in HN528 and HN529	15 October 2015 and 8 April 2016
Pomaderris brunnea	Brown Pomaderris	Random meanders in HN526	15 October 2015 and 8 April 2016
Wahlenbergia multicaulis - endangered population	Wahlenbergia multicaulis (Tadgells Bluebell) population, Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield local government areas	Random meanders in HN526	15 October 2015 and 8 April 2016
Fauna			
Anthochaera phrygia	Regent Honeyeater	Targeted diurnal bird surveys in woodland habitats	22-23 October 2015
Litoria aurea	Green and Golden Bell Frog	Targeted spotlighting and call playback surveys in aquatic habitat	22 October 2015 and 26 – 28 October 2015
Meridolum corneovirens	Cumberland Plain Land Snail	Targeted leaf litter searches in HN526, HN528 and HN529	15 October 2015
Phascolarctos cinereus	Koala	Call playback in woodland habitats	26 – 28 October 2015 *
Petaurus norfolcensis	Squirrel Glider	Call playback in woodland habitats	26 – 28 October 2015 *

** Although Koala and Squirrel Glider do not require further assessment call playback for these species were conducted in conjunction with the Green and Golden Bell Frog surveys*

Coordinate System: MGA Zone 56 (GDA 94)



Legend

Development Site

Additional North-South Link Road Area

Survey Locations

- Amphibian surveys (Green and Golden Bell Frog and Giant Burrowing Frog)
- Cumberland Plain Land Snail searches
- Diurnal bird surveys (Regent Honeyeater and Black Bittern)
- Spotlighting and call playback (Koala and Squirrel Glider)
- Fauna Habitat Assessment

N

Grid North

Scale: 1:9,339 @ A3 page
Date prepared: 31/03/2017

Image Source:
Image © Nearmap
(dated 11/02/2017)

Data Source:
Image © 2015
NSW Land and Property Management Authority,
SIX Viewer

cumberland ecology

I:\...\15122\Figures\RP1_BAR\20170331\Figure 5.1. Species Credit Species Survey Sites

Figure 5.1. Targeted species credit species survey locations

100 0 100 200 300 400 m

Coordinate System: MGA Zone 56 (GDA 94)



Legend

- Development Site
- Additional North-South Link Road Area

Species Credit Species

- *Grevillea juniperina subsp. juniperina*

Grid North

Scale: 1:9,339 @ A3 page
Date prepared: 31/03/2017

Image Source:
Image © Nearmap
(dated 11/02/2017)

Data Source:
Image © 2015
NSW Land and Property
Management Authority,
SIX Viewer

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I:\...\15122\Figures\RP1_BAR\20170331\Figure 5.2. Locations_Threatened Species

Figure 5.2. Locations of threatened species

100 0 100 200 300 400 m

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Chapter 6

Avoid and Minimise Impacts

This chapter outlines the actions that have been undertaken to demonstrate that reasonable measures have been taken to avoid and minimise the potential direct and indirect impacts of a development proposal on biodiversity values.

6.1 Measures to Avoid

6.1.1 Avoidance of Direct Impacts

Under the FBA, a proponent must seek to avoid the direct impacts of the Major Project on all biodiversity values at the development site including impacts on:

- Endangered ecological communities (EECs) and critically endangered ecological communities (CEECs);
- PCTs that contain threatened species habitat;
- Areas that contain habitat for vulnerable, endangered or critically endangered threatened species or populations;
- An area of land that the Minister for Environment has declared as critical habitat in accordance with section 47 of the TSC Act;
- The riparian areas of 4th order or higher streams and rivers, important wetlands and estuaries; and
- State significant biodiversity links.

Demonstration of these is summarised in **Table 6.1**.

Table 6.1 Avoidance of direct impacts on biodiversity values at the development site

Direct impact to be avoided	Avoidance mechanism proposed
Impacts to endangered ecological communities (EECs) and critically endangered ecological communities (CEECs)	The development site is located within existing farmland so as to minimise environmental impacts to vegetation. Large areas of native vegetation are left intact to the west of the site. 95% of the

Table 6.1 Avoidance of direct impacts on biodiversity values at the development site

Direct impact to be avoided	Avoidance mechanism proposed
	vegetation within the development area comprises revegetation areas or exotic low diversity grassland. While the remaining 5% does include EECs or CEECs, they mostly consist of remnant patches of fragmented, degraded and/or isolated vegetation. It is unlikely that the impacted areas of EECs or CEECs are viable in the future if left in their current state.
Impacts to PCTs that contain threatened species habitat	The development site is located within the study area so as to minimise environmental impacts to PCTs that may provide threatened species habitat No threatened flora or fauna species were found during surveys. Due to historical agricultural land use, 95% of the site is degraded grassland dominated by exotic species. The remaining small patches of woodland are unlikely to provide habitat for endangered species due to their fragmentation, isolation and considerable edge effect. It is possible that some highly mobile species and transient species use the site for foraging. Nevertheless, the vegetation on site is to be considered of low value habitat and is unlikely to form part of viable future habitat for any endangered species.
Impacts to areas that contain habitat for vulnerable, endangered or critically endangered threatened species or populations	The development site is located within the study area so as to minimise environmental impacts to threatened species habitat. As discussed above, it is unlikely that the remnant patches of woodland on site constitute part of important habitat for threatened species or populations.
Impacts to an area of land that the Minister for Environment has declared as critical habitat in accordance with section 47 of the TSC Act	There are no areas of critical habitat within the study area.
Impacts to the riparian areas of 4th order or higher streams and rivers, important wetlands and estuaries	There are no 4th order or higher streams within the study area, nor are there wetlands or estuaries. Potential impacts by the proposed development, which comprises a tributary to Ropes Creek, are minimized by the construction of several Bio-Retention Basins, swales and storm water management during construction. Any impacts on streams, rivers, wetlands or

Table 6.1 Avoidance of direct impacts on biodiversity values at the development site

Direct impact to be avoided	Avoidance mechanism proposed
	estuaries are therefore unlikely.
Impacts to state significant biodiversity links	There is no record available of any state significant biodiversity links within or adjacent to the development area. No information regarding such links has been provided in the SEARS.

6.1.2 Site Selection

The selection of a suitable development site for this Project was informed by knowledge of biodiversity values. In addition to the current study, there have been desktop assessments and onsite assessments of biodiversity values, which include studies of both the study area (Oakdale West Estate), as well as other studies of biodiversity within the locality. A summary of considerations during site selection in accordance with Section 8.3.2.2 – 8.3.2.6 of the FBA is shown in **Table 6.2**.

Table 6.2 Consideration of the proposed development during site selection

FBA Section	FBA Criteria	Considerations of the FBA guidelines at Oakdale West Estate
8.3.2.2	Selecting a suitable development site for a Major Project or a route for linear projects, should be informed by knowledge of biodiversity values. An initial desktop assessment of biodiversity values would assist in identifying areas of native vegetation cover, EECs or CEECs, and potential habitat for threatened species.	Desktop surveys of the locality include online resources such as the Atlas of NSW Wildlife (OEH, 2015) and EPBC Protected Matters Search Tool (DoE, 2015). Studies of the biodiversity of the area includes Ecological Assessment - Oakdale Concept Plan (Cumberland Ecology, 2007) and Oakdale South Biodiversity Assessment Report (Cumberland Ecology, 2016). These datasets provided the preliminary information necessary to inform project planning. Early consideration of biodiversity values influenced site selection.
8.3.2.3	Stage 1 of the FBA will provide the preliminary information necessary to inform project planning. Early consideration of biodiversity values is recommended in site selection, or route selection for linear projects, and the planning phase.	Biodiversity values were given early consideration during the site selection plan. The development footprint has been amended several times to maximise environmental outcomes and minimise impacts on biodiversity.
8.3.2.4	The site/route selection process should include consideration and analysis of the biodiversity constraints of the proposed development site and consider the suitability of the Major Project based on the types of biodiversity values present on the development site.	Specific biodiversity constraints identified within the study area includes the presence of threatened ecological communities including Swamp Oak Forest, River Flat Eucalypt Forest and Cumberland Plain Woodland which are listed as EEC and CEEC respectively under the TSC Act. Cumberland Plain Woodland is also listed as a CEEC under the EPBC Act.
8.3.2.5	When considering and analysing the biodiversity constraints for the purpose of selecting a development site, the following matters should be addressed: (a) whether there are alternative sites within the property on which the	Given the size of the required impact footprint for construction of warehouses and offices, the alternative location of the development would involve impacts to significantly larger tranches

Table 6.2 Consideration of the proposed development during site selection

FBA Section	FBA Criteria	Considerations of the FBA guidelines at Oakdale West Estate
	proposed development is located where siting the proposed Major Project would avoid and minimise impacts on biodiversity values	of vegetation. The current development site has been selected to minimise impacts to biodiversity values.
	(b) how the development site can be selected to avoid and minimise impacts on biodiversity values as far as practicable	The development site is to be located on the exotic grassland which is of negligible biodiversity value. Much of the main impact has been avoided with the retention and enhancement of woodland and forest areas on site.
	(c) whether an alternative development site to the proposed development site, which would avoid adversely impacting on biodiversity values, might be feasible.	
8.3.2.6	For linear projects, the route selection process must include consideration and an analysis of the biodiversity constraints of the various route options. In selecting a preferred option, loss of biodiversity values must be weighed up and justified against social and economic costs and benefits.	The proposed development is not a linear project.

6.1.3 *Incorporating Principles of Avoidance and Minimising Impacts to Biodiversity*

i. Planning

Once a suitable development site has been selected, further analysis of the biodiversity constraints of the proposed development site were then used to inform concept planning, project siting and design. This includes the proposed location of temporary construction infrastructure such as roads, camps, stockpile sites and parking bays. All temporary construction works will be located within the development site.

Although there are TECs within the development site, the majority (95%) of the development site will be located in exotic grassland which is the lowest condition vegetation and poorest threatened species habitat. The development site is located whereby loss of native vegetation and impacts to biodiversity are minimised. The location of the development site also minimises losses of connectivity by retaining the riparian corridor along Ropes Creek in its entirety. A summary table of considerations during the planning phase is shown in **Table 6.3**.

6.2 Measures to Minimise Impacts

The proponent will implement reasonable measures to avoid and minimise any impacts that may occur during the operational phase of the proposed development, that are additional to the impacts which occurred during the site selection and planning phases.

As part of the proposed development a Biodiversity Management Plan will be created in order to guide all facets of biodiversity management and mitigation for the proposed development and will detail the management requirements for the following:

- Vegetation pre-clearance and clearance supervision;
- Dam and creek dewatering;
- Rehabilitation and habitat restoration; and
- Weed management.

6.2.1 *Minimising Impacts During Construction Phase*

Considerations have been given to minimising impacts during the construction phase. Considerations to minimise impacts to biodiversity at the development site includes:

- Method of clearing;
- Clearing operations protocols;
- Timing of construction; and

- Other measures that minimise inadvertent impacts of the proposed development on the biodiversity values indirect impacts during the construction phase.

Methods to minimise impacts during the construction phase are detailed below in **Table 6.3**.

Table 6.3 Considerations to minimise direct impacts of the proposed development during construction

FBA Section	FBA Criteria	Considerations of the FBA guidelines at Oakdale West Estate
8.3.2.10a	Method of clearing – using a method of clearing during the construction phase that avoids damage to retained native vegetation and reduces soil disturbance. For example, removal of native vegetation by chain-saw, rather than heavy machinery, is preferable in situations where partial clearing is proposed	The patches of vegetation to be removed are small remnants and can be removed safely with chainsaws rather than heavy machinery.
8.3.2.10b	Clearing operations – minimising direct harm to native fauna during actual construction operations through onsite measures such as undertaking pre-clearing surveys, daily fauna surveys and the presence of a trained ecologist during clearing events	The clearing will take place in two stages. During the first stage, all habitat trees will be marked and left standing, while the vegetation surrounding them will be cleared. A licensed wildlife carer and/or ecologist will capture and/or remove fauna that have the potential to be disturbed as a result of clearing activities. These fauna will be relocated into pre-determined habitat identified for fauna release. All fauna handling will be carried out by licensed wildlife carers and/or ecologists. The two-stage clearing process enables fauna to feel secure whilst clearing occurs around their tree, and allows them a chance to self-relocate upon nightfall, when foraging typically occurs The next day, during stage two, the remaining trees will be cleared. The ecologist will be present during all clearing activities to rescue animals injured during the operation. Any fauna found will be captured and relocated to nearby remnant vegetation and released after nightfall to minimise the risk of predation by diurnal predators. Any animals that are inadvertently injured will be taken to the nearest veterinary clinic for treatment, or if the animal is unlikely to survive, it will be humanely euthanized. All persons working on the vegetation clearing will be briefed about the

Table 6.3 Considerations to minimise direct impacts of the proposed development during construction

FBA Section	FBA Criteria	Considerations of the FBA guidelines at Oakdale West Estate
		possible fauna present at the time of construction, and what procedures should be undertaken in the event of an animal being injured or disturbed. Results and outcomes of pre-clearing and clearing fauna surveys shall be documented by the ecologist and submitted to the proponent.
8.3.2.10c	Timing of construction – identifying reasonable measures that minimise the impacts on biodiversity. For example, timing construction activities for when migratory species are absent from the site, or when particular species known to or likely to use the habitat on the site are not breeding or nesting, can minimise the impacts of construction activities on biodiversity	There are limited fauna species that utilise the site. However, as it is likely there are several microchiropteran bat species that use the development site, clearing should be proposed to not occur over winter when animals are in torpor.
8.3.2.10d	Other measures that minimise inadvertent impacts of the Major Project on the biodiversity values – measures such as installing temporary fencing to protect significant environmental features such as riparian zones, promoting the hygiene of construction vehicles to minimise spread of weeds or pathogens, appropriately training and inducting project staff and contractors so that they can implement all measures that minimise inadvertent adverse impacts of the Major Project on biodiversity values.	Temporary fencing should be installed prior to clearing works to delineate impact from protected areas. All mobile plant should be brought to site in clean condition to prevent the spread of weeds or pathogens into areas outside the development site. Stormwater run-off will be managed during the construction phase of the project.

In addition to measures proposed above to minimise direct impacts to biodiversity, the following measures are proposed to minimise indirect impacts during the construction phase as shown in **Table 6.4**.

Table 6.4 Proposed measures to minimise indirect impacts to biodiversity during construction

Indirect impact	Proposed measure to minimise impact
Sedimentation and run-off	Sediment barriers, sedimentation ponds, and detention basins have been incorporated into the project design to protect adjacent waterways from sediment and run-off. This measure will protect Ropes Creek to the east of the development site.
Noise, dust or light spill	The area is currently protected by topography to lighting from nearby residential and industrial areas. Construction should be limited to daylight hours to mitigate for noise and light spill impacts to fauna in adjacent vegetation. Dust will be managed onsite through an approved Construction Environment Management Plan (CEMP) at the time of construction.
Inadvertent impacts on adjacent habitat or vegetation	Fencing should be erected to delineate the extent of the development site and protect adjacent vegetation from impacts such as vehicular traffic. All set down areas and lay down areas should be located outside of areas of native vegetation, within the development site.
Feral pest, weed and/or pathogen encroachment into vegetation on land adjoining the development site	Light vehicles and mobile plant should all be clean when entering the site to prevent the introduction of pathogens that may impact vegetation outside the development site.

6.2.2 Minimising Impacts During Operational Phase

The following matters should be considered in order to avoid and minimise direct impacts on biodiversity values at the operational phase as described in **Table 6.5**.

Table 6.5 Consideration of measures to minimise direct impacts the proposed development during operation

FBA Section	FBA Criteria	Considerations of the FBA guidelines at Oakdale West Estate
8.3.2.12.a	Seasonal impacts – whether there are likely to be any impacts that occur during specific seasons. Minimisation measures may include amending operational times to minimise impacts on biodiversity during periods when seasonal events such as breeding or species migration occur	There are no seasonal impacts of the proposed development during operation.
8.3.2.12.b	Artificial habitats – using 'artificial habitats' for fauna where they may be effective in minimising impacts on such fauna. These include nest boxes, glider-crossings or habitat bridges.	Nest boxes are useful in reducing the impact to fauna habitat within the study area. Nest boxes should be erected for each natural hollow that is removed during the contraction phase. Nest boxes are to be erected before removal of hollow bearing trees. The total quantum of nest boxes required is to be established during pre-clearing surveys identified in Table 6.3.
8.4.1.4.f	Impacts during the operational phase – measures to avoid or minimise the indirect impacts on threatened species and threatened species habitat on land adjoining the development site, migratory species or flight pathways as a result of the operation of the development. Such measures may include those adopted to avoid and minimise: (i) trampling of threatened flora species (ii) rubbish dumping (iii) noise (iv) light spill	There are no threatened flora species known within the study area. Dumping of rubbish will be prevented by permanent fencing to prevent access to the riparian woodland along Ropes Creek. The proposed development will also have suitable security measures in place to prevent illegal dumping. Noise from the warehouse facilities will be contained within the buildings onsite. All noise will result from traffic which will unlikely exceed current levels adjacent to the study area. Noise will be managed onsite to relevant standards. Light spill will be managed by directing street lighting eastward to provide light for access and security within the warehouse facilities, and preventing excessive light spill into the riparian corridor.

Table 6.5 Consideration of measures to minimise direct impacts the proposed development during operation

FBA Section	FBA Criteria	Considerations of the FBA guidelines at Oakdale West Estate
	(v) weed encroachment (vi) nutrient run-off (vii) increased risk of fire, and (viii) Pest animals.	There will not be an increased risk of fire as a result of the development. The occurrence of feral cats and foxes might increase as a result of the proposed development. A pest management plan will be incorporated into the Biodiversity Management Plan for the development site.

6.3 Summary of Measures

Although the Project has sought to avoid and minimise impacts, not all biodiversity impacts can be avoided for many aspects of the development as detailed above. The measure described in **Table 6.6** should be implemented to mitigate impacts during construction and operation.

Table 6.6 Measures to be implemented to mitigate the impacts on biodiversity

Impact	Mitigation measure	Outcome	Timing	Responsibility
General flora and fauna impacts	A Flora and Fauna Management Plan would be prepared as part of the CEMP. Native vegetation clearing would not occur until the Flora and Fauna Management Plan is approved	Flora and fauna would be managed in accordance with the requirements of the FFMP.	Pre-construction and construction	Goodman and Contractor
Degradation of aquatic habitats	Install appropriate drainage infrastructure (e.g. sediment basins, diversion drains), sediment and erosion controls prior to the commencement of construction.	Prevention of sedimentation and erosion leading to a reduction in water quality and degradation of aquatic habitats in Ropes Creek.	Pre-construction/ Construction	Construction Contractor
	Clearing of vegetation would be timed to avoid periods when rain is forecast	Prevention of sedimentation and erosion leading to a reduction in water quality and degradation of aquatic habitats in Ropes Creek.	Construction	
	Locate soil or mulch stockpiles away from watercourses and key stormwater flow paths to limit potential transport of these substances into the watercourses via runoff.	Prevents soil and mulch reaching waterways.	Construction	
	Dust suppression activities to be undertaken where appropriate.	Prevents sedimentation and erosion leading to a reduction in water quality and degradation of aquatic habitats in Ropes Creek.	Construction	
	Stabilisation of disturbed areas, including revegetation in accordance with the Flora and Fauna Management Plan, is to be undertaken as soon as practicable after disturbance.	Prevents sedimentation and erosion leading to a reduction in water quality and degradation of aquatic habitats in Ropes Creek.	Construction	

Table 6.6 Measures to be implemented to mitigate the impacts on biodiversity

Impact	Mitigation measure	Outcome	Timing	Responsibility
	Emergency response protocols and procedures for implementation in the event of a contaminant spill or leak to be clearly articulated in the Construction and Operational Environmental Management Plans.	Prevents pollution of waterways.	Pre-construction and construction	Goodman and Construction Contractor
	Spill kits to be located to allow for timely response to uncontained spills. Site inductions are to include a briefing on the use of spill kits.	Prevents pollution of waterways.	Pre-construction and construction	Goodman and Construction Contractor
	Bio-retention installed in base of channels and swales to capture and store stormwater consisting of bio-filtration layers, planting and subsoil collection and drainage.	Reduces impacts from altered hydrological regimes leading to an increase in impervious surface such as changes in runoff and infiltration, redirection of flows.	Construction	Construction Contractor
Vegetation removal or disturbance	Clearly identifying sensitive areas ('no-go areas') which cannot be impacted by construction and managing clearing such that clearing activities are constrained to these approved areas only.	Prevention of over clearing of vegetation	Pre-construction and construction	Construction Contractor
	Site inductions are to include a briefing regarding the local threatened of the site and protocols to be undertaken if they are encountered.	Prevention of impacts to threatened species	Construction and operation	Goodman and Construction Contractor
Weed invasion and spread	Management of weeds in and adjacent to cleared areas will occur in accordance with the FFMP CEMP and OEMP. This plan would include details relating to the monitoring, management and where	Prevention of weed establishment and invasion	Pre-construction, construction and operation	Goodman and Construction Contractor

Table 6.6 Measures to be implemented to mitigate the impacts on biodiversity

Impact	Mitigation measure	Outcome	Timing	Responsibility
	necessary eradication of weeds, disposal of green waste, and vehicle/plant weed wash down protocols if required.			
	Management of noxious weeds is to be undertaken in accordance with the Noxious Weeds Act 1993.	Prevention of weed establishment and invasion	Pre-construction and construction	Goodman and Construction Contractor
	Equipment used for treating weed infestation will be cleaned prior to moving to a new area within the development site to minimise the likelihood of transferring any plant material and soil.	Prevention of weed establishment and invasion	Pre-construction and construction	Goodman and Construction Contractor
	Soil stripped and stockpiled from areas containing known weed infestations are to be stored on cleared land at least 40 m from native vegetation.	Prevention of weed establishment and invasion	Construction	Construction Contractor
Impacts to fauna and fauna habitat	Fauna microhabitat such as hollow logs should be removed from areas to be cleared and relocated to the proposed Oakdale Onsite BioBank Site in the presence of an ecologist.	Retaining fauna habitat resources	Pre-construction and construction	Construction Contractor
	A nest box management strategy would be prepared prior to clearing of hollow bearing trees. The strategy would inform the installation of nest boxes in retained native vegetation in the riparian corridor of the proposed Oakdale Onsite BioBank	Replaces lost hollow resources in the landscape	Pre-construction, construction and operation	Construction Contractor

Table 6.6 Measures to be implemented to mitigate the impacts on biodiversity

Impact	Mitigation measure	Outcome	Timing	Responsibility
	Site and the on-going monitoring and maintenance of nest boxes through the construction and operational phases.			
	High visibility plastic fencing is to be installed to clearly define the limits of the works area.	Prevents disturbance or over clearing of fauna habitat and native vegetation outside the construction area	Construction	Construction Contractor
	Undertake a pre-start-up check for sheltering native fauna of all infrastructure, plant and equipment and/or during relocation of stored construction materials.	Prevents fauna injury/mortality	Construction	Construction Contractor
	Undertake a two-stage approach to clearing: • Remove non-hollow bearing trees at least 48 hours before habitat trees are removed. • Hollow bearing trees are to be knocked with an excavator bucket or other machinery to encourage fauna to evacuate the tree immediately prior to felling. • Felled trees must be left for a short period of time on the ground to give any fauna trapped in the trees an opportunity to escape before further	Prevents fauna injury/mortality	Construction	Construction Contractor

Table 6.6 Measures to be implemented to mitigate the impacts on biodiversity

Impact	Mitigation measure	Outcome	Timing	Responsibility
	processing of the trees. • Felled hollow bearing trees must be inspected by an ecologist as soon as possible (not longer than 2 hours after felling).			
	Site inductions are to include a briefing regarding the local fauna of the site and protocols to be undertaken if fauna are encountered.	Prevents fauna injury/mortality	Construction	Construction Contractor
	If any animal is injured, contact the relevant local wildlife rescue agency (e.g. WIRES) and/or veterinary surgery as soon as practical. Until the animal can be cared for by a suitably qualified animal handler, if possible minimise stress to the animal and reduce the risk of further injury by: • Handling fauna with care and as little as possible. • Covering larger animals with a towel or blanket and placing in a large cardboard box. • Placing small animals in a cotton bag, tied at the top	Prevents fauna injury/mortality	Pre-construction, construction and operation	Goodman and Construction Contractor

Table 6.6 Measures to be implemented to mitigate the impacts on biodiversity

Impact	Mitigation measure	Outcome	Timing	Responsibility
	Keeping the animal in a quiet, warm, ventilated and dark location.			
	If any pits/trenches are to remain open overnight, they are to be securely covered, where reasonable and feasible. Alternatively, fauna ramps (logs or wooden planks) are to be installed to provide an escape for trapped fauna.	Prevents fauna injury/mortality	Construction	Construction Contractor
	The extent of vegetation clearing is to be clearly identified on construction plans.	Prevents impacts to fauna habitat and native vegetation outside the development footprint	Pre-construction	Goodman and Construction Contractor
	In circumstances where native vegetation or mature tree clearing is required outside of the biodiversity study area, an ecologist will inspect the proposed area and provide advice on the impact to flora and fauna and appropriate management.	Prevents impacts to fauna habitat and native vegetation outside the development footprint	Construction	Goodman and Construction Contractor
	Directional lighting will be used where lighting is required in construction areas.	Minimises disruption to fauna foraging, nesting or roosting behaviours	Construction	Construction Contractor
	Frequent maintenance of construction machinery and plant will be undertaken to minimise unnecessary noise.	Minimises disruption to fauna foraging, nesting or roosting behaviours	Construction	Construction Contractor

Table 6.6 Measures to be implemented to mitigate the impacts on biodiversity

Impact	Mitigation measure	Outcome	Timing	Responsibility
	Speed limits will be developed so as to minimise the potential for fauna to be struck by a vehicle within the construction areas. All vehicles and plant in operation during construction are to adhere to site rules relating to speed limits.	Prevents fauna injury/ mortality	Construction	Construction Contractor
Bushfire risk connectivity	Bushfire awareness included in staff induction and in toolbox talks pre-commencement.	Reduces risk of possible bushfire events impacting on biodiversity values.	Pre-construction and construction	Construction Contractor

6.4 Assessment of Impacts

6.4.1 Direct Impacts

Direct impacts relating to the development site include:

- Vegetation clearance; and
- Habitat removal.

The direct impacts associated with vegetation removal are discussed further within **Chapter 7**.

6.4.2 Indirect Impacts

Indirect impacts of the Project during construction and operation phase includes the following impacts:

- Sedimentation and run off;
- Noise, dust and light during construction;
- Impacts to adjacent native vegetation outside the development site;
- Weed encroachment;
- Accumulation of rubbish; and
- Feral pest encroachment.

6.5 Identification of Final Project Footprint

The layout for the Project has been refined through the consideration of a number of alternatives which have reduced the potential for adverse impacts to the environment, including specific impacts on threatened ecological communities. The final footprint is referred to as the development site and is shown in **Figure 1.3**.

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Chapter 7

Impact Summary

7.1 Introduction

The Project will involve direct impacts on native vegetation and fauna habitat, primarily within the construction phase. As the operation of the development will be relatively contained within the warehouse facilities, impacts of the operation phase will be minimal and confined to indirect impacts. The direct impacts of the construction phase are summarised below.

7.2 Summary of Impacts

A summary of the impacts of the Oakdale West Masterplan is shown in **Table 7.1.**

Table 7.1 Summary of Impacts

Likely Impact	Details	Extent/scale
Loss and fragmentation of native vegetation	Woodland and forest vegetation communities	5.44 ha of native vegetation (including 4.93 ha naturally occurring vegetation and 0.51 ha planted vegetation) will be cleared
Loss of threatened ecological communities	Cumberland Plain Woodland CEEC	2.20 ha (1.96 ha EPBC Act)
	River-flat Eucalypt Forest EEC	1.11 ha
	Swamp Oak Forest EEC	1.62 ha
Loss of threatened flora species and fragmentation of habitat	Juniper-leaved Grevillea (*Grevillea juniperina subsp. juniperina*)	None: The removal of 24 individuals occurs under separate approval for Fitzpatrick land
Loss of fauna habitat	Remnant woodland and forest and farm dams offer habitat for a diversity of reptiles, amphibians, birds and mammals. A total of 8.21 ha of fauna habitat will be removed comprising 4.93 ha of remnant forest and woodland, 0.51 ha of planted native vegetation and 2.77 ha of farm dams	8.21 ha of fauna habitat is proposed to be cleared
Fauna fragmentation	Removal of commuting habitat of fauna species	May reduce the capacity of some less mobile fauna to

Table 7.1 Summary of Impacts

Likely Impact	Details	Extent/scale
		move within and between patches of remaining habitat adjacent to the development site.
Fauna mortality	May result from clearance works, earthworks or collisions with vehicles or machinery	Most likely during clearance activities
Degradation of aquatic habitats	Caused by changes in run-off, infiltration, pollution and erosion. May influence downstream habitats.	Ropes Creek most susceptible during construction.
Impacts on fish passage	No important fish passage habitat is present within the development site	None
Edge effects and week invasion	Vehicles and plant may transport weed propagules into the development site. No new edges will be created as a result of the development.	Most likely during clearance activities
Alteration to air quality and noise environments	May impact upon the roosting, breeding and foraging activities of locally occurring fauna	Temporary and localised scale of impacts during construction.

7.2.1 Direct Loss of Native Vegetation

The proposal will unavoidably remove 4.93 ha of remnant native vegetation and 111.31 ha of exotic vegetation or planted vegetation that does not meet the determination of a PCT and does not require further assessment under the FBA. Native vegetation to be removed includes four PCTs conforming to three separate vegetation communities listed under the TSC Act as TECs. A summary of the areas directly impacted within the development site is shown in **Table 7.2**.

Table 7.2 Summary of areas directly impacted by the Project

Vegetation	TSC Act Status	EPBC Act Status)	Area to be Removed (ha)
HN526: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin	EEC	-	1.11
HN528: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin (TSC and EPBC Acts)	CEEC	CEEC	0.89

Table 7.2 Summary of areas directly impacted by the Project

Vegetation	TSC Act Status	EPBC Act Status)	Area to be Removed (ha)
HN528: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin (TSC Act only)	CEEC	-	0.14
HN529: Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (TSC and EPBC Acts)	CEEC	CEEC	1.07
HN529: Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion (TSC Act only)	CEEC	-	0.10
HN594: Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion	EEC	-	1.62
Revegetation Areas, Exotic grassland and Cleared Land	-	-	113.85
Total			**118.78**

TSC Act / EPBC Act Status: EEC = endangered ecological community; CEEC = critically endangered ecological community

7.2.2 Direct Loss of Fauna Habitat

Although the condition and nature of the habitats within the development site have been greatly altered by existing and historical land uses, it is evident that they still retain some value for the resident and visiting native fauna that were recorded in the development site. The regrowth areas generally lack many habitat features but areas of more mature habitat are also present in the development site that do retain valuable habitat features. Important fauna habitat features that will most likely be removed by the Project include:

- **Understorey vegetation** – loss of shelter and foraging habitat for amphibians, reptiles, small birds and terrestrial mammals;
- **Fallen logs, woody debris and leaf litter** – although limited within the development site, loss of shelter habitat for amphibians, reptiles and terrestrial mammals, and forage habitat for woodland bird species;
- **Hollow-bearing living trees and stags** – loss of habitat for a range of fauna species which may rely on them for shelter, breeding or roosting. Loss of mature remnant hollow-bearing trees will have important implications for threatened species such as reptiles, birds, arboreal mammals and micro bats;
- **Nectar-producing trees and shrubs** – loss of food resources for blossom-dependant birds, arboreal mammals and mega chiropteran bats (flying-foxes);

- **Shrubs and grasses** – loss of food for a range of passerine birds and herbivorous mammals;
- **Emotional (edge) communities** – loss of foraging habitat for many species, particularly birds such as raptors;
- **Ephemeral drainage lines** – loss of limited foraging, shelter and breeding habitat for amphibians, aquatic reptiles, wetland birds and aquatic mammals; and
- **Constructed farm dams with limited aquatic vegetation** – loss of foraging and breeding habitat for amphibians, aquatic reptiles and wetland birds.

Much of the impact of the Project occurs within revegetation areas and cleared land (exotic grassland) that offer little suitable fauna habitat and therefore it is considered that primary fauna habitat impact will be restricted to the 4.89 ha of woody native vegetation communities and to the scattered mature trees within the exotic grassland.

7.3 Thresholds for Assessing Unavoidable Impacts

Unavoidable impacts of the Project have been considered and a determination made of the assessment and offsetting requirements of such impacts. **Table 7.3** summarises these requirements which include:

- Impacts that require further consideration by consent authority;
- Impacts for which the assessor is required to determine an offset;
- Impacts for which the assessor is not required to determine an offset; and
- Impacts that do not require further assessment by the assessor.

Figure 7.1 shows the location of these areas within the development site. A discussion of each of these components is provided below. The Biodiversity Credit Report generated by the Project is provided in **Appendix D**.

Table 7.3 Thresholds for the assessment and offsetting of unavoidable impacts of the Project

Threshold	Biodiversity Value	Criteria	Applicable to the Project?
I. Impacts that require further consideration by consent authority	Landscape Features	Impacts that will substantially reduce the width of vegetation in the riparian buffer zone bordering rivers and streams 4th order or greater	No
		Impacts in state biodiversity links	No
		Impacts on important wetlands and their buffers	No
		Impacts in the buffer zone along estuaries	No
	Native Vegetation	Any impact on a CEEC (unless specifically excluded in the SEARs) because it is likely to: • cause the extinction of the CEEC from the IBRA subregion, or • significantly reduce the viability of the CEEC	**Yes** – The Project will remove 1.03 ha of HN528 and 1.17 ha of HN529 CEEC
		Any impact on an EEC nominated in the SEARs because it is likely to: • cause the extinction of the EEC from the IBRA subregion, or • significantly reduce the viability of the EEC	No
	Species and populations	Impacts on areas of land that the Minister for Environment has declared as critical habitat in accordance with section 46 of the TSC Act and which is listed on the Register of Critical Habitat in NSW	No
		Any impact on a critically endangered species (unless specifically excluded in the SEARs)	No
		Any impact on a threatened species or population nominated in the SEARs because it is likely to: • cause the extinction of a species or population from an IBRA subregion, or • significantly reduce the viability of a species or population	No
		Any impact on a threatened species or population that has not previously been recorded in	No

Table 7.3 Thresholds for the assessment and offsetting of unavoidable impacts of the Project

Threshold	Biodiversity Value	Criteria	Applicable to the Project?
		the IBRA subregion according to records in the NSW Wildlife Atlas	
II. Impacts for which the assessor is required to determine an offset	Landscape Features	Not applicable to the FBA	n/a
	Native Vegetation	Impacts on CEECs that are specifically excluded from requiring further consideration in the SEARS	No
		Impacts on PCTs that are EECs not specifically nominated as requiring further consideration in the SEARs	**Yes** – The Project will impact on two EECs, HN526 and HN594, that are not specifically nominated as requiring further consideration in the SEARs.
		Impacts on PCTs associated with threatened species habitat and which have a site value score ≥17	No
	Species and populations	Impacts on a critically endangered species that is specifically excluded from requiring further consideration in the SEARS	No
		Impacts on threatened species, populations and threatened species habitat not specifically nominated as requiring further consideration in the SEARs	No
		Impacts on threatened species habitat associated with a PCT and which has a site value score of ≥17	No
III. Impacts for which the assessor is not required to determine an offset	Landscape Features	Not applicable to the FBA	n/a
	Native Vegetation	Impacts on PCTs that: • have a site value score <17, or • are not identified as CEECs / EECs	No

Table 7.3 Thresholds for the assessment and offsetting of unavoidable impacts of the Project

Threshold	Biodiversity Value	Criteria	Applicable to the Project?
		Impacts on PCTs that are not associated with threatened species habitat and are not identified as CEECs / EECs	No
	Species and populations	Impacts on non-threatened species and populations that do not form part of a CEEC or EEC	**Yes** – The Project will impact on non-threatened species and populations that do not form part of a CEEC or EEC
		Impacts on threatened species habitat associated with a PCT within a vegetation zone with a site value score of <17	No
V. Impacts that do not require further assessment by the assessor	Landscape Features	Areas of land without native vegetation, unless the area of land requires assessment under the SEARs issued for the Major Project	No
	Native Vegetation	Areas of land without native vegetation, unless the area of land requires assessment under the SEARs issued for the Major Project	**Yes** – the Project will impact on 113.85 ha of land that does not confirm to a PCT
	Species and populations	Not applicable since all areas of land must be assessed for threatened species, even if they do not contain native vegetation	n/a

7.4 Impacts that Require Further Consideration

7.4.1 Landscape Features

No landscape features relevant to the Project required further consideration.

7.4.2 Native Vegetation

Impacts of the Project that fall into the threshold of impacts that require further consideration comprise the removal of a total 2.20 ha of CEEC which comprises 0.89 ha of HN528 and 1.07 ha of HN529 that are both TSC Act listed and EPBC Act listed CEEC of Cumberland Plain Woodland. The remaining 0.14 ha of HN528 and 0.10 ha of HN529 being listed CEEC under TSC Act only.

An assessment of impacts to this vegetation is provided below. No other impacts of the Project require further consideration.

i. Calculation of Credits

A summary of the vegetation zones comprising Cumberland Plain Woodland that fall within the threshold of requiring further consideration and their credit requirement is shown in **Table 7.4**. Vegetation Zones 4 and 7 are CEECs listed under both TSC Act and EPBC Act and Vegetation Zones 5, 6 and 8 are listed under the TSC Act only.

Table 7.4 Impacts that require further consideration

Vegetation Zone	PCT	Condition	Area (ha)	Current Site Value	Future Site Value	Credit Requirement
4	HN528	Moderate/Good	0.89	53.86	0.00	39
5	HN528	Moderate/Good_High	0.05	53.86	0.00	2
6	HN528	Moderate/Good_Medium	0.10	53.86	0.00	4
7	HN529	Moderate/Good	1.07	39.86	0.00	35
8	HN529	Moderate/Good_High	0.10	39.86	0.00	3
		TOTAL	**2.20**			**83**

ii. Further Information

(a) the area and condition of the CEEC or EEC to be impacted directly and indirectly by the proposed development

An area of 2.20 ha of Cumberland Plain Woodland will be removed. This will constitute removal of 100% of the occurrence of the CEEC from the development site.

(b) the extent and overall condition of the CEEC or EEC within an area of 1000 ha and then 10,000 ha surrounding the proposed development footprint

Within the 1,000 ha area around the development site, there are scattered occurrences of Cumberland Plain Woodland which total 116.97 ha with the majority of the vegetation immediately surrounding the development is highly fragmented. There are no intact occurrences of the CEEC within the locality with security of tenure such as National Parks, Reserves, or Priority Conservation Areas.

Within 10,000 ha of the development site, there are several intact occurrences of Cumberland Plain Woodland. Prospect Nature Reserve occurs approximately 5 km to the west of the development site. There are also three Priority Conservation Areas, Hoxton, Castlereagh, and Mulgoa, which occur within a 10,000 ha area of the development site. The 2013 update for the Cumberland Plain Vegetation Mapping (DECCW, 2007), has identified up to 743.54 ha of Cumberland Plain Woodland within 10,000 ha of the development site.

(c) an estimate of the extant area and overall condition of the CEEC or EEC remaining in the IBRA subregion after the impact of the proposed development has been taken into consideration

The proposed development will reduce the extent of the CEEC by 2.20 ha within the Cumberland IBRA subregion. The proposed development will not affect the condition of the CEEC beyond the development site. The remaining 741.38 ha of CEEC within 10,000ha of the development site is a more mature version of that found on the development site and is of much greater quality. Much of it is already maintained and managed within a voluntary conservation agreement that is present on the CEEC to the north of the development site.

(d) the development proposal's impact on:

(i) abiotic factors critical to the long-term survival of the CEEC or EEC. For example, will the impact lead to a reduction of groundwater levels or substantial alteration of surface water patterns?

(ii) characteristic and functionally important species through impacts such as, but not limited to, inappropriate fire/flooding regimes, removal of understorey species or harvesting of plants

(iii) the quality and integrity of an occurrence of the CEEC or EEC through threats and indirect impacts including, but not limited to, assisting invasive flora and fauna species to become established or causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants which may harm or inhibit growth of species in the CEEC or EEC.

The Project will not affect abiotic factors critical to the long term survival of the CEEC beyond the development site. Impacts of the Project such as groundwater or substantial alterations to surface water patterns will be confined to the development site.

The Project will remove 2.20 ha of the CEEC from the development site. The Project will not affect the CEEC beyond the development site as it will not affect fire/flooding regimes, will it impact on the community by removal of understorey species.

Cumberland Plain Woodland has previously been substantially cleared and or modified within the development site and adjoining land. The Project will not affect the integrity or occurrence of the CEEC, as the remaining CEEC does not occur nearby to the development site. The Project will not affect the CEEC within the development site through introduction of invasive flora and fauna species, as the entire extent of the CEEC within the development site will be removed.

(e) direct or indirect fragmentation and isolation of an important area of the CEEC or EEC

The occurrence of the CEEC within the development site is a small area (2.20 ha) of regrowth of the community that is fragmented across the development site and is only present in small, isolated stands of the community. The development site is not located within or nearby any National Parks or Priority Conservation Areas identified as important areas for the CEEC.

(f) the measures proposed to contribute to the recovery of the CEEC or EEC in the IBRA subregion.

The proponent of the Project proposes to acquire offsets in the form of BioBanking Credits commensurate to the exact credit requirement prescribed by the BBCC. A summary of the credit requirements for this CEEC are outlined in **Table 7.4**.

7.4.3 Species and Populations

No species and populations have been assessed as impacted by the Project, therefore none require further consideration.

Coordinate System: MGA Zone 56 (GDA 94)



Legend

- Development Site
- Additional North-South Link Road Area
- Area of unavoidable impact (Native vegetation)

N

Grid North

Scale: 1:9,339 @ A3 page
Date prepared: 31/03/2017

Image Source:
Image © Nearmap
(dated 11/02/2017)

Data Source:
Image © 2015
NSW Land and Property Management Authority,
SIX Viewer

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I:\...\15122\Figures\RP1_BAR\20170331\Figure 7.1. Location of Impact Thresholds

Figure 7.1. Location of impact thresholds

100 0 100 200 300 400 m

7.5 Impacts Requiring Offsetting

7.5.1 Landscape Features

No landscape features relevant to the Project required further consideration.

7.5.2 Native Vegetation

Native vegetation impacts of the Project that fall into the threshold of impacts that require offsetting comprise:

- The removal of 1.11 ha of HN526 which comprises the River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions EEC; and
- The removal of 1.62 ha of HN594 which comprises Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions EEC.

The offset requirement for HN526 and HN594 were calculated using the BBCC. A summary of the vegetation zone impacted, threatened species associated with that vegetation zone, loss landscape value, loss in site value, and the number of ecosystem credits required for the impacts is detailed in **Table 7.5**.

Table 7.5 Ecosystem Credit requirement of the Project

Zone	PCT	Associated TECs and/or Ecosystem Credit Species	Loss in Landscape Value	Loss in Site Value Score	Required Ecosystem Credits
1	HN526: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions Masked Owl	12.80	28.65	14
2	HN526: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions Yellow-bellied Sheath-tail Bat	12.80	28.65	5
3	HN526: Forest Red	River-Flat Eucalypt Forest	12.80	28.65	8

Table 7.5 Ecosystem Credit requirement of the Project

Zone	PCT	Associated TECs and/or Ecosystem Credit Species	Loss in Landscape Value	Loss in Site Value Score	Required Ecosystem Credits
	Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin	on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions Yellow-bellied Sheath-tail Bat			
9	HN594: Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions Masked Owl	12.80	65.22	84

7.5.3 Species and Populations

The removal of 24 Juniper-leaved Grevillea (*Grevillea juniperina* subsp. *juniperina*) would comprise a species impact that falls into the threshold of impacts that require offsetting under the FBA. However as the offsetting for the removal of these individuals forms part of the approvals for the development of the Fitzpatrick land, further offsetting is for this species is not considered within this BAR.

7.6 Impacts not Requiring Offsetting

7.6.1 Native Vegetation

All native vegetation relevant to the Project is required to be further assessed (see ***Section 7.4***) or requires an offset (see ***Section 7.5***).

7.6.2 Species and Populations

A number of non-threatened species and populations have been recorded within the development. In accordance with Section 9.4.2 of the FBA these species do not require offsetting.

7.7 Impacts that do not Require Further Assessment

The development site includes 113.85 ha of revegetated, exotic or cleared land that is not considered to comprise of a PCT or habitat for threatened species and populations. In accordance with Section 9.5.1.1 of the FBA this area of land does not require further assessment.

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Appendix A

Plot and Transect Data

Table A.1 Plot and Transect Data from the Development Site

Plot Name	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
PCT	HN526	HN594	HN594	HN594	HN528	HN529	HN529	HN529	Exotic	Exotic	Exotic	Exotic	HN528	Reveg	Exotic
Date	16-Oct-15	16-Oct-15	16-Oct-15	16-Oct-15	16-Oct-15	16-Oct-15	16-Oct-15	19-Oct-15	19-Oct-15	19-Oct-15	19-Oct-15	19-Oct-15	19-Oct-15	8-Apr-16	8-Apr-16
Easting	29674	295977	296992	297378	296320	295940	295895	296761	296073	296465	297214	296785	297046	297062	297090
Northing	6254609	6254396	6254280	6255300	6254107	6254931	6254622	6254107	6254796	6254369	6254751	6255036	6254490	6255368	6255553
Native Plant Species Richness	11	19	23	20	25	24	26	31	2	6	5	4	17	21	11
Over-storey Cover	28	30.5	20	18	68	62	72	19	0	0	0	0	33	0	0
Mid-storey Cover	21	0	8	5	0	0	0	4	0	0	0	0	27	5.5	0
Native Ground Cover (Grasses	0	78	54	94	0	0	0	100	6	18	0	0	70	9	11
Native Ground Cover (Shrubs)	0	0	18	20	21	18	23.3	46	0	0	0	0	0	3.5	1.5
Native Ground Cover (Other)	0	0	0	10	38	45.5	69	88	0	0	2	0	0	2	2
Exotic Plant Cover	27.3	24	32.6	20	0	0	0	10	33.3	33.3	100	100	23.3	31	47
Number of Trees with Hollows	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0
Over-storey Regeneration	0	1	1	1	1	1	1	1	0	0	0	0	0	1	0
Total Length of Fallen Logs	9	23	2	0	24	10	15.5	25	0	0	0	0	15	0	0

Appendix B

Flora Species List

Table B.1 Flora species list from development site

Form	Family *	Scientific Name	Common Name	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
1 - Trees	Casuarinaceae	*Casuarina glauca*	Swamp Oak		X	X	X											
1 - Trees	Myrtaceae	*Angophora subvelutina #*																
1 - Trees	Myrtaceae	*Eucalyptus amplifolia #*	Cabbage Gum															
1 - Trees	Myrtaceae	*Eucalyptus crebra*	Narrow-leaved Ironbark	X				X								X		
1 - Trees	Myrtaceae	*Eucalyptus eugenioides*	Thin-leaved Stringybark								X					X		
1 - Trees	Myrtaceae	*Eucalyptus molucanna*														X		
1 - Trees	Myrtaceae	*Eucalyptus tereticornis*	Forest Red Gum	X				X	X	X	X					X		
2 - Small Trees	Casuarinaceae	*Casuarina glauca*	Swamp Oak		X	X	X										X	
2-Small Trees	Fabaceae (Mimosoideae)	*Acacia decurrens*	Sydney Wattle														X	
2 - Small Trees	Fabaceae (Mimosoideae)	*Acacia parramattensis*	Parramatta Wattle								X							
2 - Small Trees	Myrtaceae	*Eucalyptus amplifolia #*	Cabbage Gum															
2 - Small Trees	Myrtaceae	*Eucalyptus crebra #*	Narrow-leaved Ironbark															
2 - Small Trees	Myrtaceae	*Eucalyptus eugenioides*	Thin-leaved Stringybark								X							
2 - Small Trees	Myrtaceae	*Eucalyptus tereticornis*	Forest Red Gum						X	X	X						X	

Table B.1 Flora species list from development site

Form	Family	*	Scientific Name	Common Name	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
2 - Small Trees	Myrtaceae		*Melaleuca styphelioides*	Prickly-leaved Tea Tree			X												
2 - Small Trees	Myrtaceae		*Melaleuca decora*		X														
3 - Shrubs	Asteraceae		*Ozothamnus diosmifolius*	Rice Flower								X							
3 - Shrubs	Brassicaceae		*Lepidium africanum* #																
3 - Shrubs	Casuarinaceae		*Casuarina glauca*	Swamp Oak			X	X										X	
3 - Shrubs	Dilleniaceae		*Hibbertia diffusa*	Wedge Guinea Flower								X							
3 - Shrubs	Fabaceae (Mimosoideae)		*Acacia decurrens*	Sydney Wattle														X	
3 - Shrubs	Fabaceae (Mimosoideae)		*Acacia falcata*	Sickle Wattle														X	
3 - Shrubs	Fabaceae (Mimosoideae)		*Acacia parramattensis*	Parramatta Wattle				X											
3 - Shrubs	Fabaceae (Faboideae)		*Dillwynia siebri*	Prickly Parrot-pea														X	
3 - Shrubs	Myrtaceae		*Callistemon pinifolius*	Pine-leaved Bottlebrush															X
3 - Shrubs	Myrtaceae		*Callistemon salignus*	Willow Bottlebrush														X	
3 - Shrubs	Myrtaceae		*Eucalyptus crebra* #	Narrow-leaved															

Table B.1 Flora species list from development site

Form	Family	*	Scientific Name	Common Name	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
				Ironbark															
3 - Shrubs	Myrtaceae		*Eucalyptus tereticornis*	Forest Red Gum							X	X						X	
3 - Shrubs	Myrtaceae		*Melaleuca linariifolia*	Flax-leaved Paperbark			X												
3 - Shrubs	Myrtaceae		*Melaleuca nodosa*	Prickly-leaved Paperbark															X
3 - Shrubs	Myrtaceae		*Melaleuca styphelioides*	Prickly-leaved Tea Tree			X												
3 - Shrubs	Pittosporaceae		*Bursaria spinosa*	Blackthorn			X	X	X		X	X					X	X	
3 - Shrubs	Rosaceae	*	*Rosa rubiginosa*	Sweet Bria			X												
3 - Shrubs	Solanaceae	*	*Cestrum parqui*	Green Cestrum			X		X										
3 - Shrubs	Solanaceae	*	*Lycium ferocissimum*	African Boxthorn			X	X	X	X							X		
4 - Ferns and Allies	Lindsaeaceae		*Cheilanthes distans #*	Bristly Cloak Fern															
4 - Ferns and Allies	Pteridaceae		*Cheilanthes sieberi*							X									
5 - Herbs (Dicots)	Acanthaceae		*Brunoniella australis*	Blue Trumpet		X	X	X	X		X	X							
5 - Herbs (Dicots)	Amaranthaceae		*Alternanthera denticulata*	Lesser Joyweed				X											
5 - Herbs (Dicots)	Amaranthaceae		*Alternanthera nanab #*	Hairy Joyweed															
5 - Herbs (Dicots)	Apiaceae	*	*Centella asiatica*	Indian Pennywort				X											
5 - Herbs (Dicots)	Apiaceae	*	*Cyclospermum leptophyllum*	Slender Celery	X	X	X		X	X	X		X	X		X	X		

Table B.1 Flora species list from development site

Form	Family	*	Scientific Name	Common Name	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
5 - Herbs (Dicots)	Apiaceae		*Daucus glochidiatus*	Native Carrot						X									
5 - Herbs (Dicots)	Asteraceae	*	*Bidens pilosa*	Cobblers Peg	X			X	X	X	X	X						X	
5 - Herbs (Dicots)	Asteraceae	*	*Bidens subalternans*	Greater Beggar's Ticks														X	
5 - Herbs (Dicots)	Asteraceae		*Chrysocephalum apiculatum #*	Common Everlasting															
5 - Herbs (Dicots)	Asteraceae	*	*Cirsium vulgare*	Spear Thistle	X	X	X	X	X	X	X					X	X	X	
5 - Herbs (Dicots)	Asteraceae	*	*Conyza bonariensis*	Flax-leaf Fleabane														X	
5 - Herbs (Dicots)	Asteraceae	*	*Conyza sumatrensis*	Tall Fleabane	X	X	X	X		X	X		X			X		X	X
5 - Herbs (Dicots)	Asteraceae		*Cotula australis*	Common Cotula	X	X			X	X	X						X		
5 - Herbs (Dicots)	Asteraceae	*	*Cotula coronopifolia*	Water Buttons	X		X												
5 - Herbs (Dicots)	Asteraceae		*Cymbonotus lawsonianus*	Bears-ear		X													
5 - Herbs (Dicots)	Asteraceae		*Eclipta platyglossa*				X												
5 - Herbs (Dicots)	Asteraceae		*Euchiton sphaericus*			X			X	X	X	X						X	
5 - Herbs (Dicots)	Asteraceae	*	*Facelis retusa*	Annual Trampweed													X		
5 - Herbs (Dicots)	Asteraceae	*	*Gamochaeta americana*	Cudweed		X	X						X			X		X	X
5 - Herbs (Dicots)	Asteraceae	*	*Gamochaeta calviceps*	Cudweed						X	X					X	X		
5 - Herbs (Dicots)	Asteraceae	*	*Gamochaeta purpurea #*	Purple Cudweed															
5 - Herbs (Dicots)	Asteraceae	*	*Hypochaeris microcephala*	White Flatweed	X	X	X	X	X	X	X			X		X	X	X	X

Table B.1 Flora species list from development site

Form	Family	*	Scientific Name	Common Name	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
5 - Herbs (Dicots)	Asteraceae	*	*Hypochaeris radicata*	Catsear	X	X		X	X	X	X	X	X	X	X		X		X
5 - Herbs (Dicots)	Asteraceae	*	*Lactuca saligna*	Willow-leaved Lettuce	X			X											
5 - Herbs (Dicots)	Asteraceae	*	*Lactuca serriola*	Prickly Lettuce						X									
5 - Herbs (Dicots)	Asteraceae	*	*Senecio madagascariensis*	Fireweed	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5 - Herbs (Dicots)	Asteraceae	*	*Senecio pterophorus*					X											
5 - Herbs (Dicots)	Asteraceae		*Sigesbeckia orientalis*				X												
5 - Herbs (Dicots)	Asteraceae	*	*Soliva sessilis*	Jo-jo		X				X		X		X		X			
5 - Herbs (Dicots)	Asteraceae	*	*Sonchus asper #*	Prickly Sowthistle															
5 - Herbs (Dicots)	Asteraceae	*	*Sonchus oleraceus*	Common Sowthistle	X	X	X	X	X		X						X		
5 - Herbs (Dicots)	Asteraceae	*	*Tagetes minuta*	Stinking Roger															
5 - Herbs (Dicots)	Asteraceae	*	*Taraxacum officinale*	Dandelion	X			X											
5 - Herbs (Dicots)	Asteraceae		*Triptilodiscus pygmaeus*	Common Sunray															
5 - Herbs (Dicots)	Asteraceae		*Vernonia cinerea #*																
5 - Herbs (Dicots)	Asteraceae		*Vittandina cuneata*	Fuzzweed														X	
5 - Herbs (Dicots)	Aizoaceae		*Tetragonia tetragonioides*	New Zealand Spinach				X											
5 - Herbs (Dicots)	Brassicaceae	*	*Brassica fruticulosa*	Twiggy Turnip															
5 - Herbs (Dicots)	Brassicaceae	*	*Brassica sp.*						X								X		

Table B.1 Flora species list from development site

Form	Family	*	Scientific Name	Common Name	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
5 - Herbs (Dicots)	Brassicaceae	*	*Lepidium africanum*						X								X		
5 - Herbs (Dicots)	Brassicaceae	*	*Lepidium bonariense*		X	X	X			X									
5 - Herbs (Dicots)	Brassicaceae	*	*Rorippa nasturtium-aquaticum*	Watercress			X												
5 - Herbs (Dicots)	Brassicaceae	*	*Sisymbrium officinale*	Hedge Mustard					X										
5 - Herbs (Dicots)	Campanulaceae	*	*Paronychia brasiliana*	Chilean Whitlow Wort	X				X	X							X		
5 - Herbs (Dicots)	Campanulaceae		*Wahlenbergia communis*	Tufted Bluebell								X							
5 - Herbs (Dicots)	Campanulaceae		*Wahlenbergia gracilis*	Sprawling Bluebell			X		X	X		X		X		X	X		
5 - Herbs (Dicots)	Caryophyllaceae	*	*Cerastium glomeratum* #	Mouse-ear Chickweed															
5 - Herbs (Dicots)	Caryophyllaceae	*	*Petrorhagia dubia*							X									
5 - Herbs (Dicots)	Caryophyllaceae	*	*Polycarpon tetraphyllum*	Four-leaved Allseed	X				X	X							X		
5 - Herbs (Dicots)	Caryophyllaceae	*	*Silene gallica var. gallica*						X										
5 - Herbs (Dicots)	Caryophyllaceae	*	*Spergularia bocconei* #	Bocconi's Sand-spurrey															
5 - Herbs (Dicots)	Caryophyllaceae	*	*Spergularia levis*		X														
5 - Herbs (Dicots)	Caryophyllaceae	*	*Stellaria media*	Common Chickweed			X								X	X	X		
5 - Herbs (Dicots)	Chenopodiaceae	*	*Chenopodium album*	Fat Hen															

Table B.1 Flora species list from development site

Form	Family	*	Scientific Name	Common Name	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
5 - Herbs (Dicots)	Chenopodiaceae	*	*Chenopodium glaucum #*																
5 - Herbs (Dicots)	Chenopodiaceae	*	*Chenopodium murale*	Nettle-leaf Goosefoot	X														
5 - Herbs (Dicots)	Chenopodiaceae	*	*Einadia nutans #*	Climbing Saltbush															
5 - Herbs (Dicots)	Chenopodiaceae		*Einadia nutans subsp. nutans*	Climbing Saltbush	X	X	X			X									
5 - Herbs (Dicots)	Chenopodiaceae		*Einadia nutans subsp. linifolia*						X		X								
5 - Herbs (Dicots)	Chenopodiaceae		*Einadia polygonoides*									X							
5 - Herbs (Dicots)	Chenopodiaceae		*Einadia trigonos*	Fishweed					X			X					X		
5 - Herbs (Dicots)	Clusiaceae		*Hypericum gramineum*	Small St. John's Wort						X									
5 - Herbs (Dicots)	Convolvulaceae		*Dichondra repens*	Kidney Weed		X	X	X	X	X	X	X					X		
5 - Herbs (Dicots)	Fabaceae (Faboideae)		*Bossiaea prostrata*									X							
5 - Herbs (Dicots)	Fabaceae (Faboideae)	*	*Lotus uliginosus*	Birds-foot Trefoil	X	X	X			X	X		X	X	X	X	X		
5 - Herbs (Dicots)	Fabaceae (Faboideae)	*	*Medicago lupulina #*	Black Medic															
5 - Herbs (Dicots)	Fabaceae	*	*Medicago polymorpha #*	Burr Medic															

cumberland ecology

Table B.1 Flora species list from development site

Form	Family	*	Scientific Name	Common Name	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
	(Faboideae)																		
5 - Herbs (Dicots)	Fabaceae (Faboideae)	*	*Trifolium campestre*	Hop Clover											X	X			
5 - Herbs (Dicots)	Fabaceae (Faboideae)	*	*Trifolium dubium*	Yellow Suckling Clover									X						
5 - Herbs (Dicots)	Fabaceae (Faboideae)	*	*Trifolium repens #*	White Clover															
5 - Herbs (Dicots)	Fabaceae (Faboideae)	*	*Vicia sativa #*																
5 - Herbs (Dicots)	Gentianaceae	*	*Centaurium tenuiflorum*										X			X	X		
5 - Herbs (Dicots)	Geraniaceae		*Geranium solanderi*	Native Geranium					X								X		
5 - Herbs (Dicots)	Goodeniaceae		*Goodenia hederacea*	Forest Goodenia								X							
5 - Herbs (Dicots)	Juncaginaceae		*Triglochin procera*	Water Ribbons				X											
5 - Herbs (Dicots)	Lamiaceae		*Plectranthus parviflorus*	Cockspur Flower			X												
5 - Herbs (Dicots)	Lamiaceae		*Scutellaria humilis*	Dwarf Skullcap			X												
5 - Herbs (Dicots)	Linaceae	*	*Linum trigynum*	French Flax		X	X			X	X								
5 - Herbs (Dicots)	Lobeliaceae		*Pratia purpurascens*	Whiteroot			X	X			X	X							
5 - Herbs (Dicots)	Malvaceae	*	*Malva parviflora*	Small-flowered Mallow					X										
5 - Herbs (Dicots)	Malvaceae	*	*Modiola caroliniana*	Red-flowered		X	X	X	X		X	X							

Table B.1 Flora species list from development site

Form	Family	*	Scientific Name	Common Name	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
				Mallow															
5 - Herbs (Dicots)	Malvaceae	*	*Sida rhombifolia*	Paddy's Lucerne	X		X	X	X	X	X	X					X		
5 - Herbs (Dicots)	Myrsinaceae	*	*Anagallis arvensis*	Scarlet Pimpernel	X	X			X	X	X	X	X	X	X		X		
5 - Herbs (Dicots)	Myrtaceae		*Eucalyptus tereticornis*	Forest Red Gum						X									
5 - Herbs (Dicots)	Oleaceae	*	*Olea europaea subsp. Cuspidata*	African Olive				X											
5 - Herbs (Dicots)	Oxalidaceae		*Oxalis perennans*			X	X	X	X	X	X	X	X		X		X	X	
5 - Herbs (Dicots)	Phyllanthaceae		*Phyllanthus virgatus*							X	X								
5 - Herbs (Dicots)	Phyllanthaceae		*Poranthera microphylla*							X		X					X		
5 - Herbs (Dicots)	Plantaginaceae		*Plantago debilis*		X	X													
5 - Herbs (Dicots)	Plantaginaceae	*	*Plantago lanceolata*	Lamb's Tongue	X	X	X	X	X	X	X	X		X		X			
5 - Herbs (Dicots)	Plantaginaceae		*Veronica plebeia*	Trailing Speedwell							X	X					X		
5 - Herbs (Dicots)	Polygonaceae	*	*Polygonum aviculare*	Wireweed	X														
5 - Herbs (Dicots)	Polygonaceae	*	*Rumex crispus*	Curled Dock			X												
5 - Herbs (Dicots)	Polygonaceae	*	*Rumex brownii*	Swamp Dock	X		X		X										
5 - Herbs (Dicots)	Rubiaceae		*Asperula conferta*	Common Woodruff		X	X	X	X		X	X		X					
5 - Herbs (Dicots)	Rubiaceae		*Galium leptogonium*				X												
5 - Herbs (Dicots)	Rubiaceae		*Opercularia diphylla*									X							
5 - Herbs (Dicots)	Rubiaceae	*	*Sherardia arvensis*	Field Madder			X												

Table B.1 Flora species list from development site

Form	Family	*	Scientific Name	Common Name	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
5 - Herbs (Dicots)	Scrophulariaceae		*Eremophila debilis*	Winter Apple							X								
5 - Herbs (Dicots)	Solanaceae	*	*Solanum americanum*	Glossy Nightshade			X			X									
5 - Herbs (Dicots)	Solanaceae	*	*Solanum linnaeanum*	Apple of Sodom		X	X	X	X	X	X	X					X		
5 - Herbs (Dicots)	Solanaceae		*Solanum prinophyllum*	Forest Nightshade		X	X	X	X	X	X								
5 - Herbs (Dicots)	Solanaceae	*	*Solanum pseudocapsicum*	Madeira Winter			X	X	X										
5 - Herbs (Dicots)	Solanaceae	*	*Solanum sisymbriifolium*	Sticky Nightshade														X	
5 - Herbs (Dicots)	Stackhousiaceae		*Stackhousia viminea*	Slender Stackhousia								X							
6 - Herbs (Monocots - Grasses)	Poaceae		*Aristida ramosa*	Purple Wiregrass		X			X	X	X	X	X	X			X	X	
6 - Herbs (Monocots - Grasses)	Poaceae		*Aristida vagans*	Threeawn Speargrass													X	X	
6 - Herbs (Monocots - Grasses)	Poaceae	*	*Axonopus fissifolius*	Narrow-leafed Carpet Grass						X			X		X		X		X
6 - Herbs (Monocots - Grasses)	Poaceae	*	*Briza minor*	Shivery Grass											X	X	X		
6 - Herbs (Monocots - Grasses)	Poaceae	*	*Briza subaristata*			X	X	X	X	X	X	X	X	X	X	X	X		X
6 - Herbs (Monocots - Grasses)	Poaceae		*Bothriochloa decipiens*	Red Grass														X	X

Table B.1 Flora species list from development site

Form	Family	*	Scientific Name	Common Name	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
6 - Herbs (Monocots - Grasses)	Poaceae		*Bothriochloa macra*	Red Grass		X				X	X			X					X
6 - Herbs (Monocots - Grasses)	Poaceae	*	*Bromus catharticus*	Prairie Grass	X		X	X	X	X	X					X	X		
6 - Herbs (Monocots - Grasses)	Poaceae	*	*Chloris gayana*	Rhodes Grass	X	X		X						X				X	
6 - Herbs (Monocots - Grasses)	Poaceae		*Chloris ventricosa*	Plump Windmill Grass		X			X	X		X							
6 - Herbs (Monocots - Grasses)	Poaceae		*Cymbopogon refractus*	Barbed Wire Grass										X				X	
6 - Herbs (Monocots - Grasses)	Poaceae	*	*Cynodon dactylon*	Couch	X	X	X	X	X	X	X		X		X	X	X	X	X
6 - Herbs (Monocots - Grasses)	Poaceae		*Dichelachne micrantha*	Shorthair Plumegrass						X	X				X				
6 - Herbs (Monocots - Grasses)	Poaceae		*Echinopogon caespitosus*	Bushy Hedgehog-grass					X		X						X		
6 - Herbs (Monocots - Grasses)	Poaceae	*	*Ehrharta erecta*	Panic Veldtgrass			X		X		X								
6 - Herbs (Monocots - Grasses)	Poaceae		*Elymus scaber*						X										
6 - Herbs (Monocots -	Poaceae		*Eragrostis brownii*	Brown's Lovegrass														X	X

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Form	Family	*	Scientific Name	Common Name	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
Grasses)																			
6 - Herbs (Monocots - Grasses)	Poaceae	*	*Eragrostis curvula*	African Lovegrass				X		X			X	X		X	X	X	X
6 - Herbs (Monocots - Grasses)	Poaceae		*Eragrostis leptostachya*	Paddock Lovegrass					X		X	X					X		X
6 - Herbs (Monocots - Grasses)	Poaceae	*	*Hordeum leporinum*	Barley Grass												X			
6 - Herbs (Monocots - Grasses)	Poaceae		*Lachnagrostis filiformis*		X			X		X	X				X	X	X		
6 - Herbs (Monocots - Grasses)	Poaceae	*	*Lolium perenne*	Perennial Ryegrass	X				X										
6 - Herbs (Monocots - Grasses)	Poaceae		*Microlaena stipoides*	Weeping Grass	X	X	X	X	X	X	X	X					X	X	X
6 - Herbs (Monocots - Grasses)	Poaceae		*Oplismenus aemulus*	Australian Basket Grass			X	X											
6 - Herbs (Monocots - Grasses)	Poaceae		*Paspalidium distans*							X									
6 - Herbs (Monocots - Grasses)	Poaceae	*	*Paspalum dilatatum*	Paspalum	X	X	X	X		X		X	X	X	X	X	X		X
6 - Herbs (Monocots - Grasses)	Poaceae	*	*Poa annua*	Winter Grass											X				

Table B.1 Flora species list from development site

Form	Family	*	Scientific Name	Common Name	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
6 - Herbs (Monocots - Grasses)	Poaceae		*Rytidosperma bipartitum*	Wallaby Grass														X	
6 - Herbs (Monocots - Grasses)	Poaceae		*Rytidosperma fulvum*	Wallaby Grass					X		X								
6 - Herbs (Monocots - Grasses)	Poaceae		*Rytidosperma racemosum*						X										
6 - Herbs (Monocots - Grasses)	Poaceae	*	*Setaria parviflora*					X										X	X
6 - Herbs (Monocots - Grasses)	Poaceae	*	*Sporobolus africanus #*	Parramatta Grass															
6 - Herbs (Monocots - Grasses)	Poaceae		*Sporobolus creber*	Western Rat-tail Grass		X								X				X	X
6 - Herbs (Monocots - Grasses)	Poaceae		*Sporobolus elongatus #*	Slender Rat's Tail Grass															
6 - Herbs (Monocots - Grasses)	Poaceae		*Themeda triandra*	Kangaroo Grass								X						X	
6 - Herbs (Monocots - Grasses)	Poaceae	*	*Vulpia bromoides*	Squirrel Tail Fescue												X			
7 - Herbs (Monocots - Other)	Anthericaceae	*	*Arthropodium milleflorum #*	Pale Vanilla-lily															
7 - Herbs (Monocots -	Anthericaceae		*Arthropodium sp. B*							X									

Table B.1 Flora species list from development site

Form	Family	*	Scientific Name	Common Name	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
Other)																			
7 - Herbs (Monocots - Other)	Anthericaceae		*Dichopogon fimbriatus*	Nodding Chocolate Lily								X							
7 - Herbs (Monocots - Other)	Anthericaceae		*Tricoryne elatior*	Yellow Autumn-lily													X		
7 - Herbs (Monocots - Other)	Colchicaceae		*Wurmbea dioica subsp. dioica #*	Early Nancy															
7 - Herbs (Monocots - Other)	Cyperaceae		*Carex appressa #*	Tall Sedge															
7 - Herbs (Monocots - Other)	Cyperaceae		*Carex inversa*	Knob Sedge		X		X		X	X	X					X		X
7 - Herbs (Monocots - Other)	Cyperaceae	*	*Cyperus eragrostis*	Umbrella Sedge	X		X	X											
7 - Herbs (Monocots - Other)	Cyperaceae		*Cyperus tetraphyllus*				X												
7 - Herbs (Monocots - Other)	Cyperaceae		*Fimbristylis dichotoma*	Common Fringe-sedge														X	X
7 - Herbs (Monocots - Other)	Cyperaceae		*Isolepis cernua*	Nodding Club-rush											X				
7 - Herbs (Monocots - Other)	Iridaceae	*	*Romulea rosea*	Onion Grass									X	X	X				

Table B.1 Flora species list from development site

Form	Family	*	Scientific Name	Common Name	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
7 - Herbs (Monocots - Other)	Iridaceae	*	*Romulea rosea var. australis #*	Onion Grass															
7 - Herbs (Monocots - Other)	Iridaceae	*	*Sisyrinchium rosulatum*	Scourweed		X				X	X		X			X	X		
7 - Herbs (Monocots - Other)	Juncaceae	*	*Juncus acutus*	Sharp Rush			X	X											
7 - Herbs (Monocots - Other)	Juncaceae		*Juncus bufonius*	Toad Rush												X			
7 - Herbs (Monocots - Other)	Juncaceae		*Juncus subsecundus*												X				
7 - Herbs (Monocots - Other)	Juncaceae		*Juncus usitatus*		X			X			X					X	X		X
7 - Herbs (Monocots - Other)	Juncaceae		*Juncus planifolius*		X														
7 - Herbs (Monocots - Other)	Lomandraceae		*Lomandra filiformis*	Wattle Mat-rush					X										
7 - Herbs (Monocots - Other)	Lomandraceae		*Lomandra filiformis subsp. filiformis*									X							
7 - Herbs (Monocots - Other)	Lomandraceae		*Lomandra multiflora*	Many-flowered Mat-rush								X							

Table B.1 Flora species list from development site

Form	Family	*	Scientific Name	Common Name	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
7 - Herbs (Monocots - Other)	Phormiaceae		*Dianella longifolia*	Blueberry Lily								X							
7 - Herbs (Monocots - Other)	Phormiaceae		*Dianella longifolia var. longifolia #*																
8 - Herbs (Vines and Climbers)	Convolvulaceae		*Polymeria calycina*									X							
8 - Herbs (Vines and Climbers)	Fabaceae (Faboideae)		*Desmodium varians*	Slender Tick-trefoil							X	X							
8 - Herbs (Vines and Climbers)	Fabaceae (Faboideae)		*Glycine microphylla*	Small-leaf glycine		X	X	X		X	X	X					X		
8 - Herbs (Vines and Climbers)	Fabaceae (Faboideae)		*Glycine tabacina*			X		X		X	X	X							
8 - Herbs (Vines and Climbers)	Rosaceae	*	*Rubus fruticosus*	Blackberry				X							X	X	X		

 # Incidental record of species only

** denotes exotic species*

Appendix C

Fauna Species List

Table C.1 Fauna species list from the development site

Family	Species Name	Common Name	TSC Act Status	EPBC Act Status	Exotic
Aves					
Acanthiza	*Acanthiza nana*	Yellow Thornbill			
Accipitridae	*Aquila audax*	Wedge-tailed Eagle			
Acrocephalidae	*Acrocephalus australis*	Australian Reed-Warbler			
Anatidae	*Chenonetta jubata*	Australian Wood Duck			
Anatidae	*Anas castanea*	Chestnut Teal			
Anatidae	*Anas gracilis*	Grey Teal			
Anatidae	*Anas platyrhynchos*	Mallard			*
Anatidae	*Anas superciliosa*	Pacific Black Duck			
Anatidae	*Cygnus atratus*	Black Swan			
Ardeidae	*Ardea ibis*	Cattle Egret		Migratory	
Ardeidae	*Ardea intermedia*	Intermediate Egret			
Ardeidae	*Egretta novaehollandiae*	White-faced Heron			
Ardeidae	*Ardea pacifica*	White-necked Heron			
Artamidae	*Cracticus tibicen*	Australian Magpie			
Artamidae	*Artamus cyanopterus*	Dusky Woodswallow			
Artamidae	*Cracticus torquatus*	Grey Butcherbird			
Artamidae	*Cracticus nigrogularis*	Pied Butcherbird			
Artamidae	*Strepera graculina*	Pied Currawong			
Cacatuidae	*Eolophus roseicapillus*	Galah			
Cacatuidae	*Cacatua sanguinea*	Little Corella			
Cacatuidae	*Cacatua galerita*	Sulphur-crested Cockatoo			
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike			
Campephagidae	*Lalage sueurii*	White-winged Triller			
Columbidae	*Ocyphaps lophotes*	Crested Pigeon			
Corvidae	*Corvus coronoides*	Australian Raven			
Cuculidae	*Cuculus pallidus*	Pallid Cuckoo			
Cuculidae	*Scythrops novaehollandiae*	Channel-billed Cuckoo			
Estrildidae	*Neochmia temporalis*	Red-browed Finch			
Falconidae	*Falco cenchroides*	Nankeen Kestrel			

Table C.1 Fauna species list from the development site

Family	Species Name	Common Name	TSC Act Status	EPBC Act Status	Exotic
Hirundinidae	*Petrochelidon ariel*	Fairy Martin			
Hirundinidae	*Petrochelidon nigricans*	Tree Martin			
Hirundinidae	*Hirundo neoxena*	Welcome Swallow			
Maluridae	*Malurus cyaneus*	Superb Fairy-wren			
Meliphagidae	*Anthochaera carunculata*	Red Wattlebird			
Meliphagidae	*Manorina melanocephala*	Noisy Miner			
Monarchidae	*Grallina cyanoleuca*	Magpie-lark			
Motacillidae	*Anthus novaeseelandiae*	Australasian Pipit			
Oriolidae	*Oriolus sagittatus*	Olive-backed Oriole			
Pachycephalidae	*Pachycephala pectoralis*	Golden Whistler			
Pachycephalidae	*Pachycephala rufiventris*	Rufous Whistler			
Pardalotidae	*Pardalotus striatus*	Striated Pardalote			
Pelecanidae	*Pelecanus conspicillatus*	Australian Pelican			
Petroicidae	*Eopsaltria australis*	Eastern Yellow Robin			
Psittacidae	*Platycercus eximius*	Eastern Rosella			
Psittacidae	*Trichoglossus haematodus*	Rainbow Lorikeet			
Psittacidae	*Psephotus haematonotus*	Red-rumped Parrot			
Pycnonotidae	*Pycnonotus jocosus*	Red-whiskered Bulbul			*
Rallidae	*Gallinula tenebrosa*	Dusky Moorhen			
Rallidae	*Fulica atra*	Eurasian Coot			
Rallidae	*Porphyrio porphyrio*	Purple Swamphen			
Rhipiduridae	*Rhipidura leucophrys*	Willie Wagtail			
Sturnidae	*Sturnus tristis*	Common Myna			*
Sturnidae	*Sturnus vulgaris*	Common Starling			*
Tachybaptus	*Tachybaptus novaehollandiae*	Australasian Grebe			

Table C.1 Fauna species list from the development site

Family	Species Name	Common Name	TSC Act Status	EPBC Act Status	Exotic
Threskiornithidae	*Platalea regia*	Royal Spoonbill			
Mammalia					
Canidae	*Vulpes vulpes*	Fox			*
Macropodidae	*Macropus giganteus*	Eastern Grey Kangaroo			
Amphibia					
Hylidae	*Litoria peronii*	Peron's Tree Frog			
Hylidae	*Litoria fallax*	Eastern Dwarf Tree Frog			
Myobatrachidae	*Crinia signifera*	Common Eastern Froglet			
Myobatrachidae	*Limnodynastes peronii*	Brown-striped Frog			
Myobatrachidae	*Uperoleia laevigata*	Smooth Toadlet			
Reptilia					
Chelidae	*Chelodina longicollis*	Eastern Snake-necked Turtle			

Appendix D

Biodiversity Credit Report

Biodiversity credit report

This report identifies the number and type of biodiversity credits required for a major project.

Date of report: 31/03/2017 Time: 10:48:42AM Calculator version: v4.0

Major Project details

Proposal ID:	0057/2016/2408MP
Proposal name:	15122 - Oakdale West (V4=Updated Veg)
Proposal address:	PO Box 2474 Carlingford Court NSW 2118
Proponent name:	Cumberland Ecology
Proponent address:	PO Box 2474 Epping NSW 2121
Proponent phone:	0298681933
Assessor name:	David Robertson
Assessor address:	PO BOX 2474 Carlingford Court NSW 2118
Assessor phone:	02 9868 1933
Assessor accreditation:	0057

Summary of ecosystem credits required

Plant Community type	Area (ha)	Credits created
Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	1.11	27.40
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	1.04	45.54
Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	1.17	38.72
Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion	1.62	84.43
Total	4.94	196

Credit profiles

1. Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion, (HN528)

Number of ecosystem credits created	39
IBRA sub-region	Cumberland - Hawkesbury/Nepean

Offset options - Plant Community types	Offset options - IBRA sub-regions
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion, (HN528)	Cumberland - Hawkesbury/Nepean and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

2. Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion, (HN528)

Number of ecosystem credits created	7
IBRA sub-region	Cumberland - Hawkesbury/Nepean

Offset options - Plant Community types	Offset options - IBRA sub-regions
Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion, (HN528)	Cumberland - Hawkesbury/Nepean and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

3. Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion, (HN529)

Number of ecosystem credits created	35
IBRA sub-region	Cumberland - Hawkesbury/Nepean

Offset options - Plant Community types	Offset options - IBRA sub-regions
Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion, (HN529) Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion, (HN528)	Cumberland - Hawkesbury/Nepean and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

4. Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion, (HN529)

Number of ecosystem credits created	3
IBRA sub-region	Cumberland - Hawkesbury/Nepean

Offset options - Plant Community types	Offset options - IBRA sub-regions
Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion, (HN529) Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion, (HN528)	Cumberland - Hawkesbury/Nepean and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

5. Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion, (HN526)

Number of ecosystem credits created	14
IBRA sub-region	Cumberland - Hawkesbury/Nepean

Offset options - Plant Community types	Offset options - IBRA sub-regions
Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion, (HN526)	Cumberland - Hawkesbury/Nepean and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

6. Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion, (HN526)

Number of ecosystem credits created	13
IBRA sub-region	Cumberland - Hawkesbury/Nepean

Offset options - Plant Community types	Offset options - IBRA sub-regions
Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion, (HN526)	Cumberland - Hawkesbury/Nepean and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

7. Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion, (HN594)

Number of ecosystem credits created	84
IBRA sub-region	Cumberland - Hawkesbury/Nepean

Offset options - Plant Community types	Offset options - IBRA sub-regions
Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion, (HN594) Swamp Oak swamp forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion, (HN595)	Cumberland - Hawkesbury/Nepean and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

Appendix C. DoEE Notification

Notification of
REFERRAL DECISION AND DESIGNATED PROPONENT – controlled action

Oakdale West Estate commercial development, NSW (EPBC 2017/7952)

This decision is made under section 75 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

proposed action	The project seeks to facilitate the development of the Oakdale West precinct, 6 km east of Horsley Park, in western Sydney into a regional warehousing and distribution hub. Oakdale west represents the third stage of development within the broader Oakdale estate [See EPBC Act referral 2017/7952]
decision on proposed action	The proposed action is a controlled action. The project will require assessment and approval under the EPBC Act before it can proceed.
relevant controlling provisions	Listed threatened species and communities (sections 18 & 18A)
designated proponent	Goodman Property Services (Aust) Pty Limited ACN: 088 981 793
assessment approach	The project will be assessed under the assessment bilateral agreement with NSW.
Decision-maker	
Name and position	Kim Farrant Assistant Secretary Assessments (NSW, ACT) and Fuel Branch
Signature	
date of decision	31 August 2017

Oakdale West Estate

SSD 7348 Biodiversity Assessment Report – MOD 1

prepared for

Goodman Property Services (Aust.) Pty Ltd

SSD 7348 Biodiversity Assessment Report – MOD 1

prepared for

Goodman Property Services

(Aust.) Pty Ltd

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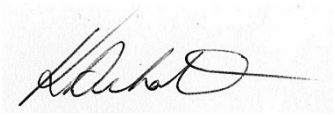
Kathryn Duchatel BSc. Env. CEnvP EIANZ #691 BAM Accreditation No.BAAS17054		01/02/2020

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Revision Schedule

Rev No	Date	Description	Issued to
1	30/04/2018	SSD 7348 RTS Submission 1	Goodman
2	26/07/2018	SSD 7348 RTS Submission 2	Goodman
3	01/10/2018	SSD 7348 RTS Submission 3	Goodman
4	22/07/2019	SSD 7348 MOD 1 draft for review	Goodman
5	05/08/2019	SSD 7348 MOD 1 for Submission	Goodman
6	02/10/2019	SSD 7348 MOD 1 for Submission – amended consent condition numbers	Goodman
7	04/11/2019	SSD 7348 MOD 1 for Submission – amended to address DPIE comments (25/10/2019)	Goodman
8	16/12/2019	SSD 7348 MOD 1 for Submission – amended to address DPIE comments (13/12/2019)	Goodman
9	01/02/2020	SSD 7348 MOD 1 FINAL – amended address RTS response to submissions (31/01/2020)	Goodman

Executive Summary

Goodman Property Services (Aust) Pty Ltd (Goodman) are seeking a modification (MOD 1) for the Oakdale West Estate State (Oakdale West). Oakdale West is a staged State significant development (SSD7348) for a warehousing and distribution hub, which includes estate-wide earthworks, infrastructure and services and the construction of the Western North South Link Road (WNSLR).

Consent for SSD7348 approves the removal of approximately 4.41 hectares (ha) of remnant native vegetation and approximately 3.0 ha of regenerating or planted (derived) native woodland. 173 ecosystem credits are to be retired to offset the removal of remnant native vegetation. A Biodiversity Offset Strategy prepared for Oakdale West detailed how this would be achieved, specifically through the establishment of an onsite Biodiversity Offset Area.

Since SSD7348 was assessed and approval granted, two key changes have impacted on specific consent conditions as follows:

1. Changes to the development footprint, which have resulted in the need to amend the areas of native vegetation being removed, and
2. The repeal of the *Threatened Species Conservation Act 1995* (TSC Act), which was replaced by the *Biodiversity Conservation Act 2016* (BC Act). This has impacted on the conditional consent for SSD7348 as follows:
    - Biodiversity assessments and offsetting strategies were completed under the NSW Framework for Biodiversity Assessment (FBA), which applied methods in place under the repealed TSC Act.
    - Transitional arrangements provisioned for under the *Biodiversity Conservation (Savings and Transitional) Regulation 2017* (BC Reg.) expired in February 2018. This resulting in the redundancy of the current SSD7348 Biodiversity Offset Strategy.

This Biodiversity Assessment Report (BAR) has been prepared to support SSD7348 MOD 1, which seeks to:

- Provide updated BAR diagrams and amended areas of native vegetation being removed as a result of the amended development footprint;
- Overcome the redundancy of the proposed Biodiversity Offsetting Strategy while avoiding lengthy delays associated with reassessment under new legislation; and
- Meet the objects of the *Water Management Act 2000* (WM Act) through the implementation of a Vegetation Management Plan (VMP). The VMP specifies how rehabilitation and restoration of a riparian corridor along Ropes Creek will be undertaken, which would otherwise have been restored under the redundant Biodiversity Offsetting Strategy.

Contents

Glossary / Abbreviations iv
1 Introduction 1
1.1 Background 1
1.2 Purpose 1
1.3 Consent conditions 2
2 Biodiversity Assessment 6
2.1 Landscape assessment 6
2.1.1 Assessment circles 6
2.1.2 Landscape features 6
2.2 Landscape value score 6
2.2.1 Percent Native Vegetation Cover 6
2.2.2 Connectivity Value 8
2.2.3 Patch Size 8
2.2.4 Loss in Landscape Value Score 8
2.3 Native Vegetation 8
3 Impacts of the Development 10
3.1 Summary of impacts 10
3.2 Impacts that require further consideration 15
3.2.1 Critically endangered ecological communities 15
3.2.2 Matters of National Environmental Significance 15
3.3 EPBC Act significance of impacts assessment 17
3.3.1 Overview 17
3.3.2 Significance of impacts 18
3.4 Ecosystem credit requirements 20
3.5 Bilateral Agreement 20
3.6 Impacts that do not require further assessment 24
4 Avoidance and Minimisation of Impacts 25
4.1 Avoidance of Impacts 25
4.1.1 Amendments made 25
4.2 Measures to Minimise Impacts 25
4.2.1 Amendments made 25
4.2.2 Flora and Fauna Management Plans 26
4.2.3 Vegetation Management Plan 26
5 Amendment Summary 28
6 References 29
Appendix 1. BAR écologique (2018) 30

Tables

Table 1-1. Consent Conditions 2
Table 2-1 Landscape features used in this assessment 6
Table 2-2 Summary of amended current and future percentage of native vegetation 6
Table 3-1 PCTs to be cleared 10
Table 3-2 Other native vegetation to be cleared 10
Table 3-3 Summary of impacts to PCTs that require further consideration 15
Table 3-4. Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest assessment under EPBC Act criteria 16
Table 3-5 Coastal Swamp Oak assessment under EPBC Act criteria 17
Table 3-6 Coastal Swamp Oak indicators that must be considered in assessment 18
Table 3-7 Summary of ecosystem credit requirements 22

Figures

Figure 1-1. Extent of development 5
Figure 2-1. Location map 7
Figure 2-2. Limiting connectivity widths 9
Figure 3-1. Extent of PCT clearing 11
Figure 3-2. Locations of changes to PCT clearing under MOD 1 12
Figure 3-3. Extent of additional clearing under MOD 1 13
Figure 3-4. Reduced clearing under MOD 1 14

Glossary / Abbreviations

Abbreviations	Expanded text
BAR	Biodiversity Assessment Report
BC Act	NSW Biodiversity Conservation Act 2016
BC Reg.	NSW Biodiversity Conservation (Savings and Transitional) Regulation 2017
BCT	NSW Biodiversity Conservation Trust
BOS	Biodiversity Offset Strategy
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
DoEE	Australian Department of Environment and Energy
DOI	NSW Department of Industry
DPIE	NSW Department of Planning Industry and Environment
EEC	Endangered Ecological Community
EES	NSW Department of Environment Energy and Science
EIS	Environmental Impact Statement
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999
FBA	Framework for Biodiversity Assessment
FFMP	Flora and Fauna Management Plan
MNES	Matters of National Environmental Significance
NRAR	NSW Natural Resource Access Regulator
OEH	NSW Office of Environment and Heritage
PCT	Plant Community Type
RTS	Response to Submissions
SSD	State Significant Development
TSC Act	NSW Threatened Species Conservation Act 1995
VMP	Vegetation Management Plan
WM Act	NSW Water Management Act 2000

1 Introduction

1.1 Background

Oakdale West Industrial Estate (Oakdale West) is a staged development for a warehousing and distribution hub, which includes estate-wide earthworks, infrastructure and services and the construction of the Western North South Link Road (WNSLR). Figure 1-1 shows the extent of the development.

Oakdale West is a State Significant Development (SSD7348) being developed by Goodman Property Services (Goodman). The SSD7348 development application was supported by the following documentation in response to SEARs and subsequent stakeholder submissions:

- Environmental Impact Statement (EIS) (Urbis, November 2017)
- Response to Submissions (RTS) (Urbis, May 2018)
- Supplementary RTS (Urbis, October 2018)
- Biodiversity Assessment Report (Cumberland Ecology 2017 and écologique 2018)
- Biodiversity Offset Strategy (Cumberland Ecology 2017 and écologique 2018)

Consent for SSD7348 approves the removal of approximately 4.41 hectares (ha) of remnant native vegetation and approximately 3.0 ha of regenerating or planted (derived) native woodland. 173 ecosystem credits are to be retired to offset the removal of native vegetation on the Site. The Biodiversity Offset Strategy detailed how this would be achieved, specifically through the establishment of an onsite Biodiversity Offset Area.

Since SSD7348 was assessed and approval granted, two key changes have impacted on specific consent conditions as follows:

1. Changes to the development footprint, which have resulted in the need to amend the areas of native vegetation being removed as assessed under the Biodiversity Assessment Report (écologique 2018), and
2. The *Threatened Species Conservation Act 1995* (TSC Act) being repealed and replaced by the *Biodiversity Conservation Act 2016* (BC Act). This has impacted on the conditional consent for SSD7348 as follows:
    - Biodiversity assessments and offsetting strategies were completed under the NSW Framework for Biodiversity Assessment (FBA), which applied methods in place under the repealed TSC Act
    - Transitional arrangements provisioned for under the *Biodiversity Conservation (Savings and Transitional) Regulation 2017* (BC Reg.) expired in February 2018. This resulting in the redundancy of the current SSD7348 Biodiversity Offset Strategy (écologique 2018)

1.2 Purpose

This Biodiversity Assessment Report has been prepared to support a modification to SSD7348 (MOD 1), which seeks to:

- Provide updated BAR diagrams and amended areas of native vegetation being removed as a result of the development
- Overcome the redundancy of the proposed Biodiversity Offsetting Strategy while avoiding lengthy delays associated with reassessment under new legislation
- Meet the objectives of the *Water Management Act 2000* (WM Act) through the implementation of a Vegetation Management Plan (VMP). The VMP specifies how rehabilitation and restoration of a riparian corridor along Ropes Creek will be undertaken, which would otherwise have been restored under the redundant Biodiversity Offsetting Strategy

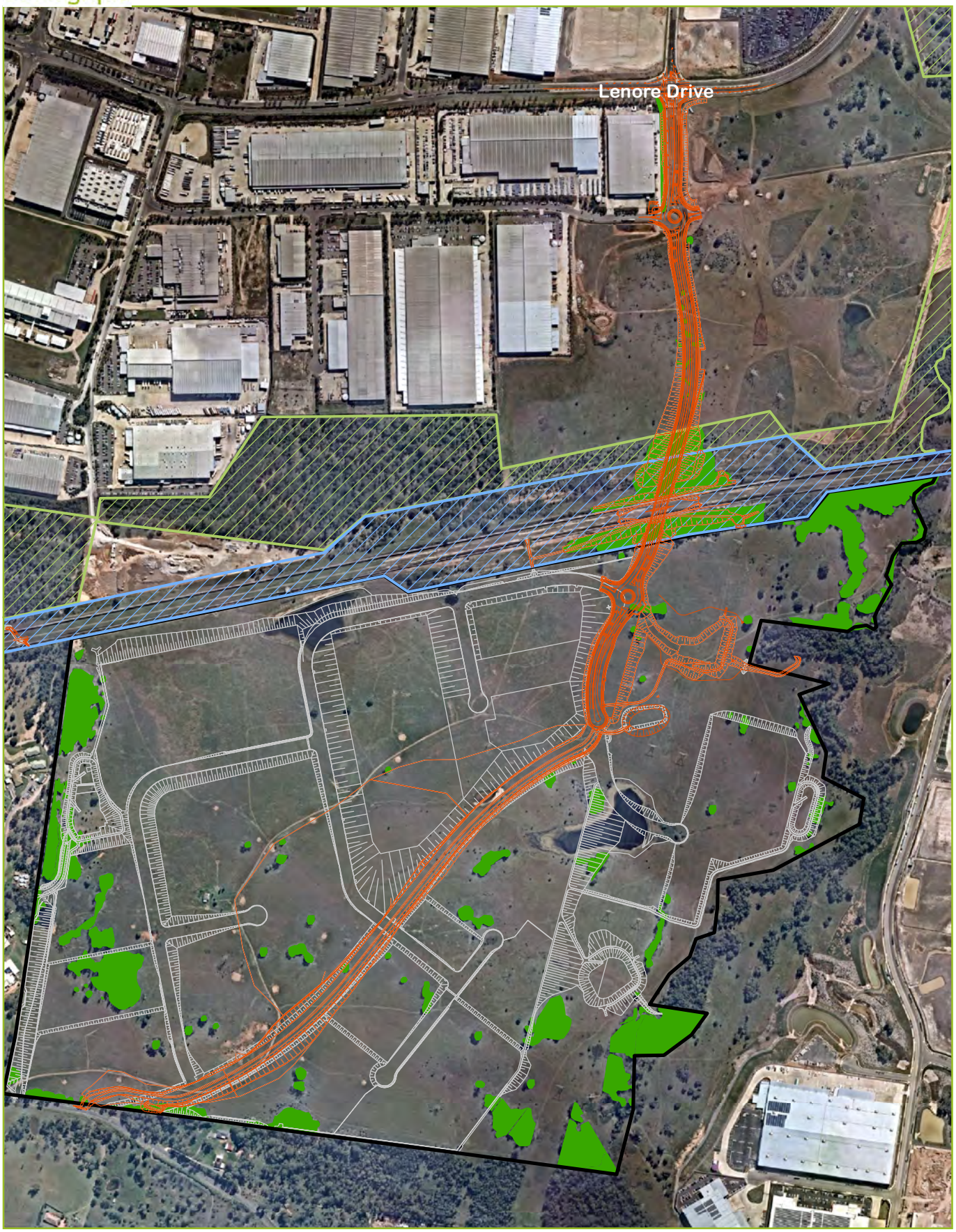
1.3 Consent conditions

Consent conditions for SSD7348, as relevant to biodiversity, are summarised in Table 1-1 along with commentary on whether the proposed MOD 1 seeks to amend each condition.

Table 1-1. Consent Conditions

Condition Requirement	Section/Comment
Flora and Fauna Management Plan	
D88. The Applicant must prepare a Flora and Fauna Management Plan (FFMP) for Stage 1, to the satisfaction of the Planning Secretary. The FFMP must form part of a Construction Environmental Management Plan (CEMP) in accordance with Condition D119 and must: • Be prepared by a suitably qualified and experienced person(s); • Include procedures for clearing marking and protecting the areas of vegetation to be retained on the Site, including the mature vegetation in the north-western corner and the Biodiversity Offset Area, established in accordance with Condition D91 adjacent to Ropes Creek; and • Detail the specific erosion and sediment controls to protect the retained vegetation.	A terrestrial and aquatic FFMP have been prepared as subplans to the CEMP for approval by the Planning Secretary. **MOD 1 does not affect this consent condition.**
D89. The Applicant must: • Not commence bulk earthworks until the FFMP required by Condition D88 is approved by the Planning Secretary; and • Implement the most recent version of the FFMP approved by the Planning Secretary for the duration of bulk earthworks and construction.	To be complied with **MOD 1 does not affect this consent condition.**
Offsets for Stage 1	
D90. Within 12 months of the date of this development consent, or as otherwise agreed with the Planning Secretary, the Applicant must retire 172 ecosystem credits to offset the removal of 4.41 hectares of native vegetation on the Site.	Amendment from172 to 173 ecosystem credits required in accordance with the biobanking credit report provided in Appendix A of the Biodiversity Assessment Report (écologique 2018). The area of native vegetation being cleared is marginally less in extent than 4.41 ha (i.e. 4.38 ha) with no impact on this condition.
D91. The Applicant shall establish a Biodiversity Offset Area on the Site, consistent with the area described in the RTS, in accordance with a Biodiversity Stewardship Agreement with the Biodiversity Conservation Trust.	Goodman seek to amend this consent condition as ecosystem credits required to offset the removal of native vegetation on the Site will either be purchased and retired from the market or assessed for reasonable equivalence and funds paid

Condition Requirement	Section/Comment
	directly to the BCT (in accordance with consent condition D90).
Biodiversity Management Action Plan	
D92. The Applicant must maintain the Biodiversity Offset Area on the Site in accordance with a Biodiversity Management Action Plan approved by the Biodiversity Conservation Trust (BCT).	Goodman seek to amend this consent condition due to the redundancy of the current Biodiversity Offset Strategy and potentially lengthy delays in reassessment under the BC Act. As a consequence, the creation of a Biodiversity Offset Area on the Site is not possible and therefore a Biodiversity Management Action Plan not required.
Offsets for WNSLR	
D93. Within 12 months of the date of this consent, or as otherwise agreed with the Planning Secretary, the Applicant must: • Offset 0.42ha of vegetation lost in the Erksine Park Biodiversity Corridor as a result of the WNSLR by carrying out planting within the area shown in the green edging on Figure 9 (Appendix 6 of consent conditions) • Plant the areas shown in the green edging on Figure 9 (Appendix 6 of consent conditions) with species similar to those identified for zone 4a, on the south-eastern side of Ropes Creek, in the Biodiversity Management Plan Erskine Park Employment Area (HLA-Envirosciences, 2 May 2006)	To be completed in consultation with the Planning Ministerial Corporation. **MOD 1 does not affect this consent condition.**
D94. The Applicant shall monitor and maintain the planting for a period of six months to ensure a minimum 85% survival rate of the planting.	
D95. The Applicant must notify the Planning Ministerial Corporation at least one month before the completion of planting to enable the Planning Ministerial Corporation to arrange ongoing maintenance.	
Snake Management Measures	
D96. Prior to construction of Stage 1, the Applicant must implement snake management measures to limit, to the extent practicable, movement of snakes from the Site into the adjacent school and retirement village on the western boundary of the Site.	Relevant snake management measures are detailed in the Oakdale West Terrestrial FFMP and CEMP. **MOD 1 does not affect this consent condition.**
The measures shall be detailed in the CEMP required by Condition D119 and shall include, but not be limited to, provision of alternative snake habitat on Site, fencing along the western boundary and installation of snake deterrents.	



Oakdale West Estate
WaterNSW
Erskine Park Biodiversity Corridor
WNSLR footprint
Native Vegetation

N

0 50 100 200 300 400 m

Oakdale West Estate BAR

Figure 1-1. Extent of Development

Coordinate System: MGA Zone 56 (GDA 94)
Image sources: Nearmap 7 April 2019

2 Biodiversity Assessment

The following assessment sections provide a summary of each component of the BAR, whether the proposed MOD 1 has resulted in any amendments and what these amendments entail. The current BAR (écologique 2018), with the Cumberland Ecology 2017 BAR as an appendix is provided in Appendix 1 of this document.

2.1 Landscape assessment

2.1.1 Assessment circles

No amendments made.

A 1,000 ha outer assessment circle and 100 ha inner assessment circle identify landscape features associated with the biodiversity assessment areas. The inner assessment circle was centred on the portion of the development area that will be most impacted upon by the development (Figure 2.1).

2.1.2 Landscape features

No amendments made:

The extent of the landscape features within the assessment circles and development site are summarised in Table 2-1 and shown in Figure 2.1.

Table 2-1 Landscape features used in this assessment

Landscape feature	Outer assessment circle	Inner assessment circle	Oakdale West development site
IBRA bio-region: Sydney Basin	100%	100%	100%
IBRA sub-region: Cumberland Plain	100%	100%	100%
NSW Mitchell landscape: Cumberland Plain	97%	98.1%	100%
NSW Mitchell landscape: Sydney Basin Diatremes	3%	2.9%	0%
Ropes Creek 3rd order stream, Ropes Creek tributary 1st and 2nd order streams	Present	Nil	Nil

2.2 Landscape value score

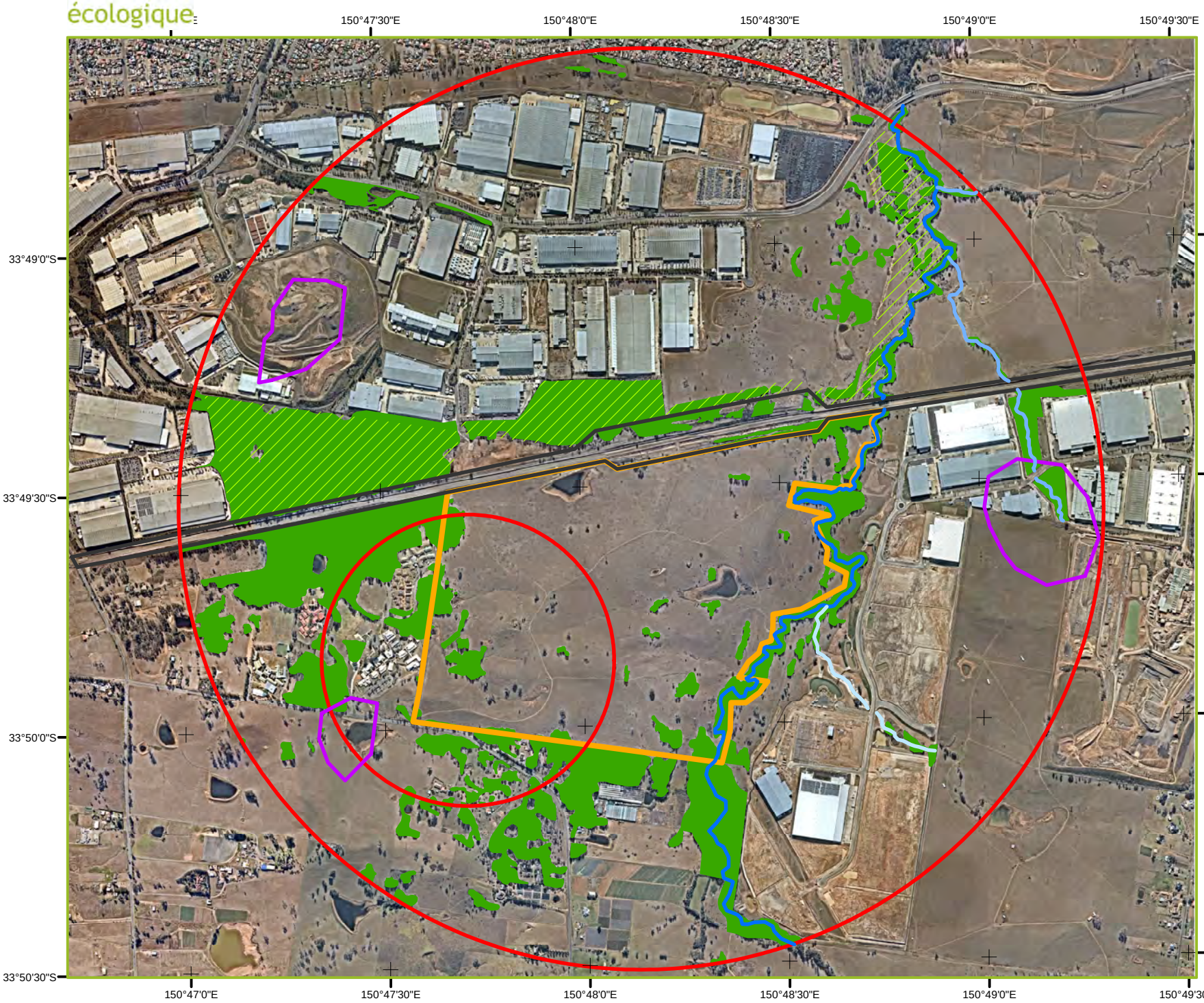
2.2.1 Percent Native Vegetation Cover

No amendments made:

Based on the values summarised in Table 2-2, the development has a native vegetation cover score of 1.25.

Table 2-2 Summary of amended current and future percentage of native vegetation

Assessment circle	Current extent of native vegetation		Future extent of native vegetation	
	Area (ha)	% Cover Class	Area (ha)	% Cover Class
Outer assessment circle	161.02	16-20	154.51	11-15
Inner assessment circle	20.72	16-20	17.23	16-20



Oakdale West Estate

Biodiversity Assessment Report

- Assessment Circles
- Oakdale West
- WaterNSW Land
- EP Biodiversity Corridor
- Native Vegetation
- Sydney Basin Diatremes
- Ropes Creek
- 2nd order tributary
- 1st order tributary

Figure 2-1. Location map

Coordinate System:
MGA Zone 56 (GDA 94)

Image sources:
Nearmap 9 September 2018
NSW (Mitchell) Landscapes - version 3.1

N

0 100 200 400 600 800 m

2.2.2 Connectivity Value

No amendments made:

- The most limiting width located within Oakdale West is that which runs along the western boundary of the development site, which is >5 and <30m before and after development
- Further connecting links are identified along the southern boundary within Oakdale West and along the eastern side of the construction development boundary.

All connecting links were considered when determining the condition of PCTs within each link before and after development. Figure 2-2 illustrates the location of limiting widths within the development construction footprint.

2.2.3 Patch Size

No amendments made:

For a site-based development, patch size was determined in accordance with Appendix 4 of the FBA. The development site occurs within the Cumberland Plain Mitchell Landscape which has a cleared native vegetation value of 91%.

The largest patch of native vegetation, of which a portion occurs within the development site, is 224.15 ha in size. Based on these variables, the patch size class is categorised as 'Extra large' which has a corresponding patch size score of 12.

2.2.4 Loss in Landscape Value Score

No amendment made:

The loss in landscape value score for the development site remains at 13.20.

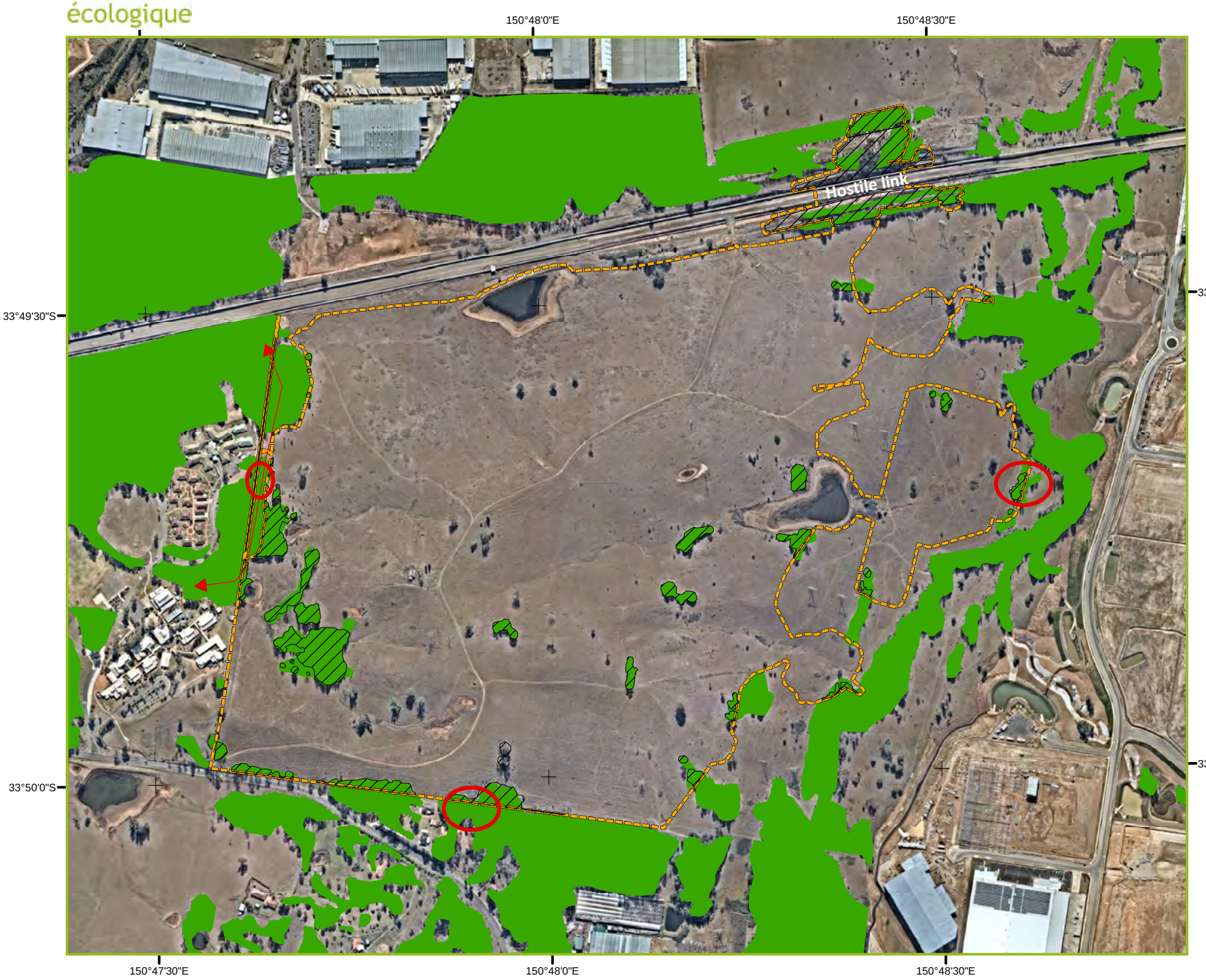
2.3 Native Vegetation

No amendments made:

Native vegetation within the Oakdale West development site was assessed through a review of existing data and collecting of floristic plot and transect plot data in accordance with the FBA.

Four PCTs were identified by Cumberland Ecology (2017):

1. PCT 835: Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin (HN526)
2. PCT 849: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin (HN549)
3. PCT 850: Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin (HN550)
4. PCT 1232: Swamp Oak floodplain forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion (HN594)



Oakdale West Estate

Biodiversity Assessment Report

Figure 2-2. Connectivity

Coordinate System:
MGA Zone 56 (GDA 94)

Image sources:
Nearmap 9 September 2018
NSW (Mitchell) Landscapes - version 3.1

3 Impacts of the Development

3.1 Summary of impacts

Amendments made:

- Redesign of bioretention basins has resulted in a small reduction native vegetation to be cleared adjacent to the Ropes Creek riparian corridor (specifically PCT 835 and PCT 1232)
- Redesign of internal embankments has resulted in both a reduction and increase in smaller remnants of Cumberland Plain Woodland to be cleared (PCT 849) with no net overall change

The development will unavoidably remove 4.38 ha of PCTs (decreased marginally from 4.41 ha) as shown in Table 3-1 and in Figure 3-1, Figure 3-2, Figure 3-3, and Figure 3-4).

Non-PCT native vegetation being removed for construction of the WNSLR remains unchanged (refer Table 3-2).

Table 3-1 PCTs to be cleared

Zone	PCT code	Condition	SSDA approved	MOD 1	Change
1	PCT 835	Mod_Good	0.49	0.46	-0.03
2	PCT 835	Mod_Good_High	0.28	0.28	0.00
3	PCT 835	Mod_Good_Medium	0.31	0.32	+0.01
4	PCT 849	Mod_Good	0.97	0.97	0.00
5	PCT 849	Mod_Good_High	0.05	0.05	0.00
6	PCT 849	Mod_Good_Medium	0.10	0.10	0.00
7	PCT 850	Mod_Good	0.84	0.84	0.00
8	PCT 850	Mod_Good_High	0.10	0.10	0.00
9	PCT 1232	Mod_Good	1.26	1.25	-0.01
		Total PCT Clearing	**4.41**	**4.38**	**-0.03**

Table 3-2 Other native vegetation to be cleared

Land ownership	Area (ha)
WaterNSW	1.34
WaterNSW	1.24
Total	**2.58**
Erskine Park Biodiversity Conservation Area	0.42
Total	**0.42**

In addition to the native vegetation summarised in Table 3-1 and Table 3-2 approximately 146.71 ha of exotic grassland and four farm dams will also be removed for the development of Oakdale West.



Oakdale West Estate

Biodiversity Assessment Report

Figure 3-1. Impacted Native Vegetation

Coordinate System:
MGA Zone 56 (GDA 94)

Image sources:
Nearmap 20 July 2019



Locations where SSD7348 and MOD 1 clearing differ

N

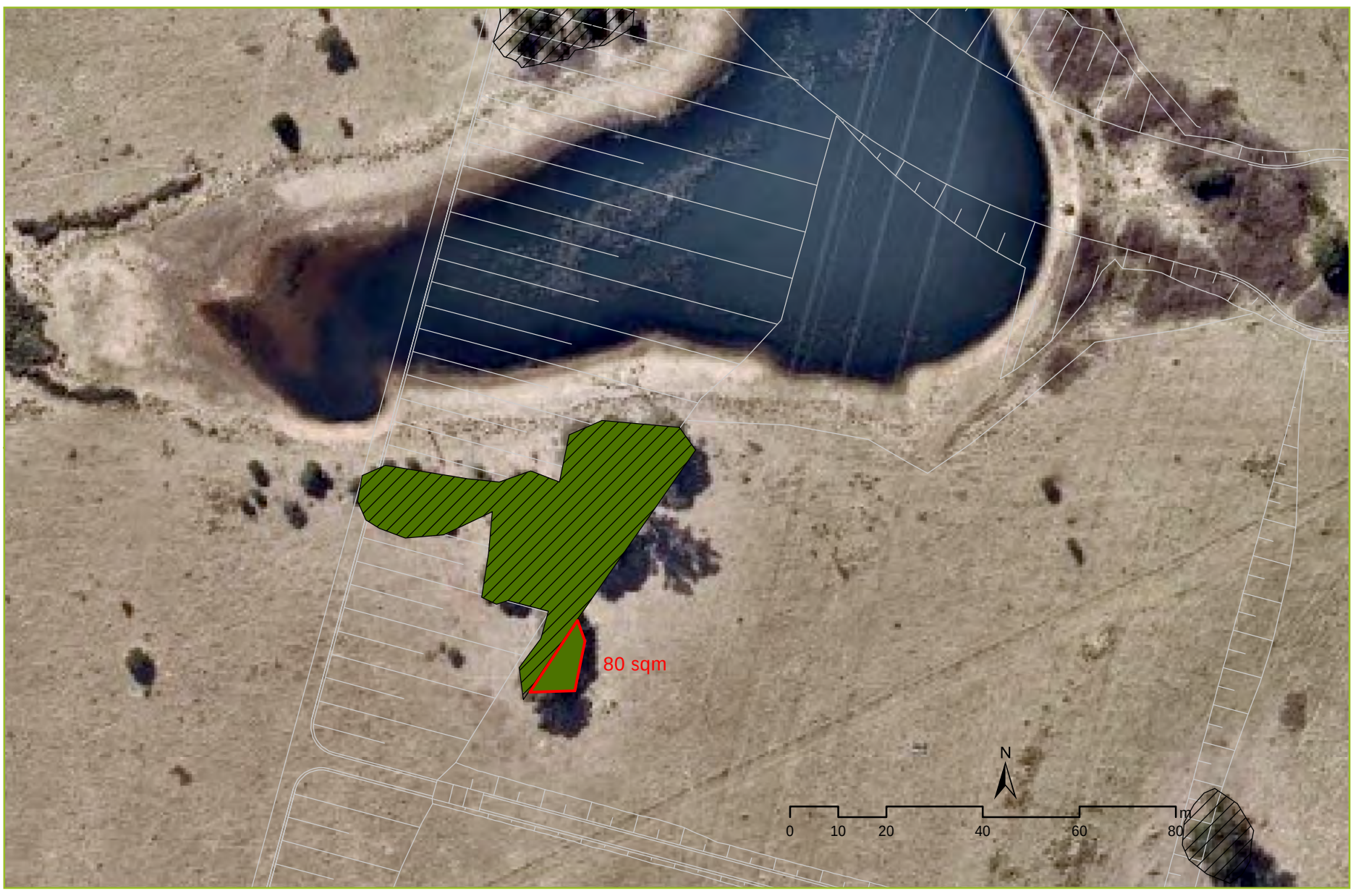
0 25 50 100 150 200 m

Oakdale West Estate

Figure 3.2 Locations where SSD7348 and MOD 1 clearing differ

Coordinate System: MGA Zone 56 (GDA 94)
Image sources: Nearmap 27 October 2019





Zone 9, PCT 1232 (SOFF) - MOD 1 clearing

Zone 3, PCT 835 (RFEF) - MOD 1 clearing

SSD7348 approved clearing

Oakdale West Estate

Figure 3.3. Additional clearing under MOD 1

Coordinate System: MGA Zone 56 (GDA 94)
Image sources: Nearmap 27 October 2019



Oakdale West Estate

Figure 3.4. Reduced areas of clearing under MOD 1

Coordinate System: MGA Zone 56 (GDA 94)
Image sources: Nearmap 27 October 2019

3.2 Impacts that require further consideration

3.2.1 Critically endangered ecological communities

In accordance with the FBA, impacts that require further consideration by the NSW Environment Energy and Science (EES) include any impact on a critically endangered ecological community (CEEC) if it is likely to:

- Cause the extinction of the CEEC from the IBRA subregion, or
- Significantly reduce the viability of the CEEC.

PCT 849 and PCT 850 both conform to the BC Act listed CEEC of Cumberland Plain Woodland in the Sydney Basin Bioregion.

Impacts of the development that fall into the threshold of impacts that require further consideration comprise the removal of two hectares of Cumberland Plain Woodland (Table 3-3). The impacts to PCT 849 and PCT 850 were assessed through consideration of the information provided in *Section 7.4* of the BAR (Cumberland Ecology 2017).

Table 3-3 Summary of impacts to PCTs that require further consideration

Zone	Code	Condition	BC Act	Area (ha)
4	PCT 849	Moderate/ Good	CEEC	0.97
5	PCT 849	Moderate/ Good_High	CEEC	0.05
6	PCT 849	Moderate/ Good_Medium	CEEC	0.10
		Subtotal		**1.12**
7	PCT 850	Moderate/ Good	CEEC	0.84
8	PCT 850	Moderate/ Good_High	CEEC	0.10
			Subtotal	**0.94**
			TOTAL	**2.06**

3.2.2 Matters of National Environmental Significance

The Australian Government is responsible for identifying and protecting matters of national environmental significance through the EPBC Act. These include nationally threatened ecological communities.

Two nationally threatened ecological communities occur within Oakdale West as follows:

1. Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest, and
2. Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community

3.2.2.1 Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest

As shown in Table 3-4, 0.97 ha of PCT 849 (Zone 4) and 0.84 ha of PCT 850 (Zone 7) meet the patch size / class category (i.e. patch size >0.5ha) of the EPBC Act listed Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest.

Table 3-4. Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest assessment under EPBC Act criteria

Zone	Code	Condition	Area (ha)	EPBC Act	Area (ha)
4	PCT 849	Moderate/ Good	0.97	CEEC	0.97
5	PCT 849	Moderate/ Good_High	0.05	-	
6	PCT 849	Moderate/ Good_Medium	0.10	-	
7	PCT 850	Moderate/ Good	0.84	CEEC	0.84
8	PCT 850	Moderate/ Good_High	0.10	-	
			2.06	-	**1.81**

As part of the SSD7348 development assessment, a referral was submitted to the Australian Department of Environment and Energy (DoEE) under the EPBC Act. It was determined that the removal of Zone 4, PCT 849 and Zone 7, PCT 850 constituted a controlled action under the EPBC Act. The DoEE further determined that this action could be assessed under the assessment bilateral agreement with NSW (refer EPBC 2017/7952 Appendix 1).

The EPBC Act listed Cumberland Plain Shale Woodland will be offset through the retirement of the 62 Biobanking credits (refer Section 3.5).

It should be noted that the referral made to DoEE under the EPBC Act referred to a marginally larger extent of the listed Cumberland Plain Shale Woodland (1.96 ha which has been decreased to 1.81 ha).

Amendments under this MOD 1 BAR do not affect Zone 4 or Zone 7 and therefore further consultation with DoEE is not required.

3.2.2.2 Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community

PCT 1232 (Swamp Oak floodplain forest fringing estuaries, Sydney Basin Bioregion and South East Corner Bioregion) conforms to the nationally threatened ecological community Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland.

This community was listed under the EPBC Act during the assessment and approval of SSD7348 and has not been considered previously in this regard.

Key diagnostic characteristics, condition thresholds, classes and categories have been provided by the Commonwealth Threatened Species Scientific Committee for the identification of whether a patch of vegetation meets the EPBC Act criteria.

Three patches of PCT 1232 were assessed under these guidelines. One patch was found to meet the EPBC Act criteria and requires further assessment of the significance of impacts (refer Table 3-5).

Table 3-5 Coastal Swamp Oak assessment under EPBC Act criteria

Patch	Patch size (ha)	Patch class	Vegetation quality classes
1	1.13	Small (at least 0.5 ha and <2 ha)	Does not meet vegetation quality class, due to: • Elevation (i.e. up to 50 m ASL, typically less than 20 m ASL) • Understorey is not predominantly native • Is not contiguous with another larger stand of native vegetation • Is not associated with a watercourse NOT EPBC Act listed SOFF
2	0.10	Does not meet patch class NOT EPBC Act listed SOFF	-
3	12.08	Large (at least 5 ha) **EPBC Act listed SOFF**	Moderate vegetation quality and condition class, due to: • Location immediately adjacent a watercourse (Ropes Creek) • Some native understorey • Non-native species comprise less than 80% of total understorey vegetation cover • AND transformer species* comprise less than 50% of total understorey vegetation cover Condition category C: a large or medium patch that meets key diagnostics and has some native understorey

* Transformer species etc.) are non-native plant species with the potential to permanently change the character, condition, form or nature of patches of the ecological community.

Patches within any of the Condition Categories A, B or C are subject to the referral, assessment, approval and compliance provisions under national environmental law, depending on the significance of impacts resulting from planned or actual activities.

3.3 EPBC Act significance of impacts assessment

3.3.1 Overview

Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community was listed as an endangered ecological community under the EPBC Act during the period time following the issuing of SEARS for SSD7348 and subsequent investigations undertaken for Oakdale West's masterplan and Stage 1 development application.

PCT 1232 is commensurate with the EPBC Act endangered Coastal Swamp Oak (*Casuarina glauca*) Forest of New South Wales and South East Queensland ecological community.

Two bioretention outlets that discharge to Ropes Creek had the potential to impact on PCT 1232. Consequently, field inspections and surveys were conducted to guide amendments made to the SSDA design to ensure that clearing of this vegetation community would not be required.

As part of pre-clearance surveys to identify habitat features within vegetation approved to be cleared under SSD7348, a small area of *Casuarina glauca* (Swamp Oak) regrowth was identified where an outlet to Ropes Creek from Bioretention Basin no. 5 (Basin 5) is intended.

The area of regrowth that would be impacted is an estimated 12.5m^2 and comprises several young Swamp Oak saplings that have suckered from adjacent more mature trees. The understorey is devoid of native shrubs and groundcover consisting of introduced pasture grasses and weeds (see photo plates 1 & 2).



Photo 1. Extent of saplings that would be removed viewed from west



Photo 2. Extent of saplings that would be removed viewed from east

The construction footprint at this location would be up to seven metres and comprise a four metre wide swale with rock rip rap. The original design location was amended to avoid the need to clear larger mature Swamp Oak trees (as can be seen in the background of photo plates 1 & 2).

In accordance with the Commonwealth Threatened Species Scientific Committee's guidance for compliance with the EPBC Act, the impacts of the proposed actions are assessed in Section 3.3.2.

3.3.2 Significance of impacts

In accordance with the Commonwealth Threatened Species Scientific Committee's thresholds and indicators, Patch no. 3 has been assessed as:

- A large patch size;
- Condition class 3; and
- Moderate vegetation quality and condition class.

The Commonwealth Threatened Species Scientific Committee specify a number of indicators that should be considered when assessing the impacts of proposed actions under national environment law, or when determining priorities for recovery, management and funding. Table 3-6 lists these indicators and provides a summary of how they relate to Patch no. 3 of PCT 1232.

Table 3-6 Coastal Swamp Oak indicators that must be considered in assessment

Indicator	Assessment
Larger area to boundary ratio – such patches are more resilient to edge effect disturbances such as weed invasion and human impacts.	The patch size is approximately 12 ha and with a perimeter of approximately 5.5km (2:1 are to boundary ratio)
Patches within or near to a larger native vegetation remnant and that contribute to a mosaic of vegetation types present at a site. Areas of mosaic native vegetation provide a	The patch is uniformly dominated by *Casuarina glauca* and a depauperate native understorey.

Indicator	Assessment
wider range of habitats that benefit flora and fauna diversity. Other patches are important as linkages among remnants, acting as 'stepping stones' of native remnants in the landscape and/or to help fauna to reach freshwater sources. Connectivity includes actual or potential connectivity to restoration works (e.g. native plantings).	It does provide a wildlife corridor to the south and north (although the latter is disrupted by the Warragamba pipelines). This continuity will be improved as a result of the adjacent development Oakdale South which is implementing a riparian restoration program along the eastern side of Ropes Creek. Similarly, as part of the Oakdale West MOD 1 a riparian restoration program will be implemented along the western side of Ropes Creek.
Patches that occur in areas where the ecological community has been most heavily cleared and degraded, or that are at the natural edge of its range, particularly where there is genetic distinction, or absence of some threats. These may include unique variants of the ecological community, e.g. with a unique flora and/or fauna composition, or a patch that contains flora or fauna that have largely declined across the broader ecological community or region.	The patch could easily be representative of the NSW endangered ecological community River-flat Eucalypt Forest (RFEF) but was identified by Cumberland Ecology (2017a) as Swamp Oak Floodplain Forest due to the dominance of *C.glauca*. The patch does not comprise an unique variant of this community or flora and fauna that have largely declined across the broader ecological community at this locality.
Patches in catchments or tidal areas with minimal modification to natural hydrology.	The patch extends across both sides of Ropes Creek. For most of its upstream length (approximately 8 kms) Ropes Creek flows under several roads including the M7 and through land historically cleared for agriculture and mostly devoid of riparian vegetation. The catchment is located within the Western Sydney Employment Area and surrounding rural residential areas. The landscape surrounding the creek and its tributaries contain over 50 farm dams, which will have impacted on the pre-European development (natural) hydrology of the creek.
Patches less likely to be subject to sea-level rise impacts and areas landward of patches that may provide important refuges from sea-level rise (through natural retreat and/or management intervention).	NOT APPLICABLE Patch is located inland (Western Sydney)

This assessment has concluded that the clearing required in this area would not constitute a significant impact on this is community. This conclusion is justified as follows:

- Patch no 3 has a moderately good area to boundary ratio (2:1);
- Patch no 3 does not comprise an unique variant of this community or flora and fauna that have largely declined across the broader ecological community at this locality;
- Patch no 3 is located within a highly modified catchment and subject to historical development and land use;

- The area of clearing is estimated at 12.5 m^2 representing 0.01% of the total area of the patch size;
- The saplings that would be removed have only recently established through suckering from larger adjacent trees over the past year, and the area is devoid of native shrub or groundcover species;
- The length along the creek edge that would be impacted is not considered to significantly interrupt the continuity of the community which is thinly distributed along this section of the creek's western bank;
- The rock rip rap will provide a habitat feature for reptiles and amphibians which is currently absent from this location; and
- The area is located within a biodiversity management area, which will be restored in accordance with the Oakdale West riparian VMP.

Based on the above conclusion, the impacts of clearing this small area of juvenile vegetation is not considered to require a referral to the Commonwealth Government under the EPBC Act.

3.4 Ecosystem credit requirements

Offset requirements were calculated under the former Biobanking Assessment Method (BBAM) and associated BioBanking Credit Calculator. Access to the former BioBanking Credit Calculator was not available at the time of preparing this document for submission. Hence this MOD 1 BAR has been prepared based on the following assumptions:

- The small differences in clearing of the various PCTs do not affect the ecosystem credits required to offset native vegetation removal;
- If the small differences in clearing of the various PCTs do affect the ecosystem credits required to offset native vegetation removal, it would result in a decrease in ecosystem credits required; and
- If required by the EES, an assessment under the former BioBanking Credit Calculator would be facilitated to test the above assumption.

Table 3-7 provides a summary of the ecosystem credit requirements approved under SSD 7348 but notated to show where the MOD 1 amendments apply. The existing and approved biobanking credit calculator estimate of ecosystem credits required is provided in Appendix 1.

173 ecosystem credits will be retired through one or more of the following methods:

(a) Purchase from the market and retire matching BioBanking credits (i.e. those calculated under the former BBAM) and/or

(b) Purchase from the market of like for like ecosystem credits calculated under the current biodiversity assessment method (BAM) and/or

(c) Payment of equivalent funds directly to the BCT.

In order to purchase ecosystem credits calculated under the current BAM and/or pay funds directly to the BCT an assessment of reasonable equivalence is required. An assessment of reasonable equivalence matches older Biobanking credits or credit obligations to the new Biodiversity Offsets Scheme credit numbers and classes.

3.5 Bilateral Agreement

The NSW Government has an Assessment Bilateral Agreement (the Agreement) with the Australian Government relating to environmental assessment under the EPBC Act. The current Agreement endorses the (now replaced) NSW Biodiversity Offsets Policy for Major Projects and the FBA as the basis for assessing and offsetting biodiversity impacts for most major development.

Actions that have been assessed under an accredited assessment approach under the EPBC Act and in the manner specified in the Agreement do not require a separate environmental impact assessment under the EPBC Act.

62 Biobanking credits are required to offset the clearing of EPBC Act listed threatened ecological communities. In accordance with the bilateral agreement, DPIE will be required to provide the DoEE with information regarding the nature of the offset and if relevant its location.

Goodman shall provide the DPIE with this information prior to retiring these credits for this purpose.

Table 3-7 Summary of ecosystem credit requirements

PC type code	Plant community type name	Management zone area (ha)	Loss in LandScape Value	Loss in site value score	EEC Offset Multiplier	Credits req for TS	TS with highest credit req	TS offset multiplier	Ecosystem credits required
PCT 835	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	0.49/0.46*	13.2	45.83	3	18	Powerful Owl	3	18
PCT 835	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	0.28	13.2	28.65	3	8	Powerful Owl	3	8
PCT 835	Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	0.31/0.32*	13.2	28.65	3	7	Powerful Owl	3	7
PCT 849	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	0.97	13.2	44.2	3	35	Powerful Owl	3	35
PCT 849	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	0.05	13.2	38.41	3	2	Powerful Owl	3	2
PCT 849	Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	0.1	13.2	38.41	3	3	Powerful Owl	3	3
PCT 850	Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion	0.84	13.2	38.41	3	27	Powerful Owl	3	27
PCT 850	Grey Box - Forest Red Gum grassy woodland on shale of the	0.1	13.2	38.41	3	3	Powerful Owl	3	3

PC type code	Plant community type name	Management zone area (ha)	Loss in LandScape Value	Loss in site value score	EEC Offset Multiplier	Credits req for TS	TS with highest credit req	TS offset multiplier	Ecosystem credits required
	southern Cumberland Plain, Sydney Basin Bioregion								
PCT 1232	Swamp Oak floodplain swamp forest, Sydney Basin Bioregion and South East Corner Bioregion	1.26/1.25*	13.2	68.12	3	69	Powerful Owl	3	69
									173

*area amended in MOD 1

3.6 Impacts that do not require further assessment

No amendments made:

In accordance with Section 9.5.1.1 of the FBA, areas that will be cleared for the development that that do not require further assessment include the following:

- Cleared land dominated by exotic pasture grasses and weeds
- Five farm dams
- Areas within WaterNSW land, which comprise depauperate shrubby regrowth of native vegetation that has colonised steep embankments of unconsolidated soils located either side of the Warragamba Pipelines
- Areas within the Erskine Park Biodiversity Conservation land, which was the subject of prior Ministerial approval for the development of land adjacent to WaterNSW land (owned and currently being developed by Fitzpartrick Investments).

Each of the above areas were determined to not provide habitat important to any threatened flora or fauna species.

4 Avoidance and Minimisation of Impacts

4.1 Avoidance of Impacts

4.1.1 Amendments made

Redesign of bioretention basins has resulted in a further reduction of impacts to native vegetation within the Ropes Creek riparian corridor.

Key avoidance strategies that remain unchanged include the following:

- Locating the development site on existing farmland;
- Avoiding most areas of native vegetation which will be left intact to the west of the site and within the riparian corridor of Ropes Creek to the east of the site;
- 95% of the vegetation within the development area comprises revegetation areas or exotic low diversity grassland;
- The remaining 5% does include EECs or CEECs, they mostly consist of remnant patches of fragmented, degraded and/or isolated vegetation. It is unlikely that the impacted areas of EECs or CEECs are viable in the future if left in their current state;
- There are no 4th order or higher streams, wetlands or estuaries within the locality. Indirect impacts to Ropes Creek (a 3rd order stream that will receive stormwater runoff from the development will be minimised through several bio-retention basins, swales and storm water management during construction.

4.2 Measures to Minimise Impacts

4.2.1 Amendments made

Measures to minimise impacts previously recommended by Cumberland Ecology (2017) included the preparation of a Biodiversity Management Plan to guide all facets of biodiversity management and mitigation for the proposed development.

MOD 1 seeks to remove now redundant Biodiversity Offset Strategy from consent conditions. As a consequence, the requirement to prepare a "Biodiversity Management Action Plan" for the previously proposed onsite Biodiversity Offset Area is also not required (refer consent condition D92 in Table 1-1).

Biodiversity management planning is now addressed in the Terrestrial and Aquatic flora and fauna management plans (refer consent condition D88 in Table 1-1 and Section 4.2.2) and the Vegetation Management Plan (refer Section 4.3) prepared for the Ropes Creek riparian corridor as part of MOD 1.

The remaining native vegetation areas that were to become on-site biodiversity offsetting areas (as proposed under the SSD7348 BOS) will be allowed to passively regenerate and be protected by way of the following:

- Removal of cattle, replacement of redundant fencing and installation of new fencing;
- Habitat placement (large woody debris), which is provisioned for in civil contracts for the development and detailed in the Oakdale West flora and fauna management plans – subplan to the Construction Environmental Management Plan (CEMP); and
- Targeted weed control of scheduled weeds in accordance with the Biosecurity Act 2015 and as listed in the Greater Sydney Regional Strategic Weed Management Plan 2017-2022.

All other measures proposed remain unchanged as described in *Tables 6.4, 6.5 and 6.6 of the BAR* (Cumberland Ecology 2017).

4.2.2 Flora and Fauna Management Plans

Three separate flora and fauna management plans (FFMPs) have been prepared in accordance with Condition D88 as subplans to the CEMP for approval by the Planning Secretary.

In accordance with D89 bulk earthworks shall not commence until the FFMPs are approved by the Planning Secretary and the most recent version of the FFMPs approved by the Planning Secretary are implemented (for the duration of bulk earthworks and construction).

The three FFMPs are as follows:

1. Oakdale West Terrestrial FFMP (version 6 04/11/2019) - addresses the removal of 3.8 ha of remnant native vegetation within the boundaries of Oakdale West;
2. Oakdale West Aquatic FFMP (version 5 04/11/2019) - addresses the decommissioning of four farm dams within the boundaries of Oakdale West; and
3. WNSLR FFMP (version 5 04/11/2019) – addresses the following:
    - removal of approximately 0.62 ha of remnant native vegetation within the boundaries of Oakdale West,
    - decommissioning of one small farm dam within the boundaries of Oakdale West,
    - clearing of approximately 2.58 ha of derived woodland within WaterNSW land, and
    - clearing of approximately 0.42 ha of derived woodland within the Erskine Park Biodiversity Conservation Area.

These FFMPs have been prepared to address the requirements of the SSD7348 consent conditions, relevant legislation, permits and approvals, which apply to the construction of the Oakdale West Estate and the WNSLR. These requirements will be met through implementing the procedures described in each FFMP, which include:

- Pre-clearance and construction strategies, which include:
    - Demarcation of remnant vegetation to the protected
    - Marking limits of vegetation clearing
    - Methods for vegetation being cleared that contains habitat
    - Site induction requirements
- Fauna rescue and relocation protocol;
- Fauna habitat creation (installation of snake refuge rock piles and large woody debris within biodiversity management areas);
- Weed and pathogen control;
- Unexpected finds protocol; and
- Monitoring and reporting strategies.

4.2.3 Vegetation Management Plan

The Oakdale West Estate VMP (écologique, 02/10/2019) addresses an area of approximately 4.2 ha which extends along the western side of Ropes Creek.

The specific objectives of this VMP align with those prescribed in the NSW Guidelines for vegetation management plans on waterfront land (DPIW July 2012) (the guidelines). The main objective being to provide a stable watercourse and riparian corridor which will emulate local native vegetation communities.

Specific issues that need to be addressed within this VMP include:

- Conserve and protect environmentally sensitive areas and biodiversity values;
- Restore and rehabilitate degraded bushland and areas of significant vegetation;
- Ensure the protection of threatened species, populations or ecological communities;
- Limit the impact of development upon existing native vegetation;
- Provide habitat connectivity and fauna corridors;
- Promote sustainable vegetation management;
- Undertake responsive site management and landscaping to ensure that bushland values are conserved; and
- Specify appropriate environmental protection works to enhance the ecological and bushland amenity value of the site.

Implementation of the VMP will extend across a two year (defects) timeframe followed by a three year maintenance period under the management of Goodman.

5 Amendment Summary

Amendments made to this BAR as a result of the proposed SSD7348 MOD 1 are summarised as follows:

- Areas of native vegetation that are proposed to be cleared have been reduced from 4.41 ha to 4.38 ha and comprise a net decrease in 0.03 ha. The proposed reduction has been assumed to not impact on the number of ecosystem credits that are required to be retired to offset the proposed native vegetation clearing (under Condition D90);
- Inclusion of an EPBC Act significance of impacts assessment of approximately 12.5 m^2 of PCT 1232 regrowth impacted by the development (Section 3.3);
- Inclusion of a discussion on the proposed approach to fulfil Condition D90, including assessment of reasonable equivalence (Section 3.4);
- Inclusion of a discussion on the bilateral agreement between the Commonwealth and NSW governments (Section 3.5);
- Figure 3-1, Table 3-1 and Table 3-7 have been amended to reflect the change in areas of native vegetation to be removed (as a result of the amended MOD 1 development footprint);
- Additional Figures 3.2, 3.3 and 3.4 have been provided to more clearly show the change in areas of native vegetation being removed; and
- Inclusion of summarises of the FFMPs (Section 4.2.2) and VMP (Section 4.2.3), which describes how the Site's biodiversity will be protected and managed.

6 References

Cumberland Ecology (2017) Oakdale West State Significant Development Application Biodiversity Assessment Report, prepared for Goodman Property Services (Aust.) Pty Ltd, March 2017.

Cumberland Ecology (2017) Oakdale West State Significant Development Application Biodiversity Offsetting Strategy (BOS), prepared for Goodman Property Services (Aust.) Pty Ltd, April 2017

écologique (2018) Oakdale West Estate Biodiversity Assessment Report Amended. Prepared for Goodman Property Services (Aust.) Pty Ltd, 1 October 2018

écologique (2018) Oakdale West Estate Biodiversity Offsetting Strategy Amended. Prepared for Goodman Property Services (Aust.) Pty Ltd, 2 October 2018

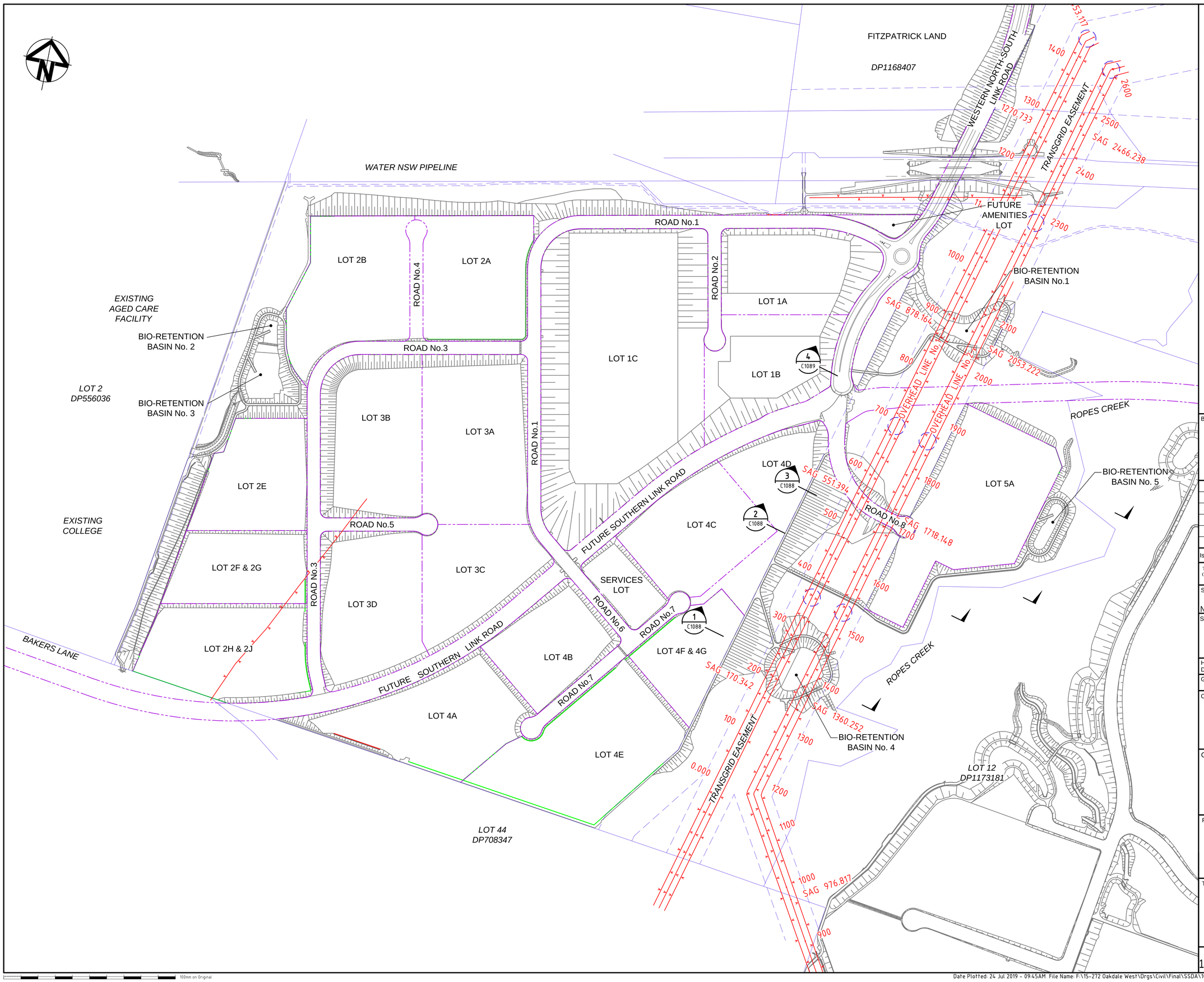
NSW Government (2014a). Framework for Biodiversity Assessment. NSW Biodiversity Offsets Policy for Major Projects. Office of Environment and Heritage for the NSW Government, Sydney.

NSW Government (2014b). NSW Biodiversity Offsets Policy for Major Projects. Office of Environment and Heritage for the NSW Government, Sydney.

Appendix 1. BAR écologique (2018)



Annexure I



LEGEND

EXISTING ELECTRICITY OVERHEAD

Bar Scales

0 50 100 150 200 250

1 : 3000 @ A1

Issue	Description	Date
A5	ISSUED FOR SSD APPROVAL MOD 1	24-07-19
A4	ISSUED FOR INFORMATION MOD 1	07-06-19
A3	ISSUED FOR SSD APPROVAL	21-09-18
A2	ISSUED FOR SSD APPROVAL	04-05-18
A1	ISSUED FOR SSD APPROVAL	14-03-17

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Status: MOD 1 APPROVAL
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A1

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		Designed	GB
Height Datum	AHD	Checked	AM
Grid	MGA	Approved	AM

Client: Goodman

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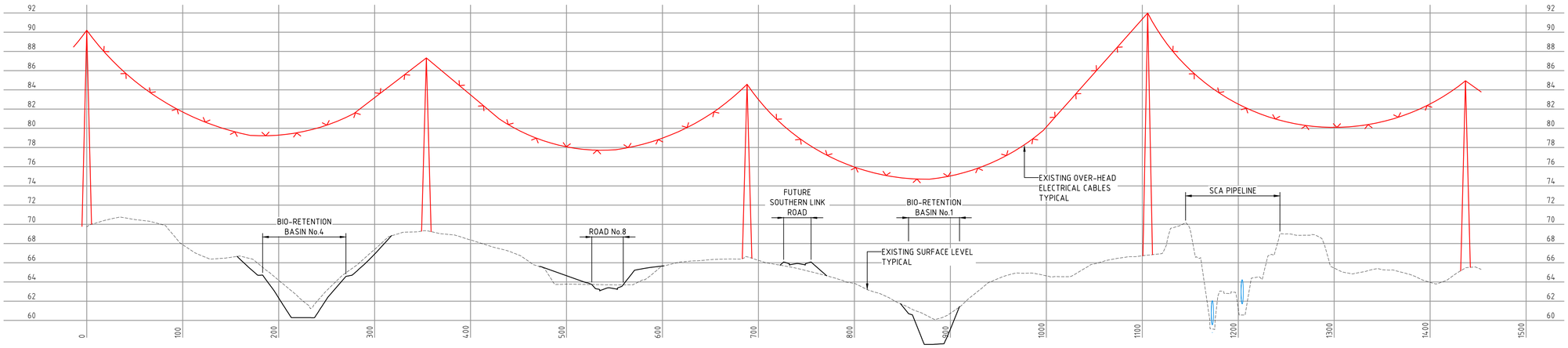
Project
PROPOSED INDUSTRIAL DEVELOPMENT
OAKDALE WEST

Title
EXISTING TRANSGRID OVERHEAD ELECTRICAL CABLES PLAN

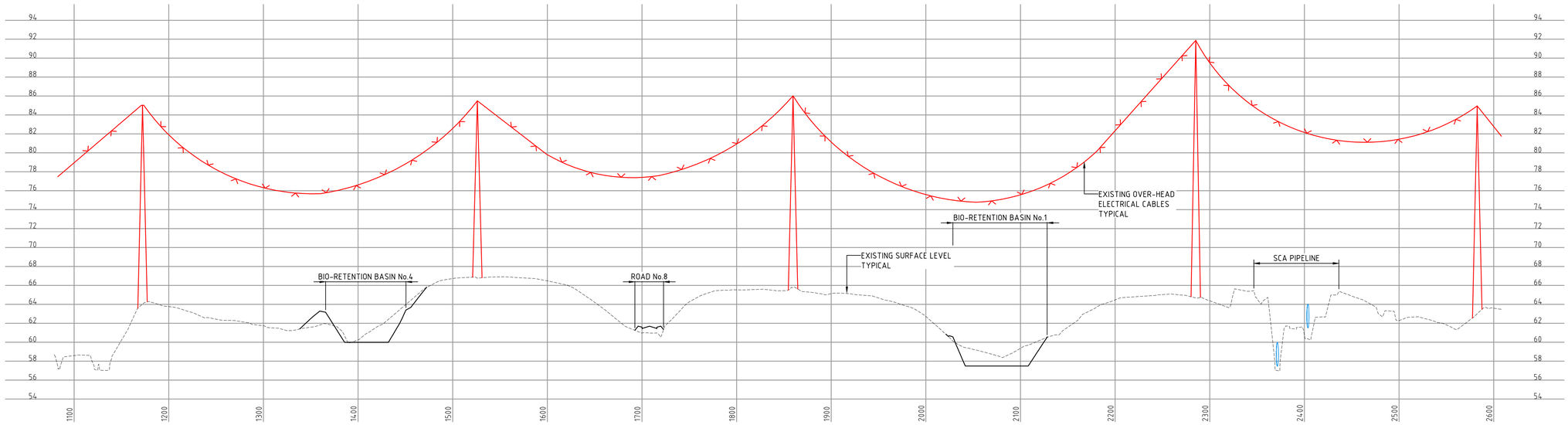
Drawing No.	Project No.	Issue
15-272-C1086	15-272	A5

100mm on Original



TRANSGRID OVERHEAD CABLE LINE No.1
LONGITUDINAL SECTION

1 : 250 VER
1 : 2500 HOR



TRANSGRID OVERHEAD CABLE LINE No.2
LONGITUDINAL SECTION

1 : 250 VER
1 : 2500 HOR

Bar Scales

0 5 10 15 20
1 : 250 @ A1 1 : 500 @ A3

0 50 100 150 200
1 : 2500 @ A1 1 : 5000 @ A3

Issue	Description	Date
A5	ISSUED FOR SSD APPROVAL MOD 1	24-07-19
A4	ISSUED FOR INFORMATION MOD 1	07-06-19
A3	ISSUED FOR SSD APPROVAL	21-09-18
A2	ISSUED FOR SSD APPROVAL	04-05-18
A1	ISSUED FOR SSD APPROVAL	14-03-17

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Status: MOD 1 APPROVAL
NOT TO BE USED FOR CONSTRUCTION — A1

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Grid	MGA	Approved	AM

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Project
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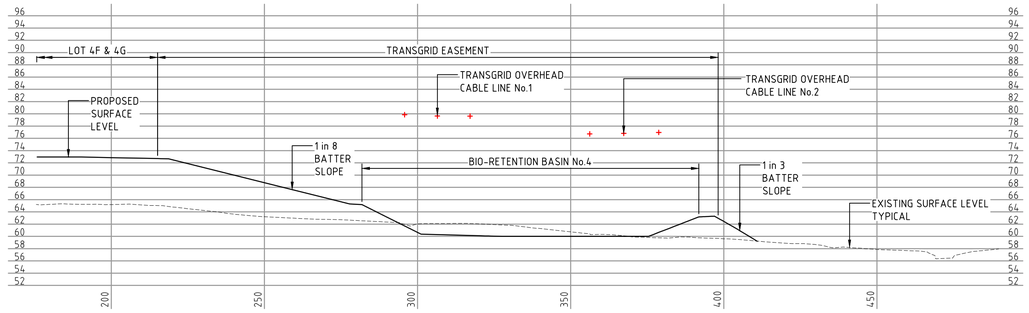
OAKDALE WEST

Title
EXISTING TRANSGRID OVERHEAD ELECTRICAL CABLES LONGITUDINAL SECTIONS

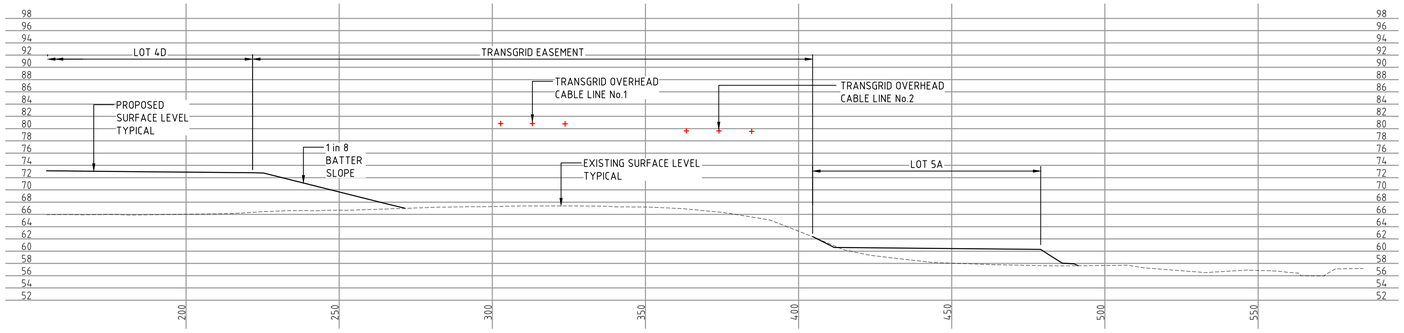
Drawing No.	Project No.	Issue
15-272-C1087	15-272	A5



TYPICAL SECTIONAL ALONG CABLE LINE No.1 AT CH220

SECTION 1 (C1087)

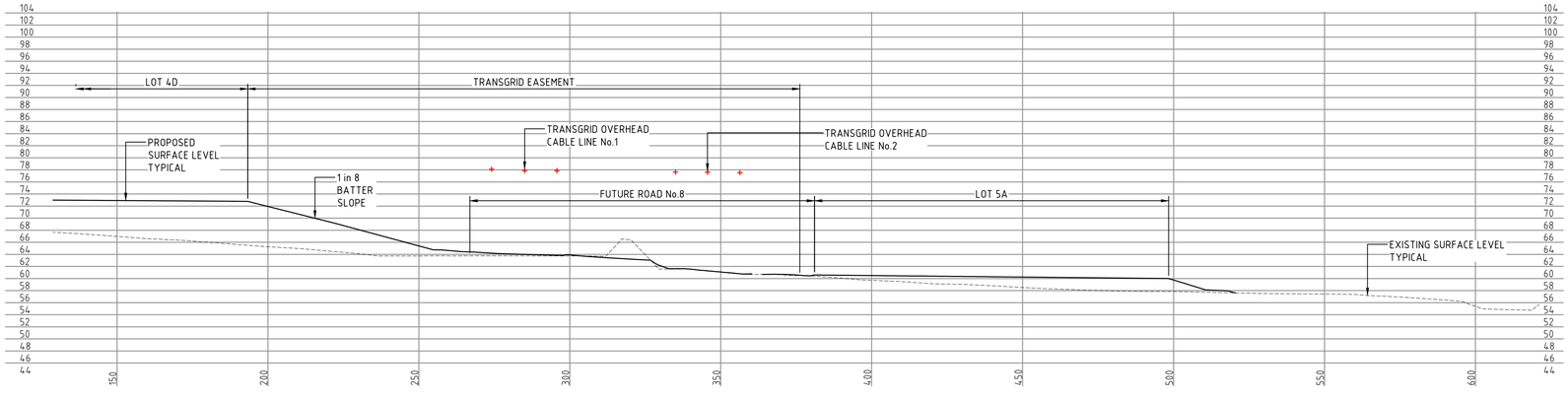
1 : 500 VER
1 : 1000 HOR



TYPICAL SECTIONAL ALONG CABLE LINE No.1 AT CH420

SECTION 2 (C1087)

1 : 500 VER
1 : 1000 HOR



TYPICAL SECTIONAL ALONG CABLE LINE No.1 AT CH540

SECTION 3 (C1087)

1 : 500 VER
1 : 1000 HOR

Bar Scales

0 10 20 30 40
1 : 500 @ A1 1 : 1000 @ A3

0 20 40 60 80
1 : 1000 @ A1 1 : 2000 @ A3

Issue	Description	Date
A5	ISSUED FOR SSD APPROVAL MOD 1	24-07-19
A4	ISSUED FOR INFORMATION MOD 1	07-06-19
A3	ISSUED FOR SSD APPROVAL	21-09-18
A2	ISSUED FOR SSD APPROVAL	04-05-18
A1	ISSUED FOR SSD APPROVAL	14-03-17

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Grid	MGA	Approved	AM

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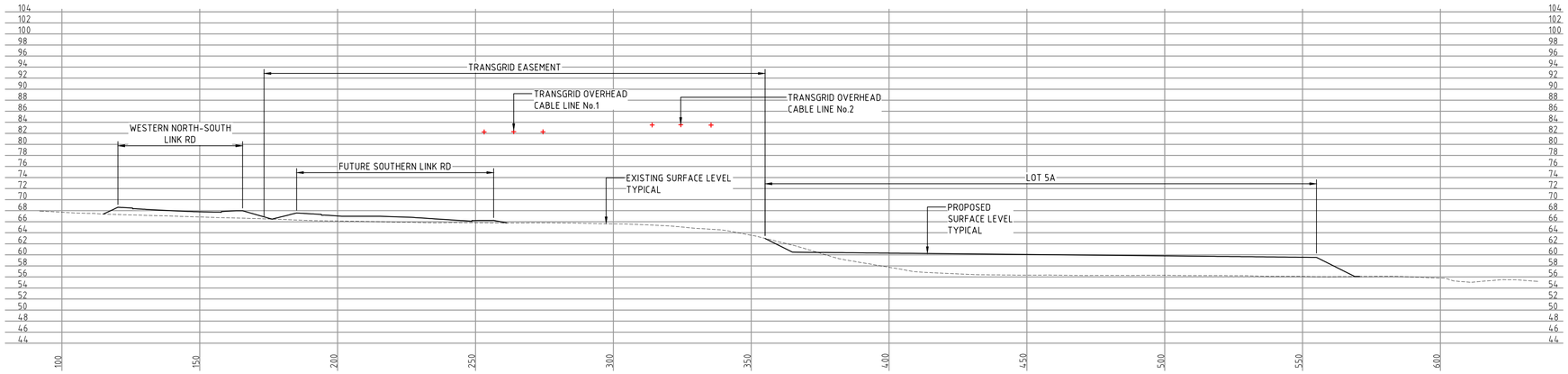
Project: PROPOSED INDUSTRIAL DEVELOPMENT OAKDALE WEST

Title: EXISTING TRANSGRID OVERHEAD ELECTRICAL CABLES TYPICAL SECTIONS SHEET 1 OF 2

Drawing No.	Project No.	Issue
15-272-C1088	15-272	A5



TYPICAL SECTIONAL ALONG CABLE LINE No.1 AT CH715

SECTION 4 (C1087)

1 : 500 VER
1 : 1000 HOR

Bar Scales

0 10 20 30 40
1 : 500 @ A1 1 : 1000 @ A3

0 20 40 60 80
1 : 1000 @ A1 1 : 2000 @ A3

Issue	Description	Date
A5	ISSUED FOR SSD APPROVAL MOD 1	24-07-19
A4	ISSUED FOR INFORMATION MOD 1	07-06-19
A3	ISSUED FOR SSD APPROVAL	21-09-18
A2	ISSUED FOR SSD APPROVAL	04-05-18
A1	ISSUED FOR SSD APPROVAL	14-03-17

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Project
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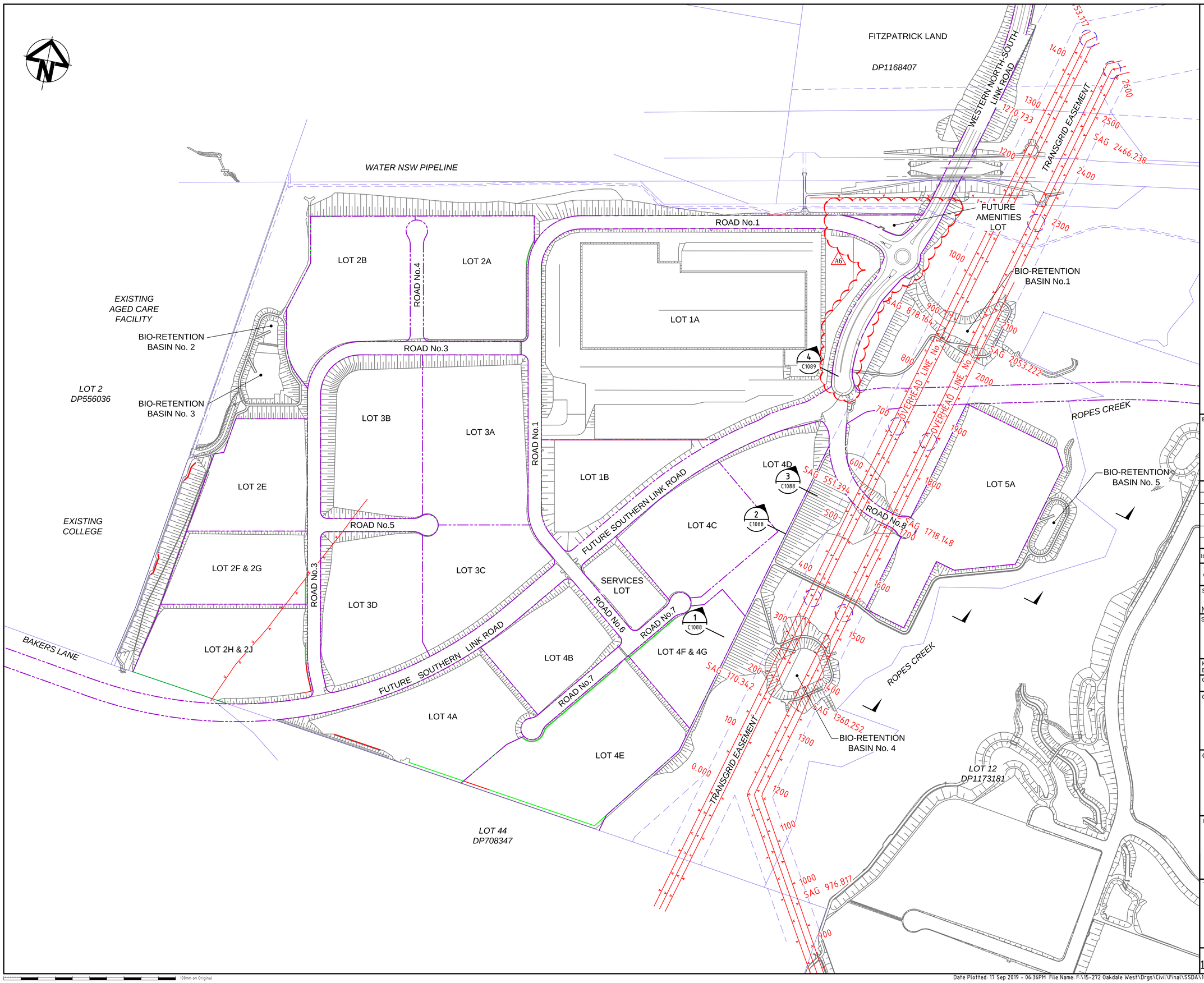
Title
EXISTING TRANSGRID OVERHEAD ELECTRICAL CABLES TYPICAL SECTIONS
SHEET 2 OF 2

Drawing No.	Project No.	Issue
15-272-C1089	15-272	A5



LEGEND

EXISTING ELECTRICITY OVERHEAD

Bar Scales

0 50 100 150 200 250

1 : 3000 @ A1

Issue	Description	Date
A6	ISSUED FOR SSD APPROVAL MOD 2	18-09-19
A5	ISSUED FOR SSD APPROVAL MOD 2	24-07-19
A4	ISSUED FOR INFORMATION MOD 2	07-06-19
A3	ISSUED FOR SSD APPROVAL	21-09-18
A2	ISSUED FOR SSD APPROVAL	04-05-18
A1	ISSUED FOR SSD APPROVAL	14-03-17

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A1

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Grid	MGA	Approved	AM

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Title
EXISTING TRANSGRID OVERHEAD ELECTRICAL CABLES PLAN

Drawing No.	Project No.	Issue
15-272-C1086	15-272	A6

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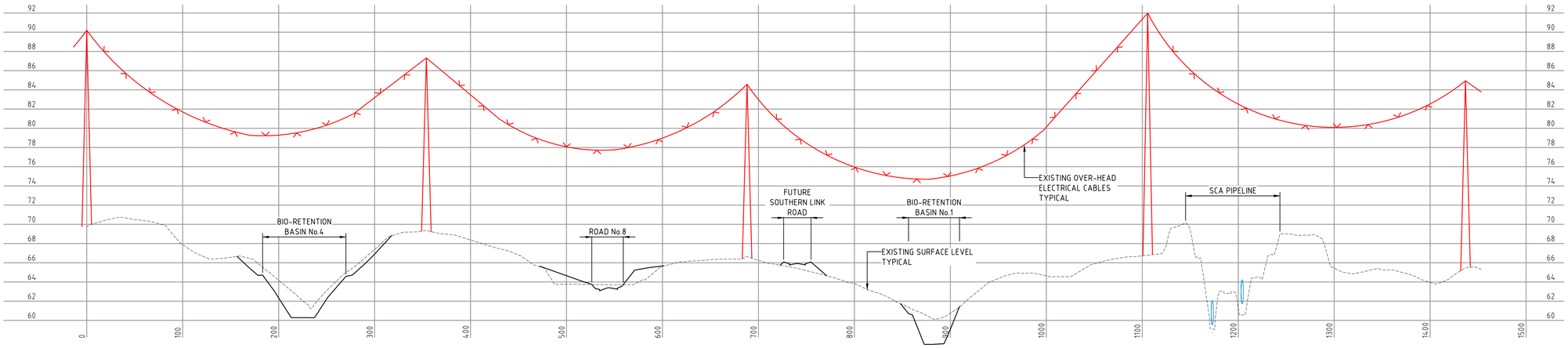
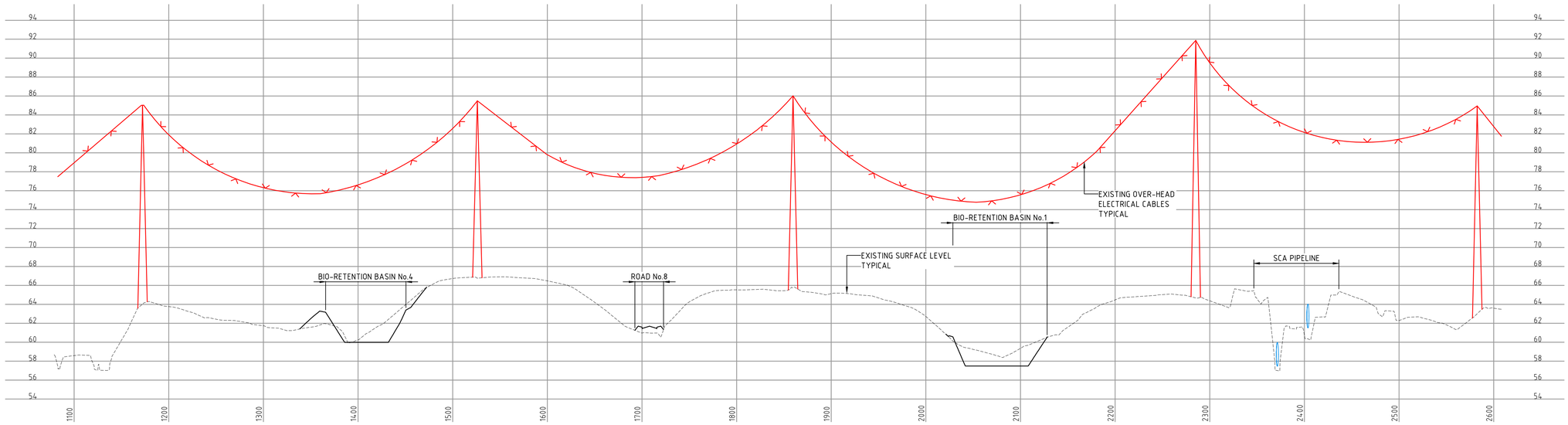


TRANSGRID OVERHEAD CABLE LINE No.1
LONGITUDINAL SECTION

1 : 250 VER
1 : 2500 HOR



TRANSGRID OVERHEAD CABLE LINE No.2
LONGITUDINAL SECTION

1 : 250 VER
1 : 2500 HOR

Bar Scales

0 5 10 15 20
1 : 250 @ A1 1 : 500 @ A3

0 50 100 150 200
1 : 2500 @ A1 1 : 5000 @ A3

Issue	Description	Date
A5	ISSUED FOR SSD APPROVAL MOD 2	24-07-19
A4	ISSUED FOR INFORMATION MOD 2	07-06-19
A3	ISSUED FOR SSD APPROVAL	21-09-18
A2	ISSUED FOR SSD APPROVAL	04-05-18
A1	ISSUED FOR SSD APPROVAL	14-03-17

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A1

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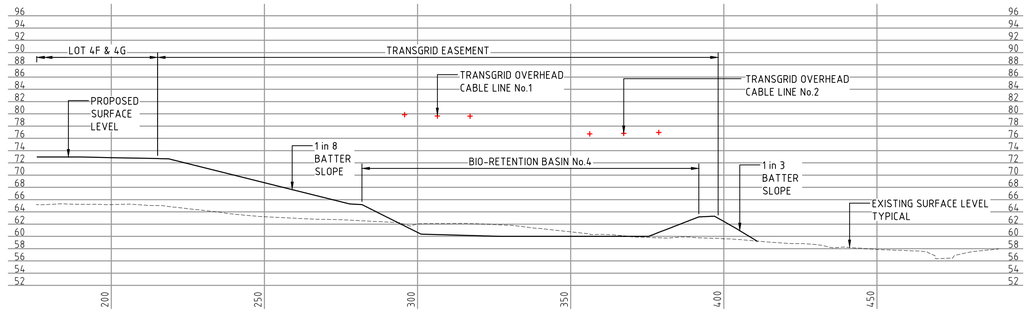
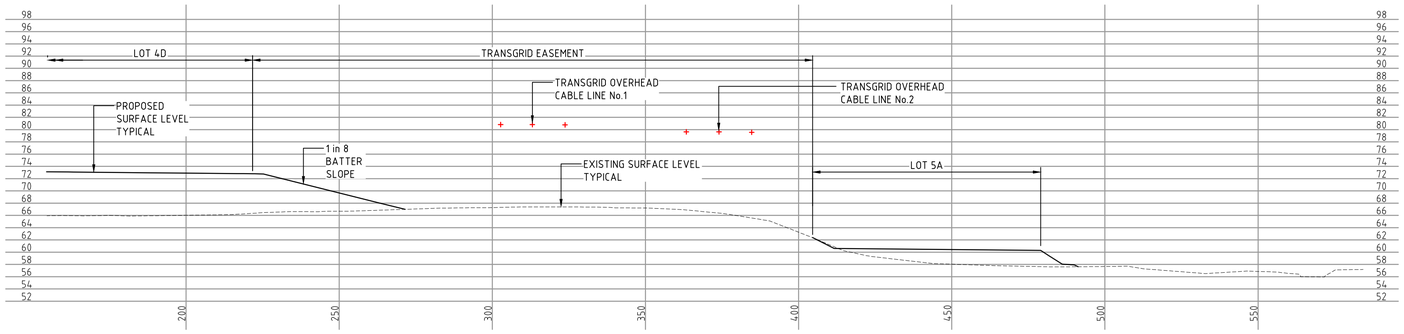
Title
EXISTING TRANSGRID OVERHEAD ELECTRICAL CABLES LONGITUDINAL SECTIONS

Drawing No.	Project No.	Issue
15-272-C1087	15-272	A5



TYPICAL SECTIONAL ALONG CABLE LINE No.1 AT CH220

SECTION 1 (C1087)
1 : 500 VER
1 : 1000 HOR



TYPICAL SECTIONAL ALONG CABLE LINE No.1 AT CH420

SECTION 2 (C1087)
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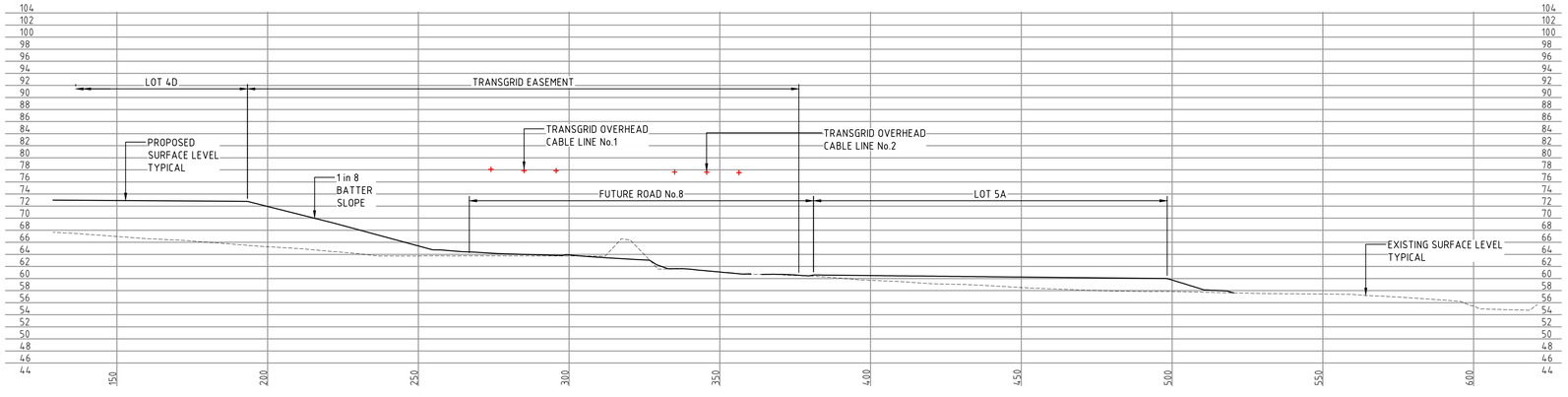
1 : 1000 HOR



TYPICAL SECTIONAL ALONG CABLE LINE No.1 AT CH540

SECTION 3 (C1087)
1 : 500 VER
1 : 1000 HOR

Bar Scales

0 10 20 30 40
1 : 500 @ A1 1 : 1000 @ A3

0 20 40 60 80
1 : 1000 @ A1 1 : 2000 @ A3

Issue	Description	Date
A5	ISSUED FOR SSD APPROVAL MOD 2	24-07-19
A4	ISSUED FOR INFORMATION MOD 2	07-06-19
A3	ISSUED FOR SSD APPROVAL	21-09-18
A2	ISSUED FOR SSD APPROVAL	04-05-18
A1	ISSUED FOR SSD APPROVAL	14-03-17

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Project
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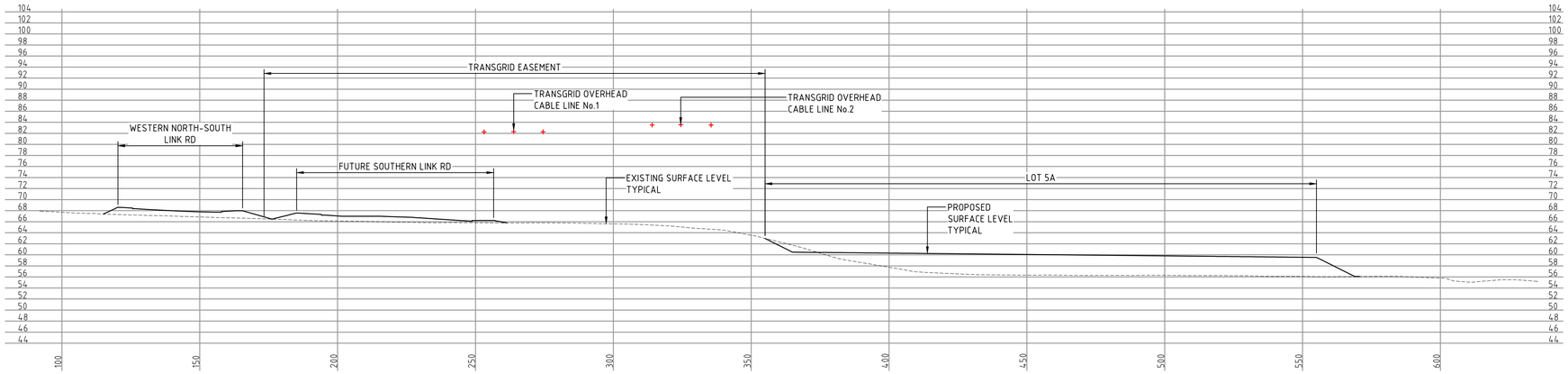
OAKDALE WEST

Title
EXISTING TRANSGRID OVERHEAD ELECTRICAL CABLES TYPICAL SECTIONS SHEET 1 OF 2

Drawing No.	Project No.	Issue
15-272-C1088	15-272	A5



TYPICAL SECTIONAL ALONG CABLE LINE No.1 AT CH715

SECTION 4 (C1087)

1 : 500 VER
1 : 1000 HOR

Bar Scales

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1 : 500 @ A1 1 : 1000 @ A3

0 20 40 60 80
1 : 1000 @ A1 1 : 2000 @ A3

Issue	Description	Date
A5	ISSUED FOR SSD APPROVAL MOD 2	24-07-19
A4	ISSUED FOR INFORMATION MOD 2	07-06-19
A3	ISSUED FOR SSD APPROVAL	21-09-18
A2	ISSUED FOR SSD APPROVAL	04-05-18
A1	ISSUED FOR SSD APPROVAL	14-03-17

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Project
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Title
EXISTING TRANSGRID OVERHEAD ELECTRICAL CABLES TYPICAL SECTIONS
SHEET 2 OF 2

Drawing No.	Project No.	Issue
15-272-C1089	15-272	A5

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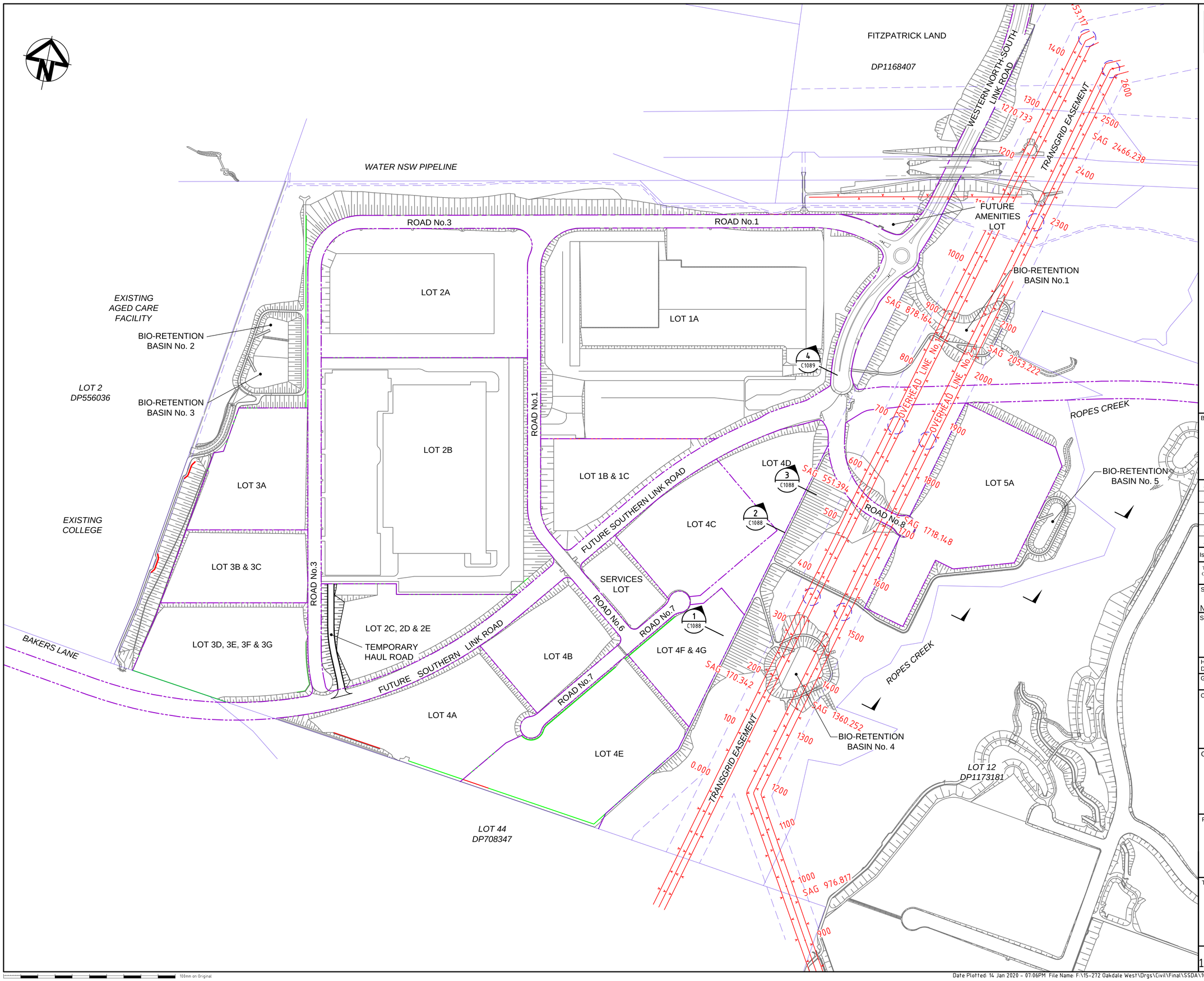

LEGEND

EXISTING ELECTRICITY OVERHEAD

Bar Scales

0 50 100 150 200 250

1 : 3000 @ A1

Issue	Description	Date
A9	ISSUED FOR SSD APPROVAL MOD 3	06-12-19
A8	ISSUED FOR INFORMATION MOD 3	19-11-19
A7	ISSUED FOR INFORMATION MOD 3	12-11-19
A6	ISSUED FOR SSD APPROVAL MOD 2	18-09-19
A5	ISSUED FOR SSD APPROVAL MOD 2	24-07-19
A4	ISSUED FOR INFORMATION MOD 2	07-06-19

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A1

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Grid	MGA	Approved	AM

Client: Goodman

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Project: PROPOSED INDUSTRIAL DEVELOPMENT OAKDALE WEST

Title: EXISTING TRANSGRID OVERHEAD ELECTRICAL CABLES PLAN

Drawing No.	Project No.	Issue
15-272-C1120	15-272	A9

100mm on Original

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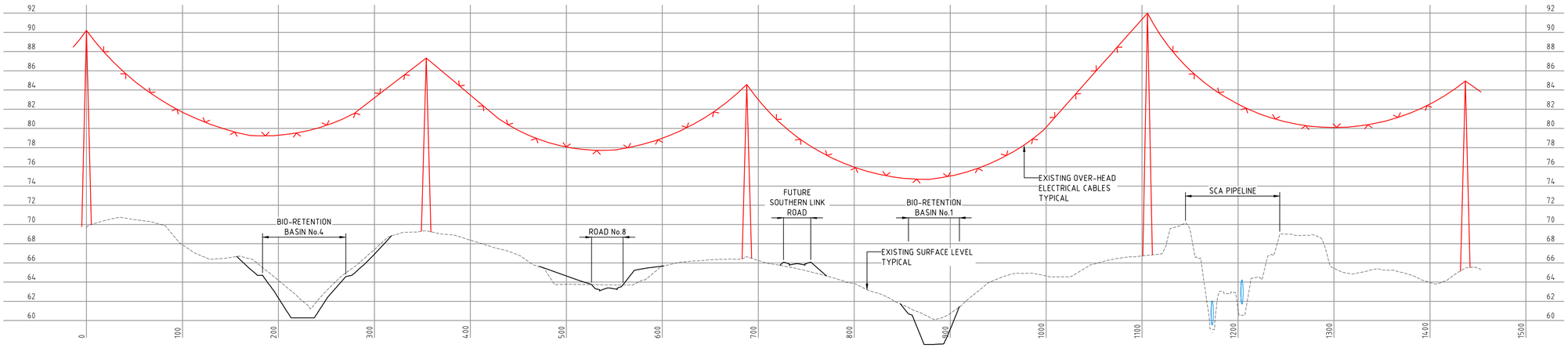
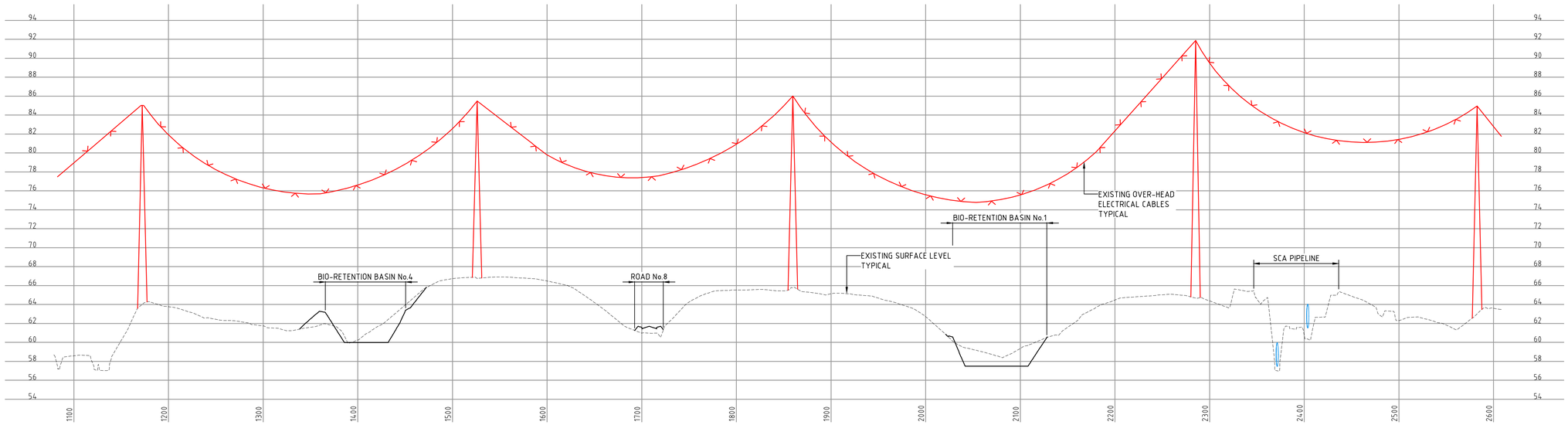
V1



TRANSGRID OVERHEAD CABLE LINE No.1
LONGITUDINAL SECTION

1 : 250 VER
1 : 2500 HOR



TRANSGRID OVERHEAD CABLE LINE No.2
LONGITUDINAL SECTION

1 : 250 VER
1 : 2500 HOR

Bar Scales

0 5 10 15 20
1 : 250 @ A1 1 : 500 @ A3

0 50 100 150 200
1 : 2500 @ A1 1 : 5000 @ A3

Issue	Description	Date
A8	ISSUED FOR SSD APPROVAL MOD 3	06-12-19
A7	ISSUED FOR INFORMATION MOD 3	19-11-19
A6	ISSUED FOR INFORMATION MOD 3	12-11-19
A5	ISSUED FOR SSD APPROVAL MOD 2	24-07-19
A4	ISSUED FOR INFORMATION MOD 2	07-06-19
A3	ISSUED FOR SSD APPROVAL	21-09-18

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Grid	MGA	Approved	AM

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Project
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OAKDALE WEST

Title
EXISTING TRANSGRID OVERHEAD ELECTRICAL CABLES LONGITUDINAL SECTIONS

Drawing No.	Project No.	Issue
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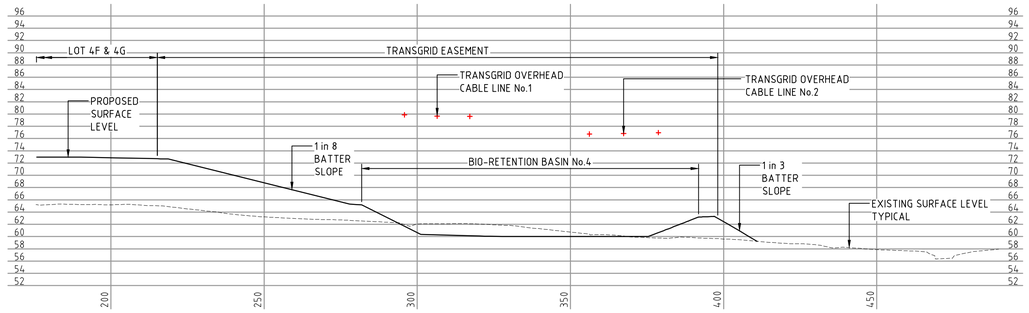
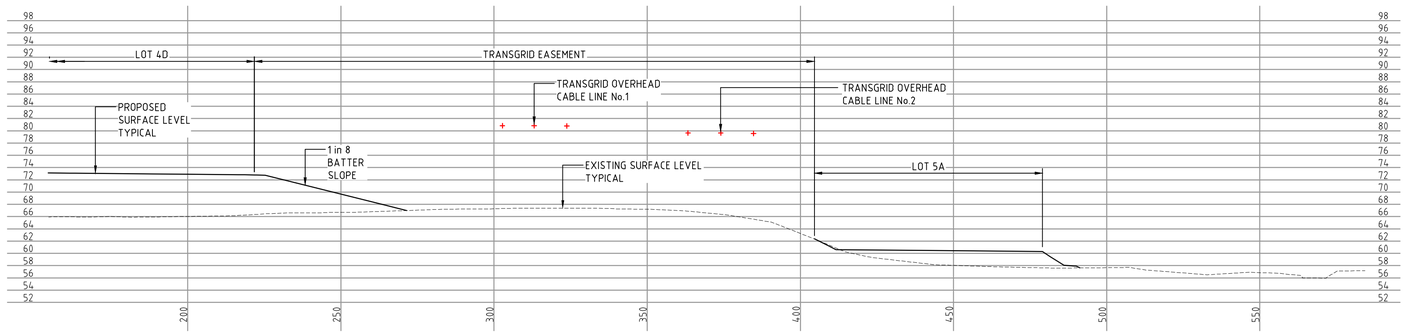


TYPICAL SECTIONAL ALONG CABLE LINE No.1 AT CH220

SECTION 1 (C1087)
1 : 500 VER
1 : 1000 HOR



TYPICAL SECTIONAL ALONG CABLE LINE No.1 AT CH420

SECTION 2 (C1087)
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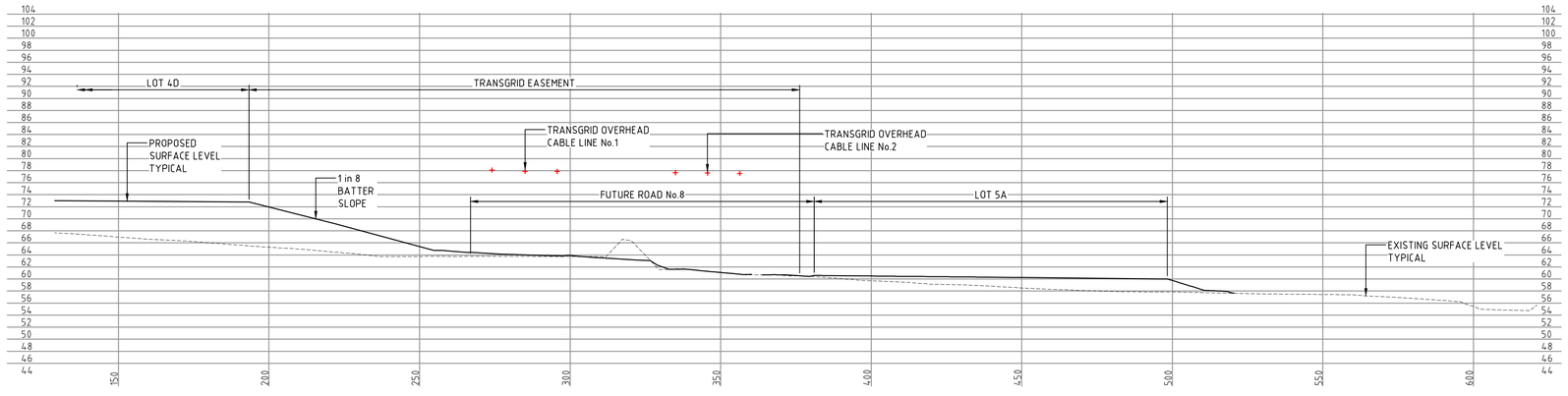
1 : 1000 HOR



TYPICAL SECTIONAL ALONG CABLE LINE No.1 AT CH540

SECTION 3 (C1087)
1 : 500 VER
1 : 1000 HOR

Bar Scales

0 10 20 30 40
1 : 500 @ A1 1 : 1000 @ A3

0 20 40 60 80
1 : 1000 @ A1 1 : 2000 @ A3

Issue	Description	Date
A8	ISSUED FOR SSD APPROVAL MOD 3	06-12-19
A7	ISSUED FOR INFORMATION MOD 3	19-11-19
A6	ISSUED FOR INFORMATION MOD 3	12-11-19
A5	ISSUED FOR SSD APPROVAL MOD 2	24-07-19
A4	ISSUED FOR INFORMATION MOD 2	07-06-19
A3	ISSUED FOR SSD APPROVAL	21-09-18

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Status: MOD 3 APPROVAL
NOT TO BE USED FOR CONSTRUCTION

A1

Scales	AS SHOWN	15-272-C1122.dwg	
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		Designed	GB
Height Datum	AHD	Checked	AM
Grid	MGA	Approved	AM

Client: Goodman

Civil Engineers and Project Managers
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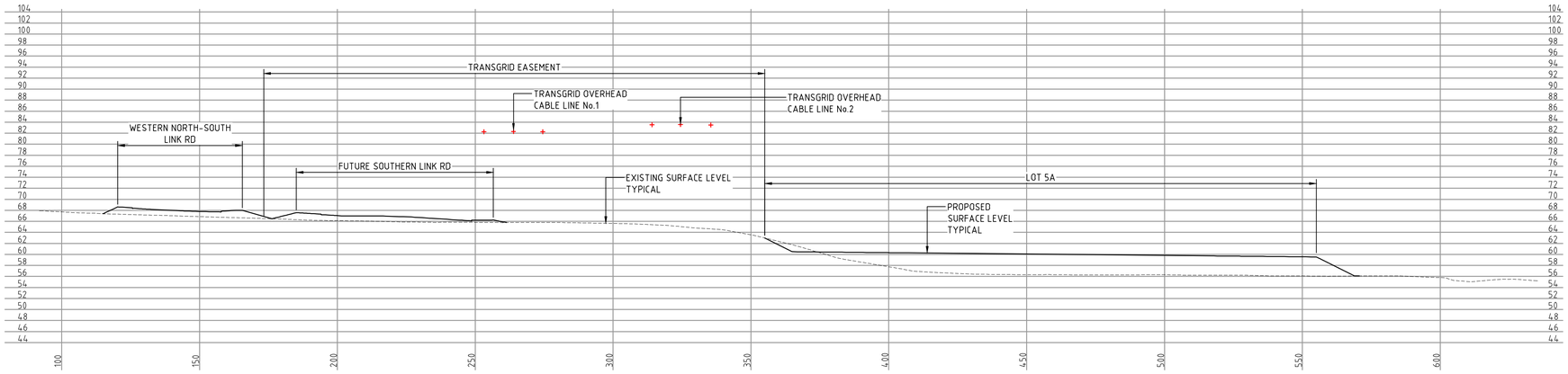
Project
PROPOSED INDUSTRIAL DEVELOPMENT
OAKDALE WEST

Title
EXISTING TRANSGRID OVERHEAD ELECTRICAL CABLES TYPICAL SECTIONS SHEET 1 OF 2

Drawing No.	Project No.	Issue
15-272-C1122	15-272	A8



TYPICAL SECTIONAL ALONG CABLE LINE No.1 AT CH715

SECTION 4 (C1087)

1 : 500 VER
1 : 1000 HOR

Bar Scales

0 10 20 30 40
1 : 500 @ A1 1 : 1000 @ A3

0 20 40 60 80
1 : 1000 @ A1 1 : 2000 @ A3

Issue	Description	Date
A8	ISSUED FOR SSD APPROVAL MOD 3	06-12-19
A7	ISSUED FOR INFORMATION MOD 3	19-11-19
A6	ISSUED FOR INFORMATION MOD 3	12-11-19
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A3	ISSUED FOR SSD APPROVAL	21-09-18

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A1

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		Designed	GB
Height Datum	AHD	Checked	AM
Grid	MGA	Approved	AM

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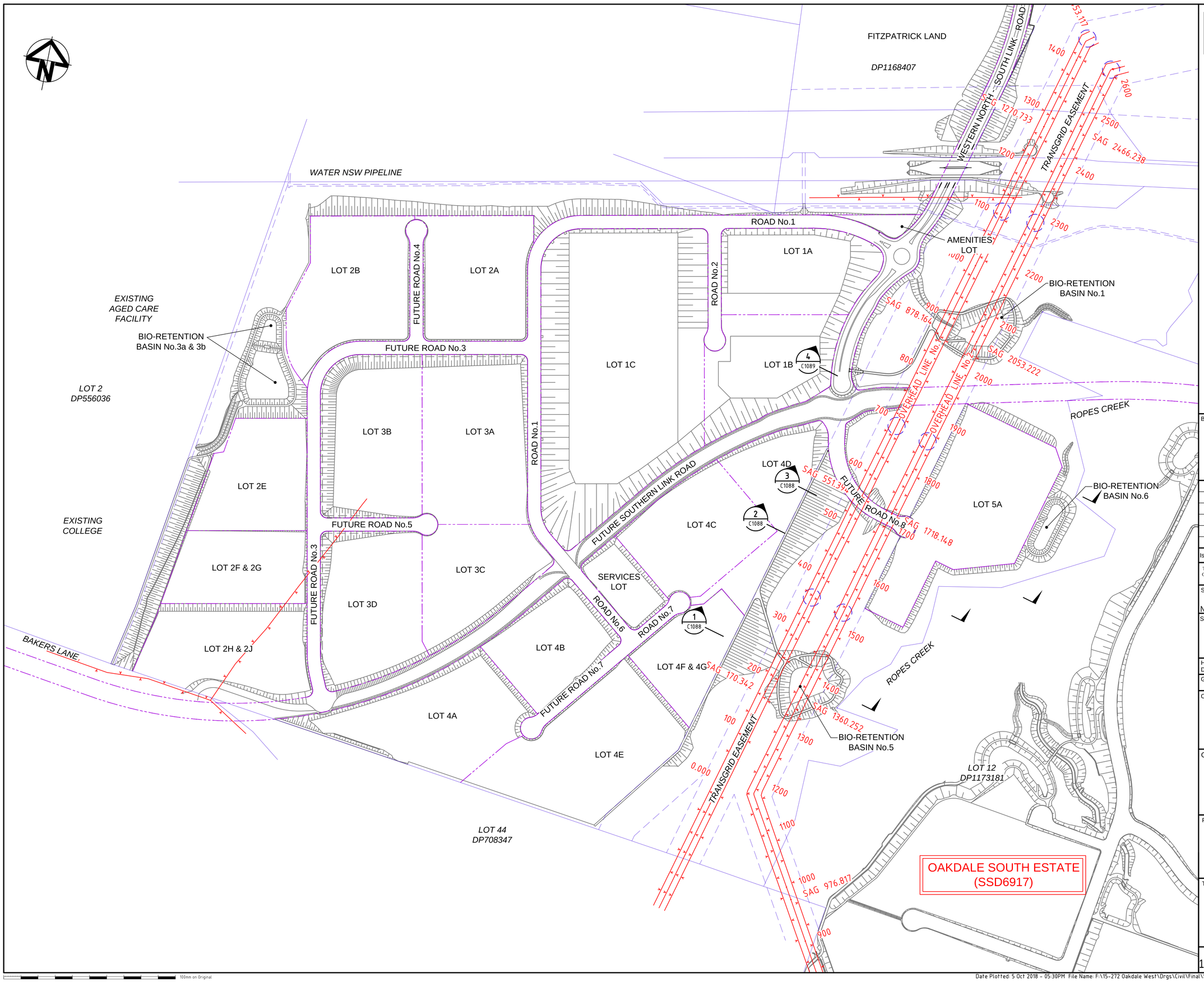
Project
PROPOSED INDUSTRIAL DEVELOPMENT
OAKDALE WEST

Title
EXISTING TRANSGRID OVERHEAD ELECTRICAL CABLES TYPICAL SECTIONS
SHEET 2 OF 2

Drawing No.	Project No.	Issue
15-272-C1123	15-272	A8



LEGEND

EXISTING ELECTRICITY OVERHEAD

Bar Scales

0 50 100 150 200 250

1 : 3000 @ A1

Issue	Description	Date
A3	ISSUED FOR SSD APPROVAL	21-09-18
A2	ISSUED FOR SSD APPROVAL	04-05-18
A1	ISSUED FOR SSD APPROVAL	14-03-17

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Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION — A1

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		Designed	GB
Height Datum	AHD	Checked	AM
Grid	MGA	Approved	AM

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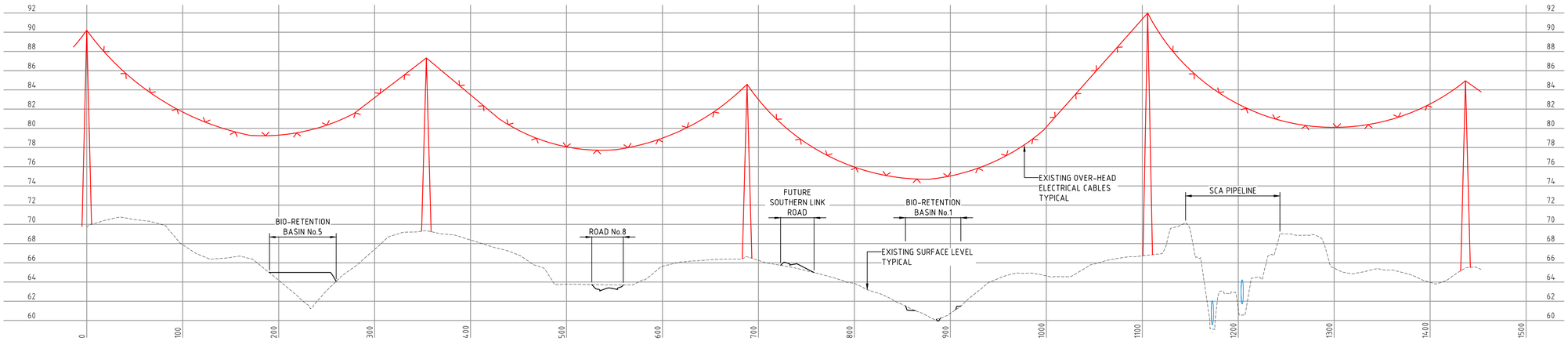
Project: PROPOSED INDUSTRIAL DEVELOPMENT OAKDALE WEST

Title: EXISTING TRANSGRID OVERHEAD ELECTRICAL CABLES PLAN

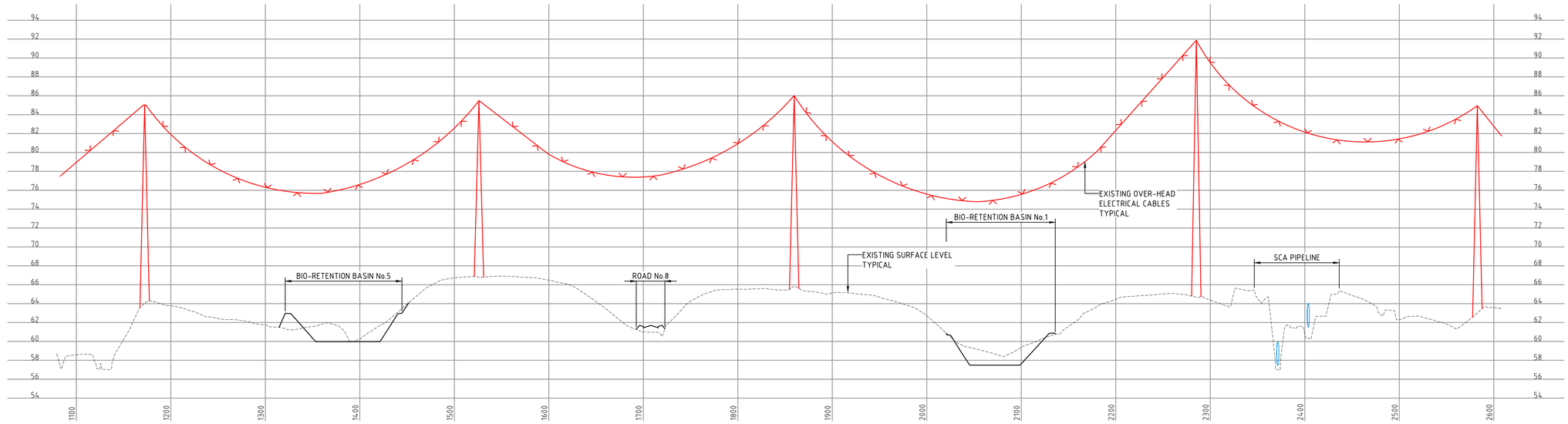
Drawing No.	Project No.	Issue
15-272-C1086	15-272	A3

100mm on Original



TRANSGRID OVERHEAD CABLE LINE No.1
LONGITUDINAL SECTION

1 : 250 VER
1 : 2500 HOR



TRANSGRID OVERHEAD CABLE LINE No.2
LONGITUDINAL SECTION

1 : 250 VER
1 : 2500 HOR

Bar Scales

0 5 10 15 20
1 : 250 @ A1 1 : 500 @ A3

0 50 100 150 200
1 : 2500 @ A1 1 : 5000 @ A3

Issue	Description	Date
A3	ISSUED FOR SSD APPROVAL	21-09-18
A2	ISSUED FOR SSD APPROVAL	04-05-18
A1	ISSUED FOR SSD APPROVAL	14-03-17

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		Designed	GB
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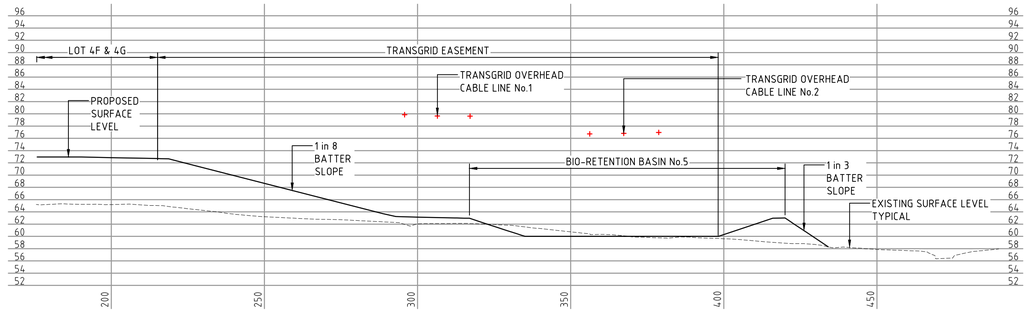
Project
PROPOSED INDUSTRIAL DEVELOPMENT
OAKDALE WEST

Title
EXISTING TRANSGRID OVERHEAD ELECTRICAL CABLES LONGITUDINAL SECTIONS

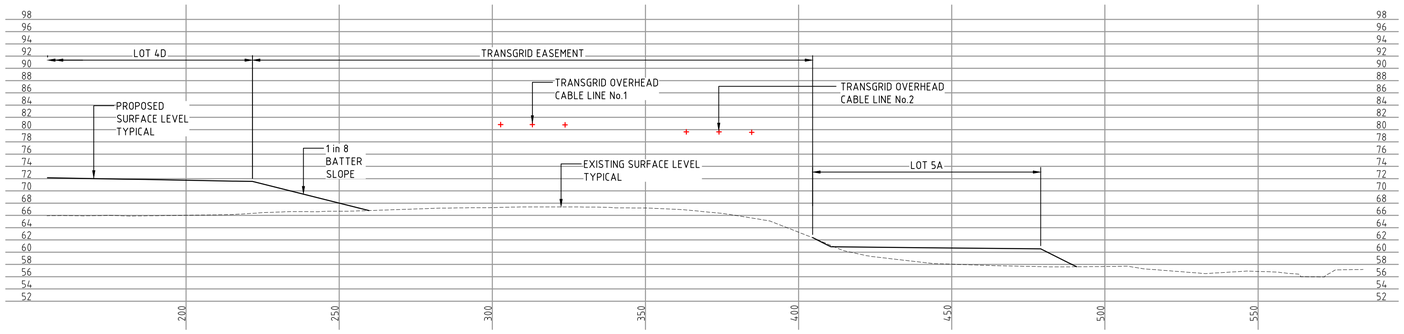
Drawing No.	Project No.	Issue
15-272-C1087	15-272	A3

100mm on Original



TYPICAL SECTIONAL ALONG CABLE LINE No.1 AT CH220

SECTION 1 (C1087)
1 : 500 VER
1 : 1000 HOR



TYPICAL SECTIONAL ALONG CABLE LINE No.1 AT CH420

SECTION 2 (C1087)
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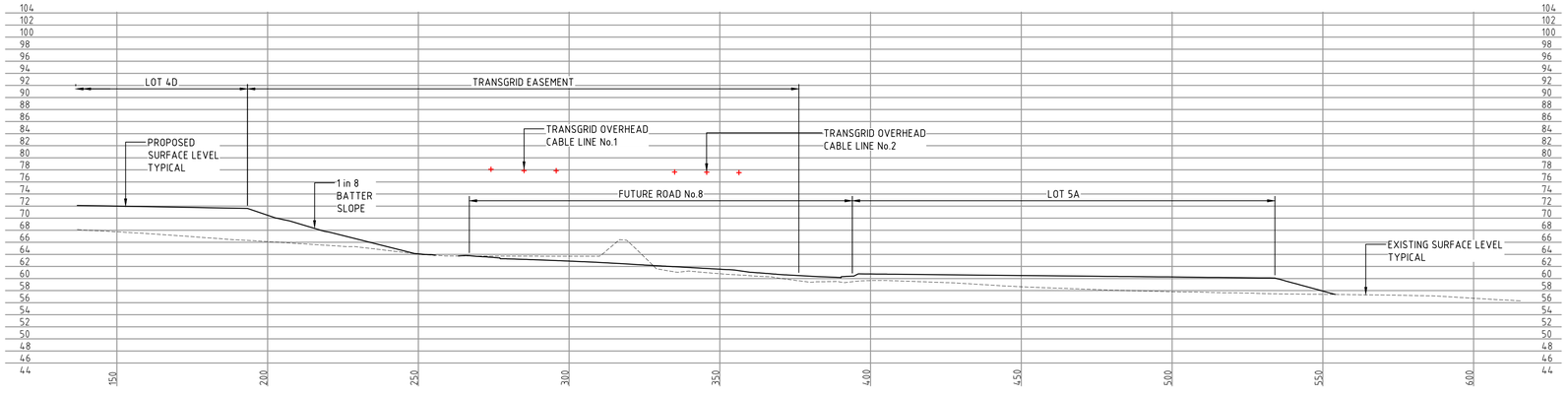

TYPICAL SECTIONAL ALONG CABLE LINE No.1 AT CH540

SECTION 3 (C1087)
1 : 500 VER
1 : 1000 HOR

Bar Scales

0 10 20 30 40
1 : 500 @ A1 1 : 1000 @ A3

0 20 40 60 80
1 : 1000 @ A1 1 : 2000 @ A3

Issue	Description	Date
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A2	ISSUED FOR SSD APPROVAL	04-05-18
A1	ISSUED FOR SSD APPROVAL	14-03-17

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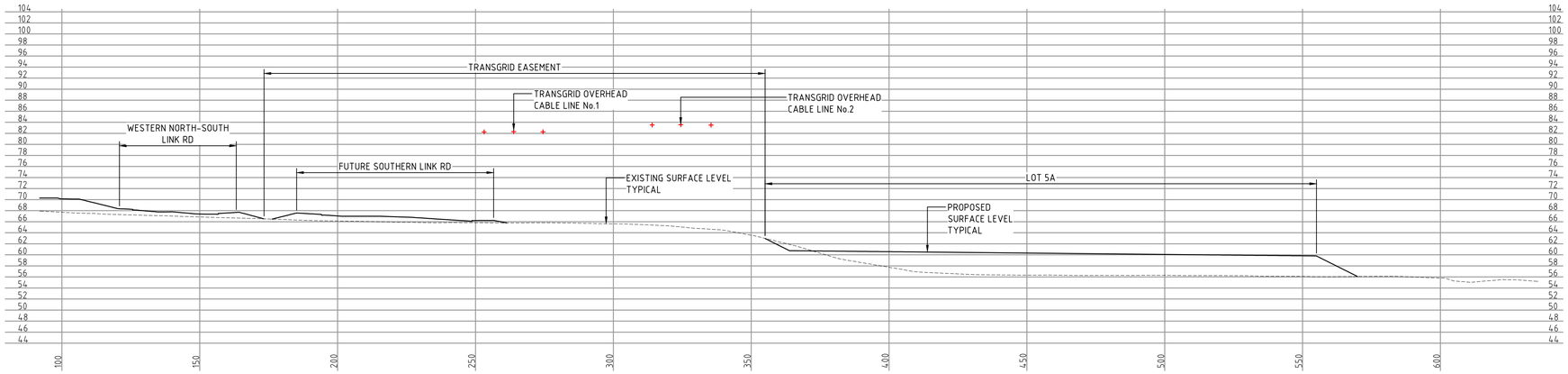
Project
PROPOSED INDUSTRIAL DEVELOPMENT
OAKDALE WEST

Title
EXISTING TRANSGRID OVERHEAD ELECTRICAL CABLES TYPICAL SECTIONS SHEET 1 OF 2

Drawing No.	Project No.	Issue
15-272-C1088	15-272	A3

100mm on Original



TYPICAL SECTIONAL ALONG CABLE LINE No.1 AT CH715

SECTION 4 (C1087)

1 : 500 VER
1 : 1000 HOR

Bar Scales

0 10 20 30 40
1 : 500 @ A1 1 : 1000 @ A3

0 20 40 60 80
1 : 1000 @ A1 1 : 2000 @ A3

Issue	Description	Date
A3	ISSUED FOR SSD APPROVAL	21-09-18
A2	ISSUED FOR SSD APPROVAL	04-05-18
A1	ISSUED FOR SSD APPROVAL	14-03-17

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Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

A1

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		Designed	GB
Height Datum	AHD	Checked	AM
Grid	MGA	Approved	AM

Client: Goodman

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Project
PROPOSED INDUSTRIAL DEVELOPMENT
OAKDALE WEST

Title
EXISTING TRANSGRID OVERHEAD ELECTRICAL CABLES TYPICAL SECTIONS
SHEET 2 OF 2

Drawing No.	Project No.	Issue
15-272-C1089	15-272	A3

Oakdale West Estate SSD7348 – MOD2

Response to Submission

Oakdale West – MOD 2 – Response to Submission

February 2020

Contents

- MOD 2 - Response to Submission
- Annexure A - Gross Lettable Area Property Council of Australia Definition
- Annexure B – Estate Signage Illumination Detail
- Annexure C – SSD7348 MOD1: Response to Submissions
- Annexure D – Riskcon Engineering Dangerous Goods Response
- Annexure E – Detailed layout of Dangerous Goods Store
- Annexure F – LPF Tank Detail Plan
- Annexure G – 1A Site Plan Showing LPG Tank Location
- Annexure H – Updated 1A Site Plan Removing Direct Access to SLR
- Annexure I – Traffic Advice Confirming no Queueing to Estate Road
- Annexure J – Updated Landscape Plans
- Annexure K – Site 1B & 1C with Additional SLR Landscape Setback
- Annexure L - Consolidated Updated Architecture Drawings

MATTERS RAISED	APPLICANT RESPONSE
NSW DEPARTMENT OF PLANNING, INDUSTRY, & ENVIRONMENT (DPIE)	
1. **Construction timeline** • Please provide details of the expected construction timeline for the proposed modification as well as all other modification applications associated with SSD 7348.	• MOD 1 – Works considered under MOD 1 will commence imminently following approval. • MOD 2 – Works considered under MOD 2 will commence imminently following approval, with aboveground construction expected to commence in December 2020 or earlier. • MOD 3 – Works considered under MOD 3 will commence imminently following approval.
2. **Other modifications** • Please include details of the likely interactions between the modification and existing, approved and proposed construction works and operations in the vicinity of the site. This should include details of how the subject modification relates to all other relevant modifications currently with the Department for consideration (including MOD 3). • Additionally, provide a summary of each modification, the expected staging and details of how each modification may impact upon any of the changes sought under the subject modification. All supporting documentation will need to be updated to ensure consistency with other modifications.	• Each subsequent modification following MOD 1 has been completed on the basis that the previous MOD has been approved. i.e MOD 2 assumes MOD 1 is approved, MOD 3 assumes MOD 1 and MOD 2 have been approved. • MOD 1, MOD 2, and MOD 3 are required to be approved at the same time to ensure works can be completed efficiently, in line with the assumptions of the assessments, and per the proposed programme. • All supporting documentation is consistent per the sequential order of the applications.

MATTERS RAISED	APPLICANT RESPONSE
	• Whilst MOD 3 overrides items within MOD 1 and MOD 2, it is important to note that mitigation measures have been put in place as part of MOD 3 that hold true for MOD 1 and MOD 2. • Goodman is pleased to provide further clarification regarding the modifications in a face to face meeting.
3. **Acoustic Assessment** • The acoustic impacts of the modification should be considered both independently and sequentially i.e. MOD 3 will ultimately change the noise impacts and the noise wall proposed under MOD 2, given we understand MOD 3 is likely to be constructed before MOD 2. As such, this potential acoustic scenario should be addressed within the MOD 2 application. As noted in Council's submission, there is a need to adopt consistent modelling assumptions to inform the predicted noise levels and the assessment should include consideration of the cumulative impacts of preceding development.	• The most recent noise modelling considers the cumulative impacts of the prior modifications (per our note above i.e MOD 3 includes MOD 2 and MOD 1). Thus, MOD 3 is likely to show the highest impact given the most intensified use, yet mitigation measures have been put in place that alleviate any exceedances in MOD 2 and MOD 3. For example, the noise agreements in place hold trust for MOD 2 and MOD 3.
4. **Visual Impact Assessment** • Similar to the matters raised in Point 3 above about the acoustic assessment, the visual impacts of the modification should be considered both independently and sequentially i.e. MOD 3 will ultimately change visual impacts from some receivers and is likely to be constructed before MOD 2, therefore this scenario should be addressed within the MOD 2 application. The visual impact assessment should be updated to include indicative views along the Southern Link Road.	• As above. • The Visual Impact Assessment includes the masterplan approval and the individual Modifications. MOD 2 and Mod 3 will be under construction at the same time with little time difference between them in terms of completion. As the MOD 3 assessment includes the impacts from MOD 1 and MOD 2, MOD 3 can be considered as part of the assessment. Noting that MOD 2 can also be assessed on it's own merits.

<table>
<tr><th>MATTERS RAISED</th><th>APPLICANT RESPONSE</th></tr>
<tr><td></td><td></td></tr>
<tr><td>5. GFA and GLA

• It is noted that the total GFA is proposed to increase, however the total GLA is proposed to decrease. The modification application notes that the decrease in GLA is a result of the utilisation of vertical automation within the building and construction of additional mezzanine levels which consolidate the building area from that originally approved. Please provide clarification on how the GLA has been calculated.</td><td>• Gross Lettable Area (GLA) is per the Property Council of Australia's definition. Refer to Annexure A and in particular section 2.0, 2.1, and 2.2.

• On the back of DPIE's and Penrith Cith Council's comments, there have been changes to both the GLA and Gross Floor Area (GFA) in the MOD 2 package (which will also affect MOD 3).

• See below table.

<table><tr><th></th><th>MOD 2</th><th>MOD 3</th></tr><tr><td>GLA</td><td>448,322 sqm</td><td>556,796 sqm</td></tr><tr><td>GFA</td><td>480,724 sqm</td><td>595,498 sqm</td></tr></table></td></tr>
<tr><td>6. Signage

• Please provide details of any proposed lighting/illumination and the dimensions for the proposed signage 'S7 Goodman Signage' and 'S8 Goodman Signage Wall'.</td><td>• In relation to S7 - Only the logos, lettering, and vertical side are to be rear (internally) LED illuminated. Refer Annexure B (pg.451). Dimensions are also provided in this annexure.

• In relation to S8 – Further details can be provided in due course closer to installation. Goodman propose that DPIE include a condition of consent that requires Goodman to submit detailed plans with dimensions and illuminating details, to DPIE, prior to installation of the subject sign.</td></tr>
</table>

MATTERS RAISED	APPLICANT RESPONSE
7. **Tenants** • The modification application notes the purpose of the proposed modification is to facilitate changes to Warehouses 1A-1C to meet the operational needs of the future tenant. Please confirm whether there are tenants in mind for buildings 1B, 1B2 and 1C.	• Goodman cannot provide further details then that already provided in the EIS noting that the proposed modifications are required for the operational needs ofits customers.
8. **Setbacks** • The Department notes Council has raised concerns regarding the setbacks provided for lot 1B/1C. In addressing Council's submission, please provide justification for the proposed setbacks in the context of the increased building height sought under the modification.	• Noted. Refer to below and the Reponse to Submissions for MOD 1 which is attached as **Annexure C (pg.456)**.
9. **Hazards** • Please provide the following additional information relating to the Preliminary Hazard Analysis: - Provide details on the layout of the DG storage area, including the location of LPG cylinder locations and the storage arrangement for various DG classes. - Please explain the purposes of the LPG tank and LPG cylinder? What is the anticipated refilling frequency for the LPG tank and the LPG tanker size? What is the LPG cylinder size and the anticipated number of LPG cylinders? Would the LPG cylinder be refilled on site? - It is noted on Figure 3-2 of PHA that the DG store and the main warehouse are sharing a common wall, and the DG store and the Energy Complex 2 are sharing another common wall. Please clarify whether these walls are fire rated.	• Refer to the response provided by Riskcon Engineering **Annexure D(pg.474)**. Goodman provides the other following comments; • Refer **Annexure E (pg.477)** for a detailed layout for the Dangerous Goods Store and LPG tank (for MHE charging). It is best to refer to the Preliminary Hazard Analysis (PHA) for detail regarding the storage of the classes of goods within the Dangerous Goods Store. Information showing where each class of goods will be positioned within the Dangerous Goods Store is yet to be produced yet. The LPG cylinder is for the commercial kitchen and is yet to be confirmed in size. There are no LPG tanks / cylinders located within the Dangerous Goods Store.

MATTERS RAISED	APPLICANT RESPONSE
- What is stored within Energy Complex 2? Are there transformers or other electrical items? - It is noted in the Fire Safety Strategy that the bonding construction from the warehouse to the DG store is going to achieve an FRL of 4 hours. Please confirm whether this is equivalent to a fire rated wall of 4 hours? - Please provide details on the tenancy arrangement for the office premises. Are the offices ancillary to the warehouse? - It is noted that the risk analysis provided two cases, namely Base Case and Sensitive Case. The sensitive case assumes the spread of fire is controlled by the second row of sprinklers which is further away from the fire source. Is the sprinkler system in the first row independent to the 2nd row? Please clarify whether such arrangement is a standard design requirement and will be installed for the entire DG store. - The failure frequency established for Jet fire appears to be too low and the fault tree logic is incorrect. However, assuming the LPG tank is 7.5kL, as provided in Table 3.1 of the PHA, and it will comply with current AS 1596, the risk associated with the LPG tanks and its filling operation could likely be managed. Please confirm these assumptions. - Please clarify whether there is an LPG filling operation for forklifts. The risk associated with LPG release from the forklift filling operation, if it is part of the proposed operation, is not considered in the current analysis, and should be included.	• The 7.5kL (3.8 tonne) LPG Tank adjacent the Receiving Docks is for refuelling forklifts (operating externally under the loading canopy). The kitchen LPG cylinder/s located adjacent the goods lift are for the commercial kitchen in the Canteen on Level 2 of the office (size for kitchen to be confirmed once a canteen operator is appointed). The standard refuelling tanker is generally a rigid vehicle (between 4T and 12T), frequency yet to be determined, though likely twice a week. Refer to **Annexure F (pg.479)** for a plan showing the LPG tank. • There is a full height fire rated precast concrete wall to the Dangerous Goods Store with a single fire rated sliding door and fire rated PA door – refer to attached detail plan in **Annexure G (pg.481)**. • Energy Complex 2 – this is subject to final agreement with Endeavour Energy, this may be house transformers with backup generator and / or the solar inverters and switchboards. • The office is ancillary to the warehouse. The office is for admin support and amenities for the warehouse and transport staff. The layout of the office area can be seen in the office drawings submitted as part of this application.
PENRITH CITY COUNCIL	
1. Access Arrangements and Driveway Locations	

MATTERS RAISED	APPLICANT RESPONSE
• The proposed amended car park arrangement includes proposed driveway access off the Western North South Link Road which is not supported by Council's Development Engineers and Traffic Engineers. • It has been requested that driveway access arrangements be amended to provide access off Estate Road No 1 only. • If there are any concerns with respect to queueing, then the driveway could be widened to accommodate one entry lane and two exist lanes (a left turn lane and a right turn lane).	• The direct access from Precinct 1 car parking onto the SLR has been removed. Driveway access in now only available onto Estate Road 1. Refer to revised site plan in **Annexure H (pg.483)**. • The Traffic engineer for the project provides the following advice with this change noting that there is no concern with queuing. Refer to **Annexure I (pg.485)**.
2. Street Setbacks and Landscape Zones	
• The proposal represents a significant variation to the maximum building height development control of 15m that applies to the site as outlined within Penrith Development Control Plan 2014. Chapter E6 – Erskine Business Park. • Consideration of a building height variation to this extent, should be predicated on the delivery of a substantial and generous landscape setback to the public domain (proposed road network) and planting within car parking areas to ameliorate the massing of the built form and the abundance of hard stand areas associated with parking and landscaping.	• Noted. The Landscaping Plans have been updated taking into consideration council's comments. Once mature, these trees will present as a significant landscaped space, reducing heat island effect and softening the presentation of the development from the road. Refer to **Annexure J (pg.489)** for the updated landscaping plans. • While the approved setback controls for internal local roads require a 3.75m landscape setback, the plans have been updated to provide double this - 7.5m. this ensures enhanced landscape screening treatment along these local road frontages. • We note the design for warehouses 1B1, 1B2 and 1C has changed to provide for the updated enhanced landscape setbacks. Refer to **Annexure K (pg.508)**. An uninterrupted minimum 20m landscape setback is provided along the SLR.
• Acknowledging that the approved concept plan does not provide prescriptive setbacks for landscaping areas, the massing of the built form and the delivery of consistent streetscape	• This is incorrect. The concept approval provides the following setback requirements for OWE:

MATTERS RAISED	APPLICANT RESPONSE
presentations necessitates a generous and consistent setback to all road frontages. Site 1A generally provides an acceptable landscape setback however Site 1B does not. While the built form on Site 1B is not the same as that on 1A, the setback required is dictated by the massing sought on Site 1A and should be continued to ensure a consistent setback pattern and streetscape presentation to Estate Road 1 is delivered. • This amendment will necessitate redesign of the Site1B car parking area fronting Estate Road 1, will likely amend internal manoeuvring between Site 1B and 1C and will likely necessitate deletion or significant amendment of Site 1C. • It has been Council's consistent position that consideration of Site 1A and the substantial height variation sought should include deletion of Site 1B and 1C to relocate parking out of setback zones of Site 1A into these areas and enable a generous landscaped embellishment to the Western North South Link Road. This is consistent with what has been reflected within the approved Concept Plan for Stages 3. If this is not reflected, then at the least, Stage 1C is again recommended to be deleted, Stage 1 B reconfigured to maintain the setbacks to the Western North South Link Road as per Stages 3C & 3D to maintain a consistent setback pattern between the 2 x remaining sites.	- 60m for Western Sydney Freight Line (northern boundary) - 40m for western boundary - 10m landscape setback for the SLR - 3.75m for local roads • It is noted the Department agreed with the adequacy of a 10m landscape to the SLR on the basis that this depth provides opportunity for a layering of landscaping of both shrubs and trees, providing effective screening for motorists travelling along the SLR through the Oakdale West IN1 zoned land. • We note that while Site 1B has considerably reduced building mass compared to 1A, it still provides consistent landscape setbacks to that provided in 1A - 10m to the SLR and 7.5m for the local road. The Site 1B and 1C landscape setbacks are either consistent or greater than the minimum required by the concept approval, and therefore considered generous and acceptable. • Goodman has amended Site 1B & 1C plan such that there are no encroachments into the landscape setback. • We do not agree that Sites 1B & 1C need to be removed. These buildings present a reduced height and massing from that of Site 1A, and therefore provides appropriate built form transition between the SLR and Site 1A when viewed travelling northbound along the SLR. 1B & 1C buildings in the foreground will therefore act to visually break up the appearance of bulk and scale of the 1A building form. • Sites 1B & 1C buildings are proposed for retention as they provide variation to the large format warehouses which characterise OWE, offering customers greater tenancy mix flexibility. • We note infill development such as that proposed at Site 1B and 1C effectively consolidates and maximises the IN1 zoned land, providing land use efficiency and reducing unnecessary urban sprawl. We note the retention of use of the Site 1B & 1C for warehouse and distribution, rather than landscape use, provides greater

MATTERS RAISED	APPLICANT RESPONSE
	employment generation to assist job targets and is more aligned with the EP&A Act's objective of "orderly and economic use and development of land". • Whilst Goodman does not propose for the Department to amend the development controls regarding the landscape and building setback requirements, Goodman in good faith, for this project only, agrees to an alternative design for 1B & 1C that provides a 20m landscape and building setback zone, rather than the 10m landscape and 20m building setback required by the concept approved controls. Refer to **Annexure K (pg.508)** for a copy of the revised plan. This is no way sets a precedent for the remaining warehouses in the estate which will employ the approved 10m landscape and 20m building setback to the SLR, as per the concept approval. • While DA approval has not yet been obtained for Site's 3C and 3D, these developments will comply with the required 10m landscape and 20m building setbacks approved by the Department in the concept approval for the SLR frontage.
• The manoeuvring area between Site 1B and 1C which is protruding into the Western North South Link Road landscaping setback should be deleted and reconfigured (as per above.). To reflect orderly and consistent development within the precinct, the approved arrangement and resulting landscape setbacks for Stage 3C and Stage 3D should be replicated within this part of the precinct. The current proposal provides an inconsistent and poor streetscape outcome that is as odds with the principles and streetscape presentation established in the approved concept plan. Any amendments now proposed should improve on the streetscape principles and delivery outcomes approved, and not compromise them.	• As requested, the hardstand area between Site 1B and 1C has been updated to remove any protrusion into the 20m building setback (despite the protrusion being allowed under the concept approval). Refer **Annexure K (pg.508)**.
• Opportunities to remove / relocate parking out of the Western North South Link Road should be further explored. Line marked parking spaces and aisle extensions should be removed / relocated where they extend in front of the identified 10m	• As above, no parking protrudes into the 10m landscape setback. Refer to **Annexure K (pg.508)**.

MATTERS RAISED	APPLICANT RESPONSE
landscape setback line. While it is noted that they are often point encroachments, the 10m landscape setback should be unencumbered. Essentially no parking or aisles should protrude forward of the green setback line on the architectural plans. • If there is a suggestion that there is a need for the full extent of parking despite the minor reduction that would result from the above request, then the allotment dimensions of Site 1A are not adequate and (as suggested above), Site 1B and Site 1C should be deleted or redesigned to ensure that parking meeting the needs of the development can be achieved on each allotment without protrusion into defined road landscape setback zones.	• As above, plan updated. Refer to **Annexure K (pg.508)**.
3. Car Park Planting	
• The landscape plans and architectural drawings provide landscape beds within the car parking areas which are not considered to achieve the intention and objectives of the DCP. It is agreed that canopy tree planting is required to ameliorate the massing of the built form and hard stand car parking areas, however the landscape beds are too narrow and ineffective to achieve necessary canopy spread and height maturity.	• Refer to revised landscaping drawings in **Annexure J (pg.489)**.
• The consolidation of beds to provide dimensions of no less than 2m wide and the length of a parking spaces is necessary with greater planting capability at the end of aisles and tree planting in dedicated beds (not diamonds between 4 x spaces). • The frequency of the planting could be 2 x trees per parking row (every 10 – 12 spaces) and offset between aisles to achieve a layering of canopy cover rather than single rows of trees as currently indicated. This will also require an amendment to car parking design and a further loss of parking to achieve the necessary landscape outcome to compensate for the height variation sought.	• Refer to revised landscaping drawings in **Annexure J (pg.489)**.

MATTERS RAISED	APPLICANT RESPONSE
• As raised above, if there is a suggestion that there is a need for this parking, then the allotment dimensions of Site 1A are not adequate and Site 1B and Site 1C should be deleted or redesigned to ensure that parking meeting the needs of the development can be achieved on each allotment without protrusion into necessary landscape setback zones.	• Refer above.
• In addition, Council's Landscape Architecture Supervisor has also raised the following items for consideration:- - Islands are proposed as resin bonded aggregate – there is opportunity for water sensitive urban design measures (being a Council requirement) and additional cooling with trees in these areas. - Tree planting in carparks must be supported by engineered planting pits eg. structural soil or stratavault to ensure optimal healthy root volume and other growing conditions for trees. Note: garden beds to be dimensioned as requested above.	• Refer to revised Landscaping plans in **Annexure J (pg.489)**.
4. Landscape Design Matters	
• There is inadequate quantity of trees to produce necessary cooling in relation to the expanse of building and pavement footprints. The quantity of perimeter (setback) trees is not adequate as spacings are shown at between 18 and 30m. For street trees, Council typically requires 8-10m spacings, with supplementary tree planting in landscape setbacks to maximise	• Refer to revised Landscaping plans in **Annexure J (pg.489).**

MATTERS RAISED	APPLICANT RESPONSE
canopy area. There are large areas of turf which are opportunities for canopy planting.	
• Council has consistently raised issue with the streetscape language of street tree plantings (being small groups with ballast mulch at very large centres planted at 3 trees per 100 linear metres). This does not deliver adequate streetscape outcomes nor best practice canopied cooling to streets.	• Ballast has been removed as requested • Refer to revised Landscaping plans in **Annexure J (pg.489).**
• There is opportunity for greater variety in tree species adding to climate and biodiversity resilience. Some species suggested are not considered sufficiently resilient to climate change and their longevity and health potentially compromised. Small tree species are inappropriate for the scale of the built form ie. Crepe Myrtle, Tuckeroo.	• Council has not provided alternative options, for consideration. • Refer to revised Landscaping plans in **Annexure J (pg.489).** .
• Council through other project and road approvals has established a Southern Link Road streetscape character (road verge and front setback) of informal yet massed planting with native trees providing full canopy cover. A consistent landscape design for the Southern Link Road is required.	• Council has not provided detail of this design alternative, for consideration.
• Surrounding public road intersections are considered to require additional landscaping to reinforce the spatial definition of the intersection and reduce the large scale of grey infrastructure	• Refer to revised Landscaping plans in **Annexure J (pg.489).**
• Ballast as a ground cover is not supported due to its heat attracting properties thus compromising healthy growing	• Refer to revised Landscaping plans in **Annexure J (pg.489).**

MATTERS RAISED	APPLICANT RESPONSE
conditions for trees. An alternative product must be provided and established for the precinct in consultation with Council's Engineering and Landscape Departments.	
• Tensile wire rope for green wall effect – this feature should be designed to be visually effective and attractive without climbers as the climate conditions often results in the failure of green walls to achieve their intended form.	• Noted. This will be designed through detail design.
• Irrigation details are required as security of ongoing maintenance and viability is critical.	• Irrigation detail will be provided in the Landscape Management Plan to be provided at CC or OC stage. This information is not provided at DA stage.
5. Advertising Signage – Pylon Signage Dimensions	
• Chapter C9 – Advertising and Signage of Penrith Development Control Plan 2014 specifically limits advertising pylon signage structures to no greater than 7.0m in height. The proposal provides pylon signs of 4.05m in width and 12m in height. This is an excessive scale of signage and is contrary to the objectives of the DCP. Smaller signage can still achieve sufficient site identification and way finding with typical pylons dimensions being maximum 2.0m width and 7m height. The majority of the signage indicated on the pylon signage plan is estate branding which can be contained within the 2.0m width underneath the Goodman Logo.	• The proposed 12m estate signage is consistent with that already assessed and approved by the Department in the concept approval. • The 12m signage is consistent with the universal Goodman signage incorporated in the various Goodman warehouse precincts in NSW, including adjacent Oakdale Central and Oakdale South Estates. • Signage is required to be appropriately proportioned to that of the host development. Due to the large scale nature of the proposed warehouse buildings, the proposed pylon signage is considered appropriately scaled. A reduced 7m pylon signage would be lost and not provide adequate entry wayfinding for the precinct. For the above reasons, the pylon sign size is required to remain as per that approved and consistent with other Oakdale warehouse precincts.
• In addition, sign wall type S8 may not be located within the boundaries of the site, and there are no details provided regarding dimensions, lighting and the like. Signage must be contained within the boundaries of the site (not within the road reserve) and dimensions, lighting, colours and finishes should be	• The proposed sign (S8) sits on land that will remain in the ownership of Goodman.

MATTERS RAISED	APPLICANT RESPONSE
confirmed where not already detailed on the signage plans.	• Goodman are refining the S8 signage design and seek that DPIE include a condition of consent permitting detailed design plans including dimensions, design and illuminating details, to be submitted to DPIE for review and approval prior to installation.
6. Acoustic Impacts and Assumptions	
• In order to adequately assess acoustic implications resulting from the scope of works within Mod 2, the implications of works resulting from Modification 1 and Modification 3 (Stage 2 Construction) must be factored into the assessment to appreciate the cumulative acoustic implications of development (given they are proposed and substantially known at this point in time). This is also required as the acoustic report submitted in support of Mod 1 is predicated on modelling assumptions for noise generation, which are further refined and clarified as a consequence of the subject Mod 2 and separate Mod 3 which both include building works and tenant occupation as part of the development.	• Noted. The Acoustic Impact Assessment for MOD3 includes cumulative assessment of MOD 1, MOD 2 and MOD 3 developments. Council are invited to review this assessment (**pg.737**) and provide further feedback if necessary. • All assessment reports submitted to date assess both the individual development and the masterplan (surrounding buildings). Therefore, MOD 2 can be relied upon should MOD 3 occur later, or not proceed. • It is also noted that Noise Agreements are in place with all sensitive receivers where an exceedance was reported within the NIA.
• Having regard to the above, the predicted noise levels within Mod 2 (as well as Mod 3) are based on the assumption that the finished ground levels within Mod 1 are both suitable and supportable. As outlined within the separate submission to Mod 1, the finished ground levels and visual impacts of the additional imported fill in Mod 1 are not deemed suitable or supportable and the address of this matter will necessitate revised modelling predicated on suitable and supportable finished ground levels and associated finished floor levels.	• The reduction in pad height agreed by Goodman has little impact on the Noise Impact. This has been confirmed by Wilkinson Murray in the MOD 1 RTS. Refer to MOD 1 RTS in **Annexure C (pg.456).** • It is also noted that Noise Agreements are in place with all sensitive receivers where an exceedance was reported within the NIA.
• It is also noted that Mod 2 and Mod 3 result in noise levels in exceedance of the approved limits. This is not supportable when the exceedance is resulting from elevated finished ground and floor levels resulting from the additional fill activities proposed as	• See response in MOD1 RTS responding to this feedback (as above).

MATTERS RAISED	APPLICANT RESPONSE
part of Mod 1. While the filling concerns relate to future development subject of Mod 3, as oppose to Mod 2, a decision on finished ground levels is still required through Mod 1 to inform if the current modelling assumptions are reliable to assess Mod 2.	• It is also noted that Noise Agreements are in place with all sensitive receivers where an exceedance was reported within the NIA.
• In considering the maximum noise level criteria in accordance with NPfI, it is requested that the Department pursue further analysis with reference to the health impact data sourced from the World Health Organisation and enHealth as detailed in the Road Noise Policy. It is recommended that maximum noise levels be cumulatively assessed against the information provided in the Road Noise Policy, giving detailed consideration to the frequency and duration of elevated noise levels and demonstrating that long-term adverse health impacts will not likely result. Long-term health concerns may not necessary be linked only to the maximum noise level per event but may also be correlated ith elevated noise over a long period. For example, the Road Noise Policy indicates that levels between 40 and 55dBA may be related to adverse health effects with many people needing to adapt to cope.	• See response in MOD1 RTS (**pg.12 & 13**) responding to this feedback.
• The noise assessment accompanying Mod 3 effectively seeks to 'supersede' or ‘over-ride’ the separate acoustic assessment in support of Mod 2, specifically relating to revised sound power levels. The Wilkinson Murray assessment (supporting Mod 3) states that the sound power levels used in SLR's Report (for Mod 2) are overly conservative. It is not acceptable that one report is disregarding or changing the parameters of another report as a consistent approach to modelling that results in the predicted noised levels must be established to ensure that a consistent and cumulative impact analysis can be undertaken. The applicant should be requested to provide a single acoustic report, or separate acoustic reports that provide consistent adoption of modelling parameters and assumptions, to the	• See response in MOD1 RTS (**pg.14**) responding to this feedback.

MATTERS RAISED	APPLICANT RESPONSE
inform the predicted noise level emissions. The assessments progressively should also consider the cumulative impacts of preceding development approved in combination with the current proposal. Alternatively, DPIE (or EPA) is requested to determine the appropriateness of the sound power level and other input data used in the noise modelling processes for address in the submitted acoustic reports for these applications and moving forward.	
• In recommending operational noise mitigation strategies, the surface construction of vehicular access ways and roads is not discussed in the noise impact assessments. It is requested that consideration be given to the type of road construction to ensure maximum acoustic benefit, should this not already have occurred.	• See response in MOD1 RTS (**pg.15**) responding to this feedback.
7. Matters Raised in Submission to Mod 1	
• The matters raised within Council's correspondence relating to Mod 1 also substantially applies to this Mod 2 as Mod 1 alters finished ground levels to which Mod 2 responds.	• Noted. Please refer to MOD1 RTS (**pg.7**).
• Please consider the matters raised with Council's correspondence with respect to Mod 1 as part of this assessment, with specific regard to finished ground level concerns.	• Noted. Please refer to MOD1 RTS (**pg.7**).
FIRE & RESCUE NSW	
• FRNSW reaffirm that recommendations previously submitted by station officer Cameron Wheatley (D17/88054, 20 December 2017) in regard to development remain valid, specifically "That any development application relating to one of the Oakdale West Estate's precinct one's speculative warehouses that is subject of	• Noted. • A Fire Safety Strategy was submitted as part of the Development Application. This was specifically completed for the subject customer. Goodman will work with Fire

MATTERS RAISED	APPLICANT RESPONSE
• the provisions of Part 2 of SEPP 33 and is subsequently approved; a condition be attached to the relevant instrument of consent requiring a Fire Safety Strategy (FSS) to be undertaken in accordance with the requirements of Hazardous Industry Planning Advisory Paper (HIPAP) No 2., • In addition, that any FSS be prescribed to meet Fire & Rescue NSW requirements or approval (as currently applicable under Appendices 1 – 3 [inclusive] of the January 2011 edition of HIPAP No.12)" This is to ensure that the fire and life safety systems afforded to the development are; commensurate with the hazards and risks, capable of mitigating a worst credible fire scenario, and give consideration to FRNSW's operational requirements. • It is noted that the modification application proposes to increase in building height for Warehouse 1A in order to accommodate automated high-bay operations. FRNSW deem that such operations constitute 'special problems of fighting fire' and recommend that suitable provisions be made in accordance with clauses E1.10 and E2.3 of Volume 1 of the National Construction Code. • It is recommended that each proposed warehouse building of the subject development be served by required fire systems that are independent of one another.	& Rescue NSW to finalise the FSS process including finalisation of the FEBQ process. • Noted. • Noted.
DPIE – OFFICE OF STRATEGIC LANDS	
• As OSL understands it, Mod 2 seeks to make a number of amendments to the existing approved Concept Plan and Stage 1 approval. OSL understands that MOD 2 does not seek to amend conditions D93, D94 and D95. OSL does not raise any objections to the approval of MOD 2, provided conditions D93,D94 and D95 remain in place and are not amended in any form. • Notwithstanding the above, OSL would also like to reiterate that	• Noted • Noted

it does not support the loss of any native vegetation within the Erskine Park biodiversity corridor and that a bridge spanning over the biodiversity corridor land would be acceptable to OSL, provided that the bridge allowed for vegetation to grow underneath the bridge.	
DPIE - NRAR	
• The Department of Planning, Industry and Environment - Water and the Natural Resources Access Regulator (NRAR) have reviewed the above and have no comments.	• Noted.
ENDEAVOUR ENERGY	
• Erskine Park) via the revised reticulation under CAM UIS0846 depending on the size of the load application(s). • The road layout within amended Precinct 1 will alter the 22 kilovolt (kV) distribution reticulation requirements under Customer Application Management (CAM) for Urban Industrial Subdivision UIS0846 for the developer and will need to be reviewed by Endeavour Energy's Network Connections Branch / Asset Planning & Performance. The proposed two x 132 kV feeder routes along Estate Road 01 and Estate Road 6 will not change. • At this point in time no firm load application for electricity supply for the revised buildings 1A + 1B + 1C has yet been received. • Electricity supply for buildings 1A + 1B + 1C will be from the future Oakdale West Zone Substation which has frontages to Estate Road 06 and Estate Road 07 at 22 kV supply voltage – some initial capacity may be available to the smaller buildings 1B + 1C from the nearby Mamre Zone Substation (located at 8 John Morphett Place Erskine Park) via the revised reticulation under CAM UIS0846 depending on the size of the load application(s).	• This contradicts Endeavour Energy's previous advice to Goodman that power for the subject warehouse will be provided from the Mamre zone substation. • Goodman confirms a formal application has already been lodged with Endeavour Energy. • Goodman has arranged a meeting with Endeavour Energy for the week of the 17th of February 2020.

MATTERS RAISED	APPLICANT RESPONSE
FURTHER ENDEAVOUR ENERGY RESPONSE - PROPERTY SERVICES SECTION (31.01.20)	
• The initial due-diligence investigations were completed in July 2019 confirming the site is in order to proceed to the next phase of the site acquisition. • Environmental controls and site clearing commenced in December 2019 and with the bulk earthworks commencing in the New Year and scheduled to be completed in October 2020. • Subject to and based on the foregoing Endeavour Energy has no objection to the modification.	• Noted • Noted • Noted
CROWN LANDS, NEW SOUTH WALES	
• Crown Lands has no comments for this proposal.	• Noted.
WATER NSW	
• WaterNSW owns and manages the Warragamba Pipelines, which are critical water supply infrastructure located along the northern boundary of the Oakdale West Estate site. • WaterNSW has previously commented on various aspects of the Estate, including the request for SEARs for this Modification. Given the changes are set back from WaterNSW land, assets and infrastructure, WaterNSW has no requirements or comments.	• Noted • Noted.
EPA	
• The proposed modification and report do not contain any further information that would constitute a scheduled activity under Schedule 1 of the Protection of the Environment Operations Act 1997. As such, the EPA has no interest in this proposal.	• Noted.

RMS	
1. TfNSW provided comments on 11 November 2019 regarding the requirements for the freight line corridor preservation and it remains applicable. 2. The previous TfNSW comments dated 13 February 2019 and 12 June 2019 also remain applicable. 3. Vehicular access on the new local roads should not be located within close proximity to future traffic signals on the Southern Link Road for efficiency and safety reasons. 4. Automatic vehicular access gates should be removed along the Western North South Link Road.	• Noted • Noted • Noted – new roads have been sufficiently setback from future traffic signals as required. • Noted.
DPIE – ENVIRONMENT, ENERGY AND SCIENCE GROUP (ESS)(OEH)	
• To assist, EES has reviewed the response prepared by ecologique/environmental consultants dated 25 November 2019, and it is noted that the report concluded that "... MOD 2 will not result in any changes to consent conditions as relevant to the clearing and offsetting of native vegetation and the protection and management of native vegetation being retained." • Based on the information submitted EES has formed the view that the proposed modification is unlikely to increase the impacts on biodiversity values.	• Noted. • Noted.
SIGMA HEALTHCARE PTY LTD	
• The services currently provided by Sydney Buses in the form of public transport servicing the current concept of 22 warehouse buildings are totally inadequate, moreover, they are non existent. • The plans as they stand need to address the public transport issue before any recommendation can be considered as ANY increase to warehousing space will simply exacerbate the	• Noted. Goodman supports the provision of public transport to the area. • Goodman has undertaken traffic modelling to demonstrate adequate traffic capacity to support the proposal. Sigma Healthcare are invited to review the TIA included with the MOD2 submission package.

problems being faced by the thousands of people having to make their transport arrangements without there being a public transport option. • The case for public transport is extremely strong, indeed, there is a significant health and safety risk presented by the lack of public transport to the general public who have no choice but to walk or cycle to work. Often the temperatures are in excess of 40 degrees at a time when most of the workforce in the Oakdale area would be "changing shift". This forces the public to expose themselves to high temperatures when having to walk several kilometres to the nearest bus stop. • The issue needs resolving in the form of a statement of intent to commence public transport services throughout the Oakdale panorama in order to ensure the public can access the workplaces afforded the permission to operate. The numbers of general public would easily be in their thousands and we have a responsibility to ensure people can access their place of work 24/7 with the use of public transport out of the main metropolitan areas of the surroundings i.e. Blacktown, Penrith, The Hills (Rousehill, Kellyville etc.) as well as Parramatta. • The "service window" needs to be carefully considered too. Most of the distribution environment created in the Oakdale Industrial Estate will be dependent upon a 24/7 three shift system over time as the on-set of Badgerys Creek takes shape and the likelihood of a round the clock service to the users of distribution services grows ever more demanding. This means that the services provided by public transport need to be pragmatic and fit for purpose with most people starting and finishing work at 5/6 AM as well as 1/2 PM and 9/10 PM - all requiring transport back to the major metro centres nearby that feed the estate's demand for workers. • Finally, the area is isolated and needs the arteries feeding into it to sustain the growth and development of a workforce whose pay rates will likely be at "Award levels" and we cannot therefore assume (without being arrogant) that people can afford to drive. • It is for these reasons that I object to the expansion plans.	• Noted. Goodman agrees with the benefits associated with public transport. • Goodman supports the provision of public transport, and has been in discussion with Transport for NSW concerning this. It is hope the agency is able to assist in providing this in the near future. • Goodman supports the provision of public transport, and has been in discussion with Transport for NSW concerning this. It is hope the agency is able assist providing this in the near future.

Other submissions	
MOD 2 Employment Numbers, Shift times, and Traffic ▪ There appears to be some discrepancy in the employee numbers provided for MOD 2. For instance, it is noted the Traffic Impact Assessment (TIA) for MOD 2 has modelled traffic generation assuming 432 staff associated with Lot 1A, however you have advised that Lot 1A is likely to provide for approximately 506 operational jobs and the site as a whole approximately 606 jobs. Please confirm whether the details regarding total traffic generation provided in the TIA are correct based on the current information.	▪ Goodman confirms that the TIA submitted as part of the application is correct as it relates to traffic movements. The anticipated average operational jobs within the facility at any point in time will be 432 staff members for Building 1A. However, up to 506 operational jobs are likely to be generated due to this development. ▪ It is expected that a further 100 operational jobs are generated for the Building 1B and 1C development.
▪ As well as providing definitive information on the total number of employees, please detail the number of employees per shift and shift times.	▪ Shift times are as per the detail provided in the TIA submitted to DPIE as part of the development application.
▪ Please also clarify parking requirements in the context of employment numbers and shifts.	▪ This is outlined within the TIA submitted to DPIE as part of the development application.
Amendments to Mod 2 – Site 1A ▪ Following the removal of the carpark access off the WNSLR, it appears no additional traffic modelling or analysis was done to ascertain if queuing would occur in the remaining accessway, car park or Estate Road 1. Please provide further information that demonstrates the ability of the remaining car park access to handle predicted traffic volumes without queuing.	▪ Refer to the MOD 2 RTS **Annexure I** (**pg.485**), a technical memo from the traffic engineer confirming the single entrance does not create queuing onto the estate road. We confirm that the throat at the entry has also been widened. Refer to **Annexure C** (**pg.456**) of this document which includes the updated plan for Building 1A.
Amendments to Building 1B & 1C ▪ Confirmation regarding updated building layout taking into consideration council's comments	▪ Please refer to **Annexure D** (**pg. 474**) showing the final plans for Building 1B & 1C.

Other submissions	
▪ Just wondering if you have consulted with Fire & Rescue NSW on the revised plan for Lot 1B? I note the site is no longer providing perimeter access around warehouse 1C with the removal of the fire brigade access road and car parking in the north east corner. Just wanting to run this by you as I am concerned it may be a safety issue in terms of fire and emergency vehicle access requirements. I note an updated Fire Safety Strategy has not been provided.	▪ The Fire Engineer for the project has confirmed given the classification of the building (and size), there is no requirement for the Fire Access track. ▪ As part of the development process we will go through the standard consultation with Fire & Rescue NSW which will include the finalisation of a Fire Engineering Brief Questionnaire.
Landscaping Amendments – Mod 1, Mod 2 and Mod 3 • The Department notes Council's position on suitable and consistent landscape setbacks along the Southern Link Road. Please respond to this matter, including considering options to relocate some of the carparking.	▪ We refer back to our comments on the RTS for MOD 2 (**pg.425-428**), included within Annexure B of that document. ▪ The initial SSD approval (for boundaries facing the WNSLR and SLR) provided that a 10m landscape setback is required. This is an existing approved evelopment control within the consent (**pg.425-428**). ▪ Council have requested a 20m landscape setback. ▪ Goodman has in good faith doubled the landscaping setbacks on the internal boundaries for Precinct 1 from that otherwise required by the setback controls, to enhance the building presentation from the internal roads. ▪ In addition to the above, Goodman has reluctantly updated the design of 1B & 1C to respond to Council's request for a 20m

Other submissions	
	landscape setback along the WNSLR. This has been done as a gesture of goodwill. ▪ Future OWE development along the SLR will provide a 10m landscape setback in accordance with the approved setback controls in SSD7348, and will not provide 20m landscape setbacks.
Landscape Plans • As the Landscape Plans for MOD2 and MOD 3 have not yet been finalised, Council has requested the following amendments due to the likely viability of certain species given the climate and heat conditions (including reflective heat) of Penrith - Removal of Elaeocarpus eumundi from the planting schedule - Limiting of the use of Tristaniopsis laurina (Water Gum) so that it is not planted within the car parking areas	▪ The landscaping drawings for MOD 2 have been amended and can be found in **Annexure E (pg.477)**.
Bakers Lane Traffic ▪ The TIA for MOD 2 is not clear on if the construction works are commencing prior to the completion of the WNSLR.	▪ The WNSLR is currently scheduled to be completed prior to the commencement of the MOD 2 works.
Transgrid • Comments from Transgrid were sent through to you yesterday. Please include your response to Transgrid with your response to the Department's issues.	▪ Please see **Annexure F (pg.479)** from Transgrid confirming acceptance of the revised levels for MOD 3, which endorses the changes to MOD 1, and MOD 2.
Visual Impact Assessment (VIA) ▪ VIA memo considering the reduced levels at the western boundary.	▪ Refer to **Annexure G** (**pg.481**) VIA memo that concludes the reduction in pad level height has minimal impact on the view at that point.
Confirmation of GLA's & GFA's	▪ Please see below for MOD 2 & MOD 3.

Other submissions

- Please confirm GLA and GFA.

GLA	MOD 2	MOD 3
Warehouse	423,104 sqm	529,101 sqm
Office	21,242 sqm	23,374 sqm
Other	4,004 sqm	4,349 sqm
Total	**448,350 sqm**	**556,824 sqm**

- What is the 'Other' box referring to?

Outbuildings

(inc Dock office, Trailer Workshop, Trailer wash, D.G. Store, Computer Room, Gatehouse, Energy Complex, Refueling area, Battery charge, Skybridge & Lobby)

- Is the Stage 2 expansion for Building 1A included within this application?

  - Yes. The Stage 2 expansion for Building 1A is shown on the plan set submitted.
  - It has been considered as part of the assessments of the environmental impacts.
  - The Environmental Assessment Report completed by URBIS notes that approval is sought for the future warehouse expansion for Building 1A (Refer to executive summary).
  - The Stage 2 expansion spans 3,318 sqm and is for warehouse and distribution use in accordance with the approval sought under the Environmental Assessment Report. This area is considered within the total GLA put forward

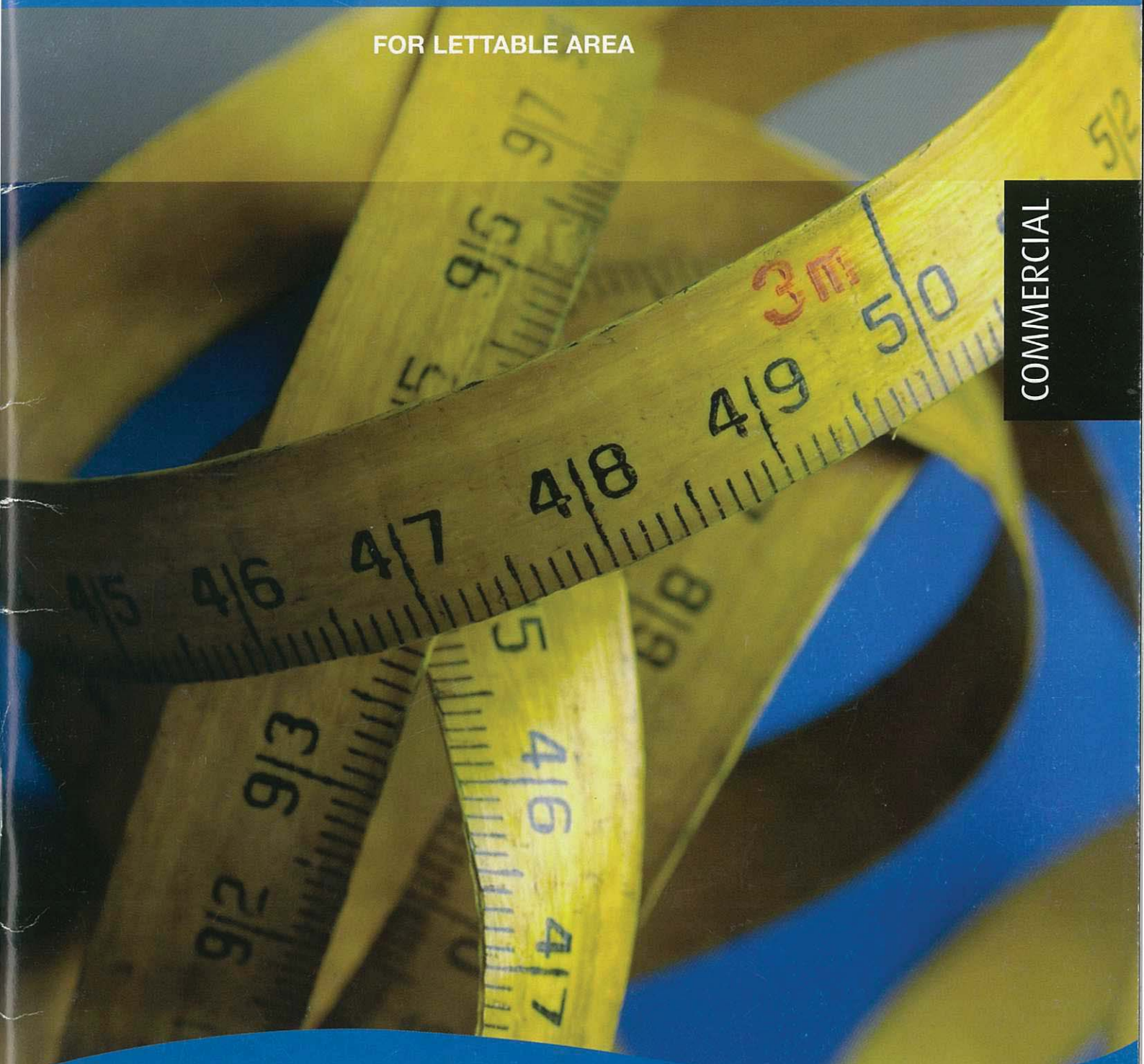
Other submissions	
	as part of the assessment and included in the tables above.

Annexure A

METHOD OF MEASUREMENT

FOR LETTABLE AREA

COMMERCIAL



The Voice of Leadership

PROPERTY COUNCIL of Australia

2. GROSS LETTABLE AREA (GLA)

Application

Used for calculating tenancy areas in:

- warehouses;
- industrial buildings;
- free standing supermarkets; and,
- showrooms.

Definition

2.1 Gross Lettable Area is the floor space contained within a tenancy at each floor level using the following rules:

2.1.1 in the case of external building walls, measuring the dominant portion of the outside faces of walls of the building alignment; and,

2.1.2 in the case of inter-tenancy walls or partitions or common areas, measuring to the centre line of the walls.

NOTE: Window or door recesses should be ignored.

2.2 Included in the lettable area calculation are areas occupied by:

2.2.1 window mullions;

2.2.2 window frames;

2.2.3 structural columns;

2.2.4 engaged perimeter columns or piers;

NOTE: The areas indicated in Points 2.2.1 to 2.2.4 should only be included if they are inside the line of the outside face of the main perimeter wall.

2.2.5 additional facilities specially constructed for individual tenants that are not covered in section 2.3.

2.3 Excluded from the lettable area of each tenancy in a multiple tenanted building are:

2.3.1 the following areas:

- stairs, accessways; fire stairs; toilets;
- recessed doorways;
- cupboards;
- telecommunications cupboards;
- fire hose reel cupboards;
- lift shafts;
- escalators;
- smoke lobbies;
- plant/motor rooms; and
- tea rooms and other service areas;

where all are provided as standard facilities in the building;

2.3.2 lift lobbies where lifts face other lifts, blank walls or areas listed in Section 2.3.1 above;

2.3.3 areas set aside for the provision of services, such as electrical or telephone ducts and air conditioning risers to the floor, where such facilities are standard facilities in the building;

2.3.4 areas dedicated as public spaces or thoroughfares that are not for the exclusive use of occupiers of the floor or building, such as foyers, atria and accessways in lift and building service areas;

How are common areas treated in sub-lease space?

The additional common areas that arise where a floor or tenancy is divided for sub-leasing are not considered part of 'public spaces or thoroughfares'. The areas would be included in the area of the tenant or occupier who holds the head lease.

2.3.5 areas and accessways set aside for use by service vehicles and for delivery of goods, where such areas are not for the exclusive use of occupiers of a tenancy.

2.4 Treatment of Balconies, Verandahs etc.

Balconies, terraces, planter boxes, verandahs, awnings and covered areas should be excluded from tenancy area calculations, but may be measured and separately identified for the purpose of negotiating rentals.

Areas should be measured to the inside face of the enclosing walls or structures. The outer edge of the awning or covered area is the defined edge.

A Checklist for Measuring Areas in Single Tenant GLA Buildings

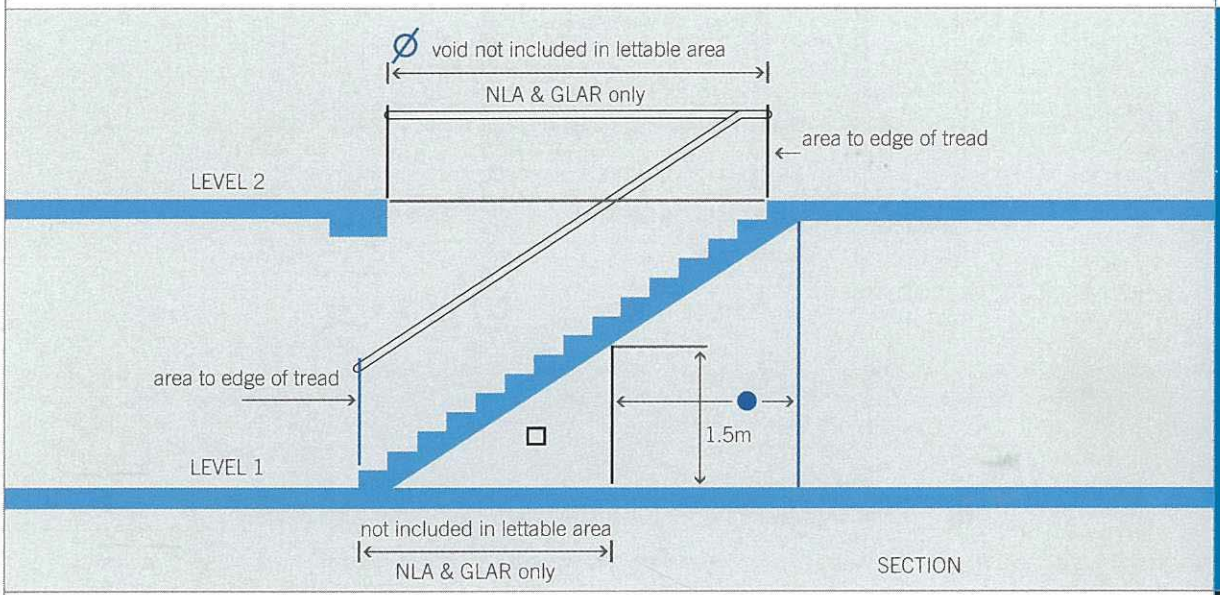
The Gross Lettable Area (GLA) should be determined by including everything within the external building walls.

Here's a checklist to clarify some commonly asked questions. While not all are relevant to every building, it's helpful to consider them each time a building is measured.

- Stairs, accessways, fire stairs, toilets, recessed doorways, cupboards, telecommunication cupboards, fire hose reel cupboards, escalators, smoke lobbies, plant/motor rooms, tea rooms and other service areas are included in GLA.
- Lifts, including the shaft, should be included in the area of every floor.
- The area of the stairs is to be included in the area of the floor above.
- Vertical ducts and other penetrations are to be included in the area of each floor.
- Loading docks that are fully enclosed and capable of being secured are to be included in GLA.
- Where a loading dock or similar structure has open sides, it should be excluded from tenancy area calculations but may be measured and recorded separately. The measurements should be taken to the outside face of the roof extremities.
- Where a mezzanine level has been erected by a tenant, that area should be shown separately and a statement added to the effect that the area is a structure that has been erected by the tenant.
- On the first and upper floors, all voids except stairway voids, are to be excluded from the area (see diagram on page 31).

4. EXPLANATORY DIAGRAMS

Treatment of Stairs in NLA, GLAR and GLA Buildings



Open Stairway

Such stairway being part of the original architectural design and built during original building construction.

- ● NLA and GLAR on level 1 includes area under stairway where height above floor is at least 1.5 metres.
- Ø Void or tread above stairway is not included in NLA or GLAR on level 2 but is included in GLA. Area should be recorded separately for NLA and GLAR.
- □ Record this area separately for NLA and GLAR. Area is to be included in GLA.

Open Stairway

Added after building has been constructed for private use by tenant as inter-floor access.

- ● Included in NLA, GLAR and GLA for level 1.
- Ø Included in NLA, GLAR and GLA for level 2.
- □ Included in NLA, GLAR and GLA for level 1.

Annexure B

Goodman OWE – Estate Signage Illumination

The following components of the proposed OWE signage is proposed for illumination. It should be noted that the illumination will be of low intensity and will mirror illumination approved of Goodman signage across NSW and Australia.

The following components of the signage is proposed for illumination:

+ **Sign S1** – proposed to be illuminated as follows:
  - ‘Goodman’ lettering within the Goodman square logo / Estate name lettering / RHS (side) section (refer to area highlighted for sign S1 below)

+ **Signs S2, S3, S4, S5, S6** – all proposed to be illuminated as follows:
  - ‘Goodman’ square logo / numbering / ‘Entry’ wording (where relevant) / arrows (Refer to Fig.1 - 3 below for example)

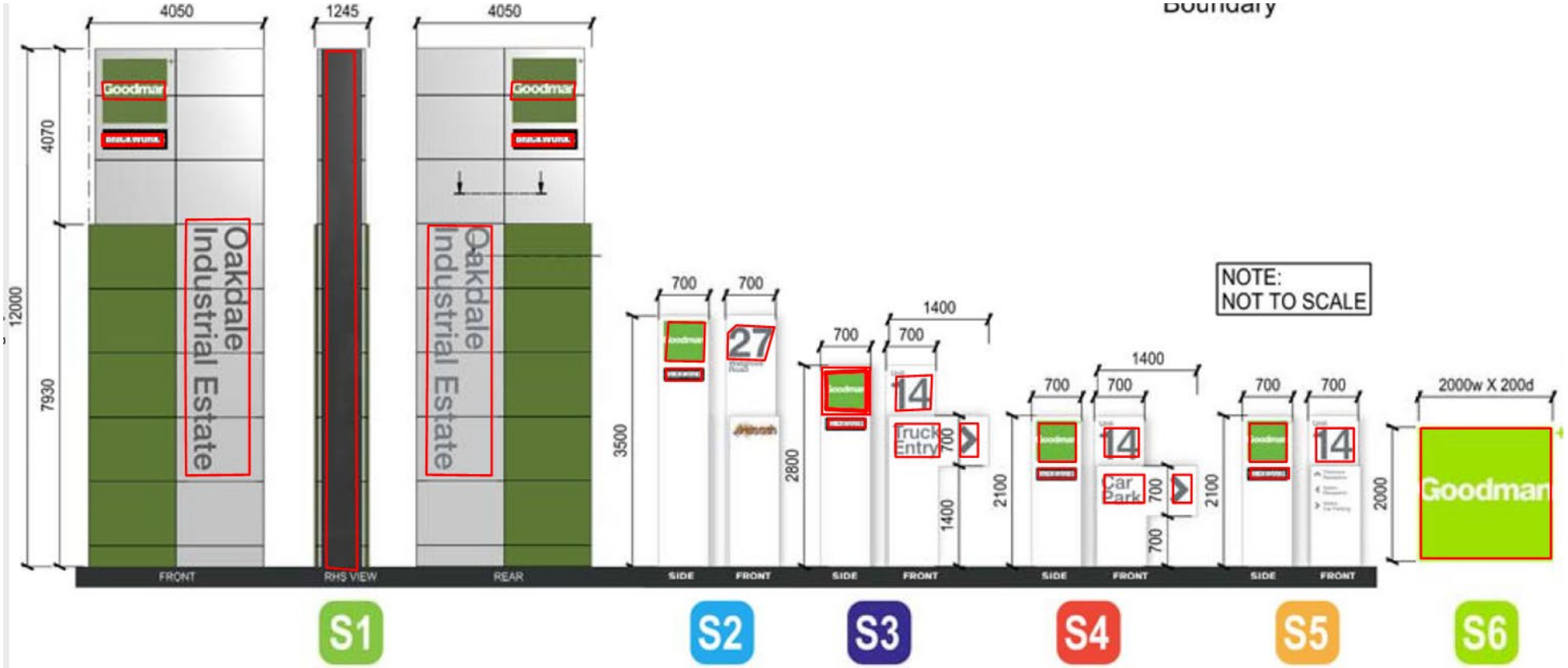


Figure 1 - Proposed OWE signage illumination



S1

Identification site

Day view



S1

Identification site

Night view

Fig. 2: Sign S1 – proposed illumination



Figure 3: S2, 3, 4, 5 example illumination

Assessment Criteria

Part 2 of SEPP 64 provides that a consent authority must consider the matters in Schedule 1 of the SEPP prior to granting consent to development involving signage. The assessment criteria under Schedule 1 of the SEPP are addressed in the table below.

Illumination

Would illumination result in unacceptable glare?	No. Illumination will be muted in nature, with only certain portion of the signage illuminated for a sophisticated yet recessive presentation (refer to Fig. 2 & 3 above).
Would illumination affect safety for pedestrians, vehicles or aircraft?	The illumination is not proposed to be of an intensity which would have any unacceptable impact on either pedestrian, vehicles or aircraft. The illumination levels propose have been tried and tested throughout Goodman's numerous estates to be of an acceptable level which provides adequate visual appearance at night, while not creating glare.
Would illumination detract from the amenity of any residence or other form of accommodation?	There are no residences within proximity to the signage which would be impacted by proposed illumination.
Is the illumination subject to a curfew?	Due to the industrial character of the area, the fact it operated 24/7 and has no nearby sensitive receivers, no curfew is proposed.
Can the intensity of the illumination be adjusted, if necessary?	As the light will be of low intensity, this will not be necessary, however it is possible for the illumination intensity to be adjusted.

Annexure C

MATTERS RAISED	APPLICANT RESPONSE
NSW DEPARTMENT OF PLANNING, INDUSTRY, & ENVIRONMENT	
Sewerage Design 1. The proposed modification involves the increase of the Precinct 2 building pad level height by 2 metres to facilitate the sewerage servicing of Precinct 2. The Department notes Council have stated it is unable to support the proposed increase in pad level height in its submission made on the modification application. The Department requests that the proposed sewerage design be revisited to reduce the increase building pad level height of Precinct 2 and provide detailed justification for the final pad level height.	• Both Council and the Department's concerns with the increase in pad levels are noted. After significant consideration of alternative design and infrastructure options and at additional cost, Goodman will reduce the pad levels of 2E, 2F & 2G (or 3A, 3B, & 3C as they are described for MOD 3) back to the original approved SSD levels. This is in line with Council's request to reduce the pad levels west of Road 3 back to the approved SSD levels. • For clarity, we summarise the pad levels for MOD 1 and MOD 3 below (Note, these refer to the Finished Floor Level (FFL)).

SSD & MOD 1 pad level reference	MOD 3 pad level reference	SSD approved pad level	Original MOD 1 pad level	Proposed MOD 1 pad levels	Proposed MOD 3 pad levels
2A	2A	64.50	66.20	66.20	68.60
2B		64.50	66.20	66.20	68.60

MATTERS RAISED	APPLICANT RESPONSE

2E	3A	66.80	67.00	66.80	66.80
2F	3B	67.80	69.5	67.80	67.80
2G	3C	67.80	69.5	67.80	67.80
2H	3D, 3E, 3F, 3G	71.75	71.75	71.75	71.75
2J		71.75	71.75	71.75	71.75

- Refer to **Annexure A** for the updated civil masterplan confirming these levels.
- We summarise the pad levels for MOD 1 and MOD 3 below (Note, these refer to the Bulk Earthworks Levels (BEL)). Refer to **Annexure A** updated civil masterplan and memo from our civil engineers confirming these levels.

SSD & MOD 1 pad level reference	**MOD 3 pad level reference**	**SSD approved pad level**	**Original MOD 1 pad level**	**Proposed MOD 1 pad levels**	**Proposed MOD 3 pad levels**
2A	2A	64.20	66.20	66.20	68.30
2B		64.20	66.20	66.20	68.30
2E	3A	66.50	67.00	66.50	66.50
2F	3B	67.50	69.5	67.50	67.50

MATTERS RAISED	APPLICANT RESPONSE

2G	3C	67.50	69.5	67.50	67.50
2H	3D, 3E, 3F, 3G	71.75	71.75	71.75	71.75
2J		71.75	71.75	71.75	71.75

- Godman does not propose to reduce the pad levels back to the SSD approved levels for Pad 2A & 2B (or 2A as described in MOD 3). The pad has been increased in height to accommodate one large flat pad for a shortlisted enquiry. The pad has also been increased to accommodate the change to road network in MOD 3. Pad 2A is offset 120m from the western boundary. The section included in **Annexure B** shows that there is appropriate buffer zone between the western boundary and the proposed building. Working from the western boundary adjacent to Pad 2A; a 80m landscape setback exists as well as a biodiversity conservation area that is heavily planted with 15m high mature trees, a 23m road corridor is proposed to built, and then each building pad will have appropriate landscape setbacks. The section included shows that the view from the western neighbours remains largely the same, despite the increase in pad level.
- To further mitigate any visual impacts resulting from the raised pad levels of Pad 2A, Goodman propose to include additional landscaping immediately to the west of Pad 2A, in addition to the existing extensive conservation area which exists as a highly mature tree area. Refer to the revised landscape drawing shown in **Annexure C** and sections highlighting the setbacks between the western boundary and the proposed building on Pad 2A (refer to **Annexure B)**.

MATTERS RAISED	APPLICANT RESPONSE
Fill Importation 2. The Modification Report prepared by Urbis describes the development as only modifying the pad levels of Precinct 2 however, Table 3 of the Modification Report provides the net changes in cut and fill across each precinct of the Oakdale West Estate. The Modification Report should be updated to concisely describe all changes being sought under this modification.	• The only changes now to pad levels are to Pad 2A & 2B (2A) as described above. Refer to revised cut/fill table below based on MOD 3 (630,023m3 net import). PRECINCT / MOD 3 ORIGINAL CUT/FILL BALANCE / MOD 3 REVISED CUT/FILL BALANCE 1 — 78,999 — 78,999 2 — -276,343 — -276,343 3 — 320,304 — 270,706 4 — 490,773 — 490,773 5 — 149,220 — 149,220 WNSLR STOCKPILE — -83,332 — -83,332 TOTAL — 679,620 — 630,023
3. In respect to the comment above, the Department requests that changes to all building pad level heights be confirmed for Oakdale West site.	• Refer to point No. 1 above for the changes in pad levels and updated civil plans (**Annexure A**).

MATTERS RAISED	APPLICANT RESPONSE
Visual Impacts 4. The Modification Report should confirm if the increase in pad level height will result in changes to the height and slope of the western boundary landscape buffer. Furthermore, the Modification Report and Visual Impact Assessment should clarify if any changes to the western boundary landscape buffer have been considered in the impact assessment.	• There will be no changes to the proposed levels at the 40m western landscape buffer and conservation area. Goodman are proposing to install further landscaping as a mitigation measure adjacent to the conservation area. Refer to **Annexure C**.
PENRITH CITY COUNCIL	
Finished Ground Levels and Western Boundary Interface	
5. Retention of finished ground levels as approved, or similar to what is approved, is considered essential for all lots west of Road 3, with gradient transitions to be managed through future Development Applications within the confines of allotments, not additional imported fill presenting adverse visual impact external to the allotments.	• Refer to point No. 1 above (DPIE comment).
6. It is also noted that a landscape bund / mound is proposed south of the basin, with no indications of a landscape mound west and north of the basin. While the fill as proposed is not supportable, it would be recommended that any fill required within the western end of the precinct be separated from adjoining development by a suitable landscape mound where	• As the pad levels for Pad 2E, 2F, & 2G (3A & 3B) are proposed to remain as approved, the landscape bund / mound treatment therefore proposed to remain consistent with that already approved. • In addition to the reduction in pad levels (3A & 3B), further landscaping is proposed in the area to the west of Pad 2A (**Annexure B and C**). This will ensure that additional screening

<table>
<tr><th>MATTERS RAISED</th><th>APPLICANT RESPONSE</th></tr>
<tr><td>canopy tree planting and layered shrub planting can ameliorate the bulk, scale and visual impacts of development, specifically noting Mod 2 and Mod 3 seeks approval for non- compliant building height well beyond the DCP limitation of 15m.</td><td>is provided to enhance visual presentation to the west. The visual impact assessment has been updated (Annexure D) to demonstrate this improvement.</td></tr>
<tr><td>7. It is also noted that the proposal seeks to partially manage level differences to the north through battered slopes adjacent to the pipeline. It would then stand to reason that a battered design treatment west should be provided rather than finished ground levels necessitating extensive retaining walls. Its is also unclear what the height of the proposed retaining walls will be, as the section drawings indicate “H” without a nominated wall height. Coupled with the suggestion of a 5.0m acoustic wall, the effective wall presentation as viewed from neighbouring properties is excessive. If the absence of mounding relates to stormwater management and discharge capability to the basin, then the stormwater strategy cannot sufficiently cater for the development form and arrangement sought through the current modification.</td><td>• Refer to Annexure B for sections confirming the retaining wall and noise walls positions and height, based on MOD 3 as this will supersede other Modifications. See below table summarising the change to the retaining walls and noise walls for MOD 1 and MOD 3 against the SSD approval. The below focuses on retaining wall and noise walls adjacent to Pad 2A (max height).

<table>
<tr><th>DESIGN PHASE</th><th>Retaining Wall 02 Maximum Height</th><th>Noise Walls Maximum Height</th></tr>
<tr><td>Initial SSD approval</td><td>12.7m</td><td>5m</td></tr>
<tr><td>MOD 1 (Proposed)</td><td>13.7m</td><td>5m</td></tr>
<tr><td>MOD 2 (Proposed)</td><td>13.7m</td><td>5m</td></tr>
<tr><td>MOD 3 (Proposed)</td><td>12.8m</td><td>5m</td></tr>
</table>

• A noise wall and retaining wall were approved under the initial SSD, and in fact they were approved closer to the western boundary. MOD 3 which will supersede MOD 1, requests approval for the retaining wall and noise wall to be further offset from the western</td></tr>
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MATTERS RAISED	APPLICANT RESPONSE
	boundary. Refer to **Annexure B**. Further to this, the additional landscaping effectively screens both of the walls as to reduce the appearance of the bulk and scale.
8. The elevated nature of development within the allotments, is also likely necessitating acoustic walls of 5.0m on top of the retaining walls. This further reinforces that the fill activities are not only resulting in a poor interface and presentation outcomes as viewed from existing developments to the west, but the fill will also set up future acoustic management issues, as a 5.0m wall on top of an excessive retaining wall is not a suitable planning outcome given the zone and development interface.	• As demonstrated by the sections in **Annexure B**, the noise walls are generously setback from the site boundary and behind significant landscaping (of which Goodman is proposing to further add to within the conservation area). It will be presented as a terraced treatment rather than a single level change reducing the appearance of significant bulk. • The Noise Wall and Retaining Wall position has in fact improved from the sensitive receivers to the west, compared to that originally approved. Refer **Annexure B**.
9. The information submitted also suggests that neighbour engagement is ongoing for further 'receiver' mitigation measures which would suggest that those proposed measures may not be sufficient to address and manage noise impacts external to the site.	• No ongoing engagement is required for receivers to the west (N1). The noise assessment demonstrates that the noise mitigation measures are adequate for the N1 receiver. • The ongoing neighbour engagement refers to discussion with residential receivers N3, N4 and N5 to the south. Goodman confirms that Noise Agreements are in place with each of these receivers (no additional mitigation measures are required). These can be made available upon request, noting that these receivers have agreed to the noise impacts.
10. The scale relationship of this fill and the visual presentation of the proposed retaining wall and acoustic fence is best reflected on the landscape sections (AA) and (BB) which provided a finished ground level above the roof of the adjacent residential dwellings.	• The updated sections and landscaping drawings demonstrate that the noise walls and retaining walls are unlikely to be viewable from the west as a result of the significant landscape setback and embellishment. Refer to **Annexure B** and **C**.
Western Bund Maintenance Track	

MATTERS RAISED	APPLICANT RESPONSE
11. The design of the western bund maintenance track should include a requirement that the track be sealed to minimise the potential for scouring and erosion and to eliminate dust disturbance and to the adjoining school and retirement village. It is noted that this could be addressed as an additional / amended condition of consent if the modification application is supported.	• This track will be sealed with a bitumen spray seal which will reduce any dust impacts to the surround. Additionally, it is noted that the road will be used infrequently and only for landscape maintenance purposes.
Acoustic Impacts and Modelling Assumptions	
12. The proposal outlined within Mod 1 seeks to substantially change finished ground levels from that approved on the endorsed concept plan for this estate.	• Refer to point No. 1 above (DPIE comment).
13. In order to adequately assess acoustic implications resulting from the scope of works within Mod 1, the implications of works resulting from Modification 2 and Modification 3 (Stage 2 Construction) must be factored into the assessment to appreciate the cumulative acoustic implications of development (given they are proposed and substantially known at this point in time). This is also required as the acoustic report submitted in support of Mod 1 is predicated on modelling assumptions for noise generation, which are further refined and clarified as a consequence of Mod 2 and Mod 3 which both include building works and tenant occupation as part of the development.	• Noted. Cumulative impact assessment has been completed in MOD2 and MOD 3 (and Stage 2) acoustic assessment - see attached **Annexure E** & F. • Response to MOD2 and MOD3 noise impacts will be addressed under separate cover in the 'Response to Submissions' for these applications.

MATTERS RAISED	APPLICANT RESPONSE
14. It is also noted that Mod 2 and Mod 3 is modelled to result in noise levels in exceedance of the approved limits. This is not supportable when the exceedance is resulting from elevated finished ground and floor levels resulting from the additional fill activities proposed as part of Mod 1.	• Noted. Revised noise modelling has been completed based on the reduction in pad levels. The modelling demonstrates that the change in pad levels had almost no effect on the Noise Impact. • Refer to **Annexure G**.

MATTERS RAISED	APPLICANT RESPONSE
15. Having regard to the above, the predicted noise levels within Mod 2 and Mod 3 are based on the assumption that the finished ground levels within Mod 1 are both suitable and supportable. As outlined above, the finished ground levels and visual impacts of the additional imported fill are not deemed suitable or supportable and the address of this matter will necessitate revised modelling predicated on suitable and supportable finished ground levels and associated finished floor levels. It is also noted that Mod 2 and Mod 3 is modelled to result in noise levels in exceedance of the approved limits. This is not supportable when the exceedance is resulting from elevated finished ground and floor levels resulting from the additional fill activities proposed as part of Mod 1. In the first instance it is requested that the concerns raised above with respect to fill and finished ground levels be resolved. Following this resolution, it is then recommended that revised modelling be undertaken as part of Mod 1, Mod 2 and Mod 3 that addresses the following:	• Refer above and below.
16. In considering the maximum noise level criteria in accordance with NPfI, it is requested that the	• Refer to **Annexure G**.

MATTERS RAISED	APPLICANT RESPONSE
Department pursue further analysis with reference to the health impact data sourced from the World Health Organisation and enHealth as detailed in the Road Noise Policy. It is recommended that maximum noise levels be cumulatively assessed against the information provided in the Road Noise Policy, giving detailed consideration to the frequency and duration of elevated noise levels and demonstrating that long-term adverse health impacts will not likely result. Long-term health concerns may not necessary be linked only to the maximum noise level per event but may also be correlated with elevated noise over a long period. For example, the Road Noise Policy indicates that levels between 40 and 55dBA may be related to adverse health effects with many people needing to adapt to cope.	
17. Whilst the noise impact assessments refer to noise-enhancing weather conditions, the frequency of these conditions is not discussed. Given that temperature inversions are a feature of the Penrith Local Government Area, it is suggested that it is necessary for this aspect of the noise assessments to be considered further. If DPIE is not able to ascertain this, it is recommended that the EPA be engaged to consider the modelling assumptions and implications and the predicted noise levels.	• Refer to **Annexure G**.

MATTERS RAISED	APPLICANT RESPONSE
The noise assessment accompanying Mod 3 effectively seeks to 'supersede' or ‘over-ride’ the separate acoustic assessment in support of Mod 2, specifically relating to revised sound power levels. The Wilkinson Murray assessment (supporting Mod 3) states that the sound power levels used in SLR's Report (for Mod 2) are overly conservative. It is not acceptable that one report is disregarding or changing the parameters of another report as a consistent approach to modelling that results in the predicted noised levels must be established to ensure that a consistent and cumulative impact analysis can be undertaken. The applicant should be requested to provide a single acoustic report, or separate acoustic reports that provide consistent adoption of modelling parameters and assumptions, to the inform the predicted noise level emissions. The assessments progressively should also consider the cumulative impacts of preceding development approved in combination with the current proposal. Alternatively, DPIE (or EPA) is requested to determine the appropriateness of the sound power level and other input data used in the noise modelling processes for address in the submitted acoustic reports for these applications and moving forward.	• The MOD3 assessment incorporates the MOD2 sound power levels with the exception of the sound power level applied to light vehicles. • During the MOD3 assessment, Wilkinson Murray (WM) undertook review of the light vehicle sound power levels in its database and with consideration to various acoustic assessments prepared by WM and other acoustic consultants. Following this review, the light vehicle sound power level of 96 dBA was considered somewhat overstated (overly conservative). Based on WM’s review a lower level of 90 dBA was adopted. WM maintains that this is considered to be more representative of a light vehicle travelling on the estate roads at a speed of 40 km/hr, particularly with respect to the higher proportion of modern vehicles that may be expected. • Refer to **Annexure G**.

MATTERS RAISED	APPLICANT RESPONSE
18. The Mod 3 acoustic assessment assumes that Lot 2B mechanical plant services can be attenuated by 10dB using noise mitigation methods. It is not clear how this can be achieved and further detail on the feasibility of this should be sought.	• It is expected that the necessary reductions can be achieved based on the exact same projects overseas. This will be confirmed within detailed design for Building 2B. Refer to **Annexure G**.
19. In recommending operational noise mitigation strategies, the surface construction of vehicular access ways and roads is not discussed in the noise impact assessments. It is requested that consideration be given to the type of road construction to ensure maximum acoustic benefit, should this not already have occurred.	• Refer to **Annexure G**.
20. As raised within the planning comments above, the reasonableness of a 5.0m acoustic wall on top of an elevated fill platform with extensive retaining wall is not supported. It also appears from the information submitted that further noise mitigation measures may still be required at receiver boundaries. It appears that negotiations are currently occurring with neighbouring properties and that 'at-receiver' noise mitigation measures are not yet finalised. The impacts of the completed development and the implications of necessary mitigation measures can only be assessed if the full extent of mitigation measures within the site and at receiver boundaries are included within the	• Refer above and to **Annexure G**. • Noise Agreements are in place with receivers to the south (N3, N4, and N5) who have accepted the Noise Impacts. N1 and N2 are deemed compliant with the proposed mitigation measures. • **Annexure B** demonstrates that the noise wall and retaining wall design are preferable to that already approved.

MATTERS RAISED	APPLICANT RESPONSE
assessment and plans. If the suggestion is made that the ultimate impacts are unknown due to current analysis being based on predications only, then the predications should be conservative in nature and include likely mitigation measures at receiver boundaries to understand what could be required after construction and occupation.	
Biodiversity Credit Requirements	
21. Appendix A (BBAM Credit Report) of Appendix G (Biodiversity Assessment Report) indicates a total of 173 ecosystem credits are required. The Statement of Environmental Effects however indicates 172 ecosystem credits. Given the requirements in Appendix G, Condition D90 should be amended to make reference to 173 credits and not that referenced within the Statement.	• Refer to **Annexure H.** Confirming 173 credits.
Transgrid	
22. TransGrid have requested 3D modelling to determine the vertical and horizontal clearance of changes within the transmission line easement (Bio-Retention Basins No.1 & 4).	• The level changes were discussed and agreed with Michael Platt from Transgrid. Refer to the 1000 series civil drawing package submitted to DPIE as part of the application. Refer to **Annexure I** for further detail.
Transport for NSW	
23. There have also been ongoing discussions between Goodman and Transport for NSW regarding corridor preservation for the Future Western Sydney Freight Line. The modification application needs to ensure preservation of	• Noted. This is consistent with the masterplan proposed for MOD 1.

the 60 metre wide corridor. Further information can be obtained from Mr Lee Farrell (Corridor Coordinator) on 02 8922 0877.	
24. With regard to any proposed construction access arrangements on Mamre Road via the Water NSW pipeline access route, please see the following comments: • The existing Water NSW pipeline access point on Mamre Road will require a left-in/left-out construction vehicle arrangement and road safety mitigation works to safely accommodate simultaneous entry/egress to the satisfaction of TfNSW. These works require concurrence from TfNSW in accordance with Section 138 of the Roads Act, 1993 and a Works Authorisation Deed. • Road safety mitigation works would need to adequately address TfNSW concerns regarding the merge point from two lanes into one lane located close to this access point. There are concerns that drivers focusing on the merge may not notice a construction vehicle slowing down just beyond the merge, potentially resulting in a rear-end crash. • The current posted speed limit is 80km/hr and a design speed of 90km/hr needs to be considered in road safety mitigation works for the construction vehicle access. • The developer will need to adequately address potential driver confusion for situations where construction vehicles are slowing down before the merge point whilst motorists are accelerating to merge at this location. • For occasional large deliveries of plant and material detailed traffic control plans need to be submitted to TfNSW's Network and Safety Section for review and approval.	• These requests have nothing to do with MOD 1, and instead relate to items that are more appropriately addressed via the Construction Environmental Management Plan (CEMP) approval for the initial SSD approval for Stage 1 construction. • Goodman will not be accessing the Water NSW pipelines via Mamre Road. Access will instead be via Old Wallgrove Road.

DEPARTMENT OF PLANNING, INDUSTRY AND DEVELOPMENT - CLIMATE CHANGE AND SUSTAINABILITY

25. To assist, EES has reviewed the response prepared by ecologique/environmental consultants dated 9 December 2020. It is noted that the proposed modification results in an overall 0.03 ha reduction in clearing and no change in the clearing of any one PCT of more than 0.03 ha.	• Noted. No response required.

MATTERS RAISED	APPLICANT RESPONSE
EES raise no objections to the following two statements made within the Biodiversity Assessment Report: • *"The small differences in clearing of the various PCTs do not affect the ecosystem credits required to offset native vegetation removal'.* • *"Amend references to the Biodiversity Offset Strategy (BOS) as Goodman propose to fulfil offsetting requirements through purchasing of ecosystem credits instead of establishing an onsite biodiversity offset area to create and retire ecosystem credits".* Further please be advised that there are no further comments in relation to flooding. Based on the information submitted EES has formed the view that the proposed modification is unlikely to increase the impacts on biodiversity values.	

Annexure D

Consultants Advice Notice

Project:	CA Warehouse	**Ref No.:**	RCE-19039
From:	Renton Parker	**Date:**	13th of February, 2020
		Revision:	0

	Attention	**Company**	**Email**
To:	Stephanie Partridge	Goodman Group	Stephanie.partridge@goodman.com

Re: Response to Department of Planning Queries

1.0 Introduction

Confidential Applicant (CA) has proposed to develop a new automated warehouse at within the Oakdale Industrial Estate in New South Wales. As the facility exceeds the State Environmental Planning Police No. 33 (SEPP 33) thresholds, it was necessary to prepare a Preliminary Hazard Analysis (PHA) to demonstrate the risks posed by the facility do not exceed the acceptable risk criteria in the Hazardous Industry Planning Advisory Paper (HIPAP) No. 4. Following review of the PHA by the Department of Planning and Environment (DPE) several queries were issued. This Consultants Advice Notice has been prepared to address the queries posed by the DPE.

2.0 Queries and Responses

Provided in **Table 2-1** are the queries relevant to the PHA and the associated responses from Riskcon Engineering Pty Ltd (Riskcon).

Table 2-1: Queries and Responses

ID	DPE Query	Riskcon Response
1	It is noted in the document of Fire Safety Strategy that the bonding construction from the warehouse to the DG store is going to achieve an FRL of 4 hours. Please confirm whether this is equivalent to a fire rated wall of 4 hours?	RL = Fire Resistance Level with the time indicating the level of a FRL. A 4 hour fire rated wall is a wall with an FRL of 240/240/240 or 4 hours. Therefore, they are the same thing. For DG stores the walls are designed such that a fire within the store is contained. How this is achieved is dictated by the builder.
2	It is noted that the risk analysis provided two cases, namely Base Case and Sensitive Case. The sensitive case assumes the spread of fire is controlled by the second role of sprinklers which is further away from the fire source. Is it that the sprinkler system in the first role is independent to the 2nd role? Please clarify whether such arrangement is a standard design requirement and will be installed for the entire DG store.	The sprinklers are arranged in a pattern with the base case being governed by a 4 sprinkler head arrangement. As the sprinklers spread out away from the initial fire scenario, an additional 8 sprinkler heads are able to activate. Therefore, the base case is where the fire is contained by only 4 sprinkler heads. The sensitivity case is where the initial 4 sprinklers fail to contain the initial fire and is spreads to the containment of the 2nd array (the additional 8 sprinkler heads). The arrangement is standard design for all sprinklers

ID	DPE Query	Riskcon Response
		and is how such fires are, and have been, typically modelled by fire engineers and risk engineers.
3	The failure frequency established for Jet fire appears to be too low and the fault tree logic is incorrect. However, assuming the LPG tank is 7.5kL, as provided in Table 3.1 of the PHA, and it will comply with current AS 1596, the risk associated with the LPG tanks and its filling operation could likely be managed.	The frequency of the event is based upon the incidents which may lead to a release and how the release occurs based upon the protection systems activating. Please demonstrate why this is considered to be incorrect. Also, please demonstrate how the logic is faulty? In addition, LPG incidents don't occur very frequently which is indicative of robust protection systems. If the protection systems weren't robust, there would be LPG jet fires occurring at much higher rates than those observed in reality. Nonetheless, the tank will comply with AS 1596 which requires a robust protection system which forms the basis of the fault tree protection systems which have been assessed. This would indicate consistency between the analysis and the protection required under the standard which aims to prevent such incidents from occurring. Nonetheless, adding 2-3 orders of magnitude to the overall event frequency still does not result in any noticeable change to the risk contours at the site.
4	Please clarify, whether there is LPG filling operation to forklift? The risk associates with LPG release from the forklift filling operation, if it is part of the proposed operation, is not considered in the current analysis, and should be included.	Filling of LPG cylinders from the system follow a similar procedure to filling the bulk tank; however, the consequence of such an incident is much lower as the pipe for filling a tank vs filling a forklift are of different gauges. Therefore, any LPG filling scenario results in an incident less than that for the tank itself. Allowing for the frequency to be increased due to increased frequency of filling, the overall event frequency would not result in a noticeable affect to overall risk profile. Furthermore, as the consequence would be less than the currently assessed scenario, the incident may not even impact over the site boundary.

Riskcon Engineering Pty Ltd

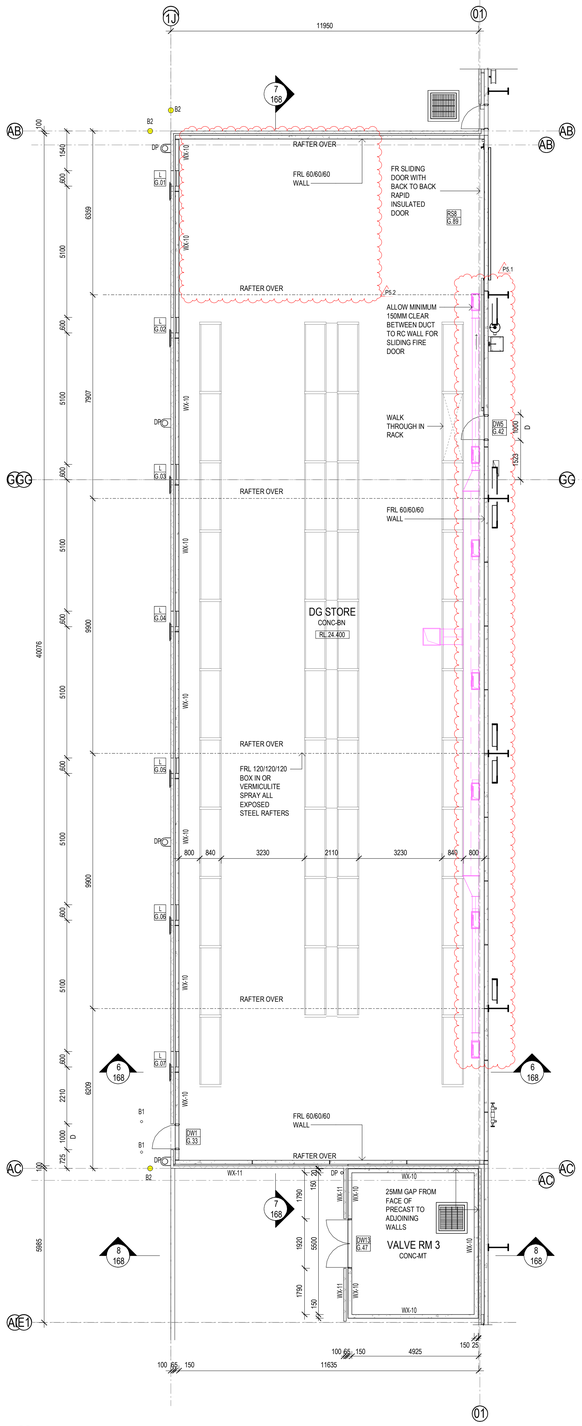
ABN 74 626 753 820



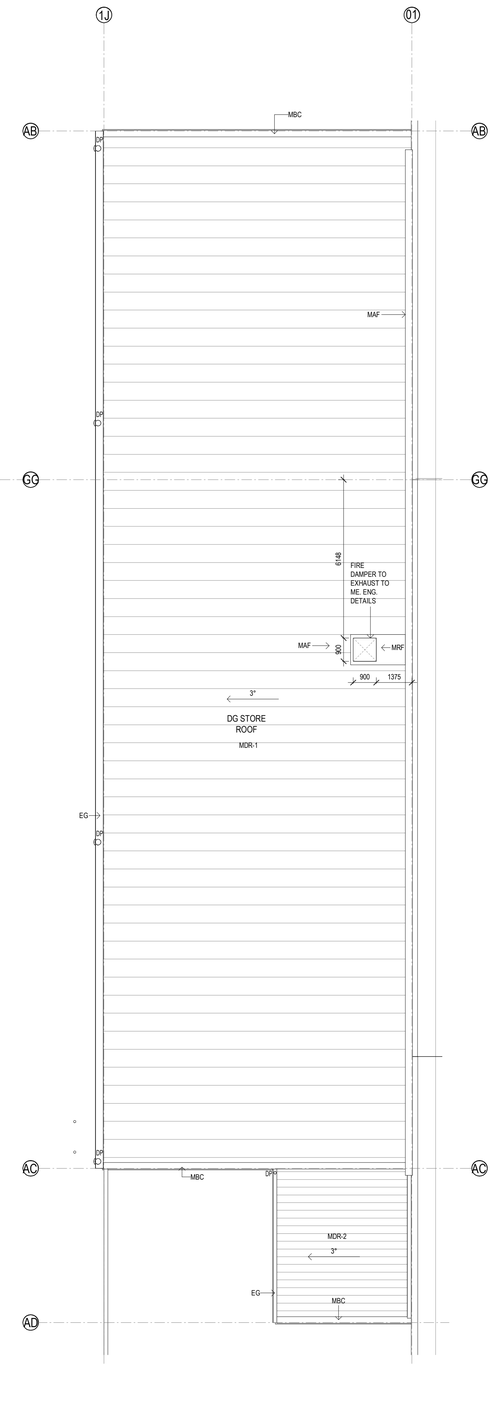
Renton Parker
Director – Risk Engineering
Riskcon Engineering Pty Ltd
+61 438 749 181

www.Riskcon-eng.com

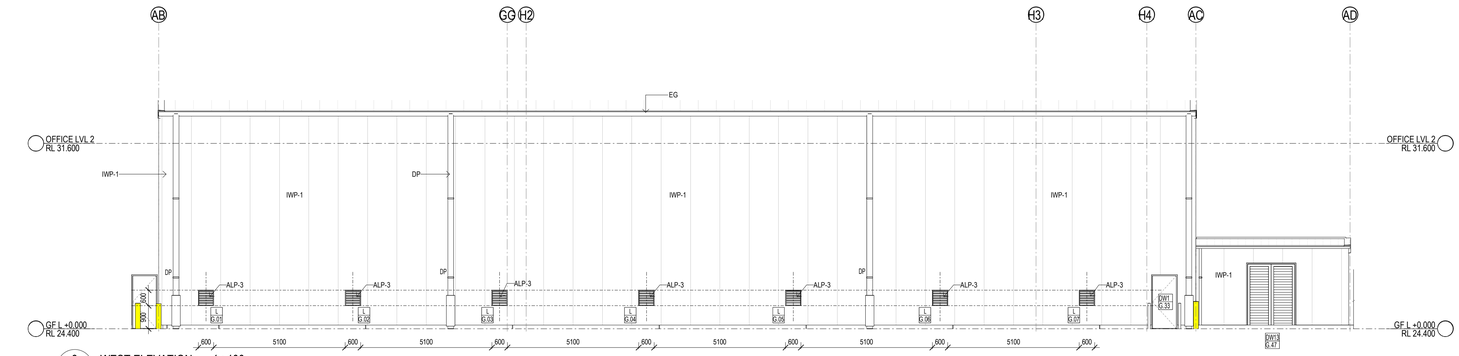
Annexure E



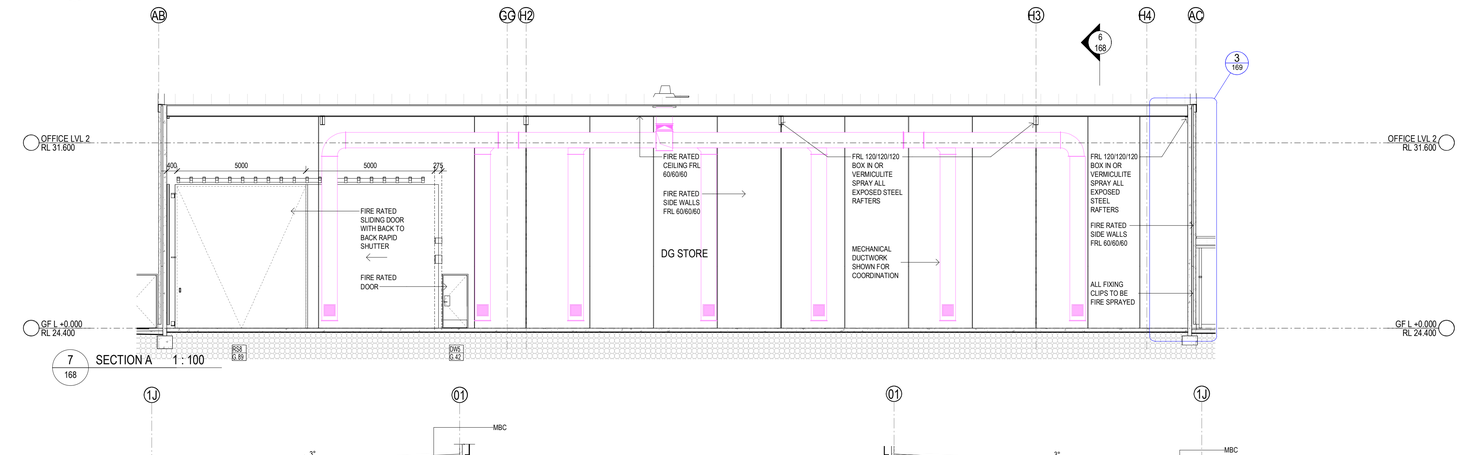
1 110 DG STORE PLAN 1 : 100



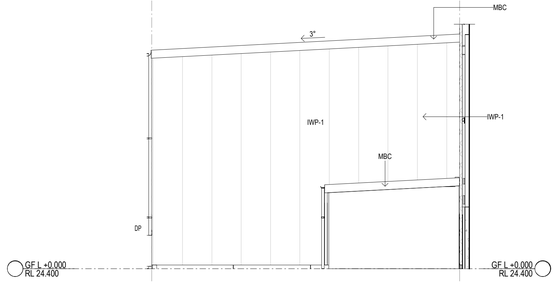
2 DG STORE ROOF 1 : 100



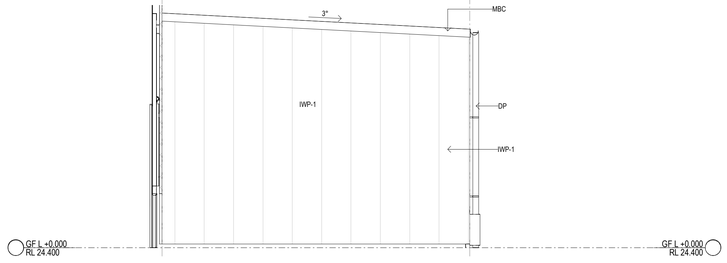
3 WEST ELEVATION 1 : 100



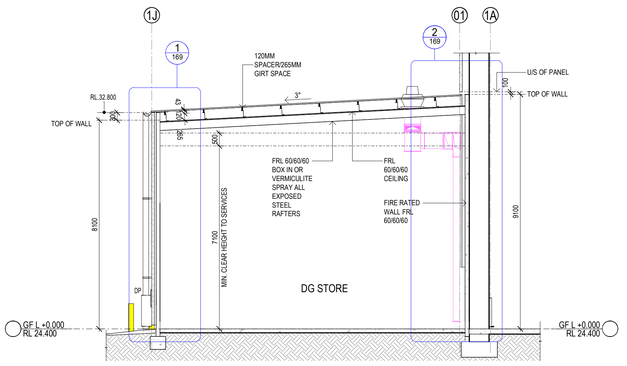
7 168 SECTION A 1 : 100



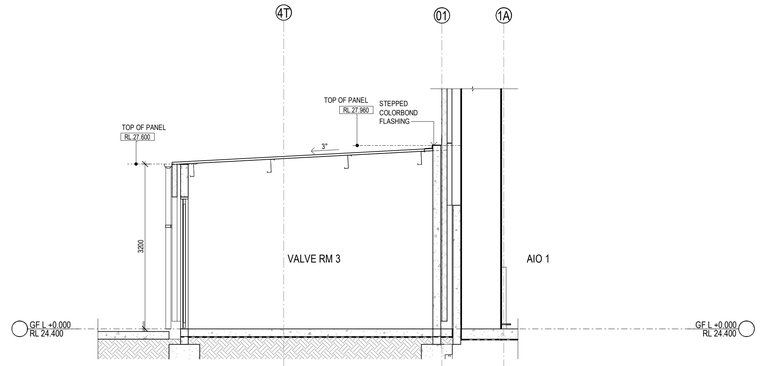
4 SOUTH ELEVATION 1 : 100



5 NORTH ELEVATION 1 : 100



6 168 SECTION B 1 : 100



8 SECTION C 1 : 50

AL-1	WINDOW FRAME TYPE 1 - BLACK - POWDERCOAT FINISH	DP	DOWNPIPE - COLORBOND MONUMENT FINISH	GL-4	GLASS TYPE 4 - SGL GLAZED - TOUGHENED GLASS BALUSTRADE - CLEAR	MCC-1	METAL CEILING CLADDING - COLORBOND SHALE GREY	PMW-2	PREFINISHED METAL WALL CLADDING - 2 - VITRADUAL - MONUMENT GREY
AL-2	WINDOW FRAME TYPE 2 - BLACK - POWDERCOAT FINISH	EG	EAVES GUTTER - COLORBOND MONUMENT FINISH	IWP-1	INSULATED WALL PANEL - COLORBOND MONUMENT	MDR-1	METAL DECK ROOFING - 1 - COLORBOND SURFMIST	PMW-3	PREFINISHED METAL WALL CLADDING - 3 - VITRADUAL - PURE WHITE
ALP-1	ALUMINIUM LOUVRES - TYPE 1 - BLACK - POWDERCOAT FINISH	GAL	GALVANISED STEEL	IWP-3	INSULATED WALL PANEL - COLORBOND SURFMIST	MDR-2	METAL DECK ROOFING - 2 - COLORBOND SURFMIST	PMW-4	PREFINISHED METAL WALL CLADDING - 4 - GOODMAN GREEN
ALP-2	ALUMINIUM LOUVRES - TYPE 2 - BLACK - POWDERCOAT FINISH	GL-1	GLASS TYPE 1 - DBL GLAZED - EXT PANEL: GREY TINT. INT PANEL: CLEAR	MAF	METAL FLASHING - COLORBOND MONUMENT	PCP	PRECAST CONCRETE PANELS - NATURAL FINISH	SF-PF-5	EXTERNAL STEEL FRAME - BLACK PAINT FINISH
ALP-3	ALUMINIUM LOUVRES - TYPE 3 - MONUMENT - POWDERCOAT FINISH	GL-2	GLASS TYPE 2 - SGL GLAZED - GREY TINT. INT FACE BLACK PF	MBC	METAL BARGE CAPPING - COLORBOND MONUMENT	PCP-PF-1	PRECAST CONCRETE PANELS - PAINT FINISH TO MATCH COLORBOND BASALT GREY	TRS-1	TRANSLUCENT ROOF SHEETING - 1 - OPAL
BLK-1	BLOCK - STACK BOND - CHARCOAL	GL-3	GLASS TYPE 3 - DBL GLAZED - EXT PANEL: GREY TINT. INT PANEL: WHITE FROSTED	MC-PF-3	EXTERNAL DOORS & FRAMES - COLORBOND BASALT GREY	PCP-PF-2	PRECAST CONCRETE PANELS - PAINT FINISH TO MATCH COLORBOND MONUMENT	TRS-2	TRANSLUCENT ROOF SHEETING - 2 - REFLECTIVE ICE
						PMW-1	PREFINISHED METAL WALL CLADDING - 1 - COLORBOND MONUMENT - MATT		

PRELIMINARY

SBA ARCHITECTS
Commercial Industrial Residential Retail Interior Design
Phone: 02 9929 9988 Web: www.sbaarch.com.au

#	DESCRIPTION	DATE
P5	PRELIMINARY ISSUE	23/08/2019
	1. Mechanical duct layouts shown.	
	2. Racking adjustments	
P4	Issued for Information	16/08/2019
	1. Refer location adjusted	
P3	PRELIMINARY ISSUE FOR COMMENT	07/05/2019
P2	PRELIMINARY ISSUE FOR COMMENT	01/05/2019

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CLIENT: Goodman
BUILDER: RICHARD CROOKES CONSTRUCTIONS

NORTH

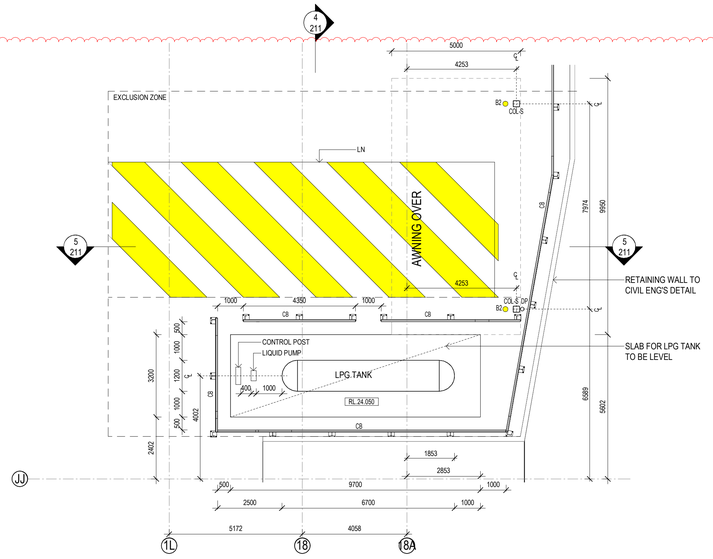
PROJECT BROCCOLI
4 WEEDMAN STREET, REDBANK MOTORWAY ESTATE, QLD.
TITLE
WHSE DG STORE - 1

DATE	23/08/2019
SCALE	As indicated @ B1
DRAWN	Author
CHECKED	Checker
APPROVED	Approver

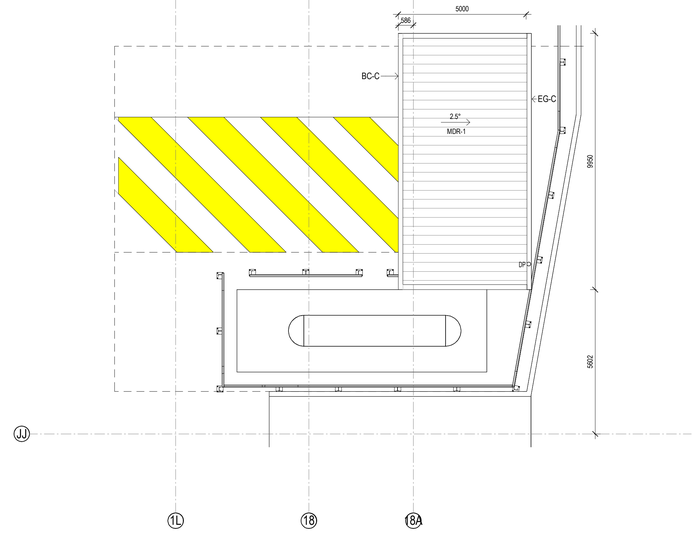
PROJECT NO. 18248
DWG NO. GA-168
REVISION P5

23/08/2019 12:16:41 PM

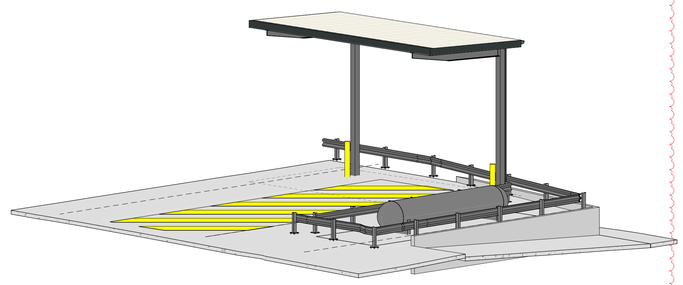
Annexure F



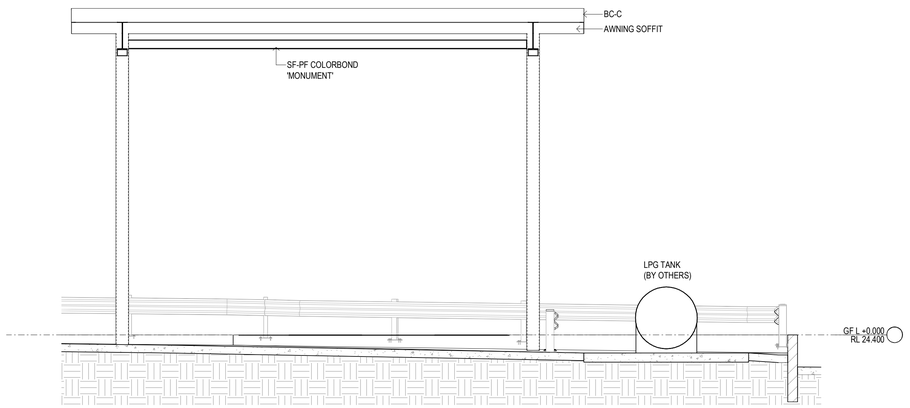
2 / 101 LPG TANK PLAN 1 : 100



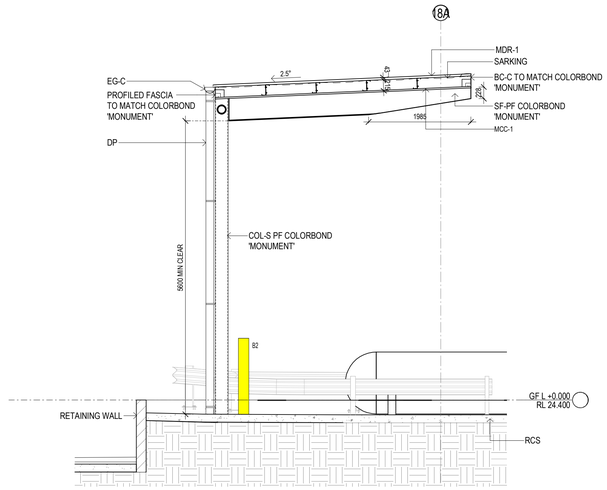
3 / 130 LPG TANK ROOF PLAN 1 : 100



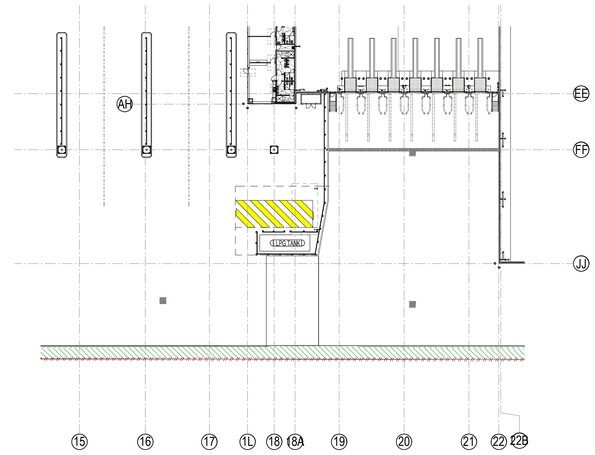
6 LPG TANK 3D (INDICATIVE)



4 LPG TANK - SECTION A 1 : 50



5 / 211 LPG TANK - SECTION B 1 : 50



1 / 101 LPG TANK LOCATION PLAN 1 : 500

PRELIMINARY

SBA ARCHITECTS
Commercial Industrial Residential Retail Interior Design
Phone: 07 5727 7188 Web: www.sbaarch.com.au

#	DESCRIPTION	DATE
P4	PRELIMINARY ISSUE	23/08/2019
	1. Layout revised	
P3	Issued for Information	16/08/2019
	1. Awning and tank setout revised	
P2	PRELIMINARY ISSUE FOR COMMENT	07/05/2019
P1	PRELIMINARY ISSUE FOR COMMENT	23/04/2019

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CLIENT Goodman

BUILDER RICHARD CROOKES CONSTRUCTIONS

NORTH

PROJECT BROCCOLI
4 WEEDMAN STREET, REDBANK MOTORWAY ESTATE, QLD.
TITLE
ANCILLARY LPG TANK

DATE	23/08/2019
SCALE	As indicated @ B1
DRAWN	Author
CHECKED	Checker
APPROVED	Approver

PROJECT NO. 18248
DWG NO. GA-211
REVISION P4

23/08/2019 12:16:53 PM

Annexure G

Goodman

BRICKWORKS LIMITED

LPG Tank for MHE Refuelling

MHE Refuelling Canopy

LPG Cylinders for Staff Canteen Kitchen

DG Store

HIGH BAY WAREHOUSE
RL. 69.000 (+/- 1000)

LOW BAY WAREHOUSE
RL. 70.000 (+/- 1000)

INBOUND

OUTBOUND

STAGE 2 FUTURE EXPANSION

ENERGY COMPLEX 1

ENERGY COMPLEX 2

OFFICE
RL. 70.000 (+/- 1000)

MHE

RECEIVING OFFICE

TRAILER WASH

TRAILER WORKSHOP

312 CAR PARK SPACES

154 CAR PARK SPACES

Future Southern Link Road

Proposed Western North South Link Rd

Development Area Schedule

Lot 1A

Site Area	187,270 sqm
Warehouse (inc stage 2 expansion)	68,160 sqm
Office (3 Level)	2,646 sqm
Mezzanines (inc stage 2 expansion)	32,402 sqm
Outbuildings (inc Dock office, Trailer Workshop, Trailer wash, D.G. Store, Computer Room, Gatehouse, Energy Complex, Refueling area, Battery charge, Skybridge & Lobby)	4,004 sqm
Total Building Area	107,212 sqm
Awning	8,620 sqm
Site Cover (exc. awning)	57 %
Floor Space Ratio	0.57 : 1
Hardstand Area	88,610 sqm
Light Duty Area	13,875 sqm
Prime Mover Parking	54
Trailer Parking	164
Carparking	472
Motorcycle Parking	6

LEGEND

- Site Boundary
- Lot Boundary
- Building 7.5m Setback
- Landscape 3.75m Setback
- FNC-1 Chainwire Fencing
- FNC-2 Palisade Fencing
- RW Retaining Wall

SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Proposed Industrial Facility - Building 1A

Site Plan

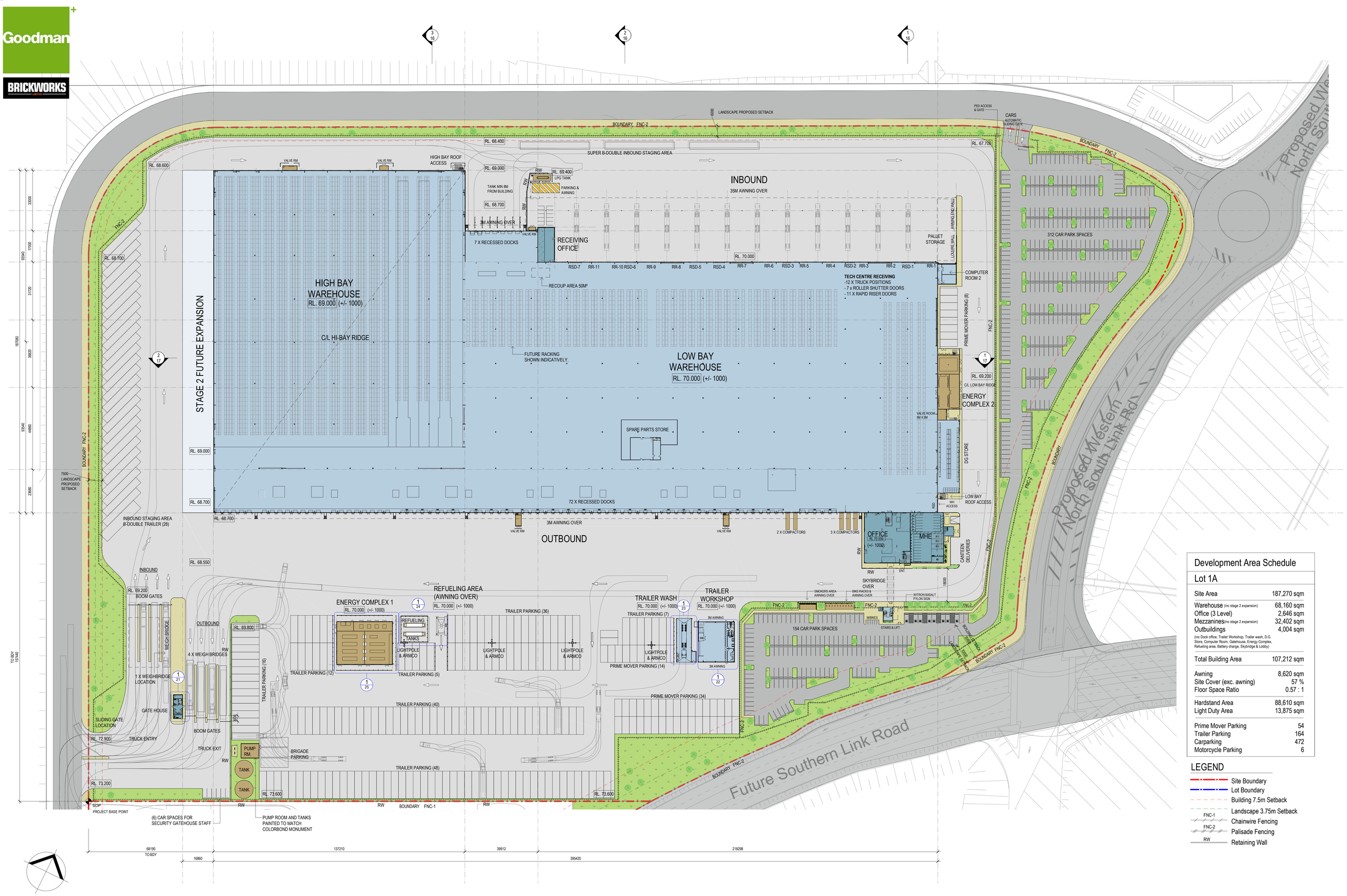
1 : 750 @ B1

5th February 2020

OAK-1A-DA-10 (W)

Job No 15117

Annexure H



Development Area Schedule

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SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Proposed Industrial Facility - Building 1A

Site Plan

1 : 750 @ B1

5th February 2020

OAK-1A-DA-10 (W)

Job No 15117

484

Annexure I

RE: Oakdale West Industrial Estate Modification 2 – Lot 1A Car Parking Design Review

Dear Stephanie,

I refer to recent revision of the Lot 1A car parking layout situated in Precinct 1 of the Oakdale West Estate, Kemps Creek. This revision primarily relates to the following changes at the request of the assessing authorities following review of the Modification 2 (the Mod 2 to SSD 7348) submission:

- Removal of the left in left out vehicular access from the Western North South Link Road (WNSLR), and consolidation of all vehicular movements to/from a single driveway on Estate Road 01, and
- Modifying the Estate Road 01 access point to separate entry and exit crossover.

In this context, Ason Group has been tasked to confirm general compliance of the following revision of the warehouse 1A car parking layout:

- SBA Architects, *OAK-1A-DA-10(W) – Job No. 15117_Proposed Industrial Facility - Building 1A_Site Plan* _ dated 05th February 2020.

A reduced copy of this plan is attached in **Attachment 1**. In this regard, we have reviewed the revised Lot 1A access car parking design against the requirements of *AS2890.1 Part 1: Off-street car parking*. Furthermore, based on the advice provided to Ason Group, the proposed automatic sliding gate at the Estate Road 01 will be open during the operational hours of the site.

Accordingly, our design review suggests that the Lot 1A access and car parking area have generally been designed in accordance with the requirements of AS2890.1. Notwithstanding, compliance with AS2890.1 would be expected to form a standard condition of consent as part of the Construction Certificate stage of the project.

We trust the above is of assistance and please contact either the undersigned or Tim Lewis should you have any queries or require further information in relation to the above.

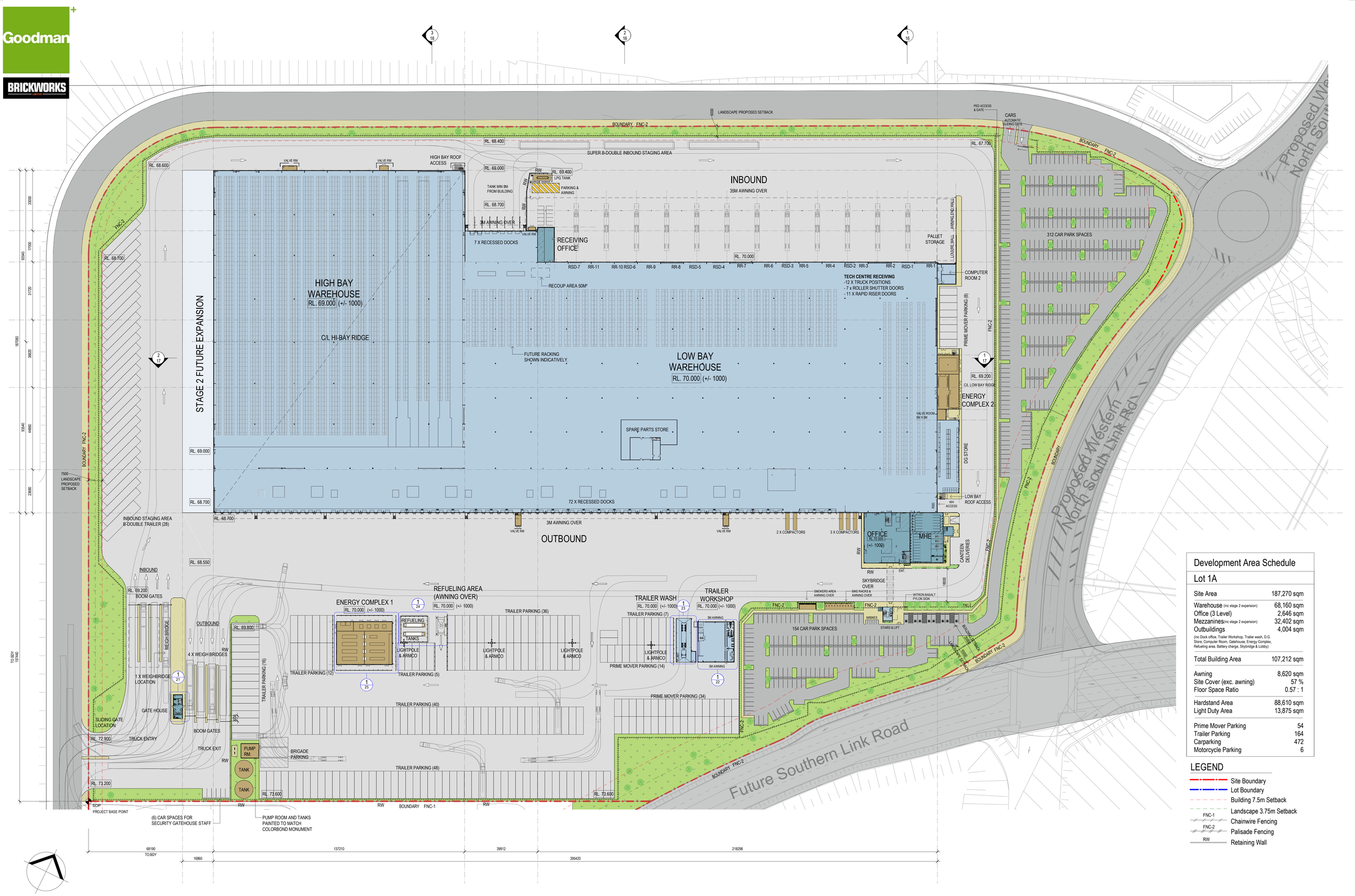
Yours sincerely,



Ali Rasouli
Senior Traffic Engineer – Ason Group
Email: ali.rasouli@asongroup.com.au

Attachment 1

Lot 1A Car Parking Plan



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- RW Retaining Wall

SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Proposed Industrial Facility - Building 1A

Site Plan

1 : 750 @ B1

5th February 2020

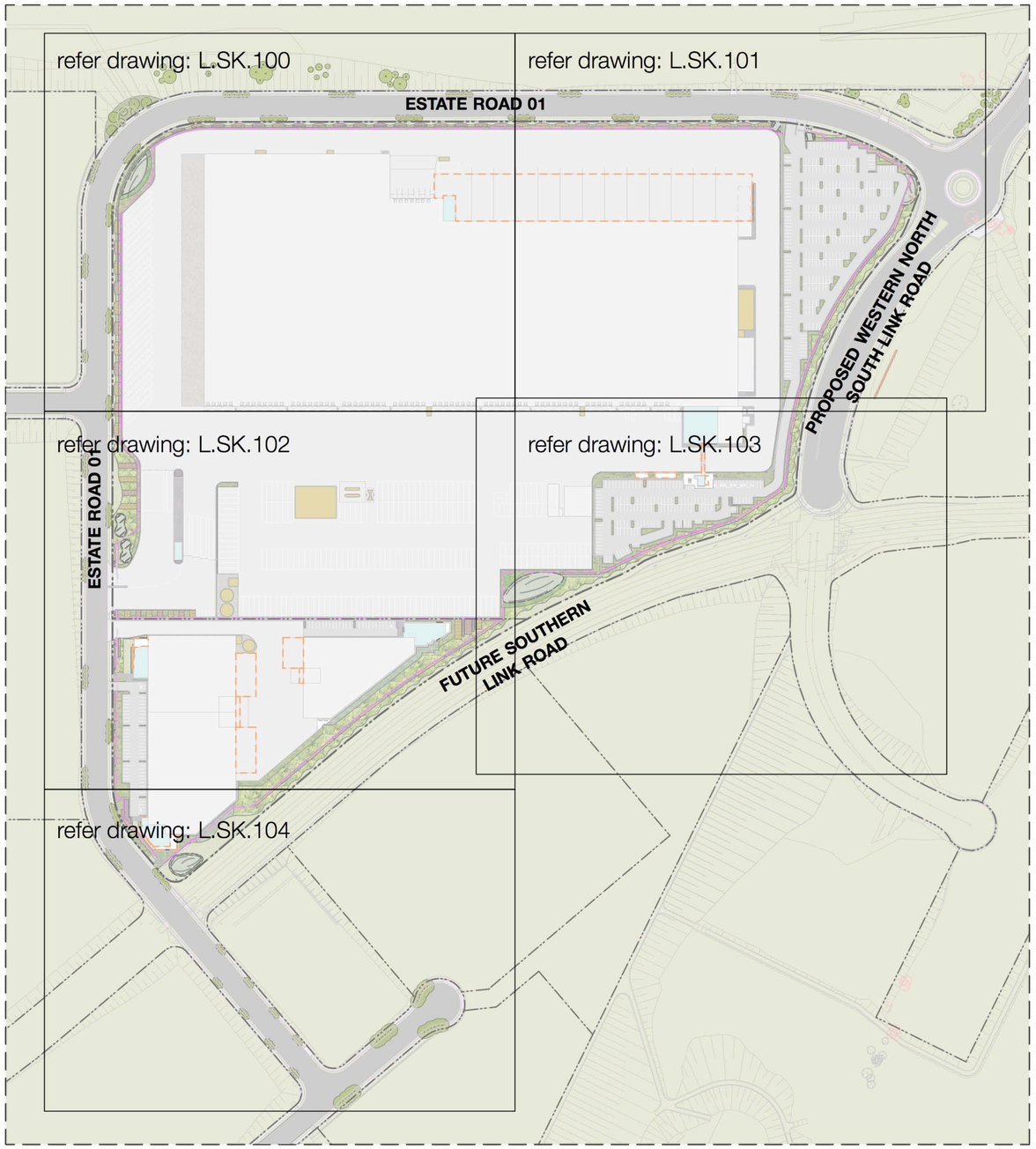
OAK-1A-DA-10 (W)

Job No 15117

488

Annexure J

KEY MAP



scape DESIGN

LANDSCAPE ARCHITECTURE

Address Suite 5, 15 The Corso
Manly NSW 2095
Phone 02 9976 0756
email office@scapedesign.com.au
Web www.scapedesign.com.au

PROJECT

Oakdale West Estate, Precinct 1

Oakdale West, NSW

Cover Sheet

PHASE

Development Application
Landscape Drawing Set

CLIENT

Goodman Property Services (AUST) PTY LTD

TRANSMITTAL

Dwg. Number	Dwg. Name	Revision	Date
L.SK.00	Cover Sheet	N	26/2/20
L.SK.01	Landscape Master Plan	M	25/2/20
L.SK.02	Planting Plan	J	25/2/20
L.SK.03	Planting Schedule	K	26/2/20
L.SK.04	Character & Materials	K	21/2/20
L.SK.05	Master Plan Configuration - MOD2	E	25/2/20
L.SK.100	Landscape - Plan - Sheet 1	K	21/2/20
L.SK.101	Landscape - Plan - Sheet 2	K	21/2/20
L.SK.102	Landscape - Plan - Sheet 3	L	25/2/20
L.SK.103	Landscape - Plan - Sheet 4	L	25/2/20
L.SK.104	Landscape - Plan - Sheet 5	L	25/2/20
L.SK.105	Landscape - Detailed Plan - Sheet 1	J	21/2/20
L.SK.106	Landscape - Detailed Plan - Sheet 2	J	21/2/20
L.SK.200	Landscape - Sections - Sheet 1	J	14/2/20
L.SK.201	Landscape - Sections - Sheet 2	J	14/2/20
L.SK.202	Landscape - Sections - Sheet 3	I	14/2/20
L.SK.203	Landscape - Sections - Sheet 4	J	14/2/20
L.SK.204	Carpark Details	D	25/2/20

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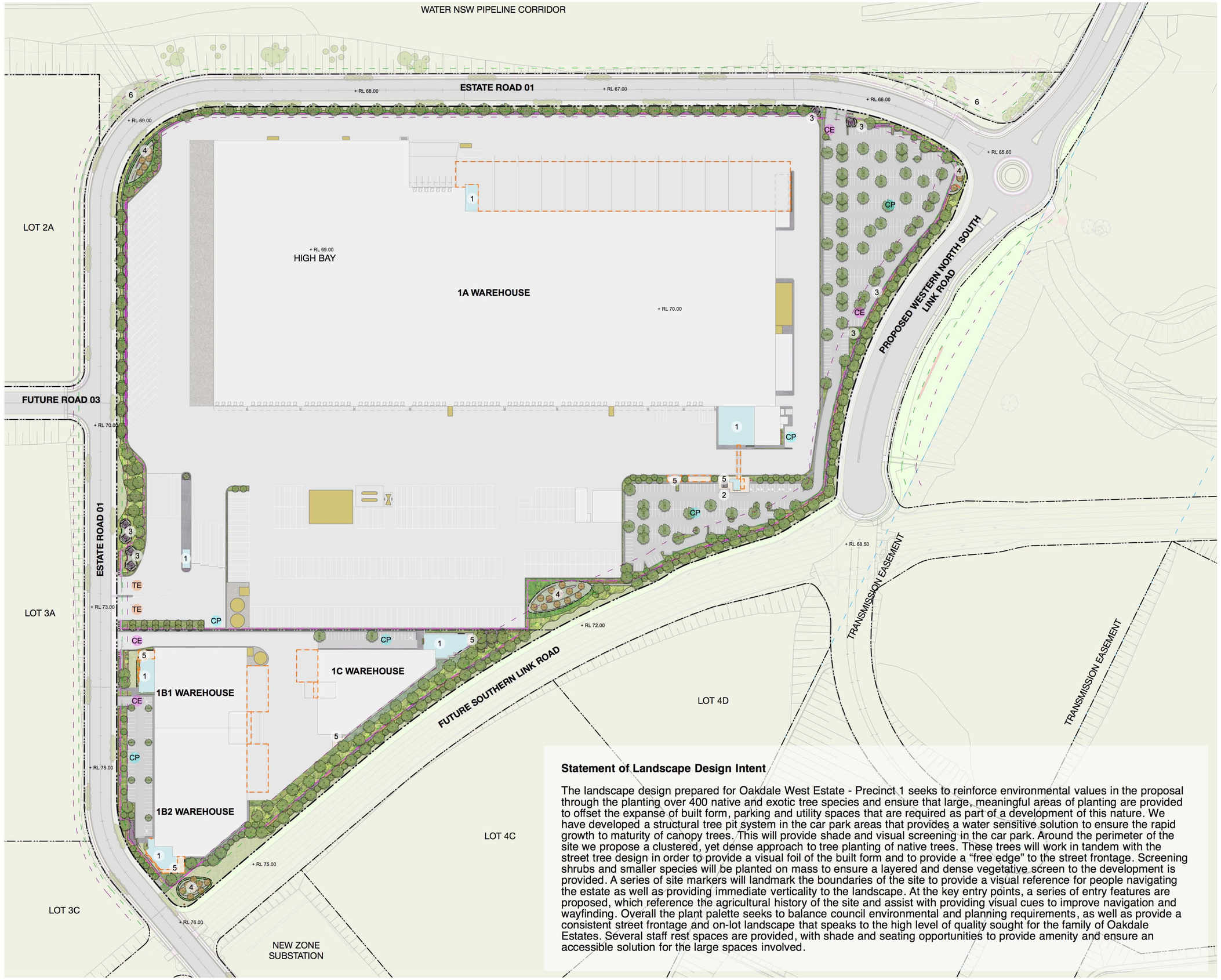
Do not scale from this drawing.
Refer to 'Dial Before You Dig' documents, design drawings and survey for locations of all services.
Verify services locations prior to commencement.
Verify all dimensions on site prior to construction.



Statement of Landscape Design Intent

The landscape design prepared for Oakdale West Estate - Precinct 1 seeks to reinforce environmental values in the proposal through the planting over 400 native and exotic tree species and ensure that large, meaningful areas of planting are provided to offset the expanse of built form, parking and utility spaces that are required as part of a development of this nature. We have developed a structural tree pit system in the car park areas that provides a water sensitive solution to ensure the rapid growth to maturity of canopy trees. This will provide shade and visual screening in the car park. Around the perimeter of the site we propose a clustered, yet dense approach to tree planting of native trees. These trees will work in tandem with the street tree design in order to provide a visual foil of the built form and to provide a “free edge” to the street frontage. Screening shrubs and smaller species will be planted on mass to ensure a layered and dense vegetative screen to the development is provided. A series of site markers will landmark the boundaries of the site to provide a visual reference for people navigating the estate as well as providing immediate verticality to the landscape. At the key entry points, a series of entry features are proposed, which reference the agricultural history of the site and assist with providing visual cues to improve navigation and wayfinding. Overall the plant palette seeks to balance council environmental and planning requirements, as well as provide a consistent street frontage and on-lot landscape that speaks to the high level of quality sought for the family of Oakdale Estates. Several staff rest spaces are provided, with shade and seating opportunities to provide amenity and ensure an accessible solution for the large spaces involved.

Note: All finished levels subject to change +/- 1000mm.

0 10 20 30 40 50 M

LEGEND

PROGRAMME
- 1 Office
- 2 Motorcycle Parking
- 3 Entry Marker
- 4 Site Marker
- 5 Staff Rest Area
- 6 OWE Stage 1 Pocket Parks
- CE Car entry/exit
- CP Carparking
- TE Truck entry/exit

GENERAL
- Site Boundary
- Lot Boundary
- Proposed Contour Line
- Existing Contour Line
- + FL 562.00 Finished Level
- + FFL 562.00 Finished Floor Level
- + RL 562.00 Reduced Level
- Fence
- 20m Setback Building
- 10m Setback Landscape
- Transmission Easement
- Demolition
- Architecture Above
- Architecture Below
- Proposed Ramp
- Proposed Stairs
- Building
- Office

PREPERATION & GROUNDWORKS
- Services
- Drainage - Grated Sump

WALLS & EDGES
- Steel Edge
- Flush Concrete Kerb
- Raised Concrete Kerb
- Retaining Gabion Wall
- Retaining Insitu Wall
- Steel Wall

PAVEMENTS
- Coarse Aggregate
- Asphaltic Concrete
- Insitu Concrete
- Precast Concrete
- Stone Tiles
- Feature paving

FURNITURE & FITTINGS
- Proposed Seating
- Proposed Pergola
- Proposed Bollards
- Proposed Street Lighting
- Proposed Sleeper Mullion
- Proposed Sandstone Block
- Bicycle rack
- Gate
- Sculpture
- Signage

PLANTING
- TF1-General Turf
- TF2-Feature Turf
- PM1A-Car park edge mix-sun
- PM1B-Car park edge mix-shade
- PM2A-Car park island mix-sun
- PM2B-Car park island mix-shade
- PM3A-Site edge mix - sun
- PM3B-Site edge mix - shade
- PM4-Site markers mix
- PM5A-Feature planting mix-sun
- PM6A-Site hedge mix-sun
- PM7A-Groundcover mix A
- PM7B-Groundcover mix B
- PM9A-Climbers mix - sun
- PM9B-Climbers mix - shade
- Existing Vegetation

TREES
- Existing Tree to be Removed Refer ARBORISTS REPORT
- Existing Tree to be Transplanted/ original location
- Existing Tree to be Transplanted/ new location
- Existing Tree to be Retained
- Proposed Tree - General
- Proposed Tree - Entry Marker
- Proposed Tree - Site Marker

scape DESIGN
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PROJECT
Oakdale West Estate, Precinct 1
Oakdale West, NSW

CLIENT
Goodman Property Services

revision	revision description	by	date
M	DEVELOPMENT APPLICATION	MF	25/2/20
L	DEVELOPMENT APPLICATION	MF	21/2/20
K	DEVELOPMENT APPLICATION	MF	14/2/20
J	DEVELOPMENT APPLICATION	ZZ	25/10/19
I	CLIENT REVIEW	MF	18/10/19

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Landscape Master Plan

scale	1:1250@A1
drawn	MF/ZZ
checked	CH
project no.	163-18
project phase	Development Application

L.SK.01 M



Note: All finished levels subject to change +/- 1000mm.

LEGEND

PLANTING

- TF1-General Turf
- TF2-Feature Turf
- PM1A-Car park edge mix-sun
- PM1B-Car park edge mix-shade
- PM2A-Car park island mix-sun
- PM3A-Site edge mix low - sun
- PM3B-Site edge mix low - shade
- PM4-Site markers mix
- PM5A-Feature planting mix
- PM6A-Site hedge mix - sun
- PM7A-Groundcover planting mix A
- PM7B-Groundcover planting mix B
- PM9A-Climbers mix - sun
- PM9B-Climbers mix - shade
- Existing Vegetation
- Proposed tree/specimen plant

scape DESIGN

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PROJECT

Oakdale West Estate, Precinct 1

Oakdale West, NSW

CLIENT

Goodman Property Services

revision	revision description	by	date
J	DEVELOPMENT APPLICATION	MF	25/2/20
I	DEVELOPMENT APPLICATION	MF	21/2/20
H	DEVELOPMENT APPLICATION	MF	14/2/20
G	DEVELOPMENT APPLICATION	ZZ	25/10/19
F	CLIENT REVIEW	MF	18/10/19

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Planting Plan

scale	1:1250@A1
drawn	MF/ZZ
checked	CH
project no.	163-18
project phase	Development Application

L.SK.02 J

PLANTING SCHEDULE

Botanical Name	Common Name	Height (m)	Spread (m)	Pot Size	Rate (m2)	
Trees & Specimen Shrubs						
Angophora bakeri	Narrow-leaved Apple	12.0	6.0	75L	As Shown	
Angophora floribunda	Rough-barked Apple	20.0	10.0	100L	As Shown	
Corymbia eximia	Yellow Bloodwood	12.0	8.0	75L	As Shown	
Corymbia maculata	Spotted Gum	30.0	10.0	75L	As Shown	
Cupaniopsis anacardioides	Tuckeroo	12.0	6.0	75L	As Shown	
Elaeocarpus eumundii	Eumundi Quandong	10.0	4.0	75L	As Shown	
Eucalyptus amplifolia	Cabbage Gum	25.0	8.0	75L	As Shown	
Eucalyptus crebra	Narrow leaved Ironbark	30.0	10.0	75L	As Shown	
Eucalyptus moluccana	Grey Box	25.0	10.0	75L	As Shown	
Glochidion ferdinandi	Cheese Tree	20.0	10.0	75L	As Shown	
Lagerstroemia indica 'Tuscarora'	Tuscarora Crepe Myrtle	6.0	4.5	200L	As Shown	
Melaleuca linariifolia	Snow-in-Summer	10.0	6.0	75L	As Shown	
Pyrus calleryana 'Capital'	Capital Flowering Pear	10.0	3.0	200L	As Shown	
Tristaniopsis laurina 'Luscious'	Water Gum	12.0	5.0	75L	As Shown	
Waterhousea floribunda	Weeping Lilly Pilly	12.0	8.0	75L	As Shown	
PM1A - Car Park Edge Mix - Sun					Area =	5878 sq.m
Callistemon viminalis 'Little John'	Little John Bottlebrush	0.6	0.8	140mm	2	
Pennisetum alopecuroides 'Nafray'	Pennisetum Nafray	0.5	0.5	140mm	1	
Trachelospermum jasminoides	Star Jasmine	0.9	0.3	140mm	2	
PM1B - Car Park Edge Mix - Shade					Area =	668 sq.m
Hibbertia scandens	Climbing Guinea-Flower	2.0	2.0	140mm	2	
Pennisetum alopecuroides 'Nafray'	Pennisetum Nafray	0.5	0.5	140mm	1	
Viola hederacea	Native Violet	0.1	0.2	140mm	2	
PM2A - Car Park Island Mix - Sun					Area =	528 sq.m
Carex appressa	Tall Sedge	0.7	0.5	140mm	2	
Gazania tomentosa	Silver Gazania	0.3	1.5	140mm	2	
Lomandra longifolia	Spiny-headed Mat-Rush	0.8	1.0	140mm	1	
Pennisetum alopecuroides 'Nafray'	Pennisetum Nafray	0.5	0.5	140mm	1	
PM3A - Site Edge Mix Low - Sun					Area =	7292 sq.m
Callistemon 'White Anzac'	Bottlebrush	1.0	2.0	140mm	1	
Gazania tomentosa	Silver Gazania	0.3	1.5	140mm	2	
Pennisetum alopecuroides 'Nafray'	Pennisetum Nafray	0.5	0.5	140mm	1	
PM3B - Site Edge Mix Low - Shade					Area =	250 sq.m
Rhaphiolepis indica 'Oriental Pearl'	Oriental Pearl Indian Hawthorn	1.0	1.0	140mm	2	
Trachelospermum jasminoides 'tricolor'	Tricolor Star Jasmine	0.5	1.0	140mm	2	
Viola hederacea	Native Violet	0.1	0.2	140mm	2	
PM4 - Site Markers Mix					Area =	711 sq.m
Nandina domestica 'Gulf Stream'	Dwarf Sacred Bamboo	0.8	0.8	140mm	2	
Pennisetum alopecuroides 'Nafray'	Pennisetum Nafray	0.5	0.5	140mm	1	
PM5A - Feature Planting Mix					Area =	1016 sq.m
Doryanthes excelsa	Gymea Lily	2.0	1.5	200mm	2	
Lorapetalum chinense rubrum 'China Pink'	Chinese Fringe Flower	1.5	1.5	200mm	2	
Photinia x fraseri 'Red Robin'	Red Robin	3.0	2.0	200mm	1	
PM6A - Site Hedge Mix - Sun					Area =	1087 sq.m
Acmena smithii 'Hot Flush'	Lilly Pilly	4.0	2.0	300mm	1	
Metrosideros thomasii	New Zealand Christmas Bush	4.0	4.0	300mm	1	
Rhaphiolepis indica 'Oriental Pearl'	Oriental Pearl Indian Hawthorn	1.0	1.0	300mm	2	
Rhaphiolepis indica 'Snow Maiden'	Snow Maiden Indian Hawthorn	0.5	1.0	300mm	2	
PM7A - Groundcover Planting Mix A					Area =	812 sq.m
Gazania tomentosa	Silver Gazania	0.3	1.5	140mm	2	
PM7B - Groundcover Planting Mix B					Area =	698 sq.m
Trachelospermum jasminoides 'tricolor'	Tricolor Star Jasmine	0.5	1.0	140mm	2	
PM9A - Climbers Mix - Sun					Area =	38 sq.m
Hibbertia scandens	Climbing Guinea-Flower	2.0	2.0	300mm	2	
PM9B - Climbers Mix - Shade					Area =	6 sq.m
Trachelospermum jasminoides	Star Jasmine	0.9	0.3	300mm	2	
TF1 - General Turf					Area =	4134 sq.m
Stenotaphrum secundatum 'Sir Walter'	Sir Walter Buffalo			Turf Roll		
TF2 - Feature Turf (Planted)					Area =	1512 sq.m
Zoysia tenuifolia	No-Mow Grass/Velvet Grass			200mm		

NOTE:
1. Mass planting to be undertaken in large groupings of the same species to approval of landscape architect.
2. Hedging species are to be set out in linear arrangements of same speceies to approval of landscape architect.

PLANTING PALETTE

Trees & Specimen Shrubs


Angophora floribunda


Corymbia maculata


Eucalyptus moluccana


Lagerstroemia indica 'Tuscarora'


Melaleuca linariifolia


Pyrus calleryana 'Captial'


Tristaniopsis laurina 'Luscious'

PM1A - Car Park Edge Mix - Sun


Callistemon viminalis 'Little John'


Pennisetum alopecuroides 'Nafray'

PM1B - Car Park Edge Mix - Shade


Hibbertia scandens


Viola hederacea

PM2A - Car Park Island Mix - Sun

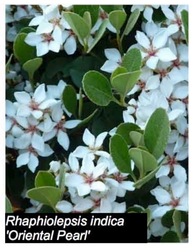

Carex appressa


Gazania tomentosa

PM3A - Site Edge Mix Low - Sun


Callistemon 'White Anzac'

PM3B - Site Edge Mix Low - Shade

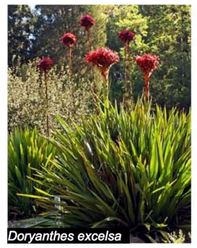

Rhaphiolepsis indica 'Oriental Pearl'


Trachelospermum jasminoides 'Tricolour'

PM4-Site Markers Mix


Nandina 'Gulf Stream'

PM5A - Feature Planting Mix


Doryanthes excelsa


Loropetalum rubrum chinense 'China Pink'


Photinia x fraseri 'Red Robin'

PM6A - Site Hedge Mix - Sun


Acmena smithii 'Hot Flush'


Metrosideros thomsanii

PM7A - Groundcovers


Gazania tomentosa

PM7B - Groundcovers


Trachelospermum jasminoides 'Tricolour'

PM9 - Climbers Mix

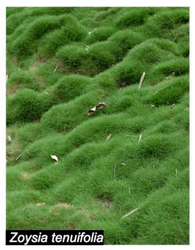

Hibbertia scandens


Trachelospermum jasminoides

TF1 - General Turf


Stenotaphrum secundatum 'Sir Walter'

TF2 - Feature Turf


Zoysia tenuifolia

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PROJECT

Oakdale West Estate, Precinct 1

Oakdale West, NSW

CLIENT

Goodman Property Services

revision	revision description	by	date
K	DEVELOPMENT APPLICATION	MF	26/2/20
J	DEVELOPMENT APPLICATION	MF	21/2/20
I	DEVELOPMENT APPLICATION	MF	14/2/20
H	DEVELOPMENT APPLICATION	ZZ	25/10/19
G	CLIENT REVIEW	MF	18/10/19

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Planting Schedule

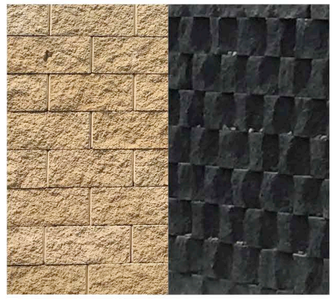
scale	NTS
drawn	MF/ZZ
checked	CH
project no.	163-18
project phase	Development Application

L.SK.03 **K**

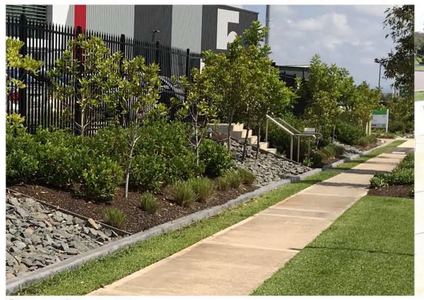
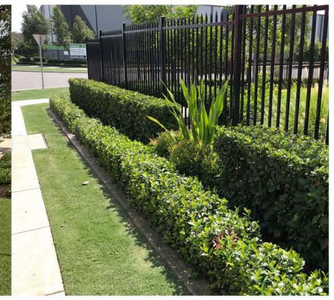
EXISTING SITE CHARACTER


Weathering steel


Mounding and grasses

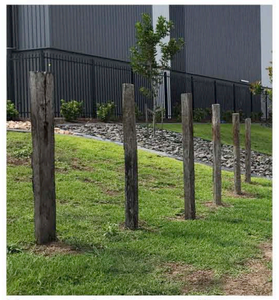

Textured walling


Verge landscape



Street frontage



Signage and detailed planting at vehicle entries/exits


Hardwood sleeper mullions

GREEN WALL SYSTEM


Jakob Rope Systems - 'Webnet ID'

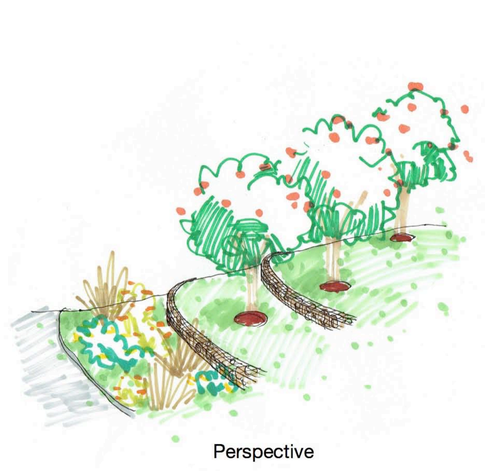

Jakob Rope Systems - INOX Line Webnet with 'Webnet ID' plus border

CARPARK CHARACTER


Resin bonded aggregate for internal roads adjacent to buildings and car park islands in conjunction with low level planting


Feature sandstone blocks at pedestrian nodes and driveway intersections

SITE MARKERS CONCEPT


Perspective

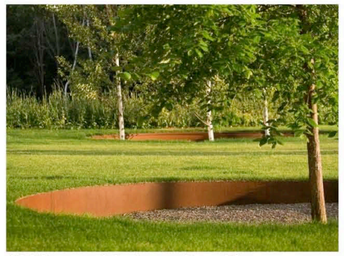
CAR PARK PLANTING CONCEPT



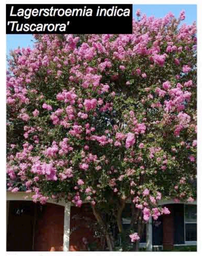
ENTRY MARKERS CONCEPT



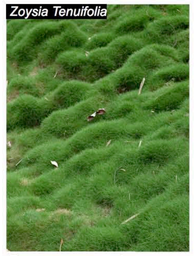

Rigid gabion stone wall


1000mm wide tree pits with weathering steel edging

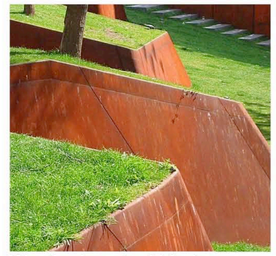

Mass planting bold texture and colour within native plant matrix

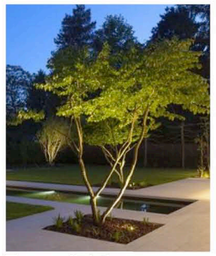


Feature trees



Green mounds


Weathering steel blades


Tree uplighting

scape DESIGN

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CLIENT
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revision	revision description	by	date
K	DEVELOPMENT APPLICATION	MF	21/2/20
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I	DEVELOPMENT APPLICATION	ZZ	25/10/19
H	CLIENT REVIEW	MF	18/10/19
G	CLIENT REVIEW	MF	26/9/19

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Character & Materials

scale	NTS
drawn	ZZ
checked	CH
project no.	163-18
project phase	Development Application

L.SK.04 K



Note: All finished levels subject to change +/- 1000mm.

LEGEND

GENERAL
- Site Boundary
- Lot Boundary
- Fence
- Building
- Office

PREPERATION & GROUNDWORKS
- Services

PAVEMENTS
- Temporary Recycled Aggregate
- Coarse Aggregate
- Asphaltic Concrete
- Insitu Concrete
- Precast Concrete
- Rock pitching

WATER ELEMENTS
- Natural Grade

PLANTING
- TF1-General Turf
- TF2-Feature Turf
- PM1A-Car park edge mix-sun
- PM1B-Car park edge mix-shade
- PM2A-Car park island mix-sun
- PM2B-Car park island mix-shade
- PM3A-Site edge mix - sun
- PM3B-Site edge mix - shade
- PM4-Site markers mix
- PM5A-Feature planting mix-sun
- PM6A-Site hedge mix-sun
- PM7A-Groundcover mix A
- PM7B-Groundcover mix B
- PM9A-Climbers mix - sun
- PM10-Verge planting mix
- PM11-Mound planting mix
- PM12-Swale planting mix
- RM1A-Native grasses on fill embankment
- RM1B-Native grasses on cut buffer
- RM3-Pasture grass revegetation mix
- Existing Vegetation

TREES
- Existing Tree to be Removed Refer ARBORISTS REPORT
- Existing Tree to be Transplanted/ original location
- Existing Tree to be Transplanted/ new location
- Existing Tree to be Retained
- Proposed Tree - General
- Proposed Tree - Entry Marker
- Proposed Tree - Site Marker

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revision	description	by	date
E	DEVELOPMENT APPLICATION	MF	25/2/20
D	DEVELOPMENT APPLICATION	MF	21/2/20
C	DEVELOPMENT APPLICATION	MF	14/2/20
B	DEVELOPMENT APPLICATION	ZZ	5/11/19
A	DEVELOPMENT APPLICATION	ZZ	4/11/19

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Landscape Master Plan - MOD 2

scale	1:3000@A1
drawn	MF/ZZ
checked	CH
project no.	163-18
project phase	Development Application

L.SK.05 **E**



Note: All finished levels subject to change +/- 1000mm.

LEGEND

PROGRAMME

1 Office
2 Motorcycle Parking
3 Entry Marker
4 Site Marker
5 Staff Rest Area
6 OWE Stage 1 Pocket Parks
CE Car entry/exit
CP Carparking
TE Truck entry/exit

GENERAL

Site Boundary
Lot Boundary
Proposed Contour Line
Existing Contour Line
+ FL 562.00 Finished Level
+ FFL 562.00 Finished Floor Level
+ RL 562.00 Reduced Level
Fence
20m Setback Building
10m Setback Landscape
Transmission Easement
Demolition
Architecture Above
Architecture Below
Proposed Ramp
Proposed Stairs
Building
Office

PREPERATION & GROUNDWORKS

Services
Drainage - Grated Sump

WALLS & EDGES

Steel Edge
Flush Concrete Kerb
Raised Concrete Kerb
Retaining Gabion Wall
Retaining Insitu Wall
Steel Wall

PAVEMENTS

Coarse Aggregate
Asphaltic Concrete
Insitu Concrete
Precast Concrete
Stone Tiles
Feature paving

FURNITURE & FITTINGS

Proposed Seating
Proposed Pergola
Proposed Bollards
Proposed Street Lighting
Proposed Sleeper Mullion
Proposed Sandstone Block
Bicycle rack
Gate
Sculpture
Signage

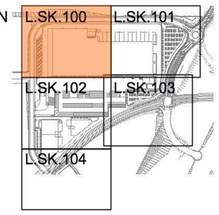
PLANTING

TF1-General Turf
TF2-Feature Turf
PM1A-Car park edge mix-sun
PM1B-Car park edge mix-shade
PM2A-Car park island mix-sun
PM2B-Car park island mix-shade
PM3A-Site edge mix - sun
PM3B-Site edge mix - shade
PM4-Site markers mix
PM5A-Feature planting mix-sun
PM6A-Site hedge mix-sun
PM7A-Groundcover mix A
PM7B-Groundcover mix B
PM9A-Climbers mix - sun
PM9B-Climbers mix - shade
Existing Vegetation

TREES

Existing Tree to be Removed Refer ARBORISTS REPORT
Existing Tree to be Transplanted/ original location
Existing Tree to be Transplanted/ new location
Existing Tree to be Retained
Proposed Tree - General
Proposed Tree - Entry Marker
Proposed Tree - Site Marker

KEY PLAN



scape DESIGN
LANDSCAPE ARCHITECTURE
Address Suite 5, 15 The Corso Manly NSW 2095
Phone 02 9976 0756
email office@scapedesign .com.au
Web www.scapedesign .com.au

PROJECT
Oakdale West Estate, Precinct 1
Oakdale West, NSW

CLIENT
Goodman Property Services

revision	revision description	by	date
K	DEVELOPMENT APPLICATION	MF	21/2/20
J	DEVELOPMENT APPLICATION	MF	14/2/20
I	DEVELOPMENT APPLICATION	ZZ	25/10/19
H	CLIENT REVIEW	MF	18/10/19
G	CLIENT REVIEW	MF	26/9/19

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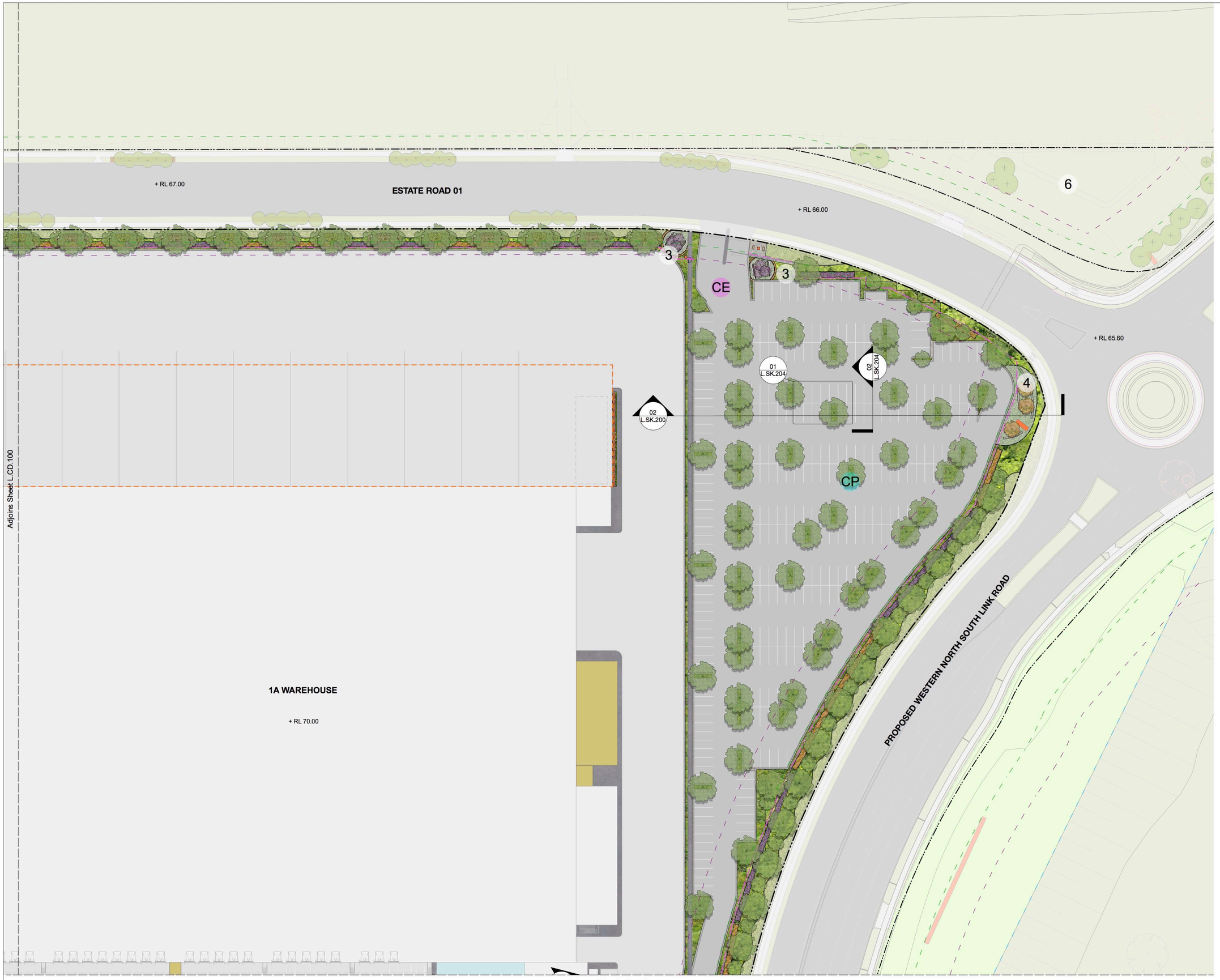
Landscape Plan Sheet 1

scale	1:500@A1
drawn	MF/ZZ
checked	CH
project no.	163-18
project phase	Development Application

L.SK.100 K



Note: All finished levels subject to change +/- 1000mm.

LEGEND

PROGRAMME

- 1 Office
- 2 Motorcycle Parking
- 3 Entry Marker
- 4 Site Marker
- 5 Staff Rest Area
- 6 OWE Stage 1 Pocket Parks
- CE Car entry/exit
- CP Carparking
- TE Truck entry/exit

GENERAL

- Site Boundary
- Lot Boundary
- Proposed Contour Line
- 88.60 Existing Contour Line
- + FL 562.00 Finished Level
- + FFL 562.00 Finished Floor Level
- + RL 562.00 Reduced Level
- Fence
- 20m Setback Building
- 10m Setback Landscape
- Transmission Easement
- Demolition
- Architecture Above
- Architecture Below
- Proposed Ramp
- Proposed Stairs
- Building
- Office

PREPERATION & GROUNDWORKS

- Services
- Drainage - Grated Sump

WALLS & EDGES

- Steel Edge
- Flush Concrete Kerb
- Raised Concrete Kerb
- Retaining Gabion Wall
- Retaining Insitu Wall
- Steel Wall

PAVEMENTS

- Coarse Aggregate
- Asphaltic Concrete
- Insitu Concrete
- Precast Concrete
- Stone Tiles
- Feature paving

FURNITURE & FITTINGS

- Proposed Seating
- Proposed Pergola
- Proposed Bollards
- Proposed Street Lighting
- Proposed Sleeper Mullion
- Proposed Sandstone Block
- Bicycle rack
- Gate
- Sculpture
- Signage

PLANTING

- TF1-General Turf
- TF2-Feature Turf
- PM1A-Car park edge mix-sun
- PM1B-Car park edge mix-shade
- PM2A-Car park island mix-sun
- PM2B-Car park island mix-shade
- PM3A-Site edge mix - sun
- PM3B-Site edge mix - shade
- PM4-Site markers mix
- PM5A-Feature planting mix-sun
- PM6A-Site hedge mix-sun
- PM7A-Groundcover mix A
- PM7B-Groundcover mix B
- PM9A-Climbers mix - sun
- PM9B-Climbers mix - shade
- Existing Vegetation

TREES

- Existing Tree to be Removed Refer ARBORISTS REPORT
- Existing Tree to be Transplanted/ original location
- Existing Tree to be Transplanted/ new location
- Existing Tree to be Retained
- Proposed Tree - General
- Proposed Tree - Entry Marker
- Proposed Tree - Site Marker

KEY PLAN



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Landscape Plan Sheet 2

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drawn	MF/ZZ
checked	CH
project no.	163-18
project phase	Development Application

L.SK.101 **K**



Note: All finished levels subject to change +/- 1000mm.

LEGEND

PROGRAMME

1	Office
2	Motorcycle Parking
3	Entry Marker
4	Site Marker
5	Staff Rest Area
6	OWE Stage 1 Pocket Parks
CE	Car entry/exit
CP	Carparking
TE	Truck entry/exit

GENERAL

- Site Boundary
- Lot Boundary
- Proposed Contour Line
- Existing Contour Line
- + FL 562.00 Finished Level
- + FFL 562.00 Finished Floor Level
- + RL 562.00 Reduced Level
- Fence
- 20m Setback Building
- 10m Setback Landscape
- Transmission Easement
- Demolition
- Architecture Above
- Architecture Below
- Proposed Ramp
- Proposed Stairs
- Building
- Office

PREPERATION & GROUNDWORKS

- Services
- Drainage - Grated Sump

WALLS & EDGES

- Steel Edge
- Flush Concrete Kerb
- Raised Concrete Kerb
- Retaining Gabion Wall
- Retaining Insitu Wall
- Steel Wall

PAVEMENTS

- Coarse Aggregate
- Asphaltic Concrete
- Insitu Concrete
- Precast Concrete
- Stone Tiles
- Feature paving

FURNITURE & FITTINGS

- Proposed Seating
- Proposed Pergola
- Proposed Bollards
- Proposed Street Lighting
- Proposed Sleeper Mullion
- Proposed Sandstone Block
- Bicycle rack
- Gate
- Sculpture
- Signage

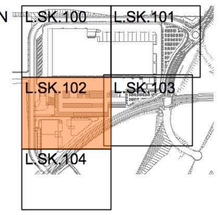
PLANTING

- TF1-General Turf
- TF2-Feature Turf
- PM1A-Car park edge mix-sun
- PM1B-Car park edge mix-shade
- PM2A-Car park island mix-sun
- PM2B-Car park island mix-shade
- PM3A-Site edge mix - sun
- PM3B-Site edge mix - shade
- PM4-Site markers mix
- PM5A-Feature planting mix-sun
- PM6A-Site hedge mix-sun
- PM7A-Groundcover mix A
- PM7B-Groundcover mix B
- PM9A-Climbers mix - sun
- PM9B-Climbers mix - shade
- Existing Vegetation

TREES

- Existing Tree to be Removed Refer ARBORISTS REPORT
- Existing Tree to be Transplanted/ original location
- Existing Tree to be Transplanted/ new location
- Existing Tree to be Retained
- Proposed Tree - General
- Proposed Tree - Entry Marker
- Proposed Tree - Site Marker

KEY PLAN



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Landscape Plan
Sheet 3

scale	1:500@A1
drawn	MF/ZZ
checked	CH
project no.	163-18
project phase	Development Application

L.SK.102 L



Note: All finished levels subject to change +/- 1000mm.

LEGEND

PROGRAMME

1	Office
2	Motorcycle Parking
3	Entry Marker
4	Site Marker
5	Staff Rest Area
6	OWE Stage 1 Pocket Parks
CE	Car entry/exit
CP	Carparking
TE	Truck entry/exit

GENERAL

- Site Boundary
- Lot Boundary
- Proposed Contour Line
- 38.00 Existing Contour Line
- + FL 562.00 Finished Level
- + FFL 562.00 Finished Floor Level
- + RL 562.00 Reduced Level
- Fence
- 20m Setback Building
- 10m Setback Landscape
- Transmission Easement
- Demolition
- Architecture Above
- Architecture Below
- Proposed Ramp
- Proposed Stairs
- Building
- Office

PREPERATION & GROUNDWORKS

- Services
- Drainage - Grated Sump

WALLS & EDGES

- Steel Edge
- Flush Concrete Kerb
- Raised Concrete Kerb
- Retaining Gabion Wall
- Retaining Insitu Wall
- Steel Wall

PAVEMENTS

- Coarse Aggregate
- Asphaltic Concrete
- Insitu Concrete
- Precast Concrete
- Stone Tiles
- Feature paving

FURNITURE & FITTINGS

- Proposed Seating
- Proposed Pergola
- Proposed Bollards
- Proposed Street Lighting
- Proposed Sleeper Mullion
- Proposed Sandstone Block
- Bicycle rack
- Gate
- Sculpture
- Signage

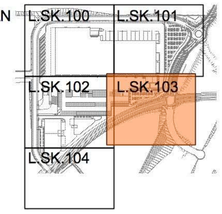
PLANTING

- TF1-General Turf
- TF2-Feature Turf
- PM1A-Car park edge mix-sun
- PM1B-Car park edge mix-shade
- PM2A-Car park island mix-sun
- PM2B-Car park island mix-shade
- PM3A-Site edge mix - sun
- PM3B-Site edge mix - shade
- PM4-Site markers mix
- PM5A-Feature planting mix-sun
- PM6A-Site hedge mix-sun
- PM7A-Groundcover mix A
- PM7B-Groundcover mix B
- PM9A-Climbers mix - sun
- PM9B-Climbers mix - shade
- Existing Vegetation

TREES

- Existing Tree to be Removed Refer ARBORISTS REPORT
- Existing Tree to be Transplanted/ original location
- Existing Tree to be Transplanted/ new location
- Existing Tree to be Retained
- Proposed Tree - General
- Proposed Tree - Entry Marker
- Proposed Tree - Site Marker

KEY PLAN



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Landscape Plan
Sheet 4

scale	1:500@A1
drawn	MF/ZZ
checked	CH
project no.	163-18
project phase	Development Application

L.SK.103 L

Adjoins Sheet L.CD.102

1B2 WAREHOUSE

ESTATE ROAD 01

LOT 3C

+ RL 76.00

+ RL 75.00

NEW ZONE SUBSTATION

LOT 4B

ESTATE ROAD 06

ESTATE ROAD 07

INSET PLAN C: SCALE 1:200

LOT 4C

WAREHOUSE 1B2

OFFICE

Office entrance

Green Wall Type C
7.2m H x 2.2m W

Indoor climbers to grow on Tensile wire rope net fixed to wall

Gabion retaining wall

Steel edge

Steel edge

Staff rest area

Raised concrete kerb

Existing footpath

Existing turfed verge

Proposed fence line

Flush concrete kerb

Feature trees

Signage - Building identification

0 2 4 6 8 10 M

Note: All finished levels subject to change +/- 1000mm.

0 5 10 15 20 25 M

LEGEND

PROGRAMME
1 Office
2 Motorcycle Parking
3 Entry Marker
4 Site Marker
5 Staff Rest Area
6 OWE Stage 1 Pocket Parks
CE Car entry/exit
CP Carparking
TE Truck entry/exit

GENERAL
Site Boundary
Lot Boundary
Proposed Contour Line
Existing Contour Line
+ FL 562.00 Finished Level
+ FFL 562.00 Finished Floor Level
+ RL 562.00 Reduced Level
Fence
20m Setback Building
10m Setback Landscape
Transmission Easement
Demolition
Architecture Above
Architecture Below
Proposed Ramp
Proposed Stairs
Building
Office

PREPERATION & GROUNDWORKS
Services
Drainage - Grated Sump

WALLS & EDGES
Steel Edge
Flush Concrete Kerb
Raised Concrete Kerb
Retaining Gabion Wall
Retaining Insitu Wall
Steel Wall

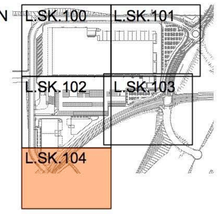
PAVEMENTS
Coarse Aggregate
Asphaltic Concrete
Insitu Concrete
Precast Concrete
Stone Tiles
Feature paving

FURNITURE & FITTINGS
Proposed Seating
Proposed Pergola
Proposed Bollards
Proposed Street Lighting
Proposed Sleeper Mullion
Proposed Sandstone Block
Bicycle rack
Gate
Sculpture
Signage

PLANTING
TF1-General Turf
TF2-Feature Turf
PM1A-Car park edge mix-sun
PM1B-Car park edge mix-shade
PM2A-Car park island mix-sun
PM2B-Car park island mix-shade
PM3A-Site edge mix - sun
PM3B-Site edge mix - shade
PM4-Site markers mix
PM5A-Feature planting mix-sun
PM6A-Site hedge mix-sun
PM7A-Groundcover mix A
PM7B-Groundcover mix B
PM9A-Climbers mix - sun
PM9B-Climbers mix - shade
Existing Vegetation

TREES
Existing Tree to be Removed Refer ARBORISTS REPORT
Existing Tree to be Transplanted/ original location
Existing Tree to be Transplanted/ new location
Existing Tree to be Retained
Proposed Tree - General
Proposed Tree - Entry Marker
Proposed Tree - Site Marker

KEY PLAN



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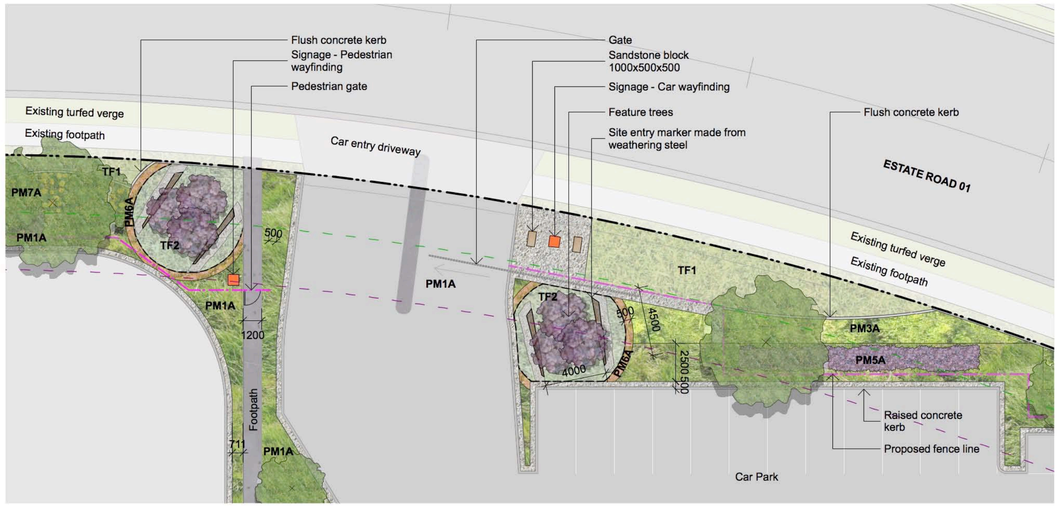
Landscape Plan
Sheet 5

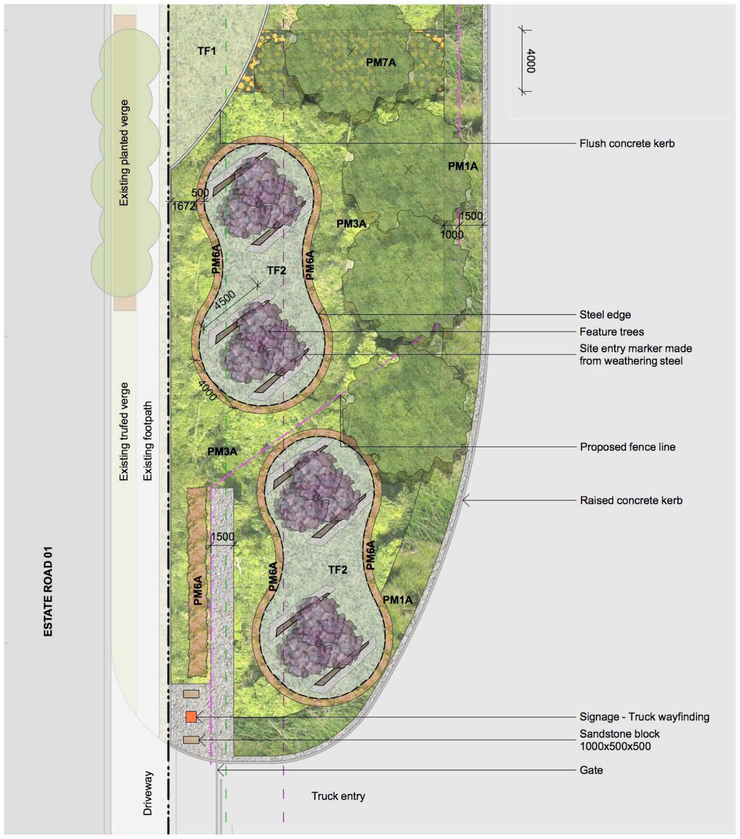
scale	1:500@A1
drawn	MF/ZZ
checked	CH
project no.	163-18
project phase	Development Application

L.SK.104 L



01 Northern Carpark - Entry Marker
Detail Plan - Scale 1:200 @ A1

0 2 4 6 8 10 M



02 Truck Entrance - Entry Marker
Typical Cross Section - Scale 1:200 @ A1

0 2 4 6 8 10 M



03 Warehouse 1B1 - Entry Marker
Detail Plan - Scale 1:200 @ A1

0 2 4 6 8 10 M

Note: All finished levels subject to change +/- 1000mm.

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1 Office
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4 Site Marker
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6 OWE Stage 1 Pocket Parks
CE Car entry/exit
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TE Truck entry/exit

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Lot Boundary
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Signage

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PM1B-Car park edge mix-shade
PM2A-Car park island mix-sun
PM2B-Car park island mix-shade
PM3A-Site edge mix - sun
PM3B-Site edge mix - shade
PM4-Site markers mix
PM5A-Feature planting mix-sun
PM6A-Site hedge mix-sun
PM7A-Groundcover mix A
PM7B-Groundcover mix B
PM9A-Climbers mix - sun
PM9B-Climbers mix - shade
Existing Vegetation

TREES
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Proposed Tree - Entry Marker
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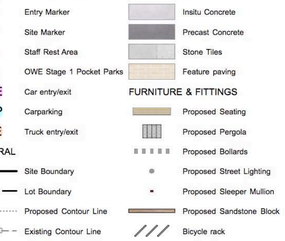

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Landscape Detailed Plan Sheet 1

scale	1:200@A1
drawn	MF/ZZ
checked	CH
project no.	163-18
project phase	Development Application

L.SK.105 J



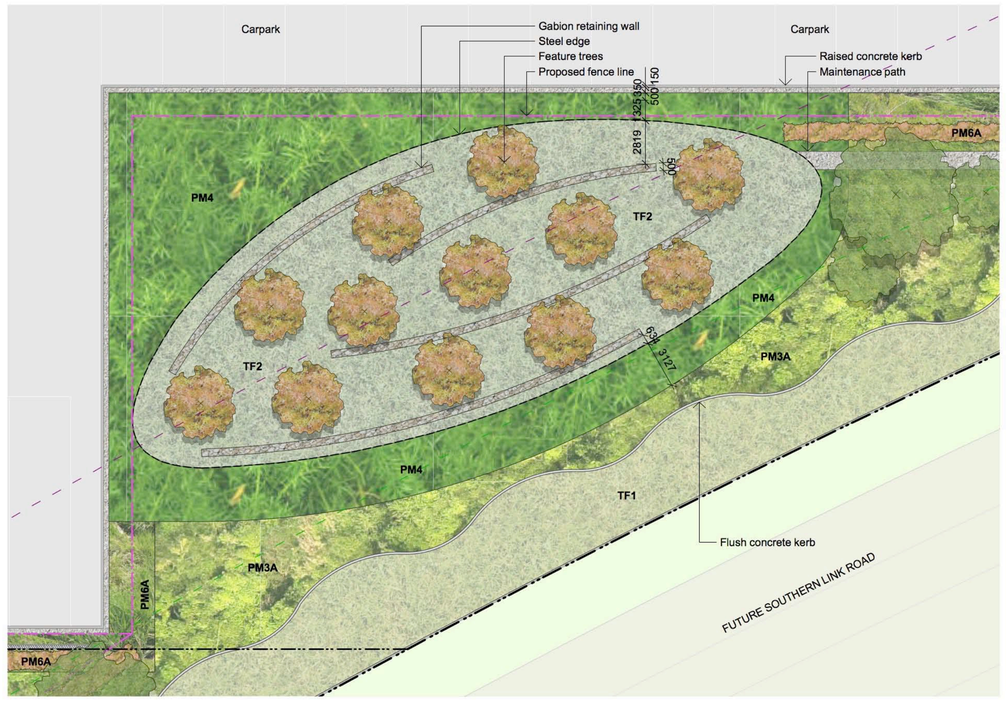
04 North-West Site Corner - Site Marker
Detail Plan - Scale 1:200 @ A1

0 2 4 6 8 10 M



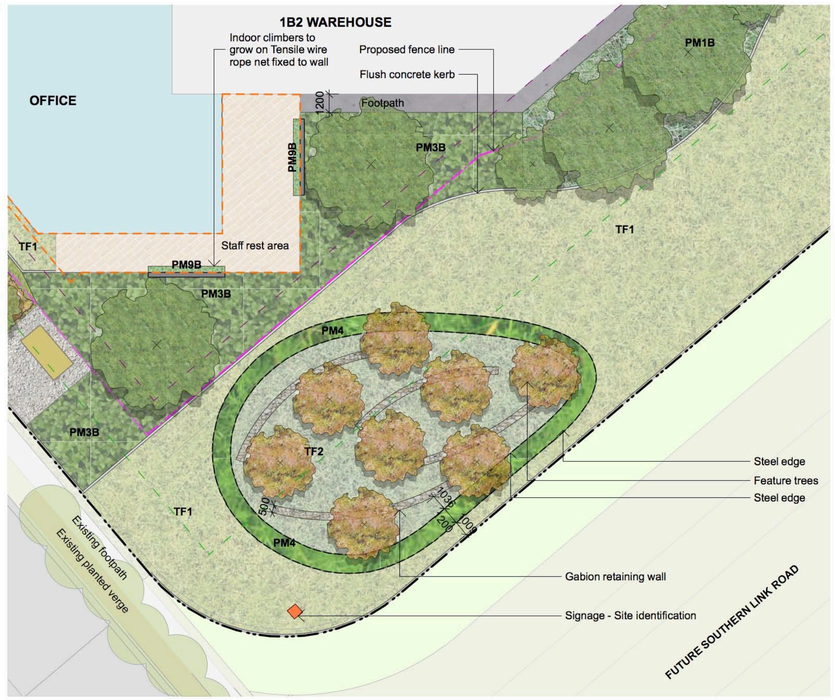
05 Main Site Signage - Site Marker
Detail Plan - Scale 1:200 @ A1

0 2 4 6 8 10 M



06 1C Warehouse - Site Marker
Detail Plan - Scale 1:200 @ A1

0 2 4 6 8 10 M



07 1B2 Warehouse Staff Rest Area - Site Marker
Typical Cross Section - Scale 1:200 @ A1

0 2 4 6 8 10 M

Note: All finished levels subject to change +/- 1000mm.

LEGEND

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PM4-Site markers mix
PM5A-Feature planting mix-sun
PM6A-Site hedge mix-sun
PM7A-Groundcover mix A
PM7B-Groundcover mix B
PM9A-Climbers mix - sun
PM9B-Climbers mix - shade
Existing Vegetation

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Proposed Tree - Entry Marker
Proposed Tree - Site Marker

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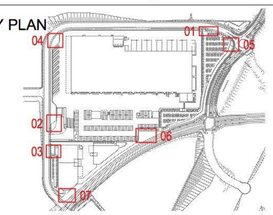

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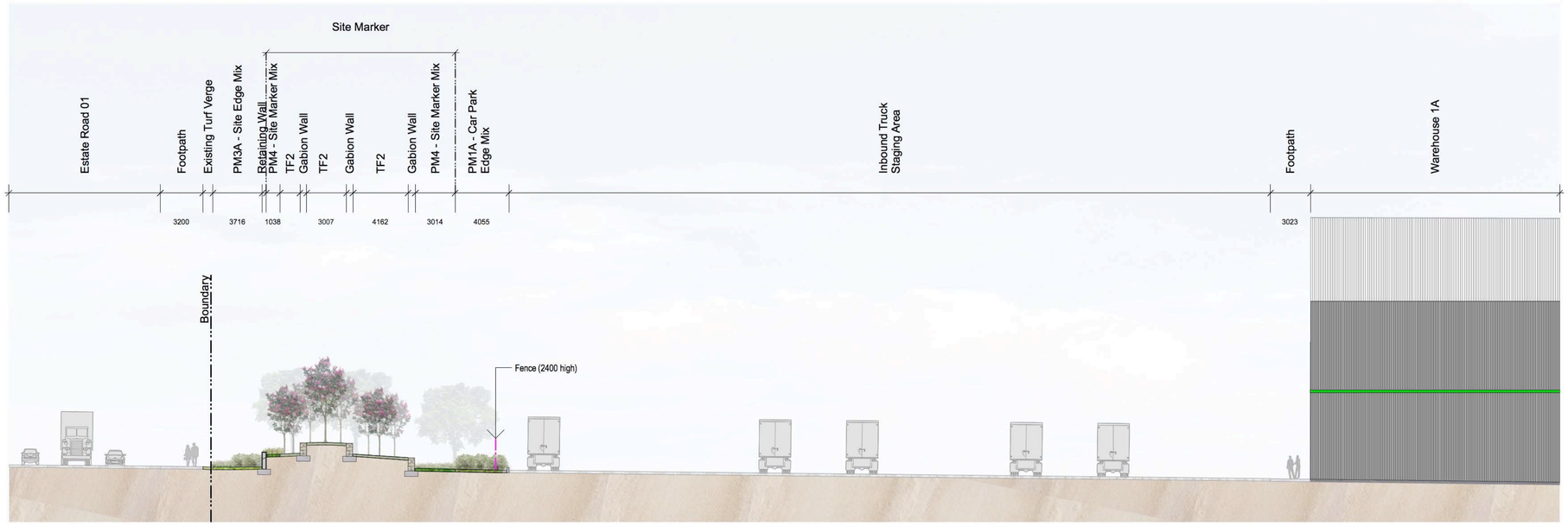
Verify all dimensions on site prior to construction .

Landscape Detailed Plan Sheet 2

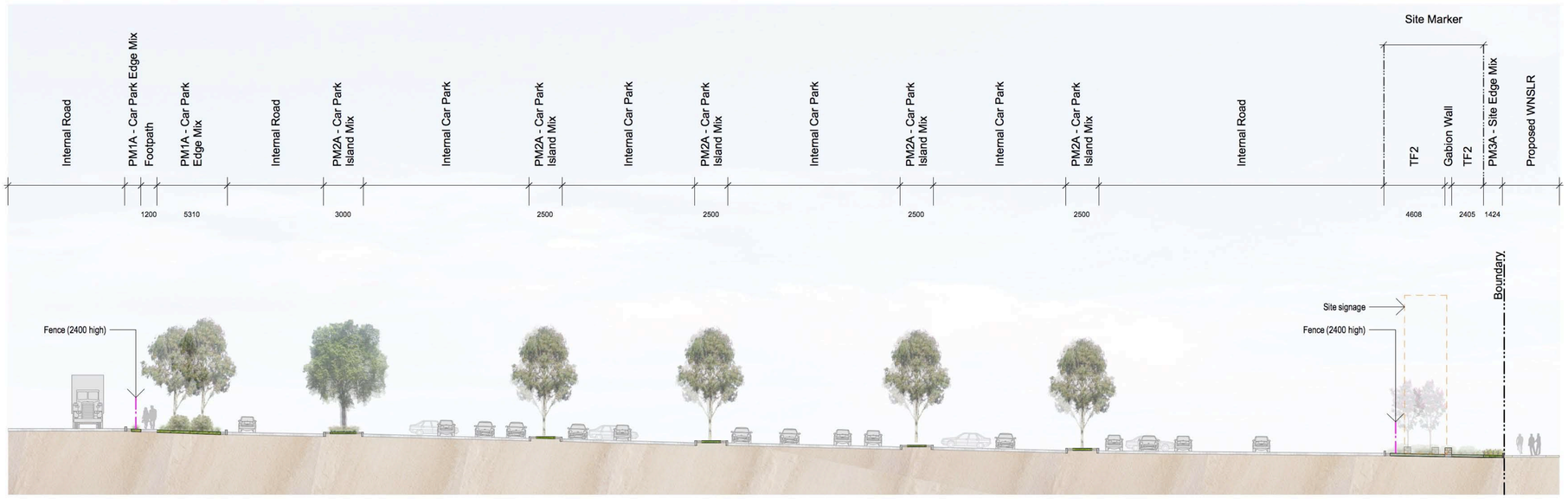
scale	1:200@A1
drawn	MF/ZZ
checked	CH
project no.	163-18
project phase	Development Application

L.SK.106 J



01 North-West Site Marker
Typical Cross Section - Scale 1:200 @ A1

0 2 4 6 8 10 M



02 Northern Employee Car Park
Typical Cross Section - Scale 1:200 @ A1

0 2 4 6 8 10 M

Note: All finished levels subject to change +/- 1000mm.

scape DESIGN
LANDSCAPE ARCHITECTURE
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Phone 02 9976 0756
email office@scapedesign .com.au
Web www.scapedesign .com.au

PROJECT
Oakdale West Estate, Precinct 1
Oakdale West, NSW

CLIENT
Goodman Property Services

revision	revision description	by	date
J	DEVELOPMENT APPLICATION	MF	14/2/20
I	DEVELOPMENT APPLICATION	ZZ	25/10/19
H	CLIENT REVIEW	MF	18/10/19
G	CLIENT REVIEW	MF	26/9/19
F	CLIENT REVIEW	MF	20/9/19

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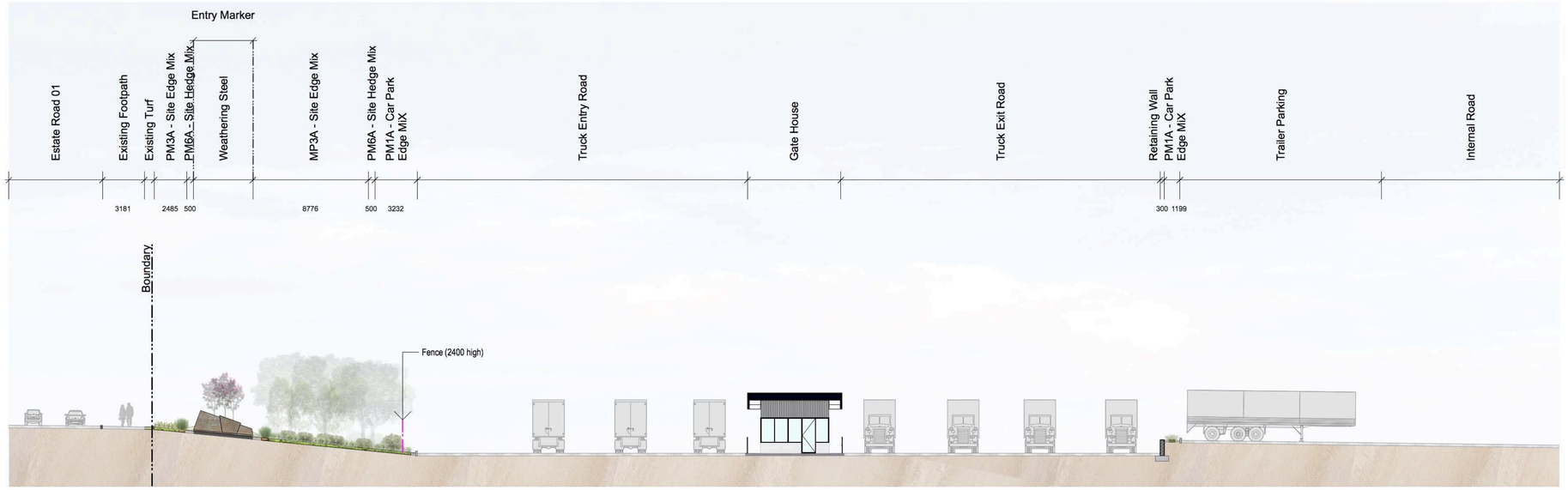
Landscape Sections Sheet 1

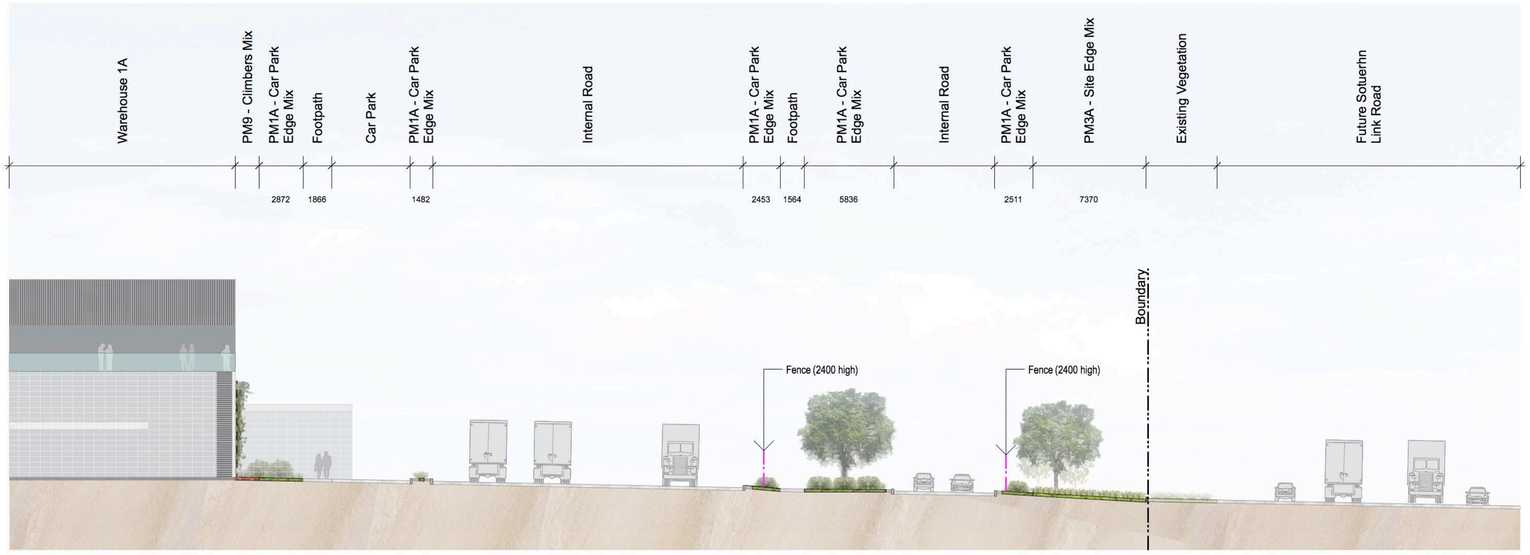
scale	1:200@A1
drawn	MF/ZZ
checked	CH
project no.	163-18
project phase	Development Application

L.SK.200 J



03 Truck Entry Marker - Estate Road 01
Typical Cross Section - Scale 1:200 @ A1

0 2 4 6 8 10 M



04 Green Wall
Typical Cross Section - Scale 1:200 @ A1

0 2 4 6 8 10 M

Note: All finished levels subject to change +/- 1000mm.

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PROJECT
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Oakdale West, NSW

CLIENT
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F	CLIENT REVIEW	MF	20/9/19

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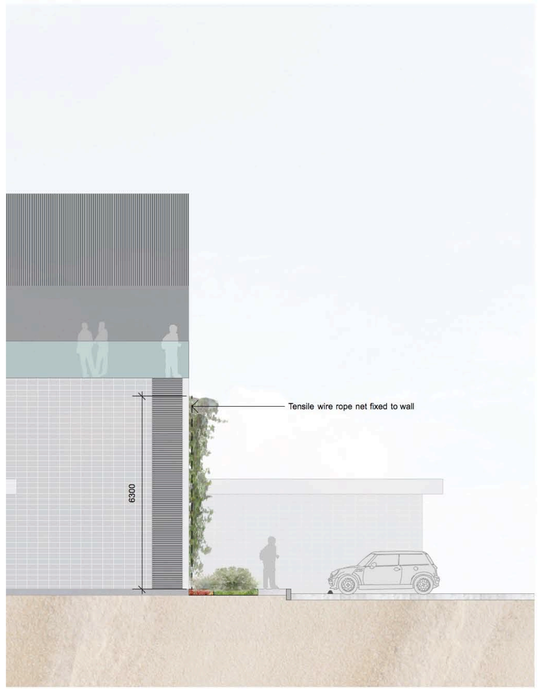
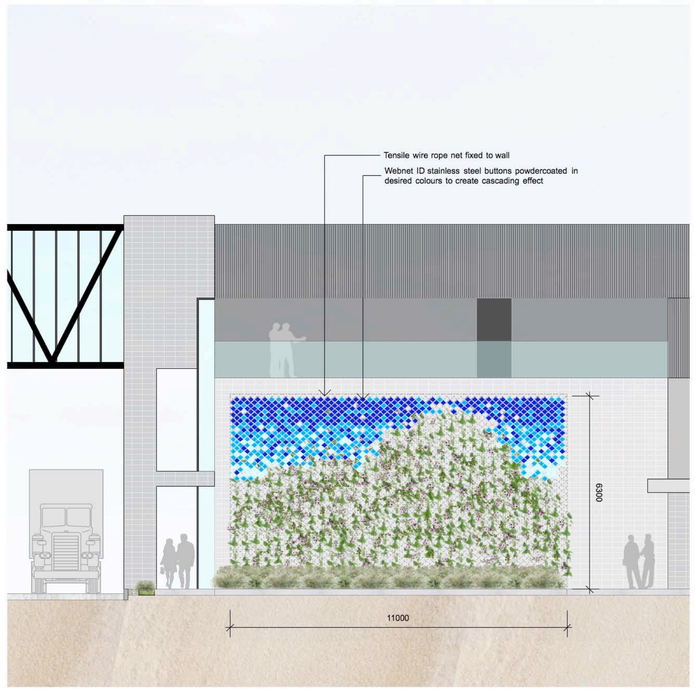
Landscape Sections Sheet 2

scale	1:200@A1
drawn	MF/ZZ
checked	CH
project no.	163-18
project phase	Development Application

L.SK.201 J



01 Green Wall Type A - Office 1A Wall - Profile
Typical Elevaton - Scale 1:100 @ A1



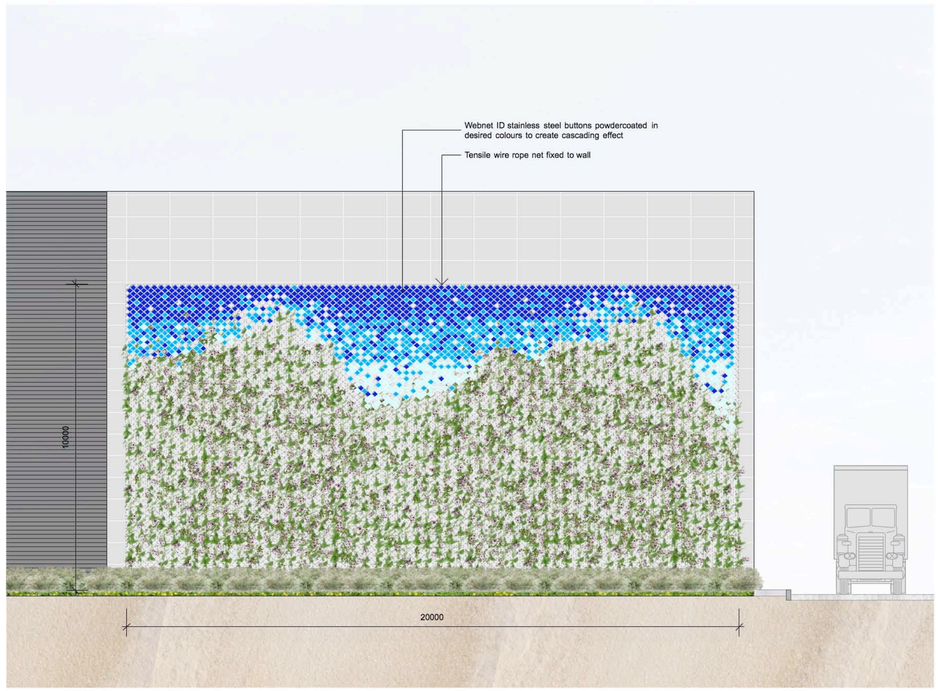
02 Green Wall Type A - Office 1A Wall
Typical Elevaton - Scale 1:100 @ A1



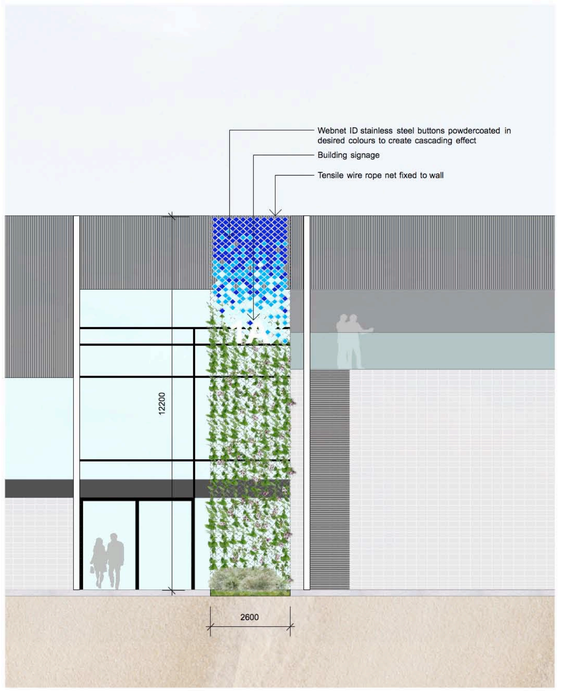
03 Green Wall Type B - Office Entrance
Typical Elevaton - Scale 1:100 @ A1



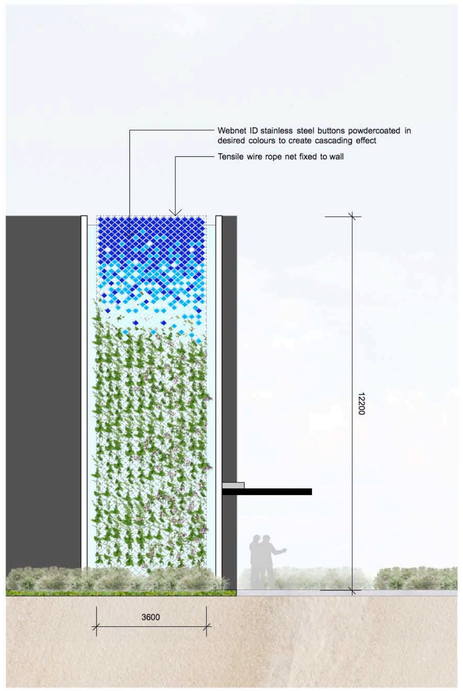
04 Green Wall Type C - Office Entrance
Typical Elevaton - Scale 1:100 @ A1



05 Green Wall Type D - Warehouse Wall
Typical Elevaton - Scale 1:100 @ A1



06 Green Wall Type E - Office Entrance
Typical Elevaton - Scale 1:100 @ A1



07 Green Wall Type F - Sky Bridge Lift
Typical Elevaton - Scale 1:100 @ A1

Note: All finished levels subject to change +/- 1000mm.

KEY PLAN

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Oakdale West, NSW

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revision	revision description	by	date
I	DEVELOPMENT APPLICATION	MF	14/2/20
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F	CLIENT REVIEW	MF	26/9/19
E	CLIENT REVIEW	MF	20/9/19

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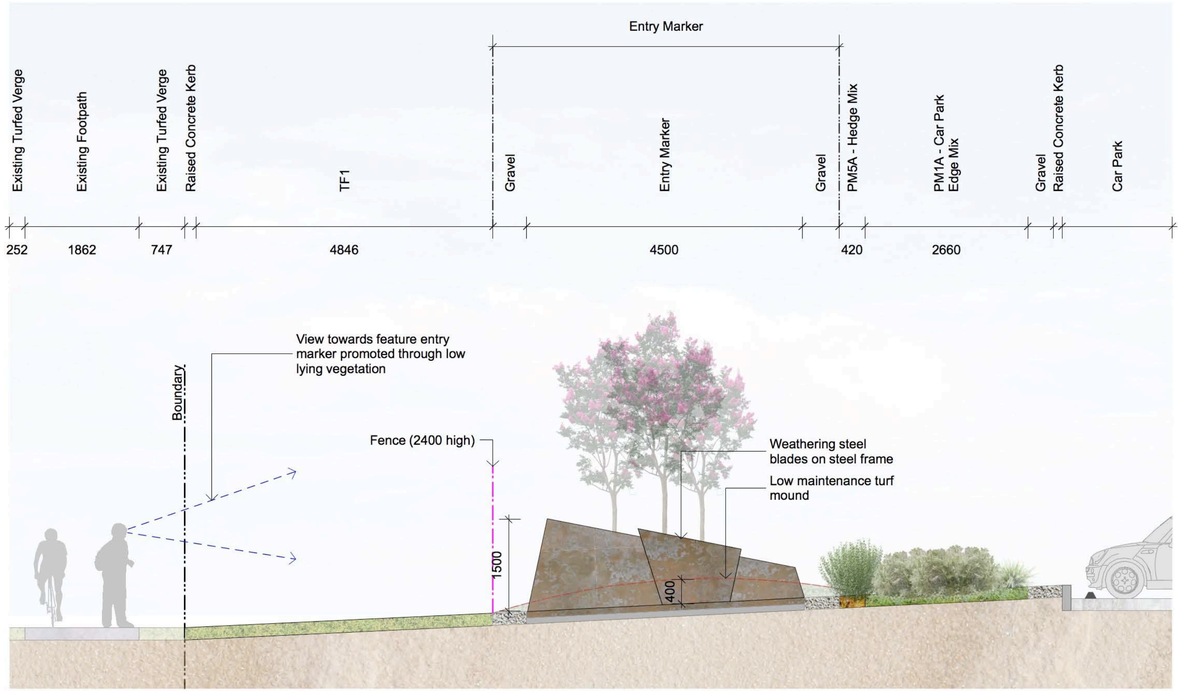
Landscape Sections Sheet 3

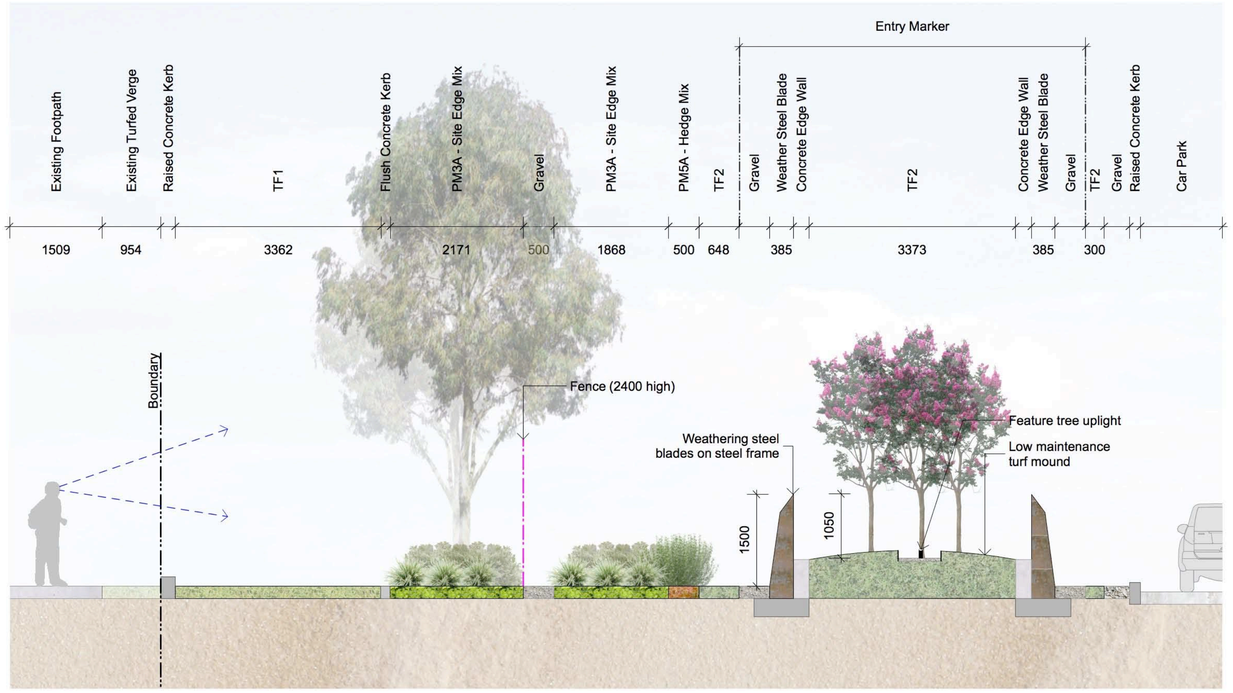
scale	1:200@A1
drawn	MF/ZZ
checked	CH
project no.	163-18
project phase	Development Application

L.SK.202 I



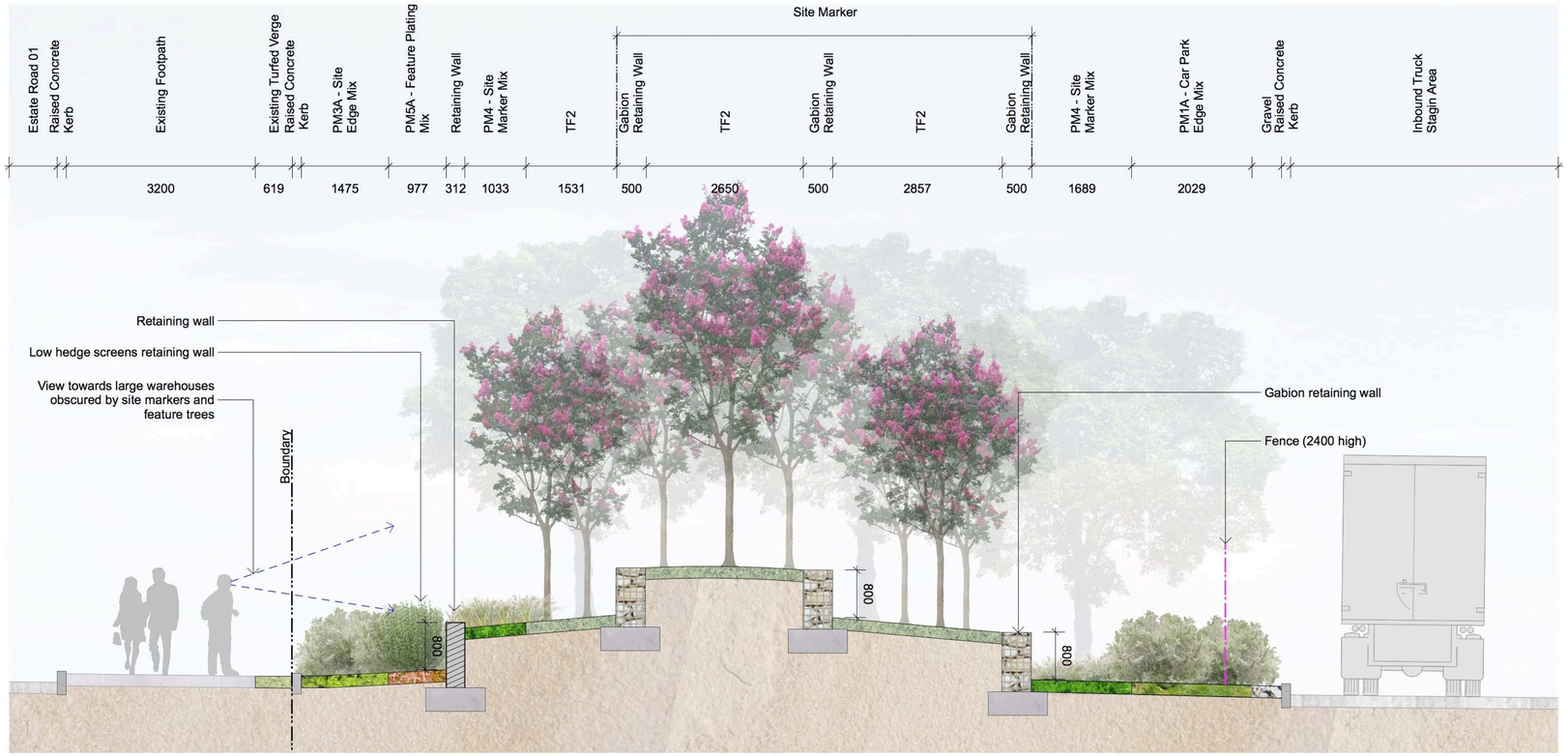
01 Entry Marker
Detailed Elevaton - Scale 1:50 @ A1

0 1 2 3 M



02 Entry Marker
Detailed Elevation - Scale 1:50 @ A1

0 1 2 3 M



03 Site Marker
Detailed Elevaton - Scale 1:50 @ A1

0 1 2 3 M

Note: All finished levels subject to change +/- 1000mm.

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Oakdale West, NSW

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revision	revision description	by	date
J	DEVELOPMENT APPLICATION	MF	14/2/20
I	DEVELOPMENT APPLICATION	MF	12/2/20
H	DEVELOPMENT APPLICATION	ZZ	25/10/19
G	CLIENT REVIEW	MF	18/10/19
F	CLIENT REVIEW	MF	26/9/19

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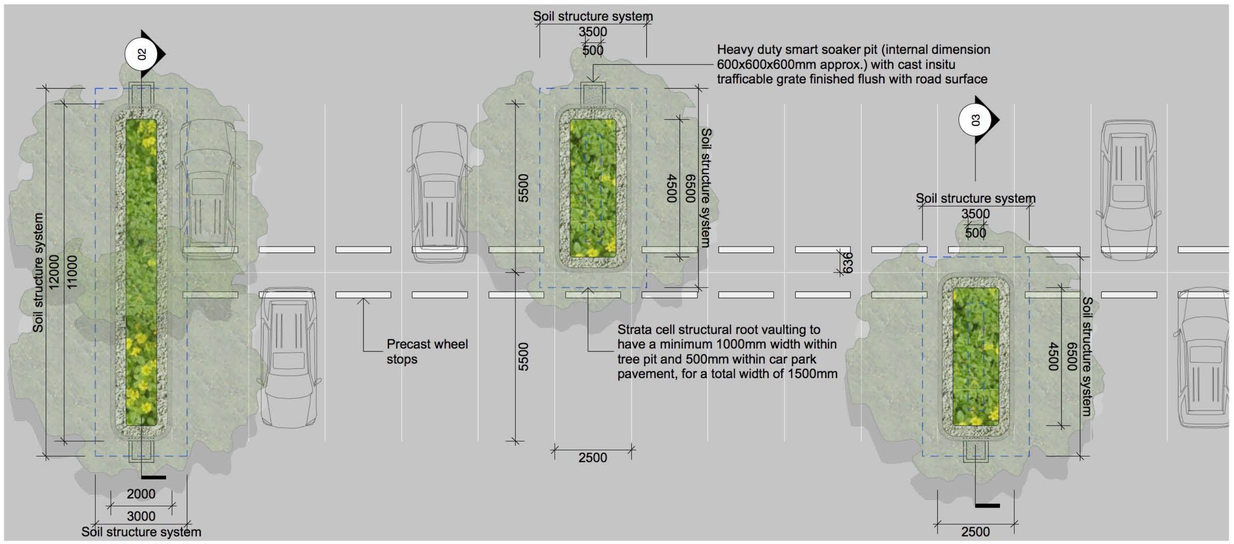
Landscape Sections Sheet 4

scale	1:200@A1
drawn	MF/ZZ
checked	CH
project no.	163-18
project phase	Development Application

L.SK.203 J

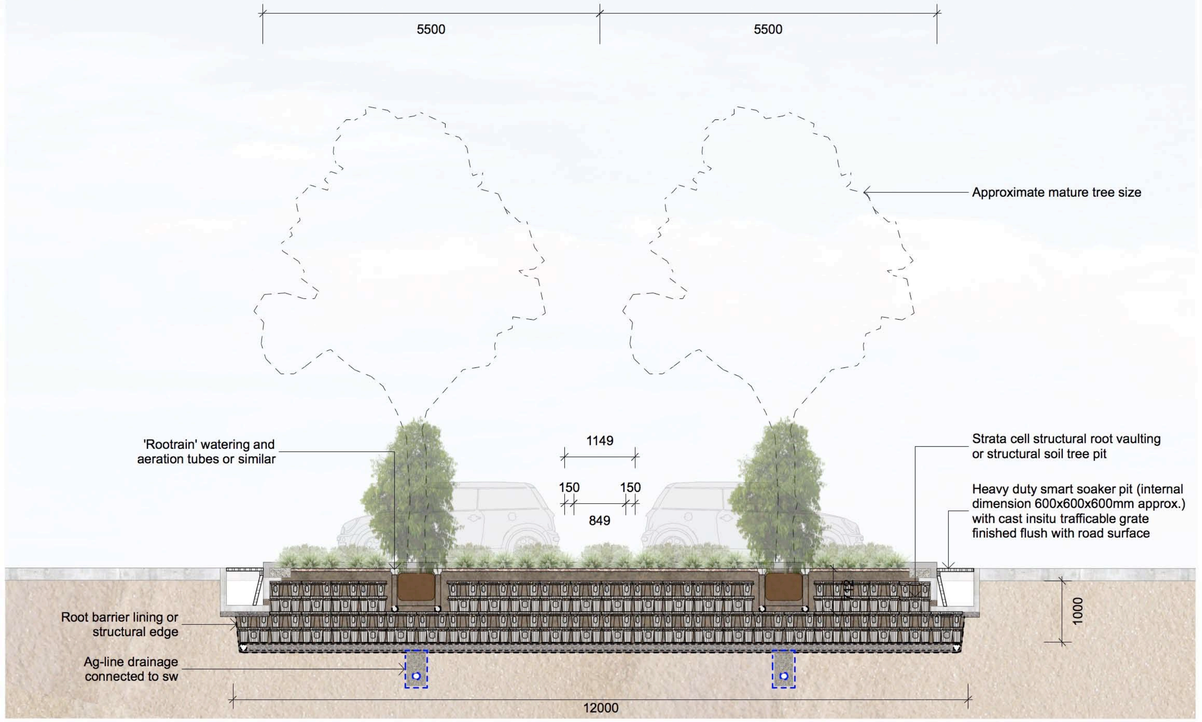


01 Carpark Tree Pit System
Detailed Plan - Scale 1:50 @ A1

0 1 2 3 M

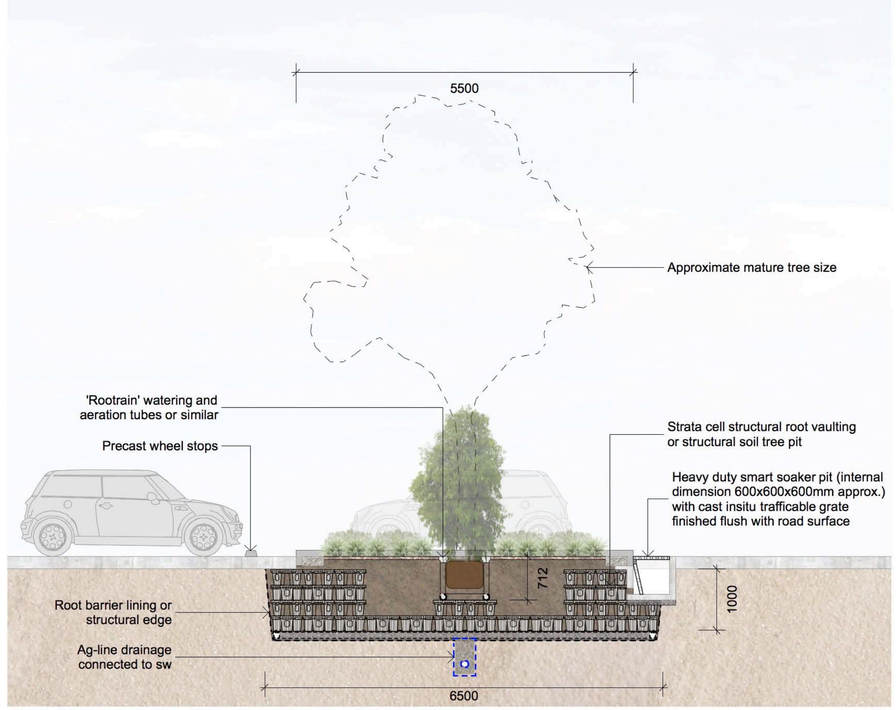
MATERIALS SCHEDULE

Description		Volume
STRATA CELL - SOIL STRUCTURE SYSTEM		
Type 1 - Strata Cell Pit 2500x6500mm		112.5 m3
Paving-Strata Cell Root Vaulting Type 1	*112.5*	
Type 2 - Strata Cell Pit 3000x6500mm		136.5 m3
Paving-Strata Cell Root Vaulting Type 2	*136.5*	
Type 3 - Strata Cell Pit 3500x6500mm		442.3 m3
Paving-Strata Cell Root Vaulting Type 3	*442.3*	
Type 4 - Strata Cell Pit 3000x12000mm		360.0 m3
Paving-Strata Cell Root Vaulting Type 4	*360.0*	
	Total Area	1051.3 m3



02 Carpark Tree Pit System
Detailed Section - Scale 1:50 @ A1

0 1 2 3 M



03 Carpark Tree Pit System
Detailed Section - Scale 1:50 @ A1

0 1 2 3 M

Note: All finished levels subject to change +/- 1000mm.

LEGEND

GENERAL
- Architecture Below

PAVEMENTS
- Concrete Insitu Vehicular
- Coarse Aggregate

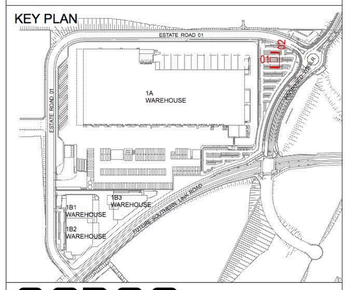
WALLS & EDGES
- Raised Concrete Kerb

PLANTING
- PM2A-Car park island mix-sun

FURNITURE & FITTINGS
- Precast Wheel Stop
- Soaker Pit

TREES
- Proposed Tree - General

KEY PLAN



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Oakdale West, NSW

CLIENT
Goodman Property Services

revision	revision description	by	date
D	DEVELOPMENT APPLICATION	MF	25/2/20
C	DEVELOPMENT APPLICATION	MF	14/2/20
B	DEVELOPMENT APPLICATION	MF	12/2/20
A	DEVELOPMENT APPLICATION	ZZ	25/10/19

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Carpark Details

scale	1:50@A1
drawn	MF/ZZ
checked	CH
project no.	163-18
project phase	Development Application

L.SK.204 D

Annexure K

Goodman

BRICKWORKS LIMITED

FOR BUILDING 1A - REFER TO DA DRAWING NO. OAK-1A-DA-10

7500
LANDSCAPE SETBACK

64745
WAREHOUSE

50000
HARDSTAND

82493
WAREHOUSE

12639

56500
WAREHOUSE 1B1

90400
WAREHOUSE 1B2

146900

14000

59524
WAREHOUSE 1C

ESTATE ROAD 01

PEDESTRIAN GATE

VEHICLE ENTRY/ EXIT

SLIDING GATE

CAR ENTRY/ EXIT

SLIDING GATE

BOUNDARY

FNC-1

FNC-2

LANDSCAPE

OFFICE 1B1
(2 LEVELS)

PUMP ROOM

WATER TANK

INDICATIVE RACKING LAYOUT

WAREHOUSE
1B1
3,854 m²
RL. 74.800 (+/- 1000)

RSD

RECESSED DOCK (2)

15m AWNING OVER

3m AWNING OVER

PARKING (59)

WAREHOUSE
1B2
5,686 m²
RL. 74.800(+/- 1000)

OFFICE 1B2
(2 LEVELS)

SUBSTATION KIOSK

HARDSTAND
50m

PARKING (24)

OFFICE 1C
(1 LEVEL)

WAREHOUSE
1C
3,586 m²
RL. 74.800 (+/- 1000)

BUILDING SETBACK
20000

LANDSCAPE SETBACK
10000

FUTURE SOUTHERN LINK ROAD

FUTURE
PRECINCT 3

FUTURE
PRECINCT 4

NEW ZONE SUBSTATION

1/37

2/37

3/37

DEVELOPMENT AREA SCHEDULE

Lot 1B/1C

Site Area	31,972 sqm
Warehouse 1B-1	3,854 sqm
Warehouse 1B-2	5,686 sqm
Warehouse 1C	3,586 sqm
Office 1B-1 (2 level)	500 sqm
Office 1B-2 (2 level)	569 sqm
Office 1C (2 level)	436 sqm
Total Building Area	14,631 sqm
Awning	1,400 sqm
Site Cover (exc. awning)	46 %
Floor Space Ratio	0.46 : 1
Hardstand Area	6,445 sqm
Light Duty Area	2,365 sqm
Carparking	83

LEGEND

- Site Boundary
- Lot Boundary
- Building 7.5m Setback
- Landscape 3.75m Setback
- FNC-1 — Chainwire Fencing
- FNC-2 — Palisade Fencing
- RW — Retaining Wall

SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Proposed Industrial Facility - Building 1B/1C

SITE PLAN

1:500@A1
1:1000@A3

20rh Feb 2020

OAK-1C-DA-30 R

Job No 15117

Annexure L

PROPOSED INDUSTRIAL FACILITIES
PRECINCT 1
OAKDALE WEST
Estate Road HORSLEY PARK, NSW 2175
Drawing List

Masterplans

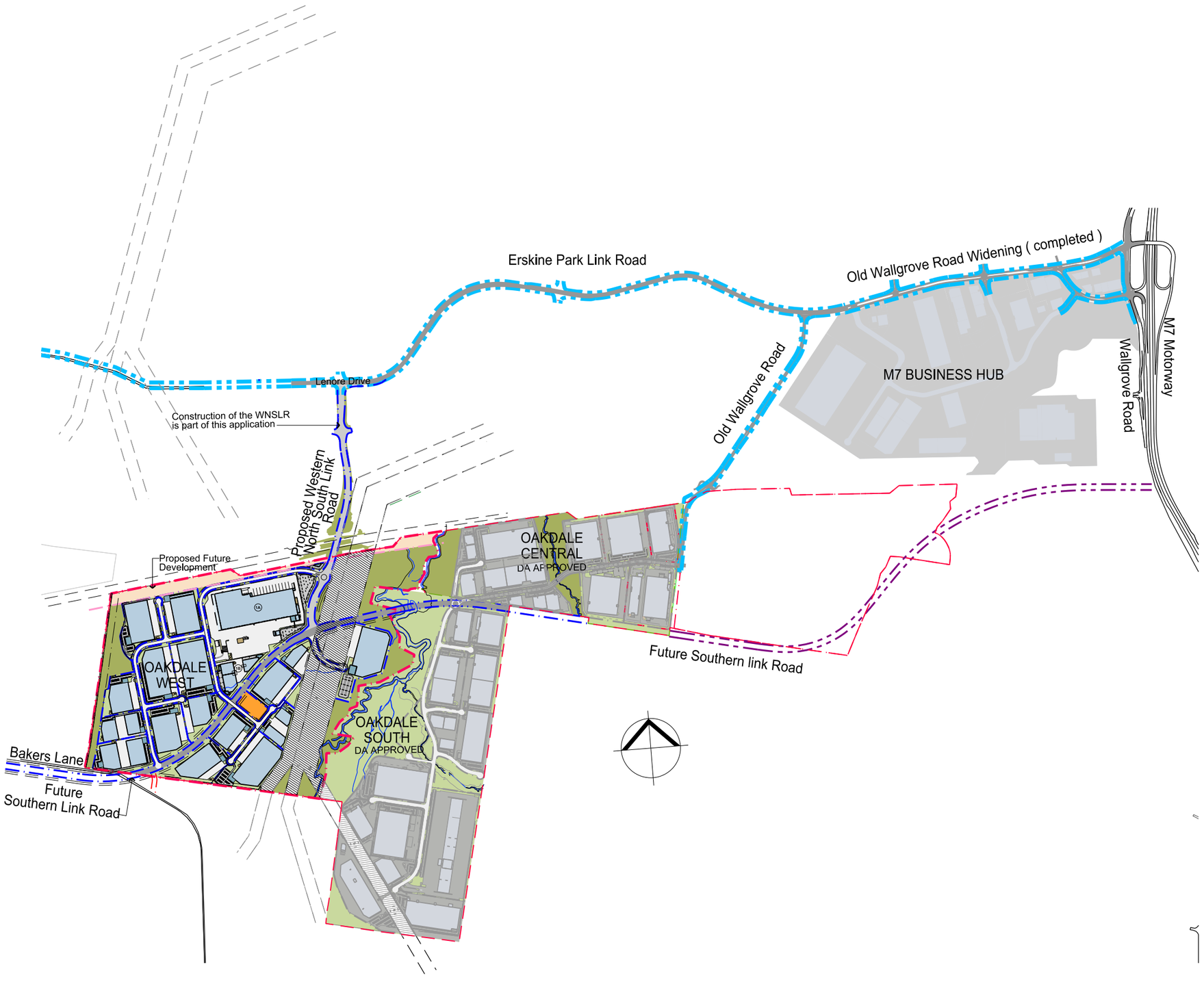
OAK MP01	Cover Sheet & Location
OAK MP02	SSDA Masterplan
OAK MP03	Western North South Link Road
OAK MP04	SSDA Stage 1 Development
OAK MP05	Precinct 1 Masterplan
OAK MP06	Precinct Plan
OAK MP07	Indicative Ultimate Lot Layout
OAK MP08	Site Ananlysis Plan
OAK MP09	Existing Zoning
OAK MP10	Not Used
OAK MP11	Building Staging Plan (Indicative)
OAK MP12	Signage Precinct 1 Plan
OAK MP13	Fire Protection Plan
OAK MP14	Biodiversity Management Plan

Lot 1A

OAK 1A DA10	Site Plan
OAK 1A DA11	Roof Plan
OAK 1A DA12	Office Plan Ground Floor
OAK 1A DA13	Office Plan First Floor
OAK 1A DA13A	Office Plan Second Floor
OAK 1A DA14	Elevations Office
OAK 1A DA15	Elevations Warehouse
OAK 1A DA16	Section 1
OAK 1A DA17	Section 2
OAK 1A DA18	Warehouse Plan
OAK 1A DA18A	Mezzanine 1 Plan
OAK 1A DA18B	Mezzanine 2 Plan
OAK 1A DA18C	Mezzanine 3 Plan
OAK 1A DA18D	Mezzanine 4 Plan
OAK 1A DA18E	Mezzanine 5 Plan
OAK 1A DA18F	Mezzanine 6 Plan
OAK 1A DA19	Skybridge Sections & Elevations
OAK 1A DA20	Receiving Office Plans
OAK 1A DA21	Gatehouse Plans
OAK 1A DA22	Trailer Workshop Plans
OAK 1A DA23	Trailer Wash
OAK 1A DA24	Diesel Refueling Area
OAK 1A DA25	Energy Complex 1
OAK 1A DA25A	Energy Complex 2
OAK 1A DA28	Stage 2 Site Plan
OAK 1A DA29	Stage 2 Elevations

Lot 1B

OAK 1C DA30	Site Plan / Floor Plan
OAK 1C DA31	Roof Plan
OAK 1C DA32	Office Floor Plans 1B1
OAK 1C DA33	Office Floor Plans 1B2
OAK 1C DA33A	Office Floor Plans 1C
OAK 1C DA34	Elevations Office
OAK 1C DA34A	Elevations Office
OAK 1C DA35	Elevations Sheet 1
OAK 1C DA36	Elevations Sheet 2
OAK 1C DA37	Sections



SBA ARCHITECTS

Oakdale West Estate
Horsley Park

Cover Sheet / Location Plan

Not To Scale
25 Feb 2020

OAK MP01 (AP)
Job No 15117

SEE DRAWING OAK MP03 FOR CONTINUATION

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BRICKWORKS LIMITED

Proposed Bridge

Proposed Western North South Link Road Subject to Just Terms Land Acquisition.

AMENITIES LOT

Substation Kiosk

New Driveway Access track

Proposed Western North South Link Rd

Goodman Signage

30m Wide Road Reserve

Main Site Identification Signage

Goodman Signage Wall WNS/R Up To SLR Subject to Subdivision

'Possible future Link Road by others, as depicted on SEPP Transport Infrastructure Map, subject to Just Terms land acquisition'.

SLR Road Reserve

Aecom Concept Alignment (Ref 60301100-00-FIG-PL0001 TO PL0003)

Future Southern Link Road

Proposed Future Development

Estate Road 01

Estate Road 02

Estate Road 03

Estate Road 04

Estate Road 05

Estate Road 06

Estate Road 07

Estate Road 08

1A RL 70.00 (+/- 1000mm)

RL 69.00 (+/- 1000mm)

2A RL 66.50 (+/- 1000mm)

2B RL 66.50 (+/- 1000mm)

3A RL 75.00 (+/- 1000mm)

3B RL 75.00 (+/- 1000mm)

3C RL 75.00 (+/- 1000mm)

3D RL 75.00 (+/- 1000mm)

1B1 RL 74.80 (+/- 1000mm)

1B2 RL 74.80 (+/- 1000mm)

1C RL 74.80 (+/- 1000mm)

4A RL 83.00 (+/- 1000mm)

4B RL 79.80 (+/- 1000mm)

4C RL 72.80 (+/- 1000mm)

4D RL 72.80 (+/- 1000mm)

4E RL 75.55 (+/- 1000mm)

4F RL 73.05 (+/- 1000mm)

4G RL 72.30 (+/- 1000mm)

5A RL 60.55 (+/- 1000mm)

2E RL 66.80 (+/- 1000mm)

2F RL 67.80 (+/- 1000mm)

2G RL 67.80 (+/- 1000mm)

2H RL 72.05 (+/- 1000mm)

2J RL 72.05 (+/- 1000mm)

Services Lot (Substation)

Transmission Easement

60000

40000 SETBACK

6000 ELECTRICAL EASEMENT

7500 SETBACK

98000 SETBACK

20000 SETBACK

Emmaus Residential Aged Care Average RL 56.00

Emmaus Catholic College Average RL 64.00

OAKDALE SOUTH
Lot 12 DP1178389

Site Area Schedule

Total Site Area	**154.12 ha**
Less:	
Non Developable Land	20.70 ha
Easements	22.45 ha
Regional Roads	6.74 ha
Services Lot	1.26 ha
Estate Roads	8.09 ha
E2 Zone non developable	1.43 ha
	60.67 ha
Development Areas	
Precinct 1	21.92 ha
Precinct 2	19.51 ha
Precinct 3	18.50 ha
Precinct 4	22.39 ha
Precinct 5	6.02 ha
Proposed Future Development	4.85 ha
Amenities Lot	.258 ha
Total Developable	**93.45 ha**
Total Warehouse	423,104 sqm
Total Office	21,242 sqm
Others (for Site 1A)	4,004 sqm
Mezzanines (for Site 1A)	32,402 sqm
Total GFA	480,752 sqm
Total GLA	448,350 sqm

SBA ARCHITECTS

Oakdale West Estate

Horsley Park

SSDA Estate Masterplan

0 60 300

1:3000 @ A1
1:6000 @ A3

25 Feb 2020

OAK MP02 (BS)
Job No 15417

Goodman

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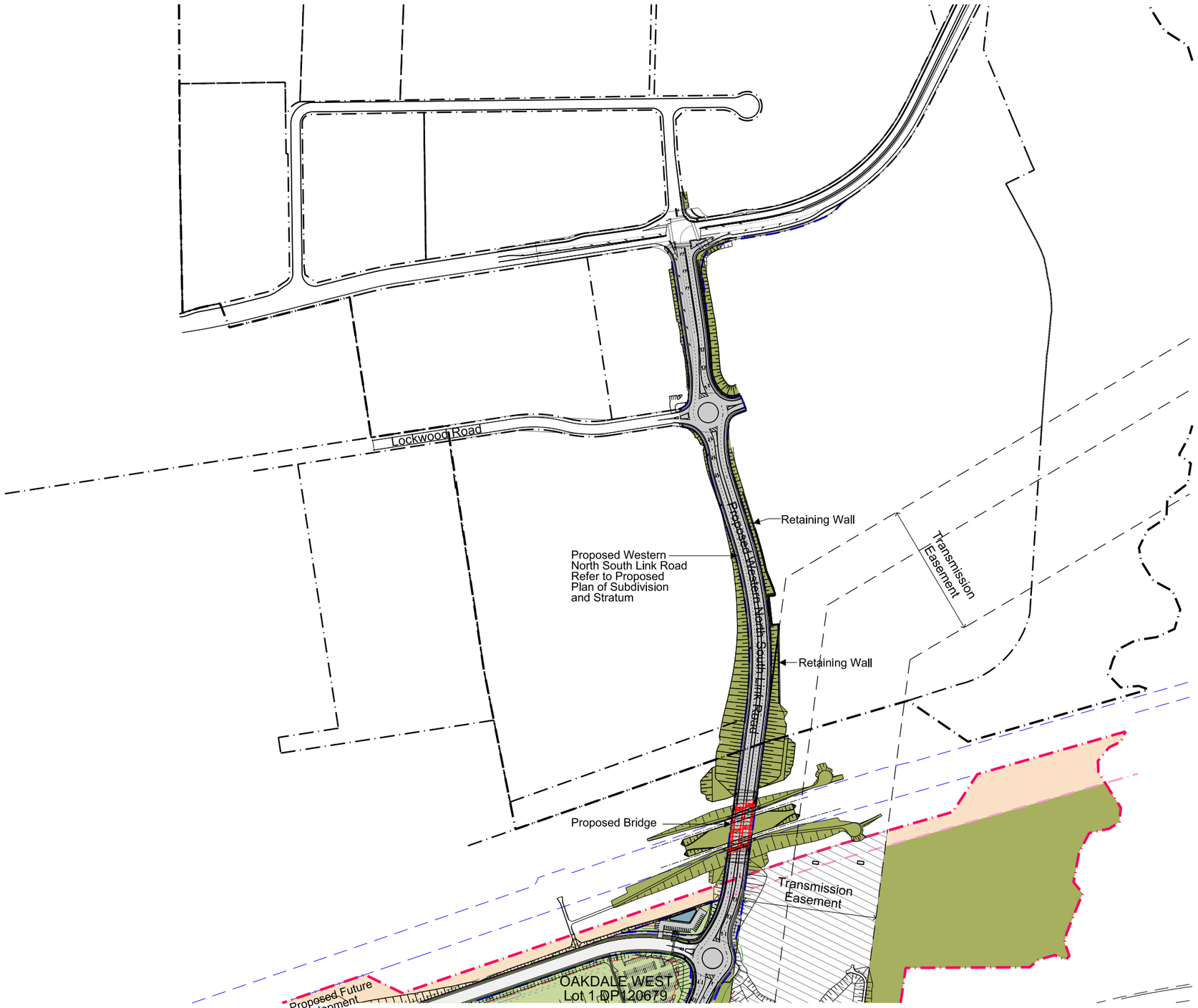


SEE DRAWING OAK MP02 FOR CONTINUATION

SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Western North South Link Road

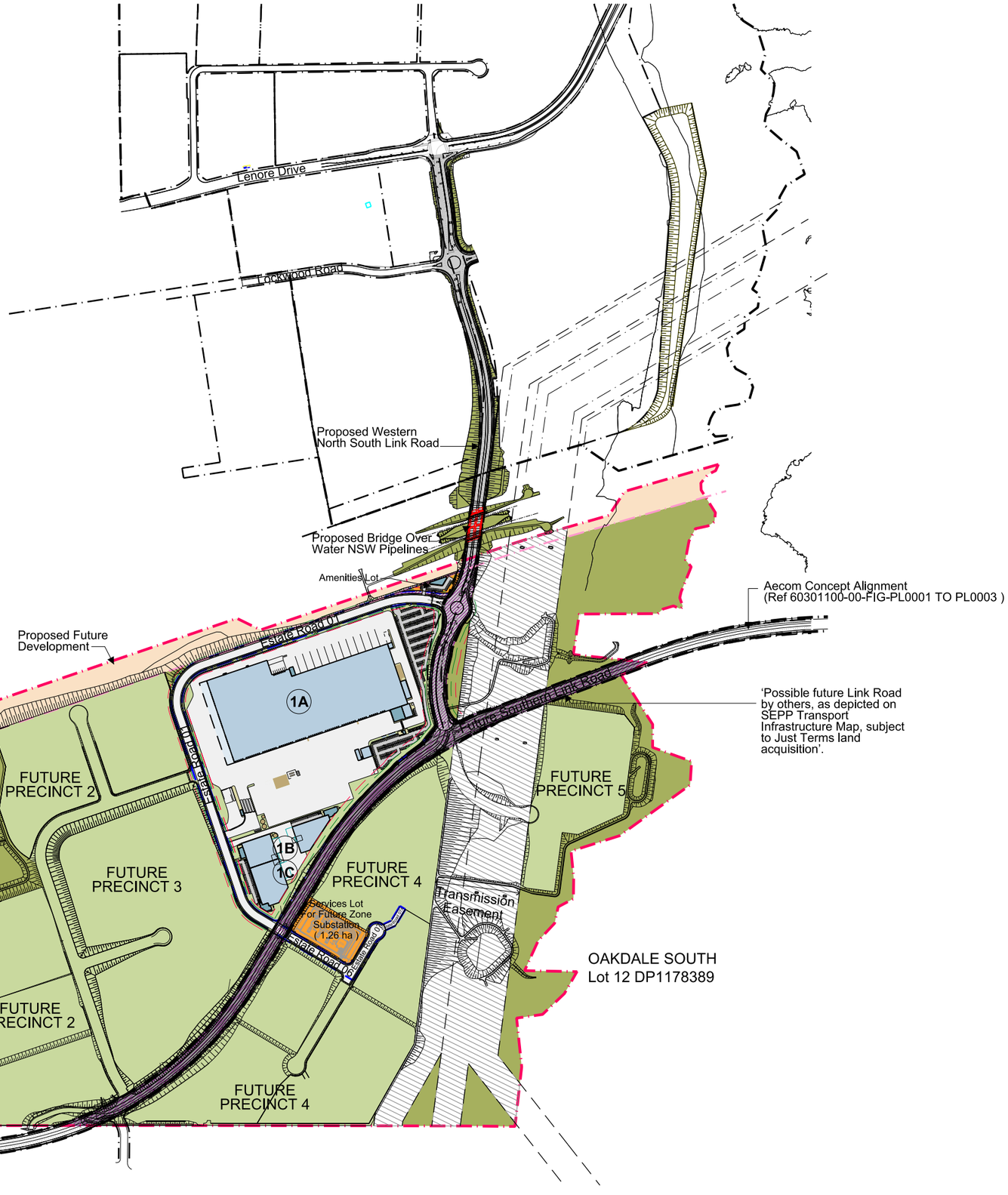
1:3000 @ A1
1:6000 @ A3

25 Feb 2020

OAK MP03 (AK)
Job No 10117

Goodman

BRICKWORKS LIMITED



Site Area Schedule

Total Site Area	**154.12 ha**
Less:	
Non Developable Land	20.70 ha
Easements	22.45 ha
Regional Roads	6.74 ha
Services Lot	1.26 ha
Estate Roads	8.09 ha
E2 Zone non delopable	1.43 ha
	60.67 ha
Development Areas	
Precinct 1	21.9242 ha
Total Developable (Precinct 1)	**21.9242 ha**
Total Warehouse (includes Stage 2)	81,285 sqm
Total Office	4,151 sqm
Total Others	4,004 sqm
Total Mezzanines (includes Stage 2)	32,402 sqm
Total GFA	121,842 sqm
Total GLA	89,440 sqm

SBA ARCHITECTS

Oakdale West Estate

Horsley Park

SSDA Stage 1 Development - Precinct 1

1:5000 @ A1
1:10000 @ A3

25 Feb 2020

OAK MP04 (AP)
Job No 15117

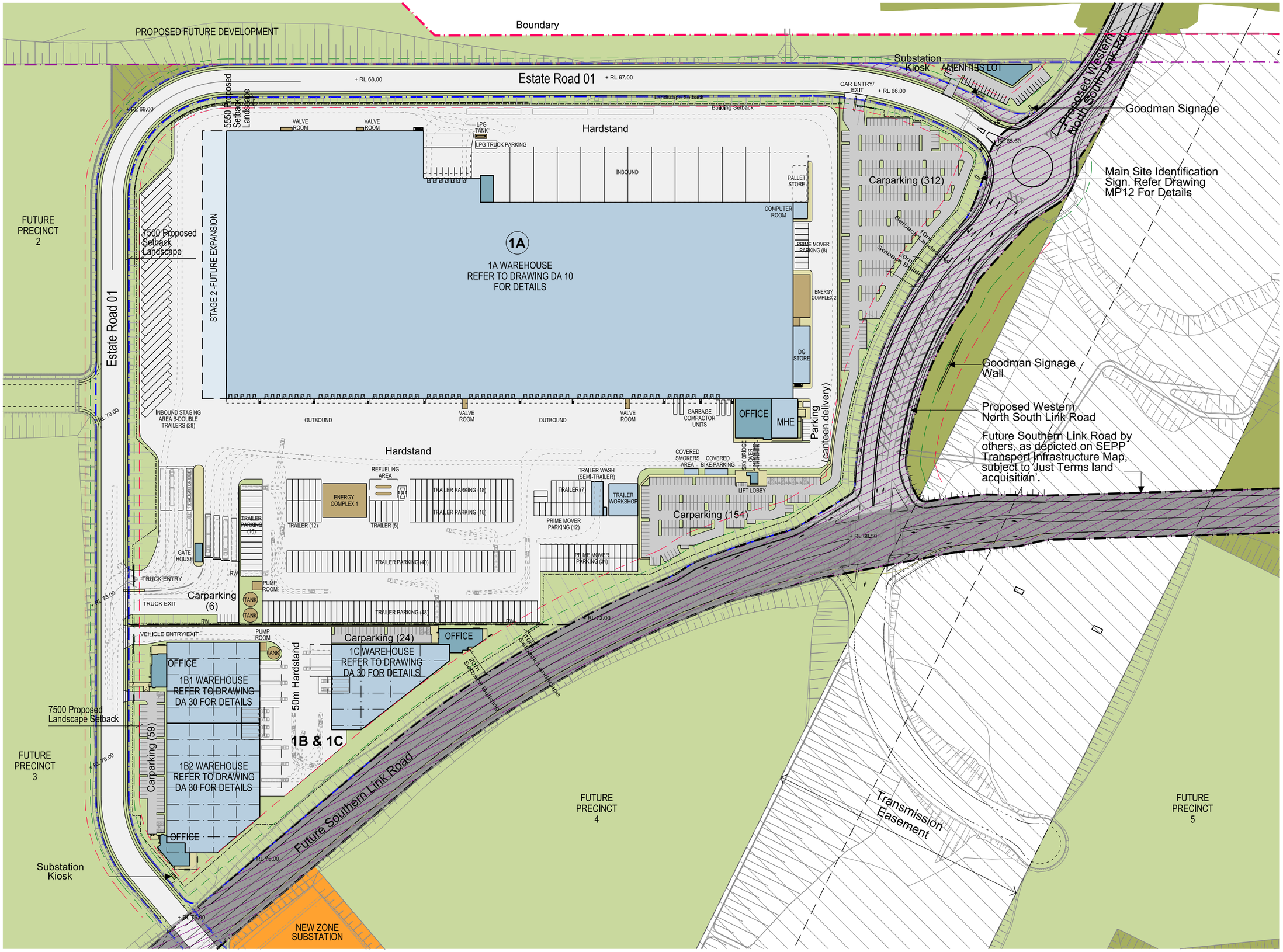
Goodman

BRICKWORKS LIMITED

Development Area Schedule	
Total Site Area	219,242 sqm
Total Warehouse	81,285 sqm
Total Office	4,151 sqm
Others (for Lot 1A)	4,004 sqm
Mezzanines (for Lot 1A)	32,402 sqm
Total GFA (includes all Mezzanines)	**121,842 sqm**
Total GLA (excludes all Mezzanines)	**89,440 sqm**
Carparking (total)	549

Lot 1A	
Site Area	187,270 sqm
Warehouse (includes Stage 2 future expansion 3,318 sqm)	68,160 sqm
Office (3 level)	2,646 sqm
Others (includes dock office, trailer workshop, trailer wash, dangerous goods store, computer room, gate house, energy complex 1 & 2, refuelling area, battery charge, skybridge & lobby)	4,004 sqm
Mezzanines (includes Stage 2 mezzanine 3,101 sqm)	32,402 sqm
Total GFA (Includes all Mezzanines)	107,212 sqm
Total GLA (excludes all Mezzanines)	74,810 sqm
Awning	8,620 sqm
Site Cover (exc. awning)	57 %
Floor Space Ratio	0.57 : 1
Hardstand Area	88,610 sqm
Light Duty Area	13,875 sqm
Prime Mover Parking	54
Trailer Parking	164
Carparking (inclusive of 6 for Gatehouse)	472
Carparking (motorcycles)	6

Lot 1B & 1C	
Site Area	31,972 sqm
Warehouse 1B1	3,854 sqm
Warehouse 1B2	5,686 sqm
Warehouse 1C	3,586 sqm
Office 1B1 (2 level)	500 sqm
Office 1B2 (2 level)	569 sqm
Office 1C (2 level)	436 sqm
Total GFA	14,631 sqm
Awning	1,400 sqm
Site Cover (exc. awning)	46 %
Floor Space Ratio	0.46 : 1
Hardstand Area	6,445 sqm
Light Duty Area	2,365 sqm
Carparking	83



SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Precinct 1 Plan

0 25 125

1:1250 @ A1
1:2500 @ A3

25 Feb 2020

OAK MP 05 (BE)
Job No 15117

Goodman

BRICKWORKS LIMITED

Precinct 1

Precinct 2

Precinct 3

Precinct 4

Precinct 5

Substation
Zone
Lot (1.26 ha)

Precinct Area Schedule

Precinct 1	28.97 ha
Net Developable area	21.92 ha
Precinct 2	30.52 ha
Net Developable area	19.56 ha
Precinct 3	19.00 ha
Net Developable area	18.50 ha
Precinct 4	23.75 ha
Net Developable area	22.39 ha
Precinct 5	13.51 ha
Net Developable area	6.02 ha

SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Precinct Plan

0 60 300

1:3000 @ A1
1:6000 @ A3

25 Feb 2020

OAK MP 06 (AK)
Job No 15117

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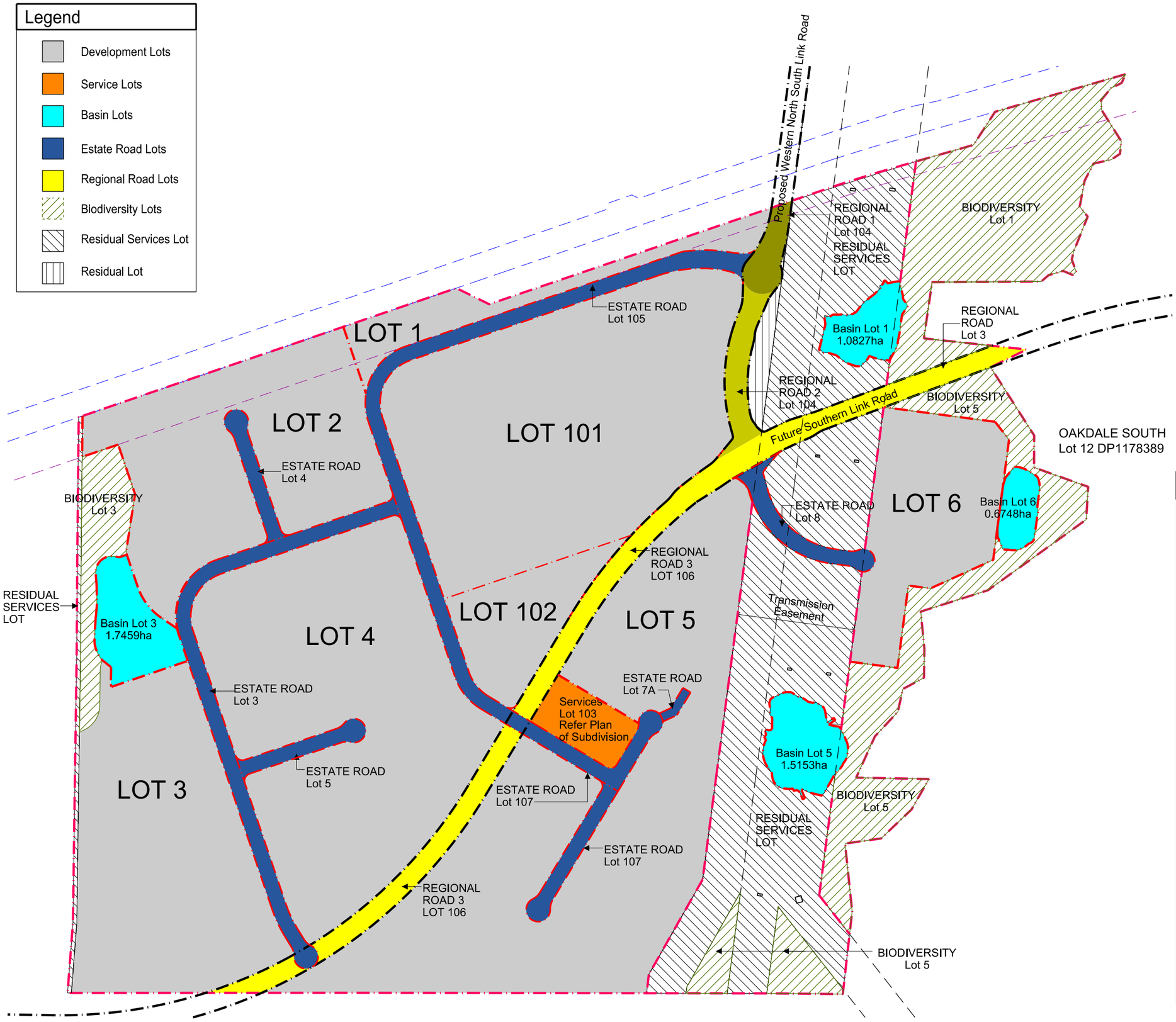
Legend

- Development Lots
- Service Lots
- Basin Lots
- Estate Road Lots
- Regional Road Lots
- Biodiversity Lots
- Residual Services Lot
- Residual Lot



Lot 1 DP120679		Sub Total
Total Land Area	WEST	154.12 ha
Biodiversity Lot 1	8.0710 ha	
Biodiversity Lot 2	Not Used	
Biodiversity Lot 3	1.9238 ha	
Biodiversity Lot 4	Not Used	
Biodiversity Lot 5	7.242 ha	17.2368 ha
Regional Road 1 Lot 104	.6057 ha	
Regional Road 2 Lot 104	.915 ha	
Regional Road 3 Lot 106	4.9813 ha	6.502 ha
Services Lot 103	1.2614ha	1.2614 ha
Residiual Lot	.5918 ha	.5918 ha
Residual Services Lot	20.0564 ha	20.0564 ha
Estate Road Lot 105	2.8266 ha	
Estate Road Lot 2	Deleted	
Estate Road Lot 3	2.2808 ha	
Estate Road Lot 4	.5228 ha	
Estate Road Lot 5	.5064 ha	
Estate Road Lot 107	1.3473 ha	
Estate Road Lot 7A	.0845 ha	
Estate Road Lot 8	.747 ha	8.3153 ha
Basin Lot 1	1.0828 ha	
Basin Lot 2	Not Used	
Basin Lot 3	1.7459 ha	
Basin Lot 4	Not Used	
Basin Lot 5	1.5153 ha	
Basin Lot 6	0.6748	5.0188 ha
Development Lot 101 & 102	21.9242 ha	
Development Lot 1	2.5583 ha	
Development Lot 2	11.2859 ha	
Development Lot 3	12.4588 ha	
Development Lot 4	18.5031ha	
Development Lot 5	22.3902 ha	
Development Lot 6	6.0196 ha	95.1402 ha

*All areas subject to survey.

SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Indicative Ultimate Lot Layout

1:3000 @ A1
1:6000 @ A3

25 Feb 2020

OAK MP07 (AH)
Job No 10717

Goodman

BRICKWORKS LIMITED

Site Constraints

- Aboriginal Sensitivity Zone
- HeritageTesting Zone
- Existing Native Vegetation

Proposed Western North South Link Road

Future Southern Link Road

Estate Road 01

Estate Road 01

Transmission Easement

New Zone Substation Lot

1A

1B

1C

PRECINCT 1

PRECINCT 2

PRECINCT 3

PRECINCT 4

PRECINCT 5

+RL.67.00

+RL.54.50

+RL.55.00

+RL.61.50

+RL.56.00

+RL.55.50

+RL.51.75

+RL.51.00

+RL.66.50

+RL.56.00

+RL.87.00

+RL.59.00

+RL.87.00

+RL.57.00

+RL.57.50

+RL.70.00

+RL.58.00

+RL.93.00

+RL.78.50

+RL.64.50

+RL.59.50

OAKDALE SOUTH
Lot 12 DP1178389

SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Site Analysis Plan

0 60 300

1:3000 @ A1
1:6000 @ A3

25 Feb 2020

OAK MP 08 (AJ)
Job No 15117

Goodman

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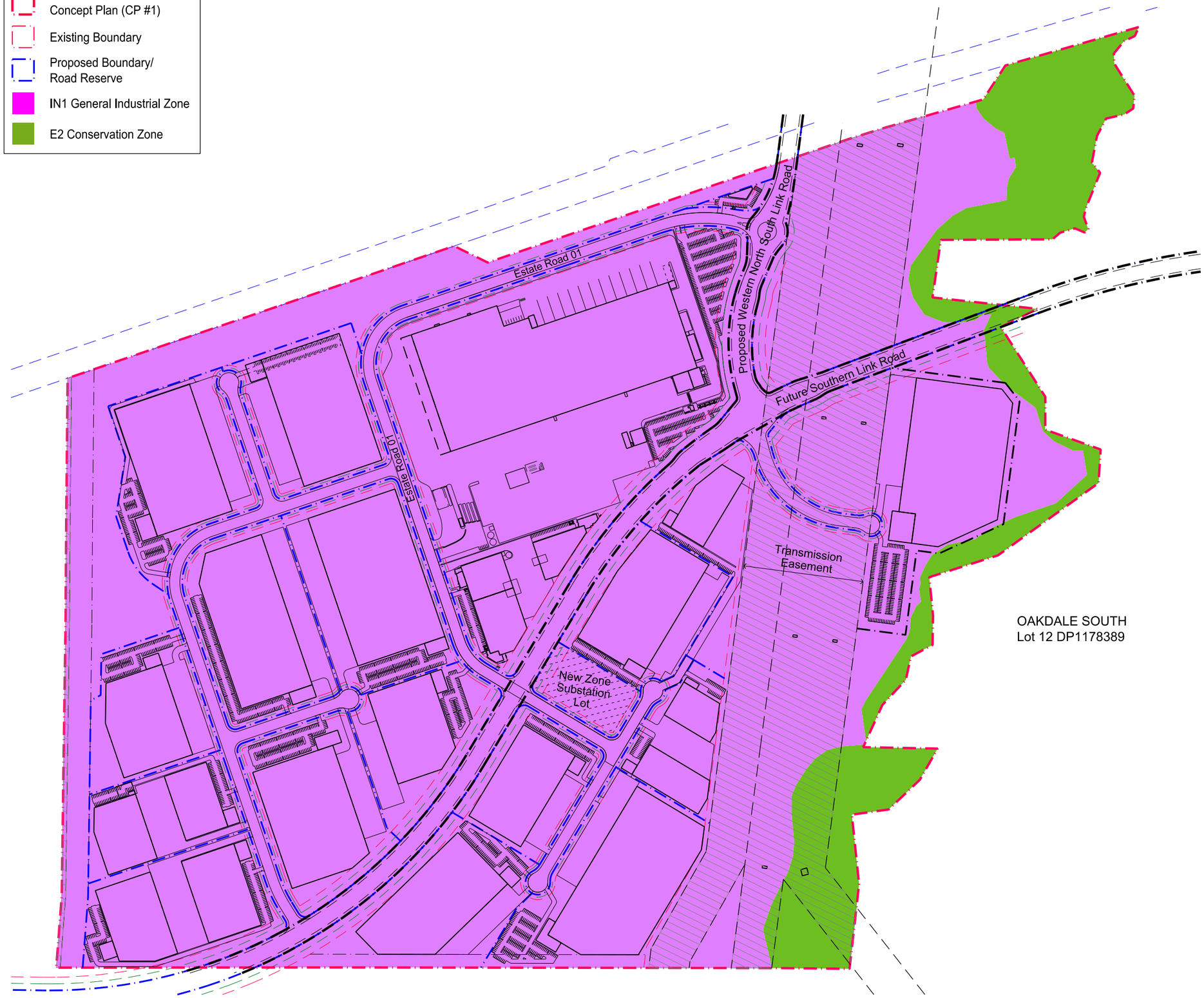
Legend

- Oakdale WEST Concept Plan (CP #1)
- Existing Boundary
- Proposed Boundary/ Road Reserve
- IN1 General Industrial Zone
- E2 Conservation Zone



SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Existing Zoning

0 60 300

1:3000 @ A1
1:6000 @ A3

25 Feb 2020

OAK MP 09 (AE)
Job No 5917

Goodman

BRICKWORKS LIMITED



OAKDALE SOUTH
Lot 12 DP1178389

SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Building Staging plan (Indicative)

1:3000 @ A1
1:6000 @ A3

25 Feb 2020

OAK MP11 (AG)
Job No 13117

Goodman

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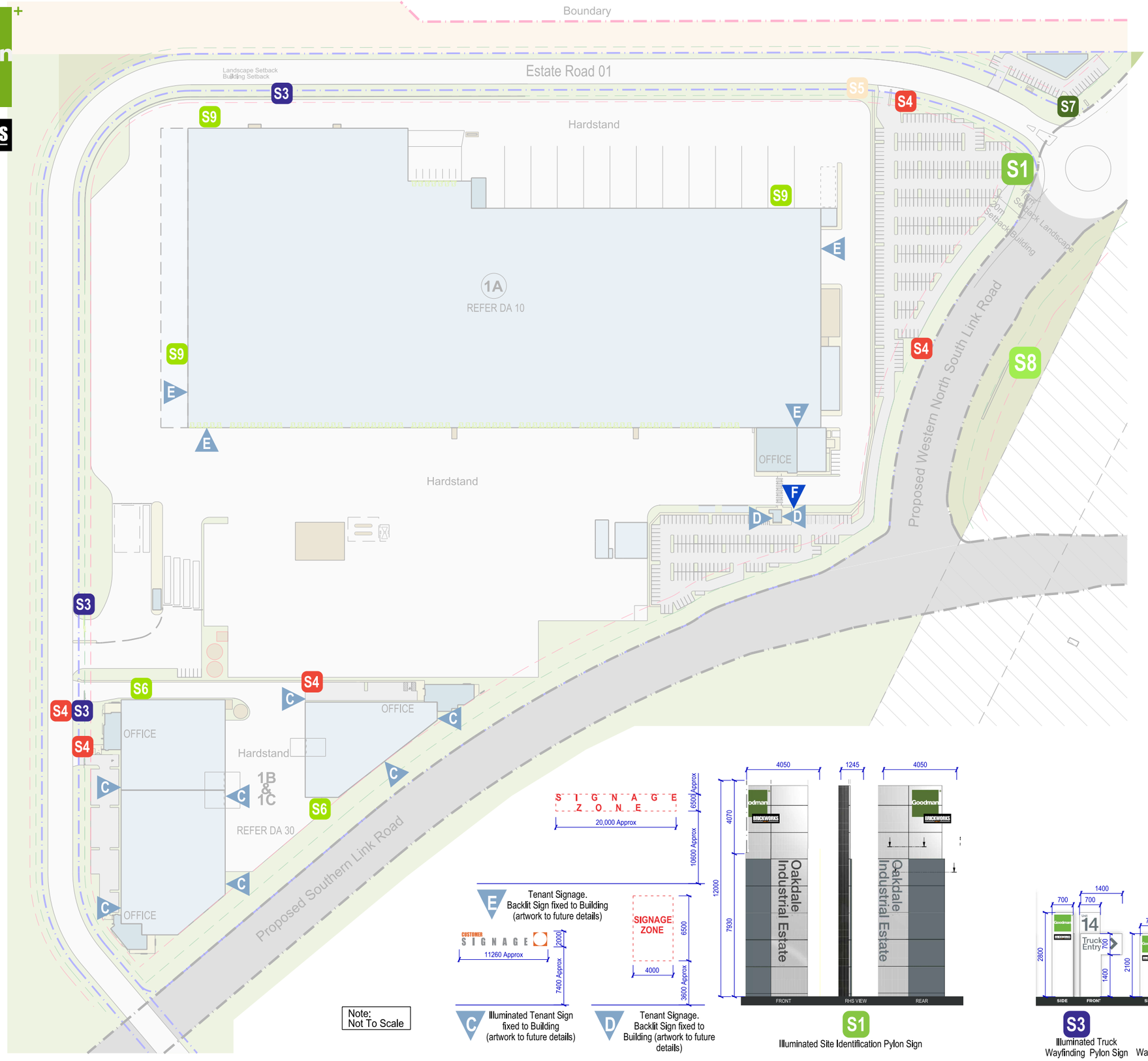
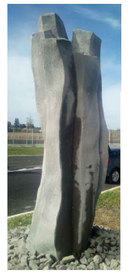


Signage Legend

- S1 Identification - Site
- S3 Wayfinding - Truck
- S4 Wayfinding - Car
- S5 Wayfinding - Pedestrian
- S6 Goodman Light Box (Type 1) on Warehouse
- S7 Goodman Signage
- S8 Goodman Signage Wall
- S9 Goodman Light Box (Type 2) on Warehouse
- C Customer Signage (Type 1)
- D Customer Signage (Type 2)
- E Customer Signage (Type 3)
- F Sculpture Artwork



F 3.8m High Sculpture Artwork



S9 Illuminated Sign fixed to Building



S8

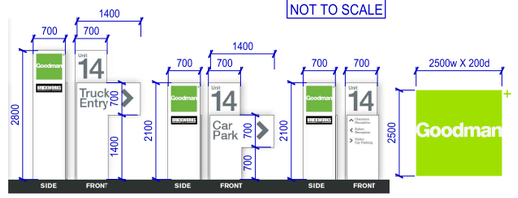


S7

S1 Illuminated Site Identification Pylon Sign

Note: Not To Scale

NOTE: NOT TO SCALE



S3 Illuminated Truck Wayfinding Pylon Sign

S4 Illuminated Car Wayfinding Pylon Sign

S5 Illuminated Wayfinding Pylon Sign

S6 Illuminated Sign fixed to Building

SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Signage Precinct 1 Plan

0 25 125

1:1250 @ A1
1:2500 @ A3

25 Feb 2020

OAK MP12 (AF)
Job No 18117

Goodman

BRICKWORKS LIMITED

Legend

Defendable Space

Proposed Bridge

Proposed Western North South Link Road, Subject to Just Terms Land Acquisition.

Proposed Western North South Link Rd

Biodiversity Lot 1

'Possible future Link Road by others, as depicted on SEPP Transport Infrastructure Map, subject to Just Terms land acquisition'.

30m Wide Road Reserve

30.9m Wide Road Reserve

Aecom Concept Alignment (Ref 60301100-00-FIG-PL0001 TO PL0003)

Proposed Future Development

Estate Road 01

Future Southern Link Road

Minimum 7.5m wide Defendable Space from Boundary

60000

Biodiversity Lot 3

PRECINCT 1

PRECINCT 2

PRECINCT 3

PRECINCT 4

PRECINCT 5

1A

2A

2B

3A

3B

3C

3D

1B & 1C

4A

4B

4C

4D

4E

4F

4G

5A

2E

2F

2G

Minimum 50m wide Defendable Space by width of road & building set back.

Minimum 7.5m wide Defendable Space from Boundary

Minimum 12m wide Defendable Space from Boundary

Services Lot (Substation)

Transmission Easement

OAKDALE SOUTH Lot 12 DP1178389

Minimum 7.5m wide Defendable Space from Boundary

Biodiversity Lot 5

Minimum 20m wide Defendable Space from Estate Boundary

SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Fire Protection Plan

0 60 300

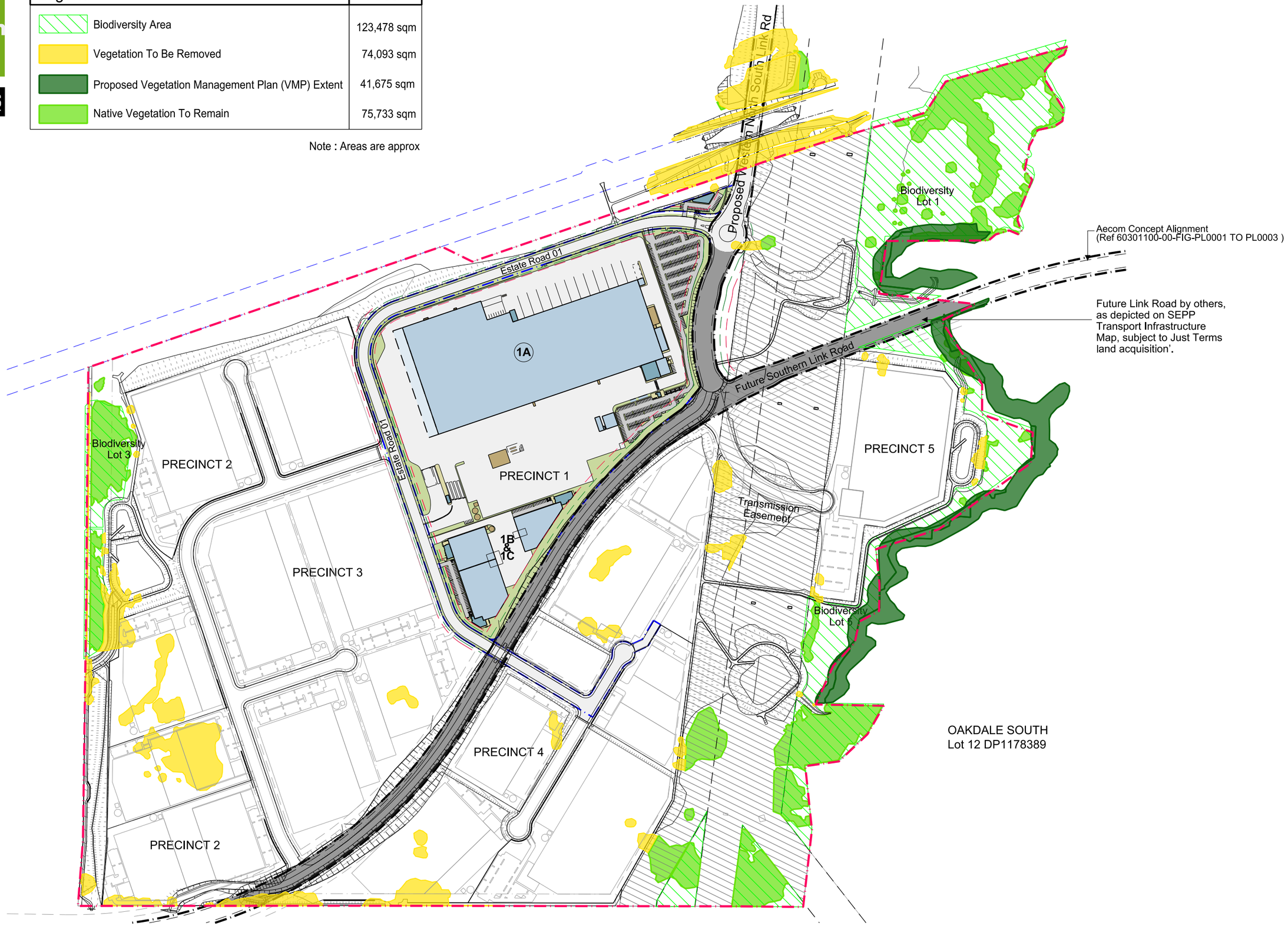
1:3000 @ A1
1:6000 @ A3

25 Feb 2020

OAK MP13 (AG)
Job No 13117

Legend	Area
Biodiversity Area	123,478 sqm
Vegetation To Be Removed	74,093 sqm
Proposed Vegetation Management Plan (VMP) Extent	41,675 sqm
Native Vegetation To Remain	75,733 sqm

Note : Areas are approx



Oakdale West Estate

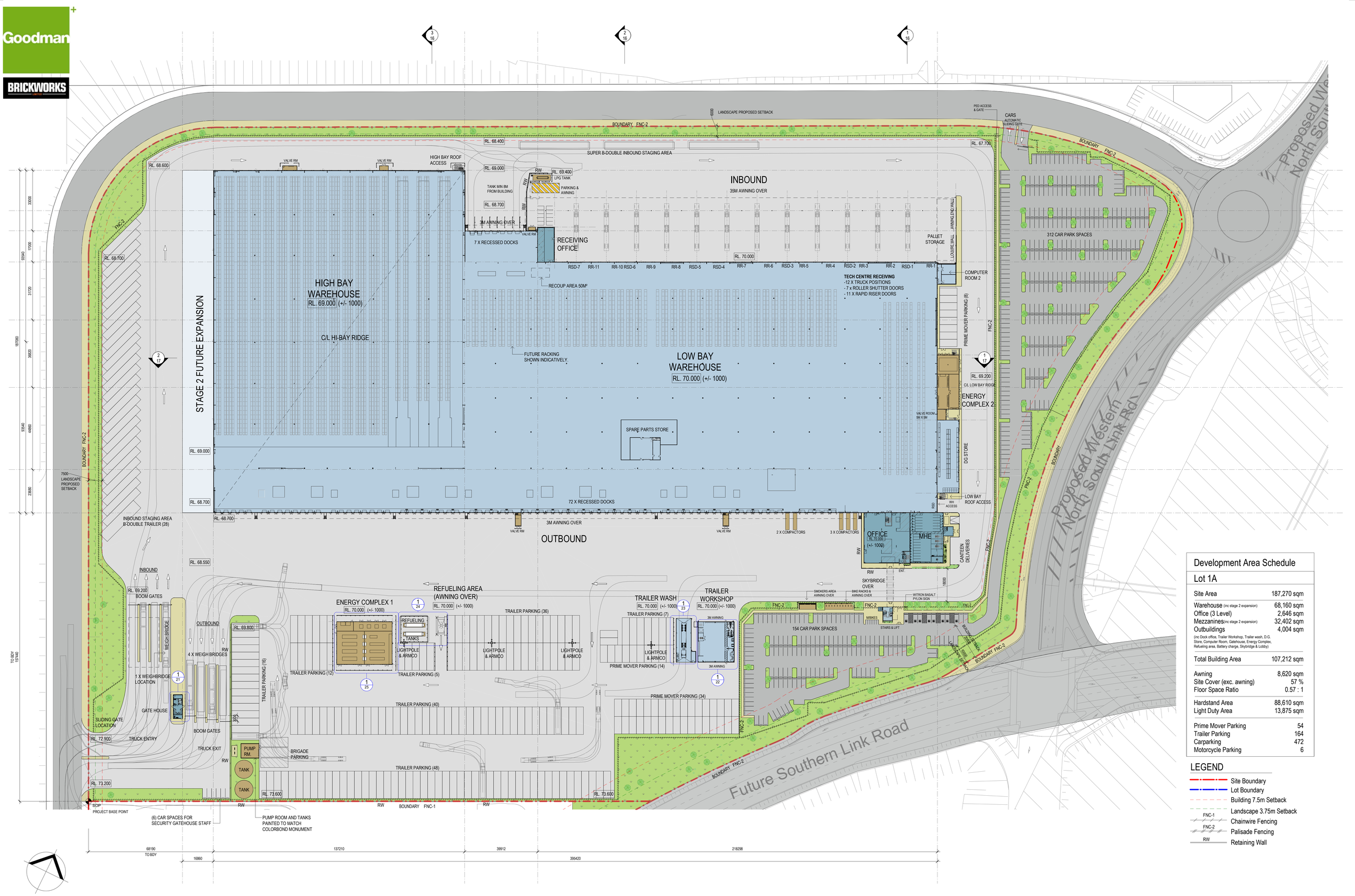
Horsley Park

Biodiversity Management Plan

1:3000 @ A1
1:6000 @ A3

25 Feb 2020

OAK MP14 (AP)
Job No 13117



Development Area Schedule

Lot 1A

Site Area	187,270 sqm
Warehouse (inc stage 2 expansion)	68,160 sqm
Office (3 Level)	2,646 sqm
Mezzanines (inc stage 2 expansion)	32,402 sqm
Outbuildings	4,004 sqm
(inc Dock office, Trailer Workshop, Trailer wash, D.G. Store, Computer Room, Gatehouse, Energy Complex, Refueling area, Battery charge, Skybridge & Lobby)	
Total Building Area	107,212 sqm
Awning	8,620 sqm
Site Cover (exc. awning)	57 %
Floor Space Ratio	0.57 : 1
Hardstand Area	88,610 sqm
Light Duty Area	13,875 sqm
Prime Mover Parking	54
Trailer Parking	164
Carparking	472
Motorcycle Parking	6

LEGEND

- Site Boundary
- Lot Boundary
- Building 7.5m Setback
- Landscape 3.75m Setback
- FNC-1 Chainwire Fencing
- FNC-2 Palisade Fencing
- RW Retaining Wall

SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Proposed Industrial Facility - Building 1A

Site Plan

1 : 750 @ B1

25th February 2020

OAK-1A-DA- 10 (X)

Job No 15117

524

Goodman

BRICKWORKS LIMITED

VALVE ROOM

VALVE ROOM

3/16

HIGH BAY STAIR ACCEES

2/16

1/16

LPG CANOPY

TRUCK POSITIONS BELOW

3M AWNING

AWNING ROOF

MAINTENANCE WALKWAY

STEP IN ROOF

STEP IN ROOF

COMPUTER ROOM 2

HIGH BAY ROOF

C/L HI-BAY RIDGE

FUTURE SOLAR PANEL LOCATION

STEP IN ROOF

LOW BAY ROOF

ENERGY COMPLEX 2 ROOF

C/L LOW BAY RIDGE

VALVE ROOM

DG STORE ROOF

LOW BAY STAIR ACCESS

2/17

1/17

ROOF MOUNTED A/C UNITS SHOWN INDICATIVELY TO MECH.ENG DETAIL DESIGN WITH ACOUSTIC SCREENING IN ACCORDANCE WITH NOISE ASSESSMENT REPORT

HIGH BAY 137525

LOW BAY 257895

VALVE ROOM

3M AWNING

VALVE ROOM

OFFICE ROOF

SKYBRIDGE

LIFT & STAIRS

REFUELING AREA

ENERGY COMPLEX 1

TRAILER WORKSHOP

TRAILER WASH

GATEHOUSE

LEGEND

BG	Box Gutter
EG	Eaves Gutter
MR	Metal Roof Sheeting
TR	Translucent Sheeting
EJ	Expansion Joint

SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Proposed Industrial Facility - Building 1A

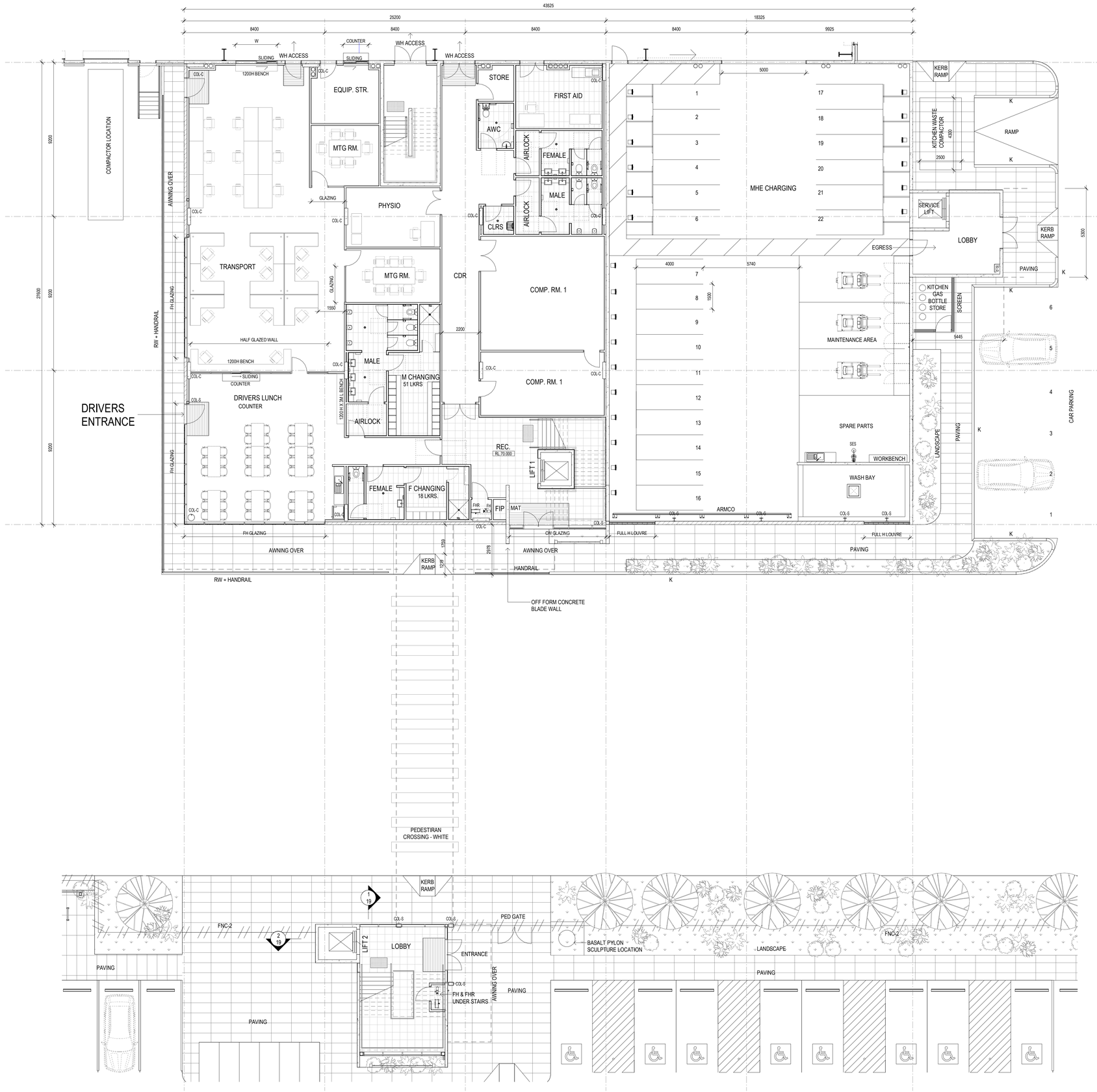
Roof Plan

1 : 500 @ B1

25th February 2020

OAK-1A-DA-11 (Q)

Job No 15117



SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Proposed Industrial Facility - Building 1A

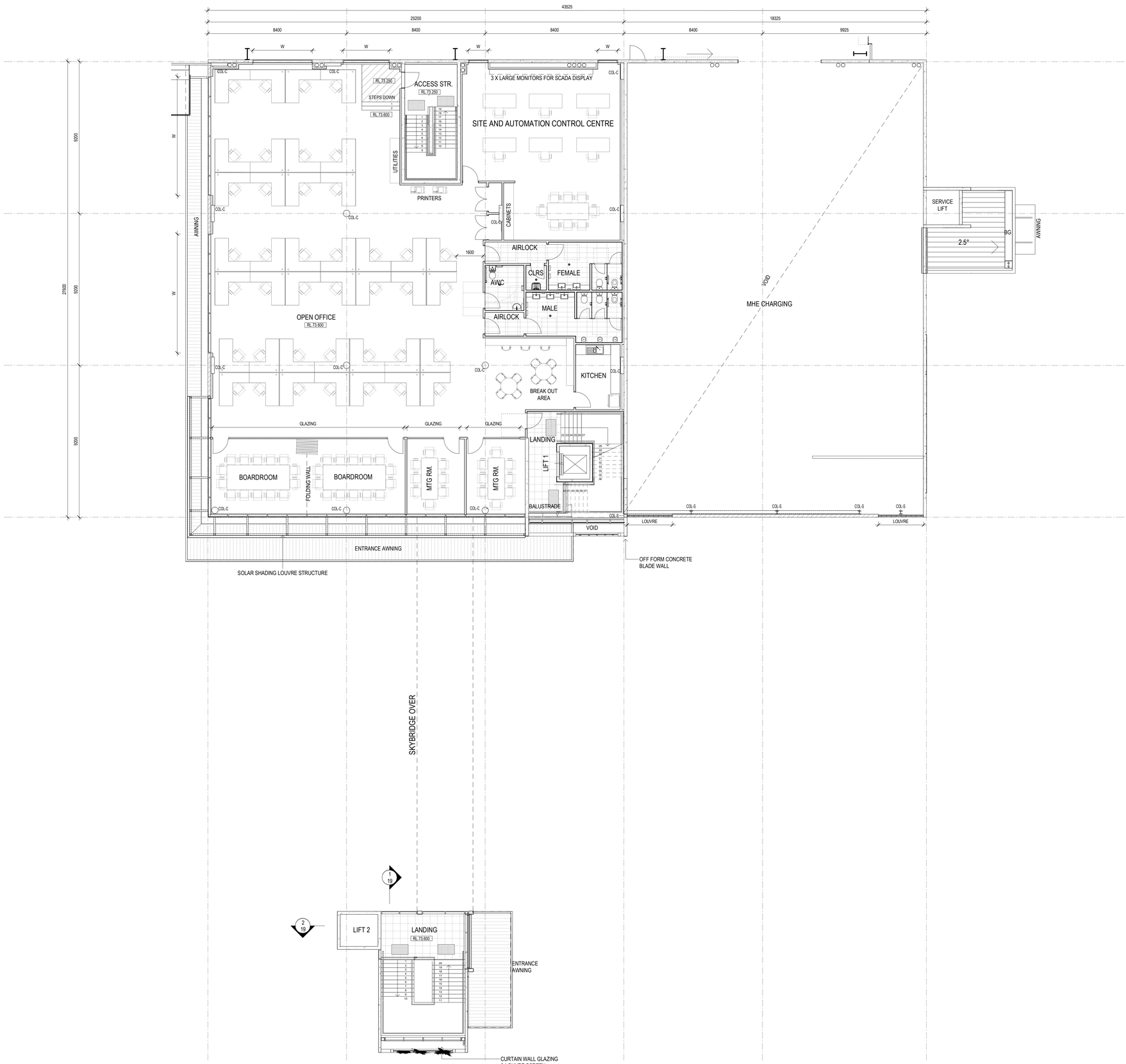
Office - Ground Floor Plan

1 : 100 @ B1

25th February 2020

OAK-1A-DA- 12 (P)

Job No 15117



SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Proposed Industrial Facility - Building 1A

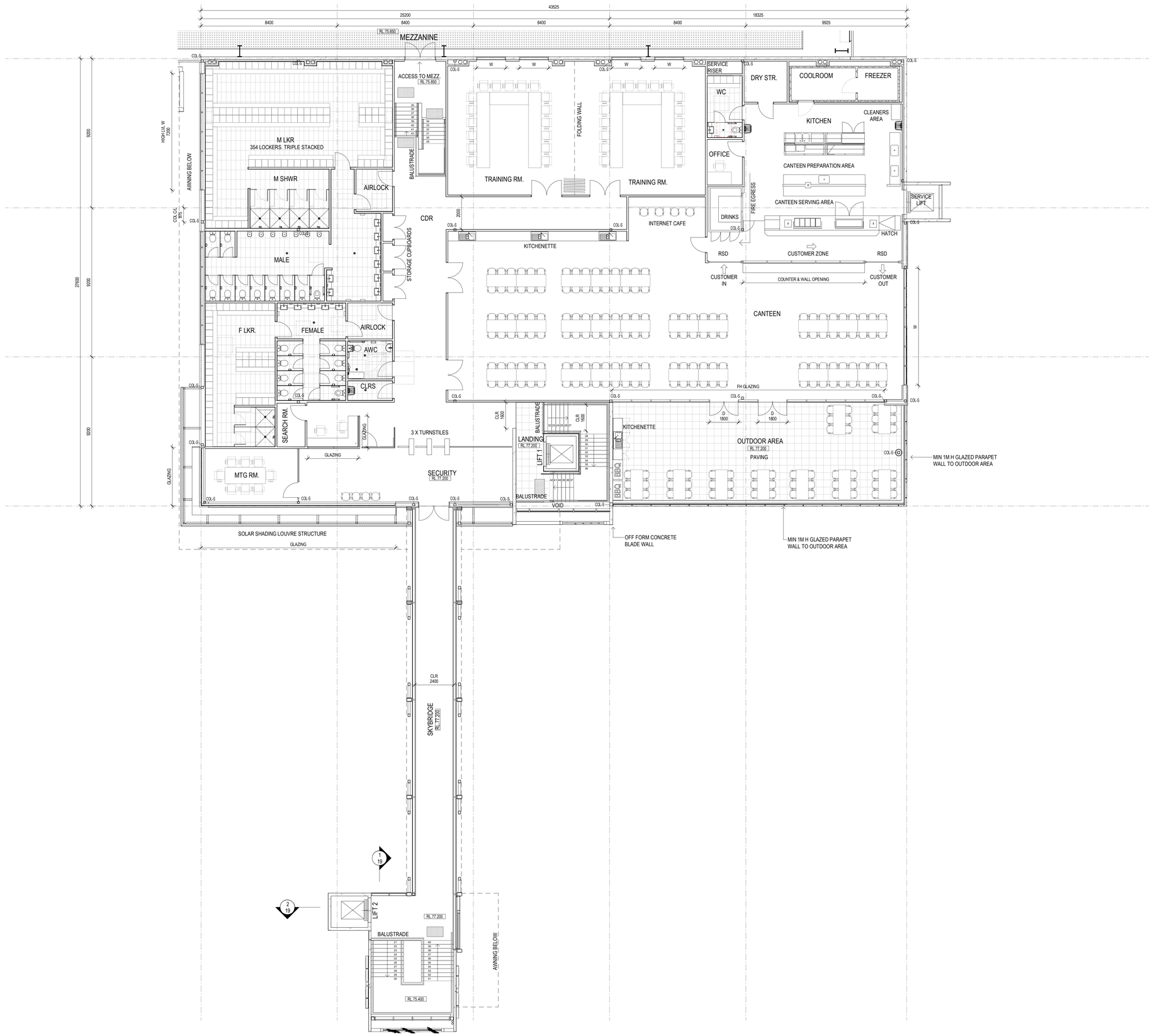
Office - First Floor Plan

1 : 100 @ B1

25th February 2020

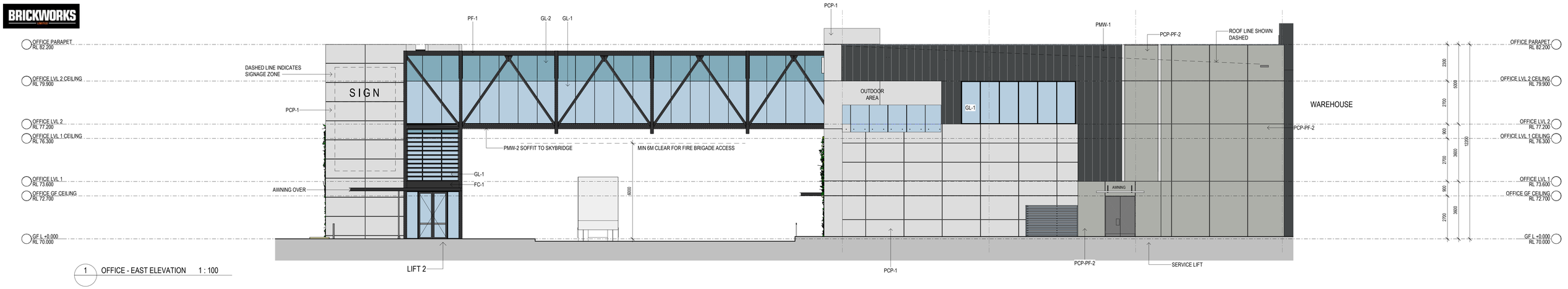
OAK-1A-DA- 13 (P)

Job No 15117

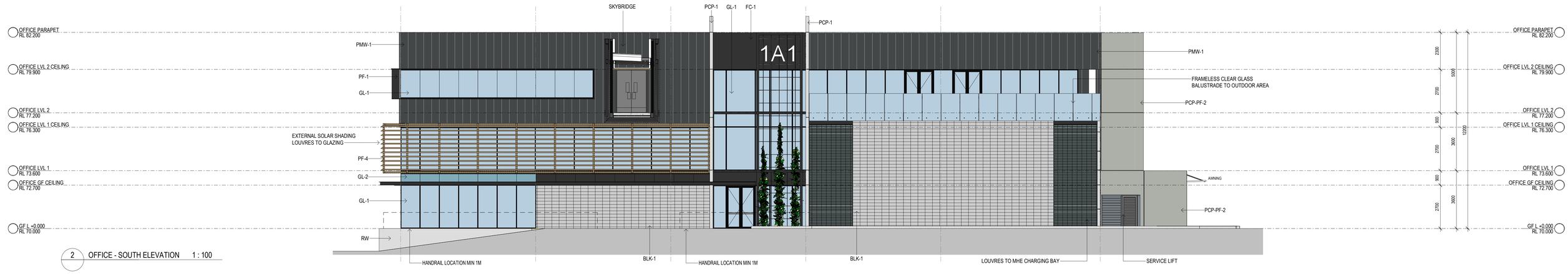


SBA ARCHITECTS	Oakdale West Estate	Proposed Industrial Facility - Building 1A	**Office - Second Floor Plan**	1 : 100 @ B1
	Horsley Park			25th February 2020

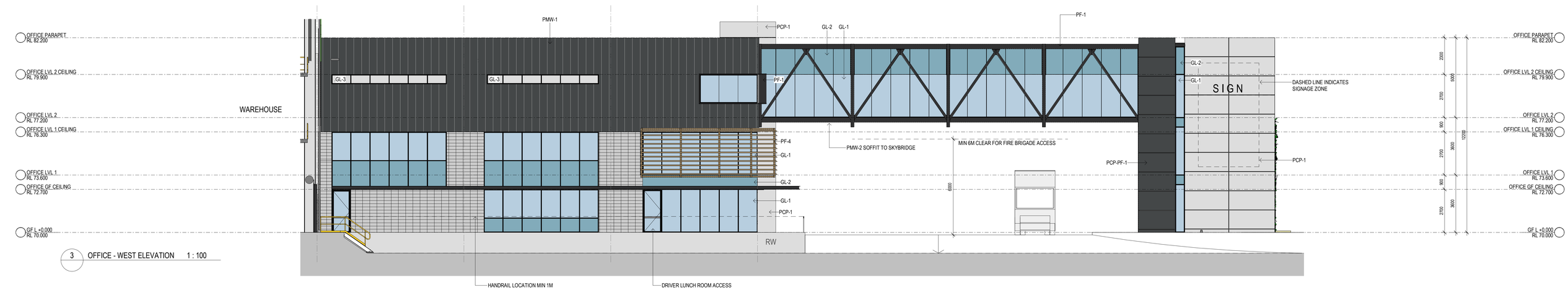
OAK-1A-DA13A (K)
Job No 15117



1 OFFICE - EAST ELEVATION 1 : 100



2 OFFICE - SOUTH ELEVATION 1 : 100



3 OFFICE - WEST ELEVATION 1 : 100

INDICATIVE EXTERNAL FINISHES LEGEND

- **BLK-1** STACKED BOND BLOCK LIGHT GREY
- **FC-1** PREFINISHED FIBRE CEMENT WALL SHEETING
- **GL-1** GLAZING DARK GREY TINT
- **GL-2** SPANDREL GLAZING DARK GREY (OPAQUE)
- **GL-3** PRIVACY GLAZING - TRANSLUSCENT
- **GL-4** CLEAR GLASS
- **IWP-1** INSULATED WALL PANEL COLORBOND - MONUMENT
- **IWP-2** INSULATED WALL PANEL COLORBOND - SHALE GREY
- **IWP-3** INSULATED WALL PANEL COLORBOND - WHITE
- **MDR-1** METAL DECK ROOFING COLORBOND - SURFMIST
- **MDR-2** METAL DECK ROOFING COLORBOND - COOLMAX
- **PCP-1** PRECAST CONCRETE PANELS OFF FORM CONCRETE
- **PCP-PF-1** PRECAST CONCRETE PANELS PAINT FINISH - MONUMENT
- **PCP-PF-2** PRECAST CONCRETE PANELS PAINT FINISH - MID GREY
- **PF-1** PAINT FINISH - 1 MONUMENT
- **PF-2** PAINT FINISH - 2 MID GREY
- **PF-3** PAINT FINISH - 3 SHALE GREY
- **PF-4** ANODISED BRONZE FINISH
- **PMW-1** PREFINISHED METAL WALL SHEETING MONUMENT (OR SIMILAR)
- **PMW-2** PREFINISHED METAL WALL SHEETING DARK GREY (OR SIMILAR)
- **PMW-3** PREFINISHED METAL WALL SHEETING WHITE (OR SIMILAR)
- **PMW-4** PREFINISHED METAL WALL SHEETING "GOODMAN GREEN"
- **TRS-1** TRANSLUCENT ROOF SHEET - OPAL COLOUR (OR SIMILAR)
- **TRS-2** DANPALON TRANSULCENT WALL CLADDING - OPAL COLOUR

SBA ARCHITECTS

Oakdale West Estate
Horsley Park

Proposed Industrial Facility - Building 1A

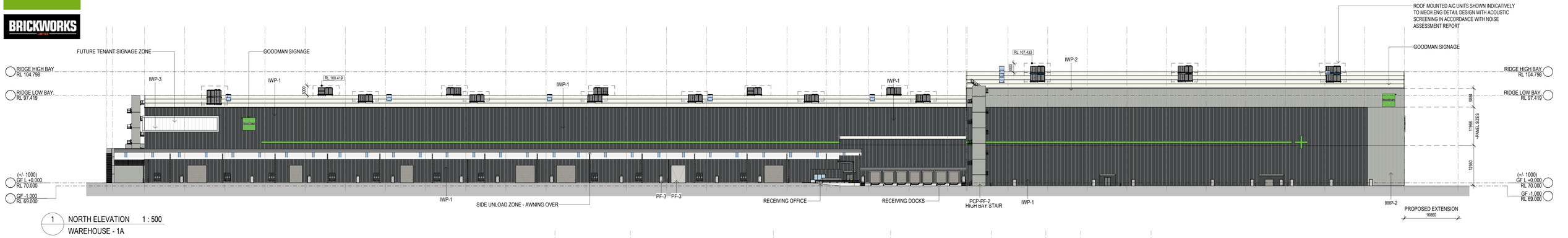
Office Elevations

As indicated @ B1

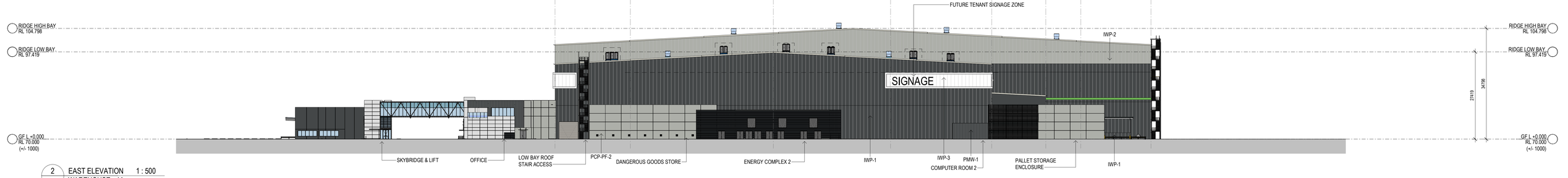
25th February 2020

OAK-1A-DA- 14 (P)

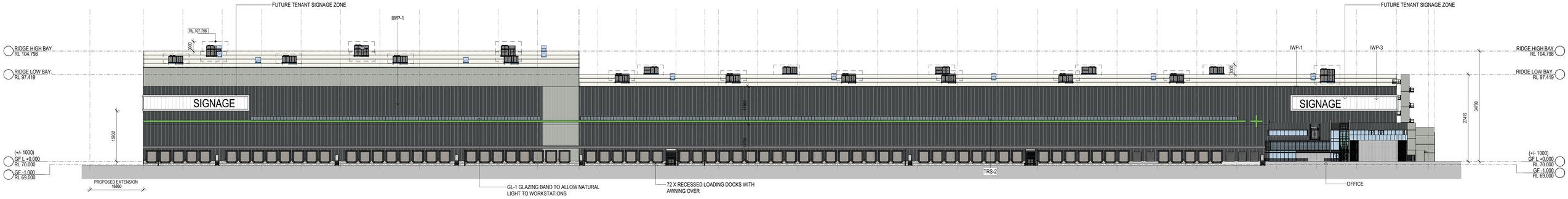
Job No 15117



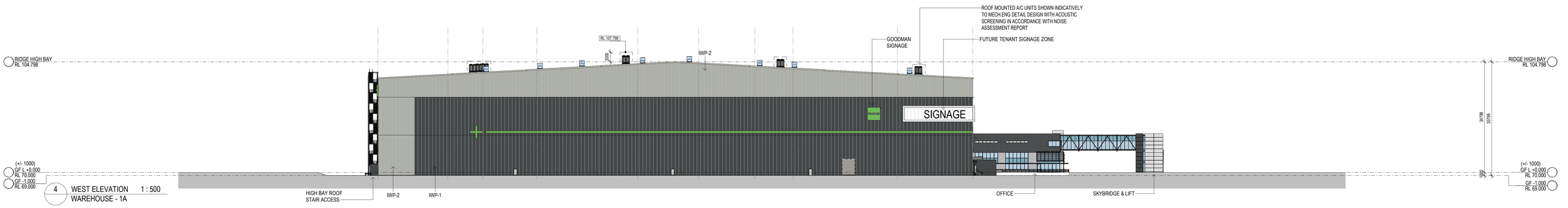
1 NORTH ELEVATION 1 : 500
WAREHOUSE - 1A



2 EAST ELEVATION 1 : 500
WAREHOUSE - 1A



3 SOUTH ELEVATION 1 : 500
WAREHOUSE - 1A



4 WEST ELEVATION 1 : 500
WAREHOUSE - 1A

INDICATIVE EXTERNAL FINISHES LEGEND

- **BLK-1** STACKED BOND BLOCK LIGHT GREY
- **FC-1** PREFINISHED FIBRE CEMENT WALL SHEETING
- **GL-1** GLAZING DARK GREY TINT
- **GL-2** SPANDREL GLAZING DARK GREY (OPAQUE)
- **GL-3** PRIVACY GLAZING - TRANSLUSCENT
- **GL-4** CLEAR GLASS
- **IWP-1** INSULATED WALL PANEL COLORBOND - MONUMENT
- **IWP-2** INSULATED WALL PANEL COLORBOND - SHALE GREY
- **IWP-3** INSULATED WALL PANEL COLORBOND - WHITE
- **MDR-1** METAL DECK ROOFING COLORBOND - SURFMIST
- **MDR-2** METAL DECK ROOFING COLORBOND - COOLMAX
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- **PF-1** PAINT FINISH - 1 MONUMENT
- **PF-2** PAINT FINISH - 2 MID GREY
- **PF-3** PAINT FINISH - 3 SHALE GREY
- **PF-4** ANODISED BRONZE FINISH
- **PMW-1** PREFINISHED METAL WALL SHEETING MONUMENT (OR SIMILAR)
- **PMW-2** PREFINISHED METAL WALL SHEETING DARK GREY (OR SIMILAR)
- **PMW-3** PREFINISHED METAL WALL SHEETING WHITE (OR SIMILAR)
- **PMW-4** PREFINISHED METAL WALL SHEETING "GOODMAN GREEN"
- **TRS-1** TRANSLUCENT ROOF SHEET - OPAL COLOUR (OR SIMILAR)
- **TRS-2** DANPALON TRANSLUCENT WALL CLADDING - OPAL COLOUR

SBA ARCHITECTS

Oakdale West Estate
Horsley Park

Proposed Industrial Facility - Building 1A

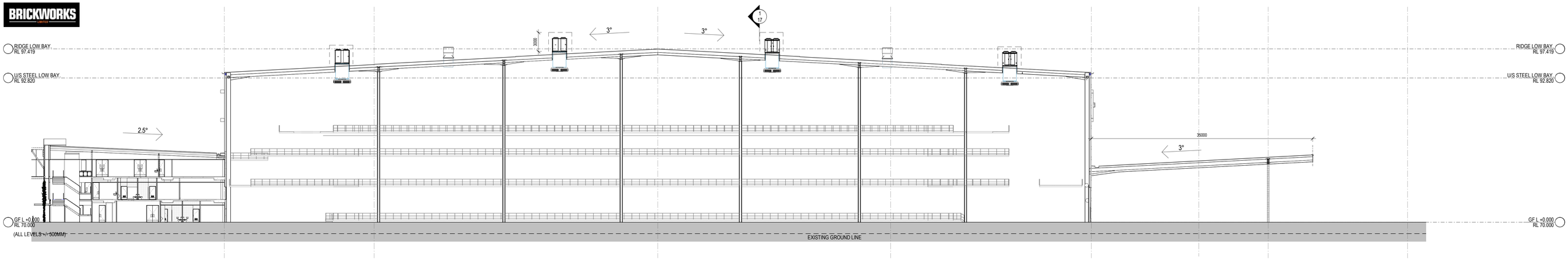
Warehouse Elevations

As indicated @ B1
25th February 2020

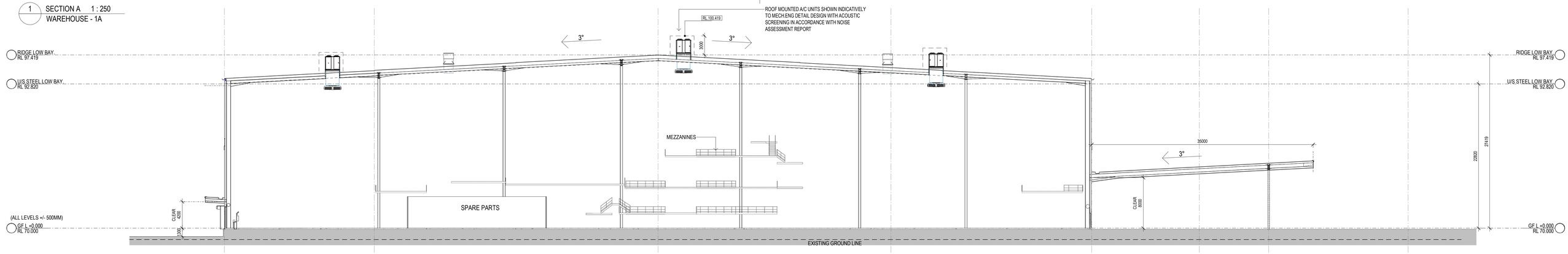
OAK-1A-DA-15 (Q)
Job No 15117

Goodman

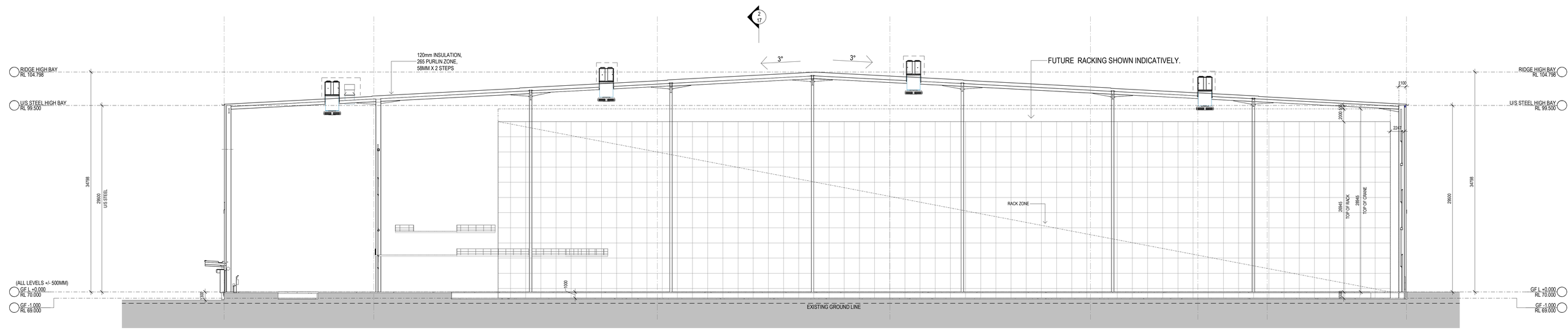
BRICKWORKS LIMITED



1 SECTION A 1 : 250
WAREHOUSE - 1A



2 SECTION B. 1 : 250
WAREHOUSE - 1A



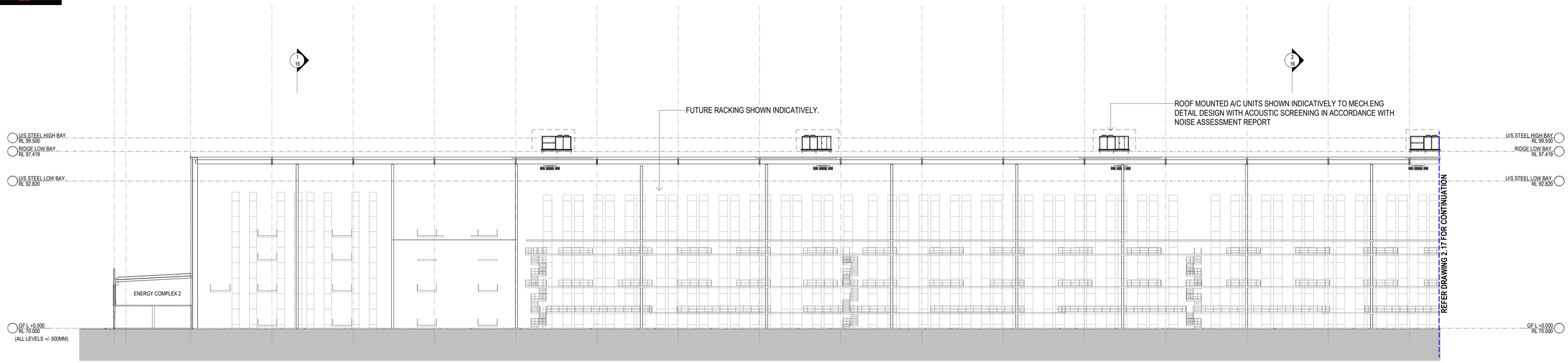
3 SECTION C 1 : 250
WAREHOUSE - 1A

SBA ARCHITECTS

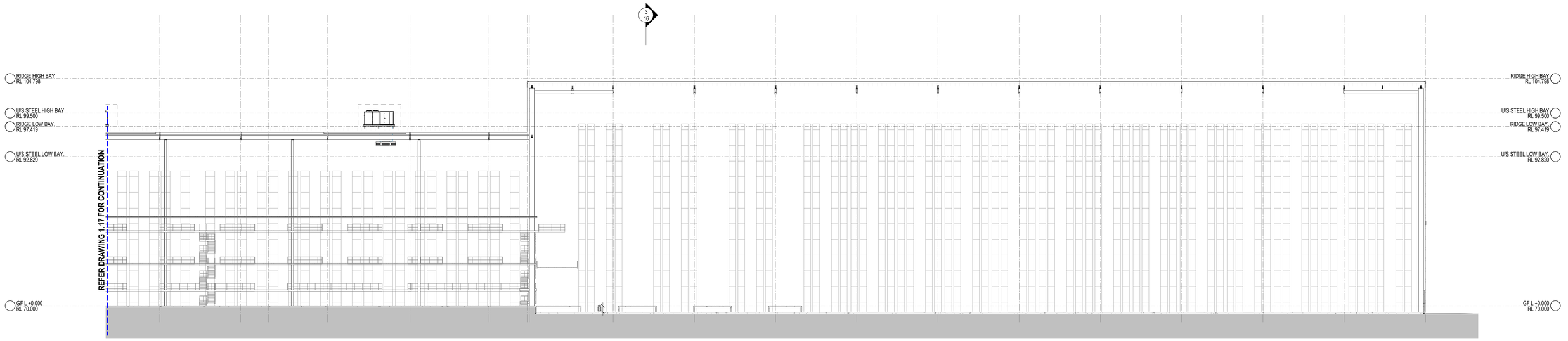
Oakdale West Estate	Proposed Industrial Facility - Building 1A	**Warehouse Sections - 1**	1 : 250 @ B1	OAK-1A-DA- 16 (Q)
Horsley Park			25th February 2020	Job No 15117

Goodman

BRICKWORKS LIMITED



1 SECTION D - PART 1 1 : 250
WAREHOUSE - 1A



2 SECTION D - PART 2 1 : 250
WAREHOUSE - 1A

SBA ARCHITECTS

Oakdale West Estate
Horsley Park

Proposed Industrial Facility - Building 1A

Warehouse Sections - 2

1 : 250 @ B1
25th February 2020

OAK-1A-DA- 17 (K)
Job No 15117

Goodman

BRICKWORKS LIMITED

FUTURE EXPANSION 16950

137525

395420

257895

12473 12433 12433 12433 12433 12433 12433 12433 12433 12433 12838 315 5855 12105 12600 13315 12380 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12640

34 33 32 31 30 29 28 27 26 25 24 23 22B 22 21 20 19 18A 18 17 16 15 14 13 12 11 10 09 08 07 06 05 04 03 02 01

JJ FF EE DD CC BB GG AA

STAGE 2 FUTURE EXPANSION

CENTELINE HI-BAY RIDGE

HIGH BAY WAREHOUSE
RL 69.000 (+/- 500)
RECESSED SLAB

LOW BAY WAREHOUSE
RL 70.000 (+/- 500)

VALVE ROOM 8M X 2.5M

VALVE ROOM 5M X 2.5M

HIGH BAY ROOF ACCESS STAIR

TANK

ARMCO

RW

INBOUND

AWNING OVER

3M AWNING OVER

VALVE ROOM 4M X 2M

7 X RECESSED DOCKS

RECEIVING OFFICE

LINE OF ROOF BOX GUTTER ABOVE

PALLET STORAGE

COMPUTER ROOM 2

RSD-7 RR-11 RR-10 RSD-6 RR-9 RR-8 RSD-5 RSD-4 RR-7 RR-6 RSD-3 RR-5 RR-4 RSD-2 RR-3 RR-2 RSD-1 RR-1

RL 69.000 PIT

RL 69.000 PIT

RECOUP AREA 50M²

STAIR 0 TO +5850

STAIR 0 TO +5850

STAIR 0 TO +14350

TECH CENTRE RECEIVING
-12 X TRUCK POSITIONS
- 7 x ROLLER SHUTTER DOORS
- 11 X RAPID RISER DOORS

STAIR 7 0 TO +6500

STAIR 0 TO +2450 TO +6500

STAIR 0 TO +6500

STAIR 0 TO +2450 TO +6500

STAIR 3 0 TO +6500

RL 70.000

STEP PLATFORMS +630

STAIR 0 TO +5850

STAIR 2 0 TO +5850

STAIR 0 TO +5850

STAIR 0 TO +5850

STAIR 0 TO +5850

STEP PLATFORMS +630

RL -1000
TYPICAL RECESSED SLAB PITS

RL 69.000

FUTURE MEZZANINE PLATFORM +460

MEZZANINE PLATFORM +460

72 X RECESSED DOCKS

4420 -1130

RSD ACCESS TO COMPACTORS

RSD ACCESS TO COMPACTORS

OFFICE ACCESS

RSD

AWNING ABOVE SHOWN DASHED

3M AWNING ABOVE SHOWN DASHED

AWNING ABOVE SHOWN DASHED

VALVE ROOM

VALVE ROOM

2 X COMPACTORS

3 X COMPACTORS

OUTBOUND

UPS

ENERGY COMPLEX 2

1 25A

CENTRELINE LOW-BAY RIDGE

LV MAIN SWITCHBOARD

HV TRANS. & SWITCH GEAR

VALVE ROOM 5M X 5M

DG STORAGE

SLIDING DOOR

STAIR 0 TO +5850 & +14350

LOW BAY ROOF ACCESS STAIR

SLIDING DOOR

1K 1L AH AG AF AE AD AC AB AJ

33000 17000 11300 10010 8654 13726 8654 3950 5000 4835

1 20

1 12

2 17

1 17

3 16 2 16 1 16

SBA ARCHITECTS

Oakdale West Estate
Horsley Park

Proposed Industrial Facility - Building 1A

Warehouse Plan

1 : 500 @ B1

25th February 2020

OAK-1A-DA- 18 (K)
Job No 15117

Goodman

BRICKWORKS LIMITED

LEGEND

MEZZANINE

RACKING

PIT

STAIR

STEP PLATFORM +630

MEZZANINE PLATFORM +460

12473 12433 12433 12433 12433 12433 12433 12433 12433 12433 12433 13153 5855 12105 12600 13315 12380 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12640 10010

22040 10960 17000 31720 39820 44860 23880

SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Proposed Industrial Facility - Building 1A

Mezzanine Plan - 1

1 : 500 @ B1

25th February 2020

OAK-1A-DA18A (H)

Job No 15117

Goodman

BRICKWORKS LIMITED

LEGEND

MEZZANINE

RACKING

MEZZANINE PLATFORM +2450

MEZZANINE PLATFORM +2370

GANTRY ACCESS +3900

SERVICE PLATFORM +2370

PIT

STAIR

12473 12433 12433 12433 12433 12433 12433 12433 12433 12433 12433 13153 5855 12105 12600 13315 12380 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12640 10010

22940 15960 17000 31720 39600 14560 23680

SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Proposed Industrial Facility - Building 1A

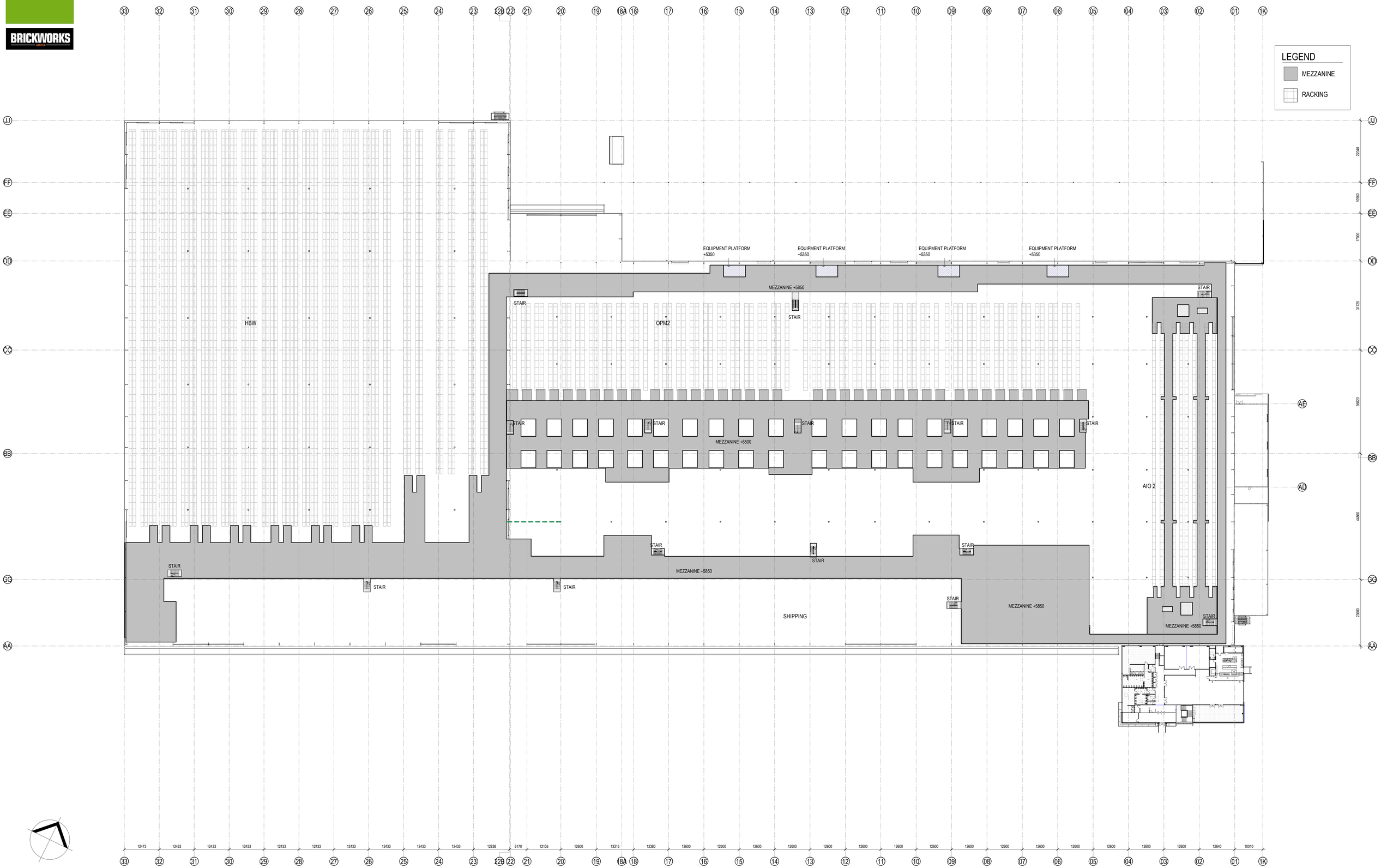
Mezzanine Plan - 2

1 : 500 @ B1

25th February 2020

OAK-1A-DA18B (H)

Job No 15117



SBA ARCHITECTS

Oakdale West Estate
Horsley Park

Proposed Industrial Facility - Building 1A

Mezzanine Plan - 3

1 : 500 @ B1
25th February 2020

OAK-1A-DA18C (H)
Job No 15117

536

Goodman

BRICKWORKS LIMITED

LEGEND

MEZZANINE

RACKING

HBW

OPM2

SHIPPING

AIO 2

STAIR

SERVICE MEZZANINE +8700

MEZZANINE +7000

MEZZANINE +7400

33 32 31 30 29 28 27 26 25 24 23 22B 22 21 20 19 18A 18 17 16 15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 1K

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JJ FF EE DD CC BB GG AA AE AD

22940 11960 11700 31720 38820 44860 29360

SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Proposed Industrial Facility - Building 1A

Mezzanine Plan - 4

1 : 500 @ B1

25th February 2020

OAK-1A-DA18D (H)

Job No 15117

Goodman

BRICKWORKS LIMITED

LEGEND

MEZZANINE

RACKING

HBW

OPM2

SERVICE MEZZANINE +10400

MEZZANINE +11500

STAIR

AIO 2

MEZZANINE +9600

MEZZANINE +10000

MEZZANINE +8400

MEZZANINE +10660

SERVICE MEZZANINE +9600

SHIPPING

12473 12433 12433 12433 12433 12433 12433 12433 12433 12433 12433 12838 6170 12105 12600 13315 12380 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12640 10010

22940 10960 17000 31720 38820 44860 23830

33 32 31 30 29 28 27 26 25 24 23 22B 22 21 20 19 18A 18 17 16 15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 1K

JJ FF EE DD CC BB GG AA AE AD

SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Proposed Industrial Facility - Building 1A

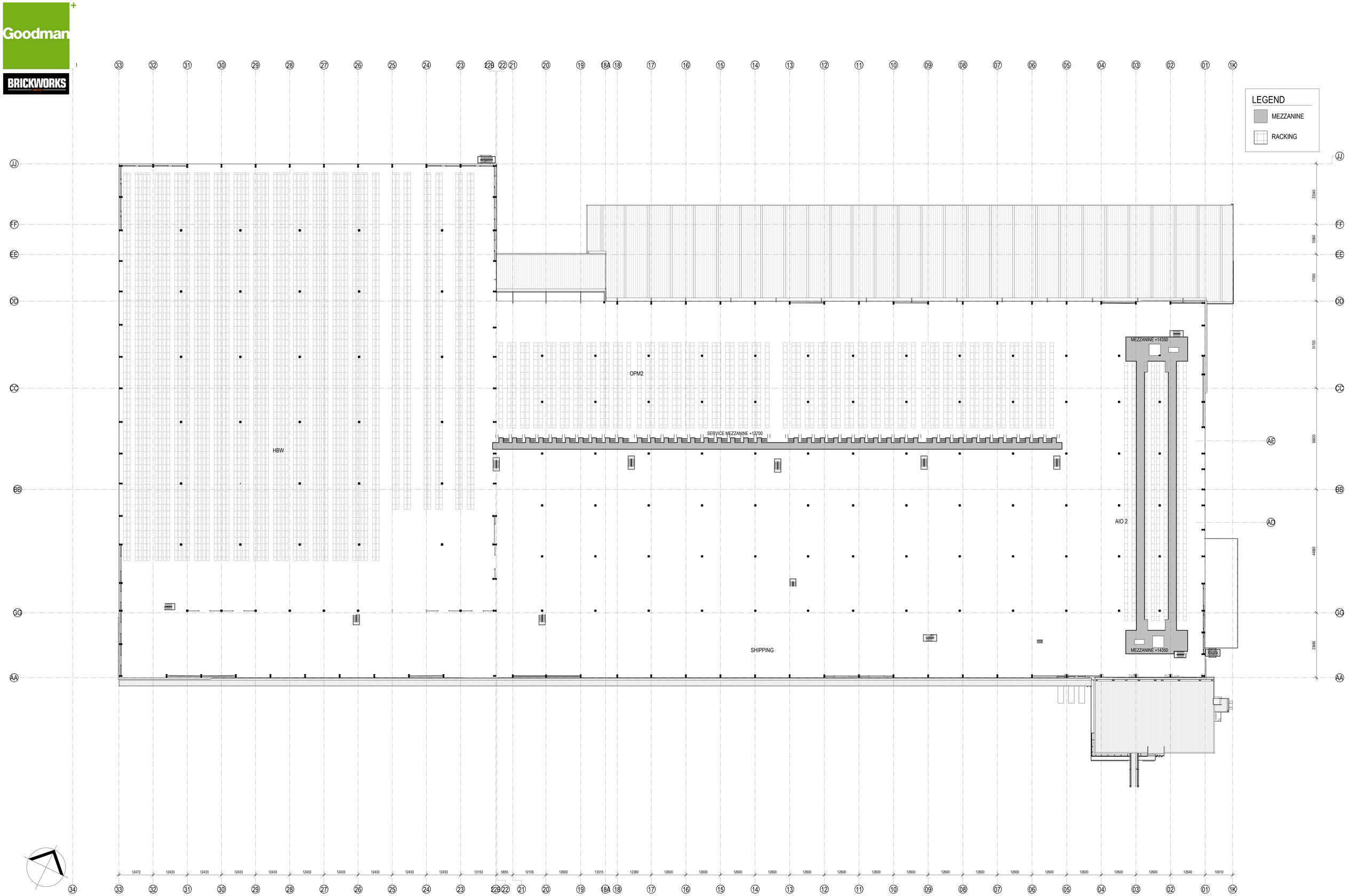
Mezzanine Plan - 5

1 : 500 @ B1

25th February 2020

OAK-1A-DA18E (H)

Job No 15117



SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Proposed Industrial Facility - Building 1A

Mezzanine Plan - 6

1 : 500 @ B1

25th February 2020

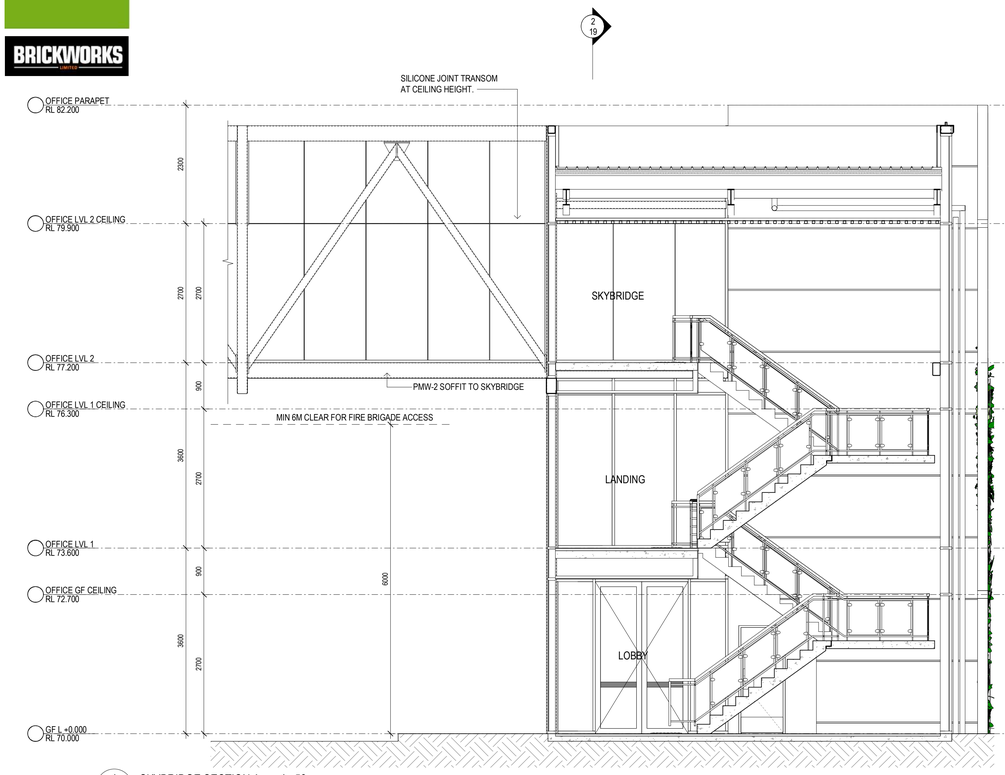
OAK-1A-DA18F (H)

Job No 15117

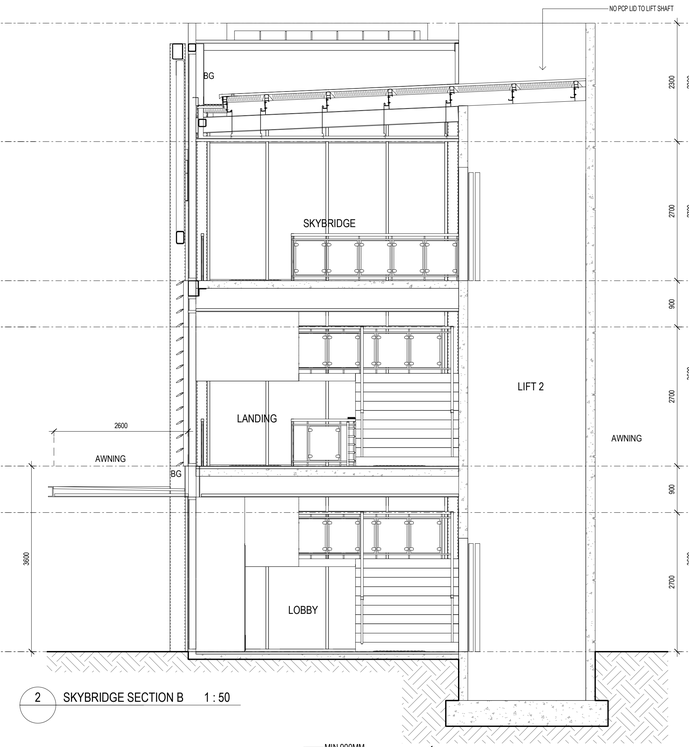
539

Goodman

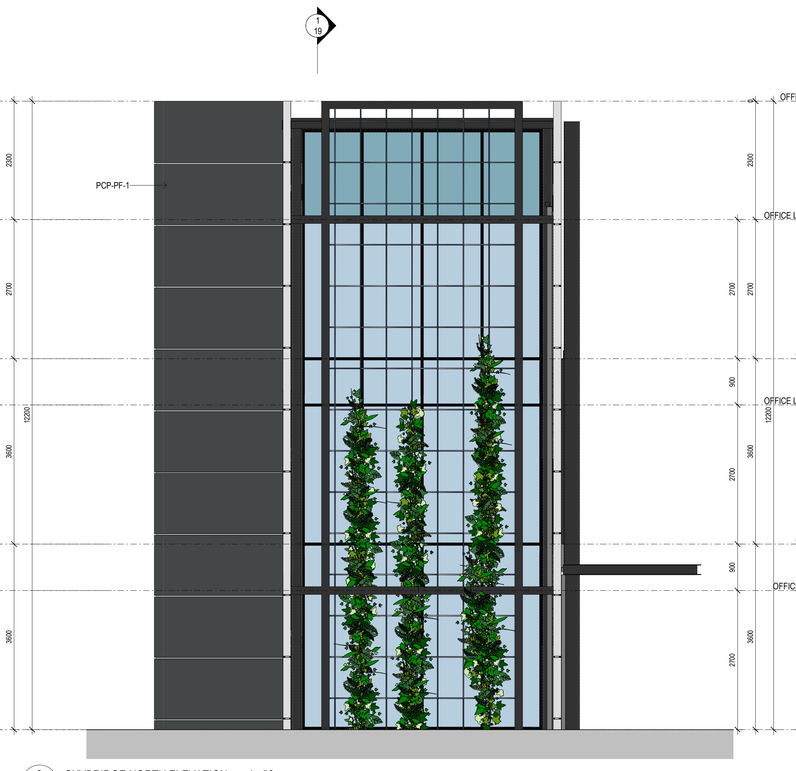
BRICKWORKS LIMITED



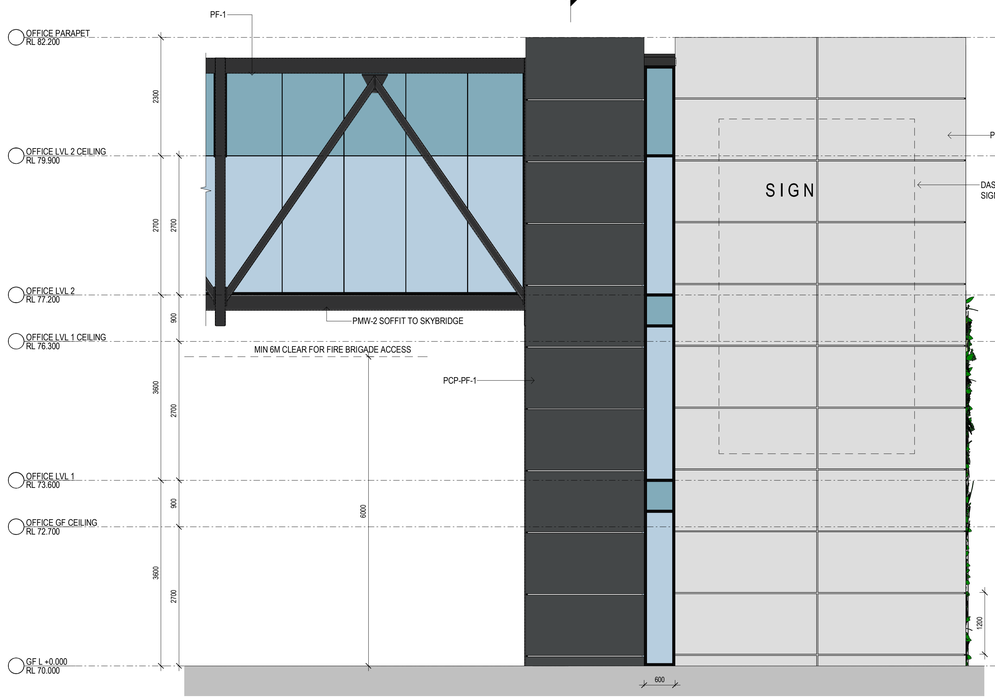
1 SKYBRIDGE SECTION A 1 : 50



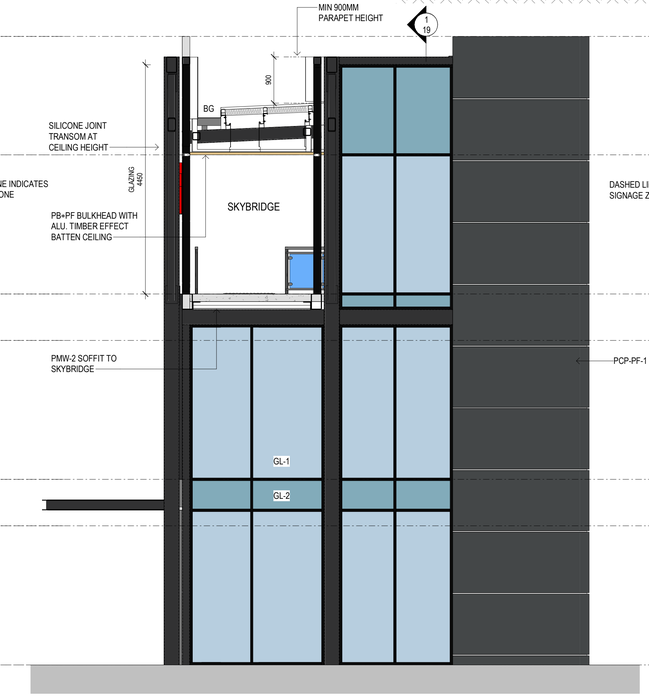
2 SKYBRIDGE SECTION B 1 : 50



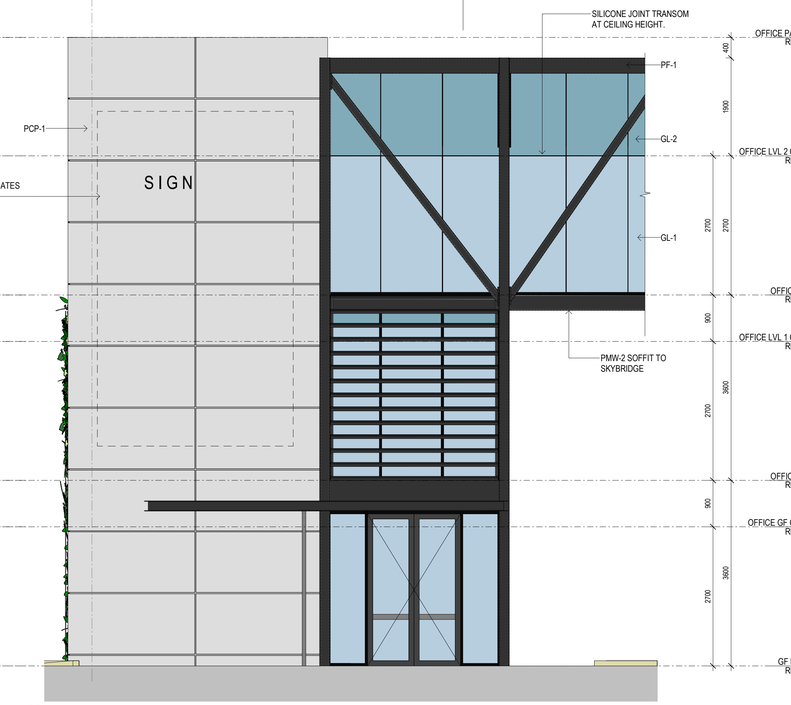
3 SKYBRIDGE NORTH ELEVATION 1 : 50



4 SKYBRIDGE EAST ELEVATION 1 : 50



5 SKYBRIDGE SOUTH ELEVATION 1 : 50



6 SKYBRIDGE WEST ELEVATION 1 : 50

SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Proposed Industrial Facility - Building 1A

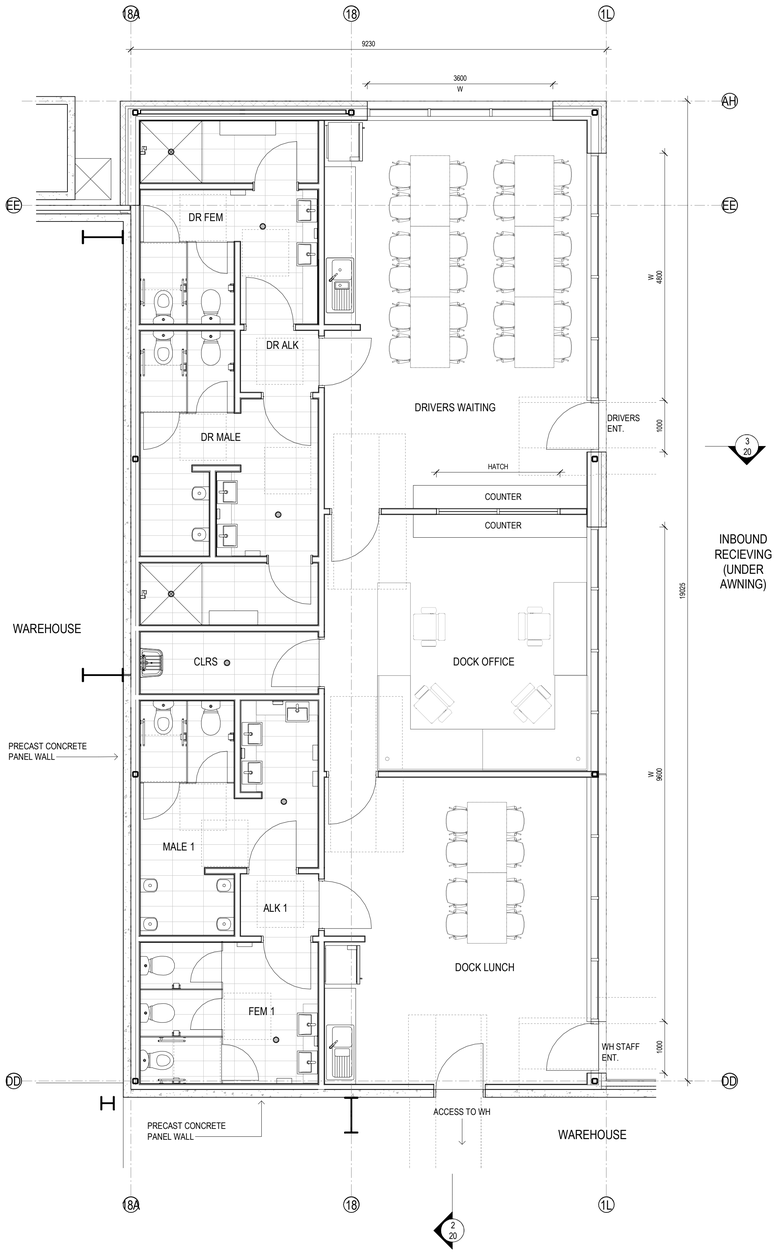
Skybridge Sections & Elevations

1 : 50 @ B1

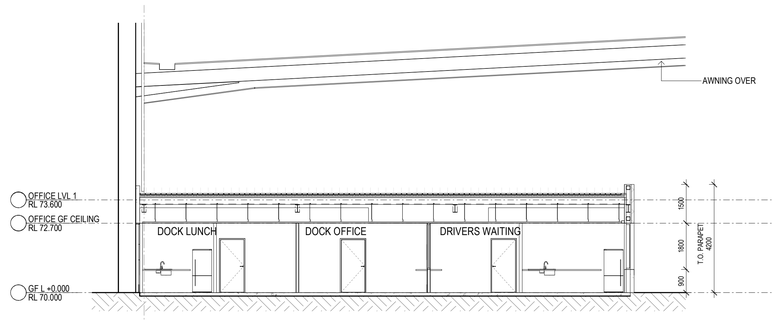
25th February 2020

OAK-1A-DA- 19 (K)

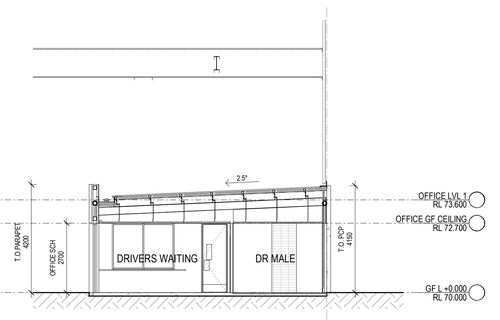
Job No 15117



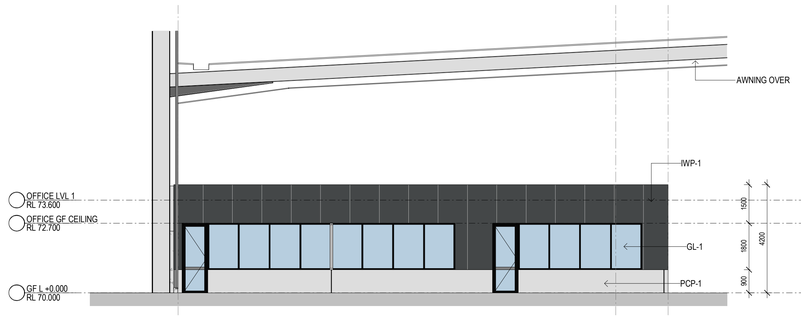
1 DOCK OFFICE - PLAN 1 : 50
WAREHOUSE 1A



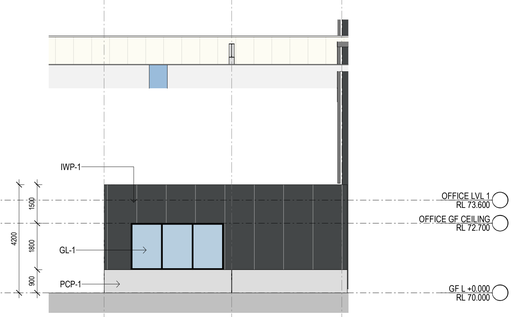
2 SECTION A 1 : 100
WAREHOUSE 1A



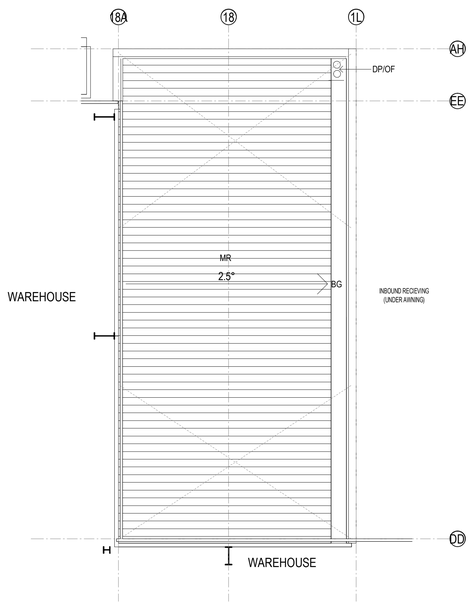
3 SECTION B 1 : 100
WAREHOUSE 1A



4 EAST ELEVATION 1 : 100
WAREHOUSE 1A



5 NORTH ELEVATION 1 : 100
WAREHOUSE 1A



6 ROOF PLAN 1 : 100
WAREHOUSE 1A

LEGEND

BG	Box Gutter
EG	Eaves Gutter
MR	Metal Roof Sheeting
TR	Translucent Sheeting
EJ	Expansion Joint

INDICATIVE EXTERNAL FINISHES LEGEND

- **BLK-1** STACKED BOND BLOCK LIGHT GREY
- **FC-1** PREFINISHED FIBRE CEMENT WALL SHEETING
- **GL-1** GLAZING DARK GREY TINT
- **GL-2** SPANDREL GLAZING DARK GREY (OPAQUE)
- **GL-3** PRIVACY GLAZING - TRANSLUSCENT
- **GL-4** CLEAR GLASS
- **IWP-1** INSULATED WALL PANEL COLORBOND - MONUMENT
- **IWP-2** INSULATED WALL PANEL COLORBOND - SHALE GREY
- **IWP-3** INSULATED WALL PANEL COLORBOND - WHITE
- **MDR-1** METAL DECK ROOFING COLORBOND - SURFMIST
- **MDR-2** METAL DECK ROOFING COLORBOND - COOLMAX
- **PCP-1** PRECAST CONCRETE PANELS OFF FORM CONCRETE
- **PCP-PF-1** PRECAST CONCRETE PANELS PAINT FINISH - MONUMENT
- **PCP-PF-2** PRECAST CONCRETE PANELS PAINT FINISH - MID GREY
- **PF-1** PAINT FINISH - 1 MONUMENT
- **PF-2** PAINT FINISH - 2 MID GREY
- **PF-3** PAINT FINISH - 3 SHALE GREY
- **PF-4** ANODISED BRONZE FINISH
- **PMW-1** PREFINISHED METAL WALL SHEETING MONUMENT (OR SIMILAR)
- **PMW-2** PREFINISHED METAL WALL SHEETING DARK GREY (OR SIMILAR)
- **PMW-3** PREFINISHED METAL WALL SHEETING WHITE (OR SIMILAR)
- **PMW-4** PREFINISHED METAL WALL SHEETING "GOODMAN GREEN"
- **TRS-1** TRANSLUCENT ROOF SHEET - OPAL COLOUR (OR SIMILAR)
- **TRS-2** DANPALON TRANSLUCENT WALL CLADDING - OPAL COLOUR

SBA ARCHITECTS

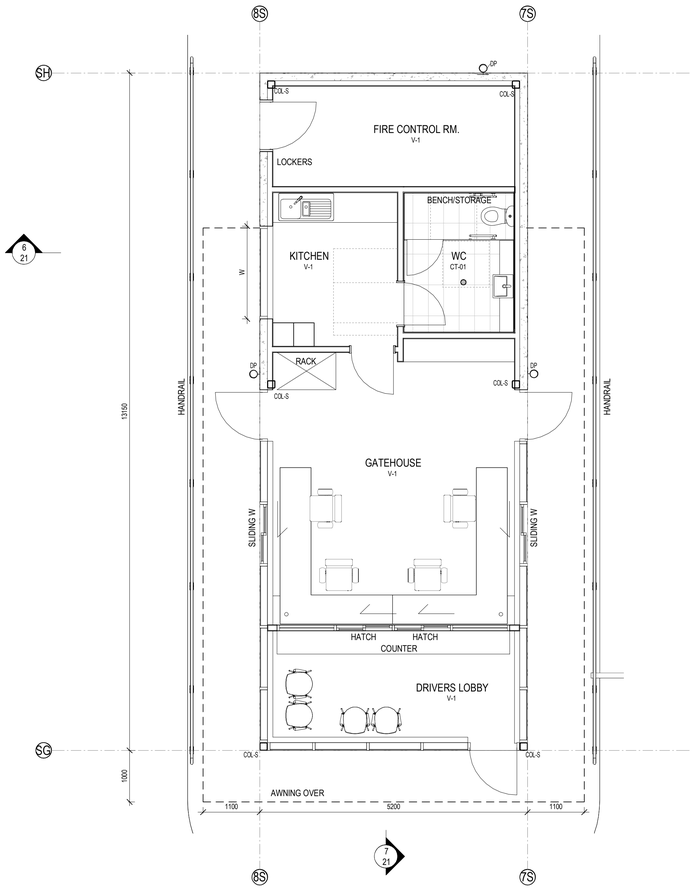
Oakdale West Estate
Horsley Park

Proposed Industrial Facility - Building 1A

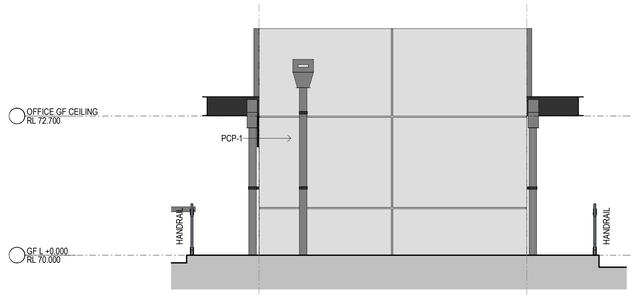
Dock Office Plans

As indicated @ B1
25th February 2020

OAK-1A-DA- 20 (J)
Job No 15117



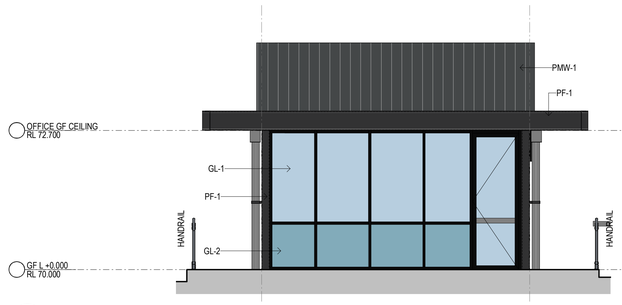
1 GATEHOUSE FLOOR PLAN 1 : 50
WAREHOUSE 1A



2 GATEHOUSE - NORTH 1 : 50
WAREHOUSE 1A



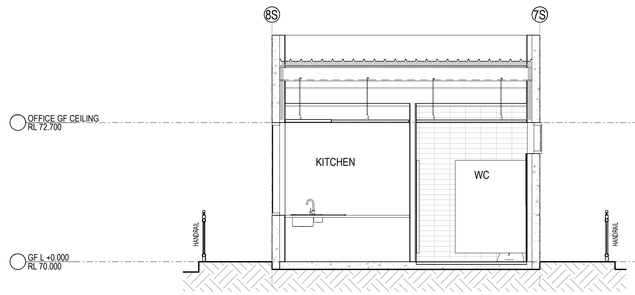
3 GATEHOUSE - EAST 1 : 50
WAREHOUSE 1A



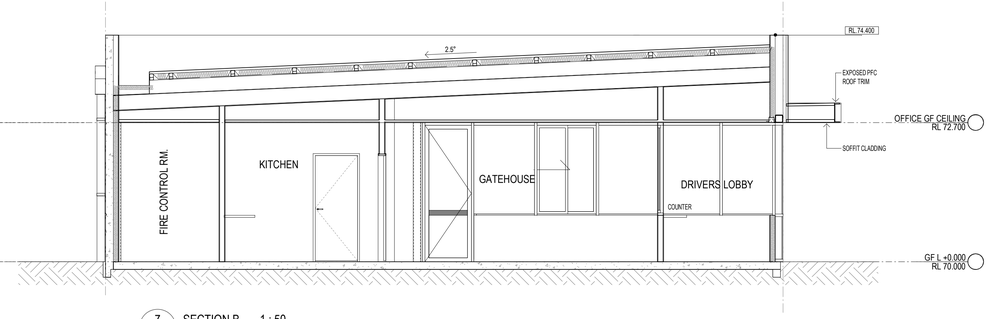
4 GATEHOUSE - SOUTH 1 : 50
WAREHOUSE 1A



5 GATEHOUSE - WEST 1 : 50
WAREHOUSE 1A



6 SECTION A 1 : 50
WAREHOUSE 1A



7 SECTION B 1 : 50
WAREHOUSE 1A

INDICATIVE EXTERNAL FINISHES LEGEND

- **BLK-1** STACKED BOND BLOCK LIGHT GREY
- **FC-1** PREFINISHED FIBRE CEMENT WALL SHEETING
- **GL-1** GLAZING DARK GREY TINT
- **GL-2** SPANDREL GLAZING DARK GREY (OPAQUE)
- **GL-3** PRIVACY GLAZING - TRANSLUSCENT
- **GL-4** CLEAR GLASS
- **IWP-1** INSULATED WALL PANEL COLORBOND - MONUMENT
- **IWP-2** INSULATED WALL PANEL COLORBOND - SHALE GREY
- **IWP-3** INSULATED WALL PANEL COLORBOND - WHITE
- **MDR-1** METAL DECK ROOFING COLORBOND - SURFMIST
- **MDR-2** METAL DECK ROOFING COLORBOND - COOLMAX
- **PCP-1** PRECAST CONCRETE PANELS OFF FORM CONCRETE
- **PCP-PF-1** PRECAST CONCRETE PANELS PAINT FINISH - MONUMENT
- **PCP-PF-2** PRECAST CONCRETE PANELS PAINT FINISH - MID GREY
- **PF-1** PAINT FINISH - 1 MONUMENT
- **PF-2** PAINT FINISH - 2 MID GREY
- **PF-3** PAINT FINISH - 3 SHALE GREY
- **PF-4** ANODISED BRONZE FINISH
- **PMW-1** PREFINISHED METAL WALL SHEETING MONUMENT (OR SIMILAR)
- **PMW-2** PREFINISHED METAL WALL SHEETING DARK GREY (OR SIMILAR)
- **PMW-3** PREFINISHED METAL WALL SHEETING WHITE (OR SIMILAR)
- **PMW-4** PREFINISHED METAL WALL SHEETING "GOODMAN GREEN"
- **TRS-1** TRANSLUCENT ROOF SHEET - OPAL COLOUR (OR SIMILAR)
- **TRS-2** DANPALON TRANSLUCENT WALL CLADDING - OPAL COLOUR

SBA ARCHITECTS

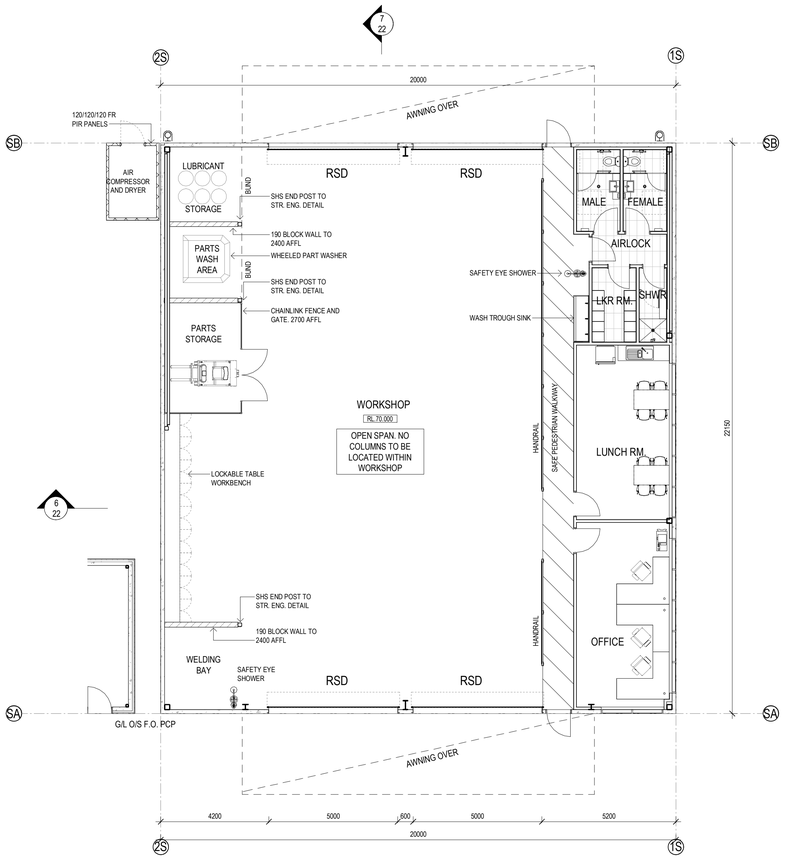
Oakdale West Estate
Horsley Park

Proposed Industrial Facility - Building 1A

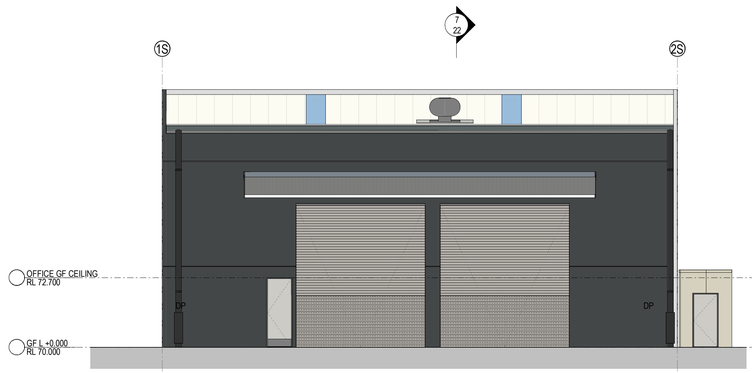
Gatehouse Plans

As indicated @ B1
25th February 2020

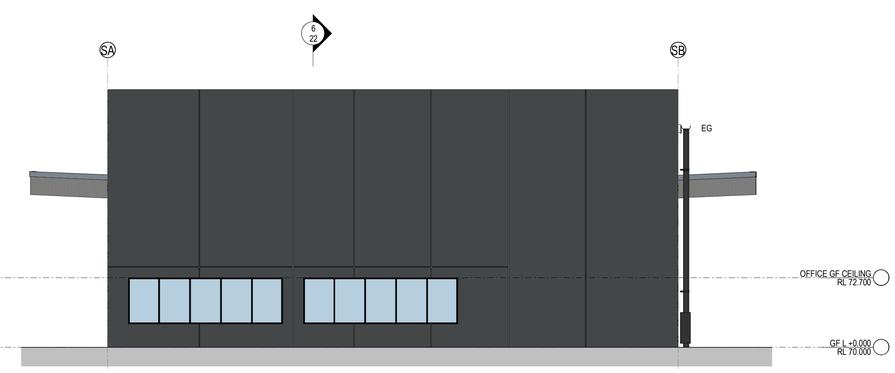
OAK-1A-DA- 21 (K)
Job No 15117



1 WORKSHOP FLOOR PLAN - DA 1 : 100
WAREHOUSE 1A



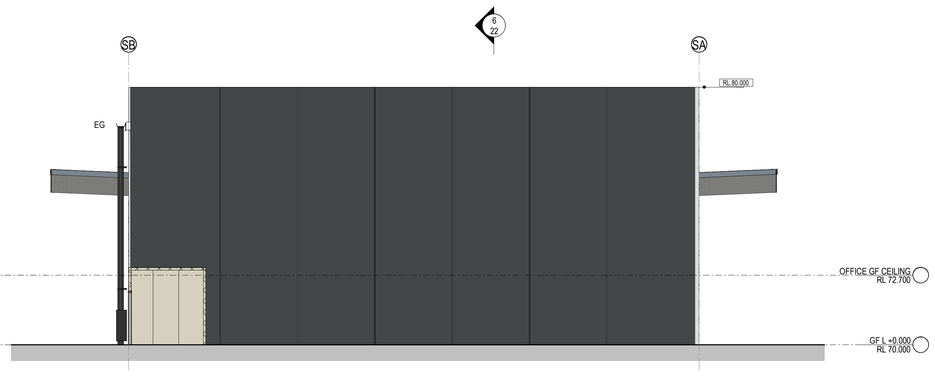
2 WORKSHOP - NORTH ELEVATION 1 : 100
WAREHOUSE 1A



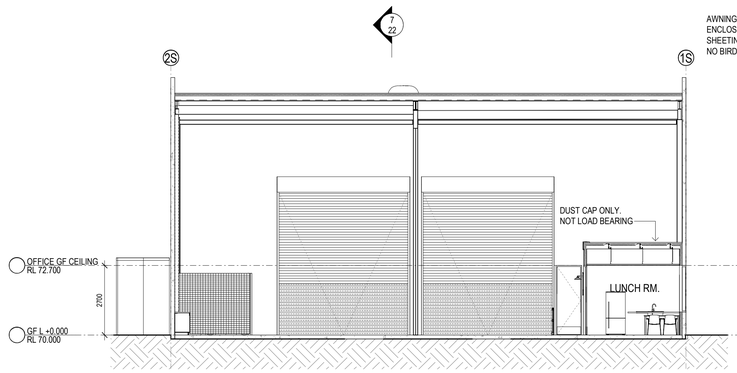
3 WORKSHOP - EAST ELEVATION 1 : 100
WAREHOUSE 1A



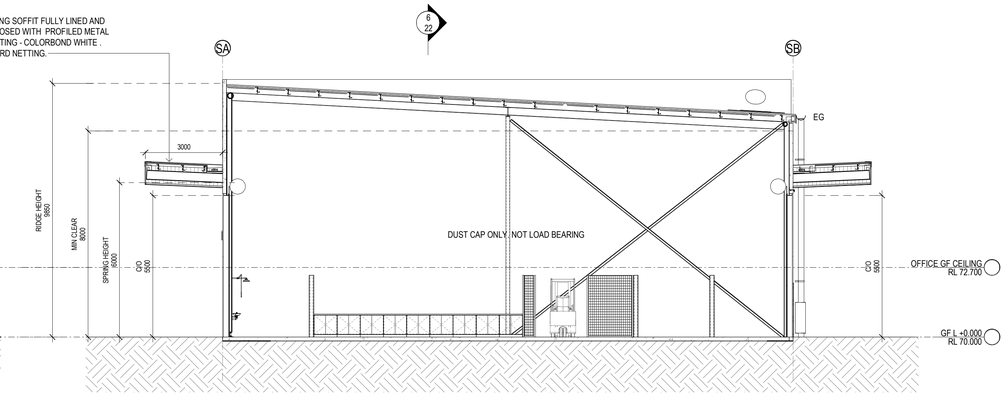
4 WORKSHOP - SOUTH ELEVATION 1 : 100
WAREHOUSE 1A



5 WORKSHOP - WEST ELEVATION 1 : 100
WAREHOUSE 1A



6 TRAILER WORKSHOP - SECTION A 1 : 100
WAREHOUSE 1A



7 TRAILER WORKSHOP - SECTION B 1 : 100
WAREHOUSE 1A

INDICATIVE EXTERNAL FINISHES LEGEND

- **BLK-1** STACKED BOND BLOCK LIGHT GREY
- **FC-1** PREFINISHED FIBRE CEMENT WALL SHEETING
- **GL-1** GLAZING DARK GREY TINT
- **GL-2** SPANDREL GLAZING DARK GREY (OPAQUE)
- **GL-3** PRIVACY GLAZING - TRANSLUSCENT
- **GL-4** CLEAR GLASS
- **IWP-1** INSULATED WALL PANEL COLORBOND - MONUMENT
- **IWP-2** INSULATED WALL PANEL COLORBOND - SHALE GREY
- **IWP-3** INSULATED WALL PANEL COLORBOND - WHITE
- **MDR-1** METAL DECK ROOFING COLORBOND - SURFMIST
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- **TRS-2** DANPALON TRANSLUCENT WALL CLADDING - OPAL COLOUR

SBA ARCHITECTS

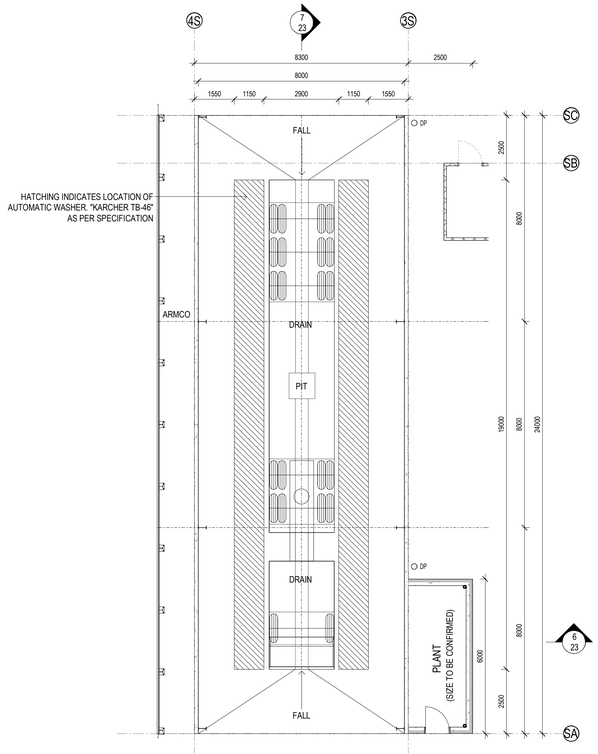
Oakdale West Estate
Horsley Park

Proposed Industrial Facility - Building 1A

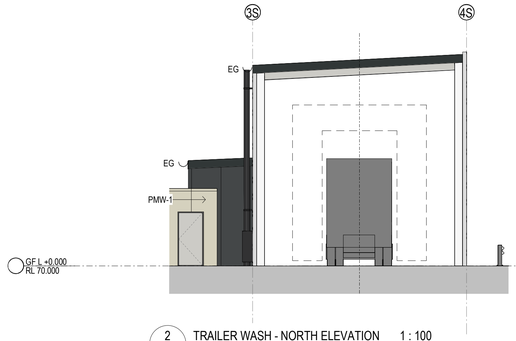
Trailer Workshop Plans

As indicated @ B1
25th February 2020

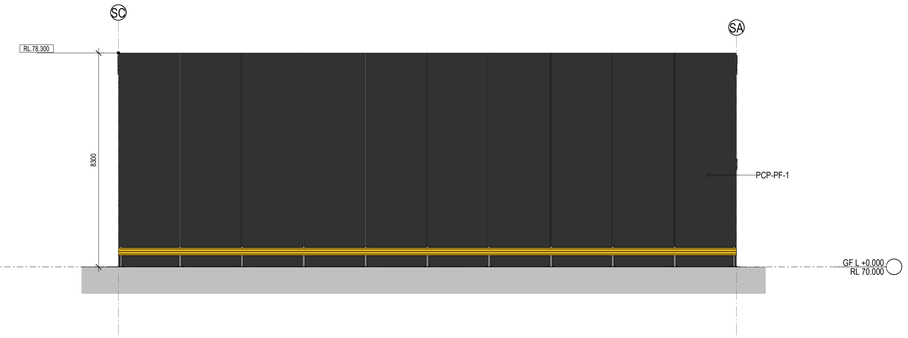
OAK-1A-DA- 22 (K)
Job No 15117



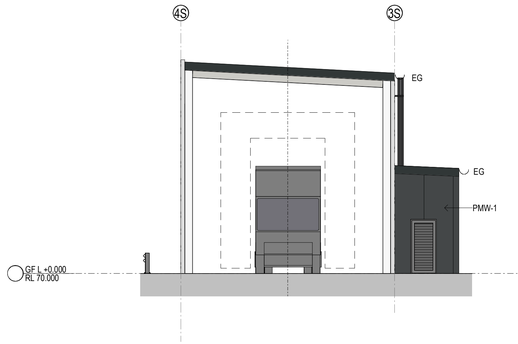
1 TRAILER WASH PLAN 1 : 100
WAREHOUSE 1A



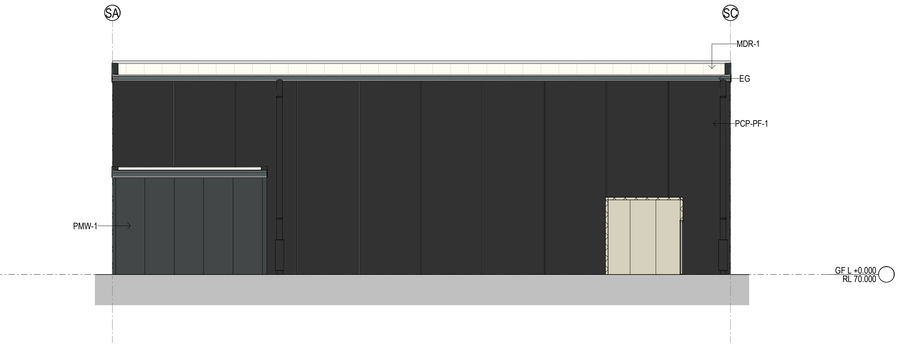
2 TRAILER WASH - NORTH ELEVATION 1 : 100
WAREHOUSE 1A



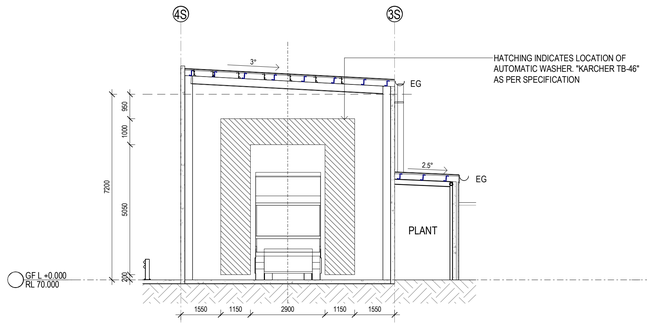
3 TRAILER WASH - WEST ELEVATION 1 : 100
WAREHOUSE 1A



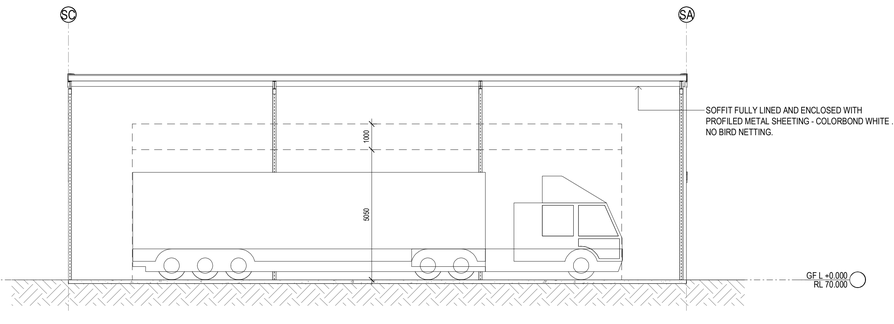
4 TRAILER WASH - SOUTH ELEVATION 1 : 100
WAREHOUSE 1A



5 TRAILER WASH - EAST ELEVATION 1 : 100
WAREHOUSE 1A



6 TRAILER WASH - SECTION A 1 : 100
WAREHOUSE 1A



7 TRAILER WASH - SECTION B 1 : 100
WAREHOUSE 1A

INDICATIVE EXTERNAL FINISHES LEGEND

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- **GL-1** GLAZING DARK GREY TINT
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- **GL-4** CLEAR GLASS
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SBA ARCHITECTS

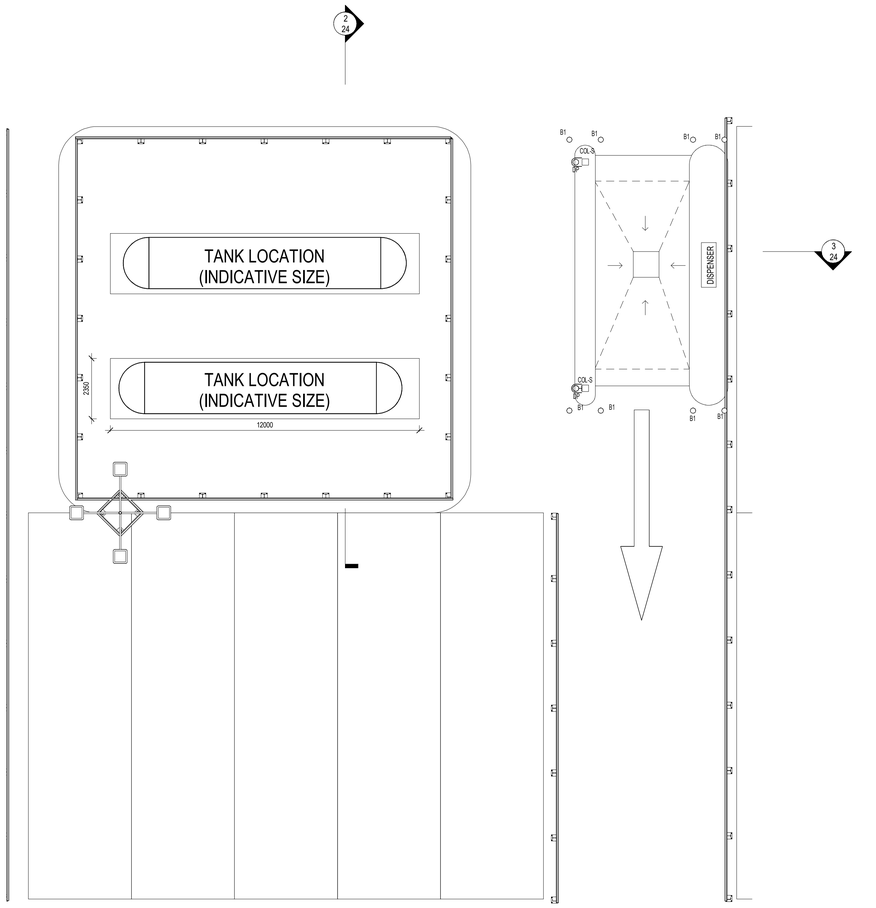
Oakdale West Estate
Horsley Park

Proposed Industrial Facility - Building 1A

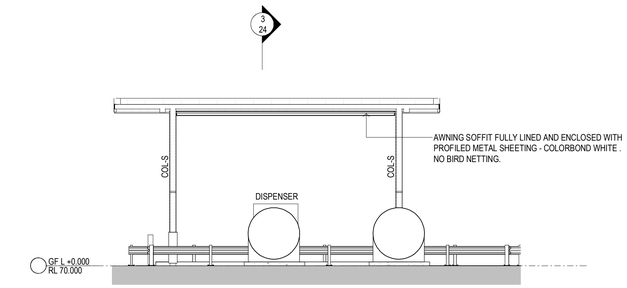
Trailer Wash Plans

As indicated @ B1
25th February 2020

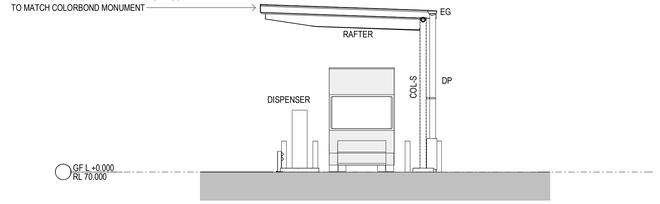
OAK-1A-DA- 23 (L)
Job No 15117



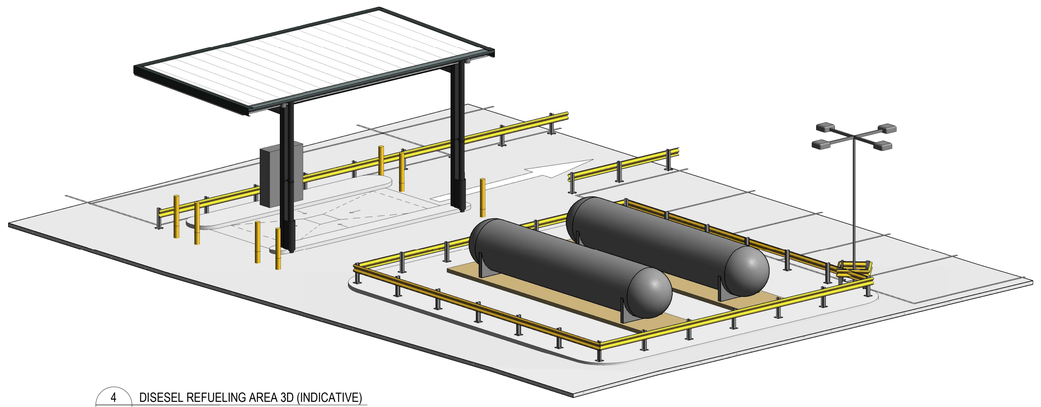
1 DIESEL REFUELING AREA - GA PLAN 1 : 100
WAREHOUSE 1A



2 DIESEL REFUELING AREA - SECTION A 1 : 100
WAREHOUSE 1A



3 DIESEL REFUELING AREA - SECTION B 1 : 100
WAREHOUSE 1A



4 DISESEL REFUELING AREA 3D (INDICATIVE)
WAREHOUSE 1A

SBA ARCHITECTS

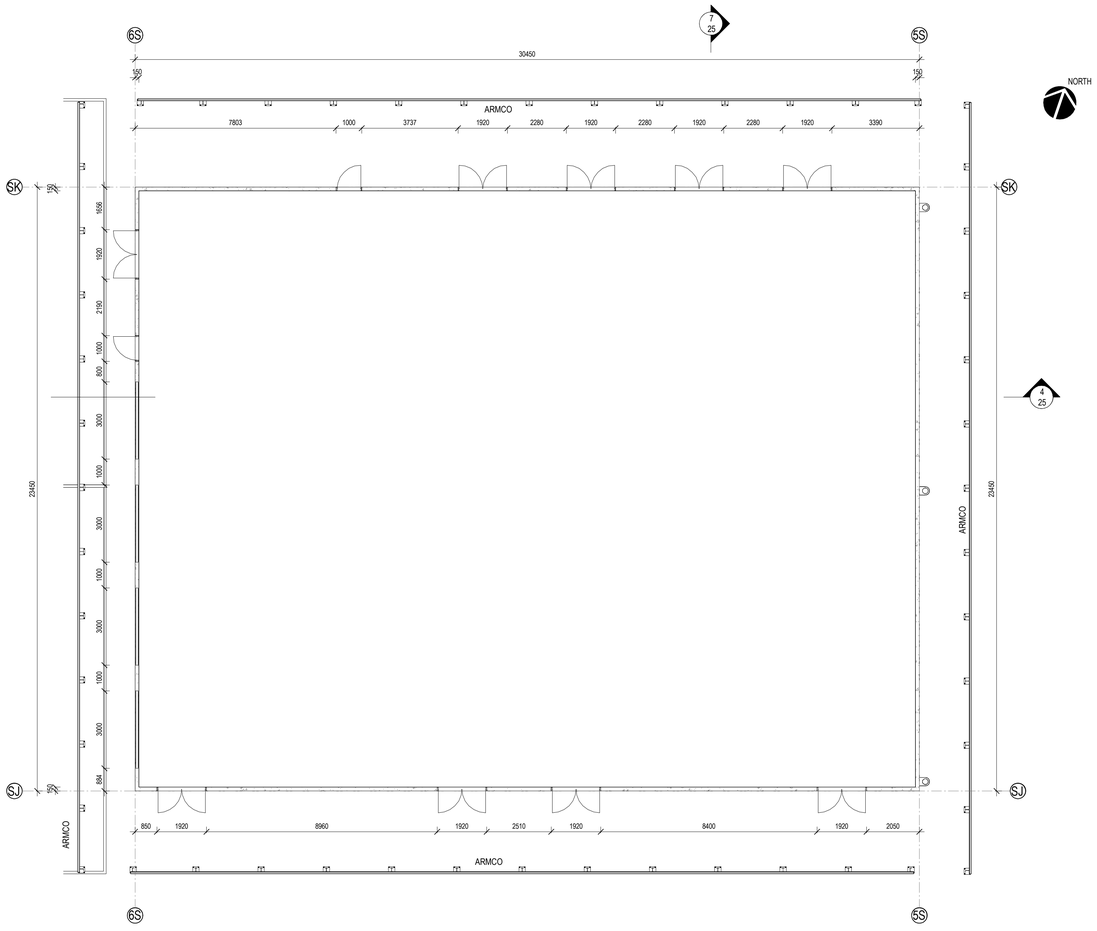
Oakdale West Estate
Horsley Park

Proposed Industrial Facility - Building 1A

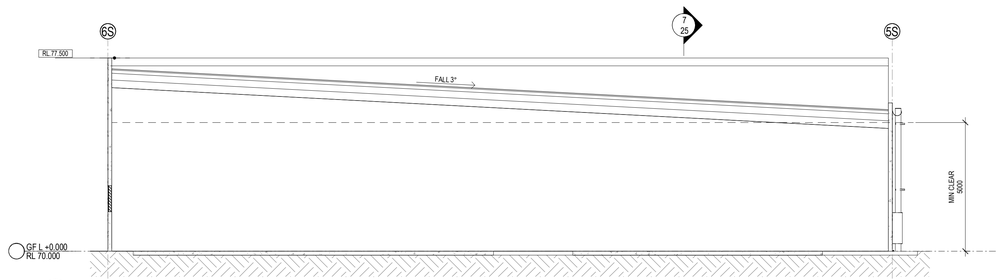
Diesel Refueling Area Plans

1 : 100 @ B1
25th February 2020

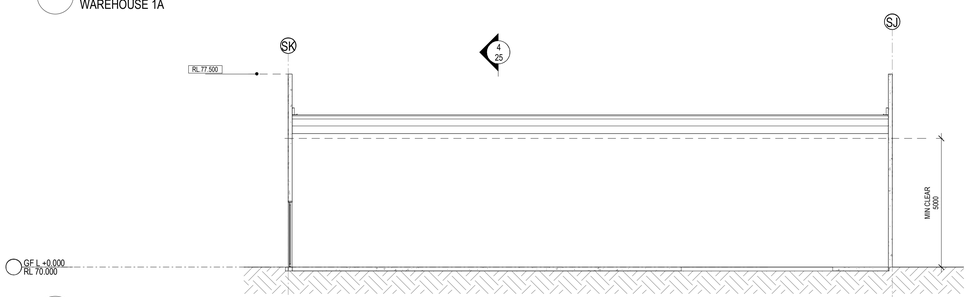
OAK-1A-DA- 24 (J)
Job No 15117



1 ENERGY COMPLEX 1 - FLOOR PLAN 1 : 100
WAREHOUSE 1A

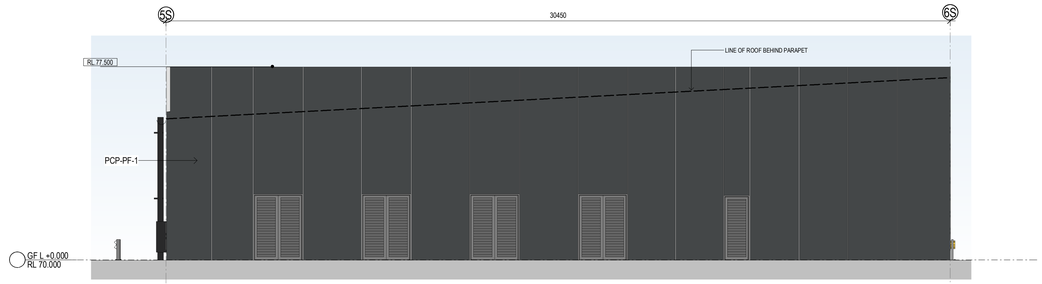


4 SECTION A 1 : 100
WAREHOUSE 1A

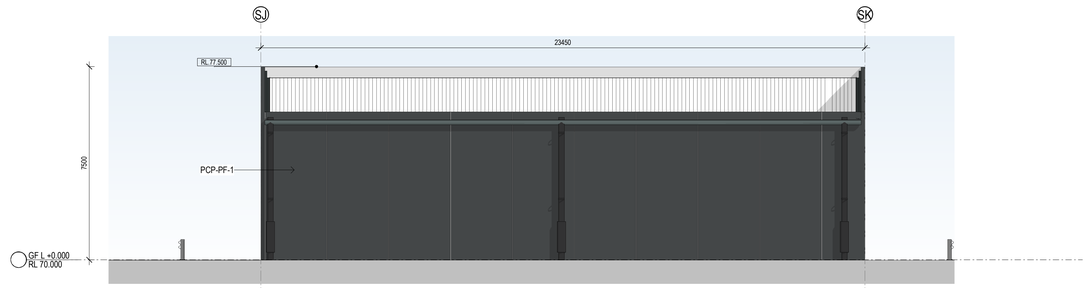


7 SECTION B 1 : 100
WAREHOUSE 1A

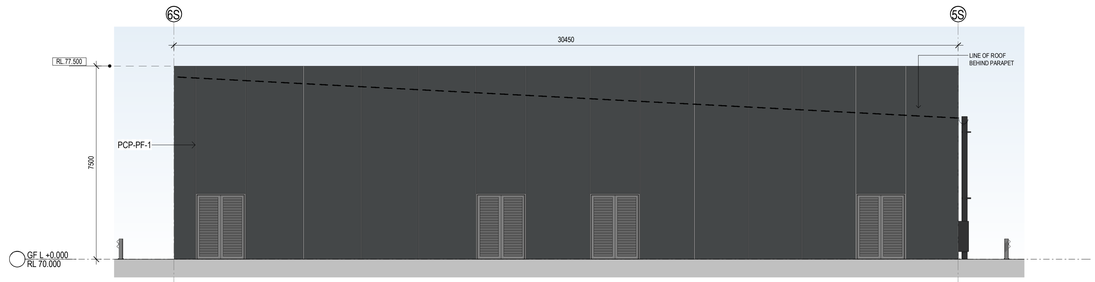
NORTH



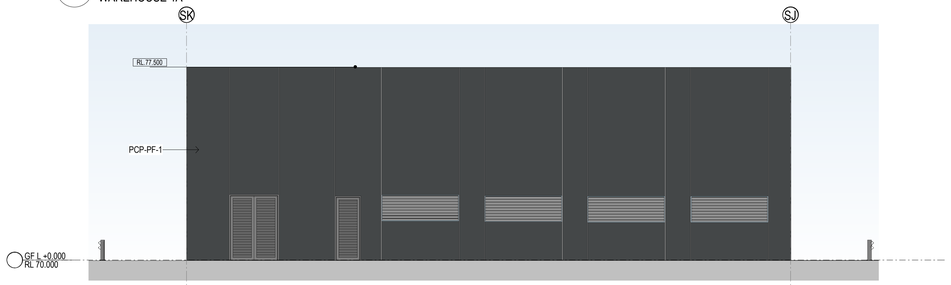
2 NORTH ELEVATION 1 : 100
WAREHOUSE 1A



3 EAST ELEVATION 1 : 100
WAREHOUSE 1A



5 SOUTH ELEVATION 1 : 100
WAREHOUSE 1A



6 WEST ELEVATION 1 : 100
WAREHOUSE 1A

INDICATIVE EXTERNAL FINISHES LEGEND

- **BLK-1** STACKED BOND BLOCK LIGHT GREY
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SBA ARCHITECTS

Oakdale West Estate
Horsley Park

Proposed Industrial Facility - Building 1A

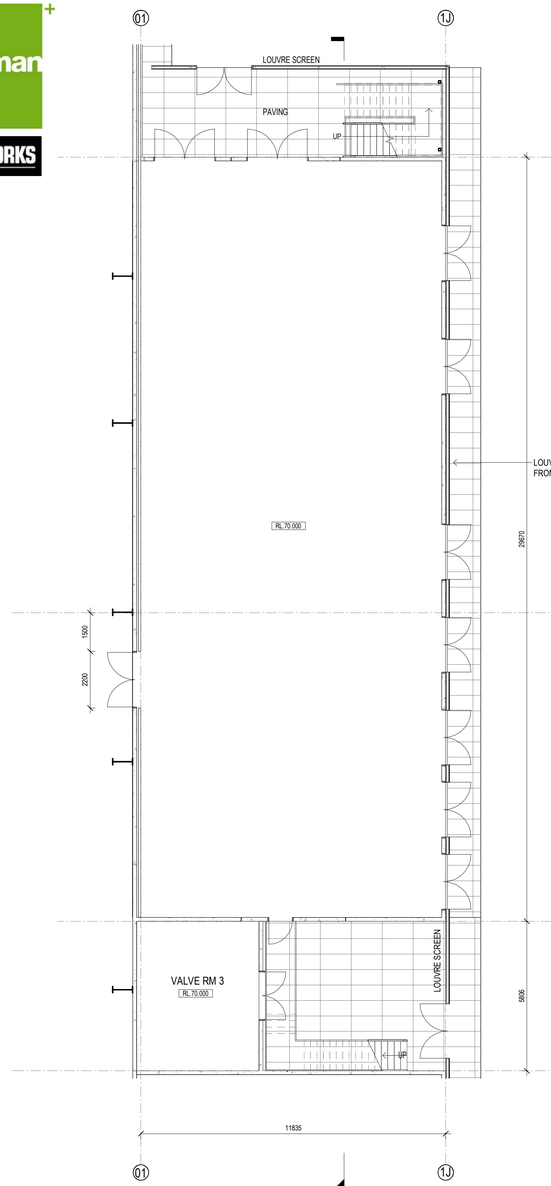
Energy Complex - 1

As indicated @ B1
25th February 2020

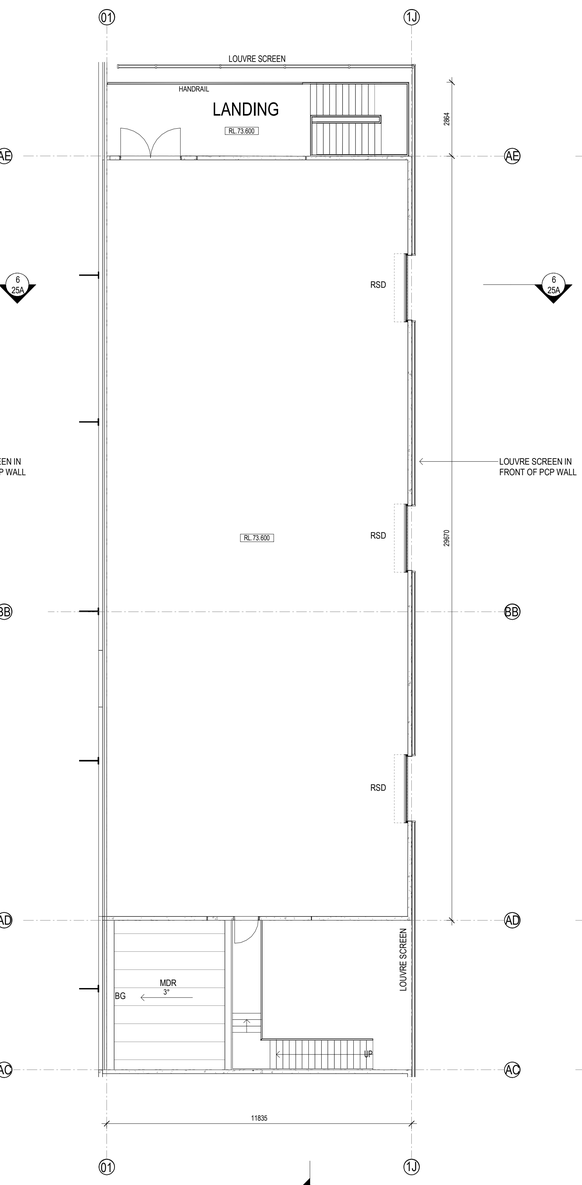
OAK-1A-DA- 25 (K)
Job No 15117

Goodman

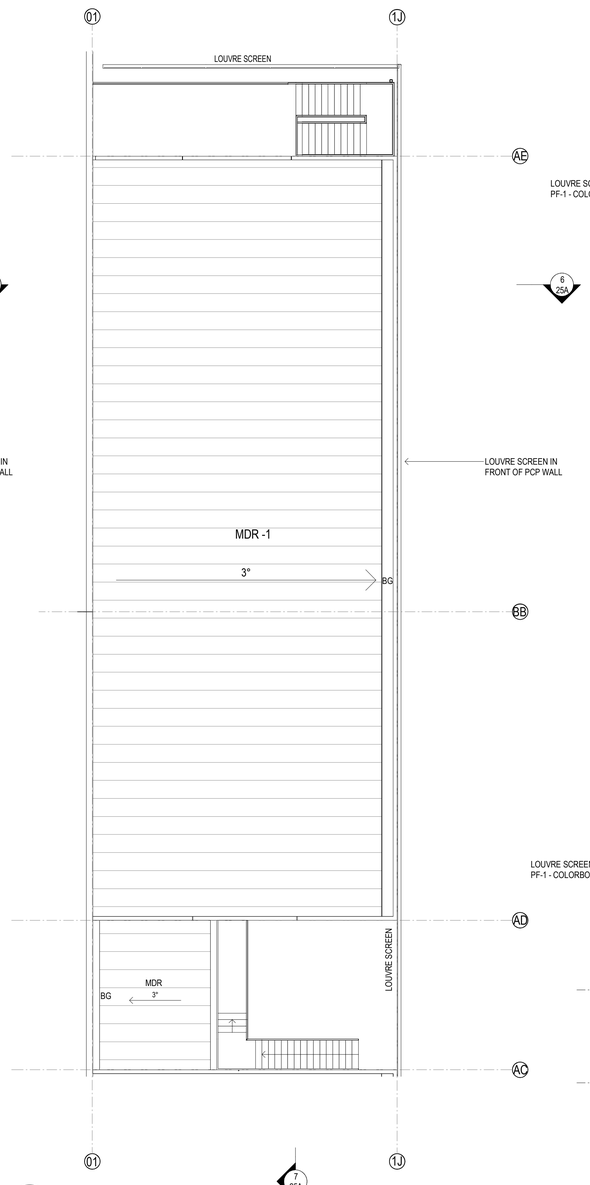
BRICKWORKS LIMITED



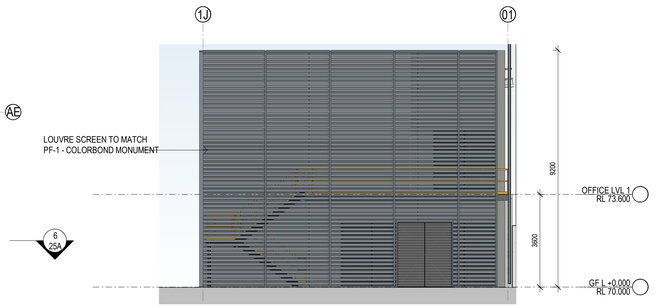
1 GROUND FLOOR PLAN 1 : 100
WAREHOUSE 1A



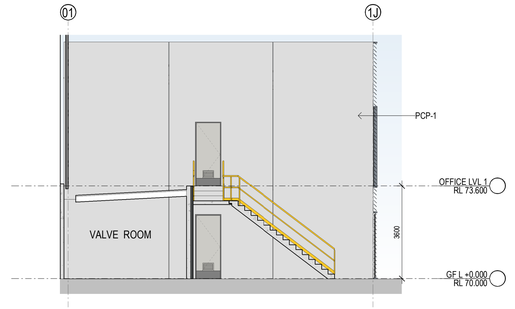
2 LEVEL 1 1 : 100
WAREHOUSE 1A



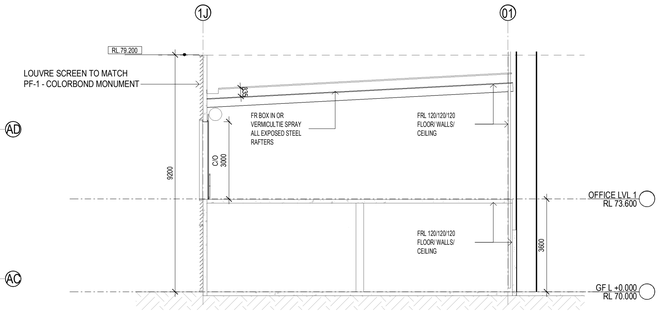
8 ROOF PLAN 1 : 100
WAREHOUSE 1A



4 NORTH ELEVATION 1 : 100
WAREHOUSE 1A



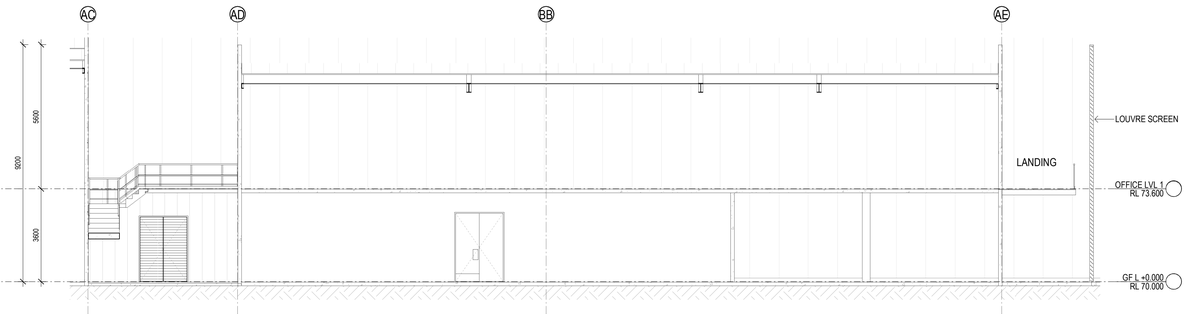
5 SOUTH ELEVATION 1 : 100
WAREHOUSE 1A



6 ENERGY COMPLEX 2 - SECTION B 1 : 100
WAREHOUSE 1A



3 EAST ELEVATION 1 : 100
WAREHOUSE 1A



7 SECTION A 1 : 100
WAREHOUSE 1A

INDICATIVE EXTERNAL FINISHES LEGEND

- **BLK-1** STACKED BOND BLOCK LIGHT GREY
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SBA ARCHITECTS

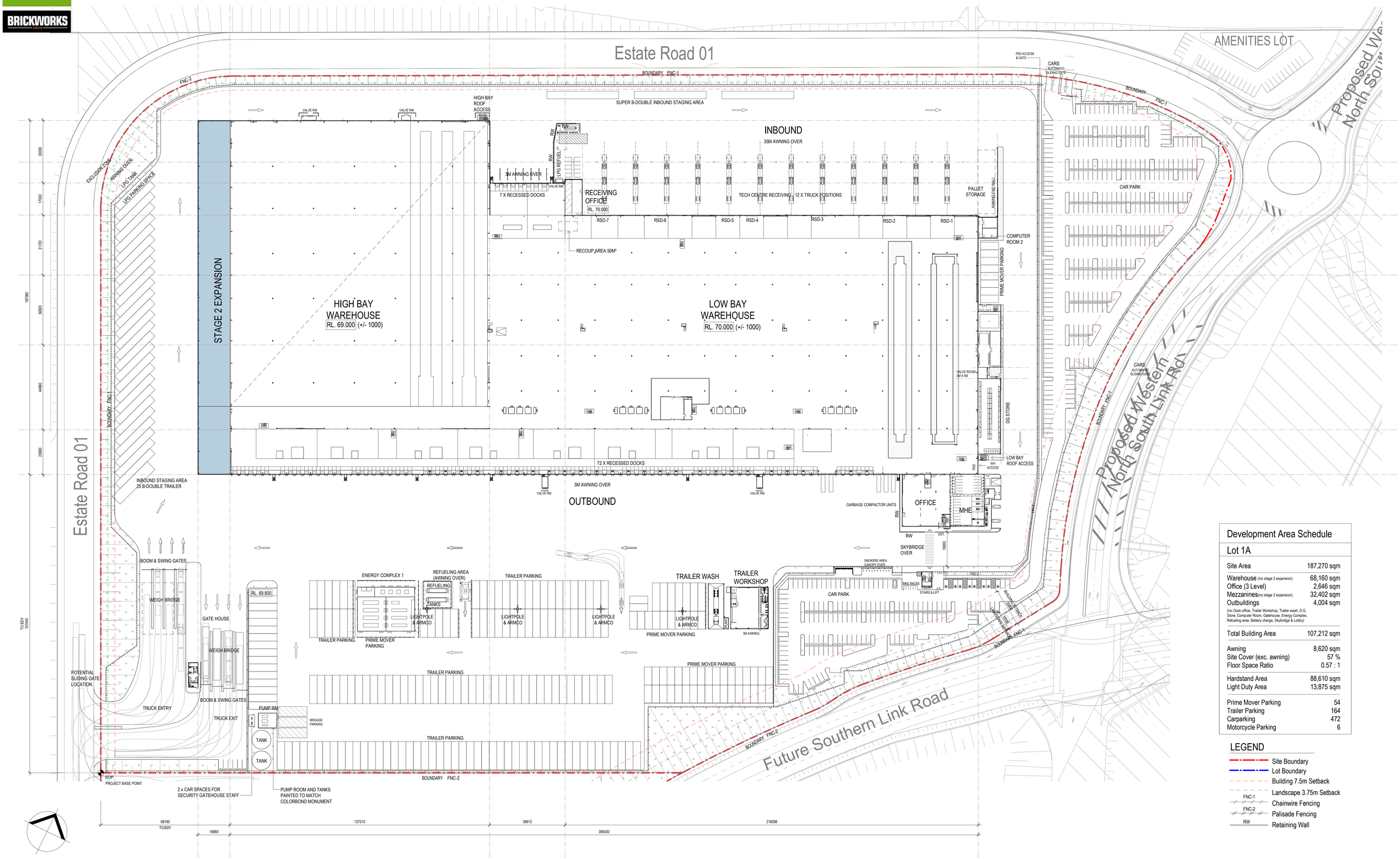
Oakdale West Estate
Horsley Park

Proposed Industrial Facility - Building 1A

Energy Complex - 2

As indicated @ B1
25th February 2020

OAK-1A-DA25A (H)
Job No 15117



Development Area Schedule

Lot 1A

Site Area	187,270 sqm
Warehouse (inc stage 2 expansion)	68,160 sqm
Office (3 Level)	2,646 sqm
Mezzanines (inc stage 2 expansion)	32,402 sqm
Outbuildings	4,004 sqm
(inc Dock office, Trailer Workshop, Trailer wash, D.G. Store, Computer Room, Gatehouse, Energy Complex, Refueling area, Battery charge, Skybridge & Lobby)	
Total Building Area	107,212 sqm
Awning	8,620 sqm
Site Cover (exc. awning)	57 %
Floor Space Ratio	0.57 : 1
Hardstand Area	88,610 sqm
Light Duty Area	13,875 sqm
Prime Mover Parking	54
Trailer Parking	164
Carparking	472
Motorcycle Parking	6

LEGEND

- Site Boundary
- Lot Boundary
- Building 7.5m Setback
- Landscape 3.75m Setback
- FNC-1 Chainwire Fencing
- FNC-2 Palisade Fencing
- RW Retaining Wall

SBA ARCHITECTS

Oakdale West Estate
Horsley Park

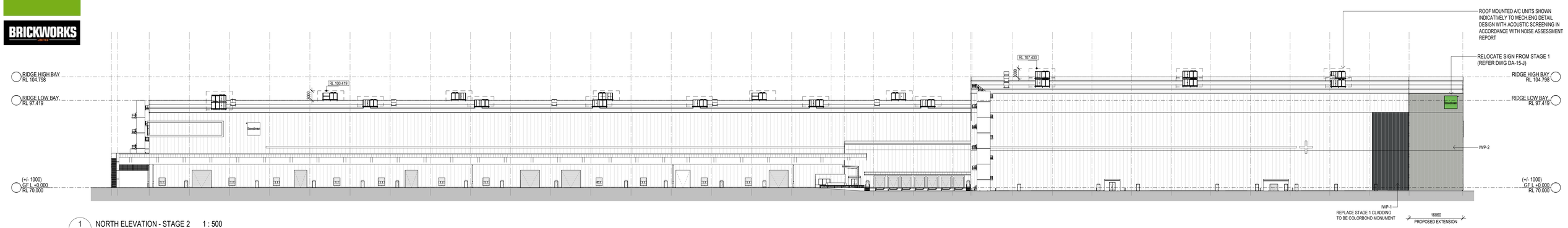
Proposed Industrial Facility - Building 1A

Stage 2 - Site Plan

1 : 750 @ B1
25th February 2020

OAK-1A-DA- 28 (L)
Job No 15117

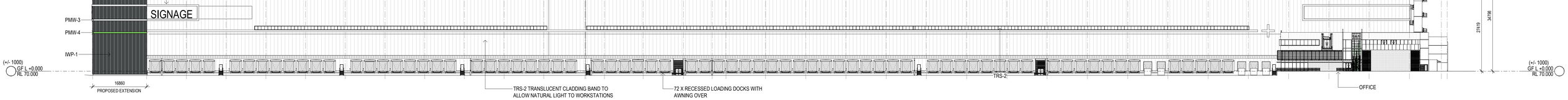
548



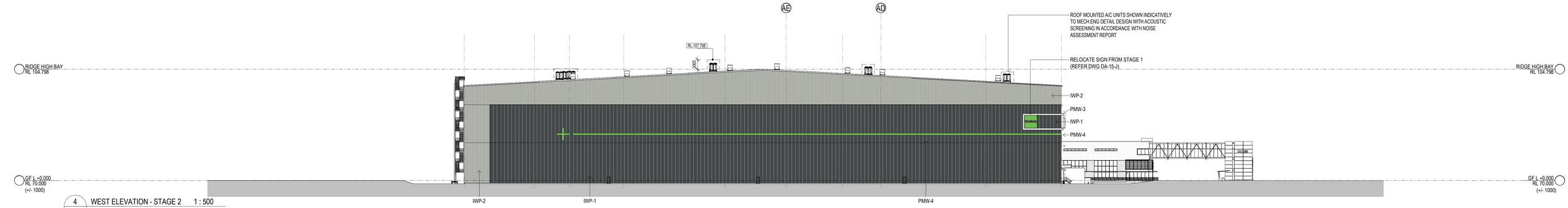
1 NORTH ELEVATION - STAGE 2 1 : 500
WAREHOUSE 1A



2 EAST ELEVATION - STAGE 2 1 : 500
WAREHOUSE 1A



3 SOUTH ELEVATION - STAGE 2 1 : 500
WAREHOUSE 1A



4 WEST ELEVATION - STAGE 2 1 : 500
WAREHOUSE 1A

INDICATIVE EXTERNAL FINISHES LEGEND

- **BLK-1** STACKED BOND BLOCK LIGHT GREY
- **FC-1** PREFINISHED FIBRE CEMENT WALL SHEETING
- **GL-1** GLAZING DARK GREY TINT
- **GL-2** SPANDREL GLAZING DARK GREY (OPAQUE)
- **GL-3** PRIVACY GLAZING - TRANSLUSCENT
- **GL-4** CLEAR GLASS
- **IWP-1** INSULATED WALL PANEL COLORBOND - MONUMENT
- **IWP-2** INSULATED WALL PANEL COLORBOND - SHALE GREY
- **IWP-3** INSULATED WALL PANEL COLORBOND - WHITE
- **MDR-1** METAL DECK ROOFING COLORBOND - SURFMIST
- **MDR-2** METAL DECK ROOFING COLORBOND - COOLMAX
- **PCP-1** PRECAST CONCRETE PANELS OFF FORM CONCRETE
- **PCP-PF-1** PRECAST CONCRETE PANELS PAINT FINISH - MONUMENT
- **PCP-PF-2** PRECAST CONCRETE PANELS PAINT FINISH - MID GREY
- **PF-1** PAINT FINISH - 1 MONUMENT
- **PF-2** PAINT FINISH - 2 MID GREY
- **PF-3** PAINT FINISH - 3 SHALE GREY
- **PF-4** ANODISED BRONZE FINISH
- **PMW-1** PREFINISHED METAL WALL SHEETING MONUMENT (OR SIMILAR)
- **PMW-2** PREFINISHED METAL WALL SHEETING DARK GREY (OR SIMILAR)
- **PMW-3** PREFINISHED METAL WALL SHEETING WHITE (OR SIMILAR)
- **PMW-4** PREFINISHED METAL WALL SHEETING "GOODMAN GREEN"
- **TRS-1** TRANSLUCENT ROOF SHEET - OPAL COLOUR (OR SIMILAR)
- **TRS-2** DANPALON TRANSLUCENT WALL CLADDING - OPAL COLOUR

SBA ARCHITECTS

Oakdale West Estate
Horsley Park

Proposed Industrial Facility - Building 1A

Stage 2 - Elevations

As indicated @ B1
25th February 2020

OAK-1A-DA- 29 (K)
Job No 15117

Goodman

BRICKWORKS LIMITED

FOR BUILDING 1A - REFER TO DA DRAWING NO. OAK-1A-DA-10

7500
LANDSCAPE SETBACK

64745
WAREHOUSE

50000
HARDSTAND

82493
WAREHOUSE

12639

56500
WAREHOUSE 1B1

90400
WAREHOUSE 1B2

146900

14000

59524
WAREHOUSE 1C

PEDESTRIAN GATE

VEHICLE ENTRY/ EXIT

SLIDING GATE

CAR ENTRY/ EXIT

SLIDING GATE

BOUNDARY

FNC-1

FNC-2

LANDSCAPE

PUMP ROOM

WATER TANK

OFFICE 1B1
(2 LEVELS)

INDICATIVE RACKING LAYOUT

RSD

WAREHOUSE
1B1
3,854 m²
RL. 74.800 (+/- 1000)

RECESSED DOCK (2)

3m AWNING OVER

15m AWNING OVER

PARKING (59)

WAREHOUSE
1B2
5,686 m²
RL. 74.800(+/- 1000)

OFFICE 1B2
(2 LEVELS)

SUBSTATION KIOSK

ESTATE ROAD 01

HARDSTAND
50m

PARKING (24)

OFFICE 1C
(1 LEVEL)

WAREHOUSE
1C
3,586 m²
RL. 74.800 (+/- 1000)

BUILDING SETBACK
20000

LANDSCAPE SETBACK
10000

FUTURE SOUTHERN LINK ROAD

FUTURE
PRECINCT 3

FUTURE
PRECINCT 4

NEW ZONE SUBSTATION

1/37

2/37

3/37

DEVELOPMENT AREA SCHEDULE

Lot 1B/1C

Site Area	31,972 sqm
Warehouse 1B-1	3,854 sqm
Warehouse 1B-2	5,686 sqm
Warehouse 1C	3,586 sqm
Office 1B-1 (2 level)	500 sqm
Office 1B-2 (2 level)	569 sqm
Office 1C (2 level)	436 sqm
Total Building Area	14,631 sqm
Awning	1,400 sqm
Site Cover (exc. awning)	46 %
Floor Space Ratio	0.46 : 1
Hardstand Area	6,445 sqm
Light Duty Area	2,365 sqm
Carparking	83

LEGEND

- Site Boundary
- Lot Boundary
- Building 7.5m Setback
- Landscape 3.75m Setback
- FNC-1 — Chainwire Fencing
- FNC-2 — Palisade Fencing
- RW — Retaining Wall

SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Proposed Industrial Facility - Building 1B/1C

SITE PLAN

1:500@A1
1:1000@A3

25th Feb 2020

OAK-1C-DA-30 S
Job No 15117

Goodman

BRICKWORKS LIMITED

FOR BUILDING 1A - REFER TO DA DRAWING NO. OAK-1A-DA-10

FUTURE PRECINCT 3

ESTATE ROAD 01

PUMP ROOM

TANK

FUTURE SOLAR PANEL LOCATION

FUTURE SOLAR PANEL LOCATION

FUTURE SOLAR PANEL LOCATION

FUTURE SOUTHERN LINK ROAD

FUTURE PRECINCT 4

NEW ZONE SUBSTATION

LEGEND	
BG	Box Gutter
EG	Eaves Gutter
MR	Metal Roof Sheeting
TR	Translucent Sheeting
EJ	Expansion Joint

SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Proposed Industrial Facility - Building 1B/1C

ROOF PLAN

1:500@A1
1:1000@A3

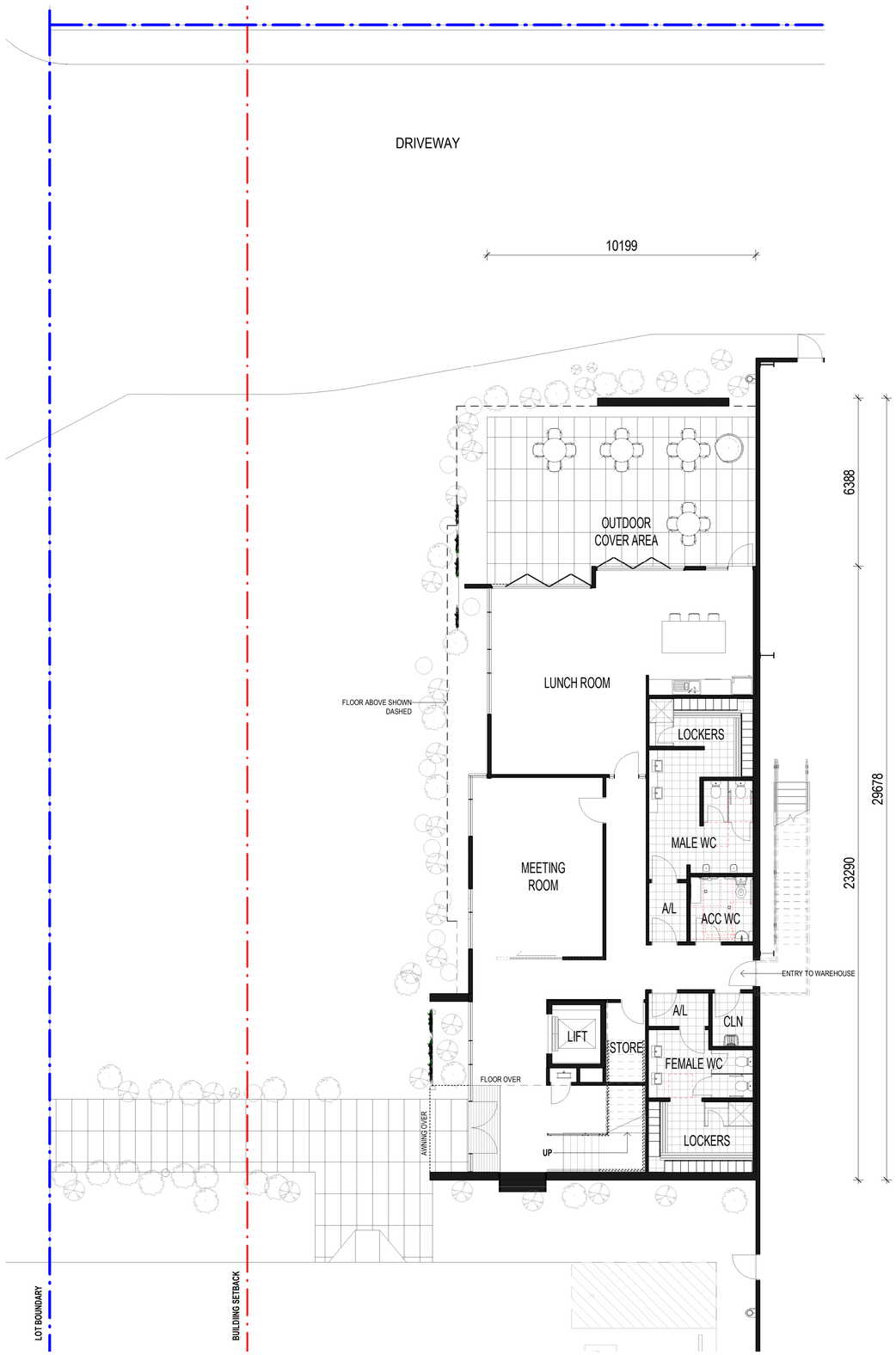
25th Feb 2020

OAK-1C-DA-31 L

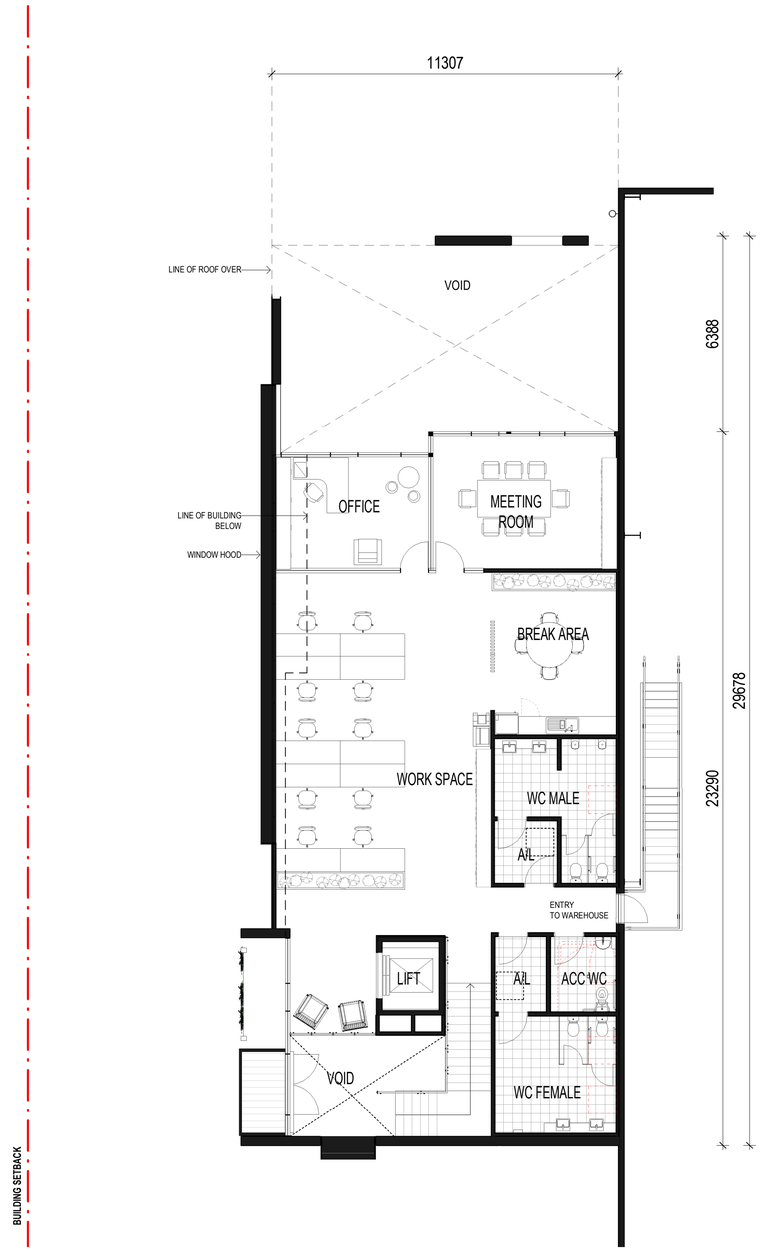
Job No 15117

Goodman

BRICKWORKS LIMITED



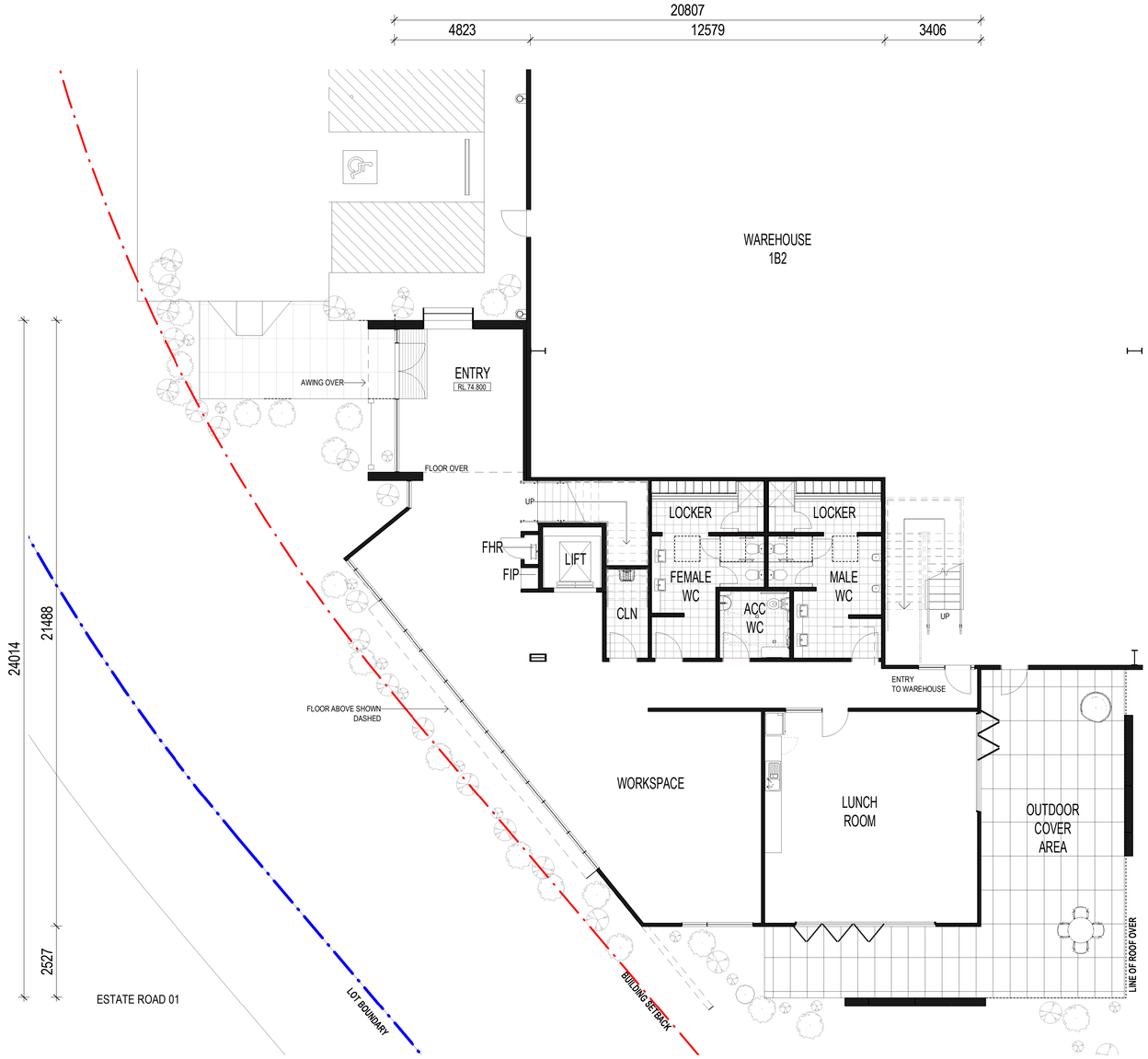
1 OFFICE 1B1 - GROUND FLOOR PLAN 1 : 100



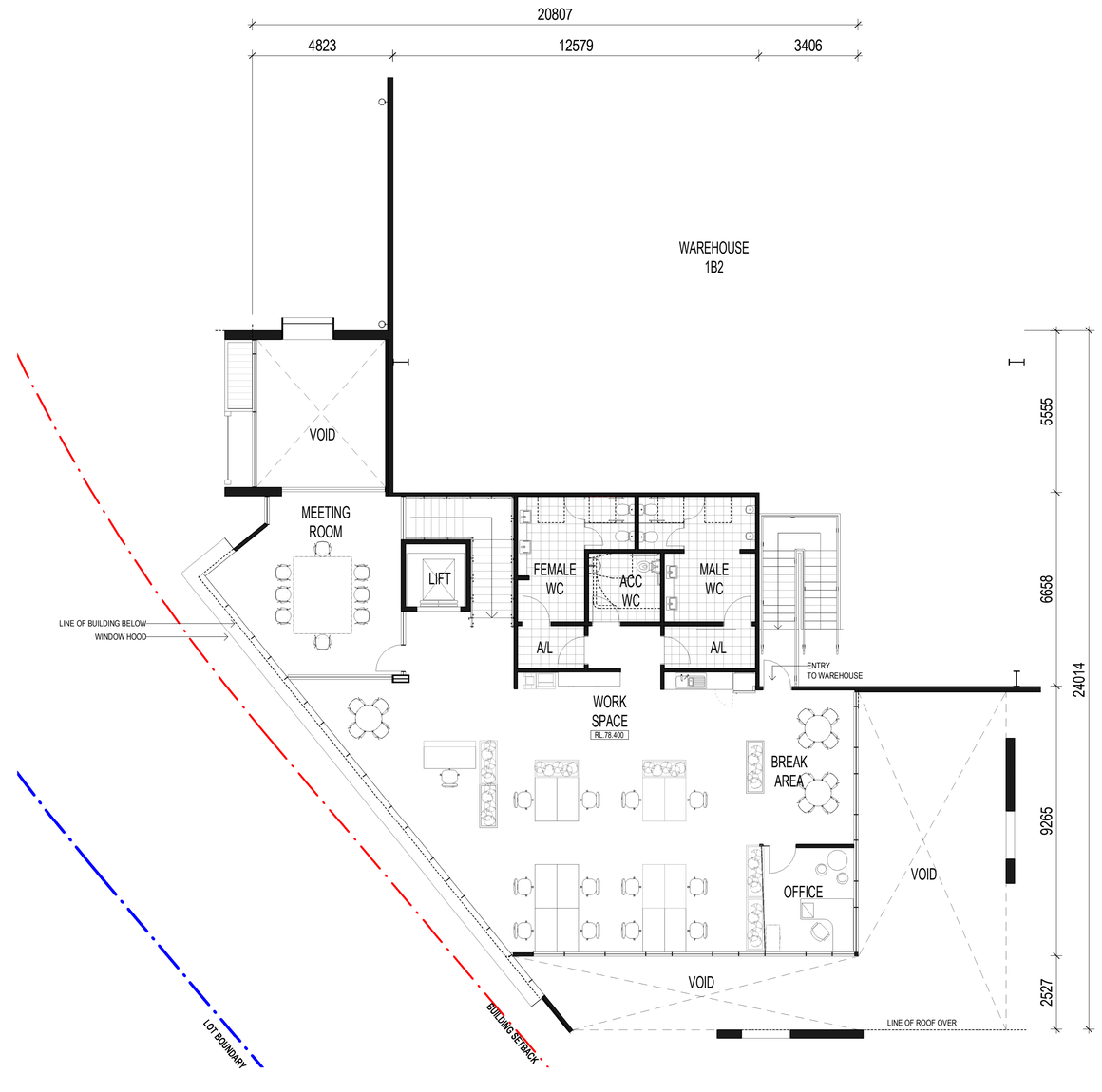
2 OFFICE 1B1 - FIRST FLOOR PLAN 1 : 100

SBA ARCHITECTS

Oakdale West Estate	Proposed Industrial Facility - Building 1B/1C	**OFFICE PLANS 1B1**	1:100@A1 1:200@A3	OAK-1C-DA-32 K
Horsley Park			25th Feb 2020	Job No 15117



1 OFFICE 1B2 - GROUND FLOOR PLAN 1 : 100



2 OFFICE 1B2 - FIRST FLOOR PLAN 1 : 100

PRELIMINARY

SBA ARCHITECTS

Oakdale West Estate — Proposed Industrial Facility - Building 1B/1C — **OFFICE PLANS 1B2**

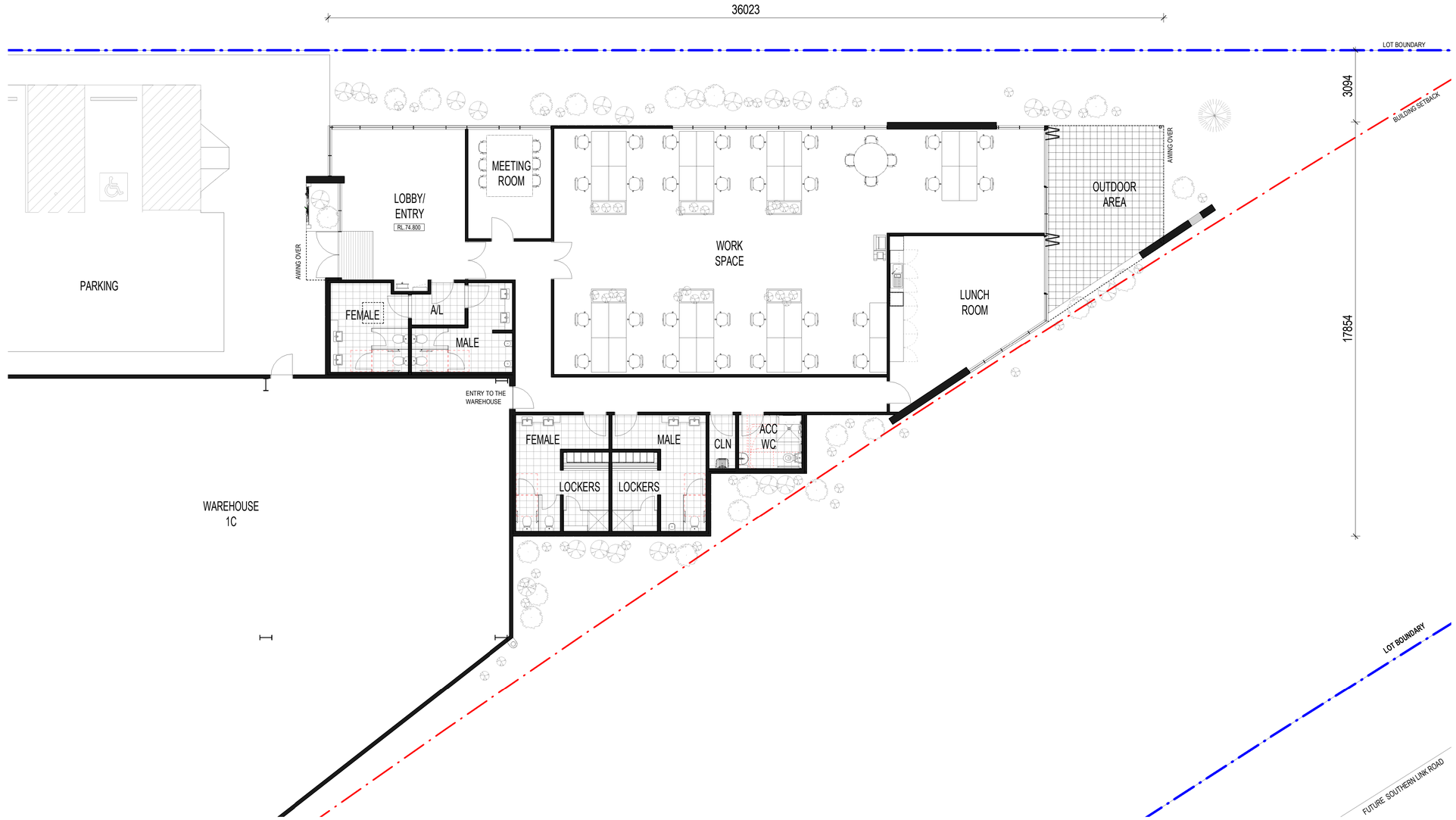
Horsley Park

1:100@A1
1:200@A3
25th Feb 2020

OAK-1C-DA-33 K
Job No 15117

Goodman

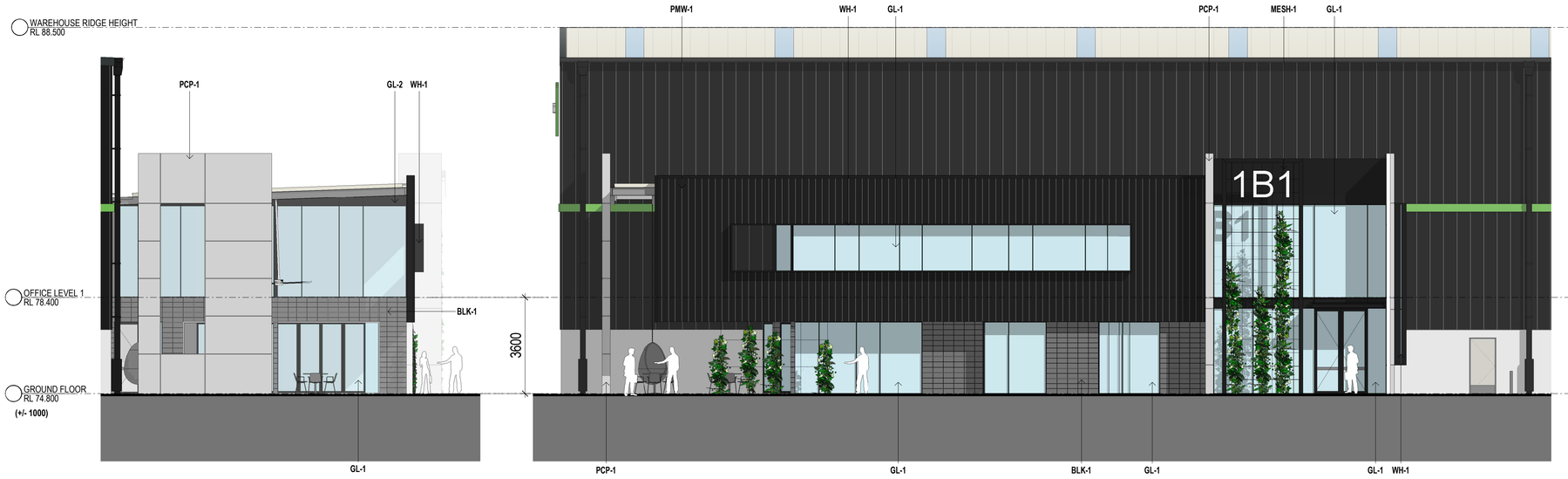
BRICKWORKS LIMITED



1 OFFICE 1C - GROUND FLOOR PLAN 1 : 100

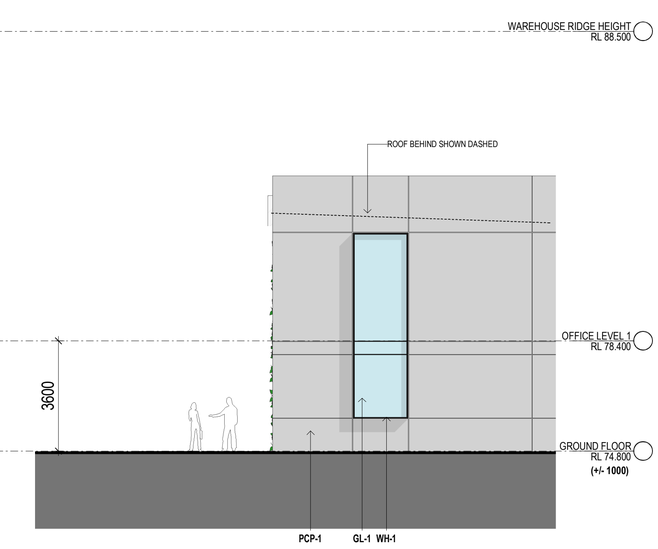
SBA ARCHITECTS

Oakdale West Estate	Proposed Industrial Facility - Building 1B/1C	**OFFICE PLANS 1C**	1:100@A1 1:200@A3	OAK-1C-DA-33A F
Horsley Park			25th Feb 2020	Job No 15117

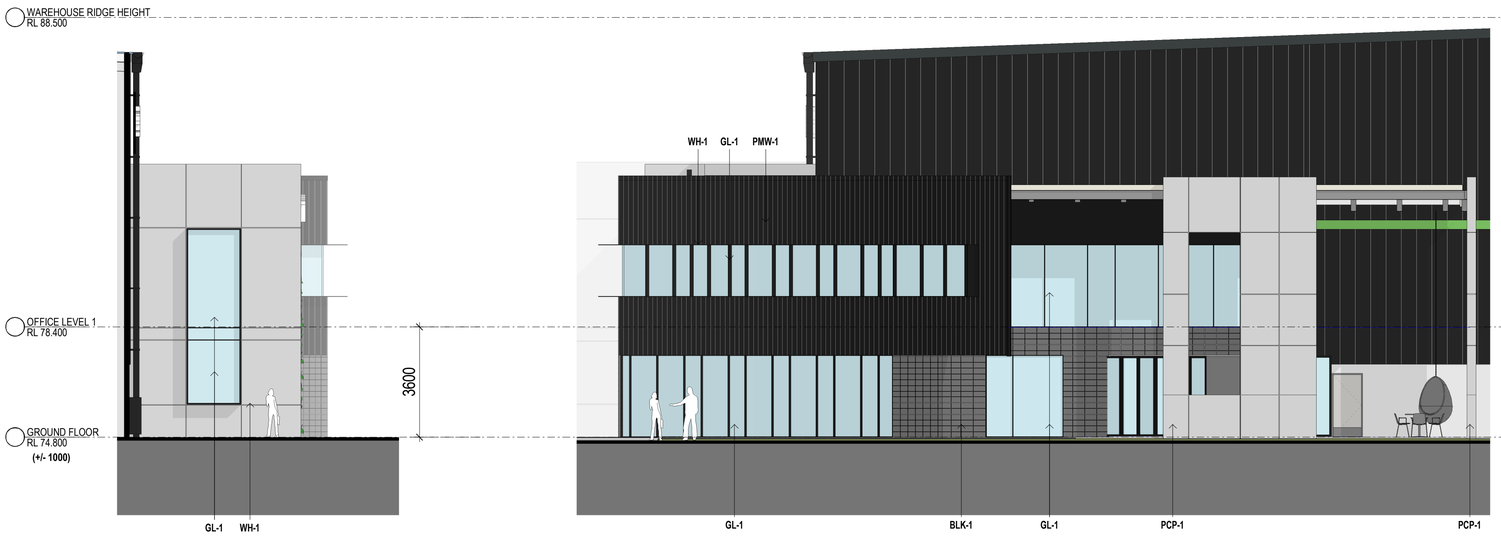


1 OFFICE 1B1 - ELEVATION NORTH 1 : 100

2 OFFICE 1B1 - ELEVATION WEST 1 : 100

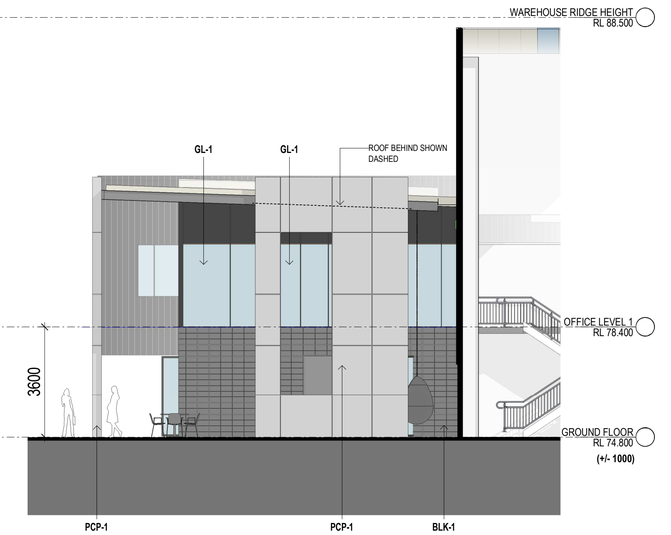


3 OFFICE 1B1 - ELEVATION SOUTH 1 : 100



4 OFFICE 1B2 - ELEVATION NORTH 1 : 100

5 OFFICE 1B2 - ELEVATION EAST 1 : 100



6 OFFICE 1B2 - ELEVATION SOUTH 1 : 100

INDICATIVE EXTERNAL FINISHES LEGEND

- **BLK-1** STACKED BOND BLOCKS GREY
- **GL-1** CLEAR GLAZING - LIGHT GREY TINT OR SIMILAR
- **GL-2** PREFINISH FC SHEET
- **MDR-1** METAL DECK ROOFING COLORBOND - SURFMIST
- **MRS** METAL ROLLER SHUTTER
- **MESH-1** STAINLESS STEEL MESH IN METAL FRAME
- **PCP-1** PRECAST CONCRETE PANEL OFF FORM CONCRETE FINISH
- **PCP-2** PRECAST CONCRETE PANEL PAINT FINISH
- **PMW-1** PREFINISHED METAL WALL SHEET CLADDING COLORBOND - MONUMENT FINISH (OR SMILIAR)
- **PMW-2** PREFINISHED METAL WALL SHEET CLADDING COLORBOND - GOODMAN GREEN FINISH
- **TRS-1** TRANSLUCENT ROOF SHEET OPAL COLOUR
- **TRS-2** TRANSLUCENT ROOF SHEET OPAL COLOUR (OR SIMILAR)
- **WH-1** STEEL WINDOW HOOD. COLORBOND MONUMENT FINISH (OR SIMILAR)

SBA ARCHITECTS

Oakdale West Estate

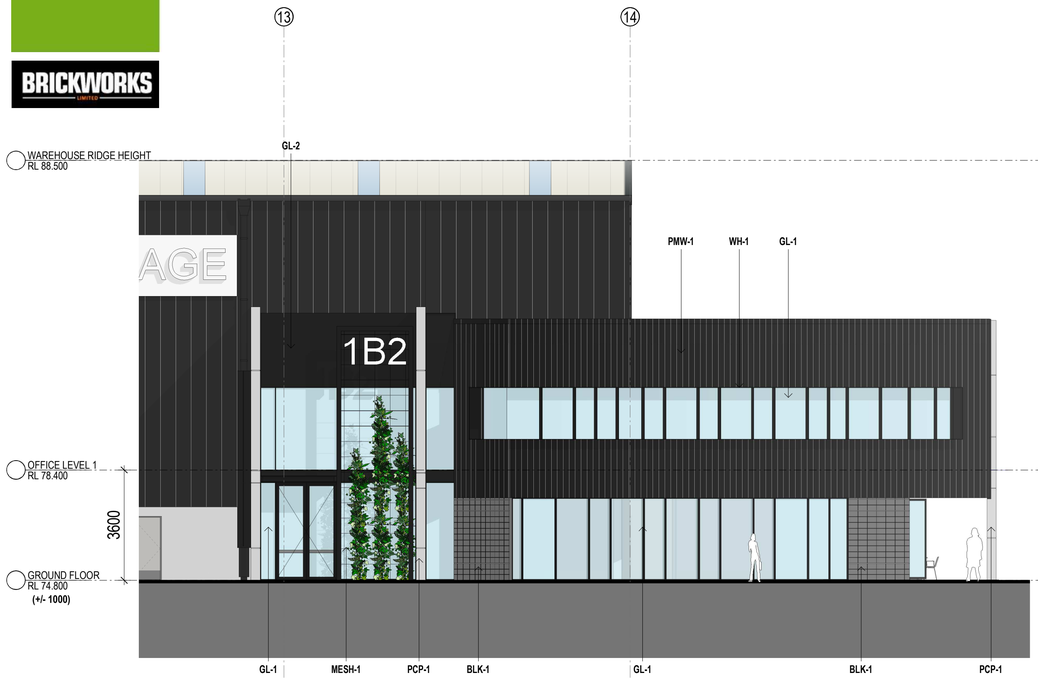
Horsley Park

Proposed Industrial Facility - Building 1B/1C

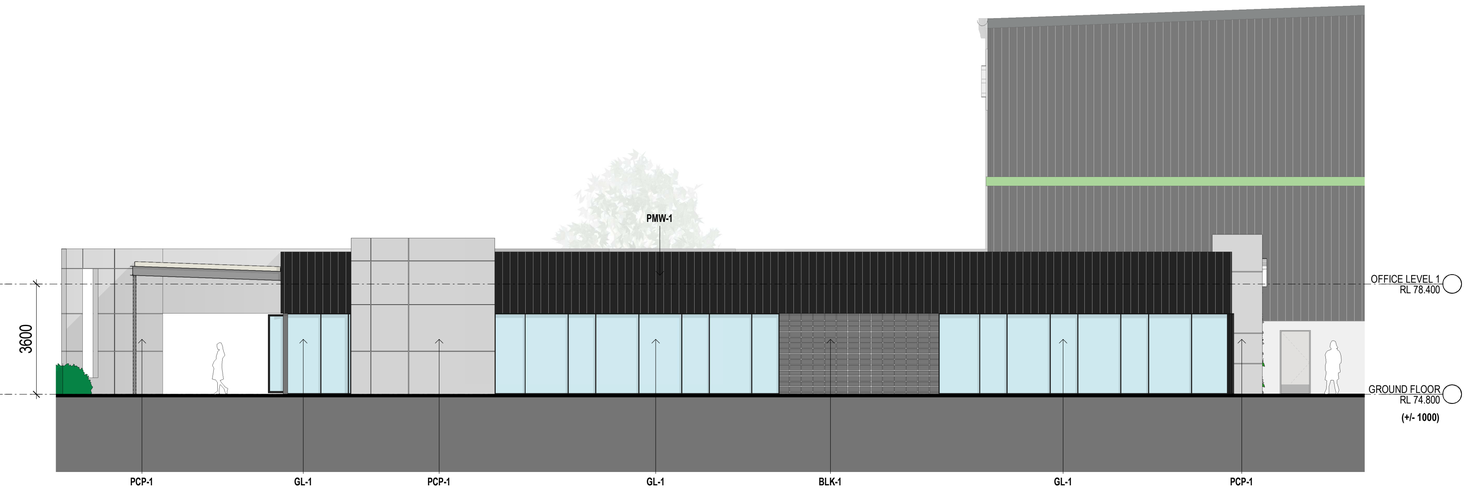
ELEVATIONS - OFFICE

1:100@A1
1:200@A3
25th Feb 2020

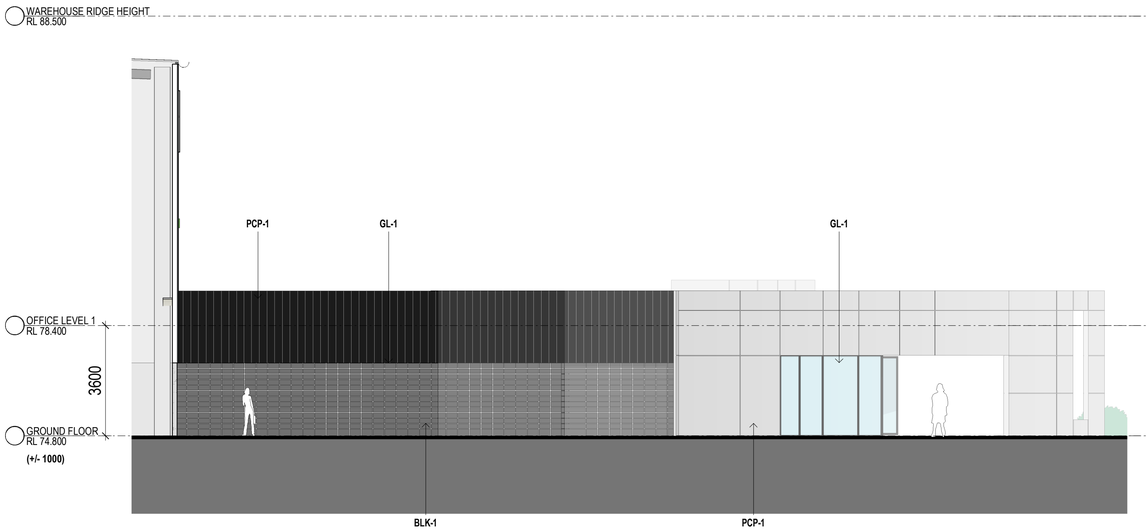
OAK-1C-DA-34 K
Job No 15117



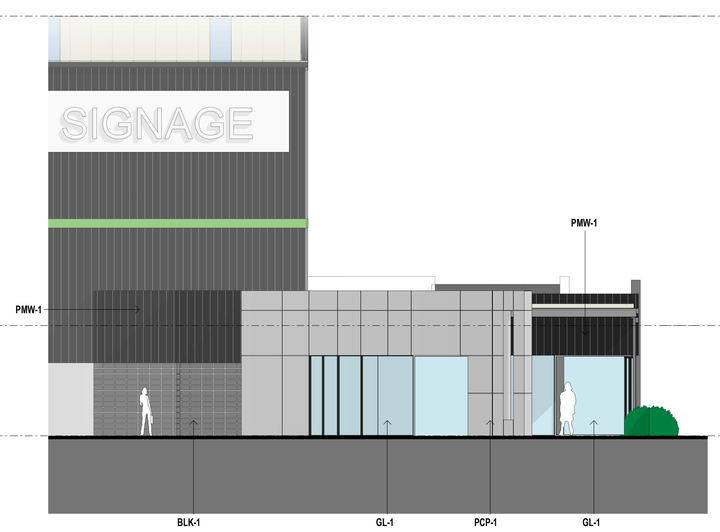
1 OFFICE 1B2 - ELEVATION WEST 1 : 100



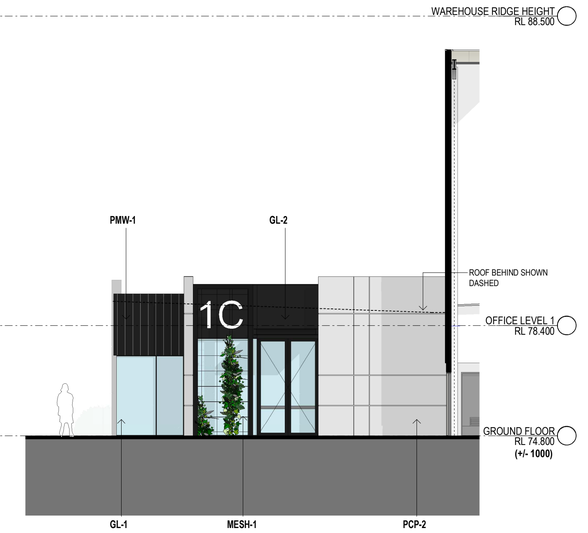
2 OFFICE 1C - ELEVATION NORTH 1 : 100



3 OFFICE 1C - ELEVATION SOUTH 1 : 100



4 OFFICE 1C - ELEVATION WEST 1 : 100



5 OFFICE 1C - ELEVATION EAST 1 : 100

INDICATIVE EXTERNAL FINISHES LEGEND

- **BLK-1** STACKED BOND BLOCKS GREY
- **GL-1** CLEAR GLAZING - LIGHT GREY TINT OR SIMILAR
- **GL-2** PREFINISH FC SHEET
- **MDR-1** METAL DECK ROOFING COLORBOND - SURFMIST
- **MRS** METAL ROLLER SHUTTER
- **MESH-1** STAINLESS STEEL MESH IN METAL FRAME
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- **PMW-2** PREFINISHED METAL WALL SHEET CLADDING COLORBOND - GOODMAN GREEN FINISH
- **TRS-1** TRANSLUCENT ROOF SHEET OPAL COLOUR
- **TRS-2** TRANSLUCENT ROOF SHEET OPAL COLOUR (OR SIMILAR)
- **WH-1** STEEL WINDOW HOOD. COLORBOND MONUMENT FINISH (OR SIMILAR)

SBA ARCHITECTS

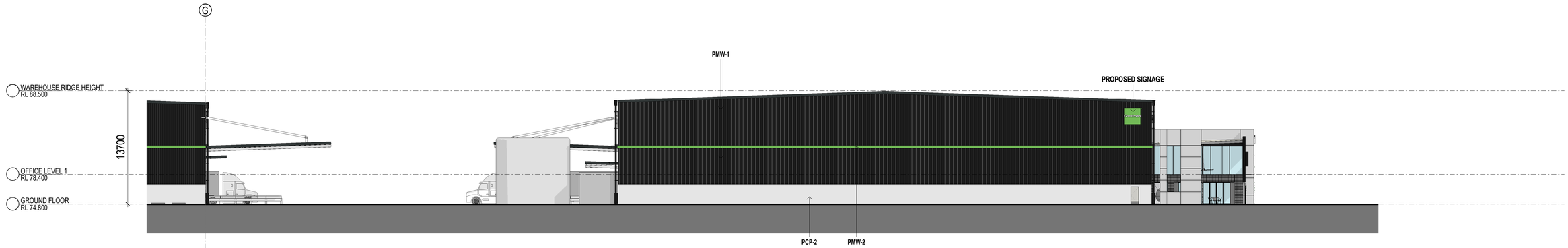
Oakdale West Estate
Horsley Park

Proposed Industrial Facility - Building 1B/1C

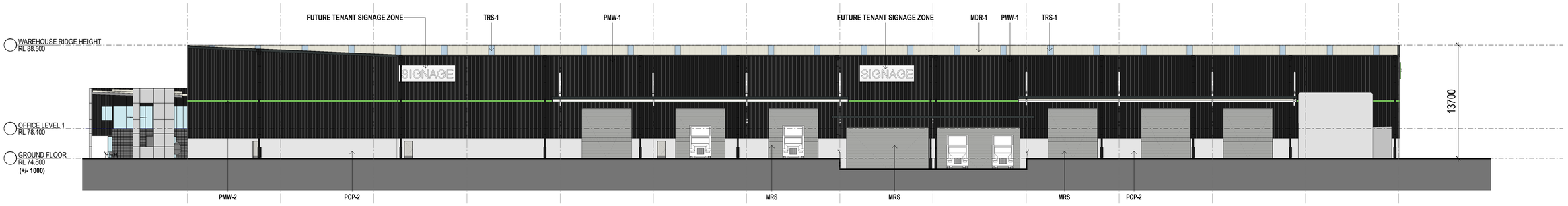
ELEVATIONS - OFFICE

1:100@A1
1:200@A3
25th Feb 2020

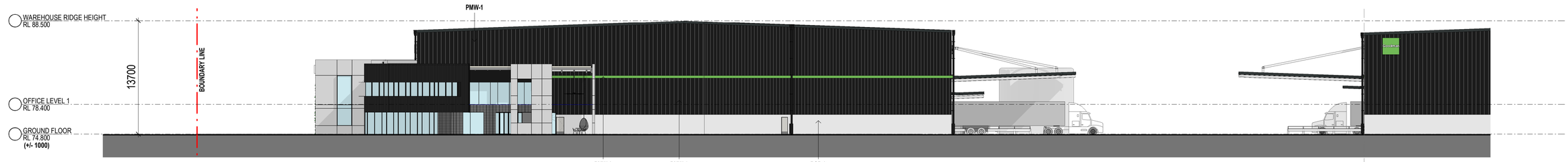
OAK-1C-DA-34A F
Job No 15117



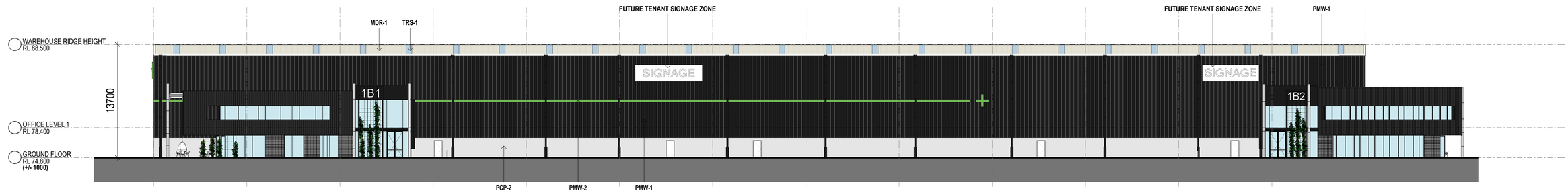
1 1B1 - NORTH ELEVATION 1 : 250



2 1B1 + 1B2 - EAST ELEVATION 1 : 250



3 1B2 - SOUTH ELEVATION 1 : 250



4 1B1 + 1B2 - WEST ELEVATION 1 : 250

INDICATIVE EXTERNAL FINISHES LEGEND

- **BLK-1** STACKED BOND BLOCKS GREY
- **GL-1** CLEAR GLAZING - LIGHT GREY TINT OR SIMILAR
- **GL-2** PREFINISH FC SHEET
- **MDR-1** METAL DECK ROOFING COLORBOND - SURFMIST
- **MRS** METAL ROLLER SHUTTER
- **MESH-1** STAINLESS STEEL MESH IN METAL FRAME
- **PCP-1** PRECAST CONCRETE PANEL OFF FORM CONCRETE FINISH
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- **PMW-2** PREFINISHED METAL WALL SHEET CLADDING COLORBOND - GOODMAN GREEN FINISH
- **TRS-1** TRANSLUCENT ROOF SHEET OPAL COLOUR
- **TRS-2** TRANSLUCENT ROOF SHEET OPAL COLOUR (OR SIMILAR)
- **WH-1** STEEL WINDOW HOOD. COLORBOND MONUMENT FINISH (OR SIMILAR)

SBA ARCHITECTS

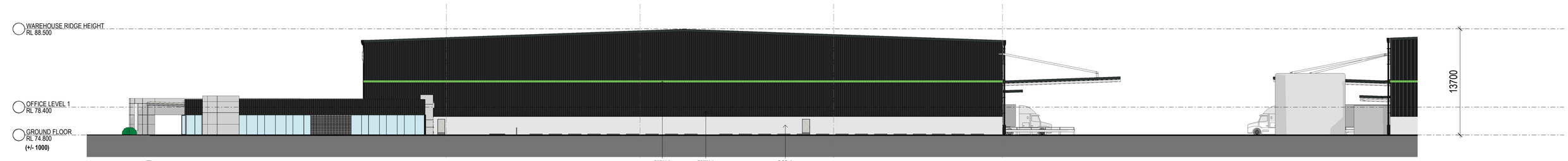
Oakdale West Estate
Horsley Park

Proposed Industrial Facility - Building 1B/1C

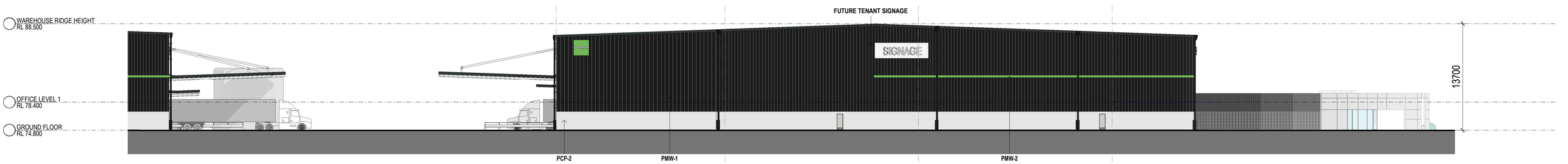
ELEVATIONS

1:250@A1
1:500@A3
25th Feb 2020

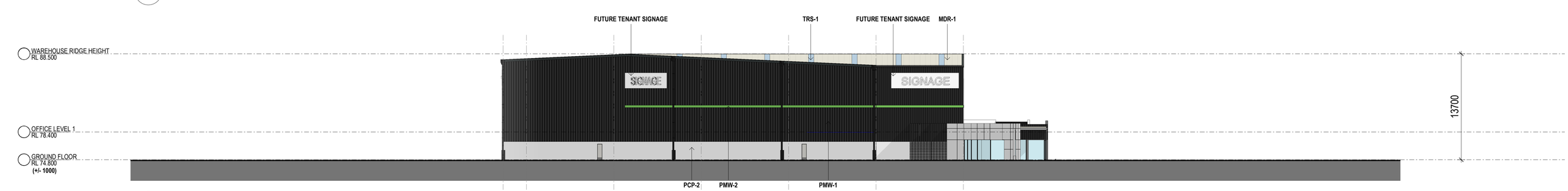
OAK-1C-DA-35 L
Job No 15117



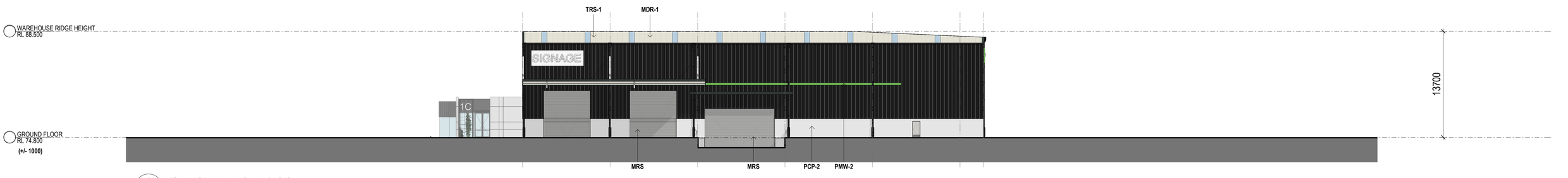
1 1C - NORTH ELEVATION 1 : 250



2 1C - SOUTH ELEVATION 1 : 250



3 1C - EAST ELEVATION 1 : 250



4 1C - WEST ELEVATION 1 : 250

INDICATIVE EXTERNAL FINISHES LEGEND

- **BLK-1** STACKED BOND BLOCKS GREY
- **GL-1** CLEAR GLAZING - LIGHT GREY TINT OR SIMILAR
- **GL-2** PREFINISH FC SHEET
- **MDR-1** METAL DECK ROOFING COLORBOND - SURFMIST
- **MRS** METAL ROLLER SHUTTER
- **MESH-1** STAINLESS STEEL MESH IN METAL FRAME
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- **TRS-1** TRANSLUCENT ROOF SHEET OPAL COLOUR
- **TRS-2** TRANSLUCENT ROOF SHEET OPAL COLOUR (OR SIMILAR)
- **WH-1** STEEL WINDOW HOOD. COLORBOND MONUMENT FINISH (OR SIMILAR)

SBA ARCHITECTS

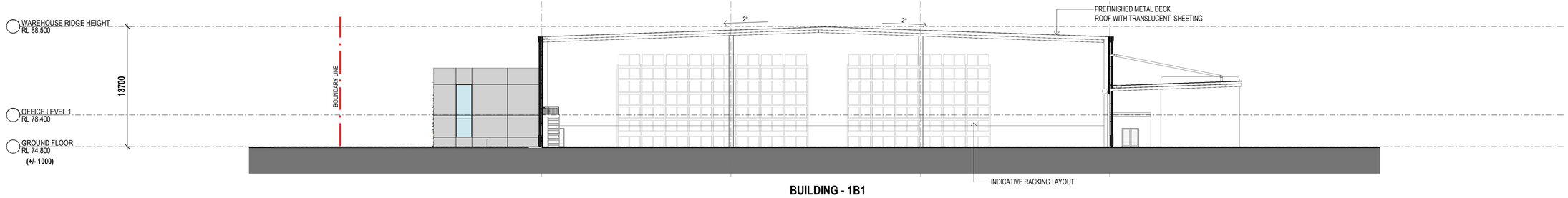
Oakdale West Estate
Horsley Park

Proposed Industrial Facility - Building 1B/1C

ELEVATIONS

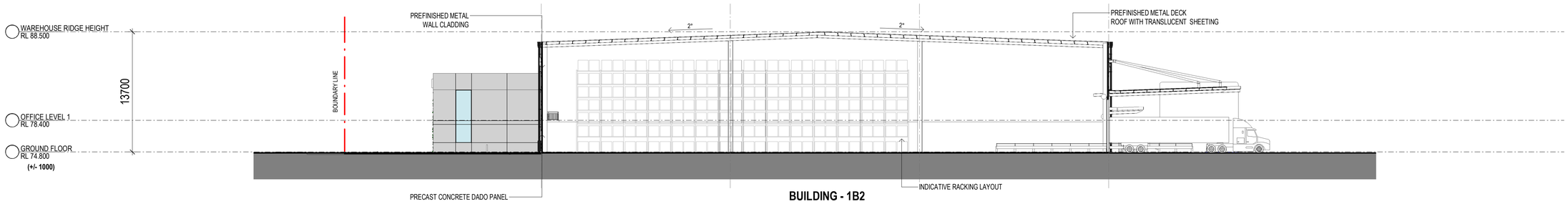
1:250@A1
1:500@A3
25th Feb 2020

OAK-1C-DA-36 L
Job No 15117



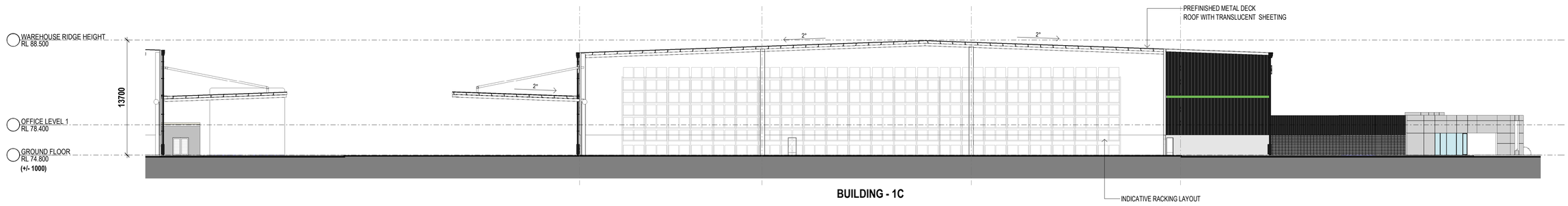
BUILDING - 1B1

1 SECTION A - BUILDING 1B1 1 : 250



BUILDING - 1B2

2 SECTION B - BUILDING 1B2 1 : 250



BUILDING - 1C

3 SECTION C - BUILDING 1C 1 : 250

SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Proposed Industrial Facility - Building 1B/1C

SECTIONS

1:250@A1
1:500@A3
25th Feb 2020

OAK-1C-DA-37 L
Job No 15117

Oakdale West Estate SSD7348 – MOD3

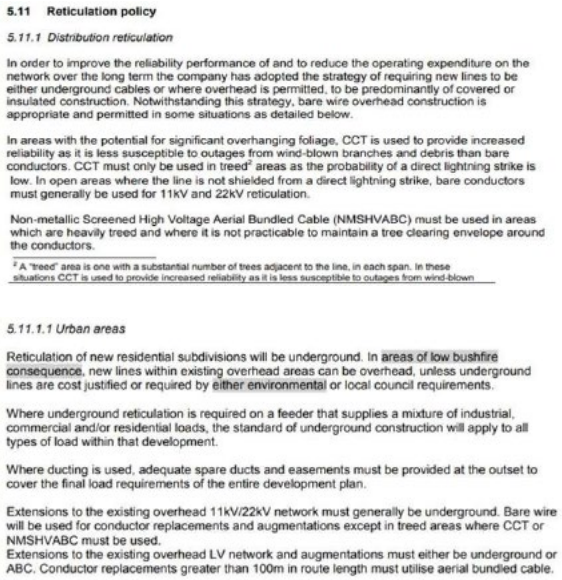
Response to Submission

Matters Raised	Applicant Response
Water NSW	
▪ The EIS adequately addressed Water NSW's SEARS request concerning an assessment of the risks to Water NSW's Warragamba Pipelines Corridor. The proposed changes have little impact to the risks already assessed as part of the SSD 7348 review.	▪ Noted
▪ Water NSW supports the proposed revised road layout, creating a further buffer between the estate and the pipelines corridor, as well as the building footprints being moved further away from the Pipelines corridor.	▪ Noted
Fire Rescue NSW	
▪ FRNSW reaffirm that recommendations previously submitted by station officer Cameron Wheatley (D17/88054, 20 December 2017) in regard to development remain valid, specifically "That any development application relating to one of the Oakdale West Estate's precinct one's speculative warehouses that is subject of the provisions of Part 2 of SEPP 33 and is subsequently approved; a condition be attached to the relevant instrument of consent requiring a Fire Safety Strategy (FSS) to be undertaken in accordance with the requirements of Hazardous Industry Planning Advisory Paper (HIPAP) No 2., once the warehouse tenancy is known. In addition, that any FSS be prescribed to meet Fire & Rescue NSW requirements or approval.	▪ A Fire Safety Strategy was lodged with the Development Application. This was specifically completed for the subject customer. Refer to **Annexure A (pg.587)**. ▪ Goodman are in consultation with Fire & Rescue NSW (F&RNSW) regarding the Fire Engineering Brief Questionnaire to ensure this process is completed to the satisfaction of F&RNSW. The FEBQ will be lodged imminently.

Matters Raised	Applicant Response
▪ It is recommended that each proposed warehouse building of the subject development be served by required fire systems that are independent of one another.	▪ Noted
Transport for NSW	
▪ TrfNSW provided comments on 11 November 2019 regarding requirements for the freight corridor preservation and remain applicable	▪ Noted
▪ The proposed modification and Stage 2 application seeks approval for an increase in Gross Floor Area by 120,496 sqm and an estimated increase in hourly vehicle movements by up to 585 vehicle movements during peak periods ▪ It is not clear in the submitted Traffic Report whether the left and right turn bays in the interim intersection design for the WNSLR/Lenore Drive intersection can accommodate additional traffic movements. ▪ As such, TrfNSW requests a copy of the electronic SIDRA files and output summarises for the 20226 interim peak and non-peak scenarios for the WNSLR/Lenore Drive intersection for further review and comment	▪ The Traffic Impact Assessment (TIA) (**Annexure B (pg.634)**) confirms in Table 9 on Page 24 & 25 that the WNSLR/Lenore Dr 'interim' intersection is sufficient operating at acceptable level of service (similar to that initially approved) in both forecast years (2026 and 2036) during peak seasonal and non-peak seasonal periods. ▪ The SIDRA results are provided in Annexure C of the TIA attached (**pg.733**). ▪ SIDRA modelling was sent to DPIE to issue to RMS on 18 February 2020 following the meeting held at DPIE's office. ▪ RMS has since confirmed that the intersection performance is sufficient and no further design changes are required.
Crown Lands	
▪ No comment	▪ No comment
DPIE Fisheries	
▪ No comment	▪ No comment
DPIE Agriculture	

Matters Raised	Applicant Response
▪ No comment	▪ No comment
DPIE (Climate Change and Sustainability)	
▪ ESS Group notes from the Biodiversity Assessment Report that the proposals will not result in any increase in the clearing of native vegetation approved by the consent for SSD 7348 or affect 172 ecosystem credits required. ESS Group considers the proposals are unlikely to increase the impacts on biodiversity value.	▪ Agreed. Although per MOD 1 there are 173 ecosystem credits (rounding).
Endeavour Energy	
▪ Previous comments provided by Endeavour Energy to State Significant Development SSD 7348 MOD 2 Oakdale West Estate for 'Modifications to the Oakdale West Estate approved concept plan and Stage 1 development, including master plan layout, increase in gross floor area and expansion of Building 1A, changes to internal roads, civil design and building pad levels' regarding electricity supply implied that larger loads would need to wait for the future Oakdale West Zone Substation. ▪ This statement expressed a preference by Endeavour Energy for supply by the future zone substation, as interim supplies from other sources are more complex and costly, especially for large loads. Endeavour Energy has now received applications for these lots and are working collaboratively with the proponent to determine supply arrangements in advance of a zone substation being commissioned.	▪ Noted. Goodman appreciate Endeavour Energy providing power for these applications from existing zone substations.
▪ In regard to SSD-10397, as shown in the following extract of the Architectural Plans for Proposed Building 2B, Endeavour Energy has noted that provision has been made for two padmount substation locations each with two transformers within the site with no direct access to an estate / public road.	▪ The site has a load of just 6.77MVA, we propose to install the Substations as close to the load center as practical due to the Voltage Drop with that amount of load at LV. The location of the building cannot move closer to the boundary so we ask for dispensation to move the Substations adjacent to the load center.

Matters Raised	Applicant Response
	▪ We can and will provide suitable 24/7 access via internal access roadways to provide Endeavour Energy unimpeded access, we do however wish to install Endeavour Energy locks so we can keep our site secure at the same time as provide Endeavour crews access at will.
▪ Generally it is the Level 3 Accredited Service Provider's (ASP) responsibility (engaged by the developer) to make sure that the substation location and design complies with Endeavour Energy's standards the suitability of access, safety clearances, fire ratings, flooding etc. As a condition of the Development Application \ consent the Department should request the submission of documentary evidence from Endeavour Energy confirming that satisfactory arrangements have been made for the connection of electricity and the design requirements for the substation, prior to the release of the Construction Certificate / commencement of works.	▪ Noted
▪ For further information please refer to the attached copy of Endeavour Energy's Mains Design Instruction MDI 0044 'Easements and Property Tenure Rights'. The foregoing requirements are illustrated in the following extract of Figure A4.3 'Padmount easements and clearances'.	▪ Noted
▪ Endeavour Energy's Company Policy 9.2.5 'Network Asset Design', includes the following requirements for electricity connections to new urban subdivision / development:	▪ Noted

Matters Raised	Applicant Response
 **5.11 Reticulation policy** *5.11.1 Distribution reticulation* In order to improve the reliability performance of and to reduce the operating expenditure on the network over the long term the company has adopted the strategy of requiring new lines to be either underground cables or where overhead is permitted, to be predominantly of covered or insulated construction. Notwithstanding this strategy, bare wire overhead construction is appropriate and permitted in some situations as detailed below. In areas with the potential for significant overhanging foliage, CCT is used to provide increased reliability as it is less susceptible to outages from wind-blown branches and debris than bare conductors. CCT must only be used in treed[2] areas as the probability of a direct lightning strike is low. In open areas where the line is not shielded from a direct lightning strike, bare conductors must generally be used for 11kV and 22kV reticulation. Non-metallic Screened High Voltage Aerial Bundled Cable (NMSHVABC) must be used in areas which are heavily treed and where it is not practicable to maintain a tree clearing envelope around the conductors. [2] A "treed" area is one with a substantial number of trees adjacent to the line, in each span. In these situations CCT is used to provide increased reliability as it is less susceptible to outages from wind-blown *5.11.1.1 Urban areas* Reticulation of new residential subdivisions will be underground. In areas of low bushfire consequence, new lines within existing overhead areas can be overhead, unless underground lines are cost justified or required by either environmental or local council requirements. Where underground reticulation is required on a feeder that supplies a mixture of industrial, commercial and/or residential loads, the standard of underground construction will apply to all types of load within that development. Where ducting is used, adequate spare ducts and easements must be provided at the outset to cover the final load requirements of the entire development plan. Extensions to the existing overhead 11kV/22kV network must generally be underground. Bare wire will be used for conductor replacements and augmentations except in treed areas where CCT or NMSHVABC must be used. Extensions to the existing overhead LV network and augmentations must either be underground or ABC. Conductor replacements greater than 100m in route length must utilise aerial bundled cable.	
▪ Earthing The construction of any building or structure (including fencing, signage, flag poles, hoardings etc.) whether temporary or permanent that is connected to or in close proximity to Endeavour Energy's electrical network is required to comply with Australian/New Zealand Standard AS/NZS 3000:2018 'Electrical installations' as updated from time to time. This Standard sets out requirements for the design, construction and verification of electrical installations, including ensuring there is adequate connection to the earth. Inadequate connection to the earth to allow a leaking/fault current to	▪ Noted.

Matters Raised	Applicant Response
flow into the grounding system and be properly dissipated places persons, equipment connected to the network and the electricity network itself at risk from electric shock, fire and physical injury.	
▪ Prudent Avoidance The electricity industry has adopted a policy of prudent avoidance by doing what can be done without undue inconvenience and at modest expense to avert the possible risk to health from exposure to emissions form electricity infrastructure such as electric and magnetic fields (EMF) and noise which generally increase the higher the voltage ie. Endeavour Energy's network ranges from low voltage (normally not exceeding 1,000 volts) to high voltage (normally exceeding 1,000 volts but not exceeding 132,000 volts / 132 kV). In practical terms this means that when designing new transmission and distribution facilities, consideration is given to reducing exposure and increasing separation distances to more sensitive uses such as residential or schools, pre-schools, day care centres or where potentially a greater number of people are regularly exposed for extended periods of time. These emissions are usually not an issue but with Council's permitting or encouraging development with higher density, reduced setbacks and increased building heights, but as the electricity network operates 24/7/365 (all day, every day of the year), the level of exposure can increase. Endeavour Energy believes that irrespective of the zoning or land use, applicants (and Council) should also adopt a policy of prudent avoidance by the siting of more sensitive uses eg. the office component of an industrial building, away from and less susceptible uses such as garages, non-habitable or rooms not regularly occupied eg. storage areas in a commercial building, towards any electricity	▪ Noted.

Matters Raised	Applicant Response
infrastructure – including any possible future electricity infrastructure required to facilitate the proposed development. Where development is proposed near electricity infrastructure, Endeavour Energy is not responsible for any amelioration measures for such emissions that may impact on the nearby proposed development. Please find attached a copy of Energy Networks Association's 'Electric & Magnetic Fields – What We Know' which can also be accessed via their website at https://www.energynetworks.com.au/electric-and-magnetic-fields and provides the following advice: *Electric fields are strongest closest to their source, and their strength diminishes rapidly as we move away from the source.* *The level of a magnetic field depends on the amount of the current (measured in amps), and decreases rapidly once we move away from the source.* Typical magnetic field measurements associated with Endeavour Energy's activities and assets given the required easement widths, safety clearances etc. and having a maximum voltage of 132,000 volt / 132 kV, will with the observance of these separation distances not exceed the recommended magnetic field public exposure limits.	
▪ Vegetation Management The planting of large trees in the vicinity of electricity infrastructure is not supported by Endeavour Energy. Suitable planting needs to be undertaken in proximity of electricity infrastructure (including any new electricity infrastructure required to facilitate the proposed	▪ Noted

Matters Raised	Applicant Response
development). Only low growing shrubs not exceeding 3.0 metres in height, ground covers and smaller shrubs, with non-invasive root systems are the best plants to use. Larger trees should be planted well away from electricity infrastructure (at least the same distance from overhead power lines as their potential full grown height) and even with underground cables, be installed with a root barrier around the root ball of the plant. Landscaping that interferes with electricity infrastructure could become a potential safety risk, restrict access, reduce light levels from streetlights or result in the interruption of supply may become subject to Endeavour Energy's Vegetation Management program and/or the provisions of the Electricity Supply Act 1995 (NSW) Section 48 'Interference with electricity works by trees' by which under certain circumstances the cost of carrying out such work may be recovered. In regard to the future padmount substation sites required to facilitate the proposed development, please find attached for the applicant's reference a copy Endeavour Energy's 'Guide to Fencing, Retaining Walls and Maintenance Around Padmount Substations'.	
▪ Dial Before You Dig Before commencing any underground activity the applicant is required to obtain advice from the Dial Before You Dig 1100 service in accordance with the requirements of the Electricity Supply Act 1995 (NSW) and associated Regulations. This should be obtained by the applicant not only to identify the location of any underground electrical and other utility infrastructure across the site, but also to identify them as a hazard and to properly assess the risk.	▪ Noted
▪ Public Safety	▪ Noted

Matters Raised	Applicant Response
Workers involved in work near electricity infrastructure run the risk of receiving an electric shock and causing substantial damage to plant and equipment. I have attached Endeavour Energy's public safety training resources, which were developed to help general public / workers to understand why you may be at risk and what you can do to work safely. The public safety training resources are also available via Endeavour Energy's website via the following link: http://www.endeavourenergy.com.au/wps/wcm/connect/ee/nsw/nsw+homepage/communitynav/safety/s afety+brochures If the applicant has any concerns over the proposed works in proximity of the Endeavour Energy's electricity infrastructure to the road verge / roadway, as part of a public safety initiative Endeavour Energy has set up an email account that is accessible by a range of stakeholders across the company in order to provide more effective lines of communication with the general public who may be undertaking construction activities in proximity of electricity infrastructure such as builders, construction industry workers etc. The email address is Construction.Works@endeavourenergy.com.au	
▪ Emergency Contact In case of an emergency relating to Endeavour Energy's electrical network, the applicant should note the Emergencies Telephone is 131 003 which can be contacted 24 hours/7 days. Endeavour Energy's contact details should be included in any relevant risk and safety management plan. Subject to the foregoing Endeavour Energy has no objection to SSD-7348- Mod-3 or SSD-10397.	▪ Noted

Matters Raised	Applicant Response
Penrith City Council	
1. Environmental Management Considerations – Acoustic Impacts In order to adequately assess acoustic implications resulting from the scope of works within Mod 1, the implications of works resulting from Modification 2 and Modification 3 (Stage 2 Construction) should factored into the assessment to appreciate the cumulative acoustic implications of development (given they are proposed and substantially known at this point in time). This is also required as the acoustic report submitted in support of Mod 1 is predicated on modelling assumptions for noise generation, which are further refined and clarified as a consequence of Mod 2 and Mod 3 which both include building works and tenant occupation as part of the development. Having regard to the above, the predicted noise levels within this application (Mod 3) are based on the assumption that the finished ground levels within Mod 1 are both suitable and supportable. As outlined within Council's comments on Mod 1, the finished ground levels and visual impacts of the additional imported fill are not deemed suitable or supportable and the address of this matter will necessitate revised modelling predicated on suitable and supportable finished ground levels and associated finished floor levels. It is also noted that Mod 3 is modelled with noise levels in exceedance of the approved limits. This is not supportable when the exceedance is resulting from elevated finished ground and floor levels resulting from the additional fill activities proposed as part of Mod 1. In the first instance it is requested that the concerns raised with respect to fill and finished ground levels within Mod 1 be resolved. Following this	▪ This comment was addressed as part of the MOD 1 and MOD 2 Response to Submissions (**pg.15 & 421**). ▪ Goodman has reverted to the SSD approved levels for the 2E, 2F, and 2G (or 3A, 3B, and 3C as described in MOD 3). ▪ The change in levels has little impact of the acoustic impacts. ▪ Noise Agreements have been entered into with N3, N4, and N5 with the owners accepting exceedances to the Noise criteria. ▪ Please refer to **Annexure C (pg.736)** from Wilkinson Murray in relation to council's point on consistency between MOD 2 and MOD 3. Effectively, re-modelling MOD 3 assuming the vehicle sound power level of 96dbA assumed within MOD 2 provides for a compliant result at N2 (the only receiver without a noise agreement in place) during school hours.

Matters Raised	Applicant Response
resolution, it is then recommended that revised modelling be undertaken as part of Mod 1, Mod 2 and Mod 3 that addresses the following:- • In considering the maximum noise level criteria in accordance with NPfI, it is requested that the Department pursue further analysis with reference to the health impact data sourced from the World Health Organisation and enHealth as detailed in the Road Noise Policy. It is recommended that maximum noise levels be cumulatively assessed against the information provided in the Road Noise Policy, giving detailed consideration to the frequency and duration of elevated noise levels and demonstrating that long-term adverse health impacts will not likely result. Long-term health concerns may not necessary be linked only to the maximum noise level per event but may also be correlated with elevated noise over a long period. For example, the Road Noise Policy indicates that levels between 40 and 55dBA may be related to adverse health effects with many people needing to adapt to cope. • Whilst the noise impact assessments refer to noise-enhancing weather conditions, the frequency of these conditions is not discussed. Given that temperature inversions are a feature of the Penrith Local Government Area, it is suggested that it is necessary for this aspect of the noise assessments to be considered further. If DPIE is not able to ascertain this, it is recommended that the EPA be engaged to consider the modelling assumptions and implications and the predicted noise levels. • The noise assessment accompanying Mod 3 effectively seeks to 'supersede' or ‘over-ride’ the separate acoustic assessment in support of Mod 2, specifically relating to revised sound power levels. The Wilkinson Murray assessment (supporting Mod 3) states that the sound power levels used in SLR's Report (for Mod 2) are overly conservative. It is not acceptable that one report is disregarding or changing the parameters of another report as a consistent approach to modelling that results in the predicted noised levels	

Matters Raised	Applicant Response
must be established to ensure that a consistent and cumulative impact analysis can be undertaken. The applicant should be requested to provide a single acoustic report, or separate acoustic reports that provide consistent adoption of modelling parameters and assumptions, to the inform the predicted noise level emissions. The assessments progressively should also consider the cumulative impacts of preceding development approved in combination with the current proposal. Alternatively, DPIE (or EPA) is requested to determine the appropriateness of the sound power level and other input data used in the noise modelling processes for address in the submitted acoustic reports for these applications and moving forward. • The Mod 3 acoustic assessment assumes that Lot 2B mechanical plant services can be attenuated by 10dB using noise mitigation methods. It is not clear how this can be achieved and further detail on the feasibility of this should be sought. • In recommending operational noise mitigation strategies, the surface construction of vehicular access ways and roads is not discussed in the noise impact assessments. It is requested that consideration be given to the type of road construction to ensure maximum acoustic benefit, should this not already have occurred. • As raised within the planning comments in the Mod 1 response by Council, the reasonableness of a 5.0m acoustic wall on top of an elevated fill platform with extensive retaining wall is not supported. It also appears from the information submitted that further noise mitigation measures may still be required at receiver boundaries. It appears that negotiations are currently occurring with neighbouring properties and that 'at-receiver' noise mitigation measures are not yet finalised. The impacts of the completed development and the implications of necessary mitigation measures can only be assessed if the full extent of mitigation measures within the site and at receiver boundaries are included within the assessment and plans. If the suggestion	

Matters Raised	Applicant Response
is made that the ultimate impacts are unknown due to current analysis being based on predications only, then the predications should be conservative in nature and include likely mitigation measures at receiver boundaries to understand what could be required after construction and occupation. Further to the above comments which relate to implications of MOD1 and MOD2, it is also raised that MOD 3 specifically identifies the following operational noise implications: • approved noise limits will be achieved for typical and peak operations under all meteorological conditions at receivers to the west of the OWE, and • exceedances of noise criteria at night under noise enhancing weather conditions at residential receivers (N4 and N5) to the south and south west of the site. The NIA identifies that due to the elevation of the receivers to the south, noise barriers at the source will be of little effect to these receivers. • The NIA states that the exceedances at southern receivers, N4 and N5, will occur only under 'relatively rare noise enhancing meteorological conditions' coinciding with the six week end of year peak season. The NIA does not predict the frequency of noise enhancing weather conditions, such as temperature inversions. • Predicted operational noise levels in the Wilkinson and Murray Noise and Vibration Assessment Report No. 19440 Version F are lower than those predicted in MOD 2. This is in part due to the revised noise barrier location and design proposed by MOD 3. It is also due to Wilkinson Murray reducing the sound power level input data for this assessment based on the view that the data used for MOD 2 was overly conservative. This assessment also relies upon mechanical plant and equipment achieving a specific noise	

Matters Raised	Applicant Response
reduction which is yet subject to detailed design. Wilkinson Murray's NIA predicts that 'at receiver' treatments will fully mitigate against the potential for sleep disturbance at the impacted receivers. • It is noted that development of the OWE in stages will mean that Lot 2B and Precinct 1 will operate for a substantial period prior to the full development of the OWE and it is during this stage that the most noise impact will occur to receivers N4 and N5 to the south.	
2. Environmental Management Considerations – Construction Noise Construction noise exceedances are predicted during out of hours works (evening and night), even during standard weather conditions. The NIA considers the exceedances in relation to the sleep disturbance criteria of 52dBA and concludes the exceedances 'would ...be clearly audible, but not highly intrusive' and 'would not be expected to result in material sleep disturbances'. However, the NIA does not discuss the frequency and duration of the exceedances. The existing SSDA 7348 consent restricts noise generating construction works to standard NSW EPA construction hours. MOD 3 however seeks an extension to those hours (7am-10pm 7 days a week) for a period of approximately two months to facilitate the completion of earthworks for Building 2B to meet tenancy requirements. An Extended Hours Construction Noise and Vibration report No. 19440-EH is included in the EIS. The report recommends a number of construction noise mitigation measures, including the provision of temporary noise curtains to affected receivers to the west (Emmaus Aged Care*) and the south (N4 and N5). The report indicates that noise agreement negotiations are underway with these receivers to establish at-receiver noise mitigation treatments. Ultimately, the impact of the extended construction hours is influenced by the outcome of these	▪ DPIE have approved the extended construction hours. ▪ Noise Agreements are in place with N3, N4, and N5 (the adjoining owners). ▪ A Noise curtain has been installed along the boundary of the aged care facility to the west of the estate (but on the land of the aged care facility). ▪ All schools and the aged care facility have been consulted about the extended hours.

Matters Raised	Applicant Response
negotiations. Given that the noise mitigation measures have not been agreed to at this stage, the impact of extended construction hours is not certain. Any agreement to extended construction hours should be predicated on known and agreed mitigation measures to the satisfaction of the Department / Minister as the consent authority.	
3. Landscape Design Matters The plans have been considered by Council's Landscape Architecture Team as well as Council's Urban Design Review Panel and the following landscape design matters are raised for consideration and address:- • The long bay car parking encroachment into the 20m setback zone adjacent to the southern link road is recommended to be amended to delete a small portion of parking that encroaches into the established setback line. This will improve the landscape design outcome along the link road. Given the nature of the link road, a consistent landscape setback along this arterial road is considered to be of particular importance. • The quantity and planting arrangements of trees within the front road setbacks are recommended to be amended to achieve a clumping of mixed species and mature heights, supported by understorey planting that work in combination with street tree planting as per below. A layering of canopy cover from the road reserve through the development site should be demonstrated by way of the landscape design to address and minimise urban heat island effects and respond to Council's cooling the city strategy initiatives. This would not require an amendment to the areas identified for landscaping, but rather the species and spatial arrangement of the planting as proposed. This could be addressed through conditions of consent requiring endorsement of the landscape plan by the consent authority or Council prior to the issue of any construction certificate.	▪ Majority of these comments have been addressed with the MOD 2 Response to Submissions. ▪ Updated landscaping drawings can be found in the below link. The updated plans take into consideration council's comments **(Appendix F) (pg.801).**

Matters Raised	Applicant Response
• The provision of additional large canopy trees is requested within the corner setback to Estate Road 1 and the Link Road. The planting palette should include a variety of species and deference in mature heights. The planting currently indicated are virtually all small trees and will not achieve the canopy cover and spread required for this prominent corner. This could be addressed through conditions of consent requiring endorsement of the landscape plan by the consent authority or Council • The plantings proposed within the setback to the truck / long bay parking adjacent to Estate Road 1 and Lot 2E must be sufficient to achieve screening of these hard stand areas. Concern is raised that the current planting arrangements will not provide sufficient screening and is it recommended that trees planted at 8-10m centres are requested within the front setback to Estate Road 1 and with understorey planting confirmed. The current plans do not provide specificity of understorey planting beyond a general schedule and palette mix. A planting matrix and density details are requested within all boundary setbacks to clearly identify the boundary edge conditions and the quantity and specific species of planting intended. At present, quantities are only indicated for trees throughout the landscape design. This could be addressed through conditions of consent requiring endorsement of the landscape plan by the consent authority or Council • Council has consistently raised issue with the streetscape language of street tree plantings within this precinct (being small groups with ballast mulch at very large centres planted at 3 trees per 100 linear metres). This does not deliver adequate streetscape outcomes nor best practice canopied cooling to streets. Council typically requires 8-10m tree spacings within road reserves, with supplementary tree planting in landscape setbacks to maximise canopy area. There are large areas of turf which are opportunities for canopy planting. This could be addressed through conditions of consent requiring endorsement of the landscape plan by the consent authority or Council prior to the issue of any construction certificate.	

Matters Raised	Applicant Response
• Council has previously suggested that there is opportunity for greater variety in tree species adding to climate and biodiversity resilience. The landscape design throughout the car park should include a mix of species and effective mature heights. This could be addressed through conditions of consent requiring endorsement of the landscape plan by the consent authority or Council prior to the issue of any construction certificate. • Council through other project and road approvals has established a Southern Link Road streetscape character (road verge and front setback) of informal yet massed planting with native trees providing full canopy cover. A consistent landscape design for the Southern Link Road is required. This could be addressed through conditions of consent requiring endorsement of the streetscape landscape plan by Council's Landscape Architecture Supervisor prior to the issue of any construction certificate. • Ballast as a ground cover is not supported due to its heat attracting properties thus compromising healthy growing conditions for trees. An alternative product must be provided and established for the precinct in consultation with Council's Engineering and Landscape Departments. This should be included as any condition of consent. • Irrigation details should be required as security of ongoing maintenance and viability is critical. • The proposed strata cell structural root vaulting is accepted however suggestions for an alternative "structural soil pit" are not the same. The car park planting should be as per the proposed carpark tree pit system / root vaulting and should be conditioned accordingly.	
Development Engineering Considerations **Mod 3 Stage 1 Amendments**	▪ Noted. However, we advise that council are the certifier for the estate roads and the roads have been designed in line with Council's requirements.

Matters Raised	Applicant Response
The following is requested to be addressed within any amended determination issued:- - A Stage 3 road safety audit of proposed new road layouts should be conditioned. - An amended Subdivision Certificate and Construction Certificate (if already issued) is likely required and should reflect the updated road layout and drainage.	
Stage 2 Development Works It is reiterated that no importation of fill via Bakers Lane should be supported. It is proposed that a bio basin will service Lots 2B to 2E, Part of Road 3 and Precinct 3. Lot 2B is the subject of the current application which is proposed under separate approval. Details are requested as to the timing of infrastructure delivery under MOD3 which is required to service Stage 2 works. This should include demonstration that water quality targets are met, and mechanisms around the conversion of the temporary sediment basin to the final Bio-retention Basin 3. Details of the proposed timing of finalising Bio-Retention Basin No.2 should also be confirmed.	▪ Noted. ▪ Section 6.3.5.1 of the MOD 3 Engineering Report (REP003-02-15-272 Jan 2020) demonstrates the PCC water quality targets are met, including Lot 2B and broader catchments 2 & 3 as updated in the Modification. ▪ Bio-Retention Basin No. 2 & 3 will be built in the final shape after MOD 3 is approved and maintained as a sediment basin until it is finalised, which is after 90% of the both catchments have been developed.
DPIE Planning	
Traffic & Parking	▪ On the back of TrfNSW rejecting Goodman's proposal to use Aldington Road / Abotts Road for construction traffic during school

Matters Raised	Applicant Response
1. The Department notes the issues raised by TrfNSW about construction vehicles on Aldington Road / Abbotts Road. Please respond on how these issues will be resolved. 2. I resolving the issues outlines above, please provide details of meetings / discussions held with the Mamre Anglican School, Trinity Primary School, Emmaus Catholic College and any other key stakeholder regarding the potential use of Bakers Lane for construction traffic. This should include details of any mitigation measures. 3. Please provide a draft traffic management and control plan and any other details of how impacts of construction traffic using Bakers Lane would be managed. 4. The EIS states that the Stage 2 Development would provide 155 truck parking spaces, whereas the Traffic Impact Assessment Report states a total of 135 truck parking spaces would be provided. Please clarify the discrepancy.	peak periods, Goodman propose to utilise Bakers Lane for construction traffic. Please refer to the memo included in **Annexure D (pg.742)** which assesses the use of Bakers Lane. ▪ Please refer to **Annexure E (pg. 796)** for the consultation that has been completed with the adjoining neighbours to the west. Consultation has been undertaken with all the schools at the western boundary. ▪ We confirm the total truck parking equates to 155 truck parking spaces (135 truck parking bays and 20 'double swap spaces' per the site plan). ▪ A Construction Traffic Management Plan is being completed and will be provided shortly.
Noise ▪ Please confirm timing for completing construction of the noise barriers and confirm this sits within Stage 1 works. ▪ Please confirm if proposed concrete pouring works from 3am to 7am would be conducted internal to the constructed building 2B.	▪ The noise wall is included within the Stage 1 works. The retaining wall located on the western boundary must be completed prior to installing the noise wall. The retaining wall is due to commence at the end of April 2020 (subject to receipt of MOD 3 and Construction Certificate approval), with the noise wall to be completed within three months of completion of the retaining wall (subject to wet weather). This would schedule completion of the noise wall for end of September 2020. ▪ All construction works occurring between 3am and 7am would be limited to internal works.
Landscaping ▪ Please confirm timing for completion of the landscape bund, including planting.	▪ The landscape bund works will be completed in line with the conditions of consent which requires the landscape bund to be completed within 6 months of construction / infrastructure commencement.

Matters Raised	Applicant Response
Visual ▪ Confirm if there are any changes to the visual impact assessment (including photomontages), resulting from the reduction on pad levels in Precinct 3 (as part of the revised MOD 1). If the visual impacts change for MOD 3 / Stage 2, please update the VIA and photomontages.	▪ Pad 2E, 2F and 2G has reduced as a result of the revised MOD 1. This may result in a change to the visual impact from the western boundary. Our visual engineer is currently assessing the impact of this change and will provide updated photomontages and impact table, once ready.
Biodiversity ▪ Please clarify the total area of decreased native vegetation removal within the area along the western site boundary	▪ Refer to section 3.1 of the Biodiversity Assessment Report memo submitted as part of the Development Application. The memo confirms that 0.513 ha will be cleared as part of MOD 3. The proposal does not affect the 173 ecosystem credits required to offset native vegetation removal (updated from 172 credits as part of MOD 1).
Heritage	
▪ No further referral to Heritage NSW is required under SSD 7348.	▪ No comment
▪ No further referral to Heritage NSW is required under SSD 10397.	▪ No comment

OTHER SUBMISSIONS	
▪ Amended earthworks MOD 3 - There appears to be a level difference between Estate Road 3 and Lot 2B. Please clarify and provide an updated Landscape Plan showing landscaping treatment along the Road 3 frontage of Lot 2B.	▪ There is a level difference between the RL of the Estate Road 3 and the BEL of pad 2B. However, given the extent of the car parking for 2B there is sufficient land to grade down so that it grades down to the road without the need for a retaining wall. Refer to the Infrastructure Civil Package 1000 for detailed design. The Landscaping design shows the correct treatment. Refer to below final landscape package. ▪ Updated Landscape plans - Annexure F (**pg.801**)
▪ Similarly, please explain the apparent level differences ranging from 1.2 m below Road 3 to 8 m above Road 3 at Lot 2C, D and E (as shown on *Mod 3 General Arrangement Plan, Drawing No 15-272-C0001, Issue A10, dated 14-01-20)* / Lot 3D (as shown on *Mod 1 General Arrangement Master Plan, Drawing No 15-272-C0001, Issue A8, dated 19/02/20*) and provide justifications for the design.	▪ Estate Road 3 has been designed having regard for the revised masterplan, servicing, the reversion to lower pad levels at the western boundary (on the back of PCC's request), and to meet the levels of the future Southern Link Road. Lot 2A in the SSDA Consent had external / infrastructure retaining walls of maximum height of 4m, and walls on the entire frontage of Road 3 and Road 1. Lot 2A (in MOD 3) now has no designed external / infrastructure walls and only potential for future on lot walls for around 25% of the site boundary. This is an improvement. ▪ Lot 3D in SSDA Consent (Lot 2C-E in MOD 3) have stabilised batters of a similar height above and below Road 3. In MOD 3, the frontage is now shorter and the height below

OTHER SUBMISSIONS	
	the Road 3 at the SLR end is reduced from 5m high in SSDA to just 1.2m high. There is now also more space to accommodate visual relief in the revised indicative building layout on the SBA drawings. ▪ Please refer to the Infrastructure Civil Package 1000 series for detailed infrastructure design.
Landscaping Amendments – Mod 1, Mod 2 and Mod 3 • The Department notes Council's position on suitable and consistent landscape setbacks along the Southern Link Road. Please respond to this matter, including considering options to relocate some of the carparking.	▪ We refer back to our comments on the RTS for MOD 2 (**pg.425-428**). ▪ The initial SSD approval (for boundaries facing the WNSLR and SLR) provided that only a 10m landscape setback is required. This is an existing development control within the consent. ▪ Council have requested a 20m fully landscape setback. ▪ Goodman has in good faith doubled the landscaping setbacks on the internal boundaries for Precinct 1 from that otherwise required by the setback controls, in order to enhance the building presentation from the internal roads.

OTHER SUBMISSIONS	
	▪ In addition to the above, Goodman has reluctantly updated the design of 1B & 1C to respond to Council's request for a 20m landscape setback along the WNSLR. This has been done as a gesture of goodwill. ▪ Future OWE development along the SLR will provide a 10m landscape setback in accordance with the approved setback controls for SSD7348, and will not provide 20m landscape setbacks.
Landscape Plans • As the Landscape Plans for MOD2 and MOD 3 have not yet been finalised, Council has requested the following amendments due to the likely viability of certain species given the climate and heat conditions (including reflective heat) of Penrith - Removal of Elaeocarpus eumundi from the planting schedule - Limiting of the use of Tristaniopsis laurina (Water Gum) so that it is not planted within the car parking areas	▪ The landscaping drawings for MOD 3 have been amended and can be found in **Annexure F (pg.801)**.
Transgrid ▪ Transgrid raised a number of questions in their 19 March 2020 email. Please respond and close out with Transgrid.	▪ Please see **Annexure G** (**pg.810**) from Transgrid confirming acceptance of the revised levels for MOD 3, which endorses the changes to MOD 1, and MOD 2.
PCC ▪ PCC have provided further comments on the RTS submitted to date. Please respond.	▪ Refer to **Annexure H** (**pg.817**) which provides responses to PCC's comments.

OTHER SUBMISSIONS

Transport for NSW ▪ The Department notes the issues raised by TrfNSW about construction vehicles using Aldington Road / Abbotts Road. Please respond on how these issues will be resolved.	▪ A meeting was held between DPIE, TrfNSW, and GMG to discuss the proposal for construction traffic to use Aldington Road / Abbotts Road. ▪ We understand that in principle agreement has been reached for GMG to use Bakers Lane for construction traffic with the exception of during school peak periods at which time vehicles up to 8.8m in length can use Aldington Road / Abbotts Road (left-in/left-out) only.
▪ Intersection performance – GMG to provide the SIDRA modelling to TrfNSW to confirm the WNSLR intersection does not require an upgrade based on the traffic modelling considered as part of this application (overall estate volumes).	▪ GMG provided the SIDRA modelling to TrfNSW. ▪ TrfNSW have since confirmed that an upgrade for this application is not required (considering the estate volumes projected)
Visual Impact Assessment (VIA) ▪ VIA memo considering the reduced levels at the western boundary.	▪ Refer to **Annexure I (pg.883)** VIA memo that concludes the reduction in pad level height has minimal impact on the view at that point.
Confirmation of GLA's & GFA's ▪ Please confirm GLA and GFA.	▪ Please see below for MOD 2 & MOD 3.

GLA	MOD 2	MOD 3
Warehouse	423,104 sqm	529,101 sqm

OTHER SUBMISSIONS

Office	21,242 sqm	23,374 sqm
Other	4,004 sqm	4,349 sqm
Total	**448,350 sqm**	**556,824 sqm**

Annexures

Annexure	Document
A	Fire Safety Study
B	Traffic Impact Assessment
C	Wilkinson Murray Noise Memo
D	Traffic Impact Memo
E	Consultation with Schools
F	Scape Landscape Plans
G	Transgrid Consultation
H	Penrith Council RTS – MOD1,2,3
I	Visual Impact Assessment Memo, Cloustons

Annexure A

Fire Safety Strategy

Building 2B, Oakdale West Estate

SSD 7438 Mod 3 & SSD 10397 Stage 2 DA
Kemps Creek NSW 2178

Prepared For:
Goodman Property Services (Aust) Pty Ltd

Report No. 19378-R01
Issue No. 5
Issue Date: 14 January 2020

QUALITY SYSTEM

Report Register

The following report register documents the development and issue of this Report as undertaken by this office.

Reference	Issue No.	Remarks	Date	Prepared By	Checked By
19378-R01	1	Initial Issue	18-11-2019	TDD	JDP
19378-R01	2	Revised Issue	28-11-2019	TDD	JDP
19378-R01	3	Revised Issue	12-12-2019	TDD	JDP
19378-R01	4	Revised Issue – Updated Site Plan	08-01-2020	TDD	JDP
19378-R01	5	Revised Issue – Updated Site Plan	14-01-2020	TDD	JDP

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TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY 4

2.0 INTRODUCTION 5

2.1 PURPOSE OF REPORT 5
2.2 OBJECTIVE AND SCOPE OF REPORT 5
2.3 BASIS OF REPORT 6
2.4 EXCLUSIONS 6
2.5 ASSUMPTIONS 6
2.6 REGULATORY FRAMEWORK 6
2.7 MEETING THE PERFORMANCE REQUIREMENTS 7

3.0 DEVELOPMENT DESCRIPTION 8

3.1 DESCRIPTION OF DEVELOPMENT 8
3.2 BCA ASSESSMENT DATA 18

4.0 DOMINANT OCCUPANT CHARACTERISTICS 19

4.1 POPULATION AND DISTRIBUTION 19
4.2 STATE, PHYSICAL AND MENTAL ATTRIBUTES 19
4.3 FAMILIARITY WITH THE BUILDING 19
4.4 LEVEL OF ASSISTANCE AND EMERGENCY TRAINING 20
4.5 DISABLED OCCUPANTS 20

5.0 HAZARD IDENTIFICATION 21

5.1 GENERAL 21
5.2 GENERAL BUILDING LAYOUT AND CONSTRUCTION 21
5.3 BUILDING ACTIVITIES 22
5.4 POTENTIAL IGNITION SOURCES AND AREAS OF FIRE ORIGIN 22
5.5 COMBUSTIBLE CONTENTS 23

6.0 DESIGN OBJECTIVES 24

6.1 REGULATORY OBJECTIVES 24
6.2 RELEVANT PERFORMANCE REQUIREMENTS 24
6.3 FIRE BRIGADE OBJECTIVES 27

7.0 BCA DTS NON-CONFORMANCE ASSESSMENT 28

8.0 DESIGN FIRE SAFETY STRATEGY 34

8.1 FIRE RESISTANCE 34
8.2 ACCESS AND EGRESS 38
8.3 SERVICES AND EQUIPMENT 39
8.4 MANAGEMENT AND USE 43

9.0 REFERENCES 45

1.0 EXECUTIVE SUMMARY

This Fire Safety Strategy has been prepared by Innova Services Pty Ltd for Goodman Property Services (Aust) Pty Ltd and relates to construction of the industrial warehouse building on Site 2B in the Oakdale West Industrial Estate. Building 2B comprises of a four (4) storey automated warehouse and distribution centre at Kemps Creek NSW 2178.

Innova Services Pty Ltd has been commissioned to prepare a preliminary fire safety strategy to provide confidence to project stakeholders that the documentation being readied for issuance of the planning permit is capable of achieving compliance with the Building Code of Australia 2019 (BCA).

The subject design has been observed to exhibit a number of non-conformances with the prescriptive provisions of the BCA. These non-conformances have been to date and will continue to be identified by the Authority Having Jurisdiction.

Subsequently, it will be necessary for the method of compliance with the building regulations to incorporate a Performance Based approach as supported by the BCA. Innova Services Pty Ltd have reviewed the architectural design drawings and proposes the following fire safety strategy for consideration.

We can confirm that based on the strategy documented herein, that an assessment can be undertaken by a C10 Accredited Fire Engineer in consultation with project stakeholders (including the Principal Certifying Authority), to demonstrate that the building will comply with the Performance Requirements of the BCA. This may be via a combination of the following:

- Becoming Deemed-to-Satisfy by way of design development.
- Comparison to the BCA Deemed-to-Satisfy Provisions to demonstrate equivalence.
- Compliance with the BCA Performance Requirements.

It is considered that the preparation of the Performance Solutions and corresponding fire safety measures that are likely to be documented therein will not result in significant changes to the building design presented in the schematic drawings reviewed for the feasibility stage and planning permit.

2.0 INTRODUCTION

2.1 PURPOSE OF REPORT

The purpose of this report is to present a Fire Safety Strategy of Performance Solutions to the Deemed to Satisfy (DTS) provisions of the Building Code of Australia 2019 (BCA). The report relates to the four (4) storey automated warehouse and distribution centre in the Oakdale West Industrial Estate at Kemps Creek NSW 2178.

2.2 OBJECTIVE AND SCOPE OF REPORT

This Fire Safety Strategy is intended for use in the design of the proposed building.

The Fire Safety Strategy outlines the construction and management requirements considered necessary to achieve an acceptable level of life safety with the building and satisfy the Performance Requirements of the BCA.

As a preliminary document the requirements are meant to assist with detailed design preparation. The complete fire engineering analysis will form the Fire Engineering Report and is to be developed as the design progresses. As such, no fire engineering analysis is documented herein.

The aim of the design is, subject to consultation with stakeholders, to provide an adequate level of fire safety for the building occupants, firefighters and maintenance and other emergency services personnel. The BCA's fire safety objectives are:

- Safety of occupants (reduce risk to an acceptable level).
- Facilitation of effective emergency services intervention.
- Protection of adjoining property and third parties.

At a community level, fire safety objectives are met if the relevant legislation and regulations are complied with. As stated in the BCA, "*A Building Solution will comply with the BCA if it satisfies the Performance Requirements*".

At a local level this Fire Safety Strategy should be consulted to inform decisions about fire safety design and application, and to help secure best value and sustainability in relation to the design and use of the premises.

This report is designed to be consistent with the objectives and limitations of the BCA. Effects of arson (e.g. from multiple fire starts), terrorism, explosive devices, use of accelerants, and sabotage of fire safety systems and equipment are considered outside the scope of this report.

The effective application of fire safety design and management principles should not be considered in isolation and this document should therefore be viewed alongside other relevant statutory requirements, management policies, guides and standards relating to the management of health and safety, procurement, environmental protection and quality.

2.3 BASIS OF REPORT

The content of this report is based on the following Legislation:

- The Building Code of Australia 2019(BCA).
- *NSW Environmental Planning & Assessment Act 1979.*
- *NSW Environmental Planning & Assessment Regulation 2000.*

The content of this report is based on the following texts, references and documentation:

- International Fire Engineering Guidelines, 2005 Edition (ABCB, 2005).
- Guide to the Building Code of Australia (NCC Vol. 1) (ABCB, 2019).
- Architectural plans of the subject development prepared by SBA Architects Pty Ltd.
- BCA Assessment for the subject development prepared by Blackett Maguire & Goldsmith Pty Ltd.

2.4 EXCLUSIONS

This report does NOT cover the following:

- A detailed BCA assessment of the subject development.
- Access for people with disabilities (Part D3 of the BCA).
- System or engineering design of any part of the subject development.
- 'Absolute' or '100%' safety is not attainable, and there will always be a finite risk of injury, death or property loss. Also, fire and its effects on people and property are complex and variable. Thus, all stakeholders should understand that a fire safety system is not designed to cope with all possible scenarios.
- Arson (other than as a source of initial ignition), multiple ignition sources, acts of terrorism.
- Dangerous Goods and Hazardous Materials Assessment.
- Explosion risk.
- Protection of property (other than adjoining property).
- Business interruption or losses, or personal or moral obligations of the owner/occupier.
- Workplace Health and Safety, and Work Cover Authority Regulations.

2.5 ASSUMPTIONS

It is assumed that apart from the identified variations presented in of the Executive Summary, all other fire safety aspects associated with the subject development will comply with the relevant DTS provisions of the BCA.

2.6 REGULATORY FRAMEWORK

Fire safety legislation, the National Construction Code Building Code of Australia and relevant Australian Standard documentation are in place to support designers in arriving at a suitable and sufficient final design solution. The reference to any relevant guides is not intended to be exhaustive but to provide an indication of the range of requirements that need to be taken into account when approaching fire safety design and management.

The design will comply with all relevant legislation relating to the design and construction and ensure that an appropriate and broadly acceptable standard of fire safety management is adopted, the guidance described in this document takes into consideration the requirements and recommendations contained in the following documents:

2.7 MEETING THE PERFORMANCE REQUIREMENTS

Compliance with the BCA is achieved by satisfying the Performance Requirements. Clause A2.1 of the BCA states that the Performance Requirements can be satisfied by:

1. *Performance Solution; or*
2. *Deemed-to-Satisfy Solution; or*
3. *a combination of (1) and (2).*

Clause A2.2(1) of the BCA states that a Performance Solution is achieved by demonstrating:

(a) compliance with all relevant Performance Requirements; or

(b) the solution is at least equivalent to the Deemed-to-Satisfy Provisions,

Clause A2.2(2) of the BCA states that a Performance Solution must be shown to comply with the relevant Performance Requirements through one or a combination of the following Assessment Methods:

Evidence of suitability in accordance with Part A5 that shows the use of a material, product, plumbing and drainage product, form of construction or design meets the relevant Performance Requirements.

(a) A verification Method including the following –

(i) The Verification Methods in the NCC; or

(ii) Other Verification Methods accepted by the appropriate authority that show compliance with the relevant Performance Requirements

(b) Expert Judgment.

(c) Comparison with the Deemed-to-Satisfy Provisions.

3.0 DEVELOPMENT DESCRIPTION

3.1 DESCRIPTION OF DEVELOPMENT

General

Building 2B is located within the Oakdale West Industrial Estate located in Kemps Creek, approximately 39 km west of the Sydney central business district (refer to Figure 1). The development relates to the construction of Building 2B, an automated warehouse and distribution centre located at Kemps Creek NSW 2178.

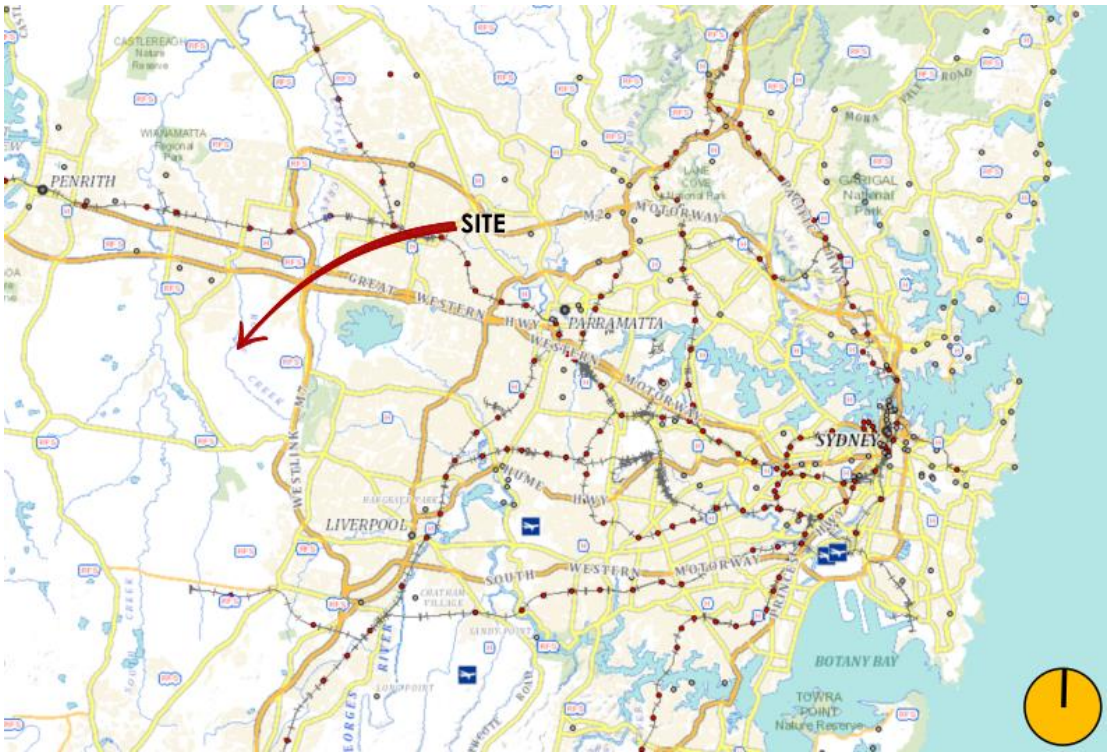


Figure 1: Regional Location

The site is an irregular rectangular shape with a primary street frontage to new future link roads to the east, south eastern corner and western boundary of the allotment (refer to Figure 2).

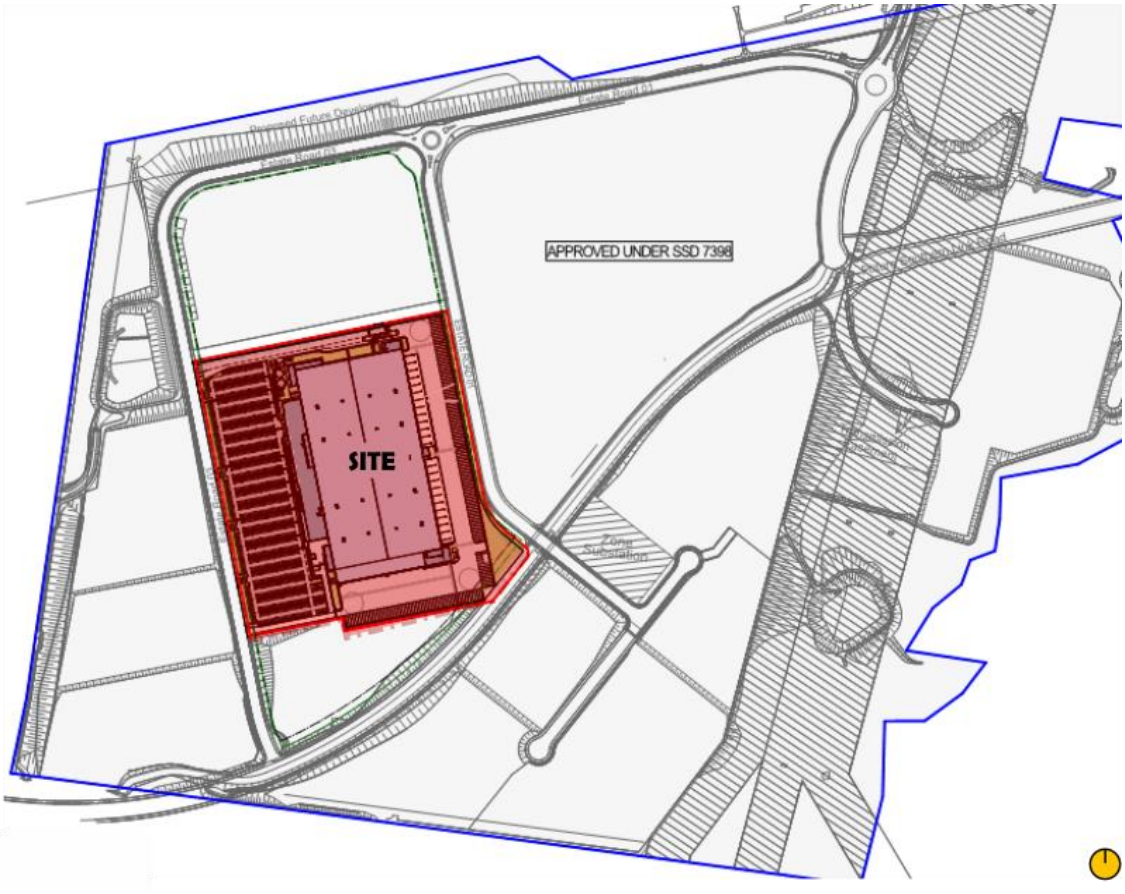


Figure 2: Estate Location Plan

The building works involve construction of a four (4) storey composite concrete and steel portal frame industrial warehousing and distribution facility. The office associated with the warehouse ins located on the western side of the floorplate (adjacent to the public roads), breakout and rest areas for staff are positioned within the main office on the western side of the building and in the southern and northern corners of the building.

Loading and unloading facilities undertaken on the southern and eastern side of the building under super awnings.

The building is serviced by a hardstand area for loading and manoeuvring on the eastern and southern sides of the building, a separate 1,127 space carpark on the western side of the site and perimeter landscaping.

Vehicle access is provided from the western allotment boundary, with heavy vehicle access to the north and south and four (4) entry points to the staff carpark.

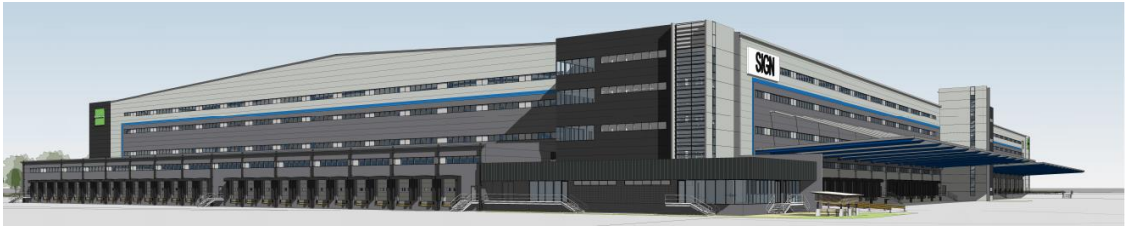


Figure 3: Architectural Perspective (south-east view)

Building Use

The building is a single fire compartment with an associated single storey office.

The building is designed to store goods in automated low level racks having a height of not more than 3m. The building has floor areas in the order of:

- Ground Floor Office -5,492 m^2
- Warehouse – 50,873 m^2 (Ground Level)
- Mezzanine – 6,300 m^2 (Ground Level)
- Warehouse – 48,101 m^2 (Level 1 to Level 3)

Total floor area is therefore in the order of 206,968 m^2.

An architectural perspective, section and site plan are provided in Figure 5 and Figure 6.

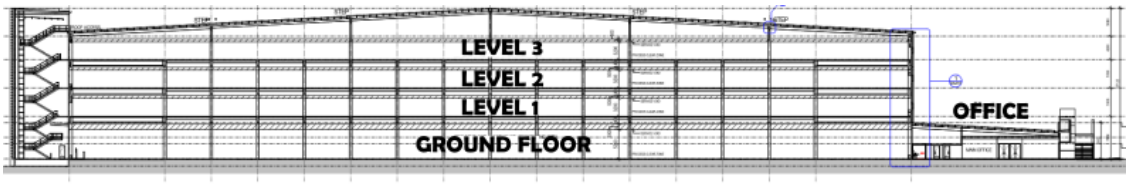


Figure 4: East West Section

Due to the need to respond to the warehousing operational needs of the tenant, the building height provides a maximum clearance height of:

- Offices – generally 2,700 mm
- Ground Floor Warehouse – <7,600mm with a process clear zone of 5,260 mm
- Ground Floor Mezzanine - ~3,800 mm
- Level 1 and Level 2 – 4,530 mm with a process clear zone of 2,780 mm
- Level 3 – 4,000 mm to the underside of the haunch, with a process clear zone of 2,780 mm

The warehouse will act as a storage and distribution centre for a range of non-putrescible merchandise. The warehouse includes an automated picking field that is a restricted area. Within the field robots deliver large stacks of products to workers located around the perimeter of the processing zone (Figure 8), by following set paths around the warehouse.

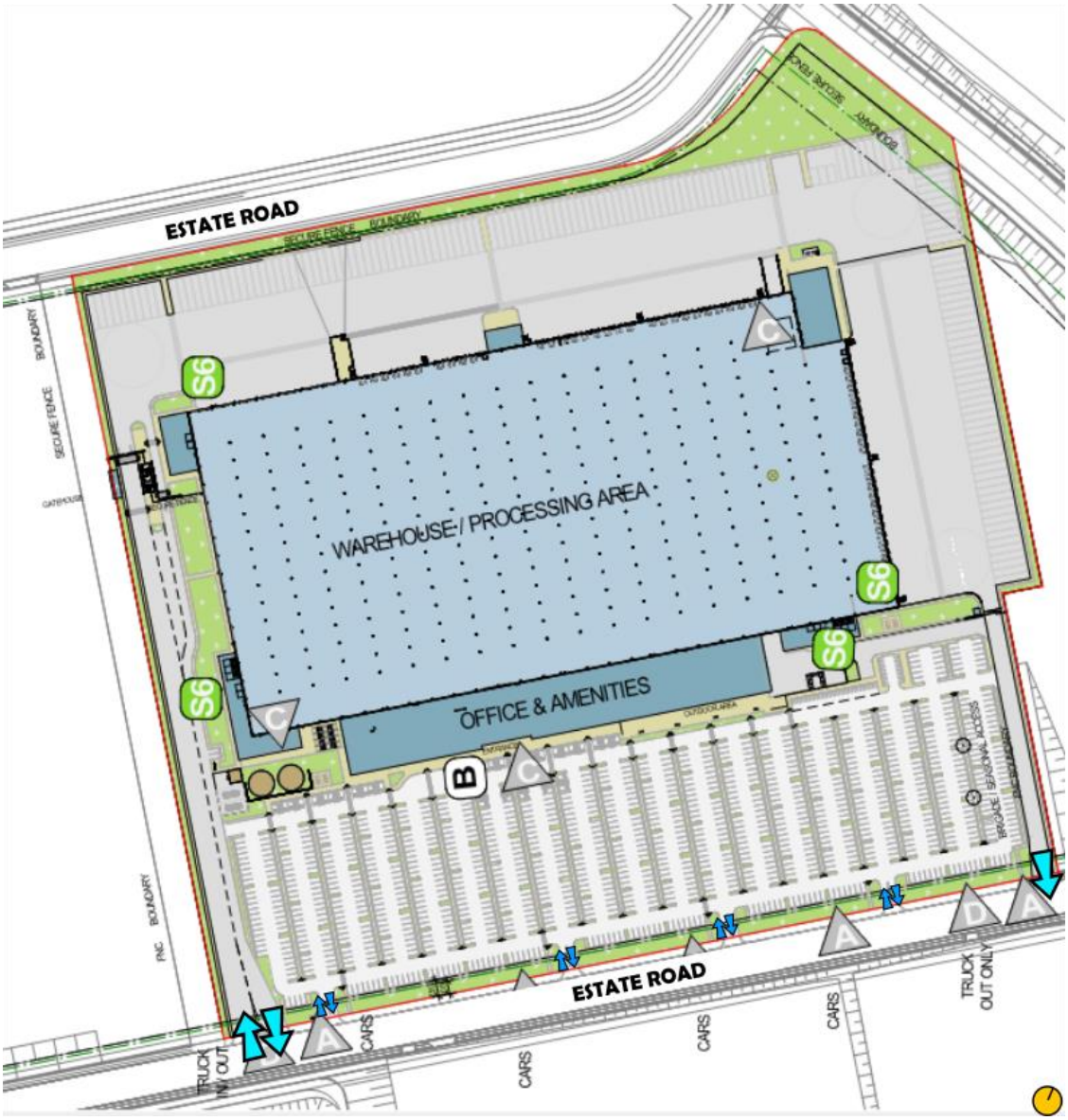


Figure 5: Estate Site Plan

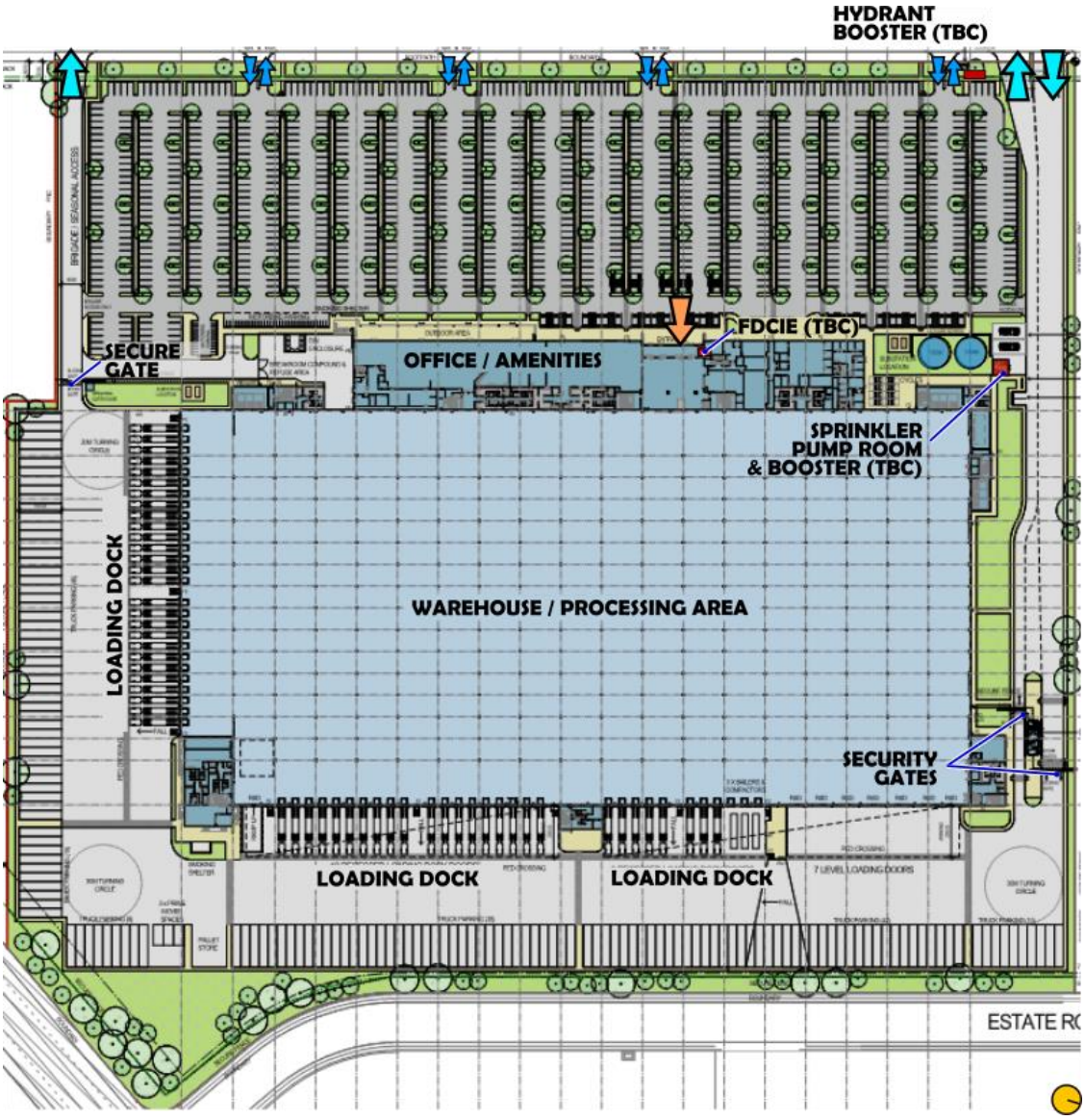


Figure 6: Warehouse Site Plan

Whilst there are multiple egress points around the perimeter of the building, due to the expansive nature of the floor plate it is necessary for a Performance Solution to address travel distances throughout the building.

At Ground Level, egress is direct to open space at grade. Egress from the Ground Floor Mezzanine is via stairways and walkways complying with AS 1657 and therefore is subject to a performance solution in relation to both the total travel distance that needs to be traversed and the nature of the egress system.

On Level 1 to Level 3 egress is via fire isolated stairs (refer to Figure 8). The discharge of the fire isolated stairs into office lobby and around the perimeter of the building are likely to be subject to a Performance Solution.

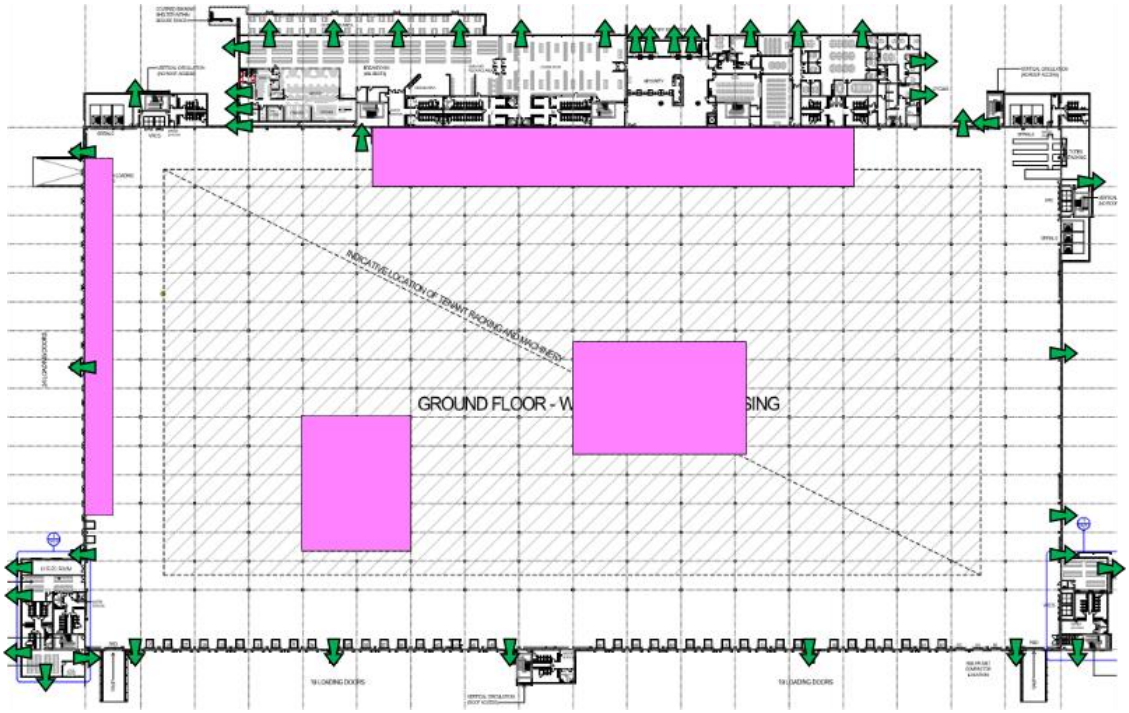


Figure 7: Ground Floor egress points and mezzanine (highlighted pink)

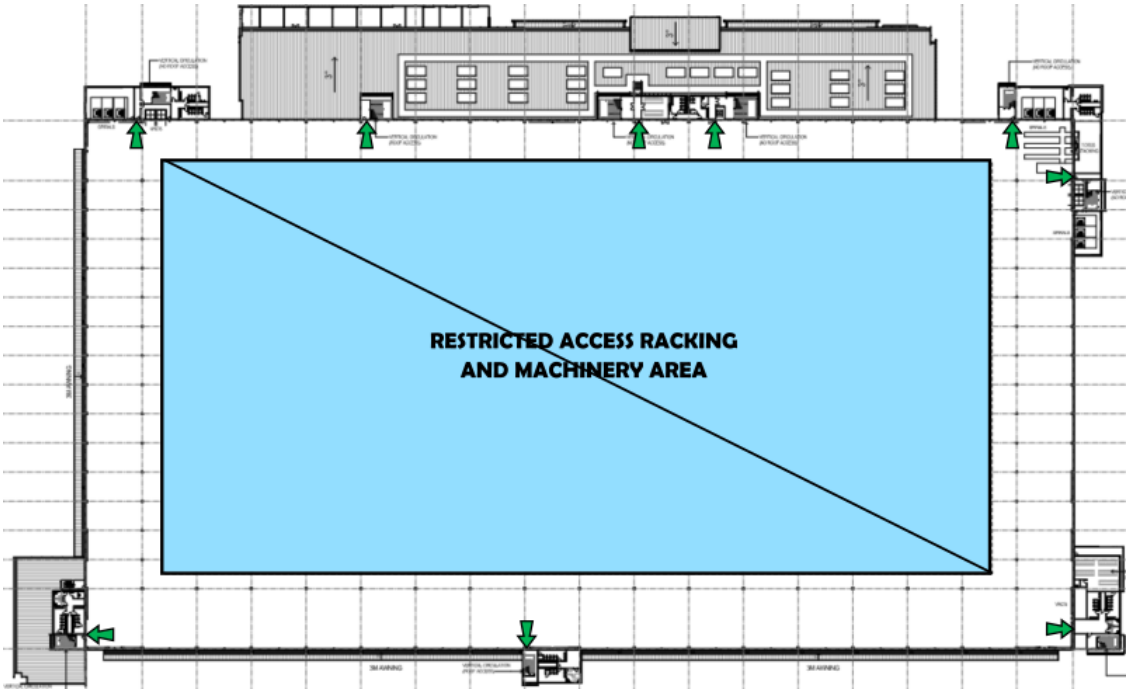


Figure 8: Level 1, Level 2 and Level 3 typical egress arrangement

Fire Brigade Intervention

The building is provided with access for emergency appliances and vehicles around its perimeter.

That access will be subject to a Performance Solution as a result of the proximity of the vehicular pathway being greater than 18 metres from the external wall of the building, the “pinch points” at the entry gates and security access control points as well as the discontinuity of the pathway as a result of the staff carpark (refer to Figure 9).

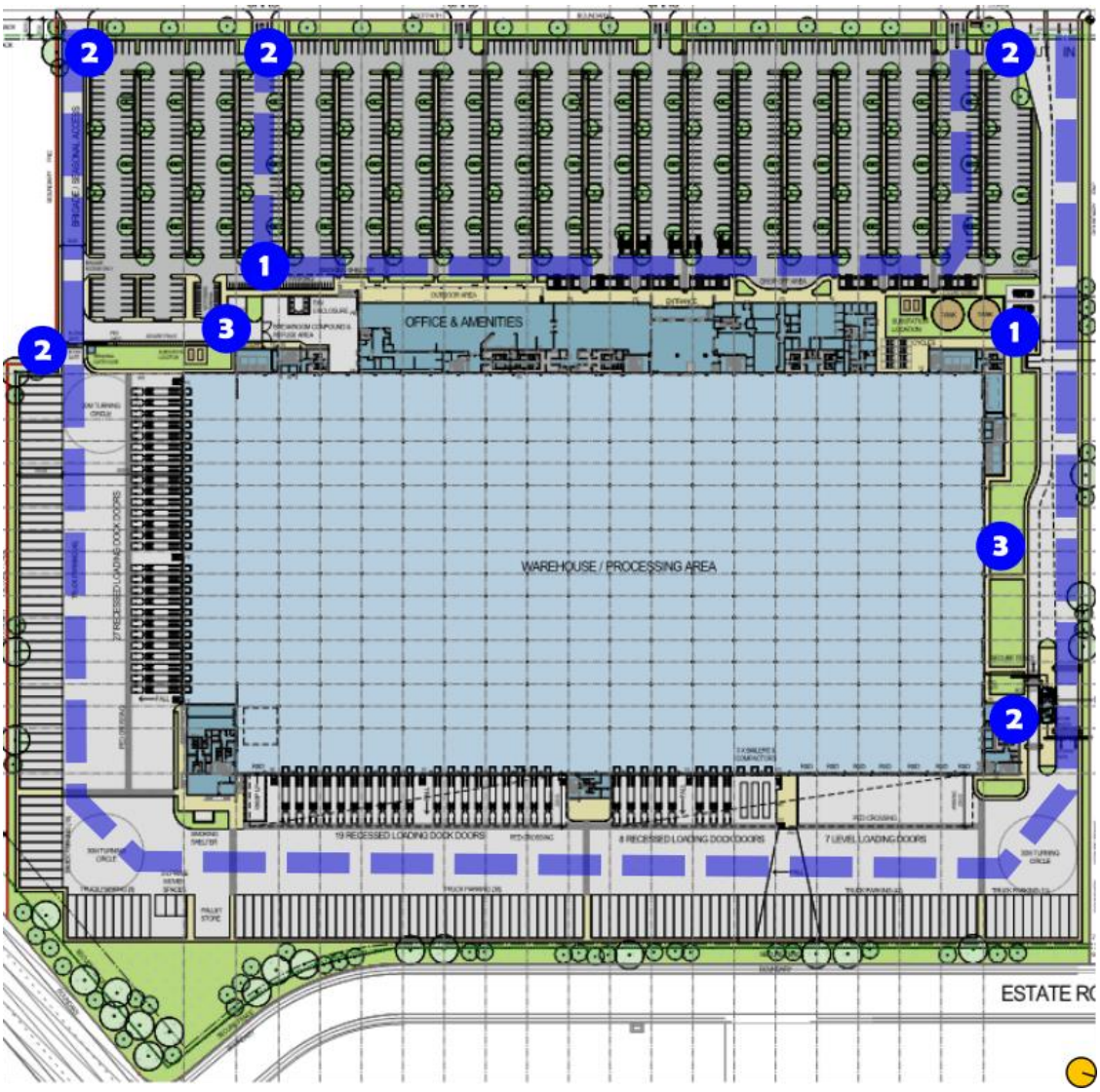


Figure 9: Perimeter Access and points of non-conformity (Point ‘1’ discontinuous travel path, Point ‘2’ restricted width at gates and security control points, Point ‘3’ pathway >18 m from the building)

The fire hydrant booster assembly is located at the western street frontage, and the sprinkler booster and suction point is adjacent to the sprinkler tanks and pump room (refer to Figure 10). Connection to the sprinkler booster hard suction is facilitated by appliance parking space adjacent to the sprinkler pump room on the road. The location of the sprinkler booster is subject to a Performance Solution.

A main fire indicator panel and a fire fan control panel will be located in a fire control centre in the office (refer to Figure 10). This is within sight of the booster assembly which is situated on the western street frontage. The controls together with operating instructions for use by emergency personnel are to be provided adjacent to the FDCIE in accordance with the requirements of clauses 4.11 and 4.13 of AS/NZS 1668.1.

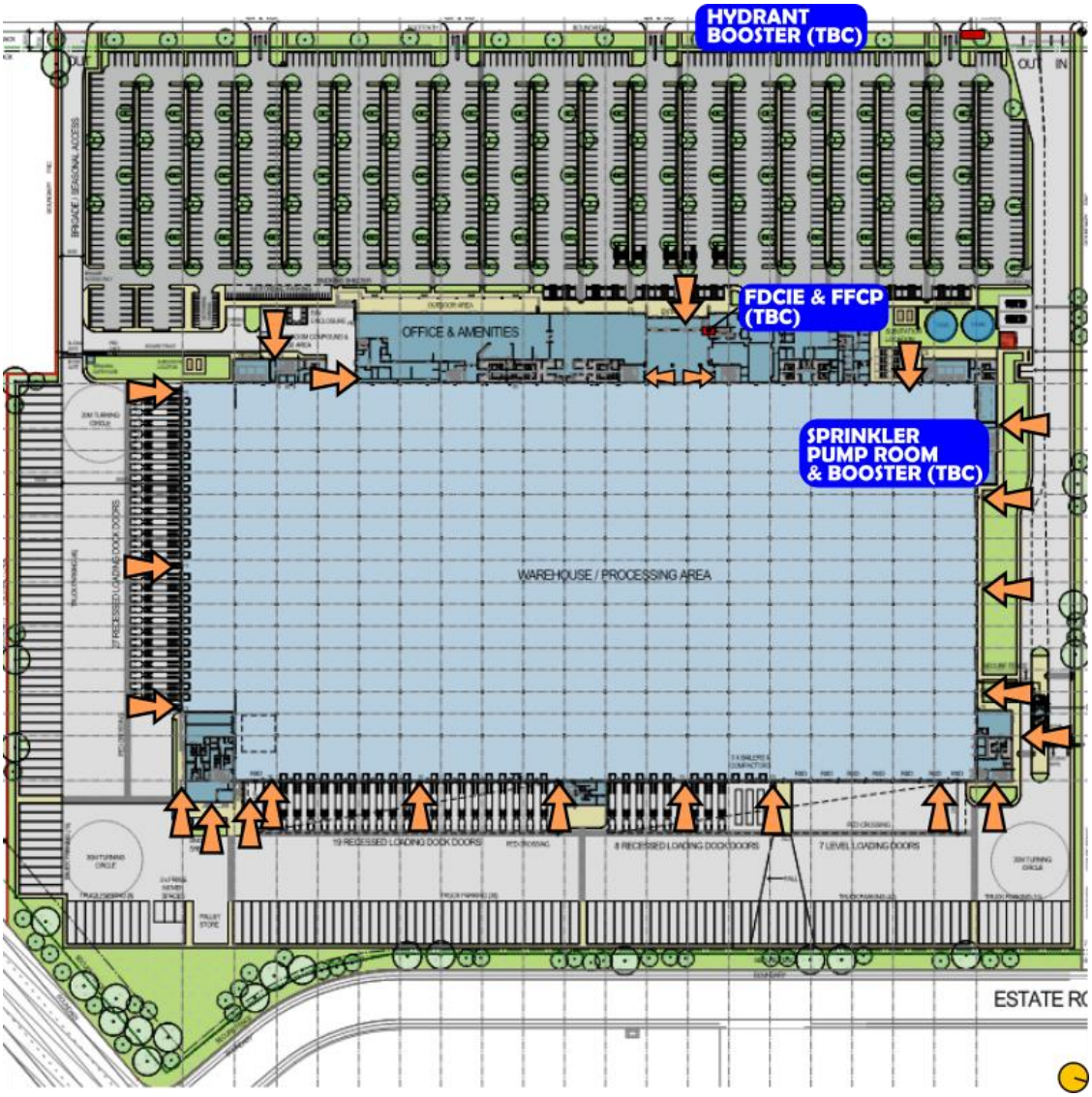


Figure 10: Location of Fire Brigade Infrastructure and Fire Fighter Entry Points

It is expected that the fire brigade will react to a call in a timely manner with notification occurring via direct monitored alarm. Based on the response time data from the fire brigade and the Fire Brigade Intervention Model, it is suggested that the following activities generally outline the likely timing of the Fire Brigade's response.

1. *Time for notification and travel to site*

   The closest fire stations (© 2019 Google) are as considered to be:

   - Mount Druitt Fire Station (81 Railway Street, Mount Druitt NSW 2770) ~14 km by road from the site
   - Huntingwood Fire Station (42 Huntingwood Drive, Huntingwood NSW 2148) ~11 km by road from the site

   Whilst the response time obviously depends on the distance to the building from the fire station and the density of traffic. It can be seen from the FRNSW Annual Report (Fire & Rescue New South Wales, 2016) that the 50th percentile response time is around 7 minutes and the 90th percentile is less than 12 minutes. As the building is expected to contain both smoke detectors and sprinklers the 90th percentile response time is adopted.

2. *Locate an appliance adjacent to booster connections*

   The boosting of the fire-fighting water supply is important to ensure that there is adequate flow and pressure and is normally undertaken by one of the responding appliances. This activity is related to Point 5 and 6 and can be considered to occur independently of the other activities.

3. *Dismount vehicle and put on breathing apparatus and prepare for activities*

   This is estimated as being typically between 2—3 minutes.

4. *Enter building to FIP*

   This time can be short (eg. 60 secs) as the location of the FDCIE in relation to the vehicular entrance to the site is considered to be readily apparent. There will also be interaction between security staff and the fire brigade and it is likely that the staff will initially have a better understanding of the location of the fire.

5. *Remove, connect and charge 65 mm hose from hydrant to appliance*

   See comment under Point 6 below.

6. *Remove, connect and charge 65mm hose from appliance to boosters*

   Estimated elapsed time for Tasks 2 and 5 is between 3—4 minutes.

7. *Gather information from FIP and tactical fire plans*

   This is when the Officer-in-Charge (OIC) considers the available information and directs crews as to operational procedures.

   As the building incorporates automated processing so the transfer of information is expected to be ongoing.

   Note: The emergency procedures for the building include the automatic call out of staff in the pre-alarm fire condition should detection by the Smoke Detection System occur after hours.

   For the purposes of the intervention assessment it is estimated as taking up to 2 minutes before initial operating decisions are made and is improved by the presence of staff.

8. *Travel to set-up area with equipment (hose lines etc)*

   This is a function of the distance to the fire area and whether it is on ground level or the levels above. Assuming a fire in the centre of the warehouse the estimated travel time is ~307 seconds (200 metres at 0.65 m/s)

9. *Connect and charge hose lines*

   Connection, layout and charging of hose lines is estimated to take about two minutes.

10. Gather additional information and provide feedback

This action (by the OIC) is aimed at providing additional information in relation to the best strategy for fighting the fire and takes place concurrently with the first application of water.

Table 1: Time to supply water to the fire

Activity	Activity time (secs)	Elapsed time (secs)
1. Time for notification and travel to site	720	720
2. Locate an appliance adjacent to booster connections	Included in activity 6.	-
3. Dismount vehicle and put on breathing apparatus and prepare	120	840
4. Enter building to FIP.	60	900
5. Remove, connect and charge 65 mm hose from hydrant to appliance (included in 6. Below)	Included in activity 6.	-
6. Remove, connect and charge 65mm hose from appliance to boosters	240	1,140
7. Gather information from FIP and tactical fire plans	120	1,260
8. Travel to set-up area with equipment (hose lines etc)	307	1,567
9. Connect and charge hose lines	120	1,687
10. Gather further information and feedback	Ongoing	-
Total	-	28 minutes 7 seconds

In summary, from the time of alarm approximately 28 minutes will elapse before fire fighters are in a position where they may direct water onto the fire. If staff offer support in terms of direction, it is possible that the above times could be reduced.

3.2 BCA ASSESSMENT DATA

The relevant BCA classifying information for the subject development is summarised in Table 2.

Table 2: Relevant BCA Assessment Data

BCA Reference	BCA Assessment
Classification	Class 5 (office) and Class 7b (warehouse)
Rise in Storeys	Five (5)* *The rise in storeys is five (5) as a result of the application of Clause C1.2(c) of the BCA.
No. of Levels Contained	Four (4)
Minimum Type of Construction Required	Type A
Effective Height	16.72 m
Maximum Fire Compartment Size	The building is a single fire compartment of ~18,000m^2 and volume > 108,000 m^3. As such, for the purposes of classification under the BCA the building is treated as 'large isolated'. Nominal sizing is as follows: ▪ Office -5,280 m^2 ▪ Warehouse – 46,030 m^2 (Ground Level) ▪ Mezzanine – 6,000 m^2 (Ground Level) ▪ Warehouse – 45,940 m^2 (Level 1 to Level 3) Total floor area is therefore in the order of 195,130 m^2.

4.0 DOMINANT OCCUPANT CHARACTERISTICS

4.1 POPULATION AND DISTRIBUTION

The occupants within subject development will predominantly comprise of staff and visitors. It is not likely for visitors to be unescorted when within the warehouse.

Visitors will be made up of a combination of customers and technicians and/or maintenance personnel.

The population level can be calculated by using the population densities in Table D1.13 of the Building Code of Australia (NCC Vol. 1), or via any other suitable means of assessing its capacity (Clause D1.13(c)).

Population numbers are estimated at 750 full time equivalent positions during a single shift.

This figure is proposed to be utilized for the purpose of the assessment.

4.2 STATE, PHYSICAL AND MENTAL ATTRIBUTES

The staff profile will be that of working age adults with no expected skew in relation to gender, age or physical attributes. Staff are likely to be awake and generally unaffected by drugs and/or alcohol during occupied hours. Staff members are also expected to require minimal response time in the event of an emergency.

Similarly, visitors to the warehouse and/or office and areas are expected to be awake and have a range of physical attributes as would be displayed by the general public.

External contractors are expected to be mobile with normal hearing and visual abilities and occupants in this group are considered to take and implement decisions independently and require minimal assistance during evacuation in a fire emergency. The contractors are always expected to be awake and generally aware of their surroundings when inside the building.

Fire fighters are expected to be equipped with safety equipment and will be educated in firefighting activities and the dangers associated with fire incidents. This occupant group would be expected to be able to assist other occupants requiring assistance to evacuate. It is not expected that fire fighters would be present in the building at the time of fire ignition; however, they are expected to enter the building at a later stage to assist with the evacuation of occupants, if required, and to undertake fire suppression activities.

4.3 FAMILIARITY WITH THE BUILDING

Staff are expected to be familiar with the building layout and the location of exits. Whilst other occupants are expected to be generally familiar with the building layout and the location of exits that they utilized on entry to the building.

Visitors to the development are not considered to be familiar with the overall site and building layout, however, site visitors are generally expected to be accompanied by staff, and wayfinding within the building is straightforward.

Despite this, due to there being clear sightlines between exits, the relatively straight line of sight between exits with minimal directional changes, wayfinding is not considered to be complex.

The provision of exit signage is expected to assist occupants identify the location of the exits, and the path of travel to the exits.

4.4 LEVEL OF ASSISTANCE AND EMERGENCY TRAINING

Fire wardens are expected to be present, as required by the Workplace Health and Safety legislation enforced by the State, i.e. emergency management planning in accordance with AS 3745.

Wardens are expected to have received at least some level of fire safety training which may include the use of first aid firefighting equipment.

Most of the occupants are not assumed to have received fire safety training or training to use first aid fire-fighting equipment such as fire hose reels and portable fire extinguishers.

4.5 DISABLED OCCUPANTS

Occupants with disabilities who are unable to evacuate of their own volition are expected to be assisted by able-bodied carers or staff.

Managing the evacuation of people with disabilities relies on the individual building management systems, procedures and training, which are outside the scope of the BCA, but can substantially contribute to the overall evacuation efficiency of the building.

Therefore, disabled access and egress should be addressed in an emergency evacuation plan and management procedures developed for people with disabilities.

5.0 HAZARD IDENTIFICATION

5.1 GENERAL

In identifying potential fire hazards within the development, and those that are typical and/or unique to the development the following factors are considered:

- General building layout and construction.
- Building activities.
- Potential ignition sources.
- Combustible contents.

5.2 GENERAL BUILDING LAYOUT AND CONSTRUCTION

Refer to Section 3 of this Report for a description of the subject development and an overview of the layout.

In summary, the building is segregated into two main areas; warehousing and ancillary uses, and offices; the design of the building is such that there are good sightlines between exits and clear wayfinding paths.

Non-conformant travel egress provisions are proposed in a fire engineering assessment.

Specifically, extended travel distances to an exit and between exits are evident due to the scale of the warehouse.

In general warehouses pose substantial challenges for fire protection due to their large floor plate, storage configurations and picking and packing technologies, ceiling heights, and types of commodities stored.

The sprinkler system is an essential element of the warehouse fire protection system.

In the NFPA report on the U.S. experience with sprinklers ((Hall, 2010)) it was calculated that sprinklers operated at least 86% of the time when properties were protected by wet pipe sprinklers and fires were large enough to activate the equipment. Wet pipe sprinklers were effective in 84% of the fires in which they were present and contributed to a 61% reduction in dollar loss in those fires. The design of the warehouse in this instance is one which minimises the risk of occupants having to pass by high ignition hazards (e.g. kitchenettes and switch rooms) in reaching a point of choice between exits.

Services equipment and installations are to be correctly designed, specified, constructed in accordance with the Australian Standards and BCA and checked when commissioned. In the long term planned maintenance in accordance with the statutory legislation will be provided so that safety standards can be maintained.

The subject development is assumed to comply with the relevant provisions for Type A construction, with the materials of construction typically steel, concrete or masonry.

External walling is non-combustible (i.e. insulated rockwool panels) and roofing is metal deck.

5.3 BUILDING ACTIVITIES

The building will be used as a storage and distribution centre.

Hazards are generally expected to be typical to that exhibited in incident data for warehouse buildings with the exception of the automated processing area that dominates the floor area on Level 1 to Level 3.

The warehouse will be stocked with a range of goods and commodities that do not exceed the thresholds for Dangerous Goods and Hazardous Substances in the legislation. The products are to be redistributed to customers.

Loading, unloading and storage of products and materials will be primary activities within the building.

Whilst maintenance and repair work will be undertaken it is not expected that the activities undertaken represent a greater hazard than any other warehouse development.

NFPA (Campbell, 2016) reported the leading causes of fires in warehouses as:

- 18% of fires were intentionally lit.
- Electrical distribution or lighting equipment was also the cause of 18% of fires.
- Heating equipment accounted for 8% of fires
- Smoking accounted for 5% of all fires
- Arcing was the most common heat source (13% of fires).

Due to the nature of the use, the general members of the public are unlikely to be within the building without direct supervision. This supervision will assist in ensuring that appropriate decision-making choices are made in a fire emergency. Hazards from operational activities are most likely to include moving parts, human error and carelessness, forklift impact and mechanical failure of any associated equipment.

As the warehouse is a restricted space the danger posed is related to the fact that this area is not designed to be an area where unauthorised people will gain access.

The risks of working in the space includes:

- fire or explosion from the ignition of flammable contaminants
- difficulty rescuing and treating an injured or unconscious person

The provision of access control, infrequent access and job specific risk management controls e.g. SWMS shall be used to minimise the risk to occupants.

These risks will be managed to the degree expected in any other development with scheduled and unscheduled maintenance of equipment and machinery, maintenance of workplace health and safety requirements and compliance with relevant statues for health, safety and fire compliance.

These risks will be managed to the degree expected in any other development with scheduled and unscheduled maintenance of equipment and machinery, maintenance of workplace health and safety requirements and compliance with relevant statues for health, safety and fire compliance.

5.4 POTENTIAL IGNITION SOURCES AND AREAS OF FIRE ORIGIN

Within the building the items first ignited are expected to be:

- Rubbish, trash or waste (~12%)
- Electrical wire or cable insulation (~8%)
- Unclassified items (~7%)
- Flammable and combustible liquids or gases, piping and filters (6%)

5.5 COMBUSTIBLE CONTENTS

The structural elements of the building (walls, floors, roofs, ceilings, beams, etc.) are non-combustible or deemed to be non-combustible and therefore will not serve as a significant fuel sources in the event of a fire.

The interior finishes on the walls and any ceilings will act as a fuel sources, however they are to comply with the prescriptive provisions of Building Code of Australia (NCC Vol. 1) Clause C1.10 and its Specification to reduce the hazard to an acceptable level.

The greatest hazard will therefore be associated with the contents of the building, which will comprise of:

- Palletised goods, carboard boxes and other cellulosic fuels
- Storage of boxed goods and equipment
- Computer equipment, monitors, printers and copiers
- Plastic packers and fillers, and plastic componentry
- Fixed furnishing and equipment
- Robots, including batteries

The risk associated with the storage of the abovementioned fuel sources is mitigated by a suppression system that is designed in accordance with the necessary requirements for the commodity being stored. This will include:

- High hazard ESFR sprinklers in the warehouse.
- Ordinary hazard sprinklers to the awnings.
- Light hazard sprinklers to the offices.

6.0 DESIGN OBJECTIVES

6.1 REGULATORY OBJECTIVES

The main objectives of the Building Code of Australia (BCA) include:

- Life safety of occupants.
- Facilitation of fire brigade operations.
- Protection of adjacent buildings.

The objectives of the BCA are met when the relevant Performance Requirements of the BCA are satisfied. Thus, a Performance Solution will comply with the BCA if it satisfies the relevant Performance Requirements of the BCA.

6.2 RELEVANT PERFORMANCE REQUIREMENTS

The relevant Performance Requirements of the BCA (being CP1, CP2, CP8, CP9, DP2, DP4, DP5, DP6, EP1.1, EP1.3, EP1.4 and EP2.2) associated with the proposed Performance Solutions are presented below. The Performance Solutions must comply with these Performance Requirements.

CP1 *A building must have elements which will, to the degree necessary, maintain structural stability during a fire appropriate to -*

(a) the function or use of the building; and

(b) the fire load; and

(c) the potential fire intensity; and

(d) the fire hazard; and

(e) the height of the building; and

(f) its proximity to other property; and

(g) any active fire safety systems installed in the building; and

(h) the size of any fire compartment; and

(i) fire brigade intervention; and

(j) other elements they support; and

(k) the evacuation time.

CP2 *(a) A building must have elements which will, to the degree necessary, avoid the spread of fire-*

(i) to exits; and

(ii) to sole-occupancy units and public corridors; and

(iii) between buildings; and

(iv) in a building.

(b) Avoidance of the spread of fire referred to in (a) must be appropriate to -

(i) the function or use of the building; and

(ii) the fire load; and

(iii) the potential fire intensity; and

(iv) the fire hazard; and

(v) the number of storeys in the building; and

(vi) its proximity to other property; and

(vii) any active fire safety systems installed in the building; and

(viii) the size of any fire compartment; and

(ix) fire brigade intervention; and

(x) other elements they support; and

(xi) the evacuation time.

***CP8** Any building element provided to resist the spread of fire must be protected, to the degree necessary, so that an adequate level of performance is maintained -*

(a) where openings, construction joints and the like occur; and

(b) where penetrations occur for building services.

***CP9** Access must be provided to and around a building, to the degree necessary, for fire brigade vehicles and personnel to facilitate fire brigade intervention appropriate to -*

(a) the function or use of the building; and

(b) the fire load; and

(c) the potential fire intensity; and

(d) the fire hazard; and

(e) any active fire safety systems installed in the building; and

(f) the size of any fire compartment.

***DP2** So that people can move safely to and within a building, it must have -*

(a) walking surfaces with safe gradients; and

(b) any doors installed to avoid the risk of occupants -

(i) having their egress impeded; or

(ii) being trapped in the building; and

(c) any stairways and ramps with -

(i) slip-resistant walking surfaces on -

(A) ramps; and

(B) stairway treads or near the edge of the nosing; and

(ii) suitable handrails where necessary to assist and provide stability to people using the stairway or ramp; and

(iii) suitable landings to avoid undue fatigue; and

(iv) landings where a door opens from or onto the stairway or ramp so that the door does not create an obstruction; and

(v) in the case of a stairway, suitable safe passage in relation to the nature, volume and frequency of likely usage.

***DP4** Exits must be provided from a building to allow occupants to evacuate safely, with their number, location and dimensions being appropriate to -*

(a) the travel distance; and

(b) the number, mobility and other characteristics of occupants; and

(c) the function or use of the building; and

(d) the height of the building; and

(e) whether the exit is from above or below ground level.

***DP5** To protect evacuating occupants from a fire in the building exits must be fire-isolated, to the degree necessary, appropriate to -*

(a) the number of storeys connected by the exits; and

(b) the fire safety system installed in the building; and

(c) the function or use of the building; and

(d) the number of storeys passed through by the exits; and

(e) fire brigade intervention

DP6 *So that occupants can safely evacuate the building, paths of travel to exits must have dimensions appropriate to—*

(a) the number, mobility and other characteristics of occupants; and

(b) the function or use of the building.

EP1.1 *A fire hose reel system must be installed to the degree necessary to allow occupants to safely undertake initial attack on a fire appropriate to -*

(a) the size of the fire compartment; and

(b) the function or use of the building; and

(c) any other fire safety systems installed in the building; and

(d) the fire hazard.

EP1.3 *A fire hydrant system must be provided to the degree necessary to facilitate the needs of the fire brigade appropriate to -*

(a) fire-fighting operations; and

(b) the floor area of the building; and

(c) the fire hazard.

EP1.4 *An automatic fire suppression system must be installed to the degree necessary to control the development and spread of fire appropriate to –*

(a) The size of the fire compartment; and

(b) The function or use of the building; and

(c) The fire hazard; and

(d) The height of the building.

EP2.2 *(a) In the event of a fire in a building the conditions in any evacuation route must be maintained for the period of time occupants take to evacuate the part of the building so that -*

(i) the temperature will not endanger human life; and

(ii) the level of visibility will enable the evacuation route to be determined; and

(iii) the level of toxicity will not endanger human life.

(b) The period of time occupants take to evacuate referred to in (a) must be appropriate to -

(i) the number, mobility and other characteristics of the occupants; and

(ii) the function or use of the building; and

(iii) the travel distance and other characteristics of the building; and

(iv) the fire load; and

(v) the potential fire intensity; and

(vi) the fire hazard; and

(vii) any active fire safety systems installed in the building; and

(viii) fire brigade intervention.

EP4.2 *Identification of exits*

To facilitate evacuation, suitable signs or other means of identification must, to the degree necessary—

(a) be provided to identify the location of exits; and

(b) guide occupants to exits; and

(c) be clearly visible to occupants; and

(d) operate in the event of a power failure of the main lighting system for sufficient time for occupants to safely evacuate.

6.3 FIRE BRIGADE OBJECTIVES

Each fire agency throughout Australia, including Fire & Rescue NSW, has a fundamental set of legal obligations, which are defined under the Fire Agency Act for each State or Territory.

The objectives of the fire brigades involve the protection of life, property and the environment. The BCA outlines DTS provisions for buildings in relation to fire resistance, egress, and services and equipment (such as fire hydrants) to enable the objectives of the fire brigades to be fulfilled during fire brigade intervention activities.

To satisfy the performance requirements of the BCA, fire fighters must have reasonable time to enter and exit a building to undertake fire brigade intervention activities before untenable conditions occur and prior to building collapse. The Performance Solutions will be assessed against the objectives of the fire brigades during fire brigade intervention activities. Where the relevant Performance Requirements of the BCA refer to Fire Brigade Intervention, the objectives of the fire brigades will be considered.

7.0 BCA DTS NON-CONFORMANCE ASSESSMENT

Table 3 summarises the Variations to the BCA DtS Provisions, the relevant BCA Performance Requirements, the Compliance and Assessment Methods, and the International Fire Engineering Guidelines (IFEG) Subsystems that have been considered in the Fire Engineering Analysis.

Table 3: Summary of Proposed Performance Solutions

No.	DtS Provisions	Variations to DtS Provisions	Performance Requirements	Compliance & Assessment Methods	IFEG Subsystems
1.	Clause C1.1 **Fire resistance levels**	Clause C1.1 requires a building of Type A construction to have a Fire Resistance Level (FRL) commensurate with the requirements of Table 3 of Specification C1.1. The single storey office at Ground Floor is proposed to be constructed of lightweight steel framework.	CP1 and CP2	A2.2(1)(a) and A2.2(1)(b)(ii) and A2.2(b)(d)	C and F
2.	Clause C1.1 **Fire resistance levels**	Clause C1.1 requires a building of Type A construction to have a Fire Resistance Level (FRL) commensurate with the requirements of Table 3 of Specification C1.1. The Ground Floor Mezzanine structure is proposed to retain the inherent fire resistance of the structure only in lieu of having fire protection applied.	CP1 and CP2	A2.2(1)(a) and A2.2(1)(b)(ii)	C and F
3.	Clause C1.1 **Composite construction**	Clause C1.1 requires a building of Type A construction to have a Fire Resistance Level (FRL) commensurate with the requirements of Table 3 of Specification C1.1. The warehouse is to be constructed in accordance with AS 2327:2017 i.e. the fire design adopts the slab panel methodology (which permits some beams within a floor to be left unprotected). The design is based on the standard fire curve.	CP1	A2.2(1)(a) and A2.2(1)(b)(ii)	C and F

No.	DtS Provisions	Variations to DtS Provisions	Performance Requirements	Compliance & Assessment Methods	IFEG Subsystems
4.	Clause C2.3 & C2.4 **Perimeter access**	Clause C2.3(b) requires a large isolated building with a floor area and volume of more than 18,000 m2 or 108,000 m3 to be provided with perimeter access complying with C2.4(b), being a roadway not less than 6 m wide not more than 18 m from the building. The following non-conformance have been identified: ▪ Vehicular access is not continuous around the perimeter of the building; and ▪ At the access control points (gates and security points) the width of the vehicular pathway is less than 6 m; and The pathway is not provided within 18m of a proportion of the external wall of the building on the northern side and south western corner side of the building.	CP9	A2.2(1)(a) and A2.2(1)(b)(ii)	F
5.	Clause C3.15 **Protection of service penetrations**	Clause C3.15 states that where an electrical, electronic, plumbing, mechanical ventilation, air-conditioning or other service penetrates a building element (other than an external wall or roof) that it is required to have an FRL with respect to integrity or insulation or a resistance to the incipient spread of fire. The automated processes building results in vertical penetration of services throughout the building. It is not proposed to fire separate the penetrations in accordance with Clause C3.15 nor Specification C3.15.	CP2 and CP8	A2.2(1)(a) and A2.2(1)(b)(ii)	B, C, E and F
6.	Clause D1.2 **Number of exits**	Clause D1.2 states that every building must have at least one exit from each storey. A preliminary review of the design has identified that there are a number of automated equipment zones on both the Ground Level and Level 1 to Level 3 that are enclosed or inaccessible and do not have clearly defined dedicated access to exits through the equipment.	DP2	A2.2(1)(a) and A2.2(1)(b)(ii)	E and F

No.	DtS Provisions	Variations to DtS Provisions	Performance Requirements	Compliance & Assessment Methods	IFEG Subsystems
7.	Clause D1.4 **Travel distances**	Clause D1.4(c)(i) states that no point on a floor must be more than 20 m from an exit, or a point from which travel in different directions to 2 exits is available, in which case the maximum distance to one of those exits must not exceed 40 m; and Clause D1.4(c)(ii) states in a Class 5 or 6 building, the distance to a single exit serving a storey at the level of access to a road or open space may be increased to 30 m. Travel distances in the building will exceed 20 m and 40 m to a point of choice and to the nearest exit respectively. Preliminary assessment indicates distances in the order of: ▪ 125 m to the nearest exit at Ground Level ▪ 40 m to point of choice at Ground ▪ 45 m to nearest exit on Central Mezzanine ▪ 100 m to the nearest exit on Level 1 to Level 3	DP4 and EP2.2	A2.2(1)(a) and A2.2(1)(b)(ii)	E and F
8.	Clause D1.5 **Travel between alternative exits**	Clause D1.5 states that exits that are required as alternative means of egress must be not more than 60 m apart. Travel distances between alternative exits will exceed 60 m. Preliminary assessment indicates distances in the order of: ▪ 225m between alternative exits at Ground Level ▪ 180m between alternative exits Level 1 to Level 3	DP4 and EP2.2	A2.2(1)(a) and A2.2(1)(b)(ii)	E and F
9.	Clause D1.6 **Width of travel paths**	Clause D1.6 states that in a required exit or path of travel to an exit the unobstructed width of each exit or path of travel to an exit, except for doorways, must be not less than 1 m. Throughout the building the path of travel is reduced to less than 1 m where access platforms and stairways complying with AS 1657 are utilised.	DP4 and DP6	A2.2(1)(a), A2.2(1)(b)(ii) and A2.2(2)(d)	E and F

No.	DtS Provisions	Variations to DtS Provisions	Performance Requirements	Compliance & Assessment Methods	IFEG Subsystems
10.	Clause D1.7 **Fire isolated stair discharge**	Clause D1.7(b) states that each fire-isolated stairway or fire-isolated ramp must provide independent egress from each storey served and discharge directly, or by way of its own fire-isolated passageway to: ▪ a road or open space; or ▪ to a point in a storey or space, within the confines of the building, that is used only for pedestrian movement, car parking or the like and is open for at least 2/3 of its perimeter; and from which an unimpeded path of travel, not further than 20 m, is available to a road or open space; or ▪ into a covered area that o adjoins a road or open space; and o is open for at least 1/3 of its perimeter; and o has an unobstructed clear height throughout, including the perimeter openings, of not less than 3 m; and o provides an unimpeded path of travel from the point of discharge to the road or open space of not more than 6 m. Clause D1.7(c)Where a path of travel from the point of discharge of a fire-isolated exit necessitates passing within 6 m of any part of an external wall of the same building, measured horizontally at right angles to the path of travel, that part of the wall must have— ▪ an FRL of not less than 60/60/60; and ▪ any openings protected internally in accordance with C3.4, for a distance of 3 m above or below, as appropriate, the level of the path of travel, or for the height of the wall, whichever is the lesser. Two of the fire isolated stairs discharge into the office lobby / reception area on the western side of the building. In addition, around the perimeter of the building fire isolated stairs discharge within 6 m of openings in the external wall.	DP4, DP5, EP2.2	A2.2(1)(a) and A2.2(1)(b)(ii)	B, C, D, E and F

No.	DtS Provisions	Variations to DtS Provisions	Performance Requirements	Compliance & Assessment Methods	IFEG Subsystems
11.	Clause D1.9 **Travel via non-fire isolated stairs**	Clause D1.9 states that a non-fire-isolated stairway or non-fire-isolated ramp serving as a required exit must provide a continuous means of travel by its own flights and landings from every storey served to the level at which egress to a road or open space is provided. In a Class 5, 6, 7, 8 or 9 building, the distance from any point on a floor to a point of egress to a road or open space by way of a required non-fire-isolated stairway or non-fire-isolated ramp must not exceed 80 m. Preliminary assessment indicates that the distances in the order of 140 m are evident and that the total distance from the discharge location is greater than 40 m.	DP4, DP5 and EP2.2	A2.2(1)(a) and A2.2(1)(b)(ii)	E and F
12.	Clause E1.3 **Fire hydrant**	Clause E1.3 states that a fire hydrant system must be provided in accordance with AS 2419.1. Clause 7.3(d) of AS 2419.1 states that the fire hydrant booster must be located more than 10m from the external wall of the building and within sight of the main entrance to the building. Clause 3.2.2.2 (e) of AS 2419.1 states that external hydrants must not be located within 10 m of the buildings unless they are safeguarded by construction having a FRL of not less than 90/90/90 extending 2 m each side of the hydrant outlet and 3 m above ground level. In the subject warehouse: ▪ The hydrant booster may not within sight of the main entry; and ▪ At Ground Floor a number of hydrants are located outside the building but are positioned beneath an awning and are proposed to considered as “external hydrants” for the purposes of coverage.	EP1.3	A2.2(1)(a) and A2.2(1)(b)(ii)	F
13.	Clause E1.4 **Fire hose reels**	Clause E1.4 requires a fire hose reel system must have fire hose reels installed in accordance with AS 2441:2005. It is not proposed to provide coverage to the automated zones on Ground Level, Level 1, Level 2 and Level 3.	EP1.1	A2.2(1)(a), A2.2(1)(b)(ii) and A2.2(2)(d)	A, C and D

No.	DtS Provisions	Variations to DtS Provisions	Performance Requirements	Compliance & Assessment Methods	IFEG Subsystems
14.	Clause E1.5 **Sprinkler system**	Clause E1.5 states that a sprinkler system must be provided in accordance with AS 2118.1:2017 Clause of 4.14.1 of AS 2118.1 requires a sprinkler booster assembly to be located in accordance with AS 2419.1. This requires the booster to be within sight of the main entrance to the building (refer to Clause 3.2.2.2 (e) of AS 2419.1). The sprinkler booster is not within sight of the main entry to the building.	EP1.4	A2.2(1)(a) and A2.2(1)(b)(ii)	F
15.	Clause E2.2 **Smoke hazard management**	In a Class 5, 6, 7, 8 or 9 building, which exceeds 18 000 m^2 in floor area or 108 000 m^3 in volume, the building must be provided with an automatic smoke exhaust system in accordance with Specification E2.2b. The smoke hazard management system in the building shall be rationalised in relation to: ▪ Smoke exhaust quantities which vary from that of Figure 2 of Specification E2.2b; and ▪ Smoke reservoir size in accordance with Clause 4 of Specification E2.2b.	EP2.2	A2.2(1)(a) and A2.2(1)(b)(ii)	B, E and F
16.	Clause E4.6 **Emergency exit signage**	Clause E4.6 states that if an exit is not readily apparent to persons occupying or visiting the building then exit signs must be installed in appropriate positions in corridors, hallways, lobbies, and the like, indicating the direction to a required exit. On Level 1 to Level 3 the central area of the floor plate is inaccessible to occupants during normal operating conditions. It is proposed to rationalise the directional exit signage arrangement throughout the area.	EP4.2	A2.2(1)(a) and A2.2(1)(b)(ii)	E

8.0 DESIGN FIRE SAFETY STRATEGY

The design strategy is based on early detection and warning of fire in order to preserve life by facilitating speedy evacuation from the premises.

When considering the factors that will influence escape related to the risk profile and occupancy levels of the building the stages in the process of escape and the maximum distances people can be expected to travel. Escape is generally considered in four distinct stages as follows:

- Stage 1 – escape from the room or area of fire origin
- Stage 2 – escape from the compartment of origin via the circulation route to a protected stairway or an adjoining compartment offering refuge
- Stage 3 – escape from the floor of origin to the ground level
- Stage 4 – escape at ground level away from the building.

The Fire Safety Strategy outlined below has been proposed to satisfy the fire and life safety objectives specified for this project by the relevant stakeholders.

In addition, the Fire Safety Strategy is required to adequately address the specific fire and life safety hazards identified for the development, and as such have been generally derived from the preventative and protective measures outlined within the BCA, and fire engineering literature and research.

Where items of non-compliance have not been identified by the design team in the concept design it is considered that those items are to be deemed-to-satisfy solutions.

The specified Fire Safety Strategy will undergo analysis as part of the Fire Engineering Report to ascertain whether the relevant Performance Requirements of the BCA are satisfied.

The Fire Safety Strategy will incorporate the following elements:

8.1 FIRE RESISTANCE

In addition to life safety, the potential impact of a fire on the client and end users ability to provide business activities, as a result of loss of facility, working capability or denial of access is considered. Beyond the passive and active fire safety measures introduced for life safety, there is scope to make provision to limit the extent of fire and smoke spread, reducing the time and cost associated with reinstatement, and minimising business interruption.

Wherever practicable, to secure property protection, the guiding strategy for compartmentation is to restrict the spread of fire to the room of origin.

The subject development shall fully comply with the DTS provisions of Section C of the BCA (Parts C1, C2 & C3) with the exception of the following.

Fire rating to the Ground Floor Office

1. The internal and external columns supporting the non-fire rated roof of the single storey office at Ground Floor are not required to be fire rated.

Working Platforms / Mezzanine

1. The Ground Floor Warehouse Mezzanine structures shall be constructed of structural steel having an exposed surface area to mass ration (ESA/M) of not greater than 26 m^2/tonne for columns and 30 m^2/tonne for beams provided that the mezzanine are independent of the main warehouse structure.

Stairs above Ground Floor Office Roofing

1. Where the roof of the office is lower than the fire isolated stairs that pass through the office, the fire rating bounding the fire isolated stair is to extend not less than 1.5 m above the covering of the lower roof.
2. Any equipment located on the roof top deck is to be located not less than 6 m from the face of the glazing to the fire isolated stairs.
3. The lower roof is to be constructed of steel construction and be screw fixed.

Discharge of stairs into the Ground Floor lobby

4. The Ground Floor office lobby is to be separated from the adjoining rooms by construction having an FRL for structural adequacy, integrity and insulation (as the case requires) of 60 minutes (refer to Figure 11). The construction shall meet the following level of performance.

    i. Walls having an FRL of (120/120/120) in accordance with Clause C2.7a of the Building Code of Australia (NCC Vol. 1)

    ii. Self-closing (or automatic closing) doors having an FRL of -/120/30 in accordance with Clause C3.5(b) of the Building Code of Australia (NCC Vol. 1)

    Note: Doors to the FDCIE and Fire Hose Reel cabinets do not need to be fire rated.

    iii. Signage on doors shall be applied in accordance with Clause D2.23 of the Building Code of Australia (NCC Vol. 1)

    iv. Openings for service installations in accordance with Clause C3.15 of the Building Code of Australia (NCC Vol. 1)

    v. Construction joints in accordance with Clause C3.16 of the Building Code of Australia (NCC Vol. 1)

    a. The door which opens into the lobby from the fire stairs is to be provided with a vision panel complying with the provisions of Clause 2.5 of AS 1905.1:2015.

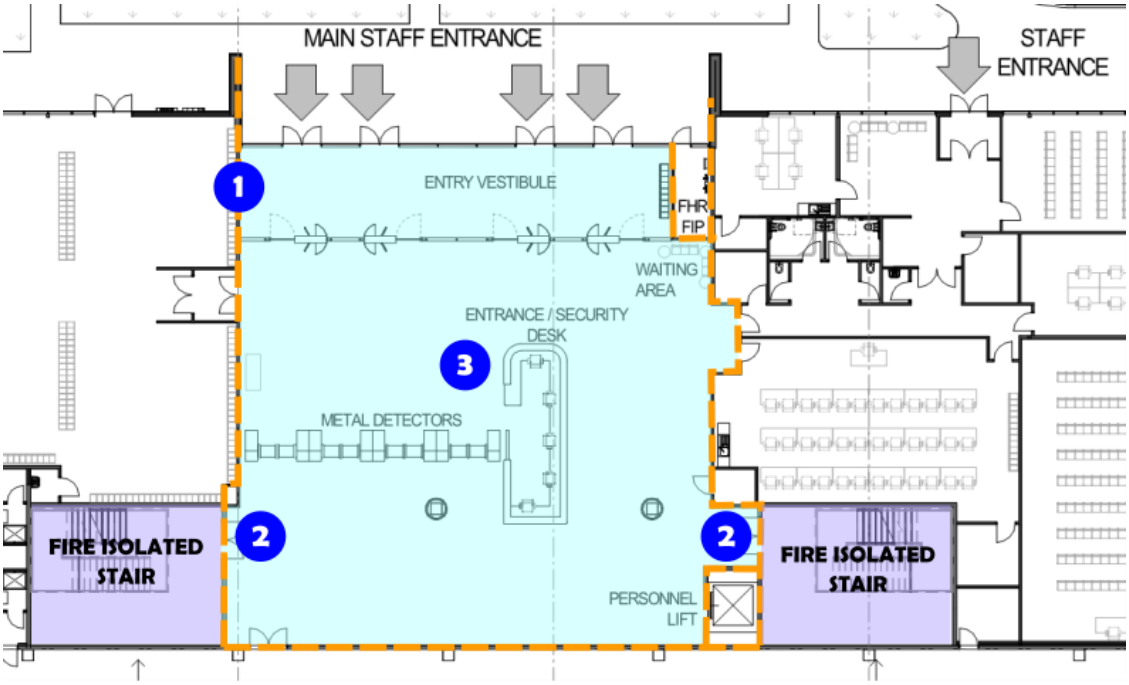
    b. At Ground Level, on the internal (stair side) face of the door a sign in 25 mm high lettering of a contrasting colour is to be erected. The signage shall state the following, or similar

    CAUTION - IF LOBBY IS OBSTRUCTED EXIT VIA LEVEL 1

    At level 1, on the internal (stair side) face of the door a sign in 25 mm high lettering of a contrasting colour that identifies the floor level is to be erected. All signage shall be fixed between 1,500-1,800mm above floor level, and shall comprise of permanent durable construction, such as anodized metal.

    c. The door(s) that provide access to the Ground Floor office lobby are to be self-closing or automatic closing **hinged doors**. Where automatic closing, the operation must be initiated by the activation of a smoke detector installed in accordance with the relevant provisions of AS 1670.1:2018 and located on each side of the door not more than 1.5 m horizontal distance from the opening.

    d. Where parts of the wall utilise glazed panes the glazing shall protected with wall wetting sprinklers. The glazing shall comprise of at least 6mm thick heat strengthened toughened safety glass in accordance with AS 1288:2006.



LEGEND

1. **120/120/120 (load-bearing) or -/120/120 fire rating to the underside of the roof above. Self-closing (or automatic closing) doors having an FRL of -/120/30 in accordance with Clause C3.5(b) of the Building Code of Australia (NCC Vol. 1)**
   Where parts of the wall utilise glazed panes, the glazing shall be protected with wall wetting sprinklers on the opposite side of the lobby. The glazing shall comprise of at least 6mm thick toughened safety glass in accordance with AS 1288.
2. **Vision Panel to fire stair discharge door in accordance with Clause 2.5 of AS 1905.1**
   At Ground Floor on the internal (stair side) face of the door a sign in 25 mm high lettering of a contrasting colour is to be erected. The signage shall state the following or similiar:
   CAUTION - IF LOBBY IS OBSTRUCTED EXIT VIA LEVEL 1
3. **Lobby to be a separate fire detection zone to the remainder of the Ground Floor.**

Figure 11: Proposed Lobby Protection Measures

Protection of Vertical Transport Chutes and Spirals

1. Vertical Transport Chutes and Spiral are to be contained in enclosing construction having an FRL of 240/120/120 (load bearing) or -120/120 (non-loadbearing) refer to Figure 12 and Figure 13.

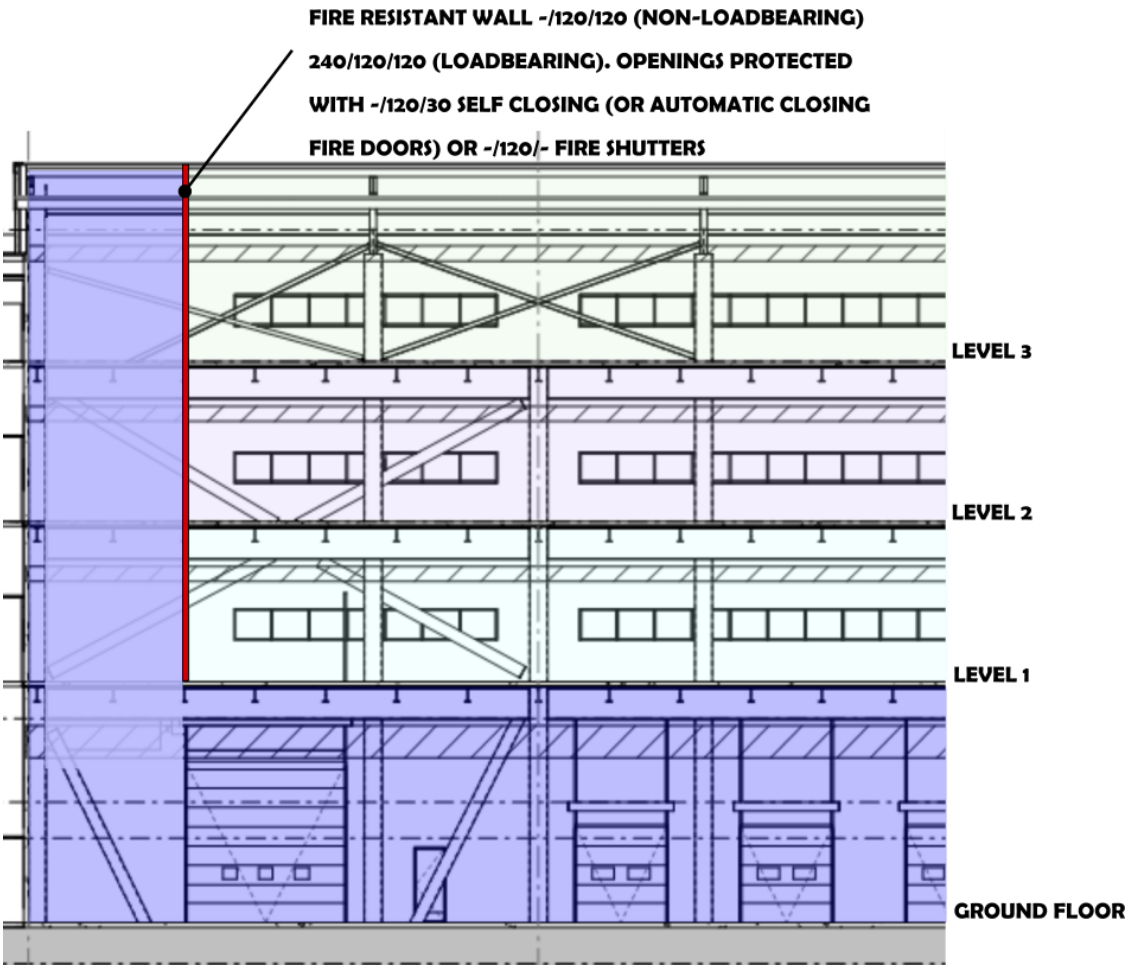
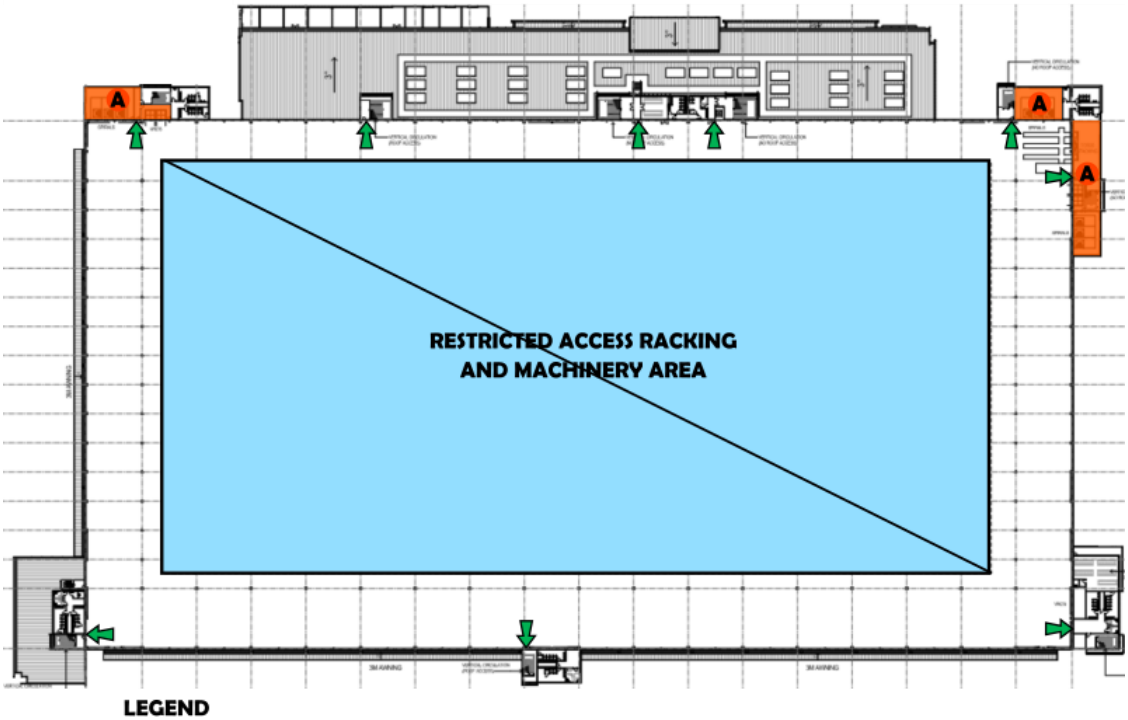


Figure 12: Indicative section through goods transport shaft

Fire shutters that achieves an FRL of -/120/30 shall be provided to protect the opening into the vertical chute and spiral locations shown in Figure 13



2. **Figure 13**. The fire shutter shall comply with the relevant provisions of AS 1905.2 and shall incorporate the following specific features:

   - The fire rated shutter shall automatically close upon activation of a fire alarm within the building and / or fusible link and / or fire detector (deemed suitable in accordance with AS 1670.1) located centrally not more than 1.5m horizontal distance from the opening formed by the fire shutter.
   - A red strobe light shall be provided above the fire shutter and shall automatically activate upon fire alarm.
   - Permanent line markings (e.g. yellow strips or tiger tails), at least 1m in width, shall be provided on the floor on both sides of the fire shutter to minimise obstructions being placed within the immediate area of the fire shutter.
   - Signage shall be provided on the fire shutter stating:

     WARNING — FIRE SHUTTER

     The sign shall be in capital letters at least 50 mm high in a colour contrasting to the background and shall be of fade resistant and weatherproof construction (e.g. anodized metal).
   - The fire shutter shall be protected with sprinklers located not more than 500 mm horizontal distance from the opening formed by the fire shutter.

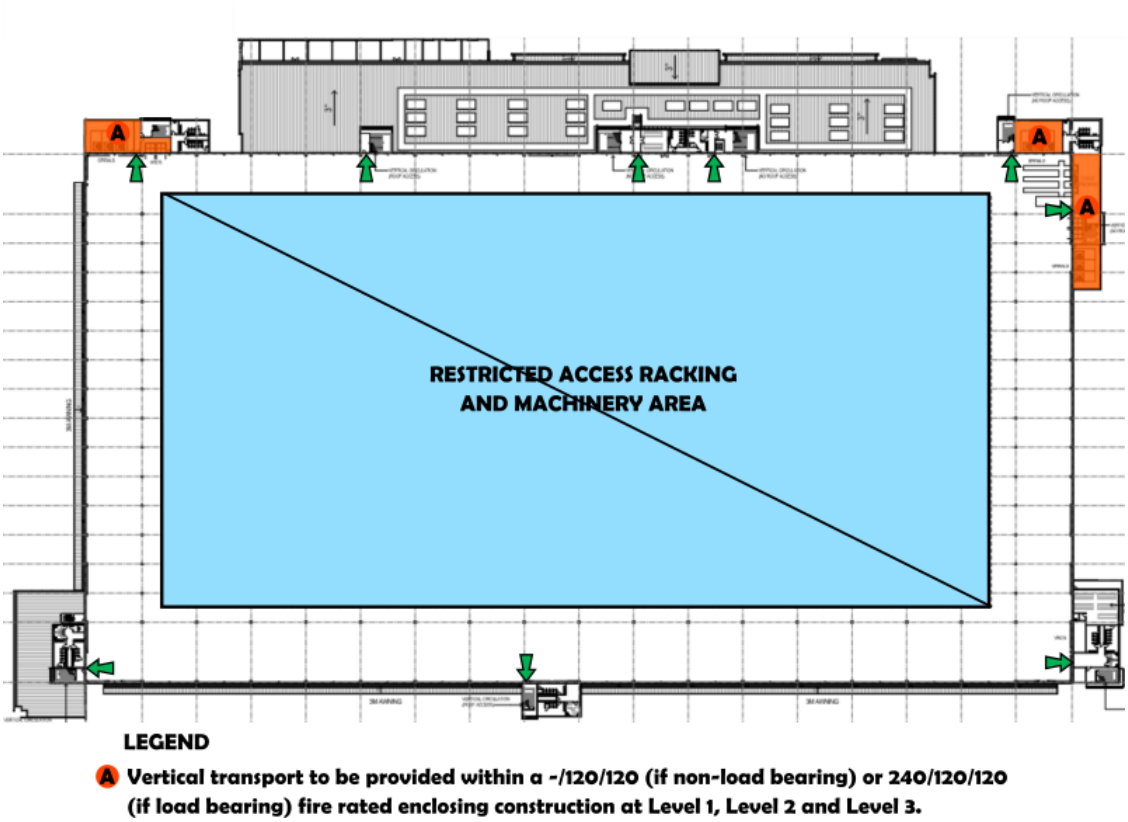


Figure 13: Vertical Material Transport lifts and spiral separation

Note: The composite warehouse structure shall comply with AS/NZS 2327:2017 using the standard fire curve for four (4) hours.

This permits the omission of protection of secondary beams.

8.2 ACCESS AND EGRESS

Means of escape travel distances will be in accordance with the relevant distances identified in the BCA Assessment Report and the Fire Engineering assessment provided that through the application of fire engineering principles, distances can be increased in response to identified need or design requirements.

During the design phase, every effort will be made to avoid dead-end conditions and inner room situations where an extended travel path exists. Where dead-end corridors exist distances will be limited to the degree necessary having regard to the nature of access to the area and the geometry of the enclosure.

Therefore the subject development shall fully comply with the DTS provisions of Section D of the BCA (Parts D1, D2 & D3), except for the design variations addressed in any Performance Solution.

Working Platforms / Mezzanine

Access to, on and from the Ground Floor Warehouse Mezzanine structures shall be provided by stairs, walkways and platforms that comply with AS 1657:2018.

8.3 SERVICES AND EQUIPMENT

The subject development shall fully comply with the DTS provisions of Section E of the BCA (Parts E1, E2, E3 & E4), except for the design variations summarised in the Performance Solution, and the following specific requirements.

NOTE: Reference shall be made to the Fire Safety Schedule for the subject development for the list of required fire safety systems and measures, and the relevant Standards of Performance.

Fire Hydrants

Note: The fire hydrant system needs to be designed in consultation with FRNSW.

3. A fire hydrant system shall be installed in accordance with Clause E1.3 of the BCA and the relevant provisions of AS 2419.1:2005, except:

    a. External hydrant valves are permitted to apply the concession for the radiant heat shields in sprinkler protected buildings as detailed in the Performance Solution and AS 2419.1:2017.

    b. Dual hydrant valves external to the building envelope but positioned under the awning shall be treated as external hydrants for the purpose of coverage. They are to be provided with permanent all-weather fade resistant signs which state in text not less than 25 mm in height:

    "External Hydrant – 2 Hose Lengths Required"

    c. Hydrant valves are to be located around the perimeter of the restricted access / processing zone on Level 1, Level 2 and Level 3 and within the restricted access / robotic zone as decided with the local fire brigade.

    d. When internal hydrants are provided a localised block plan should be provided at every hydrant pictorially and numerically illustrating the location of the next available additional hydrant.

    These localised block plans should be at least A4 size and be of all-weather fade resistant construction.

4. All fire hydrant valves shall be fitted with Storz aluminium alloy delivery couplings manufactured and installed in accordance with Clauses 7.1 and 8.5.11.1 of AS 2419.1:2005. All hydrant valves shall possess a forging symbol and manufacturers mark and shall comply with Fire & Rescue NSW Fire Safety Guideline Technical Information (D15/45534).

Fire Hose Reels

1. A fire hose reel system shall be installed in accordance with Clause E1.4 of the BCA, and the relevant provisions of AS 2441:2005 except that 50 m hose lengths (54 m coverage) may be utilized in the warehouse.

    Coverage shall be achieved by providing not more than 2 changes in direction on any hose run.

    Fire hose reel coverage is not proposed to be provided throughout the restricted access / robotic field.

Portable Fire Extinguishers

1. Portable fire extinguishers shall be installed in accordance with Clause E1.6 of the BCA, and the relevant provisions of AS 2444:2001.

2. Subject to resolution of the hydrant coverage design additional portable fire extinguishers may be provided at strategic locations around the perimeter of the robotics zone.

Fire Sprinkler System

1. A sprinkler system in accordance with Building Code of Australia (NCC Vol. 1) Clause E1.5 and the relevant provisions of AS 2118.1:2017 and relevant FM Global data sheets. The sprinkler system shall meet the following performance criteria:
    a. The sprinkler design shall be undertaken on the basis that a high hazard system shall be installed throughout the warehouse.
    b. Early suppression fast response (ESFR) sprinklers in the warehouse.
    c. The sprinkler response time index (RTI) is to be no greater than 50 $m^{0.5}s^{0.5}$.
    d. Sprinkler activation temperature no greater than 68°C (below the ceiling) in the office and the warehouse where appropriate.
    e. Higher temperature sprinkler heads are permitted directly below the roof covering in these areas as stipulated within the relevant provisions of AS 2118.1:2017.
    f. Sprinklers under awnings are to be in accordance with the relevant requirements of AS 2118.1:2017.
2. Where glazing is utilised in the wall separating the ground floor reception lobby from the remainder of the building it shall be protected internally (i.e. tenancy side) with wall wetting sprinklers.
    a. The wall wetting sprinklers shall be fit for purpose and installed in accordance with AS 2118.2:2010 and the manufacturer's specification.
    b. Coverage shall not be impeded by any mullions and transoms.
    c. The hydrant, sprinkler and wall wetting sprinkler demand shall be calculated based on simultaneous operation.
    d. The wall wetting sprinklers supply must have a capacity of not less than 60 minutes.
    e. The wall wetting system shall incorporate a labelled system isolating valve, secured in the open position by a padlocked chain.

Detection System

1. Smoke detection and alarm system is to be installed throughout the building in accordance with Clause E2.2 of the BCA and the relevant provisions of Section 7 of AS 1670.1:2018 for a smoke control system.
2. The ground floor reception lobby is to form **a separate fire detection zone** (refer to Figure 11). In the event of general fire alarm **in this zone** (the **"lobby" zone**) the following shall occur:
    a. The doors of the two stairs that discharge into the lobby shall not be locked from the inside (Level 1) and outside (Ground Floor) so as to permit re-entry into the stair.
    b. The dynamic exit signage located on Level 1 to Level 3 shall display an illuminated "Red X" (refer to Emergency lighting and Exit Signs below).

Building Occupant Warning System

1. A building occupant warning system in accordance with Building Code of Australia (NCC Vol. 1) Clause E2.2 and AS1670.1:2018.

    The evacuation signal 1 shall include the words such as "Fire" and "Evacuate" inserted in the time period provided in ISO 8201, or a site-specific voice message as provided for in AS 4428.16.

Smoke Hazard Management

1. A smoke exhaust is to be provided in the warehouse. The system is to be designed so that each level operates in isolation. The smoke hazard management system shall:

    a. Incorporate fans designed to operate at 200°C for a period no less than 60-minutes and fire rated cabling; and

    b. Have a capacity at least equal to one enclosure air change per hour (TBC) so that the smoke layer height is maintained to the degree necessary to facilitate fire brigade intervention; and

    c. Shall be initiated automatically by the smoke detection system. The controls together with operating instructions for use by emergency personnel must be provided adjacent to the fire indicator panel in accordance with the requirements of clauses 4.11 and 4.13 of AS/NZS 1668.1.

    d. Make up air is to be provided by permanently open or louvre/dampers that automatically open on fire detection at low level.

Manual Call Points

1. Manual call points connected to the FDCIE are to be provided at each fire isolated stair entry point and at the FDCIE.

Emergency Lighting and Exit Signs

1. Emergency lighting and exit signs shall be installed in accordance with Clauses E4.2, E4.4, E4.5, E4.6 and E4.8 of the BCA, and the relevant provisions of AS 2293.1:2018 except as permitted herein.

    The exit signage installed on, above or adjacent to the two stairs that discharge into the Ground Floor reception lobby on Level 1 to Level 3 to nominate the required exit shall be dynamic and activate in fire mode.

    The dynamic exit sign shall incorporate a “Red X” (e.g. Clevertronics Pty Ltd or Hochiki Pty Ltd RED-X sign) over the face of the signage plate when the zone is activated.

    Adjoining signs are to incorporate a “Dynamic Green” sign that provides positive reinforcement to occupants.

    Refer to Figure 14 and Figure 15 for graphic illustration of the operational intent.

    The sign shall be installed in accordance with AS 2293.1:2018 and the manufacturer’s specification.

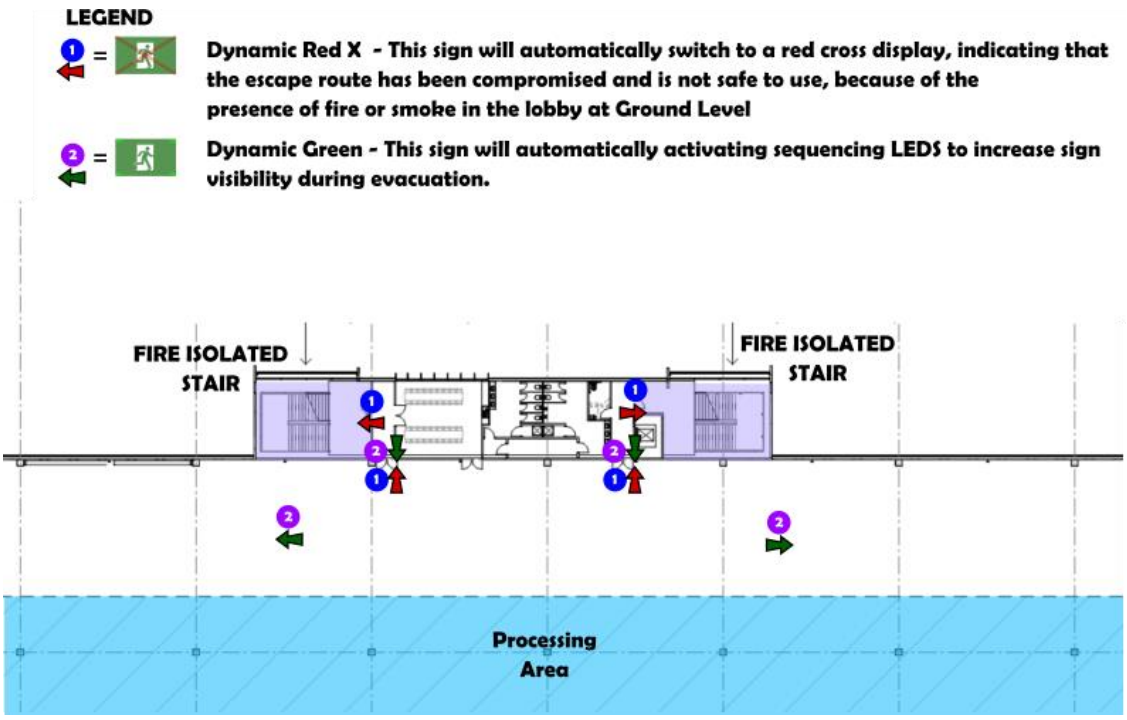


Figure 14: Fire Detected in " Ground Floor Lobby Zone" – Dynamic Exit Sign to Stair operates with negative reinforcement and alternate signs operate with positive dynamic green reinforcement (Typical Level 1 to 3)

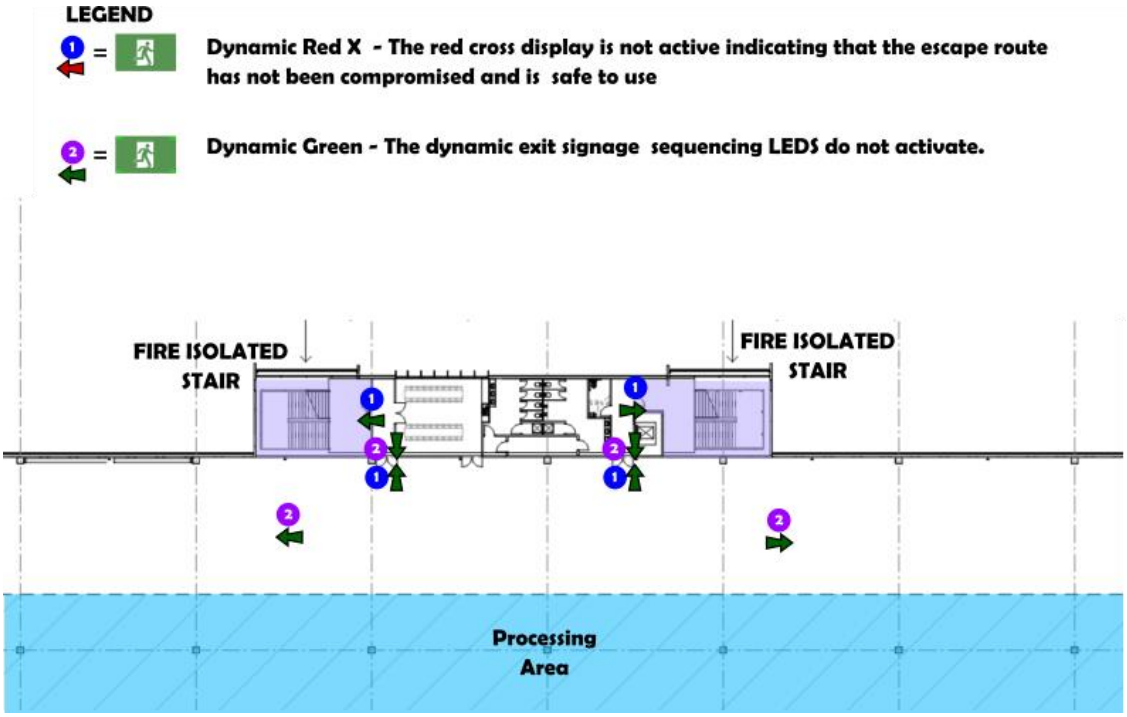


Figure 15: Fire Detected in any zone other than Ground Floor Lobby Reception Zone – Dynamic Exit Sign to Stairs maintains standard operation (Typical Level 1 to 3)

Perimeter Access

1. Access around or passing by an immovable object (e.g. building, structure, bollard, pylon, gate or vehicular barrier) shall have a clear width of not less than 3.2 m as per the FRNSW Fire Safety Guideline "Access for fire brigade vehicles and firefighters".
2. Gates and security checkpoints in the emergency vehicle travel path are to be secured with a loose chain and 003 type padlock or be provided with locking devices that can be unlocked by key (i.e. provided to the two nearest local fire stations) and be manually released or operated onsite (i.e. manual override).
3. A designated hardstand area shall be provided adjacent to the fire sprinkler tank suction connections in accordance with FRNSW Policy Guide Sheet No. 5.

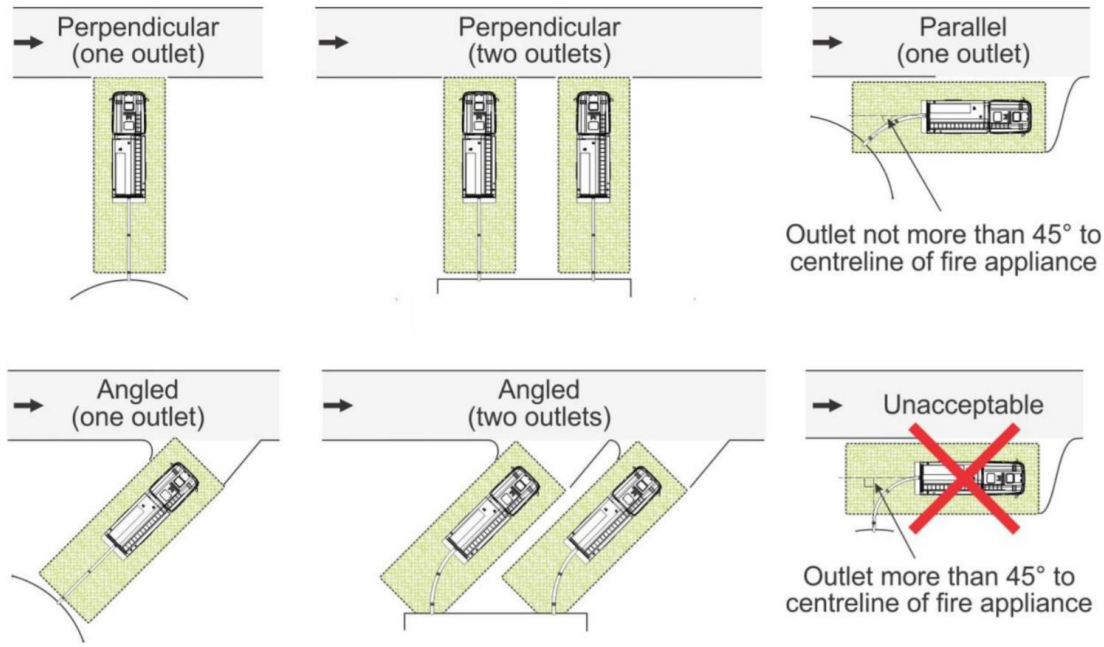


Figure 16: Excerpt of FRNSW hardstand orientation (Source: FRNSW Fire Safety Guideline "Access for fire brigade vehicles and firefighters").

8.4 MANAGEMENT AND USE

1. The following specific management procedures are recommended
   a. The restricted access / robotics zone is to be secured so that free and ready access is not available to general members of staff. Access is to be undertaken in accordance with procedures and protocols prepared and documented by the end user.
   b. An emergency management plan (EMP) shall be prepared in accordance with AS 3745:2010. The EMP shall incorporating first attack firefighting training for the Emergency Planning Committee and Emergency Control Organisation members and emergency procedures which reinforce containment of fires only where safe to do so.

      In the design the evacuation strategy will aim to apply a simultaneous single stage evacuation throughout the building. As a consequence, fire detection and alarm system design and performance, as well as building evacuation plans will be tailored to support this strategy.
   c. An emergency services information package (ESIP) is to be prepared for the building in accordance with FRNSW Community Safety Directorate's Fire Safety Guideline on Emergency Services Information Package and Tactical Fire Plans. A copy of the ESIP is to be provided to FRNSW.

d. In addition to the general provisions documented in the building's emergency management plan specific procedures relating to fire events in the processing area are to be provided.

   The plan shall account for emergency events during business hours and include an after hours call out procedures.

   The plan is designed to ensure that appropriate resources are dedicated to help brief emergency service personnel on the hazard within the building and help to facilitate access.

   Thereafter the emergency management plan shall ensure that nominated staff have sufficient authority to be able to act on the instructions of the emergency service's senior officer and assist in the provision of equipment and or necessary resources to facilitate emergency service operational procedures.

e. Warning signage is to be provided adjacent to the FDCIE (i.e Fire Indicator Panel). The signage shall pictorially show the location of the automated equipment and be permanent and fade resistant which states in text not less than 25 mm in height:

   CAUTION

   Automated Equipment may be operating within this building.

   FRNSW are not to access the processing area without staff instruction.

f. Emergency stop controls are to be provided to the automatic equipment. Safe Work Method Statements (SWMS) or similar procedures shall be developed and maintained that nominate:

   i. Positioning of stop controls in prominent, clearly and durably marked and immediately accessible to each operator of the plant;

   ii. handles, bars or push buttons associated with the stop control are coloured red

   iii. the stop control cannot be adversely affected by electrical or electronic circuit malfunction

   iv. Where the equipment is designed to be operated or attended by more than one person and more than one control is fitted, the multiple controls must be of the "stop and lock-off" type so that the plant cannot be restarted after a stop control has been used unless each activated stop control is reset.

2. A Management in Use system where all required fire safety systems / measures are subjected to the relevant maintenance regimes nominated in AS 1851:2012. The Management in Use system shall also incorporate the following measures as a minimum:

   a. A no smoking policy within internal public areas.

   b. Routine maintenance of all plant and equipment.

   c. Routine maintenance of all fire safety systems and equipment.

   d. Regular emptying of rubbish bins.

   e. Ensuring paths of travel to exits are kept free of anything that may obstruct or impede the free passage of persons.

   f. Ensuring all exit doors are functional, and all statuary signage is in place.

9.0 REFERENCES

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Annexure B

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Traffic Impact Assessment

Oakdale West Industrial Estate –SSD 7348 Modification 3 & SSD 10397 Stage 2 Development Application

Ref: P1086r01
15/01/2020

Document Control

Project No: P1086r01

Project: Oakdale West Industrial Estate – SSD 7348 MOD 3 & SSD 10397 Stage 2 DA

Client: Goodman Property Services (AUST) Pty. Limited

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5	10/01/2020	Issue V	S. Hu	
6	13/01/2020	Issue VI	S. Hu	
7	15/01/2020	Issue VII	M. Tangonan	

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Table of Contents

EXECUTIVE SUMMARY 1

1 INTRODUCTION 4
1.1 STUDY PURPOSE 4
1.2 REFERENCE DOCUMENTS 4

2 OAKDALE WEST ESTATE APPROVAL 6
2.1 SSD 7348 APPROVAL 6
2.2 RESPONSE TO SECRETARY'S ENVIRONMENTAL ASSESSMENT REPORT 8
2.3 CONDITIONS OF CONSENT 9
2.4 APPROVED TRAFFIC GENERATION 11
2.5 FUTURE INTERSECTION LAYOUTS 12

3 MODIFICATION 3 DESCRIPTION 14
3.1 MOD 3 MASTER PLAN 14
3.2 PROPOSED BUILDING CHARACTERISTICS 15
3.3 INTERNAL INTERSECTION LAYOUTS 16

4 PARKING PROVISIONS 18
4.1 CAR PARKING 18
4.2 BICYCLE PARKING 18

5 TRAFFIC ASSESSMENT 19
5.1 TRAFFIC GENERATION ESTIMATION 19
5.2 TRIP DISTRIBUTION 22
5.3 TRAFFIC IMPACTS 23

6 CONSTRUCTION TRAFFIC MANAGEMENT 27
6.1 BACKGROUND 27
6.2 IMPLICATIONS OF MOD 3 27

7 DESIGN COMMENTARY 28
7.1 RELEVANT DESIGN STANDARDS 28
7.2 ESTATE ROADS 28

8 SUMMARY & CONCLUSIONS 29
8.1 KEY FINDINGS 29
8.2 RECOMMENDATIONS 33
8.3 CONCLUSION(S) 33

Appendices

Appendix A: Traffic Impact Assessment Report for Building 2B

Appendix B: Traffic Flow Network Diagrams

Appendix C: SIDRA Results

Executive Summary

Ason Group has been engaged by Goodman Property Services (Aust) Pty Ltd (Goodman) to prepare a Traffic Impact Assessment (TIA) to assess the traffic and parking implications of:

- proposed Modification (MOD 3) to the recently approved (13 September 2019) SSD 7348 at Oakdale West Industrial Estate (OWE), and
- a Stage 2 Development Application (DA)— SSD 10397— in relation to Building 2B.

A brief summary of both assessments is outlined below, noting that this report focuses on MOD 3, whilst the TIA for the Stage 2 DA is included in **Appendix A**.

1.1.1 Modification 3

Modification 3 to the SSD7348 essentially involves changes to the built form of Precincts numbers 2 to 5 within the approved OWE. However, the Modification 3 mainly affects Precincts numbers 2 and 3, with some moderate changes to the Gross Floor Areas (GFAs) to Precinct numbers 4 and 5.

Details of the key changes resulted from MOD 3 compared to the 2019 approved masterplan can be summarised as follows:

- Estate road network re-configuration, including:
  - Construction and delivery of a proposed roundabout at Estate Road 01 and 03 intersection as well as construction and delivery of the revised Estate Road 03, and
  - Removal of Estate Road 04 and Estate Road 05.
- Rationalisation and re-sizing of warehouse buildings included in Precincts number 2 and 3,
- Minor changes to the GFAs related to Precincts number 4 and 5, and
- Changes to the overall Estate-wide levels for cut and fill process related to the additional road network changes.

This TIA has been prepared to primarily review and assess any relevant changes resulted from MOD 3 when compared to the 2019 approved masterplan.

Furthermore, MOD 3 is expected to follow the MOD 2 application which is currently under review by the Department of Planning Industrial and Environment (DPIE). It is noted that MOD 2 has been related to the changes primarily involving Precinct number 1 of the OWE.

Accordingly, a brief summary of the key findings of this TIA are as follows:

- Estate wide vehicular traffic generation post completion of MOD 3 has been compared with the traffic generation post completion of MOD 2 and the original 2019 approval and it is outlined in the following Table for context:

Time Period	Original Approval	MOD 2	MOD 3	Difference
AM Peak	775	679 (688)	1,108 (1,360)	333 (585)
PM Peak	775	679 (688)	879 (1,044)	104 (269)
Daily	8,992	8,850 (9,294)	9,776 (11,324)	784 (2,332)

Note: 1) Figures in brackets () relates to 'peak seasonal' changes.

- According to the SIDRA analysis undertaken for the MOD 3 the traffic impact of the Estate post completion of MOD 3 will not result in any additional infrastructure upgrade requirements and the approved intersection layouts can accommodate the proposed MOD 3 related traffic.
- Individual buildings will be designed to meet the approved parking requirements, as outlined Condition B13 of the approval.
- Internal Estate-road reconfiguration, access crossovers and service vehicle access for buildings impacted with the MOD 3 have been designed to cater for 26.0 m B-Double trucks, and
- MOD 3 will not result in any material implications on the construction process when compared to the Construction Environmental Management Plan – and supporting studies, including Construction Traffic Management Plan(s) — prepared in support of the development.

Furthermore, attached to this TIA is a traffic report which is intended to accompany the MOD 3 submission related to a separate Development Application for the proposed Building 2B within the revised Master Plan.

1.1.2 Stage 2 DA

Stage 2 DA only applies to Building 2B of the modification plan. Proposal for Building 2B provides for the following key characteristics:

- 206,968 m^2 GFA (200,668 m^2 GLA) of warehouse and office floorspace,
- Sum of 4 car parking access crossovers on Estate Road 03,
- A primary entry and exit access crossover to hardstand area at the northern end of the site,
- A secondary exit only crossover at the southern end of the site, and

- Total of 1,127 car parking bays and 128 bicycle parking spaces plus 54 motorcycle bays.

A separate annexure has been prepared and attached in Appendix A of this report which deals with the Stage 2 DA.

In summary, the following key findings are noteworthy:

- Traffic impact of the Stage 2 DA (Building 2B) have been assessed as part of the MOD 3 and will not have any additional impacts from MOD assessment. In this regard, it is noted that development of Building 2B will not result in requirements for any additional road upgrades beyond that already identified and approved,
- Stage 2 DA will provide ample car parking bays as required by Condition B13 of the approval,
- A preliminary Sustainable Travel Plan has been prepared to promote non-car travel modes, including identifying pedestrian and cyclist facilities to service the relevant Stage of the Development.

1 Introduction

Ason Group has been engaged by Goodman Property Services (Aust) Pty Ltd (Goodman) to prepare a Traffic Impact Assessment (TIA) to assess the traffic and parking implications of:

- proposed modifications (MOD 3) to the recently approved (13 September 2019) SSD 7348 at Oakdale West Industrial Estate (OWE), and
- a stage 2 Development Application (DA SSD 10397) in relation Building 2B.

1.1 Study Purpose

From the outset, it is critical to state that – given the recent DPIE approval of SSD 7348 – MOD 3 has been assessed in this TIA against the 'benchmark' conditions as detailed in the SSD application, given that these conditions have inherently been considered and validated by the key consent authorities, including the DPIE and Roads and Maritime Services (RMS).

This TIA therefore provides an assessment of the traffic characteristics of the Estate further to MOD 3, which have then been compared to the approved characteristics of the OWE to determine any significant departures from the current approval.

1.2 Reference Documents

In the preparation of this TIA, reference has been made to the following key transport standards and guidelines:

- RMS Guide to Traffic Generating Developments (RMS Guide).
- Austroads Guide to Road Design Part 3: Road Geometry (Austroads GRD3).
- Austroads Guide to Road Design Part: 4A Unsignalised and Signalised Intersections (Austroads GRD4A).
- Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis (Austroads GTM3).
- Australian Standard 2890.1: Parking Facilities – Off-Street Car Parking (AS 2890.1).
- Australian Standard 2890.2: Parking Facilities – Off Street Commercial Vehicle Facilities (AS 2890.2).
- Australian Standard 2890.3: Parking Facilities – Bicycle Parking (AS 2890.3).
- Australian Standard 2890.6: Parking Facilities – Off Street Parking for People with Disabilities (AS 2890.6).

This TIA also references assessments relating to development within the OWE; the broader Oakdale Industrial Estate in which the OWE lies; and the Broader Western Sydney Employment Area, including:

- Ason Group, Traffic Impact Assessment Oakdale West Estate State Significant Development Application – Response to Submissions, 27 November 2018 (OWE TIA RTS)
- Ason Group, Traffic Impact Assessment Oakdale West Industrial Precinct State Significant Development Application prepared by Ason Group, 24 March 2017 (OWE TIA 2017).
- Ason Group, Traffic Impact Assessment Oakdale West Industrial Estate SSD MOD 2 prepared by Ason Group, 11 Oct 2019 (0950r01v10 SSD MOD 2 TIA).
- GHD, Erskine Park Traffic Modelling – Proposed Western North South Link Road, May 2016 (WNSLR Report).
- AECOM, Broader WSEA SLRN – Options Refinement (2014), 6 May 2014 (SLRN Options Report).
- GHD, Old Wallgrove Road Extension Interim Network Testing, 28 March 2014 (OWR Extension Report).
- GHD, Broader Western Sydney Employment Area – Transport Planning Preliminary Analysis, Exhibition Draft, June 2013 (BWSEA Transport Report).
- GHD, Old Wallgrove Road Upgrade (Roberts Road - M7 Motorway) Traffic and Transport Report, 30 April 2012 (OWR Upgrade Report).
- AECOM, Western Sydney Employment Area – Southern Link Road Network Strategic Transport Assessment, 18 April 2011 (SLRN Report).
- RMS, Southern Link Road / WSEA RNS Key Stakeholder Briefing, July 2019
- RMS, Trip Generation Surveys - Business Parks and Industrial Estate Data Report, August 2012

2 Oakdale West Estate Approval

OWE, as approved, is shown in its local context in **Figure 1**.

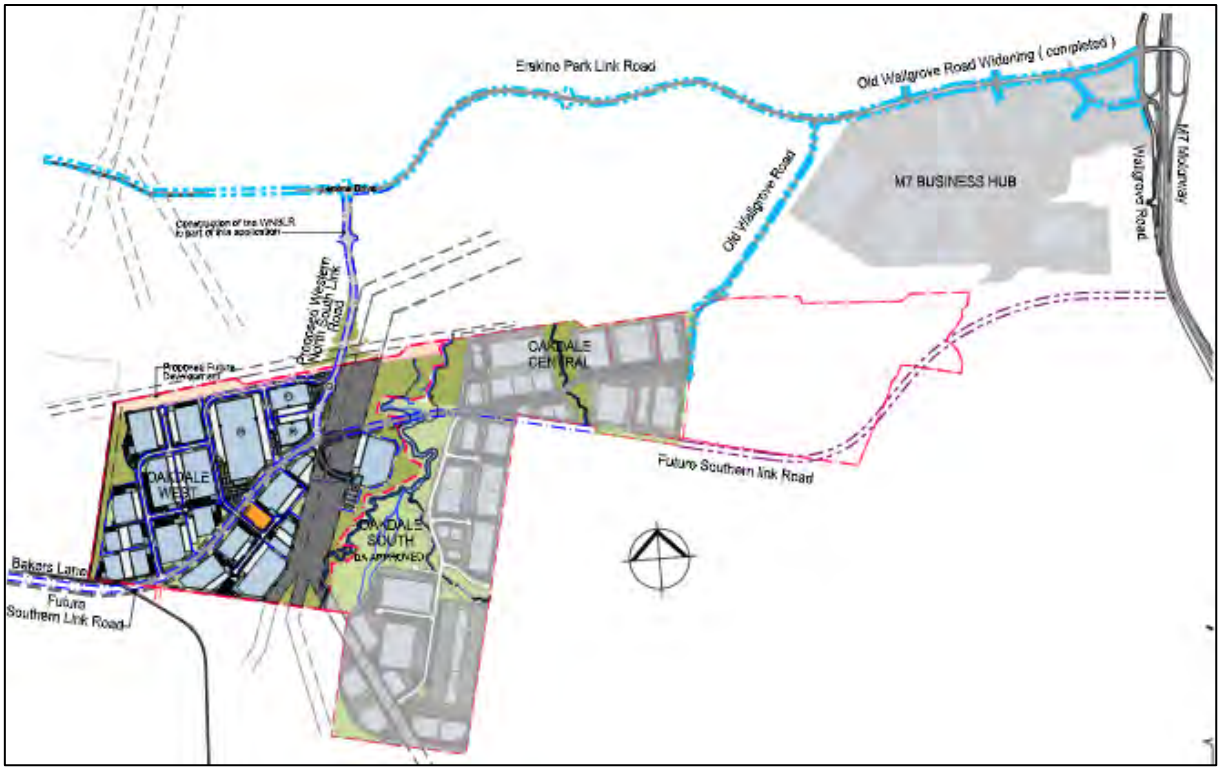

Figure 1: Oakdale West Estate Local Context

2.1 SSD 7348 Approval

The development (SSD 7348) was determined on 13 September 2019 and approved with Conditions of Consent. A copy of the approved and stamped Master Plan is provided in **Figure 2**. A summary of the SSD key characteristics – with specific considerations for Precincts 2 and 3 – is provided in the below table. It is again noteworthy that MOD 3 will have some minor impacts on all other precincts; however, the majority of changes will be at Precincts 2 and 3.

Table 1: SSDA 7348 Approval

SSD 7348 Approval	Oakdale West Estate	Precinct 2	Precinct 3	Precincts 2 & 3 Total
Warehouse GFA (m^2)	452,493	102,010	97,587	199,597
Office GFA (m^2)	22,776	5,101	4,879	9,980
Total GFA (m^2)	**475,269**	**107,111**	**102,466**	**209,577**
Number of Parking Spaces	2,542	570	604	1,174

Note: Condition B9(c) of the approval excludes the footprints for Lots 2E, 2F, 2G, 2H, 2J and 4A from the approval and postpone further assessment to relevant DAs, however, their traffic impacts have inherently been reviewed, assessed and signed off as part of the approval. Hence this TIA refers to the approved traffic generation for these Lots.

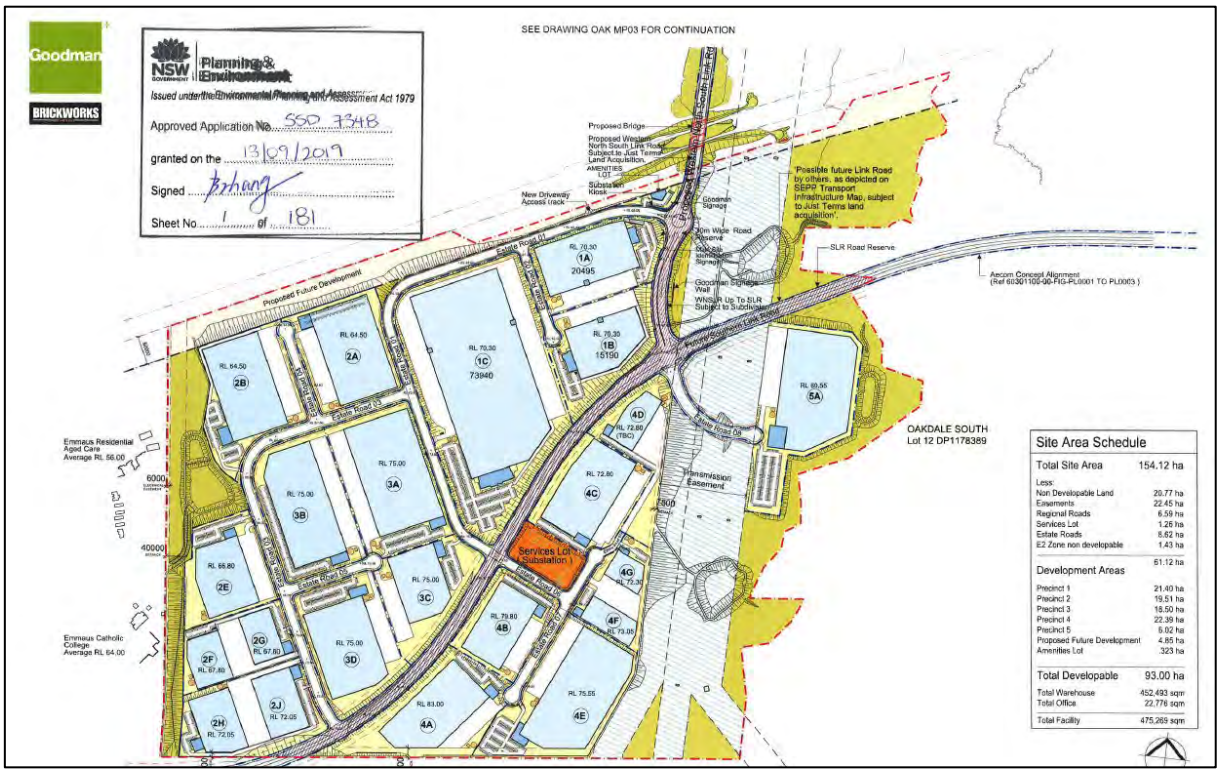

Figure 2: Approved Master Plan

A copy of the approved Precinct Plan is also shown in **Figure 3**.

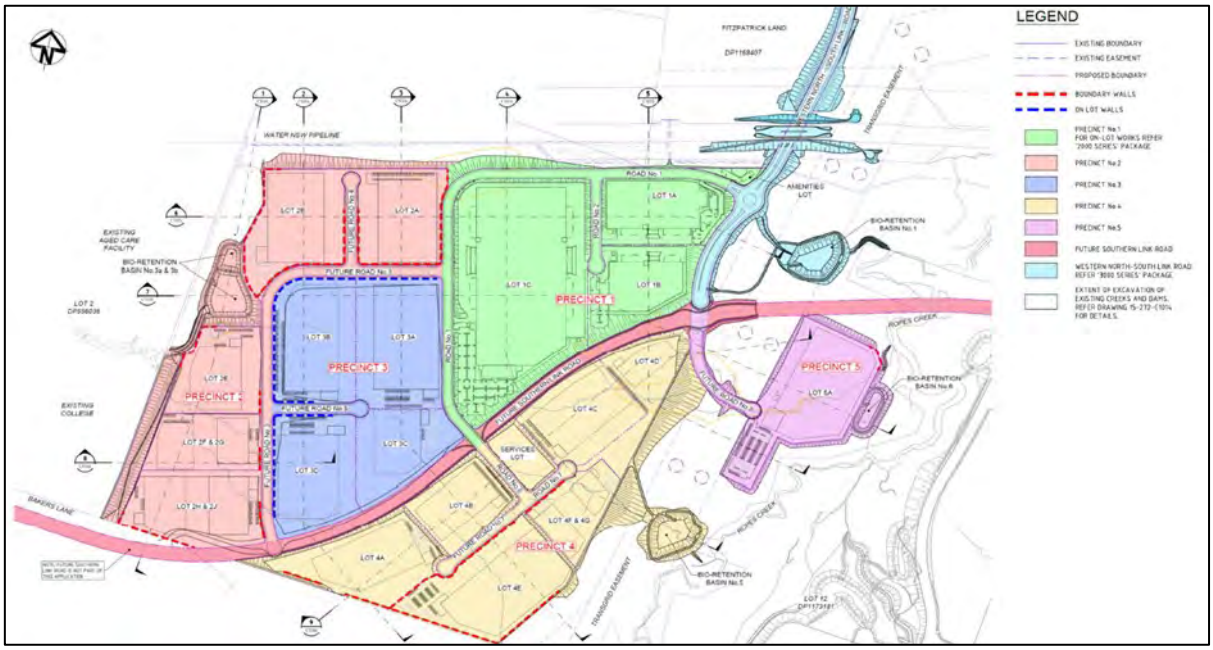

Figure 3: Approved Precinct Plan

2.2 Response to Secretary's Environmental Assessment Report

Relevant responses to the Secretary's Environmental Assessment Report (SEAR) SSD 10397 and SSD 7348 MOD 3 – dated 15 November 2019 – has been provided in the following table.

Table 2: Response to SEAR

No.	Comment	Ason Response
Traffic and Transport – including		
1	a Traffic Impact Assessment detailing all daily and peak traffic and transport movements likely to be generated (vehicle, public transport, pedestrian and cycle trips) during construction and operation of the development, including a description of vehicle access routes (construction and operation) and the impact on nearby intersections;	This TIA has been prepared as a response to this comment. The Proposal is not anticipated to generate significant pedestrian and/or public transport trip during the construction or operation of MOD 3. However, details of daily and peak hour traffic generation of the MOD 3 has been reviewed (at operational phase) and outlined in section 5. Impact of the MOD 3 on the surrounding road network during the non-peak seasonal and peak seasonal periods have also been assessed and discussed in this section. Section 6 of this TIA provides an assessment of construction impacts associated with MOD 3. In summary, the quantum of cut to fill anticipated to deliver the site plan is less than that anticipated and approved in the original Concept and Stage 1 consent. Accordingly, the this is anticipated to result in reduction in traffic impacts on the wider network as a result of the revised earthworks plan.
2	details of access to the site from the road network including intersection location, design and sight distance;	Access to the revised precincts proposed by MOD 3 will be similar to the approved 2019 Master Plan.. Localised changes to the internal Estate Roads are detailed in section 3.3. Details regarding on-site design for the relevant DA for each building. In this regard, further discussion regarding access arrangements for Building 2B are provided in Appendix A.

No.	Comment	Ason Response
Traffic and Transport – including		
3	an assessment of the predicted impacts on road safety and capacity of the road network to accommodate the development;	Section 5 of this TIA outlines the modelling results and reviews the traffic impact of the proposed MOD 3 on critical intersections. In accordance with the SIDRA results, no additional upgrades are required over the 2019 approval
4	detailed plans of the proposed site access and parking provision on site in accordance with the relevant Australian Standards and with reference to the approved concept plan (SSD 7348).;	MOD 3 parking provision in accordance with the approved SSD 7348 has been discussed in section 4. Access to the revised precincts proposed by MOD 3 will be similar to the approved concept plan with no changes. However, this comment does not seem to be directly relevant to the MOD 3 and review of access and parking design relevant to the subsequent stage detailed building DAs shall be undertaken as part of that subsequent stage assessment.
5	details of impact mitigation, management and monitoring measures.	As outlined in section 5, the traffic modelling undertaken as part of the MOD 3 suggests that no additional road upgrades will not be required as a result of the MOD 3 when compared to the approved concept plan . Furthermore, mitigation and management measures - if necessary - can be dealt with as part of the subsequent stage building applications.

2.3 Conditions of Consent

Conditions of consents relevant to this TIA, as well as brief response regarding MOD 3, are outlined in the following table.

Condition Number	Condition	Ason Response considering MOD 3
B13	The Applicant shall ensure the Concept Proposal provides car parking in accordance with the following rates: (a) 1 space per 300 m^2 of warehouse GFA; (d) 1 space per 40 m^2 of office GFA; and (e) 2 spaces for disability parking for every 100 car parking spaces.	No change to proposed car parking rates are proposed.
B14	The Applicant shall provide bicycle racks, and amenity and change room facilities for cyclists in accordance with Planning Guidelines for Walking and Cycling (December 2004, NSW Department of Infrastructure, Planning and Natural Resources and the Roads and Traffic Authority)	This is a detailed design matter that can be dealt with as part of future Development Applications for individual buildings.
C9	Future DAs shall be accompanied by a transport, access and parking assessment. The assessment must: (a) assess the impacts on the safety and capacity of the surrounding road network and access points during construction and operation of the relevant Stage; (b) demonstrate internal roads and car parking complies with relevant Australian Standards and the car parking rates in Condition B13; (c) detail the scope and timing of any required road upgrades to service the relevant Stage; and (d) detail measures to promote non-car travel modes, including a Sustainable Travel Plan identifying pedestrian and cyclist facilities to service the relevant Stage of the Development.	Noted. Future Development Applications shall be accompanied by a suitable transport assessment. This includes Stage 2 DA SSD 10397, attached in **Appendix A**.
D47	The Applicant must design and construct the intersections of the WNSLR with Estate Road 1 and Lockwood Road to the satisfaction of the relevant roads authority.	Noted. WNSLR and Estate Road 01 and Lockwood Road will be delivered as part of earlier

Condition Number	Condition	Ason Response considering MOD 3
		stages of the project prior to MOD 3 and proposed to be delivered in line with these requirements. No change to the approved geometry is required as a result of MOD 3.
D48	Prior to the commencement of construction of the Lenore Drive/Grady Crescent/WNSLR intersection (the intersection), the Applicant must finalise the detailed design, including a Traffic Signal Plan, for the intersection works. The detailed design must: (a) cut back the median further with a taper in Grady Crescent to accommodate the dual B-Double swept paths turning from WNSLR onto Lenore Drive; and (b) include an angled pedestrian crossing on the south-eastern corner of the intersection so that pedestrians are not confused by the pedestrian lantern on the opposite side of the intersection.	Noted. No change to the approved geometry or signal phasing arrangements is required as a result of MOD 3.
D49	The Applicant must enter into a WAD for works at the intersection with TfNSW (former RMS). The WAD must be executed prior to the submission of the detailed design required under condition D48 to TfNSW for approval.	Noted. No change to the approved geometry or signal phasing arrangements is required as a result of MOD 3.
D50	The Applicant must design the proposed traffic control light at the intersection in accordance with Austroads guidelines, RMS Signal Design Manual and Australian Codes of Practice. The traffic control light design must be endorsed by a suitably qualified practitioner whose qualification has been approved by TfNSW (former RMS).	Noted. No change to the approved geometry or signal phasing arrangements is required as a result of MOD 3.
D51	The Applicant must submit the certified copies of the traffic signal design plans to TfNSW (former RMS) for approval prior to the issue of a Construction Certificate	Noted. No change to the approved geometry or signal phasing arrangements is required as a result of MOD 3.
D52	The Applicant must submit a request to TfNSW (former RMS) Network Operations Team to obtain relevant approvals to remove the signalised pedestrian crossing on the eastern leg of the intersection.	Noted. No change to the approved geometry or signal phasing arrangements is required as a result of MOD 3.
D65	Prior to the commencement of construction of Stage 1, the Applicant must prepare a Construction Traffic Management Plan (CTMP) to the satisfaction of the Planning Secretary. The CTMP must form part of the CEMP required by Condition D119 and must: (a) be prepared by a suitably qualified and experienced person(s); NSW Government 15 Oakdale West Estate Department of Planning, Industry and Environment (SSD 7348) (b) be prepared in consultation with Council, Mamre Anglican School, Emmaus Catholic College, Emmaus Catholic Care Village and Trinity Catholic Primary School; (c) detail specific measures to manage construction traffic to avoid school drop off and pick up times (Monday to Friday 8 am – 9.30 am and 2.30 pm – 4 pm) and Higher School Certificate exam periods, including any temporary infrastructure arrangements and traffic safety measures; (d) detail the measures to be implemented to ensure road safety and network efficiency during construction, including scheduling deliveries of heavy plant and equipment outside of peak periods, or during school holidays where possible; (e) detail heavy vehicle routes, access and parking arrangements; (f) include a Driver Code of Conduct to: i. minimise the impacts of construction on the local and regional road network; ii. minimise conflicts with other road users including the students, staff, visitors and residents of the neighbouring schools and aged care village; iii. minimise road traffic noise, both on Bakers Lane and from construction vehicles on Site; and iv.	A detailed Construction Environmental Management Plan (CEMP) – including a Construction Traffic Management Plan (CTMP) – has been prepared in response to the original approval. It is a requirement of the Plan to be updated in response to changing conditions / requirements and, accordingly, will be updated (if required) in response any approval of MOD 3. Notwithstanding, it should be emphasised that the changes proposed as part of MOD 3 are largely internal and thus do not have a material impact on construction traffic impacts or management thereof. Indeed, according to the advice provided by AT&L, no additional construction traffic movements are expected as a result of

Condition Number	Condition	Ason Response considering MOD 3
	ensure truck drivers use specified routes and adhere to the speed restrictions on Bakers Lane; (g) include a program to monitor the effectiveness of these measures; and (h) detail procedures for early notification to residents and the community (including local schools), of any potential disruptions to routes.	MOD 3 when compared in context of MOD 1 and 2.
D67	The Applicant must design and construct the internal estate roads and intersections to accommodate the turning path of a B-Double, to the satisfaction of the Relevant Roads Authority.	All roads as part of the MOD 3 have been designed to cater for 26.0m B-Doubles as the design vehicle.
D68	Following the issue of a Subdivision Certificate, the estate roads shall be dedicated to the Relevant Roads Authority. Prior to any dedication, the Applicant shall ensure construction of the estate roads has been completed to the satisfaction of the Relevant Roads Authority and measures (such as a performance bond) are in place for any prescribed maintenance period, to the satisfaction of the Relevant Roads Authority.	Noted.

2.4 Approved Traffic Generation

Following traffic generation rates have been adopted as part of the approved OWE Master Plan studies:

- 1.892 vehicles per day per 100 m^2 of GFA, and
- 0.163 peak vehicles per hour per 100 m^2 GFA.

Accordingly, the approved TIA estimates the following traffic generation for the OWE:

Table 3: SSD 7348 Approved Traffic Generations

Precinct No.	SSD 7348 Approval		
	GFA (m^2)	AM / PM Peak Hour (vehicular traffic)	Daily (vehicular traffic)
Precinct 1	116,359	190	2,202
Precinct 2	105,425	172	1,995
Precinct 3	9,9967	163	1,891
Precinct 4	120,988	197	2,289
Precinct 5	32,530	53	615
Total	**475,269**	**775**	**8,992**

Accordingly, the following peak hour and daily traffic figures readily have been approved for Precincts 2 and 3:

- AM and PM peak hour: 335 vehicular trips/hr
- Daily: 3,886 vehicular trips/day

2.5 Future Intersection Layouts

2.5.1 2026 Modelling Scenario (interim)

Indicative layouts of key intersections approved as part of the SSD 7348 approval are shown in **Figure 4**. Reference should be made to civil engineering drawings, prepared separately by AT&L, for detailed intersection and road designs.

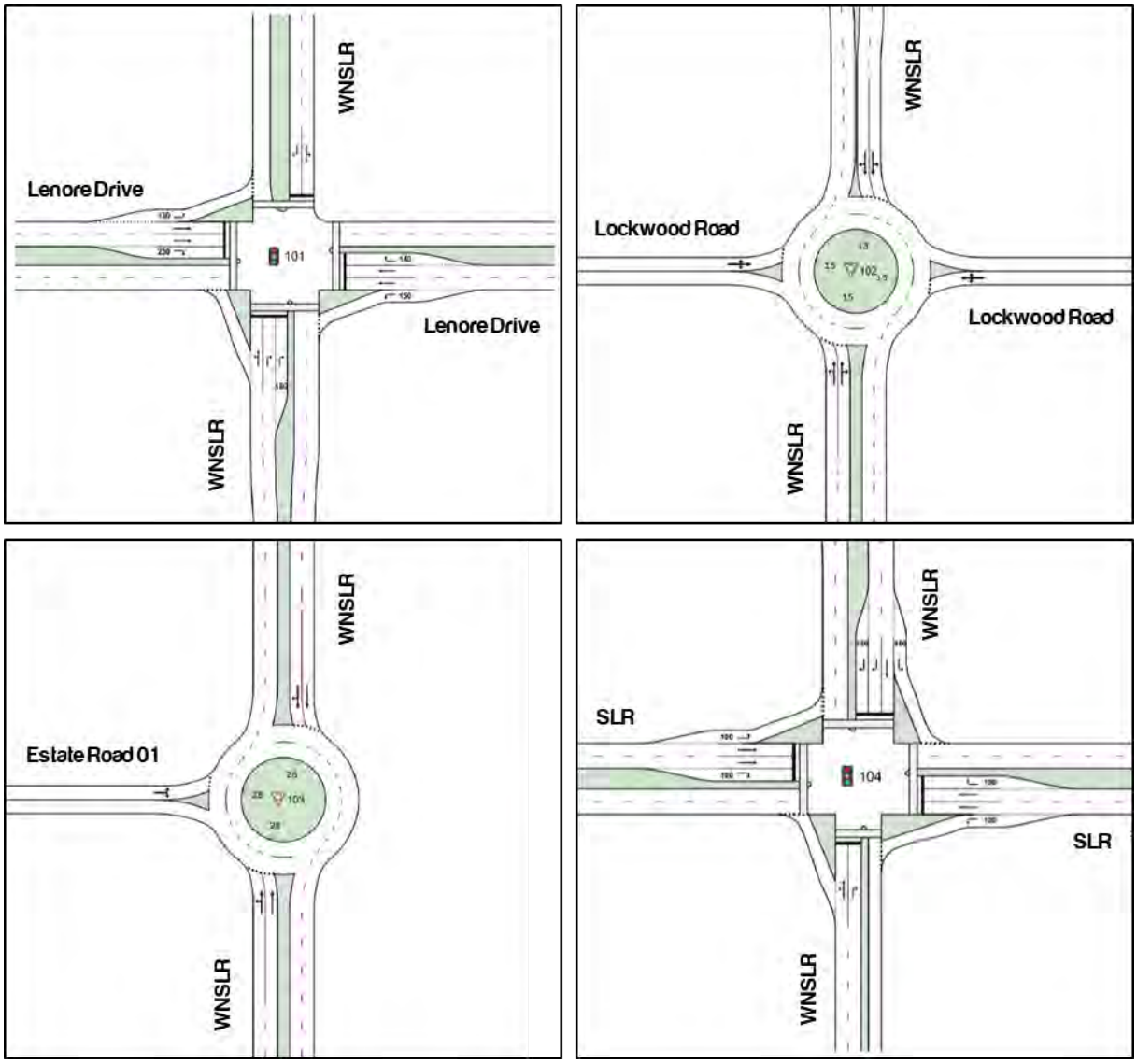

Figure 4: Approved Intersection Layouts – 2026 Modelling Scenario

2.5.2 2036 Modelling Scenario (Ultimate)

Furthermore, the original Concept Plan made allowances for potential – additional – upgrades to the Lenore Drive / WNSLR intersection by 2036, should this be deemed necessary by RMS at some point in the future. Accordingly, following intersection layout have previously been adopted for the ultimate modelling year (being 2036).

It is emphasised that additional upgrade works at this intersection are not proposed under this application and are generally attributed to additional background traffic growth to 2036. Notwithstanding, similar to the original submission, sufficient space is expected to be provided at this intersection to accommodate the additional turning lanes necessary (as documented in the engineering drawings submitted by AT&L) should these forecast traffic volumes be realised and improvement works be required at some point in the future.

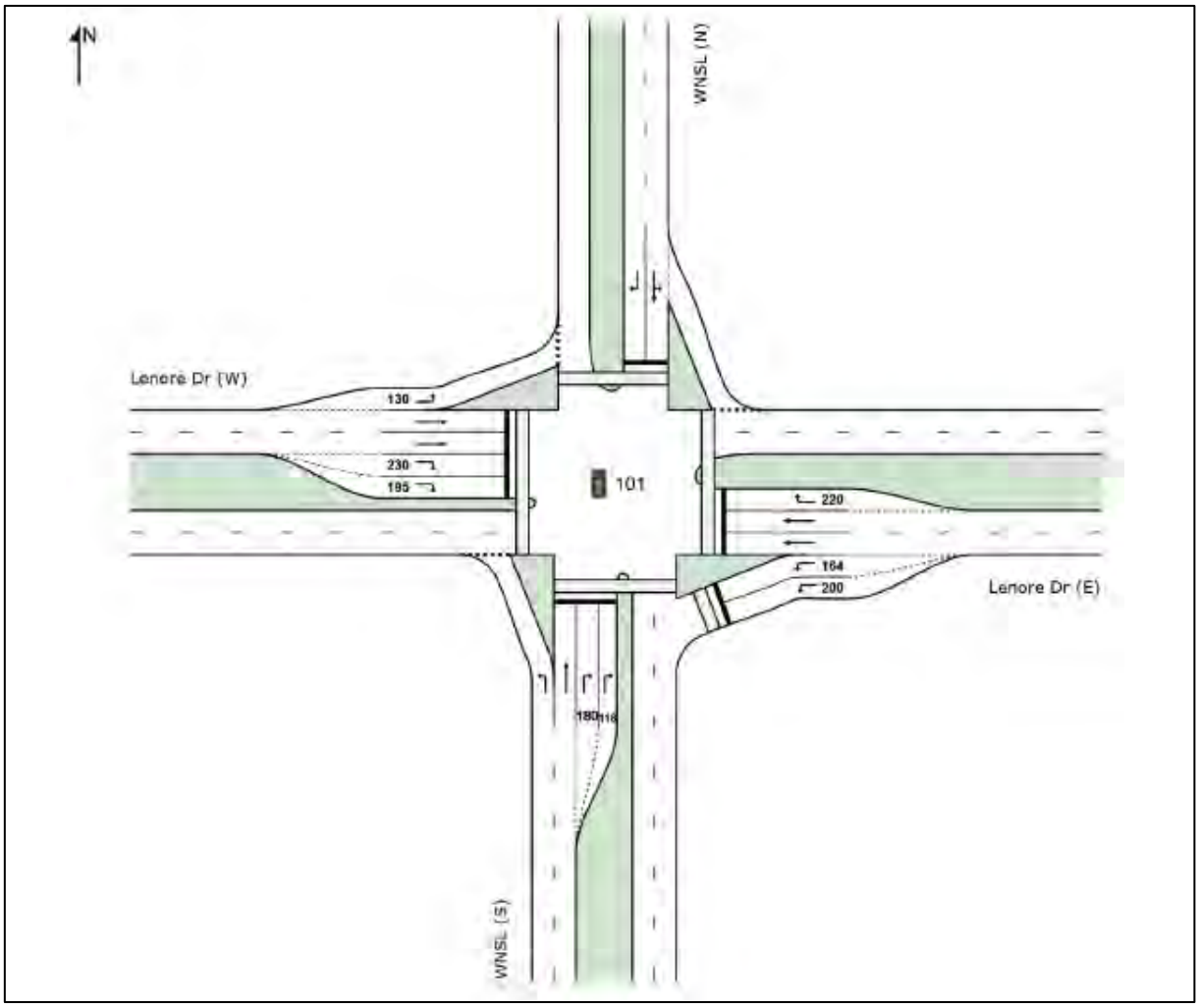

Figure 5: Lenore Drive / WNSLR intersection (Additional Upgrades) – 2036 Modelling Scenario

3 Modification 3 Description

3.1 MOD 3 Master Plan

Full details of MOD 3 are provided in the Environmental Impact Statement (EIS) which this TIA accompanies. A reduced scale of Master Plan further to MOD 3 is provided in **Figure 6** below.

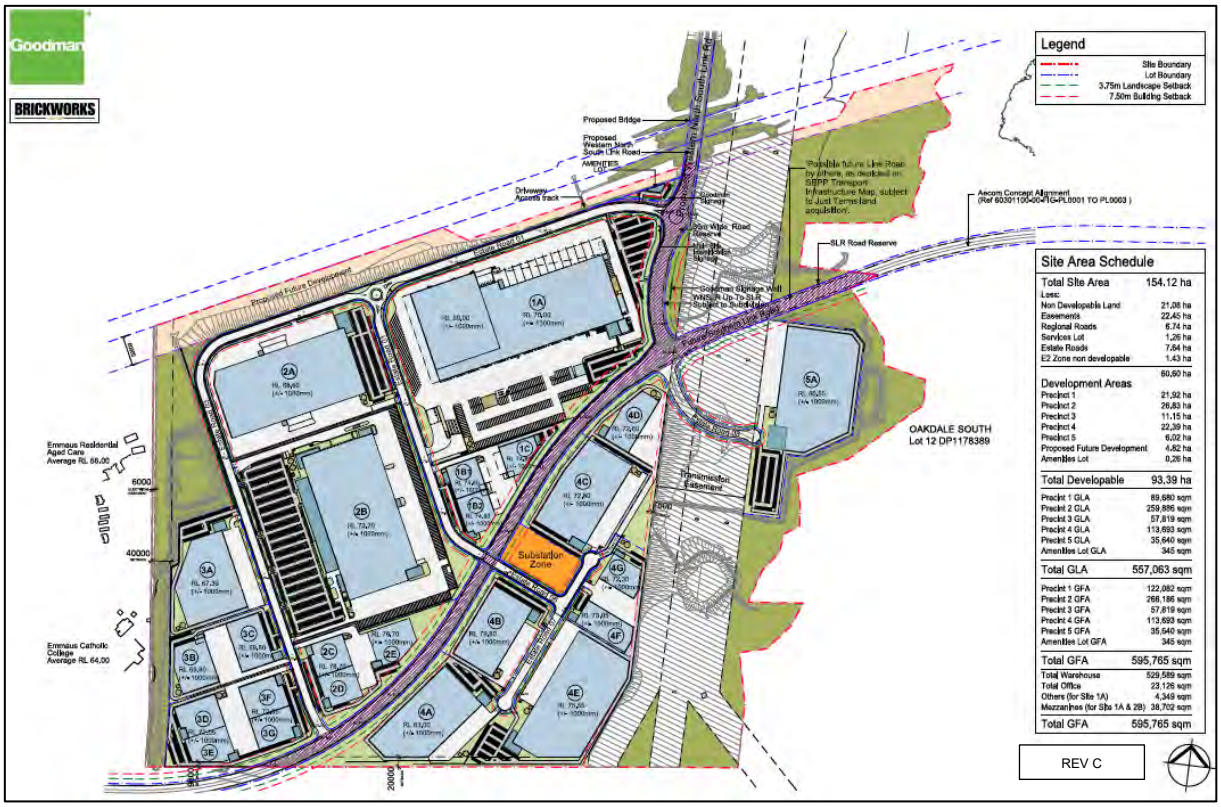

Figure 6: Modification 3 Master Plan

As stated before, MOD 3 will primarily affect some internal roads and Precincts 2 and 3 built forms, including:

- Realignment of the estate roads through Precinct 2 & 3 as a modification to the Stage 1 consent.
- Provision of a roundabout controlled intersection at the new Estate Road 01 and 03 intersection as a modification to the Stage 1 consent, and
- An increase to the overall built-form Gross Floor Area as a modification to the Stage 1 consent.

For clarity, extent of the MOD 3 when compared to the approved development plans is demonstrated in **Figure 7**.

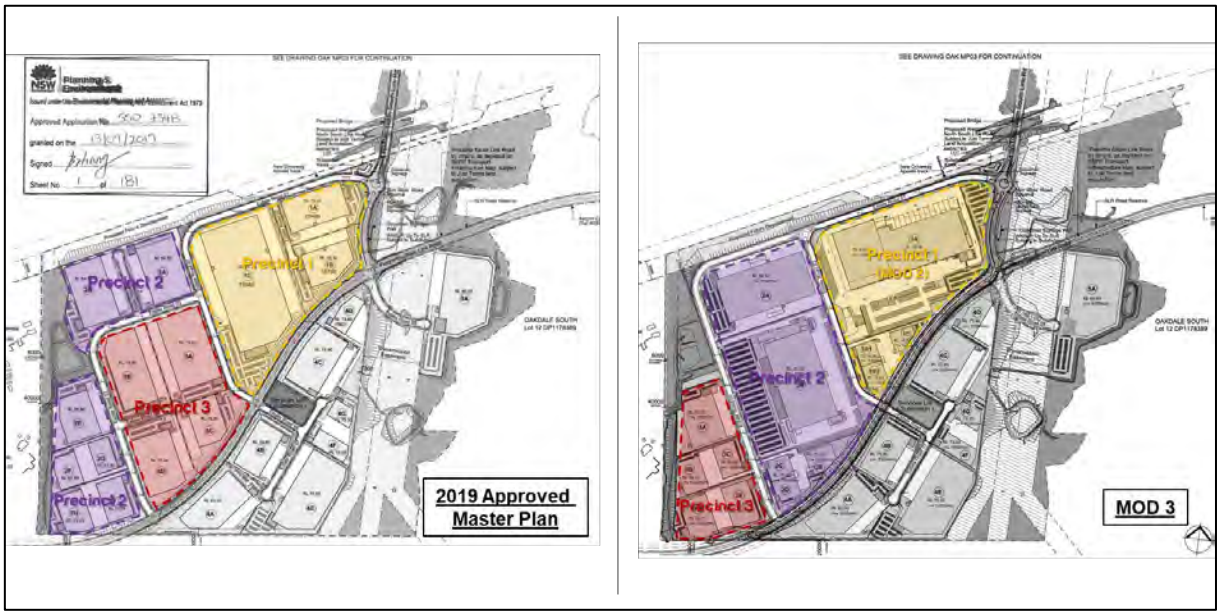

Figure 7: 2019 Approved Masterplan vs MOD 3

3.2 Proposed Building Characteristics

The following table outlines a comparison between areas schedule between the proposed Concept Plan Modification 3 and the approved Concept Plan.

Table 4: Area Comparison

Precinct No.	Original Approval GFA m^2	MOD 2 GFA m^2	MOD 3 GFA m^2	Difference (MOD 3 and approval) GFA m^2
Precinct 1	116,359	122,082	122,082	**5,723**[1]
Precinct 2	105,425	107,111	266,186	**160,761**
Precinct 3	99,967	102,466	57,820	**(-) 42,147**
Precinct 4	120,988	113,693	113,693	**(-) 7,294**[2]
Precinct 5	32,530	35,640	35,640	**3,110**[2]
Amenities Lot	-	-	345	**345**
Total	**475,269**	**480,992**	**595,765**	**120,496**

Notes: 1) As a result of MOD 2.

2) Minor changes to Precincts 4 & 5 are due to MOD 3.

It is acknowledged that upon completion of MODs 2 and 3, OWE would provide some ***595,765 m²*** of building which is 120,496 m² above that envisaged by the SSD 7348 Approval (2019). Notably, this is attributed to the increase in number of warehouse levels, as opposed to increase in building footprints.

The traffic implications for the surrounding road network as a result of this increased GFA is discussed in section 5.

3.3 Internal Intersection Layouts

MOD 3 seeks approval for the following internal road changes to the Master Plan, and their construction as a modification to the Stage 1 consent:

- Re-configuration of Estate Road 03
- Removal of Estate Road 04 and Estate Road 05
- A new roundabout at intersection of Estate Roads 1 & 3

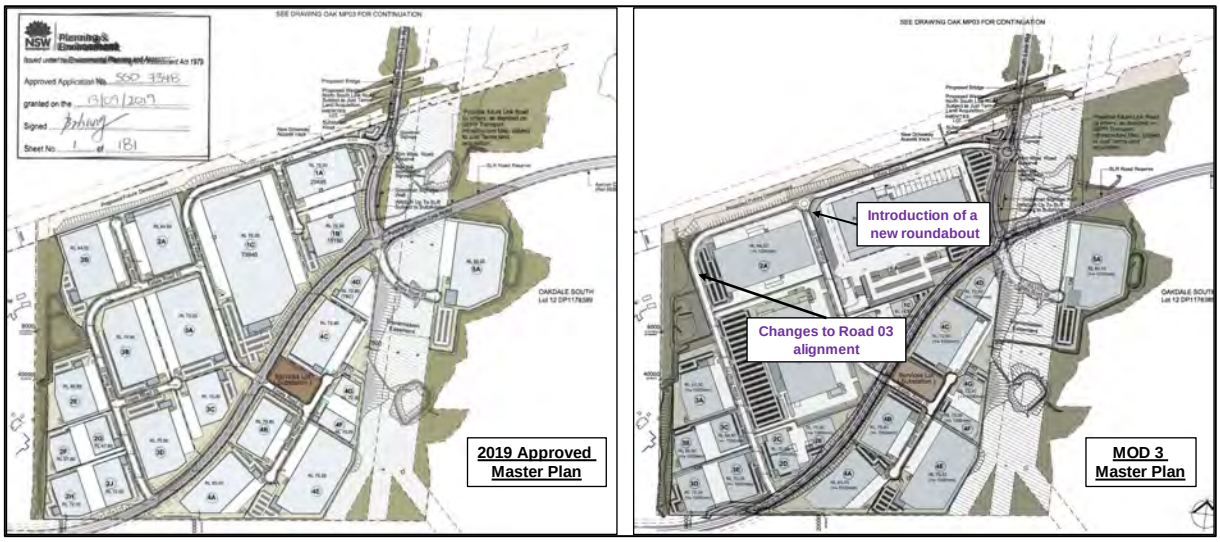

Figure 8: Internal Road Changes

Additionally, the *Southern Link Road / WSEA RNS Key Stakeholder Briefing (RMS, July 2019)* indicates that the intersections of SLR / Estate Road 01 and Estate Road 03 may be signalised intersections. Final resolution of these intersections and their timing are not yet determined and therefore, in the absence of detailed civil plans of these intersections, the following layouts have been adopted for the modelling assessment.

It should be noted that the internal roundabout SIDRA modelling is based on the resolved civil design of this intersection subject of SSD 10397 being Stage 2 DA and associated works.

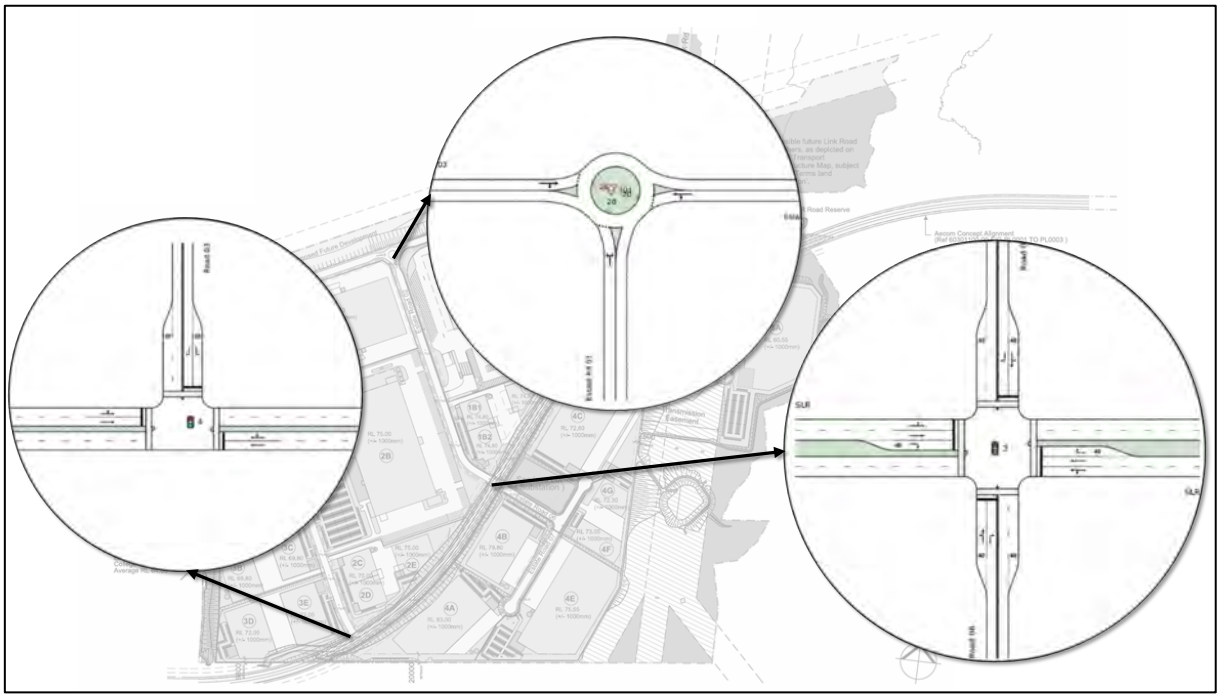

Figure 9: Internal Intersection Layouts – For the Purpose of Modelling

4 Parking Provisions

4.1 Car Parking

No change to the car parking requirements approved as part of the original Concept Plan are proposed under MOD 3. It is considered that detailed parking assessment for each individual building should be deferred to their respective DA assessment.

4.1.1 Approved Parking Rates

For clarity, the approved car parking rates — in accordance with Condition B13 — are outlined below.

Table 5: Approved Parking Rates

Land Use	Parking Rate
Warehouse	1 space per 300 m^2
Office	1 space per 40 m^2

Detailed car parking demand vs. supply assessment shall be undertaken as part of the DA stage assessments.

4.1.2 Accessible Parking

Condition B13 of the approval requires 2 accessible parking bays for every 100 car parking spaces of which should be considered for future DAs.

4.2 Bicycle Parking

Condition B14 of the approval suggest that the applicant shall provide bicycle racks in accordance with the *Planning Guidelines for Walking and Cycling* (December 2004, NSW Department of Infrastructure, Planning and Natural Resources and Roads and Traffic Authority). Accordingly, the following bicycle rates should be considered for future DAs:

- Staff Bicycle Parking Requirement 3-5% of staff number (for each building)
- Visitor Bicycle Parking Requirement 5-10% of staff number (for each building)

5 Traffic Assessment

5.1 Traffic Generation Estimation

This TIA reviews the proposed traffic generation of the MOD 3 Precinct and building layout in accordance with two different approaches, defined below:

- **Theoretical approach** – using the approved generation rates outlined in section 2.4 for all precincts,
- **Combined approach** – combination of first principles and generic assessments having regard for the operational information provided for specific building tenants. Specifically, a first-principles assessment for Building 1A (as part of MOD 2) and Building 2B (as part of SSD 10397) and adoption of the approved trip rates for all other buildings and precincts for which tenants are not yet known.

5.1.1 Theoretical Approach (Generic Rates)

Traffic generation adopted for MOD 3 assessments are identical to the approved rates which were outlined in section 2.4, and are utilised to inform the original traffic assessment in the Concept application. Application of these generic trip rates to proposed MOD 3 built form results in the following peak hour and daily traffic generation for each Precinct.

Table 6: MOD 3 Precinct Traffic Generation – Generic Trip Rates

Precinct No.	GFA m^2	AM / PM (vehicular traffic/hr)	Daily (vehicular traffic/day)
Precinct 1	122,082	199	2,310
Precinct 2	266,186	434	5,036
Precinct 3	57,820	94	1,094
Precinct 4	113,693	185	2,151
Precinct 5	35,640	58	674
Total	**595,420**	**971**	**11,265**

Note: 1) Figure includes both Light Vehicle (staff) and Heavy Vehicle movements
As the amenities lot is ancillary to the primary developments, it does not generate traffic and is not listed above.

When considering the generic trip approach above, Precinct 2 and 3 are expected to generate the following combined peak hourly and daily traffic movements:

- Peak hour: 528 vehicular trips/hr

- Daily: 6,130 vehicular trips/day

5.1.2 Combined Approach (First principles Assessment)

Ason Group has been advised that the Building 2B tenancy agreement (within Precinct 2 and subject to SSD 10397) has already been discussed and as such the immediate tenant for this building has provided detailed, hourly traffic movements (separated for light and heavy vehicles for staff and commercial movements) in accordance with their operational needs. These volumes are outlined in the Building 2B DA transport assessment report, which is included in **Appendix A**.

Precinct 2 traffic generation has been estimated having regard for the abovementioned schedules for Building 2B, and a generalised trip rate assessment based on nominal GFA's for the other future buildings within the Precinct.

It is noted that a 'seasonal peak' demand scenario figures have also been provided. However, it is emphasised that these higher volumes would occur only for a short period of time in advance of busy consumer periods (Christmas and other special days). Accordingly, the following table outlines the peak hour and daily traffic generation based on first principles assessment for both 'seasonal peak' and 'non seasonal peak' periods.

In preparation of **Table 7**, consideration has also been given to the MOD 2 traffic volumes for Precinct 1, and it should be noted that, for **CONSERVATIVE** assessment, it is assumed that the 'seasonal peak' for building 1A tenant (refer to MOD 2 TIA) and building 2B tenant will occur at the same time. Accordingly, this translates into the 'worst case scenario' for traffic impact review which may not even occur as part of the operation of these two buildings.

Table 7: MOD 3 Precinct Traffic Generation – Combined Approach

Precinct No.	GFA m^2	AM Peak	PM Peak	Daily
Precinct 1[1]	122,082	94 (103)[2]	74 (78)	2,059 (2,503)
Precinct 2	264,107	677 (920)[2]	468 (629)	3,797 (4,901)
Precinct 3	57,819	94	94	1,094
Precinct 4	113,693	185	185	2,151
Precinct 5	35,640	58	58	674
Total	**595,420**	**1,108 (1,360)**	**879 (1,044)**	**9,776 (11,324)**

Note: 1) Detailed first principles traffic generation assessment of Building 1A is included in MOD 2 TIA.

2) Figures in bracket shows peak seasonal changes. These traffic figures demonstrate the maximum possible traffic generation for Buildings 1A and 2B during their peak seasonal periods.

5.1.3 Traffic Generation Summary

The first-principles assessment results in a higher traffic generation than the generic traffic generation based purely on the 'approved rates' to all building areas. This is typical, noting that the approved rates reflect average rates and individual buildings / lots may vary slightly above and below that rate. Therefore, for conservative assessment, this traffic generation has been adopted for traffic impact review and modelling purposes. Accordingly, the following peak hour and daily traffic volumes have been estimated for Precincts 2 and 3:

- AM Peak: 771 (1,014) vehicular trips/hr
- PM Peak: 562 (723) vehicular trips/hr
- Daily: 4,891 (5,995) vehicular trips/day

Following **Table 8** outlines a comparison between SSD 7348 approved generation with the MOD 3 traffic generation estimation. As mentioned above, for **conservativeness**, the results from the combined assessment has been adopted for the impact review.

Table 8: Traffic Generation Comparison

Precinct No.	SSD 7348 Approval			MOD 3			Difference		
	AM	PM	Daily	AM	PM	Daily	AM	PM	Daily
Precinct 1	190	190	2,202	94 (103)	74 (78)	2,059 (2,503)	-96 (-87)	-116 (-112)	-143 (301)
Precinct 2	172	172	1,995	677 (920)	468 (629)	3,797 (4,901)	505 (748)	296 (457)	1,802 (2,906)
Precinct 3	163	163	1,891	94	94	1,094	-69	-69	-797
Precinct 4	197	197	2,289	185	185	2,151	-12	-12	-138
Precinct 5	53	53	615	58	58	674	5	5	59

Total	**775**	**775**	**8,992**	**1,108 (1,360)**	**879 (1,044)**	**9,776 (11,324)**	**333 (585)**	**104 (269)**	**784 (2,332)**

Note: 1) Figures in bracket shows peak seasonal changes.

Accordingly, upon full completion of MODs 2 and 3 the surrounding road network would see an increased traffic generation of 333 (585 during peak season) and 104 (269 during peak season) vehicular trips/hr during AM and PM peak period and additional of 784 (2,322 during peak season) vehicular trips/day during the weekday.

It is important to note that the peak seasonal is expected to only occur for a short period of time, and the above assessment has assumed that the seasonal peak for building 1A tenant (refer to MOD 2 TIA) and building 2B tenant will occur at the same time. Accordingly, the quantum of anticipated vehicle movement for this MOD, used in the traffic assessment in **Section 5** is considered robust and conservative.

5.2 Trip Distribution

5.2.1 Inbound / Outbound Trip Distribution

As discussed above, Ason Group has been provided with detailed operational information (hourly traffic generation for light and heavy vehicles, with separated inbound / outbound movements) for Building 2B.

Additionally, a review of the *Trip Generation Surveys - Business Parks and Industrial Estate Data Report* (RMS 2012) demonstrated the following inbound / outbound trip distribution:

- Light Vehicle:
  - AM Peak: 80% inbound movement, 20% outbound movement
  - PM Peak: 20% inbound movement, 80% outbound movement
- Heavy Vehicle:
  - AM Peak: 50% inbound movement, 50% outbound movement
  - PM Peak: 50% inbound movement, 50% outbound movement

5.2.2 Directional Trip Distribution

A review of the RMS EMME data for the relevant selected zone in the area (Z3479) for year 2036 demonstrated the following regional trip distribution:

- Arrival:
  - 30% of vehicles arriving from Lenore Drive West,
  - 20% of vehicles arriving from Lenore Drive East,
  - 35% of vehicles arriving from future Southern Link Road (SLR) West, and
  - 15% of vehicles arriving from future SLR East
- Departure:
  - 25% of vehicles departing to Lenore Drive West,
  - 20% of vehicles departing to Lenore Drive East,
  - 30% of vehicles departing to future Southern Link Road (SLR) West, and
  - 25% of vehicles departing to future SLR East

Having regard for these directional splits, the resulting traffic flow network diagrams are included in **Appendix B**, and the impact on the operation of the critical intersections in the locality is discussed below.

5.3 Traffic Impacts

The impact of the proposed MOD 3 traffic generation on the critical intersections in the locality has been assessed by comparing to the SIDRA results reported in the OWE TIA RTS (SSD 7348 Approval) for the following forecast year scenarios:

- 2026 (Interim), and
- 2036 (Ultimate)

It is noted that the 2036 results for the intersection of Lenore Drive & WNSLR references the upgraded intersection (as shown in **Figure 4**).

As the MOD 3 to the Stage 1 consent includes re-configuration of Estate Road 03 and introduction of a new roundabout at Estate Road 01 and 03, SIDRA modelling has also been undertaken at this new roundabout and the other two intersections with the SLR as discussed in Section 3.3 which were not previously reported on as part of earlier studies. Accordingly, SIDRA results are summarised in **Table 9**.

Table 9: Intersection Performance Comparison – Forecast Year 2026 (Interim)

Intersection	Time Period	SSD 7348 Approval		MOD 3 (Non-Peak Seasonal)		MOD 3 (Peak Seasonal)	
		Average Delay (AVD)	Level of Service (LoS)	Average Delay (AVD)	Level of Service (LoS)	Average Delay (AVD)	Level of Service (LoS)
WNSLR / Lenore Drive	AM	40.3	C	45.8	D	52.7	D
	PM	31.7	C	34.9	C	36.2	C
WNSLR / Lockwood Road	AM	13.1	A	13.4	A	13.6	A
	PM	14.8	B	14.9	B	15.1	B
WNSLR / Estate Road 01	AM	12	A	11.8[1]	A	11.9	A
	PM	15.1	B	13.4[1]	A	14.0	A
WNSLR / SLR	AM	28.4	B	29.1	C	29.5	C
	PM	31.5	C	31.6	C	32.4	C
SLR / Estate Rd 02	AM	Na	Na	17.2	B	17.3	B
	PM	Na	Na	18.4	B	18.5	B
SLR / Estate Rd 03	AM	Na	Na	13.4	A	16.0	B
	PM	Na	Na	16.8	B	20.1	B
Estate Rd 01 / Estate Rd 03	AM	Na	Na	9.3	A	9.3	A
	PM	Na	Na	8.5	A	9.8	A

Note: 1) the reduced average delay at the intersection of WNSLR / Estate Road 01 is because of the re-calculation / re-distribution of the overall Oakdale West Estate traffic having regard for the changes at the internal roads.

Intersection performance under the forecast year 2036 (ultimate) scenario is presented in **Table 10**.

Table 10: Intersection Performance Comparison – Forecast Year 2036 (Ultimate)

Intersection	Time Period	SSD 7348 Approval		MOD 3 (Non-Peak Seasonal)		MOD 3 (Peak Seasonal)	
		Average Delay (AVD)	Level of Service (LoS)	Average Delay (AVD)	Level of Service (LoS)	Average Delay (AVD)	Level of Service (LoS)
WNSLR / Lenore Drive	AM	37.9	C	37.9	C	38.2	C
	PM	26.9	C	29.6	C	29.6	C
WNSLR / Lockwood Road	AM	17.9	B	18.1	B	18.7	B
	PM	15.1	B	14.9[1]	B	15.1	B
WNSLR / Estate Road 1	AM	12.5	A	12.0[1]	A	12.5	A
	PM	17.7	B	13.7[1]	A	14.3	A
WNSLR / SLR	AM	40.3	C	51.1	D	53.8	D
	PM	40.8	C	40.4	C	52.3	D
SLR / Estate Rd 02	Na	Na	Na	17.8	B	19.7	B
	Na	Na	Na	19.4	B	30.3	C
SLR / Estate Rd 03	Na	Na	Na	23.2	B	49.4	D
	Na	Na	Na	26.1	B	38.4	C
Estate Rd 01 / Estate Rd 03	Na	Na	Na	9.3	A	9.7	A
	Na	Na	Na	8.5	A	8.8	A

Note: 1) the reduced average delay at the intersection of WNSLR / Lockwood Road and Estate Road 01 is because of the re-calculation / re-distribution of the overall Oakdale West Estate traffic having regard for the changes at the internal roads.

The SIDRA analysis indicates that MOD 3 will result in moderate increases in AVD and LoS at all intersections generally. Despite these minor increases, these intersections will operate with acceptable Level of Service (LoS D or better) in both forecast years (2026 and 2036) during peak seasonal and no-peak seasonal periods.

In summary, the traffic impact analysis concludes that MOD 3 traffic generation volumes will have no material additional impact at the surrounding key intersections and that the infrastructure proposed (and

approved) as part of the original Concept Plan will be sufficient to accommodate the impacts of the development.

Detailed SIDRA results outlining LoS, queue and delays for each intersection “approach” are included in **Appendix C**. A copy of SIDRA modelling files can be provided to RMS and/or Council, upon request.

6 Construction Traffic Management

6.1 Background

A detailed Construction Environmental Management Plan (CEMP), including a Construction Traffic Management Plan (CTMP), has been developed in response to the condition of consent following the original approval.

Separate reference should be made that CEMP in relation to the management measures associated with the broader works. That CEMP includes protocols for regular updates should they be required in response to changing conditions generally, such as could occur as a result of a new modification.

Changes required as a result of this specific MOD are discussed below.

6.2 Implications of MOD 3

The quantum of cut to fill anticipated to deliver the site plan and anticipated pad levels contemplated in this current proposed Master Plan is approximately 70,000m^3 less than that anticipated and approved in the original Concept and Stage 1 consent. Accordingly, the number of trucks required for fill importation is less than that contemplated in the Concept and Stage 1 consent, resulting in there being a reduction in traffic impacts on the wider network as a result of the revised earthworks plan.

Accordingly, there will be no additional traffic impacts to the wider road network as a result of the MOD 3.

7 Design Commentary

7.1 Relevant Design Standards

Detailed design of each individual building is deferred to their respective DA assessment. However, the site access, car park and loading areas for all buildings are expected to comply with the following relevant Australian Standards:

- AS 2890.1 for car parking areas,
- AS 2890.2 for commercial vehicle loading areas,
- AS 2890.3 for bicycle parking, and
- AS 2890.6 for accessible (disabled) parking.

7.2 Estate Roads

Modifications to Estate Road 01 and Estate Road 03 and the proposed new roundabout at the junction thereof have been designed to accommodate trucks up to 26m B-doubles. Reference should be made to the turn paths drawings prepared by AT&L, provided separately.

NO PARKING and NO STOPPING restrictions are proposed on all future public roads within OWE.

8 Summary & Conclusions

Ason Group has been engaged by Goodman Property Services (Aust) Pty Ltd (Goodman) to prepare a Traffic Impact Assessment (TIA) to assess the traffic and parking implications of:

- proposed modifications (MOD 3) to the recently approved (13 September 2019) SSD 7348 at Oakdale West Industrial Estate (OWE), and
- a stage 2 Development Application (DA SSD 10397) in relation Building 2B.

8.1 Key Findings

The key findings of this Traffic Impact Assessment are as follows:

- MOD 3 broadly includes:
  - Estate road network re-configuration,
  - Major rationalisation and re-sizing of warehouse buildings included in Precincts 2 and 3,
  - Moderate changes to Precincts 4 and 5 GFAs, and
  - Changes to the overall Estate-wide levels due for cut and fill process related to the additional road network changes.
- Key changes to Gross Floor Areas (GFA) are summarised in the below table.

Precinct No.	Original Approval GFA m^2	MOD 2 GFA m^2	MOD 3 GFA m^2	Difference (MOD 3 and approval) GFA m^2
Precinct 1	116,359	122,082	122,082	**5,723**
Precinct 2	105,425	107,111	266,186	**160,761**
Precinct 3	99,967	102,466	57,810	**(-) 42,147**
Precinct 4	120,988	113,693	113,693	**(-) 7,294**[2]
Precinct 5	32,530	35,640	35,640	**3,110**[2]
Amenities Lot	-	-	345	**345**
Total	**475,269**	**480,992**	**595,765**	**120,496**

- No change to the previously approved car parking rates is proposed. For clarify, the following rates are proposed to be retained:
  - Warehouse: 1 space per 300 m^2
  - Office: 1 space per 40 m^2

- The traffic generation assessment has had regard for 2 scenarios:
  - Generic assessment based on 'approved rates' which referenced standard RMS data for large format industrial warehouses.
  - First-principles assessment, based on known operational requirements of specific tenants, including 'seasonal peak factors. NOTE: for those buildings where a tenant is unknown, this scenario adopts the generic assessment above.
- Resultant worst-case forecast traffic generation — being the first-principles assessment — is then as follows.
  - AM peak non-peak seasonal (1,108 vehicular trips/hr)
    peak-seasonal (1,360 vehicular trips/hr),
  - PM peak non-peak seasonal (879 vehicular trips/hr)
    peak-seasonal (1,044 vehicular trips/hr), and
  - Daily non-peak seasonal (9,776 vehicular trips/hr)
    peak-seasonal (1,1324 vehicular trips/hr),
- Traffic modelling of the worst-case scenario has been undertaken to confirm the suitability of the road infrastructure improvements previously approved. A comparison of future intersection performance is provided in the below table.

Intersection Performance Comparison – Forecast Year 2026 (Interim)

Intersection	Time Period	SSD 7348 Approval		MOD 3 (Non-Peak Seasonal)		MOD 3 (Peak Seasonal)	
		Average Delay (AVD)	Level of Service (LoS)	Average Delay (AVD)	Level of Service (LoS)	Average Delay (AVD)	Level of Service (LoS)
WNSLR / Lenore Drive	AM	40.3	C	45.8	D	52.7	D
	PM	31.7	C	34.9	C	36.2	C
WNSLR / Lockwood Road	AM	13.1	A	13.4	A	13.6	A
	PM	14.8	B	14.9	B	15.1	B
WNSLR / Estate Road 01	AM	12	A	11.8[1]	A	11.9	A
	PM	15.1	B	13.4[1]	A	14.0	A
WNSLR / SLR	AM	28.4	B	29.1	C	29.5	C
	PM	31.5	C	31.6	C	32.4	C
SLR / Estate Rd 02	AM	Na	Na	17.2	B	17.3	B
	PM	Na	Na	18.4	B	18.5	B
SLR / Estate Rd 03	AM	Na	Na	13.4	A	16.0	B
	PM	Na	Na	16.8	B	20.1	B
Estate Rd 01 / Estate Rd 03	AM	Na	Na	9.3	A	9.3	A
	PM	Na	Na	8.5	A	9.8	A

Note:1) the reduced average delay at the intersection of WNSLR / Estate Road 01 is because of the re-calculation / re-distribution of the overall Oakdale West Estate traffic having regard for the changes at the internal roads.

Intersection Performance Comparison – Forecast Year 2036 (Ultimate)

Intersection	Time Period	SSD 7348 Approval		MOD 3 (Non-Peak Seasonal)		MOD 3 (Peak Seasonal)	
		Average Delay (AVD)	Level of Service (LoS)	Average Delay (AVD)	Level of Service (LoS)	Average Delay (AVD)	Level of Service (LoS)
WNSLR / Lenore Drive	AM	37.9	C	37.9	C	38.2	C
	PM	26.9	C	29.6	C	29.6	C
WNSLR / Lockwood Road	AM	17.9	B	18.1	B	18.7	B
	PM	15.1	B	14.9[1]	B	15.1	B
WNSLR / Estate Road 1	AM	12.5	A	12.0[1]	A	12.5	A
	PM	17.7	B	13.7[1]	A	14.3	A
WNSLR / SLR	AM	40.3	C	51.1	D	53.8	D
	PM	40.8	C	40.4	C	52.3	D
SLR / Estate Rd 02	Na	Na	Na	17.8	B	19.7	B
	Na	Na	Na	19.4	B	30.3	C
SLR / Estate Rd 03	Na	Na	Na	23.2	B	49.4	D
	Na	Na	Na	26.1	B	38.4	C
Estate Rd 01 / Estate Rd 03	Na	Na	Na	9.3	A	9.7	A
	Na	Na	Na	8.5	A	8.8	A

Note: 1) the reduced average delay at the intersection of WNSLR / Lockwood Road and Estate Road 01 is because of the re-calculation / re-distribution of the overall Oakdale West Estate traffic having regard for the changes at the internal roads.

- SIDRA results indicate that MOD 3 will:
  - Result in only moderate increases in AVD and LoS at all intersections generally. According to the SIDRA results the intersections will operate with acceptable Level of Service (LoS D or better) in both forecast years (2026 and 2036).
- MOD 3 will not have any material implications for the construction of the Estate, as it affects external parties. Changes are largely internal reconfigurations and thus, the construction impacts – and

management thereof outlined in the CEMP – shall be unaffected. In the event that minor changes were to occur, as a result of unforeseen matters, then this can occur as part of ongoing review and updates to the CEMP.

8.2 Recommendations

- No additional road upgrades are required.
- Assessment of individual buildings / lots — which shall be subject to separate Development Applications — shall consider:
  - Compliance with AS2890 series Australian Standards.
  - Parking provisions, in accordance with the approved rates or to satisfy known tenant requirements.
  - Ensure that cumulative traffic generation is not greater than assessed, or further modelling and assessment may be required. NOTE: it should be acknowledged that minor variations to generation rates can occur from lot-to-lot so that the emphasis should be on the cumulative / estate-wide generation.

8.3 Conclusion(s)

In summary, MOD 3 is supportable on traffic planning grounds and will not result in any adverse impacts on the surrounding road network or the availability of on-street parking.

Appendix A

Traffic Impact Assessment for Building 2B DA

asongroup

Traffic Impact Assessment

Oakdale West Industrial Estate
Stage 2 Development Application – SSD 10397

Ref: P1086r02
15/01/2020

Document Control

Project No: 1068r02

Project: Lot 2B SSD 10397, Oakdale West Industrial Estate

Client: Goodman Property Services (Aust) Pty. Limited

File Reference: P1086r02v8 Stage 2 SSDA_Lot 2B, Oakdale West Industrial Estate

Revision History

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2	29/11/2019	Issue II	M. Tangonan	A. Rasouli
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7	13/01/2020	Issue VII	S.Hu	
8	15/01/2020	Issue VIII	M. Tangonan	

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Table of Contents

1 STAGE 2 DEVELOPMENT APPLICATION 3
1.1 RESPONSE TO SECRETARY'S ENVIRONMENTAL ASSESSMENT REPORT 3
1.2 RELEVANT SSDA CONDITIONS 4

2 STAGE 2 DA DESCRIPTION 5
2.1 BUILT FORM 5
2.2 WAREHOUSE OPERATIONAL DETAILS 7

3 PARKING PROVISIONS 9
3.1 CAR PARKING 9
3.2 BICYCLE PARKING 10

4 TRAFFIC ASSESSMENT 11
4.1 TRAFFIC GENERATION 11
4.2 TRAFFIC DISTRIBUTION & ASSIGNMENT 12
4.3 TRAFFIC IMPACTS 12

5 CONSTRUCTION TRAFFIC ASSESSMENT 13
5.1 EXISTING CONDITIONS 13
5.2 HOURS OF CONSTRUCTION 14
5.3 TRUCK ROUTING 14
5.4 TRUCK VOLUMES 16
5.5 IMPACT ASSESSMENT 18
5.6 TRAFFIC IMPACTS 21

6 DESIGN COMMENTARY 22
6.1 RELEVANT DESIGN STANDARDS 22
6.2 ACCESS DESIGN 22
6.3 DESIGN COMMENTARY 23

7 PRELIMINARY SUSTAINABLE TRAVEL PLAN 24
7.1 PURPOSE 24
7.2 TRAVEL MODE SHARE ANALYSIS 24
7.3 STRATEGIC CONTEXT 25
7.4 SURROUNDING PUBLIC TRANSPORT SERVICES 26
7.5 OBJECTIVE AND TARGETS 27
7.6 ACTION PLAN 29
7.7 GOVERNANCE & SUPPORT 31

8 SUMMARY & CONCLUSION 33
8.1 KEY FINDINGS 33
8.2 CONCLUSION 34

Appendices

Appendix A1: Swept Path Analysis

Appendix A2: Transport Access Guide (TAG)

Appendix A3: Sample Travel Mod Questionnaire

Executive Summary

The Stage 2 Development Application (DA) specifically applies to Building 2B (the Site) of the Modification 3 Master Plan, located within revised Precinct 2 post application of MOD 3. The Proposal for Building 2B consists of 206,968 m^2 GFA (200,668 m^2 GLA) combined warehouse and office floorspace. A breakdown of the key development details is provided below:

Building	• 195,176 m^2 of warehouse GLA • 5,492 m^2 of office GLA
Parking Yield	• 1,127 parking spaces (incl. 36 accessible bays) • 128 bicycle parking spaces • 54 motorcycle spaces
Docks	• 61 Loading Bays

The proposed parking provision of Building 2B as outlined above readily satisfies the minimum parking requirements (788 spaces) outlined in Condition B13 of the approval.

Traffic generation for the warehouse has been assessed on the basis of both Generic GFA-based analysis tenant-specific operational information and are provided below.

	RMS Guide	Tenant-Specific Operational Information	
Time Period	**GFA-Based**	**Non-Peak**	**Peak**
AM Network Peak	337	580	823
PM Network Peak	337	371	532
Daily Total	3,916	2,677	3,784

The outcomes of the modelling undertaken as part of MOD 3 indicate that the operational traffic (during peak and non-peak seasonal periods) provided by the future tenant will not result in any substantial change or significant worsening of the road network performance from what has been approved as part of SSD 7348.

Similarly, a construction traffic assessment has been conducted for works associated with Stage 2 DA 10397. The modelling results demonstrate moderate impact to the two critical intersections impacted by construction routes as a result of relatively low traffic volumes. Nonetheless, suggestion is provided to the Mamre Road / Abbotts Road intersection to improve overall performance.

The layout and design of Building 2B, the hardstand area and parking facilities have generally been designed in accordance with standards and guidelines outlined in Australian Standards AS2890.1, AS2890.2, AS2890.3 and AS2890.6.

In summary, traffic and transport elements of the Stage 2 DA specifically relating to Lot 2B and their respective impacts have been accordingly assessed and is deemed to be satisfactory on traffic and transport planning grounds.

1 Stage 2 Development Application

1.1 Response to Secretary's Environmental Assessment Report

Relevant responses to the Secretary's Environmental Assessment Report (SEAR) SSD 10397 and SSD 7348 MOD 3 – dated 15 November 2019 – to Stage 2 DA, has been provided in the following table.

Table 1: Response to SEARs

No.	Comment	Ason Response
Traffic and Transport – including		
1	a Traffic Impact Assessment detailing all daily and peak traffic and transport movements likely to be generated (vehicle, public transport, pedestrian and cycle trips) during construction and operation of the development, including a description of vehicle access routes (construction and operation) and the impact on nearby intersections;	This TIA has been prepared to respond to this comment. The Proposal is not anticipated to generate significant pedestrian and/or public transport trips during the construction or operation of Building 2B. However, details of daily and peak hour traffic generation of the Building 2B has been reviewed (at operational phase) and outlined in section 4.1. Furthermore, impact of the proposed Building 2B on the surrounding road network during the non-peak seasonal and peak seasonal periods have also been assessed and discussed in the MOD 3 transport assessment with a brief provided at section 4.3. A Construction Traffic Assessment has been included and referred to in Section 5 of this report. As part of the assessment, trafficable impacts have been modelled to demonstrate that the construction traffic induced by Stage 2 works will have moderate impacts to the critical intersections outlined in the truck routes.
2	details of access to the site from the road network including intersection location, design and sight distance;	Details of the Building 2B access for light and heavy vehicles have been provided in section 2. Sight distances at the Building 2B access points have been reviewed and discussed in section 5.2.
3	an assessment of the predicted impacts on road safety and capacity of the road network to accommodate the development;	With reference to section 4.3 of this report and the SIDRA modelling undertaken as part of the MOD 3, the traffic generation of the proposed Building 2B can be accommodated through the surrounding road network as approved by 2019 concept plan.
4	detailed plans of the proposed site access and parking provision on site in accordance with the relevant Australian Standards and with reference to the approved concept plan (SSD 7348).;	Parking provision of the proposed Building 2B have been reviewed against the approved SSD 7348 in section 3. Design of the access and car parking area have also been reviewed and discussed in section 5.
5	details of impact mitigation, management and monitoring measures.	As outlined in section 4.3 and the traffic modelling undertaken as part of the MOD 3, the proposal for Building 2B will not require any additional road network upgrade works. Furthermore, a comprehensive Sustainable Travel Plan (STP) has been prepared for this DA which details the traffic management measures and ways to minimise reliance on motorised vehicles. Monitoring program has also been included in our STP referenced in section 6.

1.2 Relevant SSDA Conditions

This assessment of Stage 2 addresses the traffic impacts of the included works, as part of Modification 3 applied to Building 2B. It is subject to the conditions outlined in Schedule C of the SSDA 7348 Conditions. The conditions, as well as responses to effect are provided in **Table 2**.

Table 2: Relevant Schedule C Conditions to Building 2B (SSD 10397)

C9. Transport, Access and Parking		
	Condition	**Response**
(a)	assess the impacts on the safety and capacity of the surrounding road network and access points during construction and operation of the relevant Stage;	Assessment of the impacts on the surrounding road network have been assessed as part of the MOD 3 precinct-wide traffic modelling. Safety of the relevant access point associated with Lot 2B have been reviewed assessed in **Section 5**.
(b)	(i) demonstrate internal roads and car parking complies with relevant Australian Standards (ii) and the car parking rates in Condition B13;	(i) This traffic report details a design assessment in accordance with Australian Standards – specifically AS2890.1 and AS2890.2. Refer **Section 5**. (ii) This traffic report details the requirements of parking as outlined in Condition B13. Refer **Section 3**. However, a general condition of consent requiring car parking design in accordance with relevant Australian Standards (AS) is expected to be included as part of the DA approval.
(c)	detail the scope and timing of any required road upgrades to service the relevant Stage; and	It should be noted that road construction and delivery of the internal road network and the proposed internal roundabout between Estate Roads 01 & 03 has been planned as part of Modification 3 works to the Stage 1 consent and will be delivered as part of that construction phase. Timing for these changes will be prior to Building 2B construction.
(d)	detail measures to promote non-car travel modes, including a Sustainable Travel Plan identifying pedestrian and cyclist facilities to service the relevant Stage of the Development.	Noted. This traffic report details a Sustainable Travel Plan for Building 2B. Refer **Section 6.**

2 Stage 2 DA Description

2.1 Built Form

The Stage 2 SSD 10397 applies to Building 2B of the Modification plan 3. The Proposal for Building 2B, an industrial warehouse development with ancillary office, provides the following key characteristics:

- 206,968 m^2 GFA (200,668 m^2 GLA), consisting of:
  - 195,176 m^2 of Warehouse space;
  - 5,492 m^2 of Office space; and
  - 6,300 m^2 of Mezzanine space.
- 4 private vehicle crossovers on Estate Road 03 providing access to:
  - 1,127 car parking bays (incl. 37 accessible parking bays);
  - 128 bicycle parking spaces; and
  - 54 motorcycle parking bays.
- A primary entry and exit access crossover for commercial vehicles at the northern boundary of the Site, facilitating B-Double access and egress movements; and
- A secondary exit only crossover at the Site's southern boundary, facilitating seasonal movements for 4 weeks of the year only as an exit for vans and small trucks.

Building 2B and the Estate Roads associated with Stage 2 is identified within the contexts of the OWE in **Figure 1** below.

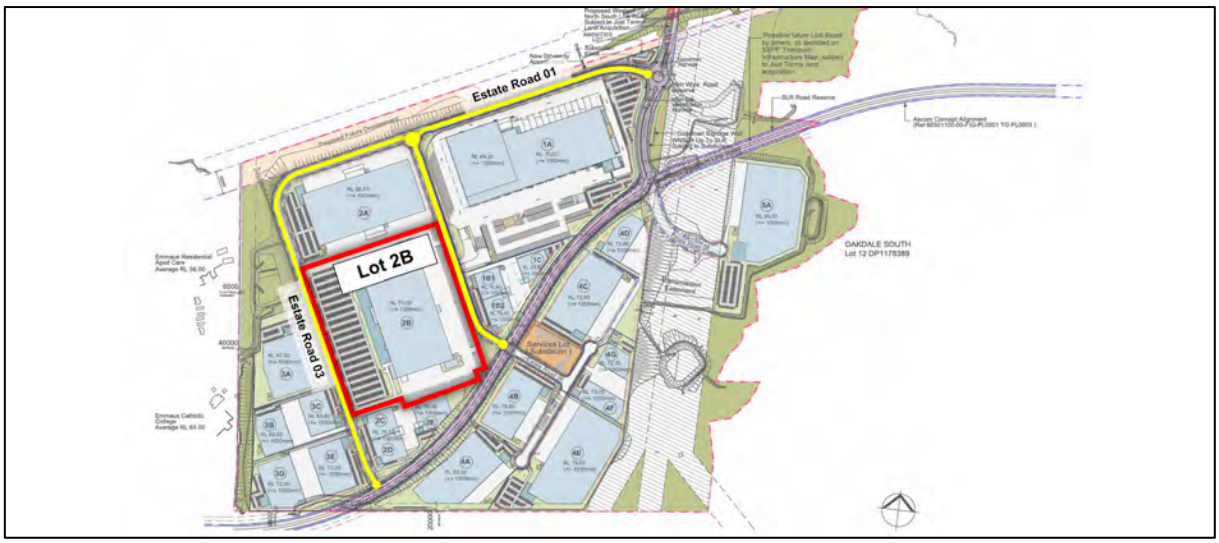


Figure 1: Modification 3 Master Plan and Building 2B Location

A copy of the detailed Warehouse Plans and access crossovers is provided in **Figure 2**.

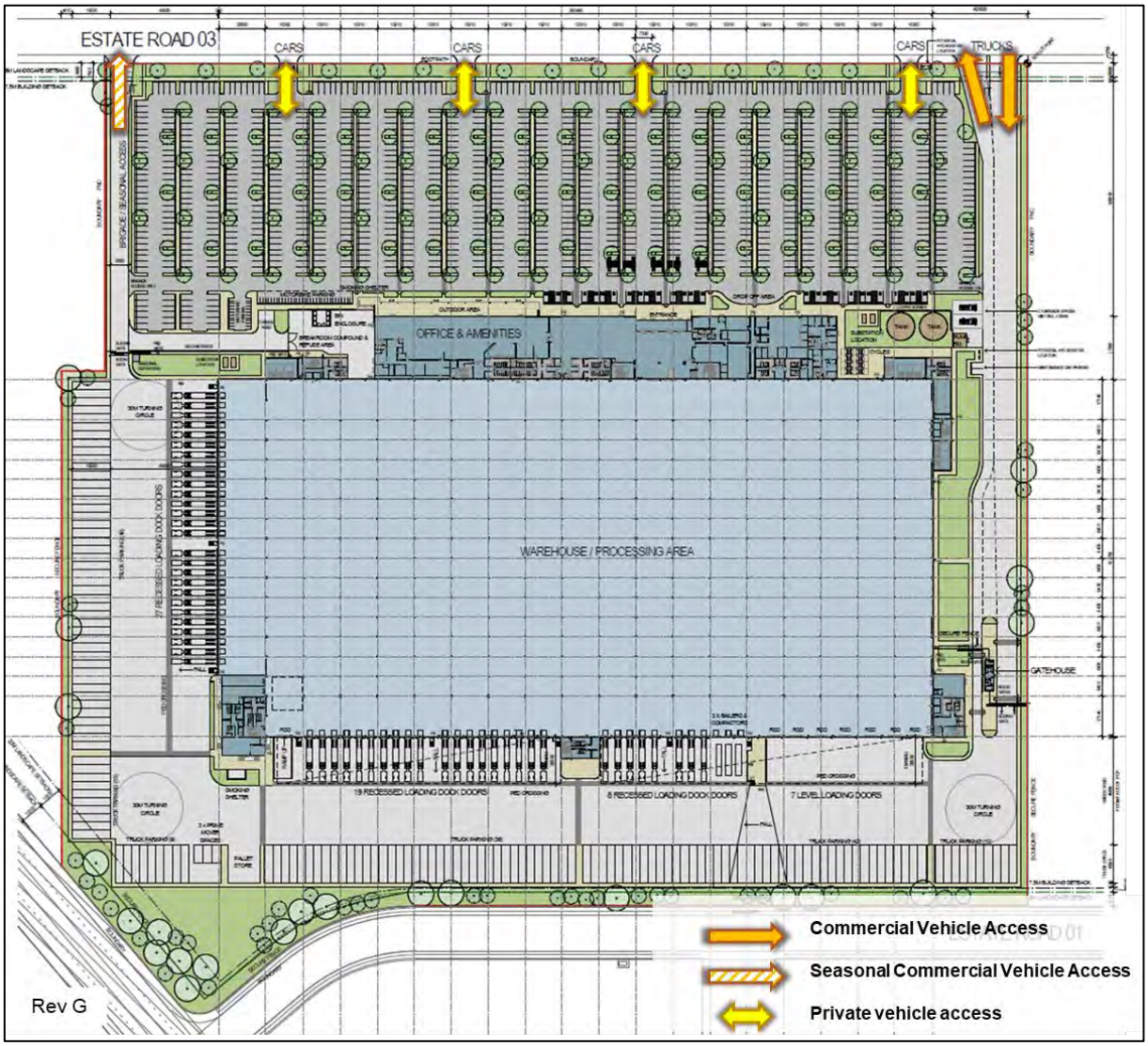


Figure 2: Detailed Warehouse Plans & Access

2.2 Warehouse Operational Details

2.2.1 Staffing Schedule

Future Tenancy has indicated that an expected 1,500 staff will be employed at the warehouse facility when fully operational.

The shift structure involves an AM and PM shift for operation of the main warehouse floor, with an anticipated 587 staff per shift during the non-peak period, and 838 staff per shift during the peak seasonal periods. It is noteworthy that the peak seasonal period will only be related to a short period of time.

2.2.2 Hours of Operation

The Building 2B Warehouse is intended to operate 24 hours a day, 7 days a week. The AM and PM shifts periods are indicated to occur as follows:

Table 3: Shift Timing

Shift / Type		Start	End
Day (AM) Shift	Inbound Deliveries	07:00 AM	05:30 PM
	Outbound Deliveries	07:30 AM	06:00 PM
Night (PM) Shift	Inbound Deliveries	06:00 PM	06:30 AM
	Outbound Deliveries	06:30 PM	07:00 AM

2.2.3 Proposed Amenities

The warehouse facility accommodates up to 135 truck parking spaces around the perimeter of the hardstand area and facilitates 61 loading bays on the warehouses' eastern and southern side, as indicated below.

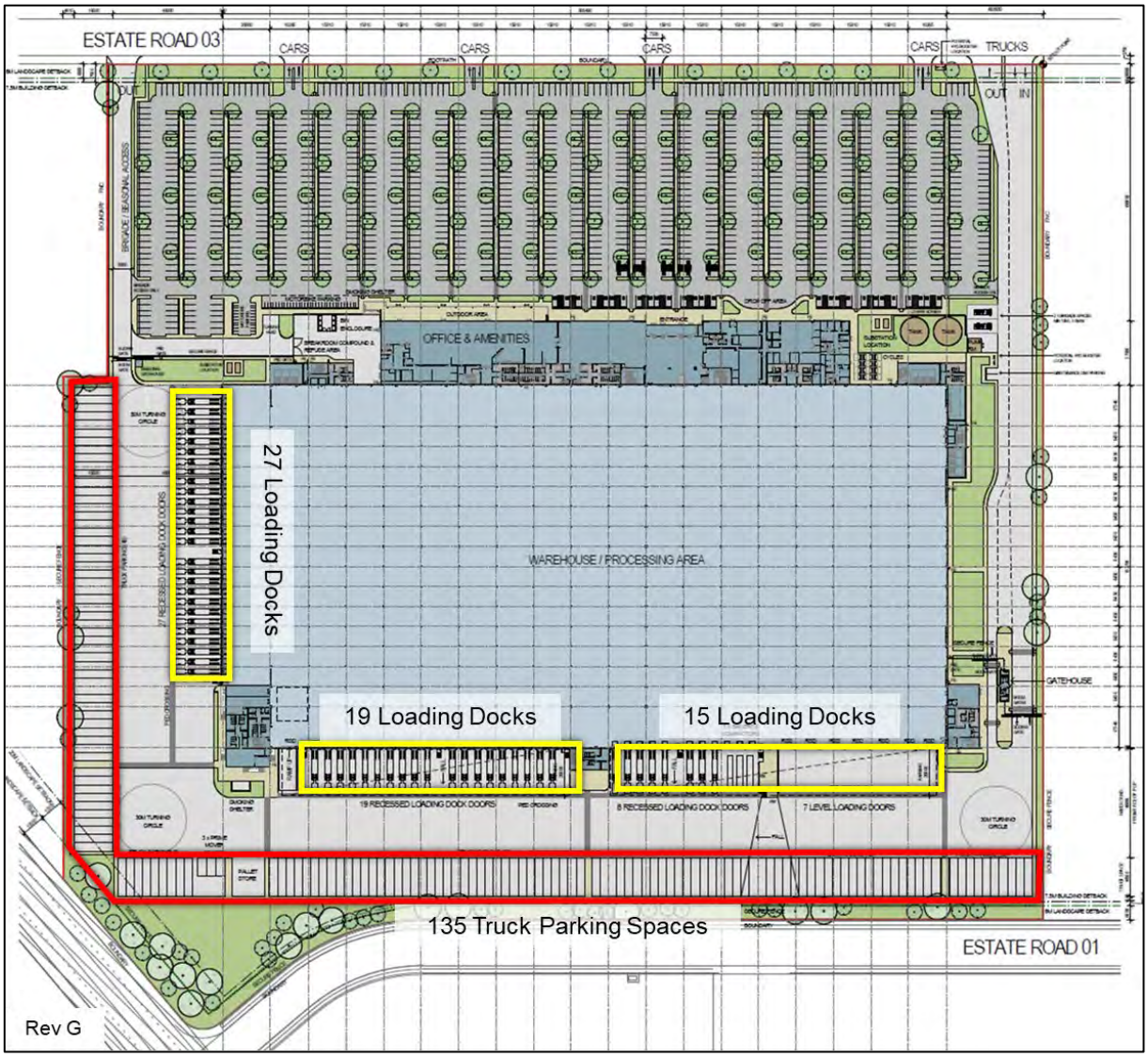


Figure 3: Loading Dock Locations and Truck Parking

3 Parking Provisions

3.1 Car Parking

Parking rates for the wider Estate have been provided in accordance with Condition B13 of the 2019 SSD approval. The rates are as follows:

- 1 space per 300 m^2 for Warehouse; and
- 1 space per 40 m^2 for Office.

Application of these approved SSDA rates to the floor areas now proposed is summarised below.

Table 4: Approved Parking Rates

Land Use	Lot 2B Yield	Car Parking Required	Lot 2B Provision
Warehouse	195,176	651	1,127
Office	5,492	137	
Total	**200,668**	**788**	**1,127**

As indicated above, the parking provided for Lot 2B exceeds the nominal parking requirement, thereby complying with the approved car parking rates, which are a minimum.

It is acknowledged that the parking provision is significantly more than strictly required by Condition B13. However, the increased provision proposed is in response to the demands of the future tenant for this Lot, with an anticipated total of 1,500 staff (maximum 838 staff on-site during peak seasonal) to be employed when fully operational.

It should be noted that the occupancy of the car park will vary throughout the day, based on the traffic information provided by the tenant. During warehouse shift periods, an estimated 587 staff will be rostered for non-peak seasonal periods, with an increase to 838 staff during the 'seasonal peak' period which is anticipated to only occur for 4-6 weeks of the year. The shifts are staggered to provide sufficient timing for staff changeover to occur between shifts. Accordingly, the parking provision proposed readily provides for this number of staff, with sufficient additional space to cater for unexpected surges.

3.1.1 Accessible Parking

Condition B13(e) of the SSD specifies the following requirements for accessible parking spaces:

- 2 spaces for disability parking for every 100 car parking spaces.

This equates to a requirement for 23 accessible spaces to be included within the above provisions.

In response, Building 2B provides for 37 accessible bays, exceeding the SSDA requirements.

3.2 Bicycle Parking

Condition B14 of the approval suggests the provision of bicycle racks in accordance with Planning Guidelines for Walking and Cycling (December 2004, NSW Department of Infrastructure, Planning and Natural Resources and Roads and Traffic Authority). Accordingly, the following bicycle rates apply:

- Staff Bicycle Parking Requirement 3-5% of staff number (for each building)
- Visitor Bicycle Parking Requirement 5-10% of staff number (for each building)

Application of the above rates to the total provision of staff (1,500) equates to a minimum requirement of 120 bicycle parking spaces. In response, Building 2B provides for a total of 128 bicycle parking exceeding the minimum requirements of the SSDA. The bicycle racks are located on the northern side of the office block.

Furthermore, the Proposal for Building 2B will provide a sum of 54 motorcycle parking spaces. In this regard, a parking diagram has been provided in **Figure 4** to show the details of parking proposed for the Site.

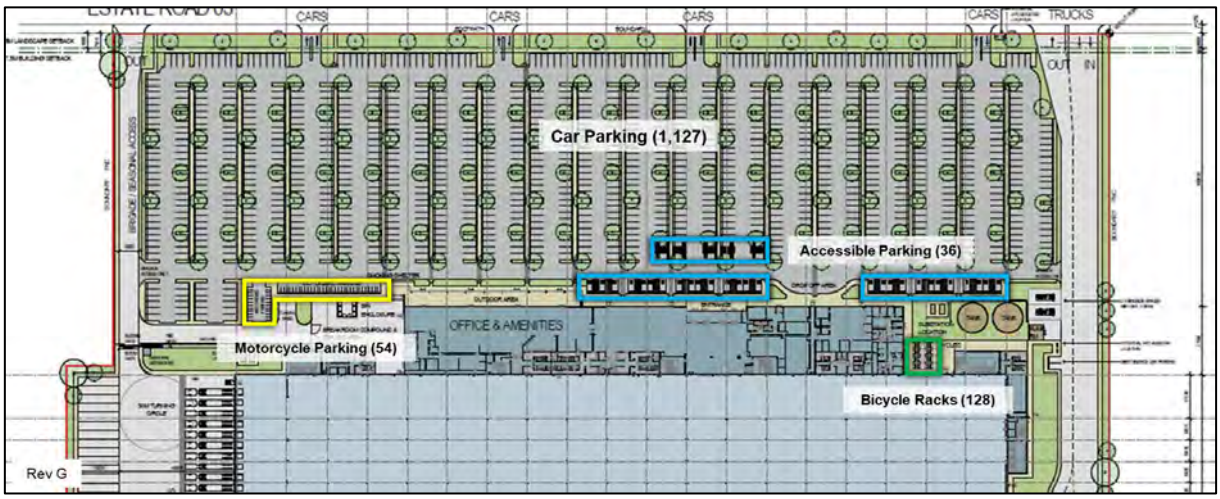


Figure 4: Proposed On-site Parking Diagram

4 Traffic Assessment

Traffic assessment of the proposed Building 2B has readily been discussed in detailed as part of the MOD 3 TIA (above). However, further details of the proposed traffic generation in accordance with the immediate tenant operational information is provided in this section.

4.1 Traffic Generation

Similar to the MOD 3 assessment, 2 methodologies have been assessed to identify Building 2B traffic generation.

4.1.1 Generic (GFA based) Approach

Application of the approved trip rates to the proposed lot 2B total building area (206,968 m^2 of warehouse plus ancillary office GFA) results in the following traffic generation estimation:

- Peak Period 337 veh/hr (@ 0.163 vehicle trips per 100 m^2 of GFA)
- Daily 3,916 veh/day (@ 1.892 vehicle trips per 100 m^2 of GFA)

4.1.2 First Principal Assessment (Operational Vehicle Movements)

Operational vehicle movements have been provided by the Tenant to account for two time periods, defined as 'non-peak and peak seasonal' operations. Seasonal peak is anticipated to occur for a short period of time and up to 4-6 weeks per year. A summary of the vehicle movements is provided below.

Table 5: Non-Peak Vehicle Movements

Period	Cars			Trucks			Cars + Truck (inbound+outbound)
	Inbound	Outbound	Total	Inbound	Outbound	Total	
AM Network Peak (07:00-0:800)	267	297	564	8	8	16	580
PM Network Peak (17:00-18:00)	206	157	363	4	4	8	371
Daily Total	1,174	1,174	2,347	165	165	330	2,677

Table 6: Seasonal Peak Vehicle Movements

Period	Cars			Trucks			Cars + Truck (inbound+outbound)
	Inbound	Outbound	Total	Inbound	Outbound	Total	
AM Network Peak (07:00-08:00)	381	424	805	9	9	18	823
PM Network Peak (17:00-18:00)	294	224	518	7	7	14	532
Daily Total	1,676	1,676	3,352	216	216	432	3,784

Accordingly, comparison of the above tables suggests as follows:

- Building 2B indicatively generates less daily traffic based on operational information than when assessed through application of the approved rates; and
- Operational traffic suggests higher traffic movements during the morning and afternoon road network peak hours.

4.2 Traffic Distribution & Assignment

Precinct-wide modelling has been conducted for the wider Oakdale West Network as part of the MOD 3 Assessment. Accordingly, traffic Distribution and assignment for the seasonal and non-seasonal volumes generated by Building 2B have appropriately been captured in the wider modelling studies.

Thus, the modelling conducted as part of MOD 3 has readily included the traffic of this proposal onto the surrounding road network.

4.3 Traffic Impacts

The Precinct-wide modelling has demonstrated that the cumulative traffic generation of MOD 2 and MOD 3 will not present worsening impacts to the road network, inclusive of the wider estate's internal roads and connections to the Link Roads. This demonstrates that the road network has sufficient capacity to cater for Building 2B traffic whilst maintaining operation at a satisfactory level.

Accordingly, this DA will not result in any unacceptable traffic impacts — being included within the MOD 3 modelling — and no additional upgrades at surrounding road network would be required as part of this DA.

5 Construction Traffic Assessment

The construction and delivery of the involved works associated with Stage 2 SSD 10397 has been assessed from a traffic and transport perspective to quantify the impact of construction vehicle movements on the surrounding road network. In this instance, reference should be made to Section 6 of the parent report (*ref:P1086r01*) as this overview provides context for and aligns with the site-specific works of Stage 2.

5.1 Existing Conditions

Tube count surveys undertaken along Bakers Lane have been reviewed to gain an appreciation for existing traffic flows. **Figure 5** below provides a summary of the results, with defined peaks in the AM and afternoon school peak noteworthy.

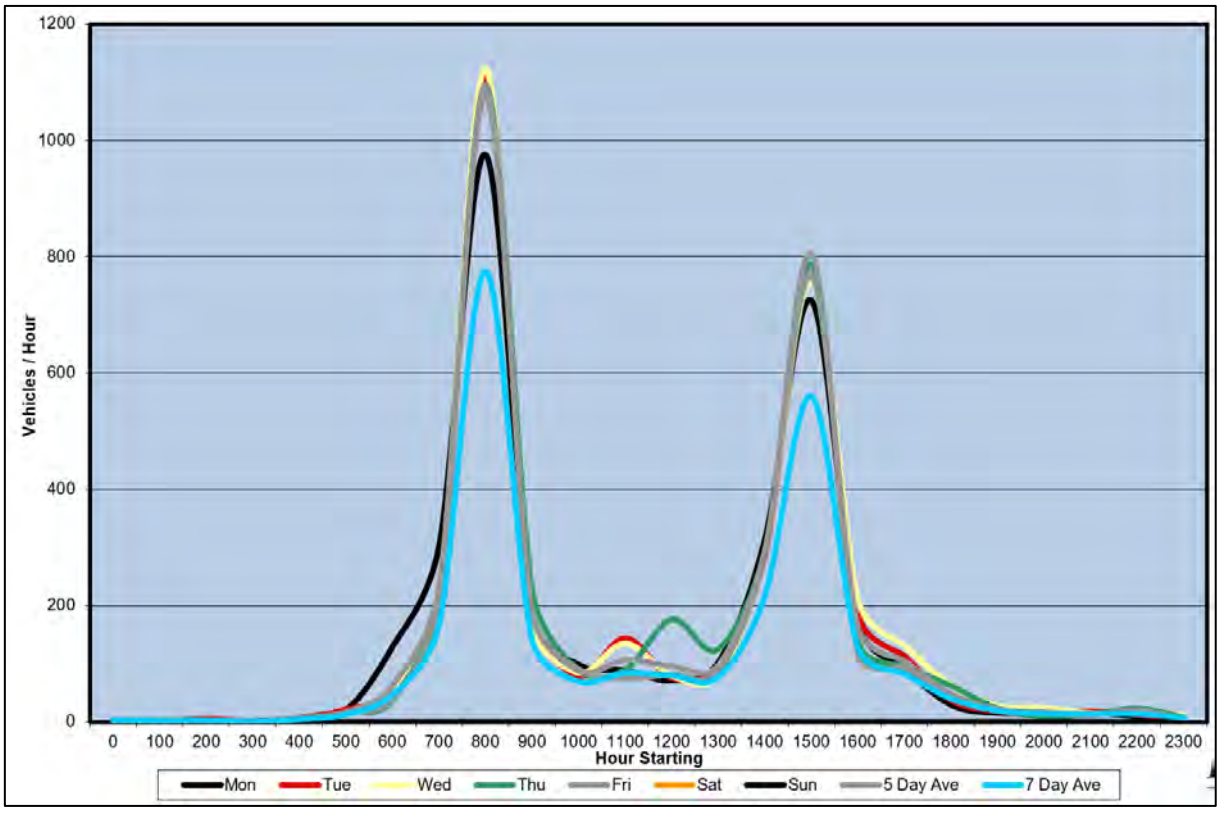


Figure 5: Bakers Lane –Volume Graph

The graph indicates that the peak periods align with the school zone speed limit restrictions placed along Bakers Lane. This similarity can result in the designation of the following peak periods:

- 8:00 am – 9:30 am for the AM Peak; and
- 2:30 pm – 4:00 pm for the PM Peak.

5.2 Hours of Construction

Construction of the encapsulated Stage 2 works shall occur between the hours of 3:00am and 11:00pm (20 hours). This bandwidth is effective 7-days of the week.

In order to mitigate the potential impacts of construction traffic during the network peak hours, it is anticipated that vehicle routes will involve two configurations for operations both within and outside of these peaks. For clarity, the time periods are defined as follows (from 3.00am to 11.00pm):

- Pre-School Period: (3:00am – 8:00am)
- AM Network Peak Period: (8:00am – 9:30am)
- Between School Periods: (9:30am – 2:30pm)
- PM Network Peak Period: (2:30pm – 4:00pm)
- Post-School Period: (4:00pm – 11:00pm)

5.3 Truck Routing

It should be noted that the abovementioned routes shall ONLY be used in relation to the Stage 2 DA construction works. These routes will not have any bearing in association with additional construction works outside of the Stage 2 DA.

For truck routes associated with estate wide infrastructure works covered by the Stage 1 DA, reference should be made to site-specific CTMP's prepared separately.

5.3.1 Network Non-Peak Operations

Construction traffic **OUTSIDE** of the network peak hours shall utilise **Bakers Lane**, via Mamre Road from the north and south as shown in **Figure 6**. The Mamre Road / Bakers Lane intersection currently exists as a signalised intersection.

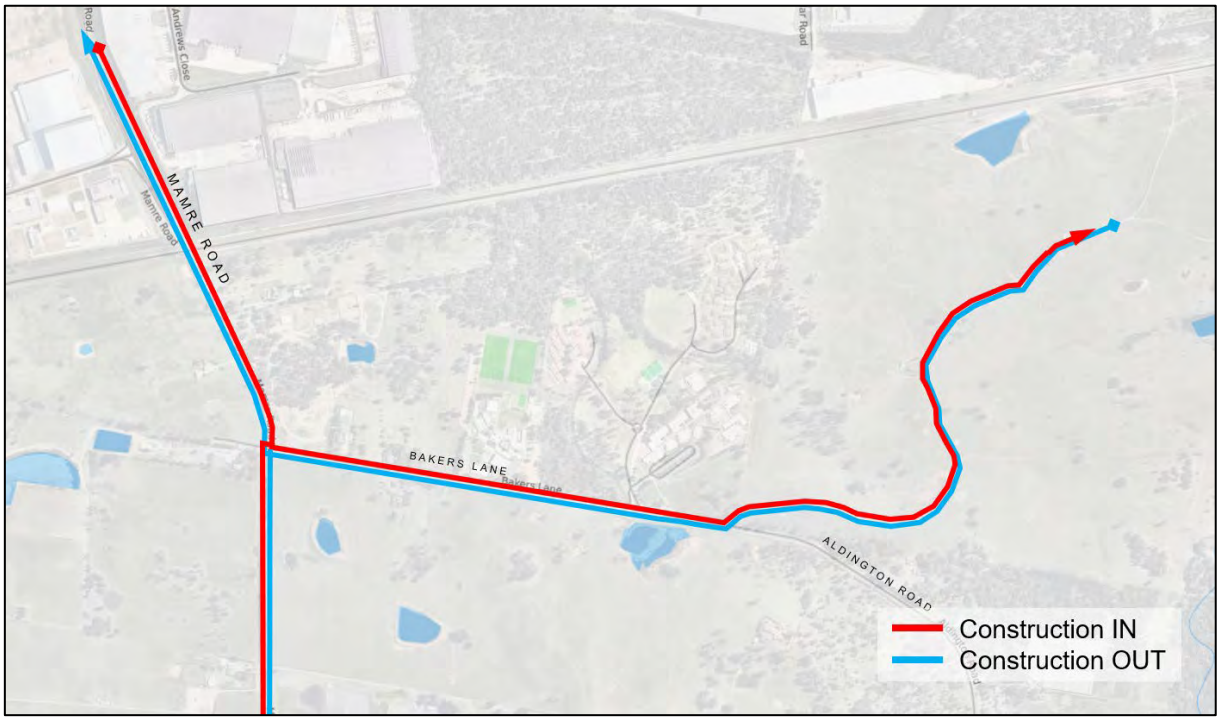


Figure 6: Network Non-Peak Route via Bakers Lane

5.3.2 Network Peak Operations

In consideration of the existing vehicular traffic and the resultant safety concerns associated with Bakers Lane during the network peaks (school pick up and drop off periods), construction traffic accessing and egressing the site **DURING network Peak periods** will be rerouted to utilise **Aldington Road** and the **Abbotts Road** connection to Mamre Road, as referred in **Figure 7**. the main reason for this is due to safety because this will provide for a safer route than trucks constantly delivering building materials on Bakers Lane via the school in pick up and drop off periods.

It should be noted that this is a temporary arrangement and will only be applicable for 3 hours of the day during the construction of the WNSLR, between 1st June 2020 through to 1st October 2020.

The existing Mamre Road / Abbotts Road intersection is a T-junction, with a flared through lane along Mamre Road to assist northbound traffic flow.

It has been considered that Aldington Road is a sealed rural road, and generally provides a minimum 6 metre carriageway from Abbotts Road to the subject Site location; deemed acceptable for two-way traffic flow. In the event that any sections of the road do not provide for 6 metres, then appropriate traffic management measures can be provided during the construction to assist with two way flow. It is noted that Abbotts Road would only be utilised during road network peak (school peak period) with a low level of traffic, and as such no material traffic impact is anticipated in this regard. It is again important to note

that this arrangement is temporary, and that construction traffic will be rerouted to the WNSLR when it has been completed.

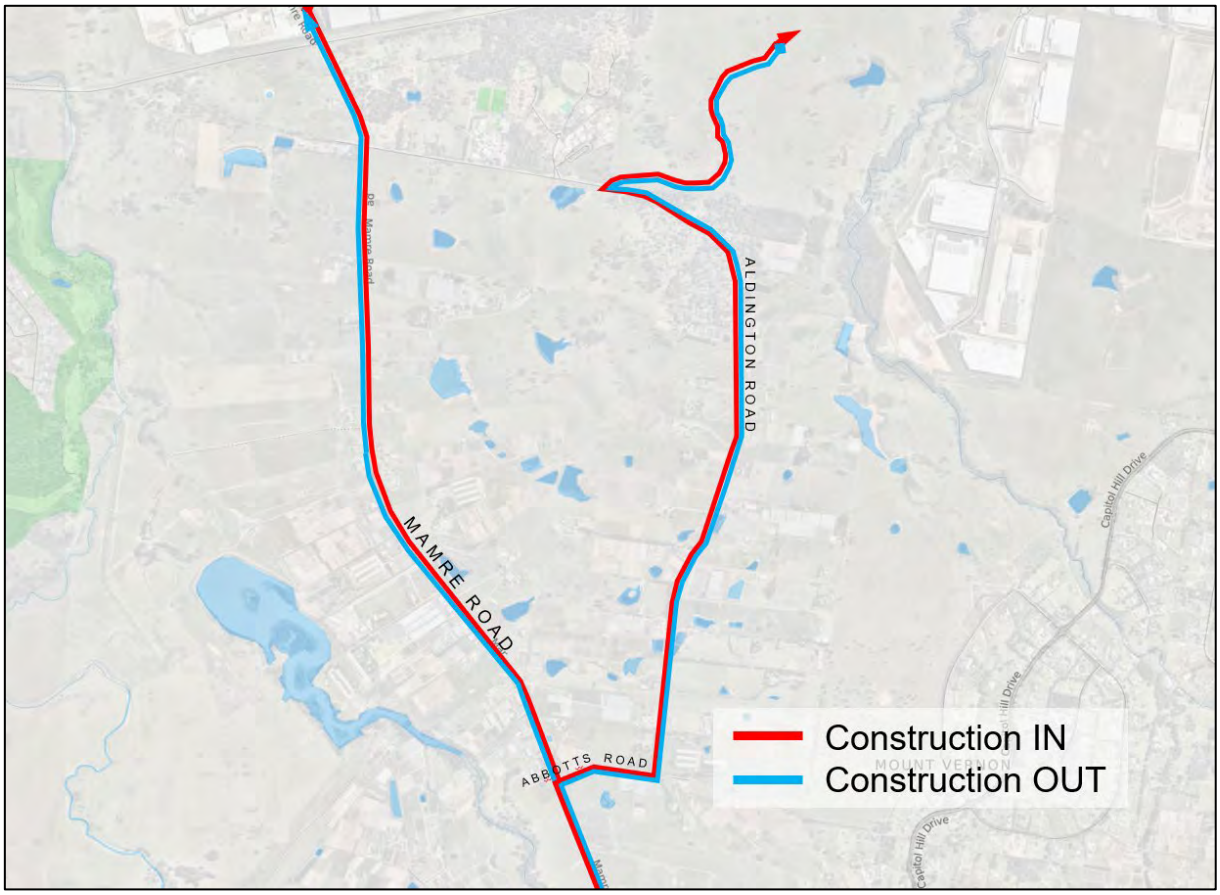


Figure 7: Network Peak Route via Aldington Road

5.4 Truck Volumes

The monthly schedule of anticipated construction traffic movements has been provided by Qanstruct, as the appointed builder. This information has been extrapolated to establish hourly and daily traffic volumes for assessment of traffic impacts on the following basis:

- Construction will occur 7-days a week,
- Construction will occur between 3:00am – 10:00pm (19-hour bandwidth); and
- Temporal distribution has been adopted from previously approved CTMP for OWE (*ref: 0605r01*).

For conservative estimation, the highest observed traffic volumes from the monthly schedule (occurring in November 2020) have been used for modelling purposes. This equates to a total of **217** daily vehicle trips (consisting of **68** Light Vehicle trips and **150** Heavy Vehicle trips). Additionally, the highest hourly

movement shall be applied regardless of occurrence in or outside of network peaks, to ensure conservativeness.

The traffic distribution for traffic movements adopts the method as referred in previous CTMP's which proportions construction traffic within the previously defined periods. The application of this methodology results in **Table 7**.

Table 7: 24-Hour Construction Traffic Movements

	Pre-School Period	AM School Period (Network Peak)	Between School Periods	PM School Period (Network Peak)	Post-School Period	Total (Daily)
Light Vehicles	38	0	7	0	23	**68**
Heavy Vehicles	26	22	54	21	27	**150**
TOTAL	**46**	**27**	**68**	**26**	**50**	**217**

Accordingly, uniform distribution within the periods has been applied to provide the total hourly breakdown demonstrated in **Figure 8**.

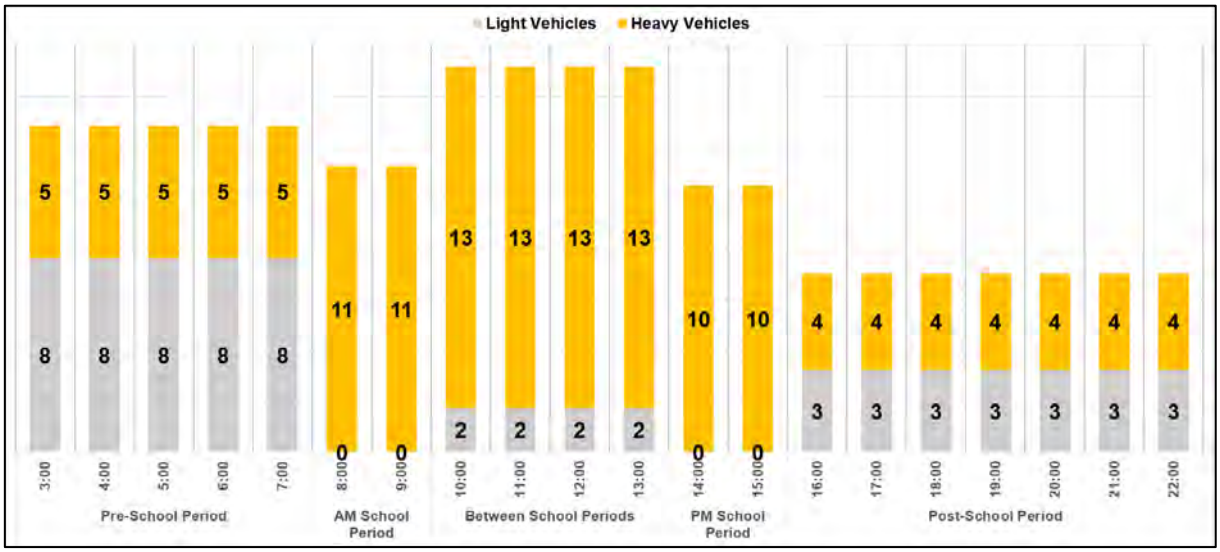


Figure 8: Hourly Construction Traffic Movements

5.5 Impact Assessment

5.5.1 Traffic Distribution

For conservative estimation, the highest estimated traffic hourly volume of 15 vehicles, in accordance with Figure 8 above, was used for indicative traffic generation within the peak hour periods.

Traffic Distribution for construction has been simplified to provide a 50/50 split between IN and OUT movements. Directional distribution to and from Mamre West has been determined proportionate to northbound and southbound traffic.

Traffic distribution for the Mamre Road x Bakers Lane intersection outside of the peaks, as well as Mamre Road / Abbotts Road (connecting to Aldington Road) during the peaks, is provided in **Figure 9** and **Figure** 10.

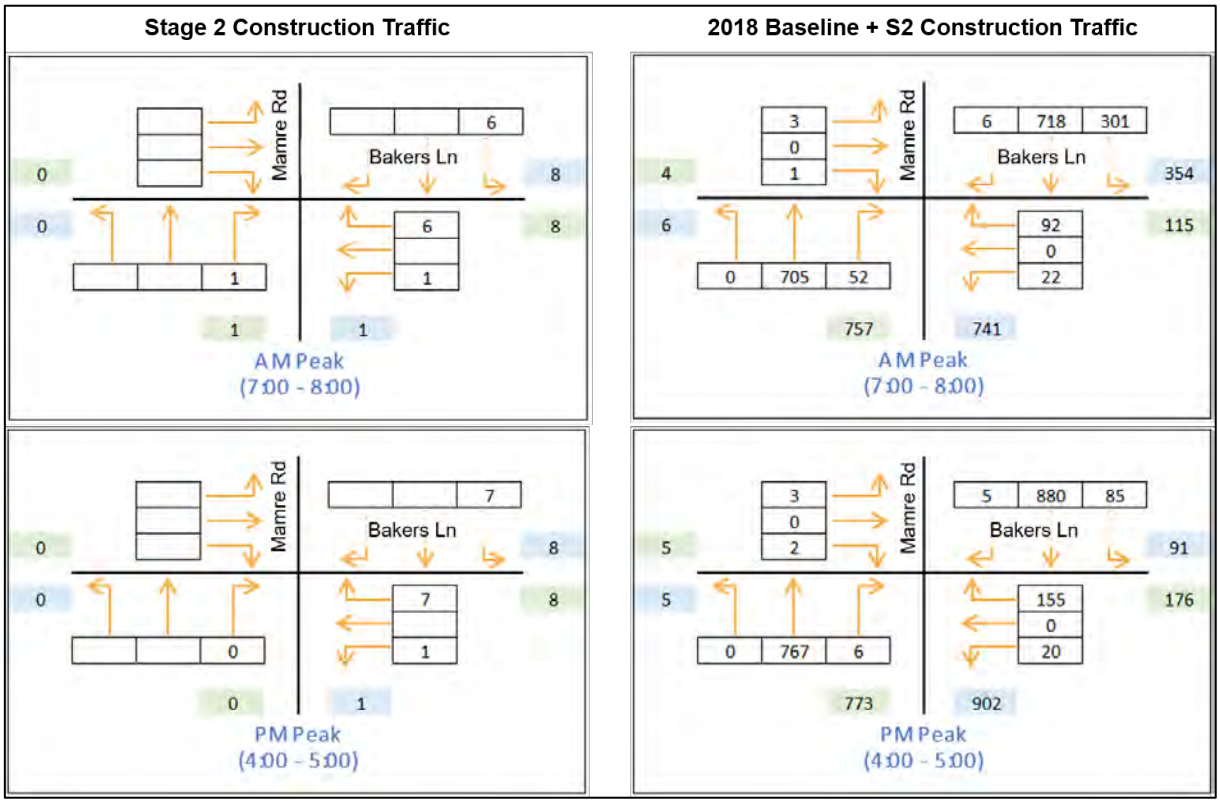


Figure 9: Mamre Road / Bakers Lane - Traffic Distribution and Project Traffic

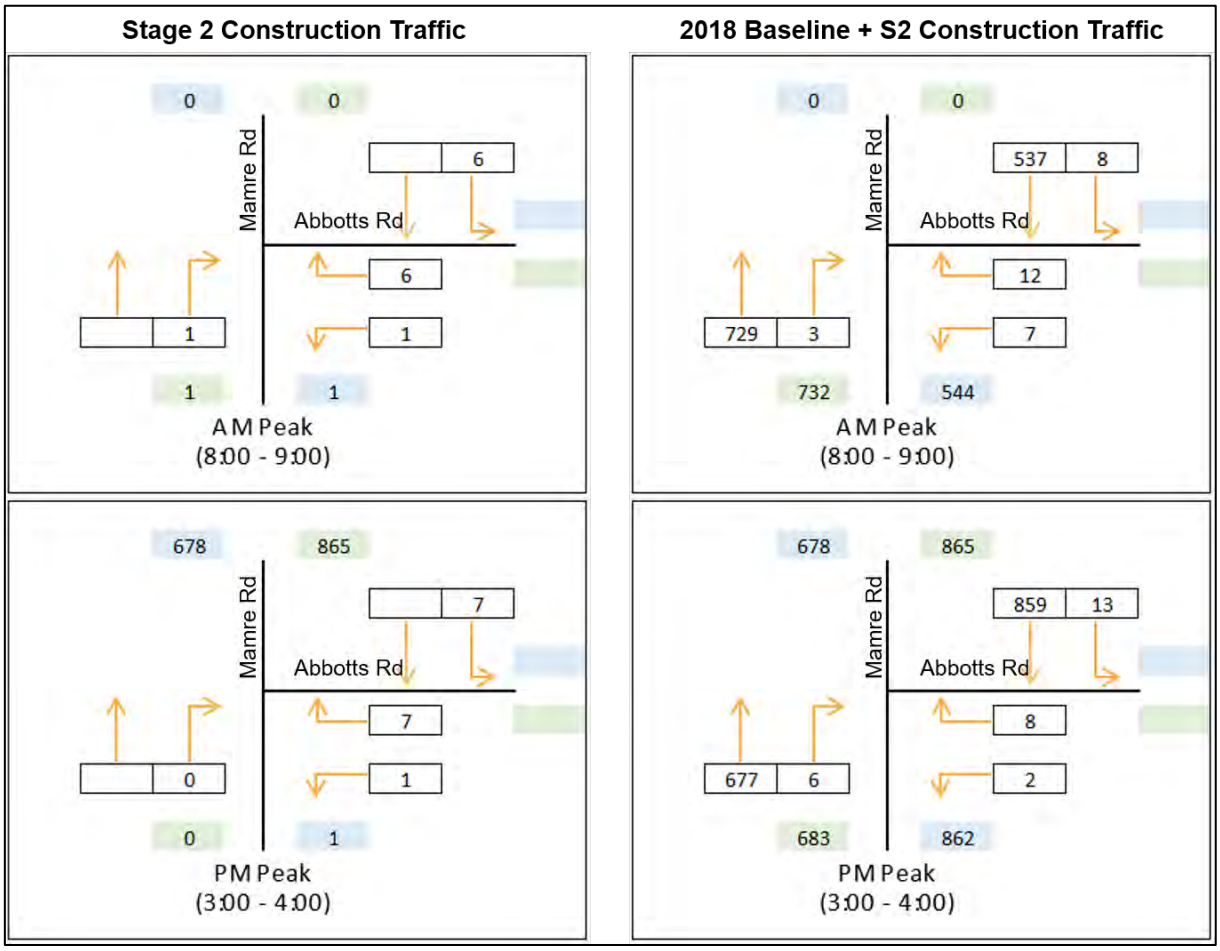


Figure 10: Mamre Road / Abbotts Road - Traffic Distribution and Project Traffic

5.5.2 Modelling

Baseline traffic has been established having regard for surveyed traffic flows as well as the inclusion of construction vehicles with the wider Oakdale West Estate earthworks. The Project scenario includes the Stage 2 construction traffic as outlined above. The results of the modelling are presented in **Table 8** and **Table 9**.

Table 8: SIDRA Modelling Results - Baseline

	Time Period	Delay (sec)	LoS
Mamre Road x Bakers Lane	AM (outside network peak)	11.8	A
	PM (outside network peak)	13.9	A
Mamre Road x Abbotts Road	AM (network peak)	38.9	C
	PM (network peak)	71.9	F
Mamre Road x Abbotts Road (No right turn out)	AM (network peak)	10.6	A
	PM (network peak)	17.1	B

Table 9: SIDRA Modelling Results - Project Case

	Time Period	Delay (sec)	LoS
Mamre Road x Bakers Lane	AM (outside network peak)	12.5	A
	PM (outside network peak)	14.4	A
Mamre Road x Abbotts Road (No right turn out)	AM (network peak)	13.6	A
	PM (network peak)	28.8	C

The intersection modelling demonstrates:

- Mamre Road / Bakers Lane operates at LoS A outside of the peak periods in both Base and Project case, indicating that the existing intersection has sufficient capacity to provide for associated traffic.
- The Mamre Road / Abbotts Road intersection generally performs at a satisfactory LoS, with the exception of the right-out movement from Abbotts Road. This movement is impacted by long average delay times accredited to the function of the priority intersection.
- Options testing to ban the Right-Out movement from Abbotts Road and restrict the approach to Left-Out only rectifies the delay issue, improving the overall intersection performance.

- The right turn out movement from Abbotts Road into Mamre Road northbound can be prohibited by means of ‘’No Right Turn’’ signs at this intersection.

In accordance with the advice provided to Ason Group, Goodman has engaged DPIE regarding this DA and the temporary construction route arrangement to be provided from Abbotts Road.

5.6 Traffic Impacts

Overall, the modelling results indicate that construction traffic generates minimal impact to the road network, both inside and outside of the network peaks, as a result of the moderate level of traffic volumes generated during these time frames.

Nevertheless, it is recommended that during the operational use of the Mamre Road / Abbotts Road priority intersection, right-out movements from Abbotts Road should be prohibited to mitigate potential impacts to intersection delay primarily during network peak periods. This may be enforced with signage on the Abbotts Road approach, or via a solution such as usage of barriers or islands to prevent undesirable movements. It should be emphasised again that this is a temporary arrangement and will only be applicable for a short period of a day and, between 1st June 2020 through to 1st October 2020.

It is noted that the existing Mamre Road intersection has already includes a Basic Turn Treatment (BAR) as denoted in Austroads Guidelines 4A and includes a 110-metre flared lane for northbound traffic to mitigate the impacts on trafficable flow by right-turning vehicles, as demonstrated in **Figure 11**.

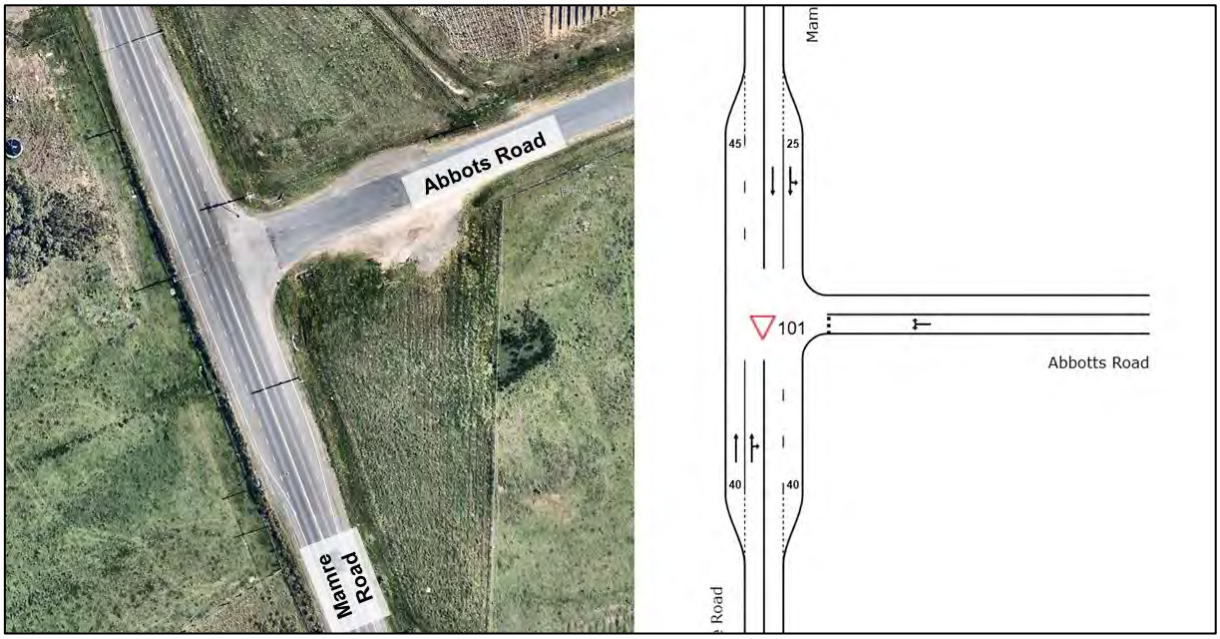


Figure 11: Basic Turn Treatment (BAR) Mamre Road / Abbotts Road

6 Design Commentary

6.1 Relevant Design Standards

The site access, car park and loading has generally been designed to comply with the following relevant Australian Standards:

- AS2890.1 for car parking areas;
- AS2890.2 for commercial vehicle loading areas;
- AS2890.3: Bicycle Parking; and
- AS2890.6 for accessible (disabled) parking.

6.2 Access Design

6.2.1 Car Park Access Design

A total of 4 access crossovers servicing a total of 1,127 car parking spaces are proposed. In this regard, the car parking area can be divided into 4 sections with approximately 200-300 spaces each serviced by one of the access points. On this basis, a Category 2 access driveway is nominally required (in accordance with Table 3.1 of AS2890.1).

In response, the proposed access crossovers are all separate entry and exit with a total width of 7.5 metres which is considered superior to the minimum 6.0m combined width required for a Category 2 driveway.

Furthermore, all 4-access point have been reviewed for sight line assessments and found to be satisfactory. However, to improve the sight lines at these accesses any landscaping proposed at the access points shall be limited to 0.5 metres in height for the first 83 metres along the kerb line to provide for a desirable Stopping Sight Distance (SSD) in accordance with figure 3.2 of AS2890.1 and with respect to the 60 km/hr speed limit on Estate Road 03.

Furthermore, it is noteworthy that all Estate Roads within OWE will be ‘No Stopping’ (or No Parking as appropriate) and hence readily improving the sight lines at access points in general.

6.2.2 Access to Commercial Area

Primary access to the hardstand area will be provided via the northern access point — a separated access with 12m entry and 12m exit with 1.5m median separation — which meets the requirements of AS2890.2 as outlined in Figure 3.2 of this standard.

A secondary ‘Exit Only’ crossover at the southern end of the Site is also provided which is expected to be in operation during the peak seasonal demand and provides a contingency in the event of unplanned issues (e.g. a breakdown or maintenance works) at the primary access.

The suitability of both access crossovers has been tested by 26.0 metres B-Double in AutoTrack software and is included in **Appendix A1** of this report.

6.3 Design Commentary

A detailed review of the car park and related areas has been undertaken and the following characteristics are noteworthy:

- The crossover locations provide sufficient sight distance to any potential obstructions or conflicts.
- Internal circulation of the hardstand area is designed to facilitate the maximum vehicle size (design vehicle) of a 26m B-Double. The more common vehicle used in operation is expected to be an 19m Articulated Vehicle (AV), and to a lesser extent, a 12.5m Heavy Rigid Vehicles (HRVs).
- Car park facilities have been designed in accordance with User Class 1/1A for employee parking.
- All disabled and adaptable parking spaces are to be provided in accordance with AS2890.6, which requires a space with a clear width of 2.4m and located adjacent to a minimum shared area of 2.4m.
- Motorcycle parking is located in an appropriate area to mitigate the potential impacts of vehicular parking and manoeuvring.

In this regard, consideration should be given to the swept path analysis conducted for the proposal and provided in **Appendix A1**.

Furthermore, compliance with the above Standards would be expected to form a standard condition of consent to any development approval.

7 Preliminary Sustainable Travel Plan

7.1 Purpose

This plan sets out objectives and strategies to assist both the DPIE and Penrith City Council in achieving their goals to improve sustainability of work trips for the proposal. This STP includes a review of the existing transport choices and sets targets so that the effective implementation of the STP can be assessed. These targets are intended to be realistic but ambitious enough to initiate substantiative behavioural change to achieve the desired outcomes, given existing and future multi-modal transport networks.

This STP is expected to be coordinated with the site tenants or their representatives. It shall be reviewed and updated regularly as part of an ongoing review to ensure it remains relevant and reflective of current conditions.

7.2 Travel Mode Share Analysis

It is noteworthy that the Site is still in development, as such existing travel patterns cannot be ascertained at this time. Therefore, for the purposes of the STP, a neighbouring travel zone with existing development, DZN114695449, has been identified and assessed.

Existing travel patterns of employees within the surrounding area have been surveyed in the 2016 Census and presented in the Journey to Work (JTW) dataset provided by TfNSW. The JTW information for the Site and surrounding locality is presented in **Figure 6** below.

It is evident that the area experiences a high proportion of private vehicle trips (inclusive of vehicle driver and vehicle passenger modes) and similarly a low proportion of public and active transport modes. Accordingly, the mode share analysis indicates a high likelihood for staff associated with the development to use private vehicles as the primary mode of transport.

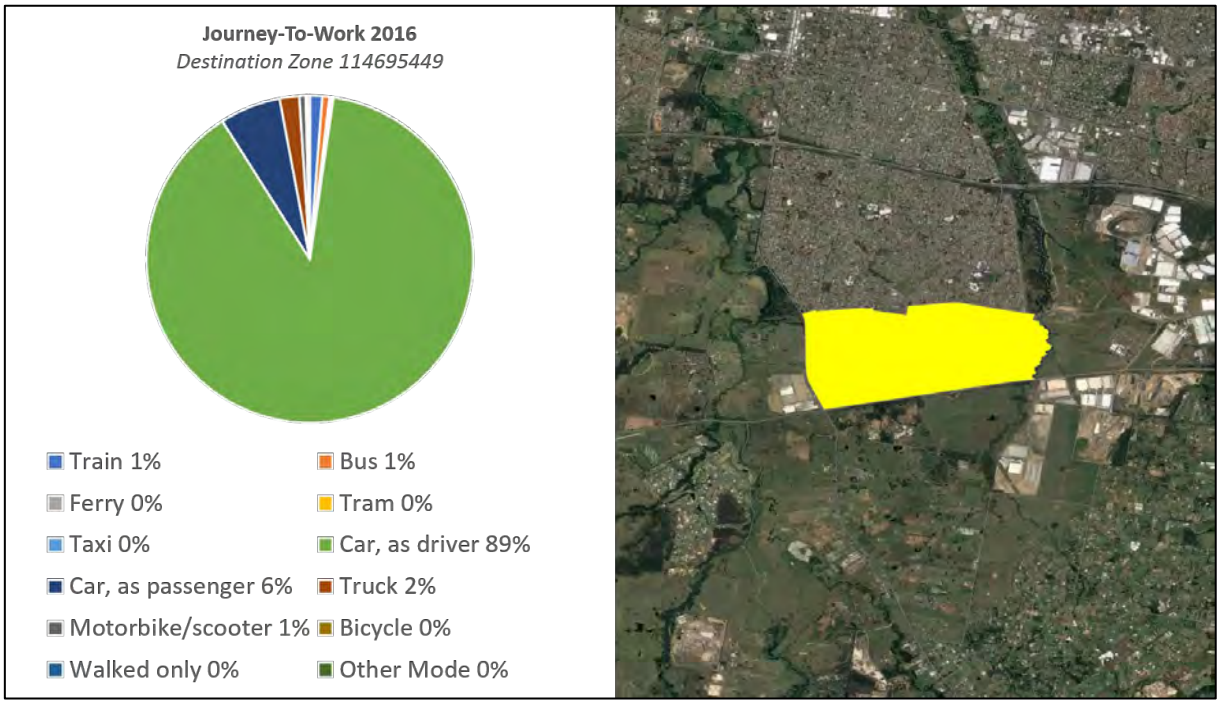


Figure 12: Journey-To-Work 2016 Profile

7.3 Strategic Context

7.3.1 Western Sydney Employment Area

The Oakdale Precinct is located within the Western Sydney Employment Area (WSEA), part of the Western Sydney Priority Growth Area – planning for which being driven by the DPIE. A key outcome of the project involves providing land opportunity for industry and employment, including improvements in connectivity to benefit transport, logistics, warehousing and office space of the area. The project aims to support the urban growth of the Badgerys Creek Aerotropolis and Western Sydney Airport.

7.3.2 North South Rail Link

The North South Rail Link is a proposed rail access corridor supporting the urban growth and employment through the Western Sydney Priority Growth Area, providing connection between the northern growth centres, through the Badgerys Creek and southwards. The corridor study identifies St Marys Station and Schofields Road as junction points for the corridor, passing through the WSEA site and towards the Western Sydney airport. This rail link will provide additional connectivity to Erskine Park and Orchard Hills from the north and south, widening the potential catchment area of employment and improving workplace accessibility for public transport modes.

7.4 Surrounding Public Transport Services

7.4.1 Railway Services

The *Integrated Public Transport Service Planning Guidelines, Sydney Metropolitan Area* (Transport for NSW, December 2013) states that rail services influence the travel mode choices of areas within 800 metres (approximately 10 minutes' walk) of a railway station. The closest railway station to the Oakdale West Precinct is Mt Druitt Station, is approximately 7km north of the site. This would imply that commuting by rail would have minimal influence on workplace travel.

It should be noted that several studies conducted for the Broader Western Sydney Employment Area (BWSEA) reference the potential development of connecting freight or passenger corridor to the Site's west, connecting the T1, T2 and T5 lines to Badgerys Creek Airport [1] [2].

7.4.2 Bus Services

Having regard to the standard bus travel, the *Integrated Public Transport Service Planning Guidelines* state that bus services influence the travel mode choices of sites within 400 metres (approximately 5 minutes) of a bus stop. As there are no existing bus services in the proximity of the Site, this implies that bus commuting would have minimal influence on workplace travel.

As outlined in the WSEA, a new regional road network is being developed interlinking the industrial precincts within the region to support the growth and continued development of the area. This presents the potential for an accompanying expansion in the bus service network to connects places of employment within the region.

Currently, Goodman is investigating opportunities to facilitate bus service routes for the Oakdale West Precinct.

[1] Western Sydney Rail Needs Scoping Study https://www.westernsydneyairport.gov.au/files/WSRNSS_Outcomes_Report.pdf

[2] Broader Western Sydney Employment Area – Structure Plan https://www.planning.nsw.gov.au//media/Files/DPE/Reports/broader-western-sydney-employment-area-structure-plan-transport-planning-preliminary-analysis-report-exhib-draft-2013-06.pdf?la=en

7.5 Objective and Targets

7.5.1 Objectives

The primary objectives of this STP are to:

- Reduce the environmental footprint of the development,
- Promote the use of 'active transport' modes such walking and cycling, particularly for short-medium distance journeys,
- Reduce reliance on the use of private vehicles for all journeys,
- Encourage a healthier, happier and more active social culture.

Having regard for the above, this Plan adopts the following movement hierarchy with priority given to 'active transport' followed by mass public transport and lastly the use of cars and other private vehicles.

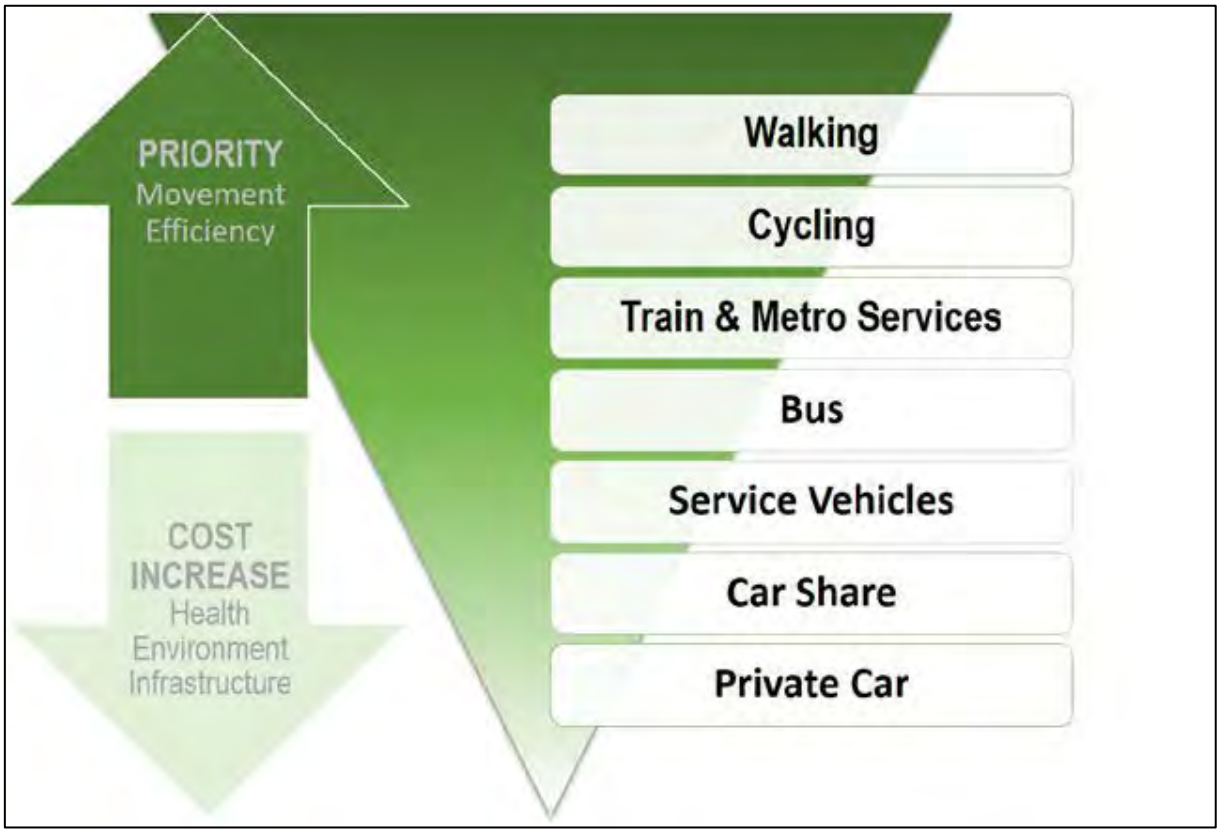


Figure 13 : Movement Hierarchy

In a broad sense, this STP is intended to encourage the use of active transport thereby reducing the overall distance travelled by private vehicles.

It is noted that the above hierarchy applies to staff and visitor (i.e. car) movements. Given the nature of the development for warehouse and industrial purposes, it is acknowledged that there is limited ability to reduce the number of commercial vehicle movements without compromising site operations.

7.5.2 Mode Share Targets

With the above objectives in mind, the mode share targets outlined in **Table 7** are proposed, based on the JTW Profile for Travel Zone 5002 in Section 6.2.

Table 10: Mode Share Targets (Primary Mode of Travel)

Travel Mode.	Existing – DZN 114695449	Proposed	Relative Change
Walking	0%	0%	0%
Cycling	0%	5%	+ 5%
Train[1]	1%	5%[2]	+ 4%
Bus[1]	1%	10%	+ 9%
Vehicle Passenger	6%	10%	+ 4%
Vehicle Driver	90%	68%	- 22%
Other/Mode Not Stated	2%	2%	0%

Note: 1) Key opportunity in future with provision of further regional infrastructure

2) The JTW classifies multi-modal journeys by indicating the 'primary' mode only, and is considered in this proposition.

Given the limited options for modal availability in the area, it is difficult to quantify the degree of modal shift from private vehicular usage to public and active transport modes. However, in the context of development outlined in the above sections, it is evident that there is clear direction in a strategic context for the expansion of public and active transport networks to serve the western Sydney area.

In this context, the mode share targets identified in **Table 7** can be considered with a focus on 20% for public and active transport, and 80% on private car usage. This ratio is reflective of travel zones observed to have higher degrees of road network connectivity and limited access to rail facilities. It shall be necessary to adjust these mode share targets as future developments and planned transport infrastructure are realized, allowing for more ambitious targets to be set.

The changes made to cycling, train and bus travel modes are specifically reliant on the improvement of connectivity and additional infrastructure to facilitate them, which is anticipated to occur through several developments and initiatives associated with the broader WSEA. Similarly, the 'Vehicle Passenger' travel mode increase will primarily be met through Precinct specific initiatives, including Shuttle Services

during the peak seasonal demand for Building 2B providing connectivity to nearby stations or interchange nodes, a strategy discussed further in **Section 6.6**.

7.6 Action Plan

7.6.1 Action Plan Measures

The following specific actions have been identified to aid achievement of the targets outlined in Section 6.5.2. It is anticipated that relevant actions in **Table 8** should be conveyed to the tenants at the time of tenancy agreement.

Identified strategies include promotion of some event or day-specific activities. In isolation, these may not dramatically alter the day-to-day travel of staff. However, there are benefits of such activities whereby participation can increase awareness of alternative modes of travel that can then form the basis of future travel choices.

Table 11: Action Plan Measures

Item No.	Action / Description	Responsibility
1. General		
1.1	Establish a centralised Travel Plan Coordinator (TPC) which is to take responsibility for the ongoing review and monitoring of this Plan. This person(s) shall also provide direction to tenants in relation to tenant-specific requirements arising from the STP.	Landowner / Strata Manager
1.2	Establish and maintain a transport coordinator to engage with the overall transport coordinator above.	Tenant
1.3	Provide 'Travel Welcome Pack' for newly employed staff, highlighting alternate modes of transport other than use of a private vehicle.	TPC / Tenant
1.4	Review of STP as a regular item on the agenda for the Tenant / Landowner meetings.	TPC
1.5	Encourage flexible work hours, where practicable. Whilst not reducing mode share, this can permit travel outside of peak periods which has other positive benefits.	Tenant
1.6	Preparation of a Transport Access Guide (TAG) – refer Appendix B.	TPC
2. Walking and Cycling		
2.1	Lobby Council / DPIE for improved cycle connections in the broader area.	TPC
2.2	Promote participation in the National Ride2Work Day activity.	Tenant
2.3	Promote participation in Walk to Work Day (and other) events.	Tenant
2.4	Provide and maintain clearly signposted bicycle parking within the Site.	Developer / Landowner
2.5	In accordance with the 5% cycling mode share target, sufficient secure parking spaces and 'EoT' facilities shall be provided and maintained. (NOTE: this can be staged to reflect realised demand)	Developer / Landowner

Item No.	Action / Description	Responsibility
3. Public Transport		
3.1	Advocate for TfNSW to improve public transport services in response to increased development within the surrounding area.	Landowner / TPC
3.2	Update the STP to reflect changes to any bus routes and service times.	TPC
3.3	Undertake a review to promote initiatives for staff using public transport.	TPC / Tenant
4. Shared Vehicles		
4.1	Review initiatives for staff to promote car-pooling. This may include (but not limited to) the provision of online services or forums to facilitate ease of finding carpooling scheme participants.	TPC / Tenant
4.2	Undertake research in the feasibility of providing shuttle services during the Building 2B peak seasonal demand to and from the Site to train stations or other interchange nodes. This may require additional coordination with surrounding precincts to facilitate additional capacity potential.	TPC
4.3	In longer term, engage with Car Share operators to encourage provision of Car Share pods in proximity to the site. This transport option – for miscellaneous travel throughout the day – can then alleviate pressure for staff to drive as part of the primary mode of travel to work.	TPC

Bicycle parking spaces and End of Journey facilities are expected to be provided on-site to support the above Action Plan. Additional bicycle parking spaces (over and above the currently provided 128 spaces) may be recommended in the future; however, this would be subject to further review as part of the ongoing STP maintenance which is discussed further below.

7.6.2 Communications Strategy

Welcome Packs

New staff shall be provided with a 'welcome pack' as part of the on-site induction process which includes the STP and other information in relation to sustainable transport choices. This pack shall include a copy of the Travel Access Guide (TAG) as well as general information regarding the health and social benefits of active transport. Advice on where to find further information should also be included such as links to Sydney Cycleways website (http://www.sydneycycleways.net).

7.7 Governance & Support

7.7.1 Travel Plan Coordinator

A person(s) shall be nominated as the Travel Plan Coordinator (TPC) and be responsible for:

- Engagement with the future tenants on-site,
- Implementation and promotion of the STP actions,
- Monitoring the effectiveness of the STP (refer to monitoring requirements outlined in **Section 6.7.3**) and ongoing maintenance of the Plan,
- Provide advice in relation to transport-related subjects to staff, tenancy management and visitors, as required, and
- Liaise with external parties (i.e. Council, public transport and car share operators) in relation to Travel Plan matters.

This role does not necessarily require full-time position; however, it should be clearly designated among the key responsibilities of the building management group.

This may include financial incentives for staff to use active transport and public transport to travel to work. However, this is not a mandatory requirement and would be subject to the management discretion.

7.7.2 Resourcing

It is not anticipated that the maintenance of this STP will have significant ongoing cost implications and shall be reviewed on an annual basis by the TPC in order for the best outcome.

7.7.3 Plan Maintenance

This Plan shall be subject to ongoing review and will be updated accordingly. Regular reviews – ideally on annual basis – will be undertaken by the TPC, as required. Key considerations regarding the review of the STP shall be:

- Updating baseline conditions to reflect any changes to the transport environment in the vicinity of the Site such as changes to bus services, new cycle routes etc. In this regard, review of the STP may be undertaken on a more frequent basis,
- Tracking progress against proposed travel mode targets,
- To identify any shortfalls and develop an updated action plan to address issues, and

- To ensure travel mode targets are updated (if necessary) and to ensure they remain realistic but also ambitious.
- To revise mode share targets and develop strategies that encourage the use of public and active transport and that discourage single occupant car travel to the site, as future public and active transport improvements around the development site occur.

7.7.4 Travel Mode Audit Requirements

Travel mode surveys will be undertaken to determine the proportion of persons travelling to/from the site by each transport mode. This will be in the form of annual travel mode questionnaire surveys to be completed by all persons attending the Site, as far as practicable. This survey may be undertaken online or in-person at the discretion of the TPC. A sample of a typical travel mode questionnaire form is included in **Appendix A3**.

8 Summary & Conclusion

8.1 Key Findings

Key findings of this Development Application (DA) Traffic Impact Assessment (TIA) are as follows:

- This Stage 2 DA 10397 relates to Building 2B, and the development and construction of an industrial warehouse facility within Precinct 2 (of the Concept Plan envisaged by MOD 3).
- The development comprises:
  - 206,968 m^2 GFA (200,668 m^2 GLA), consisting of 195,176 m^2 of Warehouse space; and 5,492 m^2 of Office space,
  - 1,127 car parking bays (incl. 36 accessible parking bays),
  - 54 motorcycle parking bays,
  - 135 truck parking bays; and
  - 61 rear loading bays catering for AVs and HRVs.
- Proposed car parking, bicycle parking and accessible parking are in line with the requirements of clause B13 and B14 of the Conditions of Consent accompanying the SSD 7348 Approval.
- Operational traffic projections have been provided by the future tenant in order to gain a more detailed appreciation for vehicle movements. Accordingly, Building 2B is anticipated to generate:
  - 580 vehicles in the AM road network Peak, and
  - 371 vehicles in the PM road network Peak of a non-peak seasonal period.
  - During the seasonal peak, this generation increases by 240 and 161 in the respective network peaks.
- The wider precinct modelling conducted for MOD 3 reflects these traffic volumes to ensure that the development traffic generation of Building 2B is suitably factored into consideration of the Estate as a whole.
- That precinct-wide modelling has demonstrated that the traffic generation provided by the future tenant will not present any unacceptable impacts to the road network, inclusive of the wider estate's internal roads and connections to the external road network.
- Construction traffic projections have been provided by the construction firm to provide a detailed appreciation for the potential impact of traffic during the construction phase of Stage 2 Works. This traffic is anticipated to peak at a total of 217 daily vehicle trips during November 2020.
- Accordingly, these numbers have been assessed and modelled. According to the SIDRA results:

- These demonstrate no significant impacts to the two critical intersections identified in the Construction Routes.
- Nonetheless, recommendation is made to ban Right-Out movements from the Abbotts Road approach of the Mamre Road / Abbotts Road intersection, improving intersection performance and driver safety.
- It is expected that a condition of consent requiring compliance with the AS series would be imposed to ensure full compliance at Construction Certificate stage of the project. In this regard, the proposed design of Lot 2B has been assessed in accordance of Australian Standards and is generally supportable. The design has adopted a 26m B-double as the 'design vehicle' which is suitable for a development of this size and nature.

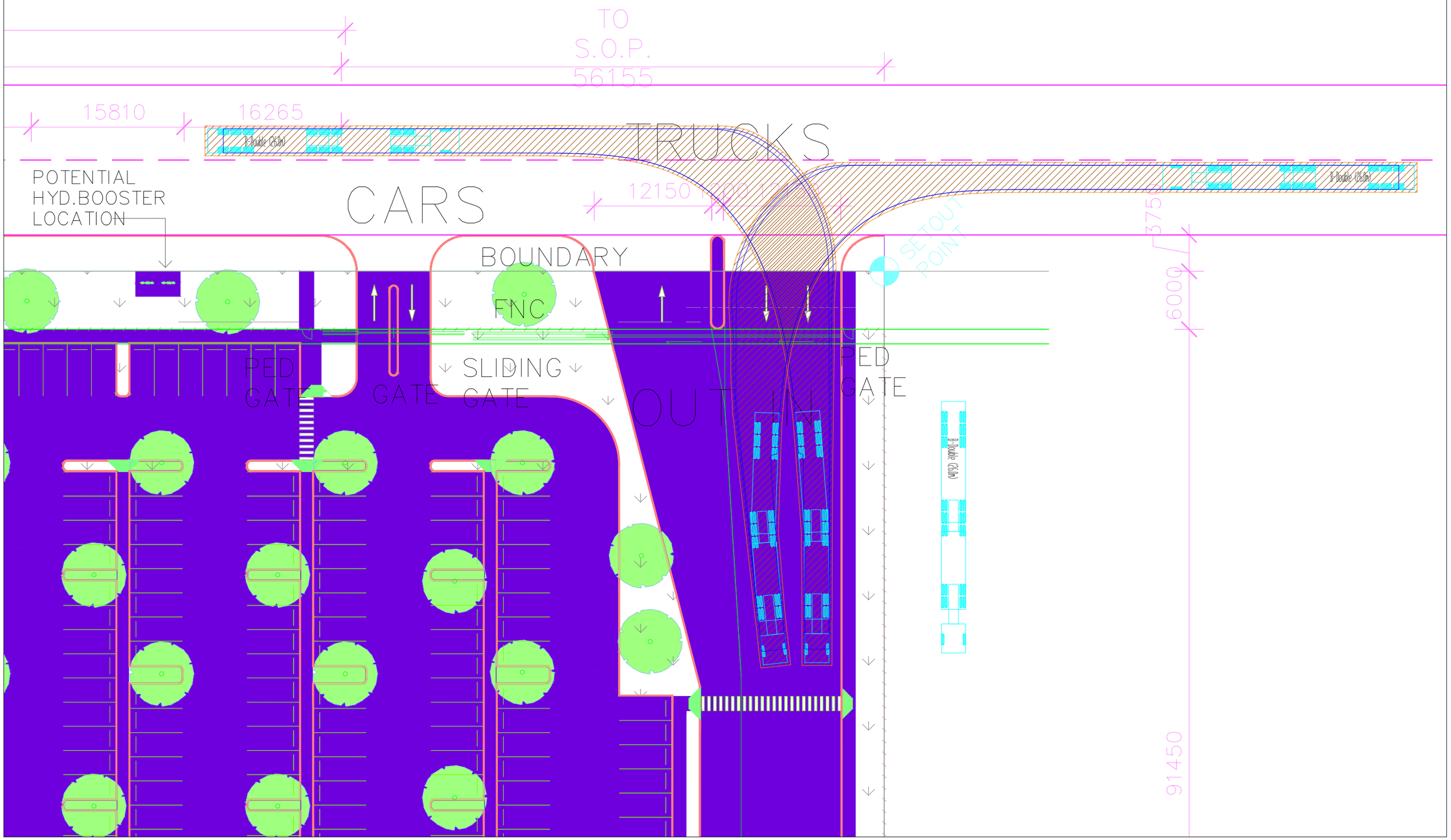
8.2 Conclusion

In summary, the Proposal is supportable on traffic planning grounds and will not result in any adverse impacts on the surrounding road network or the availability of on-street parking.

Appendix A1

Swept Paths

Northern Driveway - IN



Revision notes:

Rev:	Date:	Notes:

For information purposes only - not for construction

Drawn By: M TANGONAN

Client: Goodman Property Services

Project: P1086 OWE - Project Waratah

Drawing Title: Driveway Access B-Double (26m)

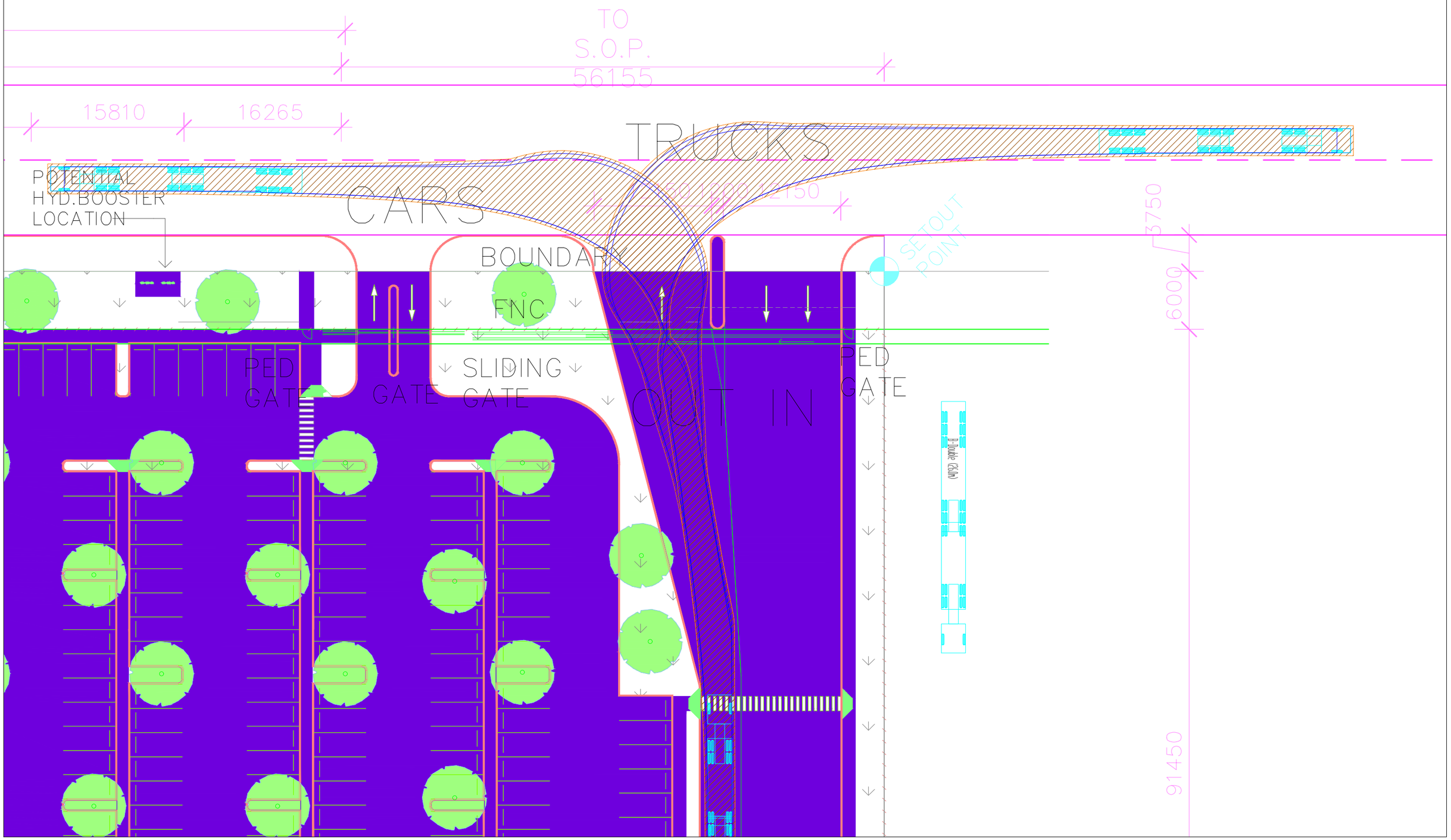
Date: 4-Dec-19

Scale @ A3: NTS

Drawing Number: AG01

asongroup
Suite 5.02, Level 5, 1 Castlereagh Street
Sydney NSW 2000
info@asongroup.com.au

Northern Driveway - OUT



Revision notes:

Rev:	Date:	Notes:

For information purposes only - not for construction

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Client: Goodman Property Services

Project: P1086 OWE - Project Waratah

Drawing Title: Driveway Egress B-Double (26m)

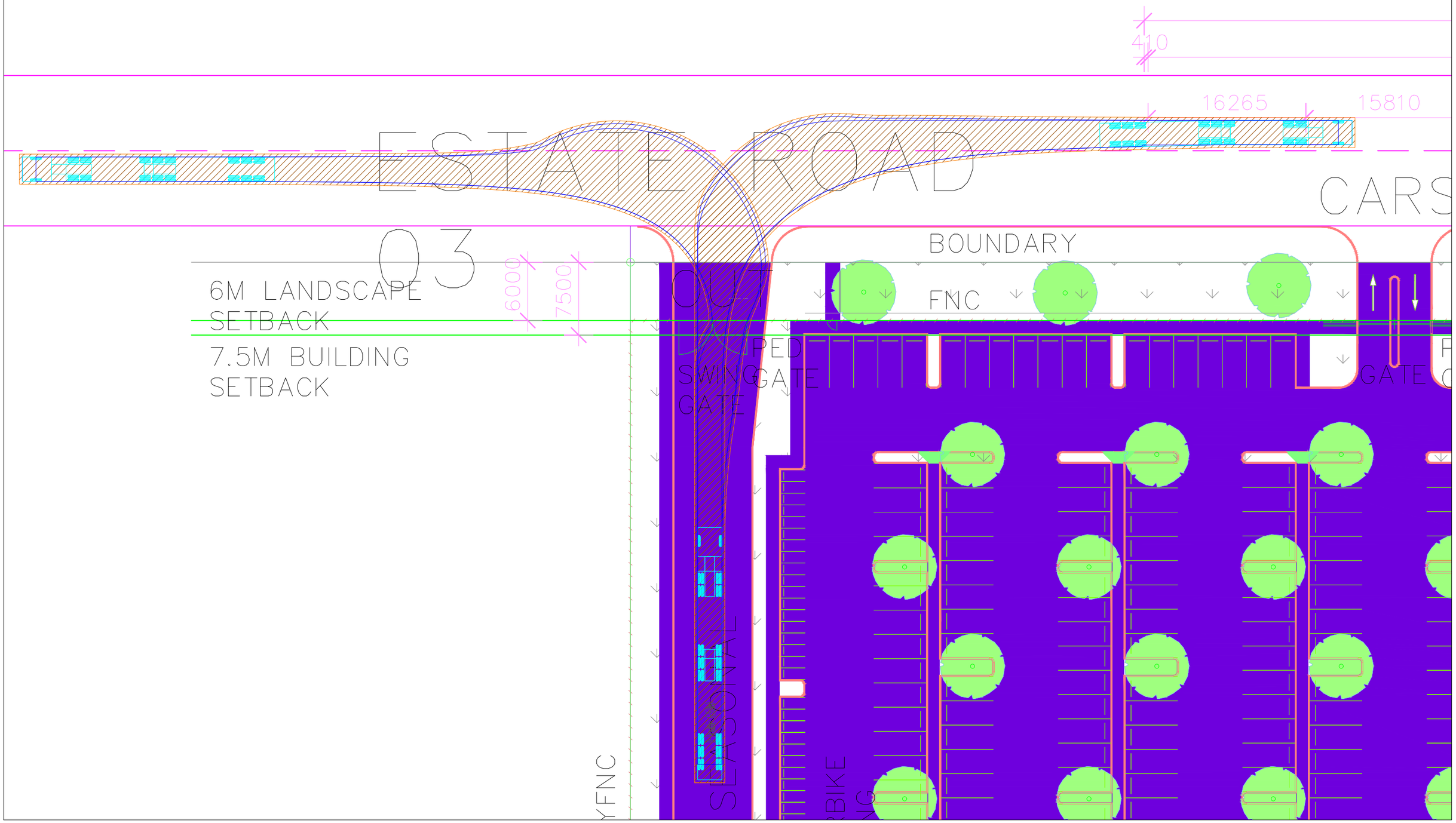
Date: 4-Dec-19

Scale @ A3: NTS

Drawing Number: AG02

asongroup
Suite 5.02, Level 5, 1 Castlereagh Street
Sydney NSW 2000
info@asongroup.com.au

Southern Driveway - OUT



Revision notes:

Rev:	Date:	Notes:

For information purposes only - not for construction

Drawn By: M TANGONAN

Client: Goodman Property Services

Project: P1086 OWE - Project Waratah

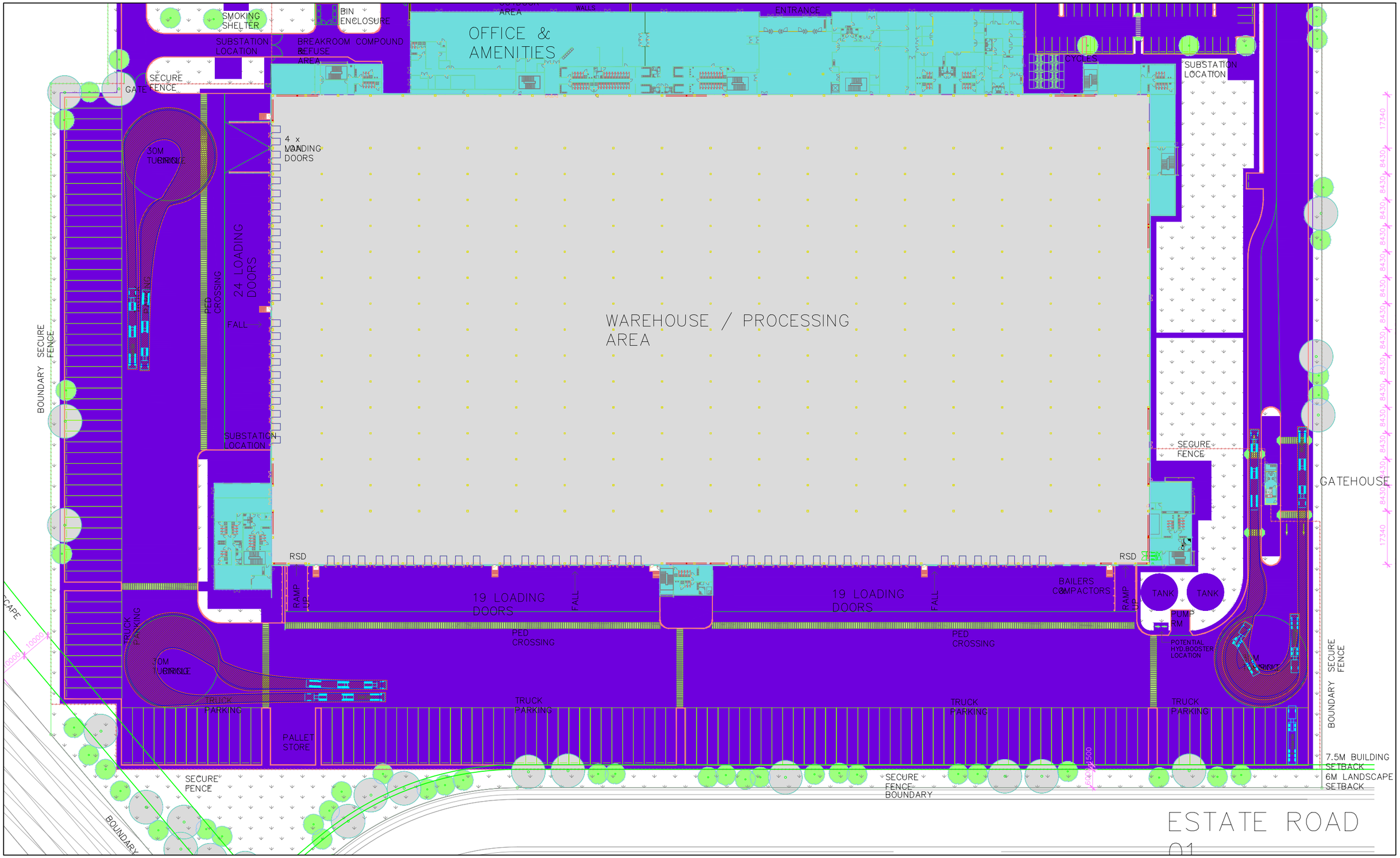
Drawing Title: Driveway Egress B-Double (26m)

Date: 4-Dec-19

Scale @ A3: NTS

Drawing Number: AG03

asongroup
Suite 5.02, Level 5, 1 Castlereagh Street
Sydney NSW 2000
info@asongroup.com.au



Revision notes:

Rev:	Date:	Notes:

For information purposes only - not for construction

Drawn By: M TANGONAN

Client: Goodman Property Services

Project: P1086 OWE - Project Waratah

Drawing Title: Hardstand Turning Circles B-Double (26m), AV (19m)

Date: 4-Dec-19

Scale @ A3: NTS

Drawing Number: AG04

asongroup
Suite 5.02, Level 5, 1 Castlereagh Street
Sydney NSW 2000
info@asongroup.com.au

Appendix A2

Transport Access Guide (TAG)

Travel Access Guide



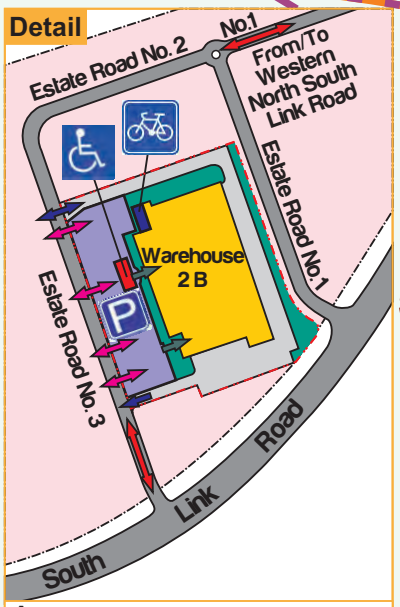
Lot 2B "Waratah" Warehouse Facility

Oakdale West Estate

Kemps Creek
Erskine Park
2759

715
November 2019

Detail



Access

- Road arrival / Departure
- Car Park Entry / Exit
- Truck Entry / Exit | Exit Only
- Warehouse Pedestrian Entry

Parking Spaces

- 1127 Car Spaces
- 34 Accessible Car Spaces
- 128 Bicycle Spaces

Public Transport

Bus Services

Busways

738 Mt Druitt to Rooty Hill via Eastern Creek Industrial Park and Horsley

779 St Marys to Erskine Park Industrial Estate

Transit Systems

813 Fairfield to Prairiewood via Horsley Park, Mt Vernon and Bonnyrigg

835 Prairiewood to University of Western Sydney Penrith via Wetherill Park, Horsley Park, Eastern Creek, Erskine Park, St Clair, Colyton and St Marys

Active Transport Routes

- Existing Shared Paths
- Motorway Cycle Lanes
- Proposed Mamre Road Upgrade from M4 Motorway to Kerrs Road, Mt Vernon
- Future S Link Road Cycleway from Mamre Road to M7 Westlink
- Future West NS Link Road Cycleway from S Link Road to Lenore Drive

To Penrith
To St Marys
To UWS via S Marys
M4 Western Motorway
To Rooty Hill and Mt Druitt
To Old Windsor Road Glenwood
To Wentworthville
738
779
835
813
Park Road
John Morphett Place
Lenore Drive
Erskine Park Road
James Erskine Drive
Proposed Archibold Road North South Link
Proposed North West Link Road
Proposed Western North South Link Road
Old Wallgrove Road
Roberts Road
M7
Warehouse 2B
See Detail
Oakdale Millner Avenue
Oakdale Central
Oakdale East
Oakdale South
Southern Link Road
Burley Road
Westlink
Mamre Road
Aldington Road
Abbotts Road
OAKDALE WEST ESTATE
To Kerrs Road Mt Vernon
To Bonnyrigg
To Prestons
To Prairiewood
To Fairfield
The Horsley Drive
Wallgrove Road
To Canley Vale Bankstown and Fairfield
0
1km

Appendix A3

Sample Travel Mode Questionnaire

Instructions for Surveyor(s)

1. The Survey Form (over page) should be completed by EVERY PERSON attending the site on a particular day.

2. This survey should be completed SEPARATELY for EACH TRIP undertaken

Travel Mode Questionnaire Survey Form

Date: **Approximate Time:**

Q1. Are you one of the following?

☐ Office staff
☐ Company driver / sub-contractor
☐ Courier / office delivery
☐ Warehouse ground staff
☐ Casual contractor
☐ Other (Please specify) .

Q2. How did you travel to / from the site today?

☐ Walked only
☐ Car share vehicle
☐ Bicycle only
☐ Motorcycle / scooter
☐ Train
☐ Car (as passenger)
☐ Bus
☐ Car (as driver)
☐ Taxi
☐ Other (Please specify)

Q3. If you drove to the site, where did you park?

☐ Not applicable – did not drive
☐ On-street
☐ On-site car park
☐ In other nearby off-street car park
☐ On-site within truck hardstand
☐ Other (Please specify)

Q4. What is your Residential Postcode?

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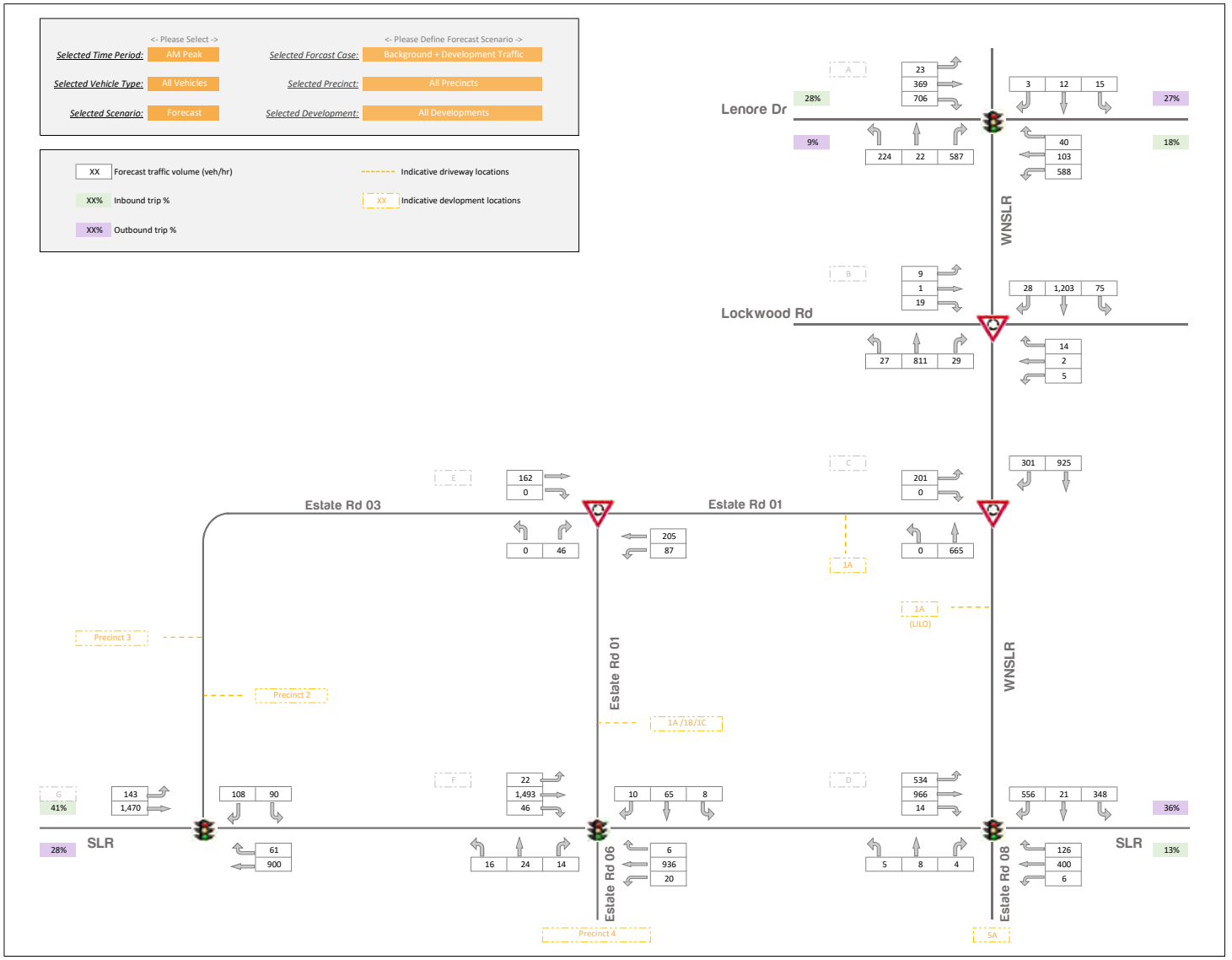
Appendix B

Traffic Flow Network Diagrams

Modelling Year 2026 – Non-seasonal Peak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Selected Development: All Developments
XX Forecast traffic volume (veh/hr)
XX% Inbound trip %
XX% Outbound trip %
Indicative driveway locations
XX Indicative devlopment locations
Lenore Dr
Lockwood Rd
Estate Rd 03
Estate Rd 01
Estate Rd 01
WNSLR
WNSLR
SLR
SLR
Estate Rd 06
Estate Rd 08
Precinct 3
Precinct 2
Precinct 4
1A/1B/1C
1A
1A (LILO)
5A
A
B
C
D
E
F
G
28%
9%
27%
18%
41%
28%
36%
13%
23
369
706
3
12
15
224
22
587
40
103
588
9
1
19
28
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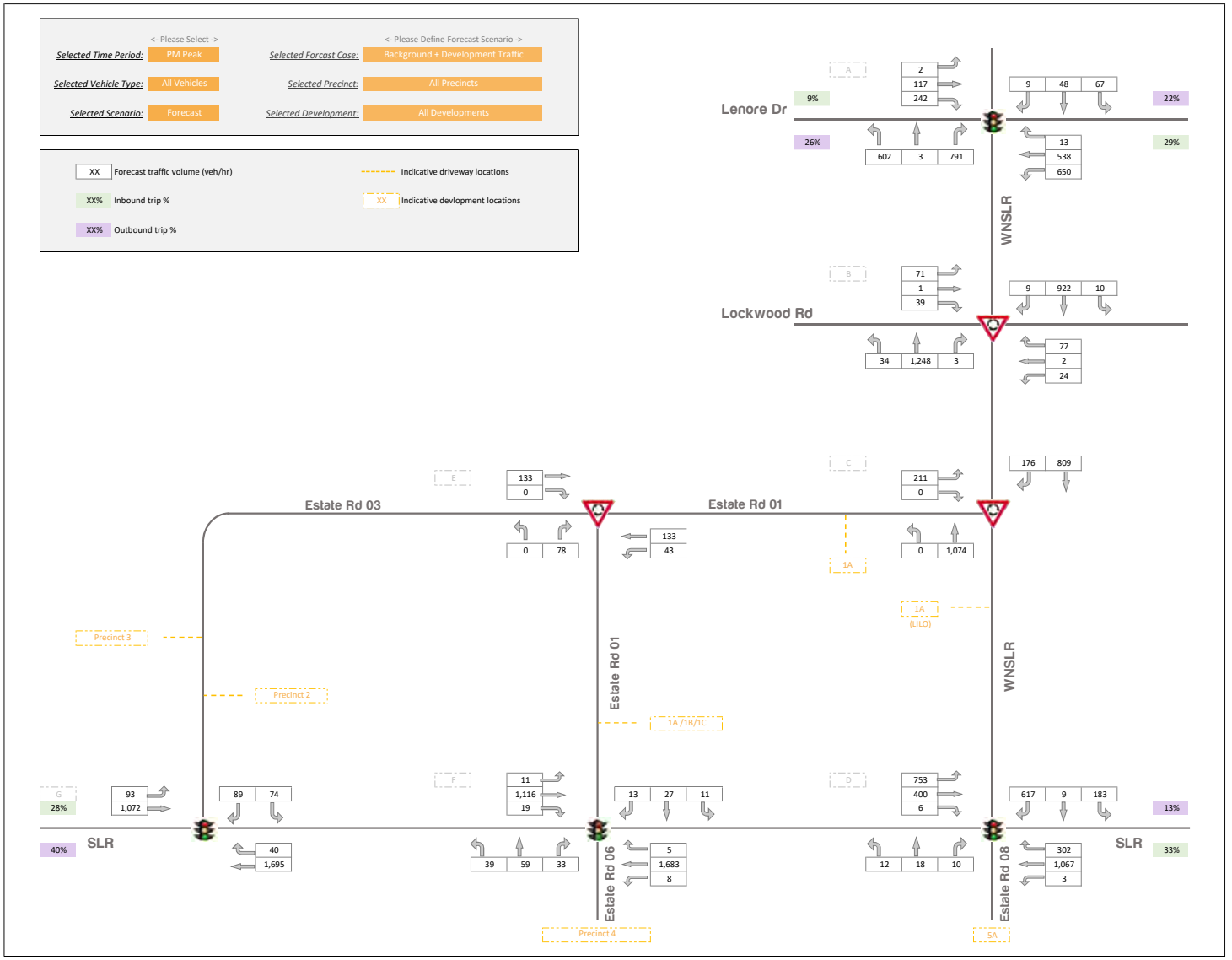
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XX% Inbound trip %
XX% Outbound trip %
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XX Indicative devlopment locations
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Estate Rd 01
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SLR
SLR
Estate Rd 06
Estate Rd 08
Precinct 3
Precinct 2
Precinct 4
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1A (LILO)
1A/1B/1C
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9%
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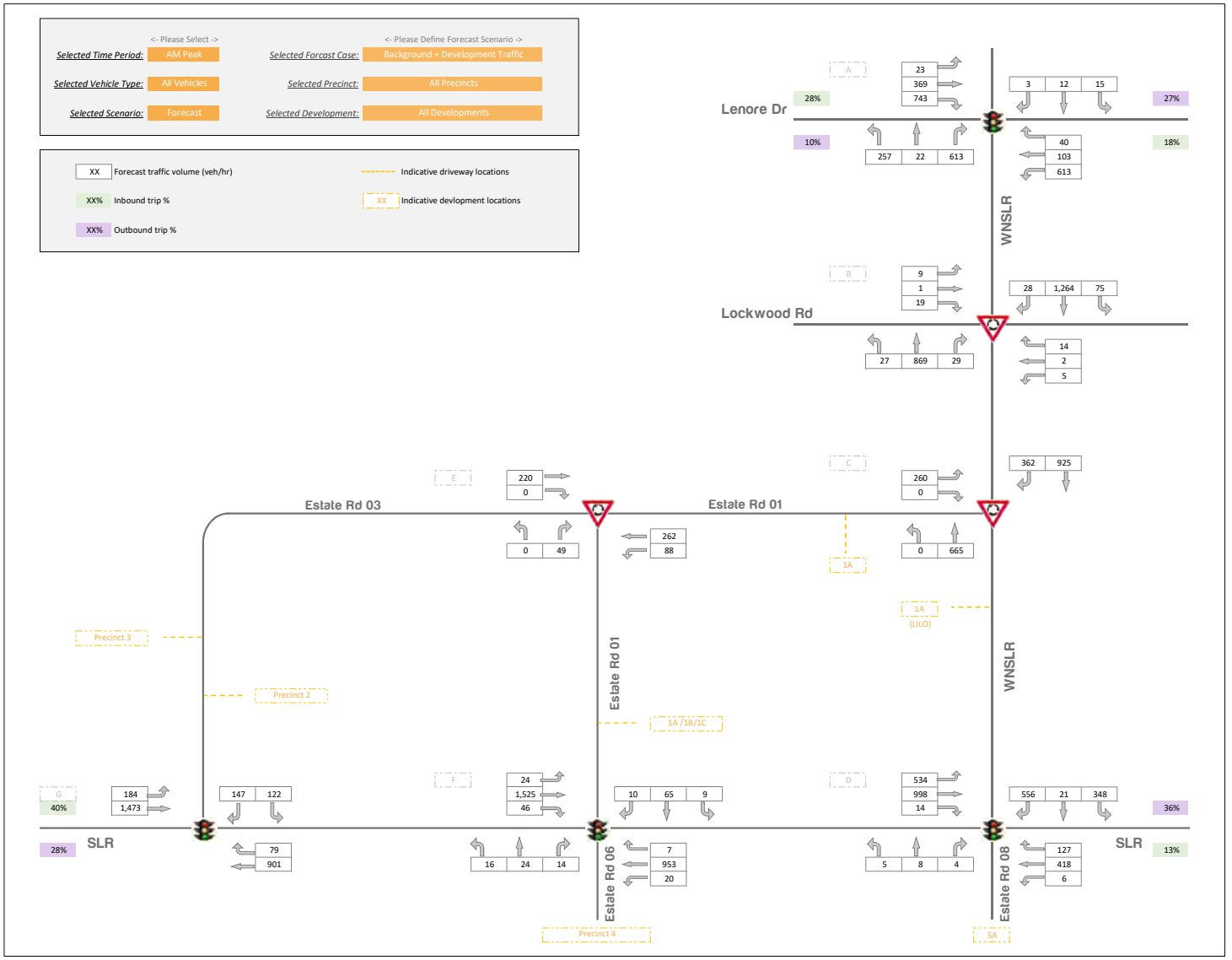
40%
13%
33%

Modelling Year 2026 – Seasonal Peak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Selected Development: All Developments
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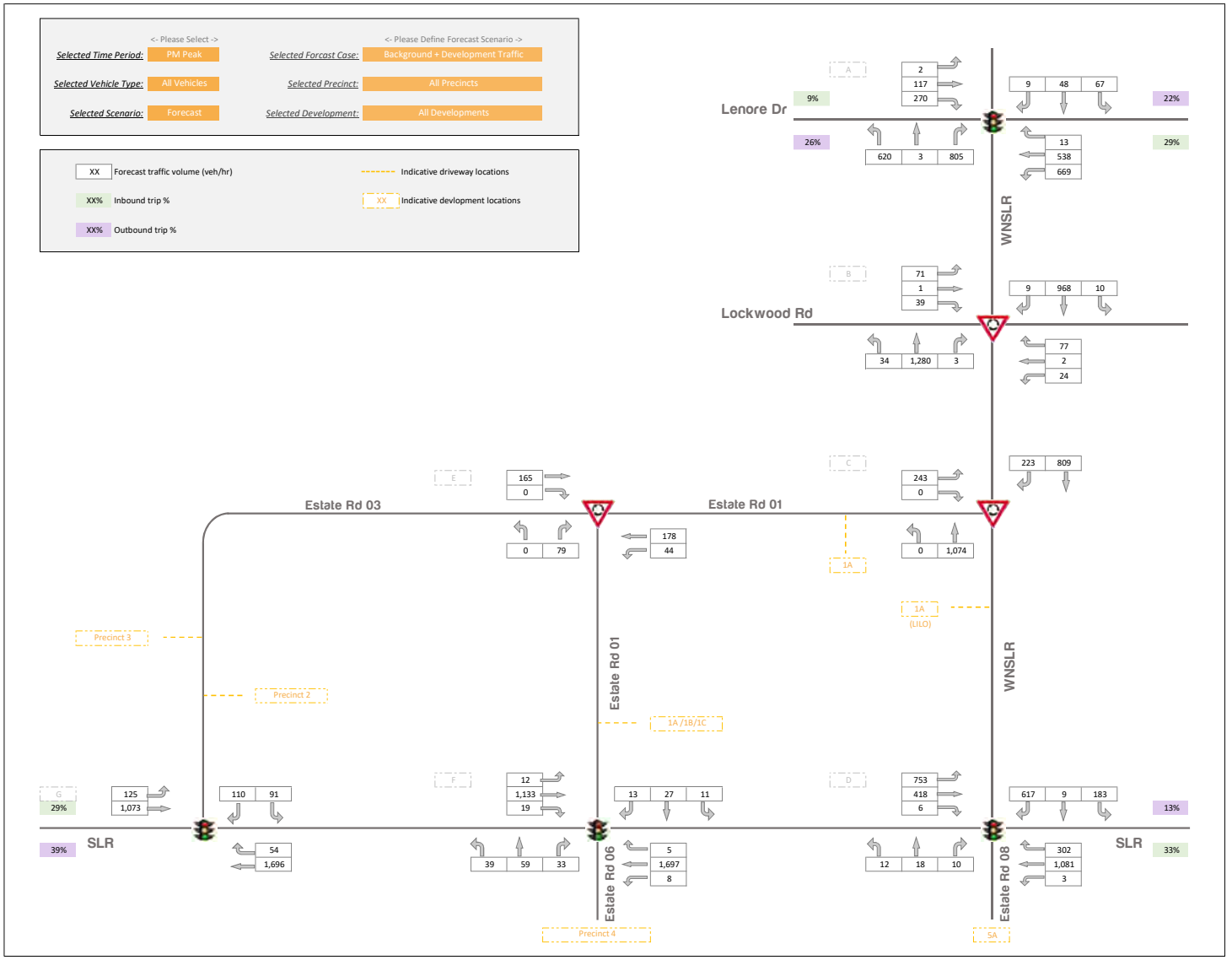
Indicative driveway locations
XX Indicative devlopment locations
Lenore Dr
Lockwood Rd
WNSLR
Estate Rd 03
Estate Rd 01
Estate Rd 06
Estate Rd 08
SLR
Precinct 2
Precinct 3
Precinct 4
1A
1A (LILO)
1A/1B/1C
5A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Selected Development: All Developments
XX Forecast traffic volume (veh/hr)
XX% Inbound trip %
XX% Outbound trip %
Indicative driveway locations
XX Indicative devlopment locations
Lenore Dr
Lockwood Rd
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Estate Rd 01
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Estate Rd 06
Estate Rd 08
Precinct 3
Precinct 2
Precinct 4
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22%
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29%
13%
39%
33%
2 117 270
620 3 805
9 48 67
13 538 669
71 1 39
34 1,280 3
9 968 10
77 2 24
165 0
0 79
178 44
243 0
0 1,074
223 809
125 1,073
110 91
54 1,696
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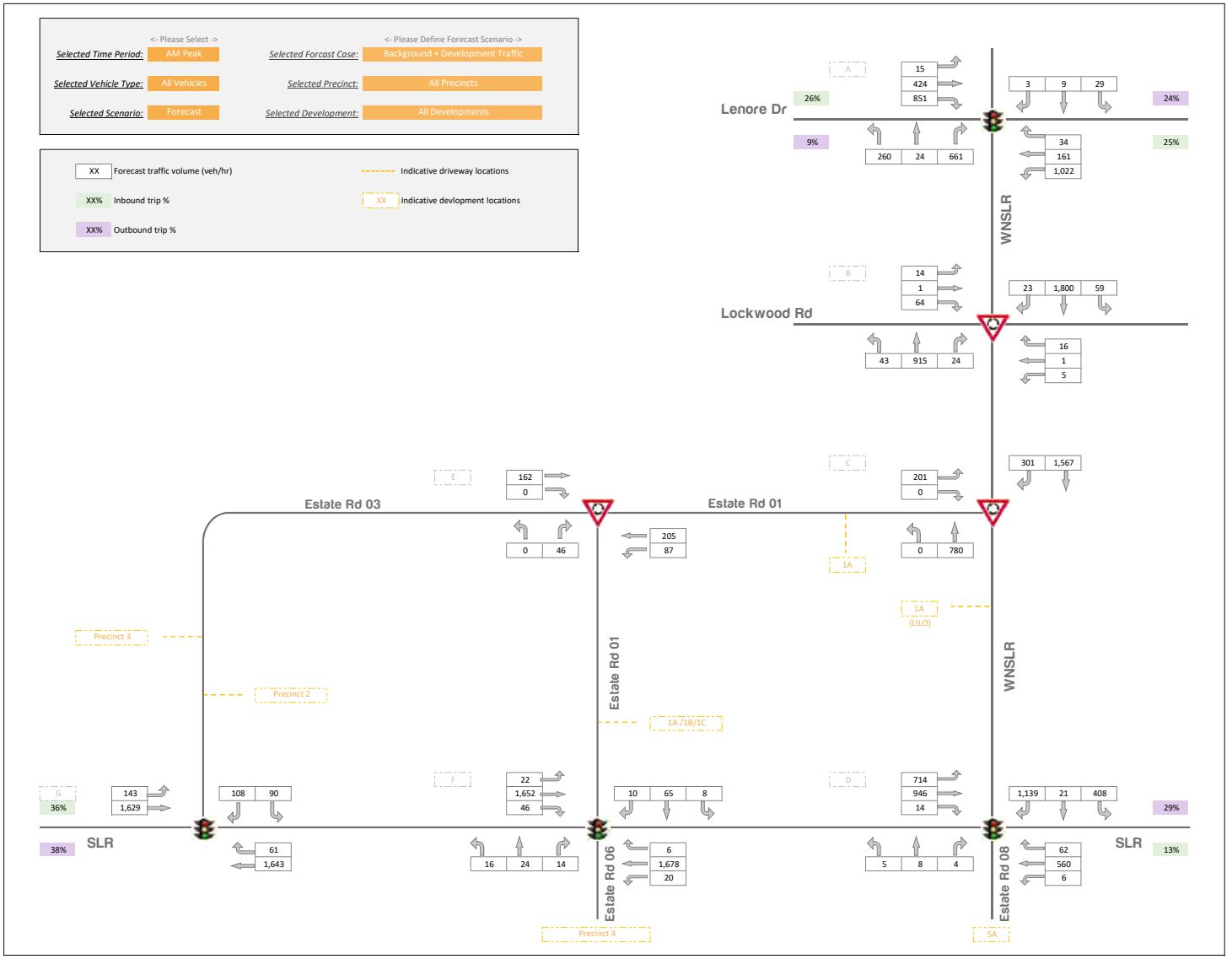
302 1,081 3

Modelling Year 2036 – Non-seasonal Peak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Selected Development: All Developments
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XX% Inbound trip %
XX% Outbound trip %
Indicative driveway locations
XX Indicative devlopment locations
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Lockwood Rd
Estate Rd 03
Estate Rd 01
Estate Rd 06
Estate Rd 08
WNSLR
SLR
Precinct 2
Precinct 3
Precinct 4
1A/1B/1C
1A
1A (LILO)
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9%
24%
25%
36%
38%
29%
13%
15
424
851
260
24
661
3
9
29
34
161
1,022
14
1
64
43
915
24
23
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16
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0
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108
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16
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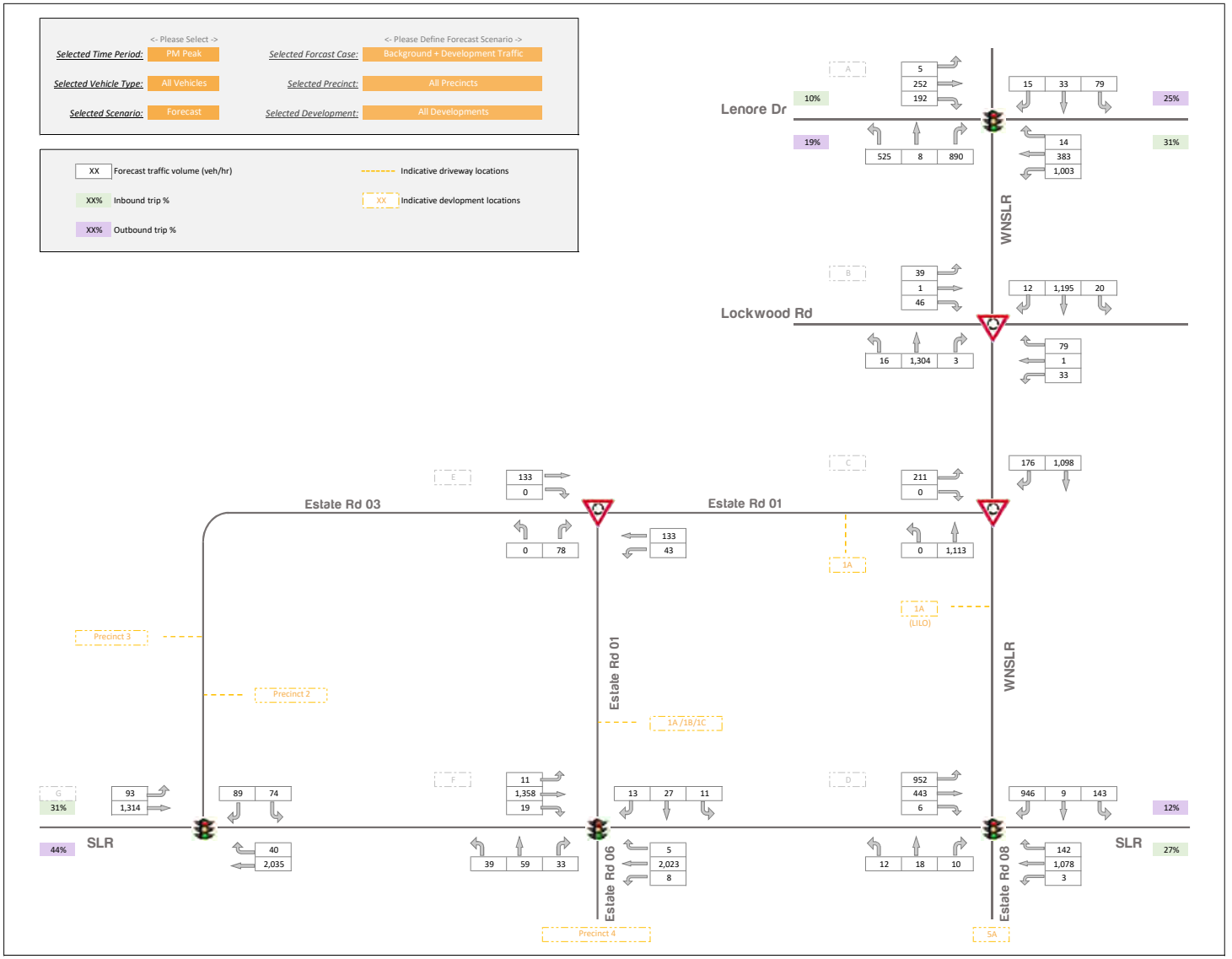
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Estate Rd 06
Estate Rd 08
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Precinct 2
Precinct 4
1A/1B/1C
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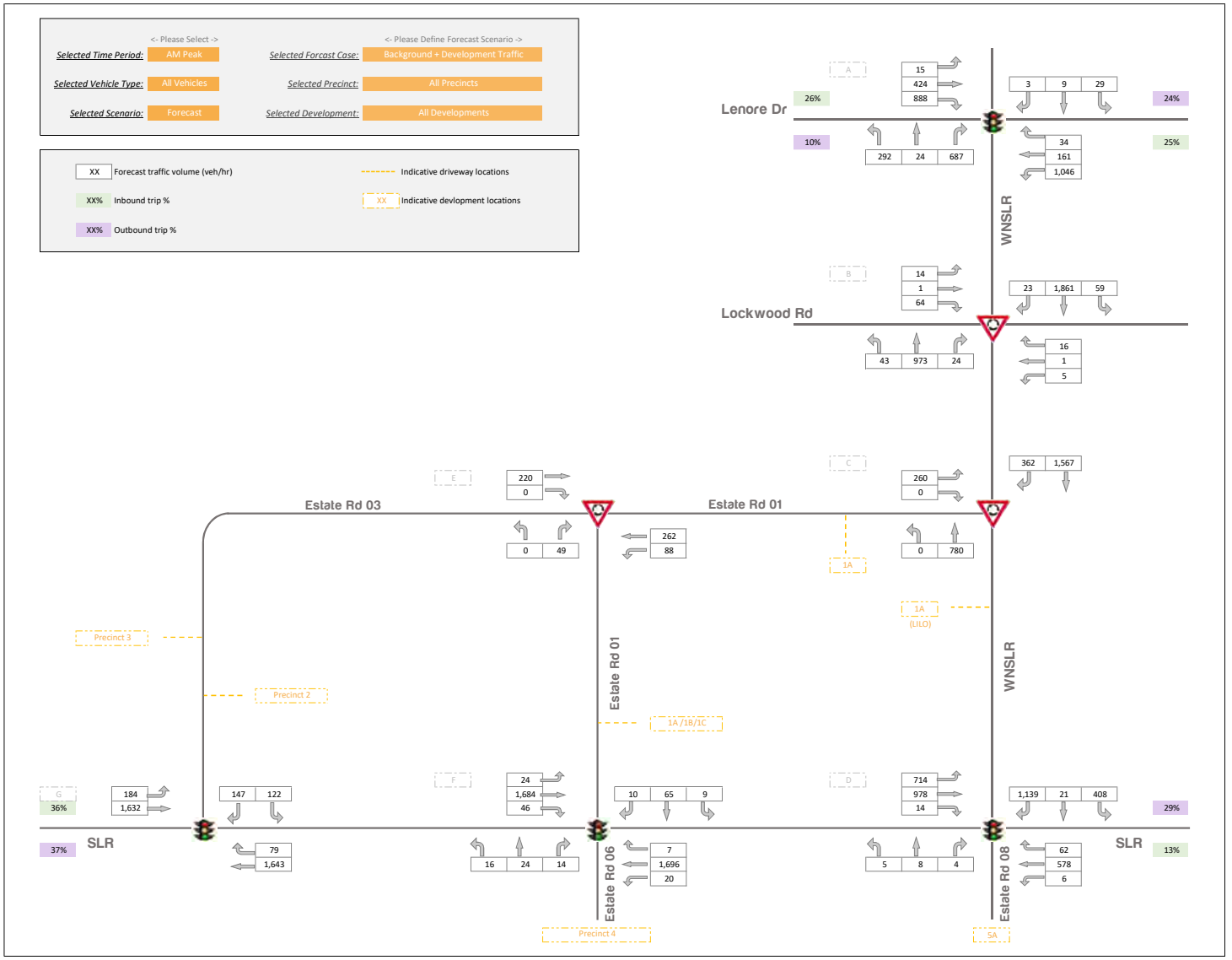
Modelling Year 2036 – Seasonal Peak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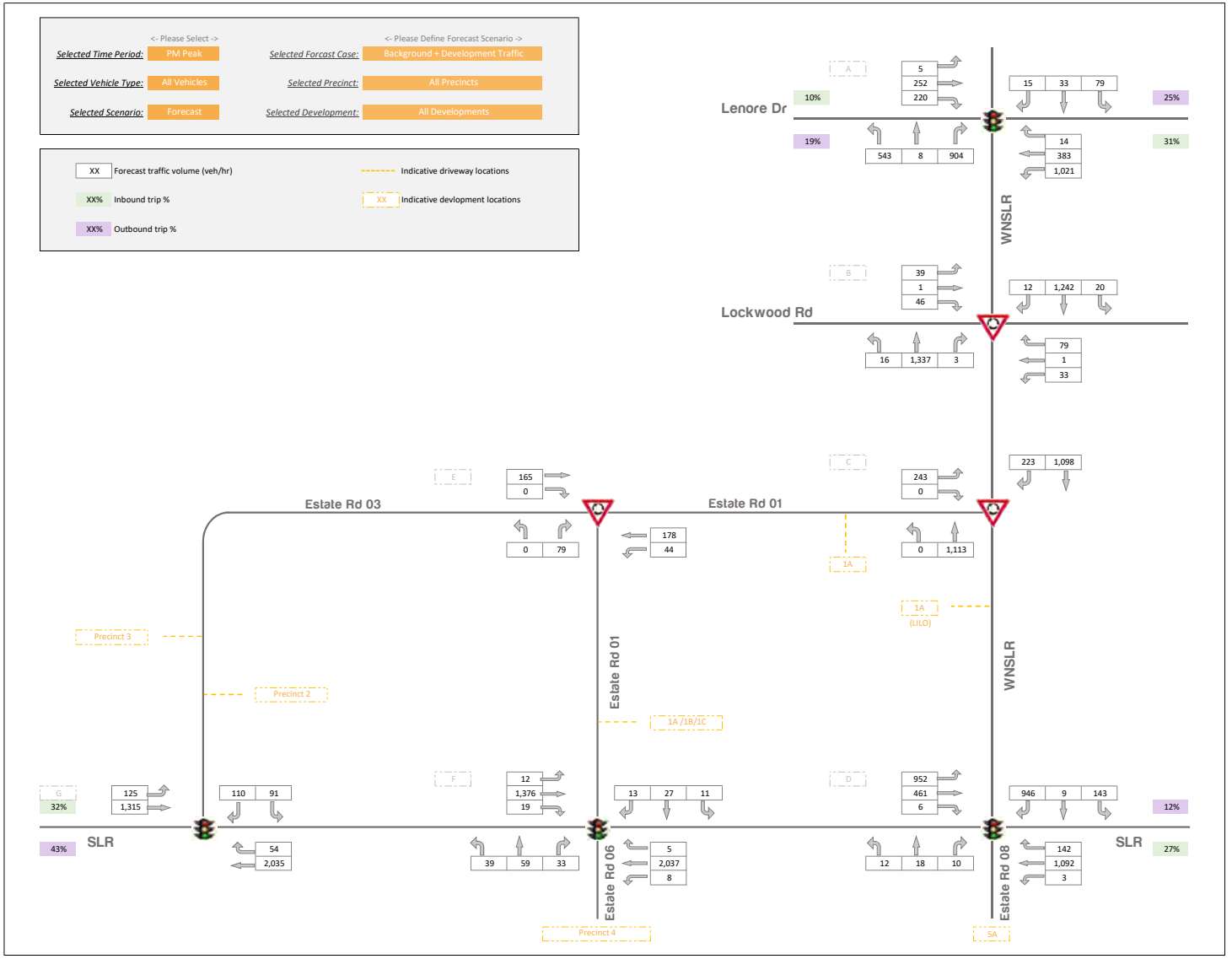
1A (LILO)
1A/1B/1C
5A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Estate Rd 01
Estate Rd 01
WNSLR
WNSLR
SLR
SLR
Estate Rd 06
Estate Rd 08
Precinct 3
Precinct 2
Precinct 4
1A
1A (LILO)
1A/1B/1C
5A
10%
19%
25%
31%
32%
43%
12%
27%

Appendix C

Detailed SIDRA Results

2026 Intersection Performance

Intersection	Control	Period	SSDA 7348 Approval				Modification 3 (Non-peak Seasonal)				Modification 3 (Peak Seasonal)			
			Overall Intersection Delay - LoS	Approach	Average Queue (m)	Average Delay (sec)	Overall Intersection Delay - LoS	Approach	Average Queue (m)	Average Delay (sec)	Overall Intersection Delay - LoS	Approach	Average Queue (m)	Average Delay (sec)
WNSLR / Lenore Drive	Signal	AM	40.3 - C	S	88	54.6	45.8 - D	S	100	54.2	52.7 - D	S	110	57.7
				E	116	38.0		E	129	45.0		E	152	53.6
				N	9	62.8		N	8	62.6		N	8	62.6
				W	169	31.5		W	225	39.4		W	269	47.8
		PM	31.7 - C	S	105	28.2	34.9 - C	S	109	31.0	36.2 - C	S	116	32.6
				E	76	28.2		E	79	31.4		E	82	32.8
				N	36	62.5		N	37	66.7		N	37	66.7
				W	42	50.5		W	77	50.5		W	85	50.6
WNSLR / Lockwood Road	Roundabout	AM	13.1 - A	S	6	10.7	13.4 - A	S	7	10.7	13.6 - A	S	8	10.7
				E	1	13.1		E	1	13.4		E	1	13.6
				N	11	10.9		N	12	10.9		N	13	10.9
				W	1	11.7		W	1	12.2		W	1	12.4
		PM	14.8 - B	S	16	11.3	14.9 - B	S	16	10.9	15.1 -B	S	16	11.0
				E	2	12.1		E	2	12.7		E	2	12.8
				N	6	10.7		N	8	10.7		N	9	10.7
				W	3	14.8		W	4	14.9		W	4	15.1
WNSLR / Estate Road 1	Roundabout	AM	12.0 - A	S	6	7.8	11.8 - A	S	5	8.2	11.9 - A	S	6	8.7
				N	11	12.0		N	11	11.8		N	12	11.7
				W	2	11.8		W	5	11.6		W	6	11.9
		PM	15.1 - B	S	9	6.4	13.4 - A	S	9	7.6	14.0 - A	S	10	8.0
				N	8	12.4		N	8	11.9		N	9	11.9
				W	9	15.1		W	6	13.4		W	8	14.0
WNSLR / SLR	Signal	AM	28.4 - B	S	1	35.8	29.1 - C	S	2	35.6	29.5 -C	S	2	35.6
				E	37	32.0		E	34	30.5		E	34	29.8
				N	70	35.1		N	69	36.4		N	72	38.2
				W	97	22.8		W	112	24.0		W	117	24.2
		PM	31.5 - C	S	5	31.0	31.6 - C	S	6	37.8	32.4 - C	S	6	37.8
				E	107	30.8		E	131	34.7		E	139	36.0
				N	95	45.1		N	80	42.0		N	80	42.0
				W	98	21.1		W	49	20.6		W	52	21.2
SLR x Estate Rd 01	Signal	AM					17.2 - B	S	17	69.4	17.3 - B	S	17	69.4
								E	71	11.3		E	73	11.4
								N	28	71.9		N	29	72.3
								W	154	16.1		W	160	16.3
		PM					18.4 - B	S	41	80.7	18.5 - B	S	41	80.7
								E	193	15.5		E	197	15.7
								N	19	80.0		N	19	80.1
								W	99	12.8		W	101	12.9
SLR x Estate Rd 03	Signal	AM					13.4 - A	E	86	8.9	16.0 - B	E	112	10.7
								N	25	44.3		N	38	49.5
								W	120	12.2		W	142	13.6
		PM					16.8 - B	E	122	9.6	20.1 - B	E	135	13.1
								N	22	41.2		N	25	39.6
								W	115	24.0		W	120	27.0
Estate Rd 01 x Estate Rd 03	Signal	AM					9.3 - A	S	1	9.3	9.3 - A	S	1	9.3
								E	4	3.0		E	4	3.0
								W	2	7.6		W	2	7.6
		PM					8.5 - A	S	1	8.5	9.8 - A	S	1	9.8
								E	2	3.3		E	5	3.0
								W	2	7.7		W	3	7.6

2036 Intersection Performance

Intersection	Control	Period	SSDA 7348 Approval				Modification 3 (Non-peak Seasonal)				Modification 3 (Peak Seasonal)			
			Overall Intersection Delay - LoS	Approach	Average Queue (m)	Average Delay (sec)	Overall Intersection Delay - LoS	Approach	Average Queue (m)	Average Delay (sec)	Overall Intersection Delay - LoS	Approach	Average Queue (m)	Average Delay (sec)
WNSLR / Lenore Drive	Signal	AM	37.9 - C	S	79	34.3	37.9 - C	S	87	33.5	38.2 - C	S	91	33.1
				E	125	39.9		E	126	42.3		E	130	42.4
				N	5	29.3		N	5	28.4		N	5	28.4
				W	100	38.7		W	110	37.4		W	117	38.3
		PM	26.9 - C	S	107	22.7	29.6 - C	S	104	24.5	29.6 - C	S	106	24.6
				E	57	24.8		E	70	26.6		E	74	27.3
				N	19	28.2		N	20	29.0		N	18	28.1
				W	34	52.9		W	34	55.1		W	34	52.3
WNSLR / Lockwood Road	Roundabout	AM	17.9 - B	S	7	10.7	18.1 - B	S	9	10.8	18.7 - B	S	10	10.8
				E	1	17.9		E	1	18.1		E	1	18.7
				N	32	12.1		N	35	12.0		N	38	12.1
				W	2	12.3		W	2	12.8		W	2	13.0
		PM	15.1 - B	S	18	11.4	14.9 - B	S	17	11.0	15.1 - B	S	18	11.0
				E	3	13.3		E	3	14.0		E	3	14.2
				N	10	10.8		N	13	10.9		N	14	10.9
				W	3	15.1		W	3	14.9		W	3	15.1
WNSLR / Estate Road 1	Roundabout	AM	12.5 - A	S	8	8.0	12.0 - A	S	7	8.3	12.5 - A	S	7	8.8
				N	38	12.5		N	45	11.8		N	51	11.7
				W	3	12.2		W	5	12.0		W	7	12.5
		PM	17.7 - B	S	9	6.5	13.7 - A	S	10	7.6	14.3 - A	S	10	8.0
				N	15	12.7		N	13	11.9		N	15	11.9
				W	14	17.7		W	7	13.7		W	8	14.3
WNSLR / SLR	Signal	AM	40.3 - C	S	2	44.0	51.1 - D	S	4	51.9	53.8 - D	S	4	51.9
				E	59	42.7		E	74	41.7		E	76	41.7
				N	191	44.3		N	243	63.8		N	243	64.1
				W	146	35.4		W	233	42.6		W	257	48.9
		PM	40.8 - C	S	12	47.0	40.4 - C	S	10	60.6	52.3 - D	S	11	64.5
				E	183	52.7		E	196	48.4		E	250	66.1
				N	170	54.2		N	171	55.5		N	222	76.5
				W	63	18.2		W	66	20.9		W	68	21.0
SLR x Estate Rd 01	Signal	AM					17.8 - B	S	20	80.0	19.7 - B	S	20	81.5
								E	186	14.4		E	281	18.6
								N	32	83.0		N	34	88.6
								W	190	16.1		W	193	15.7
		PM					19.4 - B	S	44	89.7	30.3 - C	S	47	97.1
								E	280	17.8		E	395	36.6
								N	19	81.2		N	19	81.2
								W	128	12.9		W	131	13.0
SLR x Estate Rd 03	Signal	AM					23.2 - B	E	222	18.8	49.4 - D	E	423	40.4
								N	23	51.0		N	61	76.6
								W	262	25.6		W	356	54.0
		PM					26.1 - B	E	235	15.6	38.4 - C	E	334	26.3
								N	31	58.3		N	44	64.8
								W	212	38.0		W	276	52.3
Estate Rd 01 x Estate Rd 03	Signal	AM					9.3 - A	S	1	9.3	9.7 - A	S	1	9.7
								E	4	3.0		E	5	3.0
								W	2	7.6		W	3	7.6
		PM					8.5 - A	S	1	8.5	8.8 - A	S	1	8.8
								E	3	3.3		E	3	3.3
								W	2	7.7		W	2	7.7

Annexure C

6 March 2020

WM Project Number: 19440
Our Ref: OWE_MOD3_19440_060320
Email: stephanie.partridge@goodman.com

Stephanie Partridge
Goodman Property Services (Australia) Pty Ltd
Level 17, 60 Castlereagh St
SYDNEY NSW 2000

Dear Stephanie

Re: OWE MOD3 Noise & Vibration Assessment - Additional Responses re Light Vehicle Sound Power Level Assumptions and Lot2B Mechanical Services

OWE MOD3 Light Vehicle Sound Power Levels

As discussed, there can be a high degree of variability in noise from light vehicles. Based on measurements undertaken by Wilkinson Murray (WM) of light vehicles travelling on DGA surface at speeds of approximately 40 km/hr, a light vehicle sound power level of SWL 90 dBA was adopted for the OWE MOD3 assessment. WM acknowledges this introduces an inconsistency with the OWE MOD2 noise assessment prepared by SLR, which considered a light vehicle sound power level of SWL 96 dBA.

WM's measurements indicate that SWL 90 dBA is conservatively representative of a typical movement. It is noted that occasionally higher noise levels occur (e.g. we have calculated occasional sound power levels of up to SWL 94 dBA from our measurements), but this level is not considered representative of a typical movement.

Notably, we have frequently measured sound power levels of less than SWL 85 dBA and on this basis SWL 90 dBA was considered to be reasonably representative of a typical worst case for the purposes of an $L_{Aeq,15min}$ noise assessment.

Notwithstanding this, if as a matter of consistency with the MOD2 assessment, the SWL 96 dBA light vehicle sound power level is maintained, the resultant MOD3 noise predictions are set out in Table 1.

The revised predictions corresponding with a light vehicle sound power level of SWL 96 dBA are set out in the upper rows of the table. The existing MOD3 predictions that correspond with a light vehicle sound power level of SWL 90 dBA are set out in the lower rows.

It should be noted that all other MOD3 noise source contributions are included in the predicted levels shown in Table 1 and these remain consistent with those identified by the existing MOD3 assessment.

The results are shown for all receivers, however the N3, N4, N5 results may be disregarded, given the noise agreements in place with these receivers.

Table 1 OWE MOD3 Noise Predictions (Results corresponding with light vehicle SWL 96 dBA shown above results for light vehicle SWL 90 dBA)

Receiver	Period (weather)	$L_{Aeq,15min}$ Noise Level (dBA)						
		Approved Noise Limits	Lot 2B		Lot 2B + Precinct 1		All Precincts	
			Typical	Peak	Typical	Peak	Typical	Peak
N1 – Emmaus Village	Day	44	36	40	36	40	38	41
			35	37	36	37	38	39
	Eve	43	37	36	37	37	39	38
			34	36	34	37	37	38
	Night	41	35	36	35	37	35	37
			35	36	35	36	35	36
	Night(Adverse)	41	39	39	39	41	38	40
			39	39	39	41	38	39
N2 – Emmaus College	Day	45	40	**49**	40	**49**	41	43
			40	45	40	45	40	42
	Eve	n/a	46	42	46	43	42	42
			42	42	42	43	40	41
	Night	n/a	40	43	40	44	37	39
			39	43	39	43	37	38
	Night(Adverse)	n/a	44	48	44	48	40	42
			44	47	44	48	40	42
N3 – Kemps Creek –	Day	n/a	42	48	42	48	46	50
			42	45	43	45	46	48
	Eve	n/a	46	43	46	43	47	47
			43	43	42	43	46	47
	Night	n/a	42	44	42	44	42	44
			42	43	42	43	42	44
	Night(Adverse)	n/a	46	48	46	48	46	48
			46	48	46	48	46	48
N4 – Kemps Creek –	Day	n/a	37	43	37	43	39	41
			36	39	37	40	39	39
	Eve	n/a	41	38	40	38	39	39
			37	37	37	38	39	39
	Night	n/a	37	38	37	38	36	37
			36	38	36	38	36	36
	Night(Adverse)	n/a	41	43	41	43	39	41
			41	43	41	43	39	40
N5 – Kemps Creek –	Day	n/a	36	42	36	42	40	43
			36	39	36	39	40	41
	Eve	n/a	40	37	40	37	41	40
			37	37	36	37	40	40
	Night	n/a	36	38	36	38	36	38
			36	37	36	37	36	37
	Night(Adverse)	n/a	41	42	40	42	40	43
			40	42	40	42	40	41

Note: At N2 an internal noise limit of L_{Aeq} 35 dBA applies for classrooms. For the purpose of assessment an external level of L_{Aeq} 45 dBA has been adopted, allowing for a 10 dB reduction that is accepted as the typical attenuation achieved through a partially open window. The predicted noise levels at N2 are representative of the upper floor external building façade. At the ground floor, N2 noise levels are not predicted to exceed $L_{Aeq,15min}$ 42 dBA.

N1- Emmaus Village

Assuming the light vehicle sound power level of SWL 96 dBA, at N1 depending on the scenario, a relative increase in the day and evening results by up to 3 dB is predicted. At night a relative increase of up to 1 dB during the peak season only is predicted.

Notwithstanding these increases, the predictions remain within the approved limits at N1.

N2- Emmaus College

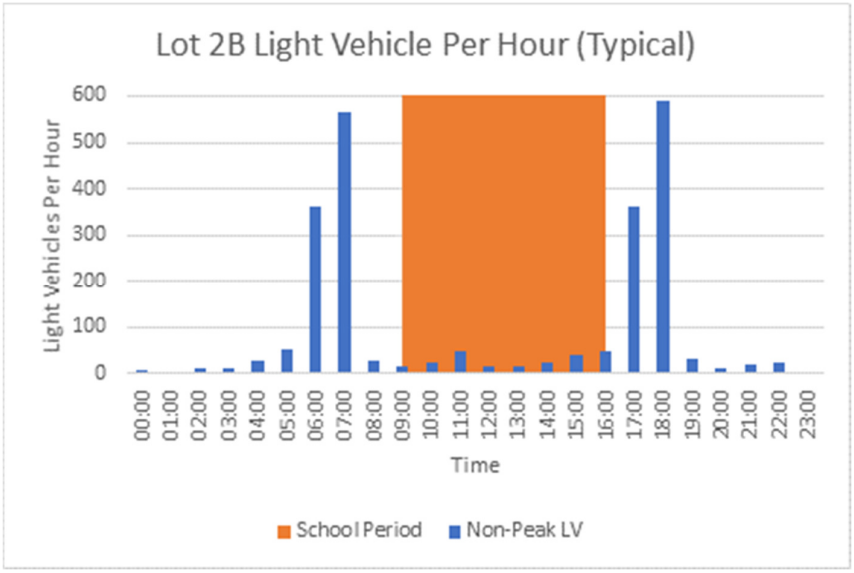
The N2 predictions set out above represent the noise levels that may be expected at the upper level (first floor). The N2 ground floor predictions do not exceed $L_{Aeq,15min}$ 42 dBA, which is in compliance with the approved limit.

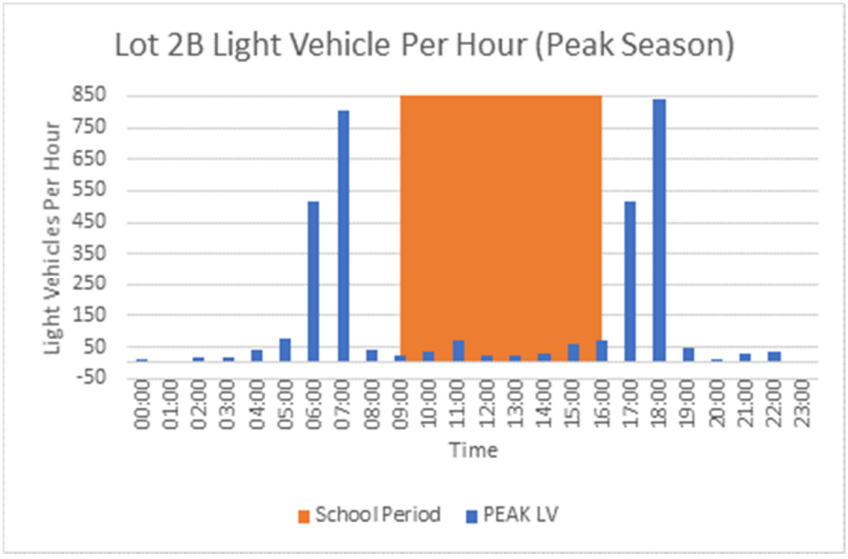
At the upper floor a relative increase in the day results, by up to 4 dB during the peak season is predicted, with levels of up to L_{Aeq} 49 dBA predicted. This represents a potential exceedance of the adopted criteria by approximately 4 dB at the first floor.

Whether an impact ultimately arises is dependent on whether the upper storey windows facing the OWE are openable or if the upper floor rooms facing the OWE are indeed sensitive (i.e. if they are indeed classrooms).

Additionally, an impact would only arise if the classroom was in use. In this regard, the plots below show the Lot 2B hourly light vehicle movements considered by the MOD3 assessment. These are compared against 'typical' operating hours considered for school classrooms. Notably, the peak light vehicle movements do not coincide with typical school hours.

When only the light vehicle movements that coincide with identified school operating hours are considered, fully compliant levels are predicted.





With consideration to the above, it is considered that material noise impacts from the operation of the OWE under the current MOD3 scheme would not be expected to arise at the receivers surrounding the site.

OWE MOD3 Lot2B Mechanical Services

As discussed, the MOD3 noise predictions have assumed that the Lot 2B mechanical services plant identified by the MOD3 report would operate continuously and simultaneously at all times. Additionally, it has been assumed that the cumulative mechanical services noise emissions can be attenuated by 10 dB by inclusion of silencers/attenuators and/or barrier solutions. This matter was raised with Goodman during the MOD3 noise assessment process and it was noted that whilst mechanical services noise can typically be reduced by levels of this order, input from the engineers responsible for the Lot 2B mechanical services / fixed plant design would be required to determine in detail how the required reduction would be achieved. At the time of assessment, it was not possible to discuss the Lot 2B mechanical services design in detail and specifications beyond the details set out in the MOD3 noise report were unavailable.

The detailed design process should confirm which combinations of plant items would operate simultaneously in the various daytime, evening and night timeframes and which plant items may be attenuated with appropriate silencer selection. For the purposes of detailed design acoustic analysis, equipment/plant sound power levels should be evaluated in octave or one-third octave frequency bands and silencer selection would need to be carried out in co-ordination with the mechanical services engineers.

I trust this information is sufficient. Please contact us if you have any further queries.

Yours faithfully
WILKINSON MURRAY



Sean Flaherty
Senior Acoustic Engineer

Note
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Quality Assurance
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AAAC
This firm is a member firm of the Association of Australasian Acoustical Consultants and the work here reported has been carried out in accordance with the terms of that membership.

Annexure D

RE: Oakdale West Estate – Stage 2 SSDA (10397) Construction Traffic Impact Assessment

Dear Stephanie,

I refer to the Oakdale West Estate (OWE), Stage 2 State Significant Development (SSD 10397) and our recent meeting with the Department of Planning Industrial and Environment (DPIE) and Transport for NSW (former RMS) dated 18 February 2020 (the meeting).

For context, the exhibited Transport Impact Assessment (TIA) dated 15 January 2020, proposed that construction vehicles would utilise the Mamre Road / Abbotts Road intersection during the morning and afternoon school zone peak periods.

However, during the meeting, it was established that TfNSW is more supportive of utilising Mamre Road / Bakers Lane signalised intersection for school peak periods as well. TfNSW acknowledged that the use of the existing signalised intersection will result in a safer outcome, when compared to the potential risks involved with trucks right turn movements from Abbotts Road intersection onto Mamre Road (northbound).

Accordingly, we have now been requested to:

- Redistribute the construction traffic during AM and PM peak periods onto Mamre Road / Bakers Lane intersection,
- Undertake SIDRA analysis for the signalised intersection of Mamre Road / Bakers Lane, and
- Provide a detailed Construction Traffic Management Plan (CTMP) to support the SSD construction program.

In this regard, this Technical Note (TN) addresses the above additional requests.

1 Construction Period

Based on the advice provided to Ason Group, the use of Mamre Road / Bakers Lane intersection will be temporarily and limited to the period between April 2020 to December 2020 (i.e. two school terms only). Once the Western North South Link Road (WNSLR) is completed, construction access will be via this road.

2 Cumulative Construction Traffic Estimate

Following submission of the exhibited TIA, the Project Team has provided us with more accurate estimates of the construction traffic volumes for the proposed Stage 2 SSD (Project Waratah). However, for completeness this assessment considers the **cumulative** traffic from the following construction programs for the purpose of the traffic modelling:

- WNSLR construction,
- OWE infrastructure works, and
- Stage 2 SSD (Project Waratah) construction works.

As such the following **Table 1** outlines the updated **maximum cumulative construction traffic volumes** on Mamre Road / Bakers Lane intersection during the construction program (envisaged to occur in December 2020). Accordingly, this assessment shows the worst-case scenario over the period of construction works and results in a robust analysis and therefore more conservative outcome. Reference should also be made to the cumulative traffic forecasts more generally, which are provided in **Attachment 1.**

Table 1: Maximum Cumulative Construction Traffic Volumes (Two-ways) – December 2020

Vehicle Type	AM Peak	PM Peak
Light Vehicle	134	134
Heavy Vehicle	91	44
Total	**225**	**178**

It is important to again re-iterate that the construction works will only be temporarily and in accordance with the traffic volumes indicated in Attachment 1, the construction AM and PM peak hour volumes exhibit their peak during **December 2020**. In this regard, the respective percentages of peak hour construction traffic volumes against the peak cumulative traffic has been estimated and outlined in the following **Table 2**.

Table 2: Estimated Construction Traffic Volumes Percentage

Peak Period	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21
AM Peak	43%	39%	49%	58%	67%	74%	83%	97%	100%	98%
PM Peak	52%	47%	52%	58%	66%	74%	83%	97%	100%	99%

As outlined in the above table the maximum traffic would be around December leading to Christmas and new year holidays when the school traffic is at its minimum. It is noteworthy that after February 2021, it is proposed that the construction traffic will use the completed WNSLR.

3 Traffic Impact

The December traffic volumes (outlined in Table 1) have been distributed having regard for the assumptions made as part of the original exhibited TIA. The impact of the above cumulative construction traffic volumes has been assessed over and above the baseline surveyed traffic volumes at the Mamre Road / Bakers Lane signalised intersection. Accordingly, the results of the SIDRA analysis are provided in the following **Table 3**.

Table 3: SIDRA Results

Scenario	Period	Average Signal LoS	Movement	Approach Delay (seconds)	Approach LoS	Approach Queue (m)
Baseline	AM	C (31 sec)	S	22.7	B	206
			E	55.1	D	212
			N	25.9	B	262
			W	4.1	A	0
	PM	F (101.8 sec)	S	15.6	B	164
			E	154.6	F	430
			N	132.9	F	813
			W	4.1	A	0
Baseline + Cumulative Construction Traffic	AM	D (56.4 sec)	S	36.0	C	273
			E	107.6	F	427
			N	43.8	D	366
			W	4.1	A	0
	PM	F (152.9 sec)	S	18.8	B	185
			E	248.9	F	670
			N	183.6	F	983
			W	4.1	A	0

As outlined in the above table the existing signalised intersection operates at LoS “C” and “F” during the road network AM and PM peak hours. Performance during the peak periods is primarily impacted by the school traffic. It is evident from the assessment that the proposed cumulative construction traffic will result in the intersection performing to LoS “D” in AM – an acceptable level - and remain at LoS “F” during the PM peak hour. In this regard consideration shall be given to the following aspects:

- Temporary nature of this construction program (limited to around 10 months),
- Better safety outcome when compared to the use of Aldington Road and the Abbotts Road / Mamre Road intersection. Indeed, TfNSW’s support of this strategy for this reason.
- Benefits in relation to compliance and ease of guidance, with a single access point, rather than variable access routes.
- Detailed management control measures planned for the construction traffic included in **Attachment 2**.

4 Construction Traffic Management Plan (CTMP)

A detailed CTMP has been prepared and attached in **Attachment 2** of this letter which details appropriate management measures to manage the construction traffic at the signalised intersection of Mamre Road / Bakers Lane.

We trust the above is of assistance and please contact either the undersigned or Tim Lewis should you have any queries or require further information in relation to the above.

Yours sincerely,



Ali Rasouli
Senior Traffic Engineer – Ason Group
Email: ali.rasouli@asongroup.com.au

Attachment 1

Cumulative Construction Traffic Volumes

Month		Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21
Combined Light Vehicles											
Pre-school peak	Per hour	92	97	129	147	166	185	205	224	249	244
AM School peak	**Per hour**	**47**	**38**	**49**	**62**	**75**	**89**	**103**	**130**	**134**	**130**
Between school peaks	Per hour	20	20	22	24	26	28	30	32	35	34
PM school peak	**Per hour**	**47**	**38**	**49**	**62**	**75**	**89**	**103**	**130**	**134**	**130**
PM network peak	Per hour	62	65	86	100	115	130	147	162	182	178
Evening	Per hour	5	6	10	14	19	24	29	34	40	38
Combined Heavy Vehicles											
Pre-school peak	Per hour	88	87	96	100	102	104	104	107	107	106
AM School peak	**Per hour**	**48**	**49**	**60**	**68**	**75**	**77**	**82**	**89**	**91**	**89**
Between school peaks	Per hour	37	37	38	39	40	40	36	36	36	35
PM school peak	**Per hour**	**45**	**45**	**42**	**42**	**42**	**42**	**44**	**44**	**44**	**46**
PM network peak	Per hour	43	43	44	46	44	46	46	43	43	44
Evening	Per hour										
TOTAL Construction Traffic Movements – Two-Way Flow											
Pre-school peak	Per hour	180	184	225	247	268	289	310	332	357	350
AM School peak	**Per hour**	**96**	**87**	**110**	**130**	**150**	**166**	**185**	**218**	**224**	**219**
Between school peaks	Per hour	57	57	60	63	66	68	66	68	71	69
PM school peak	**Per hour**	**92**	**83**	**92**	**104**	**117**	**131**	**147**	**173**	**178**	**176**
PM network peak	Per hour	105	108	130	146	159	176	193	205	225	222
Evening	Per hour	5	6	10	14	19	24	29	34	40	38

Combined traffic volumes comprising: WNSLR works + OWE Infrastructure Works + Project Waratah

Attachment 2

Construction Traffic Management Plan

Construction Traffic Management Plan

Project Waratah, Kemps Creek

Ref: 1086r03v1
6/03/2020

Document Control

Project No: 1086r03v1

Project: Project Waratah – Construction Traffic Management Plan

Client: Goodman Property Services (Aust) Pty. Limited

File Reference: 1086r03v1 CTMP_Project Waratah, Kemps Creek

Revision History

Revision	Date	Details	Author	Approved by
-	19/12/2018	Draft	J. Laidler	J. Laidler
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Table of Contents

1 INTRODUCTION 4
1.1 Overview 4
1.2 Report Purpose 5
1.3 Site Context 6
1.4 Statutory Requirements 7
1.5 Site Location 10
1.6 Road Hierarchy 10

2 OVERVIEW OF WORKS 14
2.1 Works Stages 14
2.2 Hours of Work 14
2.3 Access Arrangements 15

3 EXISTING CONDITIONS 16
3.1 Existing Conditions 16
3.2 Active Transport Connections 16
3.3 Public Transport Services 17

4 MANAGEMENT PLAN 19
4.1 Traffic Movement Restrictions 19
4.2 Other General Requirements 21
4.3 Phase 1 - Prior to the completion of WNSLR 23
4.4 Phase 2 – Post completion of the WNSLR 27

5 DRIVERS CODE OF CONDUCT 29
5.1 Objectives of the Drivers Code of conduct 29
5.2 Code of Conduct 29
5.3 Driver Responsibilities 30
5.4 The Site Team Responsibilities 31
5.5 Crash or incident Procedure 32
5.6 Environmental Procedures. 32

6 TRANSPORT IMPACT ASSESSMENT 34
6.1 Construction Traffic Generation 34
6.2 Impacts on Surrounding Network 35
6.3 Cumulative Impacts 36

7 PLAN ADMINISTRATION 38
7.1 Monitoring Program 38
7.2 Contingency Plan 38
7.3 Communications Strategy 41

Appendices

Appendix A) Traffic Control Plans

1 Introduction

1.1 Overview

Ason Group has been engaged by Goodman Property Services (Aust) Pty. Limited (Goodman) to prepare a Construction Traffic Management Plan (CTMP) relating to the construction of Project Waratah within the Oakdale West Industrial Estate (OWE) at Kemps Creek (the Site). A site plan and an overview of the proposed surroundings are provided in **Figure 1**.

This report has been prepared in response to the expected conditions of consent from the Department of Planning Industry and Environment (DPIE), which may include:

Condition D 65: Prior to the commencement of construction of Stage 1, the Applicant must prepare a Construction Traffic Management Plan (CTMP) to the satisfaction of the Planning Secretary. The CTMP must form part of the CEMP required by Condition D119 and must:

a) Be prepared by a suitably qualified and experienced person(s).

b) Be prepared in consultation with Council, Mamre Anglican School, Emmaus Catholic College, Emmaus Catholic Care Village and Trinity Catholic Primary School.

c) Detail specific measures to manage construction traffic to avoid school drop off and pick up times (Monday to Friday 8 am – 9.30 am and 2.30 pm – 4 pm) and Higher School Certificate exam periods, including any temporary infrastructure arrangements and traffic safety measures.

d) Detail the measures to be implemented to ensure road safety and network efficiency during construction, including scheduling deliveries of heavy plant and equipment outside of peak periods, or during school holidays where possible.

e) Detail heavy vehicle routes, access and parking arrangements.

f) Include a Driver Code of Conduct to:

    i. minimise the impacts of the Development on the local and regional road network.

    ii. minimise conflicts with other road users including the students, staff, visitors and residents of the neighbouring schools and aged care village.

    iii. minimise road traffic noise, both on Bakers Lane and from construction vehicles on Site; and

    iv. ensure truck drivers use specified routes and adhere to the speed restrictions on Bakers Lane.

g) Include a program to monitor the effectiveness of these measures, and.

h) Detail procedures for early notification to residents and the community (including local schools), of any potential disruptions to routes.

Condition D 66: The Applicant must:

a) not commence construction of Stage 1 until the CTMP required by Condition D65 is approved by the Planning Secretary; and

b) implement the most recent version of the CTMP approved by the Planning Secretary for the duration of construction.

The purpose of this report is to detail a traffic plan for construction that would minimise traffic impacts on the surrounding road network, ensure safety and efficiency for workers, pedestrians and road users, and provide information regarding the construction vehicle access routes and any changed road conditions (if applicable).

1.2 Report Purpose

The purpose of this report is to detail a traffic plan for construction that seeks:

- To minimise traffic impacts on the surrounding road network,
- Ensure safety and efficiency for workers, pedestrians, other road users, and
- Provide information regarding the construction vehicle access routes and any changed road conditions (if applicable).

It is expected that this plan will be updated should any necessary changes to the currently proposed arrangements arise in the future. Any special events (if required) would be subject to a separate request for a specific permit not covered by this report.

Ason Group is responsible for the preparation of this Plan only and not for its implementation, which is the responsibility of the Contractor.

In accordance with Condition D66 of the consent, no works can commence until a CTMP report is approved by the Planning Secretary of the Department of Planning, Industry & Environment.

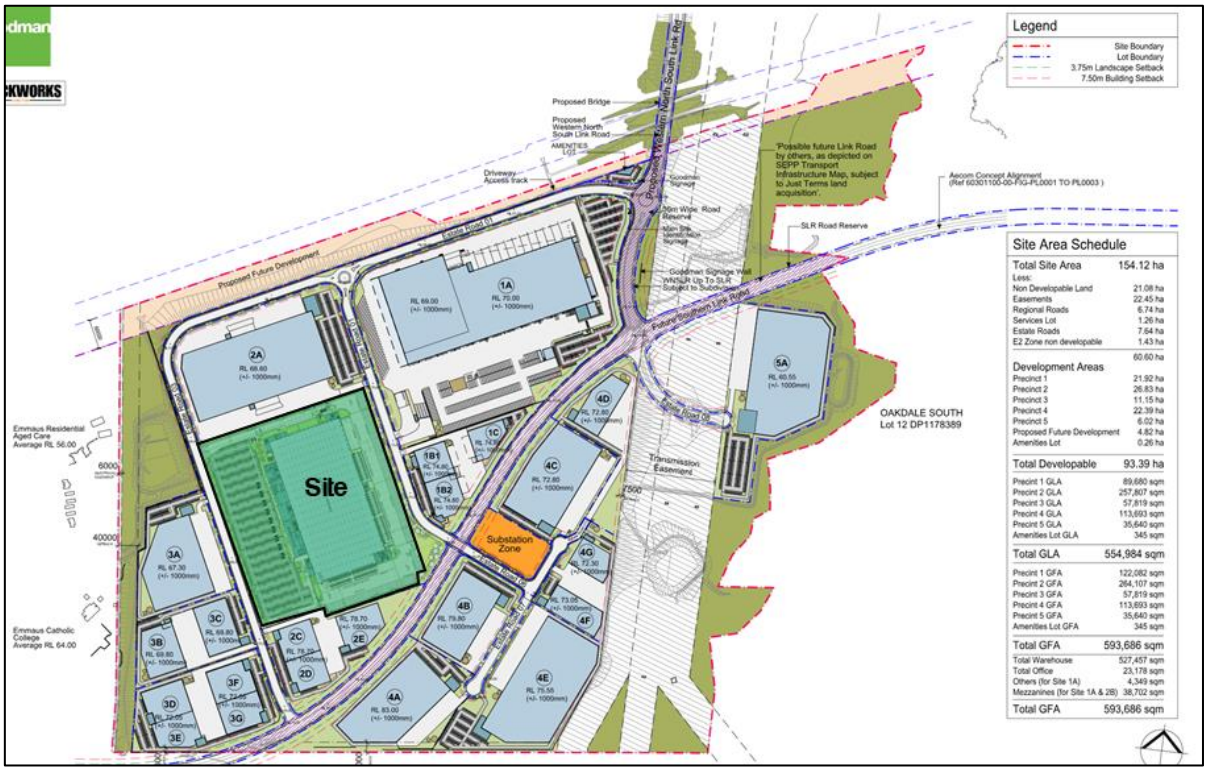

Figure 1: OWE Context

1.3 Site Context

There is existing works associated with the construction of the Western North South Link Road (WNSLR) and the OWE. For context, the works are generally summarised as follows:

- OWE is a staged development for warehousing and distribution hub. Stage 1 of the OWE (the proposed works) comprises of estate wide earthworks and construction of road infrastructure in preparation of the construction of warehouses, however it currently excludes the actual construction of any warehouses.
- WNSLR is proposed as part of a State Significant Development. It is intended that the WNSLR provide a connection between Lenore Drive and the future Southern Link Road (SLR). In the short-term the WNSLR will be a public road, owned by Council, providing local access to the future Oakdale West Estate and other industrial areas north of the Water NSW Pipeline.

Each of the above has been subject to a separate Construction Traffic Management Plan — versions referenced in preparing this CTMP:

- *Ason Group, Construction Traffic Management Plan, WNSLR, Erskine Park (Western North South Link Road), 0605r01v5 CTMP_WNSLR, Erskine Park, 12/09/2019*

- *Ason Group, Construction Traffic Management Plan, Oakdale West Estate, Kemps Creek, 0129r06v4 CTMP_ Oakdale West Estate, Kemps Creek Issue IV, 12/09/2019*

Each of the above details varying access arrangements throughout the construction program. As such, an additional report was prepared which provided a summary of construction traffic volumes for both projects using each of the key connections of Bakers Lane and Lenore Drive separately.

- *Ason Group, Western North-South Link Road & Oakdale West Estate Construction Vehicle Cumulative Impacts, 0129l04v2 WNSLR & OWE Cumulative Construction Impacts Issue II, 12/09/2019*

The findings of the report indicated that specific measures are to be proposed in order to respond to existing congestion associated with the schools along Bakers Lane. Further limitations on vehicular access via Bakers Lane should be included to ensure that large numbers of vehicles, particularly heavy vehicles, will be minimised during peak periods.

Having regard for the above, it is noteworthy that the 2019 Approved Oakdale West Estate will generate the following peak hourly traffic volumes associated with future operational traffic:

- AM peak 1,108 veh/hr
- PM peak 879 veh/hr
- Daily 9,776 veh/day

1.4 Statutory Requirements

The following conditions have been imposed with respect to construction traffic management.

Table 1: SSD 7348 Approval - Compliance Table

Reference	Requirement	Response
D65	Prior to the commencement of Stage 1, the Applicant must prepare a Construction Traffic Management Plan (CTMP) for the Development to the satisfaction of the Planning Secretary. The CTMP must form part of the CEMP required by Condition D119 and must:	
	a) be prepared by a suitably qualified and experienced person(s)	Consultants from Ason Group are suitably qualified Traffic Engineers, with relevant "Prepare a Work Zone Traffic Management Plan" accreditation. Further consultation is expected to occur, following issue of development approval, prior to finalisation of this CTMP.
	b) be prepared in consultation with Council, Mamre Anglican School, Emmaus Catholic College, Emmaus Catholic Care Village and Trinity Catholic Primary School	Consultation with all relevant (and other) stakeholders is a requirement of this CTMP. Refer Section 7.3 Consultation is currently being undertaken with Council, the schools and care facility.

Reference	Requirement	Response
	c) detail specific measures to manage construction traffic to avoid school drop off and pick up times (Monday to Friday 8 am – 9.30 am and 2.30 pm – 4 pm) and Higher School Certificate exam periods, including any temporary infrastructure arrangements and traffic safety measures;	Refer Section 4.1.4. Deliveries and contractor movements will be scheduled to avoid these periods. Where possible, deliveries and contractor movements will be scheduled to be minimised within these periods. For those movements that are required, Heavy vehicles utilising Bakers Lane shall be controlled by dedicated Traffic Controllers to ensure the minimisation of impacts to the schools. Upon completion of WNSLR, construction vehicles shall use WNSLR to avoid passing the school.
	d) detail the measures to be implemented to ensure road safety and network efficiency during construction, including scheduling deliveries of heavy plant and equipment outside of peak periods, or during school holidays where possible.	Refer Section 6.2 with regard to impacts to traffic efficiency. This section concludes that construction traffic can be satisfactorily mitigated to not have a material impact on the road network. Furthermore, Traffic Controllers (TC's) and Traffic Control Plans (TCPs) shall be developed for works impacting public roads and will be approved by the Traffic Management Centre.
	e) detail heavy vehicle routes, access and parking arrangements;	The site access arrangements – relevant to each stage - are outlined in subsequent sections of this report (Refer Section 4).
	f) include a Driver Code of Conduct to: (i) minimise the impacts of earthworks and construction on the local and regional road network. (ii) minimise conflicts with other road users, including the students, staff, visitors and residents of the neighbouring schools and aged care village. (iii) minimise road traffic noise, both on Bakers Lane and from construction vehicles on Site; and (iv) ensure truck drivers use specified routes and adhere to the speed restrictions on Bakers Lane;	A driver Code of Conduct is a requirement of and included within this CTMP. The Drivers Code of Conduct (included in Section 5) addresses ways to minimise the impacts on the road network, with other road users, ensure truck routes are utilised and to manage pedestrian movements.
	g) include a program to monitor the effectiveness of these measures	The Contractor shall include a program to monitor the effectiveness of the measures. Deliveries will be tracked against approved volumes and will keep a vehicle log - including rego & time of entry - for the purpose of assessing the effectiveness of these monitoring programs. These programs will be completed in accordance with Section 7.1.
	h) detail procedures for notifying residents and the community (including local schools), of any potential disruptions to routes.	Communication is currently being undertaken with the relevant stakeholders. Notwithstanding, the Contractor will notify the community liaison representative when traffic conditions are expected to exceed parameters with within Condition Green of Table 7. Measures that may be included within the strategy have been identified within Section 7.3. Meetings are to be undertaken on a regular basis to keep key stakeholders informed of any upcoming events

Reference	Requirement	Response
D66	The Applicant must:	
	a) not commence construction of Stage 1 until the CTMP required by Condition D65 is approved by the Planning Secretary; and	Noted and reiterated in Section 1.1.
	b) implement the most recent version of the CTMP approved by the Planning Secretary for the duration of construction.	Refer Section 7.1 of this Plan which outlines requirement for this Plan to be updated regularly.
D118	Management plans required under this consent must be prepared in accordance with relevant guidelines, and include:	
	a) details of: i. the relevant statutory requirements (including any relevant approval, licence or lease conditions). ii. any relevant limits or performance measures and criteria; and iii. the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, Stage 1 or any management measures;	Relevant requirements are outlined in this table. Other specific requirements are detailed in Section 4.
	b) a description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria;	Refer to Section 4
	c) program to monitor and report on the: i. impacts and environmental performance of Stage 1; and ii. effectiveness of the management measures set out pursuant to paragraph (b) above;	Refer Section 7.1 of this Plan which outlines requirement for this Plan to be updated regularly.
	d) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;	Refer Section 7.2 of this Plan which outlines the requirement for this Plan to be updated regularly. Traffic Control Plans — outlined in Section 4.2.7 — shall be prepared to respond to specific work situations and subject to approval by the relevant Roads Authority (Council and/or TfNSW), providing a suitable level of independent oversight.
	e) a program to investigate and implement ways to improve the environmental performance of Stage 1 over time	Refer Section 7.1 of this Plan which outlines requirement for this Plan to be updated regularly.
	f) a protocol for managing and reporting any: i. incident and any non-compliance (specifically including any exceedance of the impact assessment criteria and performance criteria). ii. complaint. iii. failure to comply with statutory requirements; and	Management and reporting protocols are outlined in the Construction Environmental Management Plan. Reference is also made to Section 5.5 of this Plan in relation to incident management.

Reference	Requirement	Response
	g) a protocol for periodic review of the plan.	Refer Section 7.1 of this Plan.

Refer to the Department of Planning, Industry & Environment's Major Project Assessments website for a full list of all conditions of approval and other background documents.

1.5 Site Location

At a regional level, the Site is located approximately 3 kilometres south of the nearest suburban area, Erskine Park, 18 kilometres west of Parramatta, and 37 kilometres west of the Sydney CBD. It is within the Local Government Area (LGA) of Penrith City Council, however, is also subject to controls of the State Environmental Planning Policy (Western Sydney Employment Area) 2009 (SEPP WSEA).

Within the context of the OWE, Lot 2B is located between Estate Road 01 and Estate Road 03 and comprises a total site area of 149,266 m^2.

1.6 Road Hierarchy

The road hierarchy in the locality is presented in Figure 2 and summarised below for key roads.

1.6.1 M7 Motorway

The M7 motorway is a high capacity road link and provides a key north-south link, to the east of the Site and OWE, between the M2 motorway in the north and the M5 motorway to the south as part of the Sydney orbital road network. A major interchange between the M7 motorway and M4 Western motorway is located 2.5 km north of OWE, which connects the Sydney CBD and western Sydney suburbs. The motorway carries 4 trafficable lanes within a divided carriageway and is generally subject to a 100 km/h speed limit (within proximity of OWE).

1.6.2 Wallgrove Road

Wallgrove Road is an arterial road that runs in a north-south direction to the east of the Site and parallel to the M7 motorway. It provides a link between Elizabeth Drive in the south and the Great Western Highway in the north. Similar to the M7 motorway, Wallgrove Road connects to the M4 motorway approximately 2.5 kilometres to the north of the Site. The posted speed limit on the road within proximity of the site is 70 km/h and the road carries approximately 30,000 vpd. Access to the M7 motorway is also provided from Wallgrove Road.

1.6.3 Lenore Drive

Lenore Drive is a recently upgraded sub-arterial route providing an east-west connection linking Old Wallgrove Road (OWR) to the east and Erskine Park Road to the west. It provides four lanes (two in each direction) within a divided carriageway with a shared path along the northern side of the road. It is subject to an 80 km/h speed zoning.

1.6.4 Old Wallgrove Road

OWR generally runs north-south in the vicinity of the site before turning to provide an east-west connection to Wallgrove Road. It forms part of an TfNSW (formally RMS) Main Road (MR 629) route between Lenore Drive and Wallgrove Road. To the south of Lenore Drive, it functions as a local collector road.

1.6.5 Mamre Road

Mamre Road generally runs in a north-south direction to the west of the work area. It is a classified road and subject to an 80 km/h speed limit.

1.6.6 Bakers Lane

Bakers Lane is a local road that connects to Mamre Road. Surrounding land-uses include schools and rural residential properties. A signalised intersection is provided at Mamre Road providing access to the wider road network.

1.6.7 Aldington Road

Aldington Road is a local road that connects to Bakers Lane in the north, and Abbotts Road to the south. Surrounding land-uses include schools and rural residential properties. It is a sealed two lane, two road with no kerbs and gutters.

1.6.8 Abbotts Road

Abbotts Road is a local road that connects to Mamre Road via an unsignalised T-intersection. Surrounding land-uses include rural residential properties. It is a sealed two lane, two road with no kerbs and gutters.

1.6.9 Estate Road 01

Estate Road 01 is currently a private road providing access to precinct 1 and Precinct 2 and links the Future Southern Link Road (SLR) to the Western North South Link Road (WNSLR). In the longer term, the intention is for this road to be dedicated to Council as a public road, however that is expected to occur following completion of the construction works covered by this plan

1.6.10 Estate Road 03

Estate Road 03 is currently a private road providing access to precinct 2 and Precinct 3 and links the Future Southern Link Road (SLR) to Estate Road 01. In the longer term, the intention is for this road to be dedicated to Council as a public road, however that is expected to occur following completion of the construction works covered by this plan

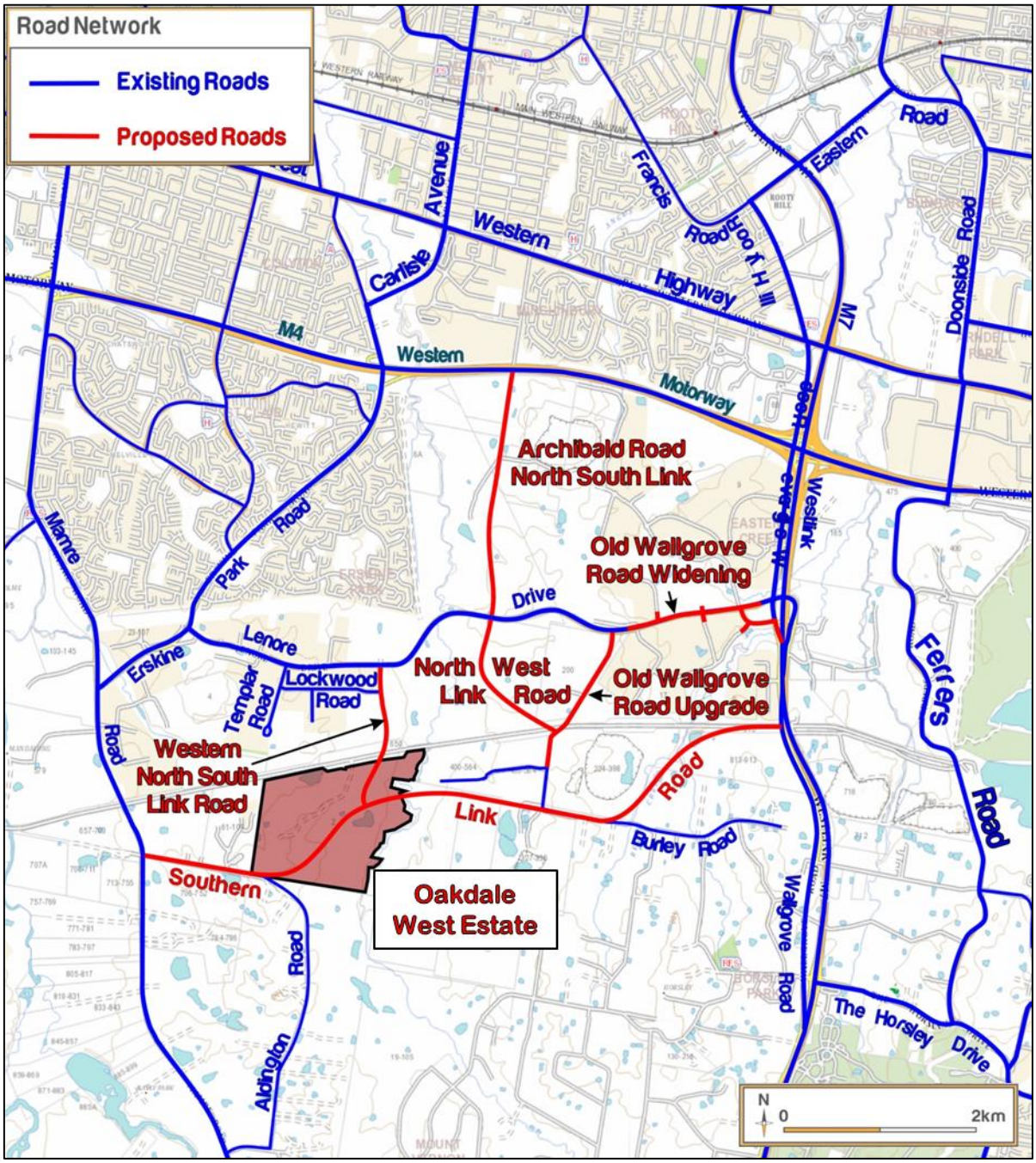

Figure 2: Road Hierarchy

2 Overview of Works

2.1 Works Stages

For the purposes of this CTMP, these works are broadly grouped as the following Phases:

1. Prior to the completion of WNSLR
2. After the completion of WNSLR

It is anticipated that Phase 1 and the construction of WNSLR shall occur concurrently. The access and traffic management required for each Phase is outlined separately for each stage later within this report.

Recognising the purpose of this CTMP, it is estimated that the total duration of the construction works will be approximately 74 weeks from the commencement date. The following summarises key aspects of the construction stages:

- Stage 1: General earthworks and the construction of the temporary accesses. This is to prepare a temporary construction entrance to the Site for the main construction of the proposed warehouse. It is proposed that these temporary construction accesses will be within the same locations as the final accesses, which is via Estate Road 03.
- Stage 2: The general construction and associated landscape works will occur during Stage 2 – including construction of crossovers Estate Road 03.

2.2 Hours of Work

Whilst having regard for Condition D70 which states that the permitted hours of works, unless otherwise agreed in writing by the Planning Secretary, is as follows:

- 7:00AM – 6:00PM Monday – Friday.
- 8:00AM – 1:00PM Saturday.
- No work Sunday and public holidays.

Notwithstanding, in order to mitigate the potential impacts of construction traffic during the network peak hours, it is anticipated that the time periods to be utilised will fall outside of the above times. Therefore, the approved extended hours of work are as follows:

- 3:00AM – 11:00PM Monday – Friday.
- 3:00AM – 11:00PM Saturday & Sunday.
- No work public holidays.

In accordance with Condition D71, work outside these hours may be undertaken under the following:

- Works that are inaudible at the nearest sensitive receivers.
- Works agreed to in writing by the Planning Secretary.
- For the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons; or
- Where it is required in an emergency to avoid the loss of lives, property or environmental harm.

2.3 Access Arrangements

Access to the Site shall be through the OWE and shall occur via Bakers Lane. Upon completion of the WNSLR, such that access to the work area from the north becomes available, all vehicular access shall be restricted to the northern access routes, via Lenore Drive and WNSLR. This is discussed in further detail below.

Every effort shall be made to plan deliveries outside of school zone hours along Bakers Lane. The monitoring strategies outlined within Section 7.1 are designed to avoid any additional conflicts between construction vehicles and school traffic.

3 Existing Conditions

3.1 Existing Conditions

Access is currently available via the Bakers Lane access gate. Once within OWE, access to the Site shall be via the haul road and Estate Road 03, as shown within Figure 3.

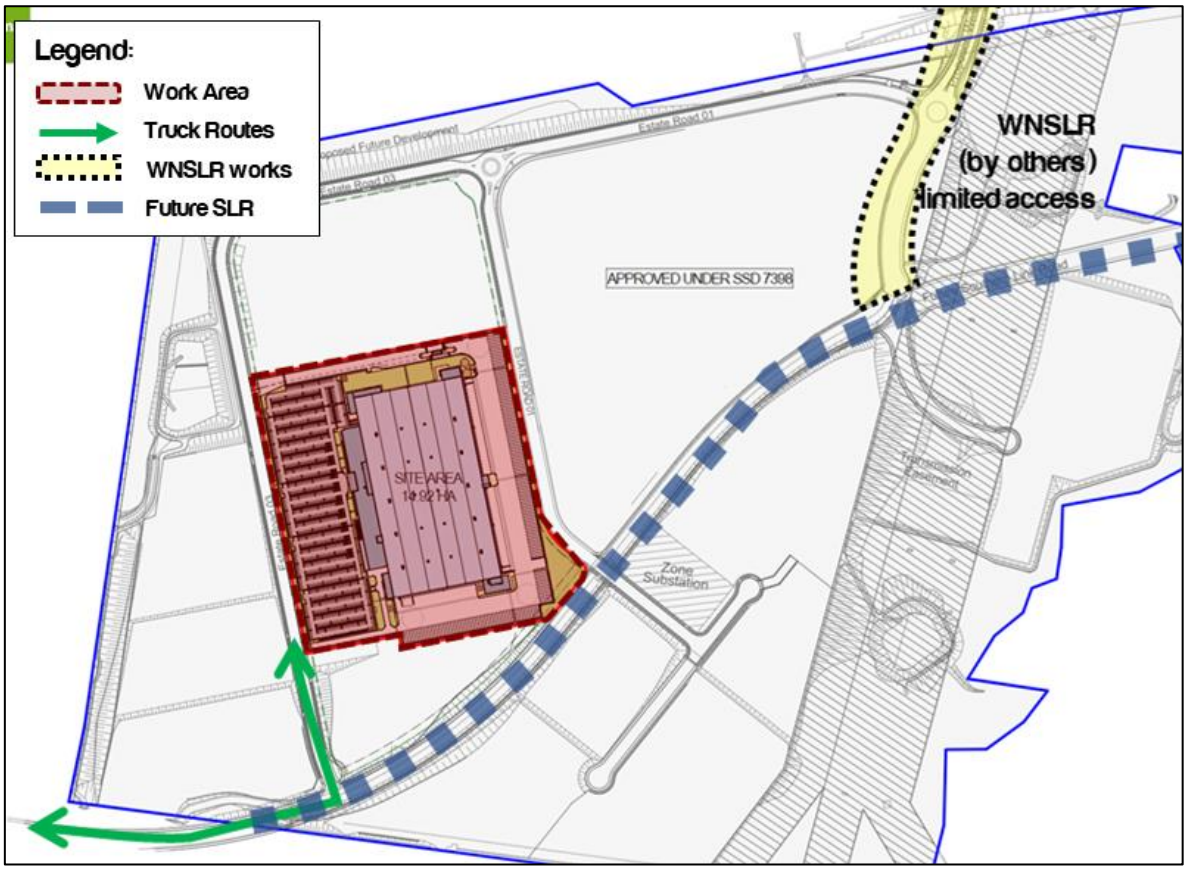

Figure 3: Existing Site Access - Bakers Lane

3.2 Active Transport Connections

A Shared Path (cyclists and pedestrians) is provided along the northern side of Lenore Drive and western side of Old Wallgrove Road, providing connections to the regional pedestrian and cycle networks.

No footpaths are provided on Mamre Road or Bakers Lane in the vicinity of the proposed construction site access locations. However, an on-road cycle lane is provided within Mamre Road to the north of the Water NSW Pipeline. Footpaths and cycle routes do not carry high volumes of pedestrians or cyclists. Notwithstanding, any TCP shall maintain a suitable level of access past work areas for these users at all times.

3.3 Public Transport Services

3.3.1 Railway Services

The *Integrated Public Transport Service Planning Guidelines, Sydney Metropolitan Area* (Transport for NSW, December 2013) states that rail services influence the travel mode choices of areas within 800 metres (approximately 10 minutes' walk) of a railway station. The closest railway station to the Oakdale West Precinct is Mt Druitt Station, is approximately 7km north of the site. This would imply that commuting by rail would have minimal influence on workplace travel.

It should be noted that several studies conducted for the Broader Western Sydney Employment Area (BWSEA) reference the potential development of connecting freight or passenger corridor to the Site's west, connecting the T1, T2 and T5 lines to Badgerys Creek Airport.

3.3.2 Bus Services

Having regard to the standard bus travel, the *Integrated Public Transport Service Planning Guidelines* state that bus services influence the travel mode choices of sites within 400 metres (approximately 5 minutes) of a bus stop. As there are no existing bus services in the proximity of the Site, this implies that bus commuting would have minimal influence on workplace travel.

As outlined in the WSEA, a new regional road network is being developed interlinking the industrial precincts within the region to support the growth and continued development of the area. This presents the potential for an accompanying expansion in the bus service network to connects places of employment within the region.

As shown in **Figure 4**, bus services operate along Lenore Drive. Accordingly, any works affecting traffic conditions along Lenore Drive shall require advanced notification to local bus operators and TfNSW.

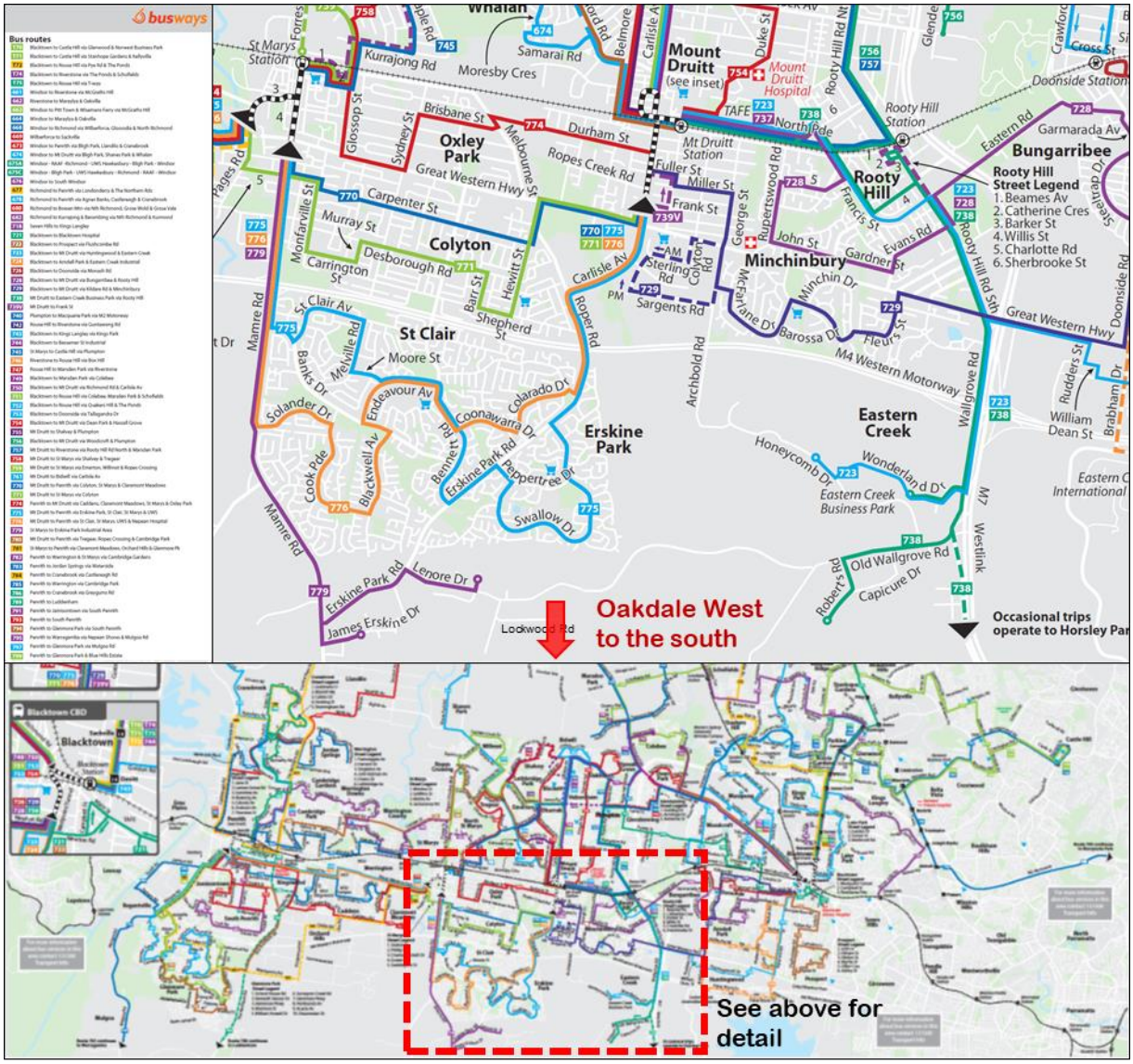

Figure 4: Public Transport Connections

4 Management Plan

4.1 Traffic Movement Restrictions

4.1.1 Background

The traffic report (Ason Group Ref: 1086r02v8) supporting the Project Waratah submission, outlined the following relevant figures with regard to future operational traffic volumes associated with the Site:

- AM Peak 580 movements per hour (movements, in & out combined)
- PM Peak 371 movements per hour (movements, in & out combined)

For the purpose of this report, 1 truck is equal to 1 inbound movement plus 1 outbound movement which equals to a total of 2 movements

4.1.2 Current Construction Traffic Estimates

The anticipated vehicle movements generated by the construction of the Site have been estimated having consideration of the likely requirements for construction staff, plant, equipment and haulage. In this regard, the design of the warehouse within Site minimises the requirement for the importation or exportation of fill. Notwithstanding there is still a requirement for large quantities of fill material for the benching of the warehouse building envelope.

Having regard for the above and the anticipated construction schedule, the estimated traffic volumes are as follows:

- Earthworks and local infrastructure – up to 1,650 employee movements per day and 200 heavy vehicle movements per day (including truck and dog and 3 tonne rigid trucks), accessing OWE via Bakers Lane, although not in the same time period. Notwithstanding the estimated maximum daily construction vehicle generation is up to 1,850 vehicle movements per day.

During the Phase 1, prior to completion of the WNSLR and its associated Water NSW pipeline crossing, it is anticipated that all construction traffic will use Mamre Road, via Bakers Lane. Any access restrictions imposed by TfNSW / Council on the use of that connection shall be subject to further negotiation with TfNSW / Council.

4.1.3 TransGrid Easement

A TransGrid easement runs along the eastern side of the Work Area which is subject to a number of restrictions. Importantly, no vehicle circulation is permitted within 5 metres of any transmission structure or guy-wires unless otherwise pre-arranged. All endeavours shall be undertaken to limit vehicular movements with the easement areas for all construction works, wherever practicable, however it is not expected that construction vehicles are required to access the clearance zones.

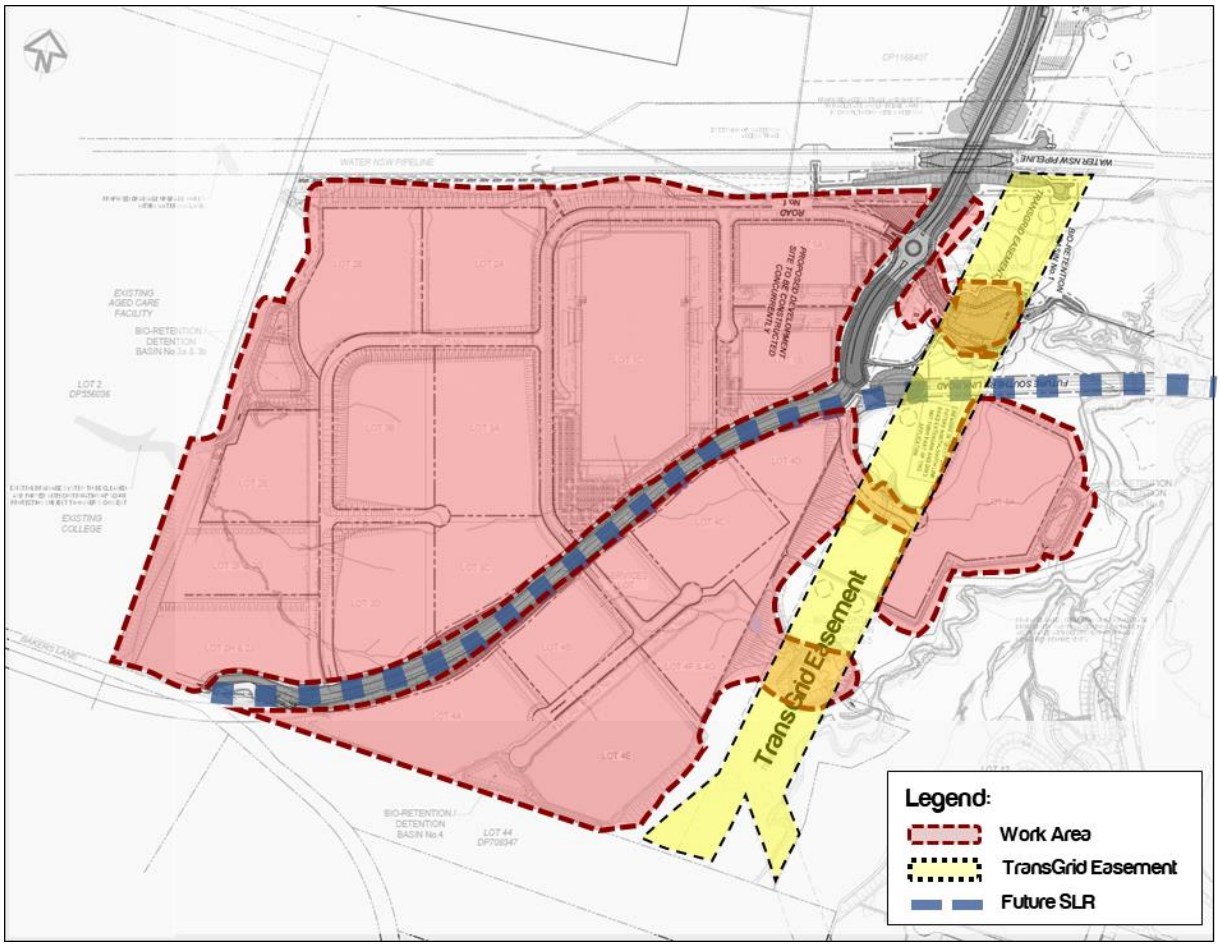

Figure 5: TransGrid Easement Within Site

4.1.4 Measures to Manage Construction Traffic in Bakers Lane During School Zone Periods

It is noted that the conditions of consent require detail of specific measures to manage construction traffic to avoid school drop-off and pick up times (Monday to Friday 8:00 – 9.30AM and 2.30 – 4:00PM, and Higher School Certificate exam periods). These restrictions shall not be enforced during school holidays. In this regard, the following measures shall be implemented to limit (as far as practicable) Heavy Vehicles from using Bakers Lane during the above hours:

- All suppliers/haulage contractors to have Vehicle Movement Plans issued at supply agreement stage
- When placing all orders, access restrictions shall be notified to dispatch and included on delivery docket, where possible
- Deliveries scheduled for outside restricted times.
- Signage installed on approach to Bakers Lane (primary route) notifying delivery drivers of time limitations
- If bulk importation periods are required, gate person tracking loads in/out and communicating and monitoring access/egress routes accordingly
- Any vehicles found to be in breach to undergo driver induction on the spot and their manager/dispatch advised; repeat offenders to be prevented from returning to site

4.2 Other General Requirements

4.2.1 Driver Code of Conduct

All drivers shall adhere to the Driver Code of Conduct, outlined in Section 5.

4.2.2 Work Zone Requirements

An on-street Works Zone is proposed for the use of hydrant fill points on Bakers Lane by Contractor water carts. The locations will be confirmed (and approved) with PCC prior to any filling.

A separate application to Council will therefore be required in the event that any special or discreet work activities do require the use of kerbside parking for the purposes of a Works Zone.

4.2.3 Materials Handling

Handling of all materials throughout the construction shall adhere to the following.

- It is proposed that all material loading will occur within the construction site boundary.
- No loading is proposed to occur outside of the provisioned areas.
- Equipment, materials and waste will be kept within the construction site boundary.

During latter stages of construction, tie in works will be required within the kerbside of Estate Road 03. All materials handling shall be undertaken off the public roadway, however in the event materials handling are required from the roadway, then prior approval shall be sought and obtained from the relevant Authorities. Noting that Estate Roads are currently in private ownership, this would require consent of the Estate Management and be subject to special management.

4.2.4 Fencing Requirements

Temporary exclusion fencing will be erected along the entire boundary of the site and will be maintained for the duration of the construction program. The fencing is to ensure unauthorised persons are kept out of the Site. Site access gates would be provided within Estate Road 03 and will be closed at all times outside of the permitted construction hours.

Careful consideration for pedestrian protection shall be included within relevant TCP, as outlined below.

4.2.5 Cyclist Management

Man-proof fencing shall be provided along all site frontages accessible by the public to prevent unwanted cyclist access.

Careful consideration for cyclist protection shall be included within relevant TCP, as outlined below.

4.2.6 Access Road Management

Access to the Site will be separate from the construction access associated with the WNSLR works which itself is to be constructed along the future Southern Link Road alignment. The Site's construction access shall be located to the west of the SLR access.

4.2.7 Traffic Control Plans

Any Traffic Control Plans (TCPs) shall be prepared by an accredited person, in accordance with the TfNSW *Traffic Control at Worksites Manual* and AS1742.3.

All TCPs involving signage or impacts to public roads shall be approved by the Traffic Management Centre (TMC), prior to the works for which they relate. These TCPs shall be updated to respond to any changes to prevailing traffic conditions throughout the life of the works.

4.3 Phase 1 - Prior to the completion of WNSLR

4.3.1 Key Stage Details Summary

Table 2: Stage Summary – Phase 1

Criteria	Response
Description of Key Activities	General earthworks, Construction of the temporary accesses, and General construction of warehouse and car parks
Max. Vehicle Size	Truck + Dog Trailer (Special Permits may be required for floating in plant)
Vehicle Movement Frequency	Approximately 1,850 movements / day
Truck Access Requirements	All vehicles shall access via Baker Lane
Vehicle access / egress in a forward direction (Y / N)	Y
Out of Hours Deliveries (Y/N)	Y – upon receipt of final conditions
Contractor Parking	Y – Location varies depending on discreet work area(s). Builder shall nominate contactor parking zones, clear of truck manoeuvring areas and wholly within Site
Pedestrian Control	Wire mesh site boundary fencing.
Public Transport Services Affected	Nil
Road Occupancy Requirements (if yes, provide further details)	N – all affected internal road will be in private ownership until completion of construction.
Lane or Footpath Closures (if yes, provide further details)	Y – Kerbside lane occupancy within Access Road 03 may be required for a short duration. Works may be restricted to outside of peak periods or prior to road becoming a publicly owned asset
Traffic Control Plan	Refer below.

4.3.2 Truck Movements & Contractor Parking

Truck access routes under Phase 1 shall occur via Bakers Lane as shown in Figure 6, in accordance with any and all conditions of consent received by the TfNSW. It is expected that a schedule for deliveries of materials and goods will be established prior to that day, with Traffic Controllers maintaining radio contact with construction vehicles at all times. Thus, at no stage shall queueing occur on the public road network.

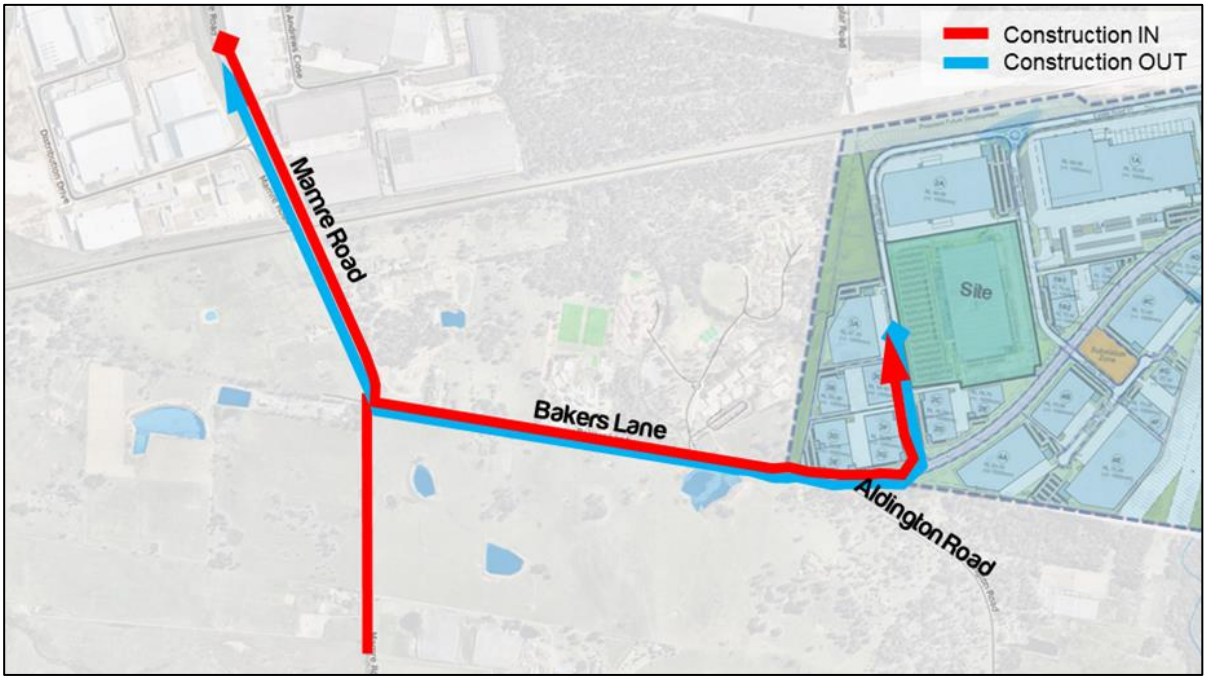

Figure 6: Network Non-Peak Route via Bakers Lane

In the event that vehicles were required to use a layover prior to arrival to site, it is expected that the vehicles shall laydown within Distribution Drive before arriving to site in order to avoid any on-street queuing. Distribution Drive is a more preferable location for a layover than Bakers Lane, as it off a main road, and removed from larger interactions to schools. **Figure 7** identifies the proposed location in reference to the Site.



Figure 7: Truck Layover Locations

These sub-phases assume that Stage 1 earthworks and surrounding precinct roads will be completed first to enable building works associated with the final built form to commence, whilst remaining earthworks are to be complete. It is expected that future contractors shall prepare Vehicle Movement Plans (VMP) for on-site circulation.

In preparing relevant details VMPs, the contractor should:

- Minimise interaction with other work areas, as far as possible.
- Where possible, separate truck movements from contractor car parking areas
- Prepare Traffic Control Plans where necessary to provide additional management of on-site vehicle movements.
- Maintain connectivity between Bakers Lane and the southern end of the WNSLR works

It should be noted that TfNSW is yet to complete detailed design of the SLR. As such, it is unlikely that SLR works will commence during the timeframes envisaged by this CTMP. Nevertheless, regular engagement with TfNSW should be undertaken to coordinate any final design and/or construction access requirements.

4.3.3 Traffic Control Plans

Having regard for the anticipated truck movements exceeding 20 movements per day, it is expected that signage (e.g. “Trucks Turning”) may be required at the site access points to advise other road users of changed traffic conditions. In this regard, it is expected that site-specific versions of the standard TCP 195 would be implemented by the Contractor.

Further to the above, it is expected that additional signage shall be installed within Bakers Lane near the intersection of Mamre Road x Bakers lane, and VMS shall be installed on approach to the schools to provide additional opportunities for drivers to be made aware of the increased pedestrian activity ahead.

In addition, site-specific versions of standard TCP 93 will be required for any works within the road network, where the kerbside lane is obstructed or insufficient clearances to passing traffic cannot be maintained.

Supplementary site-specific TCPs shall be developed and submitted to TMC for approval, as required to reflect specific work activities and/or changes to road conditions.

4.4 Phase 2 – Post completion of the WNSLR

4.4.1 Key Stage Details Summary

Table 3: Stage Summary – Phase 2

Criteria	Response
Description of Key Activities	General construction of warehouse and car parks, and Associated landscape works.
Max. Vehicle Size	Truck + Dog Trailer (Special Permits may be required for floating in plant)
Vehicle Movement Frequency	Approximately 1,850 movements / day
Truck Access Requirements	All vehicles shall access via the WNSLR.
Vehicle access / egress in a forward direction (Y / N)	Y
Out of Hours Deliveries (Y/N)	Y
Contractor Parking	Y – Location varies depending on discreet work area(s). Builder shall nominate contactor parking zones, clear of truck manoeuvring areas and wholly within Site
Pedestrian Control	Wire mesh site boundary fencing.
Public Transport Services Affected	Nil
Road Occupancy Requirements (if yes, provide further details)	N – all affected internal road will be in private ownership until completion of construction.
Lane or Footpath Closures (if yes, provide further details)	N
Traffic Control Plan	Refer below.

4.4.2 Truck Movements & Contractor Parking

Relevant truck routes to be adhered to during this Phase are outlined below in **Figure 8**. Upon the completion of the WNSLR, all construction vehicles shall access work areas via the WNSLR.

Contactors shall nominate a parking area within the Site that does not obstruct any construction vehicle manoeuvre routes, nor shall any contractor parking be permitted on estate roads.

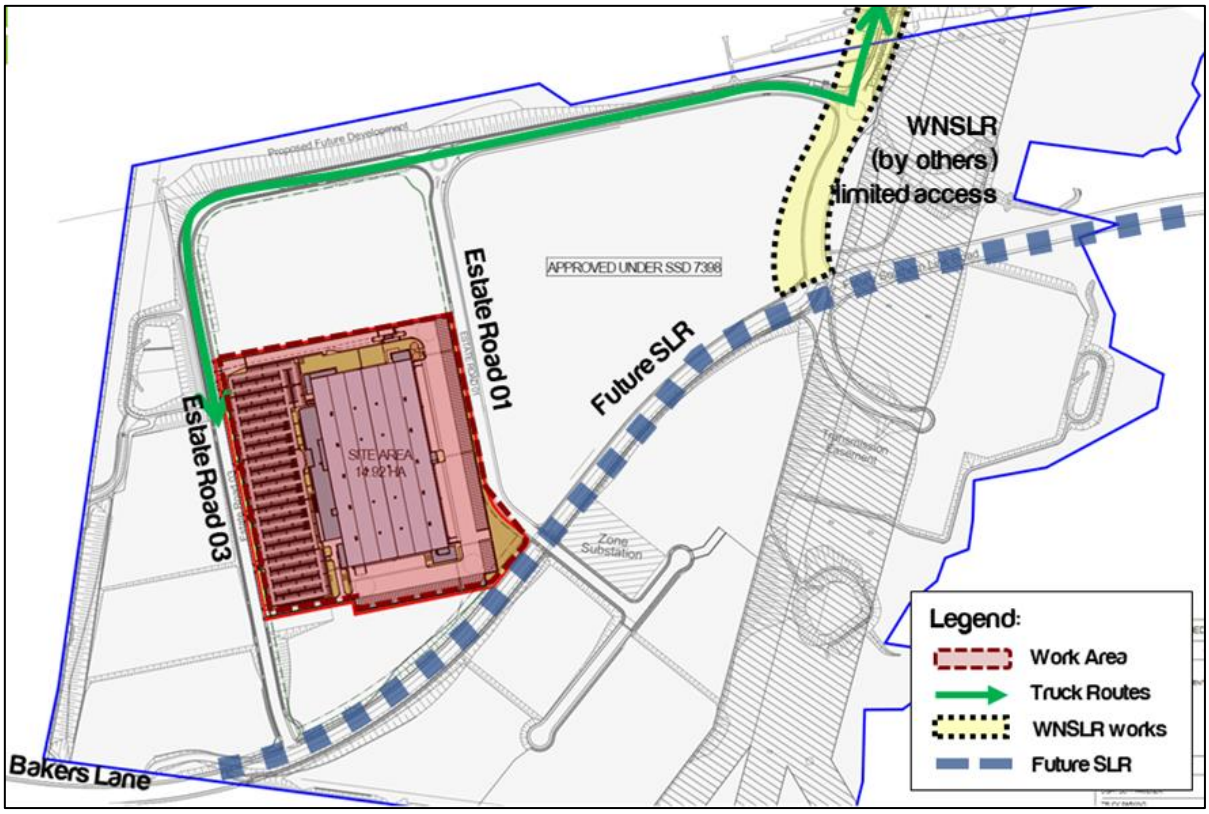

Figure 8: Truck Routes - Phase 2

4.4.3 Traffic Control Plans

Having regard for the anticipated truck movements, it is expected that signage (e.g. “Trucks Turning”) may be required at the site access points to advise other road users of changed traffic conditions. In this regard, it is expected that site-specific versions of the standard TCP 195 would be implemented by the Contractor.

In addition, site-specific versions of standard TCP 93 will be required for any works within the road network, where the kerbside lane is obstructed or insufficient clearances to passing traffic cannot be maintained.

Site-specific TCPs shall be developed and submitted to TMC for approval, as required, to reflect specific work activities and/or changes to road conditions.

5 Drivers Code of Conduct

Safe Driving Policy for Project Waratah construction activities.

5.1 Objectives of the Drivers Code of conduct

- To minimise the impact of earthworks and construction on the local and regional road network.
- Minimise conflict with other road users.
- Minimise road traffic noise; and
- Ensure truck drivers use project approved routes only

5.2 Code of Conduct

The code of conduct requires that while driving any vehicle for work-related purposes. Drivers are to be issues with a copy of the Drivers Code of Conduct, and must comply with all of the following:

- Demonstrate safe driving and road safety activities
- Abide by traffic, road and environmental legislations
- Follow site signage and instructions
- Drivers must only enter and exit the site via the approved entry and exit points and travel routes.

The below activities in any vehicles will be considered as a breach of conduct and will result in removal from site:

- Reckless or dangerous driving causing injury or death
- Driving whilst disqualified or not correctly licensed
- Drinking or being under the influence of drugs while driving
- Failing to stop after an incident
- Loss of demerit points leading to suspension of licence
- Any actions that warrant the suspension of a licence
- Exceeding the speed limit in place on any permanent or temporary roads

5.3 Driver Responsibilities

All Drivers on site must:

- Be responsible and accountable for their actions when operating a company vehicle or driving for the purposes of work.
- Display the highest level of professional conduct when driving a vehicle at all times.
- Ensure they have a current driver licence for the class of vehicle they are driving, and this licence is to be carried at all times
- Immediately notify their supervisor or manager if their drivers' licence has been suspended, cancelled, or has had limitations applied.
- Comply with all traffic and road legislation when driving.
- Assess hazards while driving.
- Undertake daily pre-start checks of oil, tyre pressures, radiator and battery levels of company vehicles they regularly used.
- Drive within the legal speed limits, including driving to the conditions.
- Not drive outside of the approved heavy vehicle routes. All drivers must obey weight, length and height restrictions imposed by the National Vehicle Regulator, and other Government agencies. Heavy Vehicles shall adhere to the routes outlined in Section 3
- Be cognisant of the noise and emissions requirements imposed within the EIS, and in a broader sense, the NSW/ Australian Road Rules. Works must be constructed with the aim of achieving the construction noise management levels detailed in the Interim Construction Noise Guideline.
- Do not queue on public roads unless a prior approval has been sought.
- Be aware that at no time may a tracked plant be permitted or required on a paved road.
- Never drive under the influence of alcohol or drugs, including prescription and over the counter medication if they cause drowsiness – to do so will merit disciplinary measures.
- All drivers to report to their supervisor if they have been prescribed medication prior to the start of work.
- Wear a safety seat belt at all times when in the vehicle.
- Avoid distraction when driving – the driver will adjust car stereos/mirrors etc. before setting off, or pull over safely to do so.
- Report ALL near-misses, crashes and scrapes to their manager,

- Report infringements to a manager at the earliest opportunity.
- Report vehicle defects to a manager prior to the next use of the vehicle.
- Follow the approved site access/egress routes only.
- Follow speed limits as imposed within the estate.
- Keep loads covered at all times.

5.4 The Site Team Responsibilities

The Contractor is responsible to take all steps necessary to ensure company vehicles are as safe as possible and will not require staff to drive under conditions that are unsafe.

This will be achieved by undertaking the following:

- Ensuring all vehicles are well maintained and that the equipment enhances driver, operator and passenger safety by way of:
  - Pre-commencement checks for all new plant arriving on-site and prior to undertaking any work.
  - Daily prestart inspections for all plant, vehicles and equipment currently on-site.
  - All construction plant must be fitted with a flashing light, fire extinguisher and reverse alarms (or squawkers).
  - Ensure all operators onsite have a current verification of competency (VOC) for their current driver's licence of the appropriate class.
  - Ensure maintenance requirements are met and recorded.
- Identify driver training needs and arranging appropriate training or re-training. This may include providing the below:
  - Operator VOC assessment as part of all inductions.
  - Regular Toolbox discussions on safety features, managing fatigue, approved heavy routes, driver responsibility and drink-driving
- Encouraging Safe Driving behaviour by:
  - Ensuring the subcontractor is informed if their staff become unlicensed
  - Not covering or reimbursing staff speeding or other infringement notices
  - Ensuring Legal use of mobile phones in vehicles while driving only and that illegal use is not undertaken.

- Encouraging better fuel efficiency by:
  - Use of other transport modes or remote conferencing, whenever practical.
  - Providing training on, and circulating information about, travel planning and efficient driving habits.

5.5 Crash or incident Procedure

- Stop your vehicle as close to it as possible to the scene, making sure you are not hindering traffic. Ensure your own safety first, then help any injured people and seek assistance immediately if required.
- Ensure the following information is noted:
  - Details of the other vehicles and registration numbers
  - Names and addresses of the other vehicle drivers
  - Names and addresses of witnesses
  - Insurers details
- Give the following information to the involved parties:
  - Name, address and company details
- If the damaged vehicle is not occupied, provide a note with your contact details for the owner to contact the company.
- Ensure that the police are contacted should the following circumstances occur:
  - If there is a disagreement over the cause of the crash.
  - If there are injuries.
  - If you damage property other than your own.
- As soon as reasonably practical, report all details gathered to your manager.

5.6 Environmental Procedures.

A range of measures — including those detailed in the Environmental and Sedimentation Control Plan (ESCP); Appendix F of the Erosion and Sediment Control Plan — shall be implemented to ensure the following;

- No dirt or debris from the construction vehicles is tracked on to the public road network.
- Reduce the impacts to sensitive receivers, including, where practicable, starting noisy equipment away from sensitive receivers and implementing respite periods.

- Watering of dusty activities will be undertaken, or activities temporarily halted and then resumed once weather conditions have improved.
- Containment measures for spillages will be provided at appropriate locations and in close proximity to staff car park areas, dangerous goods stores areas and main Project work areas.
- All vibratory compactors must not be used closer than 30 metres from residential buildings unless vibration monitoring confirms compliance with the vibration criteria, and
- Keep an accurate record which includes the range of measures undertaken to reduce environmental impacts.

6 Transport Impact Assessment

6.1 Construction Traffic Generation

6.1.1 Phase 1 Construction Traffic – Prior to the completion of WNSLR

As discussed above, the construction works are expected to generate up to 1,850 vehicle movements per day. Vehicle movements will be spread throughout the day and — particularly in the case of access to the southern work area — will avoid peak school drop-off periods. Reference is made to the detailed breakdown of vehicle movements which details projected movements during a number of periods:

- Pre-School Zone (3:00 – 8:00AM)
- Morning School Zone (8:00 – 9:30AM)
- Between School Zones (9:30AM – 2:30PM)
- Afternoon School Zone (2:30 – 4:00PM)
- Post-School Zones (4:00 – 6:00PM)
- Evening (6:00 – 11:00PM)

The peak for each of these periods varies for each work area during the life of the construction program. Works will typically generate peak hourly traffic before and after the School Zone periods, as demonstrated below. This adopts a similar Light Vehicle (LV) and Heavy Vehicle (HV) arrival profile to other construction works in the locality.

Table 4: Hourly Construction Traffic Movements – Phase 1 via Bakers Ln

Vehicle Type	Pre-School Zones	Morning School Zone	Between School Zones	Afternoon School Zone	Post School Zones	Evening	Daily
LV	159	111	17	111	125	40	1660
HV	20	47	3	1	1	-	190
TOTAL	179	158	20	112	126	40	1,851

6.1.2 Phase 2 Construction Traffic – Post completion of the WNSLR

Post completion of the WSLNR, the construction works are expected to generate up to 1,850 vehicle movements per day, spread across the day. Construction traffic volumes have been included within the morning and afternoon school zone periods, as access via the WNSLR does not impact the operation of the schools within Bakers Lane.

Table 5: Hourly Construction Traffic Movements – Phase 2 via WNSLR to Lenore Dr

Vehicle Type	Pre-School Zones	Morning School Zone	Between School Zones	Afternoon School Zone	Post School Zones	Evening	Daily
LV	190	-	62	75	57	36	1,666
HV	2	62	17	-	3	-	189
TOTAL	191	61	79	75	60	36	1,855

Volumes of heavy vehicles are to increase as the capacity within the WNSLR exceeds the proposed daily volumes of heavy vehicle movements. It should be noted that OWE – when fully operational – will generate up to 942 vehicles per hour, or 9,041 vehicle movements per day and relies upon similar network (i.e. once WNSLR is operational). Construction traffic is substantially less than this future operational traffic and will therefore not have any unacceptable impacts on the surrounding road network.

6.2 Impacts on Surrounding Network

The impacts of construction traffic and the mitigating measures to be implemented are outlined below.

- **Construction Traffic in Bakers Lane**: Construction traffic will initially use Bakers Lane to access the work area for preliminary works. To ensure the impacts to residents and schools within the area is kept to a minimum, TC's shall monitor the accesses of the schools and momentarily further restrict deliveries in order for vehicles accessing the school to either enter or exit the site. Additionally, the installation of ancillary signage and VMS's along Bakers Lane also attempts to increase awareness of the high pedestrian area ahead (the schools).
- **Construction Traffic within WNSLR**: Highest construction traffic volumes will occur after completion of the WNSLR, providing an alternative access to OWE. Construction traffic is substantially less than the approved future operational traffic volumes and will therefore not create any unacceptable impacts on the surrounding road network

- **Management of deliveries**: Construction vehicle access via Bakers Lane shall be reduced during school peaks in order to maximise the safety of all patrons arriving and departing school.
- **Safety During Construction**: Safety to motorists and pedestrians throughout the area will be maintained during construction through the preparation and execution of Traffic Control Plans (TCP's). A range of TCP's will be prepared for each access throughout construction, to identify all reasonably foreseeable hazards, assess the hazards, and manage the hazards as best possible by either eliminating or minimising the risks. TCP's shall be monitored and updated accordingly throughout the project.
- **Reporting**: Reporting and monitoring of movements during key school periods is to be undertaken to ensure that drivers are adhering to restricted times, and to ensure that the approved traffic generation, and subsequent impacts on the road network, are in line with those approved.

In summary, based on the traffic numbers currently envisaged, the traffic impacts are considered acceptable.

6.3 Cumulative Impacts

The above relates to construction traffic associated with Oakdale West estate works in isolation.

Noting that a number of other concurrent works are proposed, the cumulative impact of known construction works (covered by separate CTMPs) is addressed within a Cumulative Construction Traffic Impact Assessment (CCTIA). This CCTIA is prepared separately and shall be updated from time to time should any existing or future CTMPs envisage an increase in the cumulative construction traffic on the surrounding road network. In this regard, the CCTI report shall be subject to ongoing review and will be updated as required.

Table 6: Consolidated Site Peak Hour Construction Traffic Volumes

Access Route	Vehicle Type	Period	
		Phase 1	Phase 2
Bakers Lane	LV	134	
	HV	91	
Lenore Drive	LV		252
	HV		220
Total (Combined)	TOTAL	224	472

Furthermore, the Site's peak hours occur prior to the network peak and the AM school peak, therefore the background volume of traffic will be negligible and can be discounted from the review of impacts within the road network. Tube counts undertaken in March 2016 further illustrates that volumes within Backers Lane remains negligible during the peak periods (between 3:00am to 8:00am) and can be seen within .

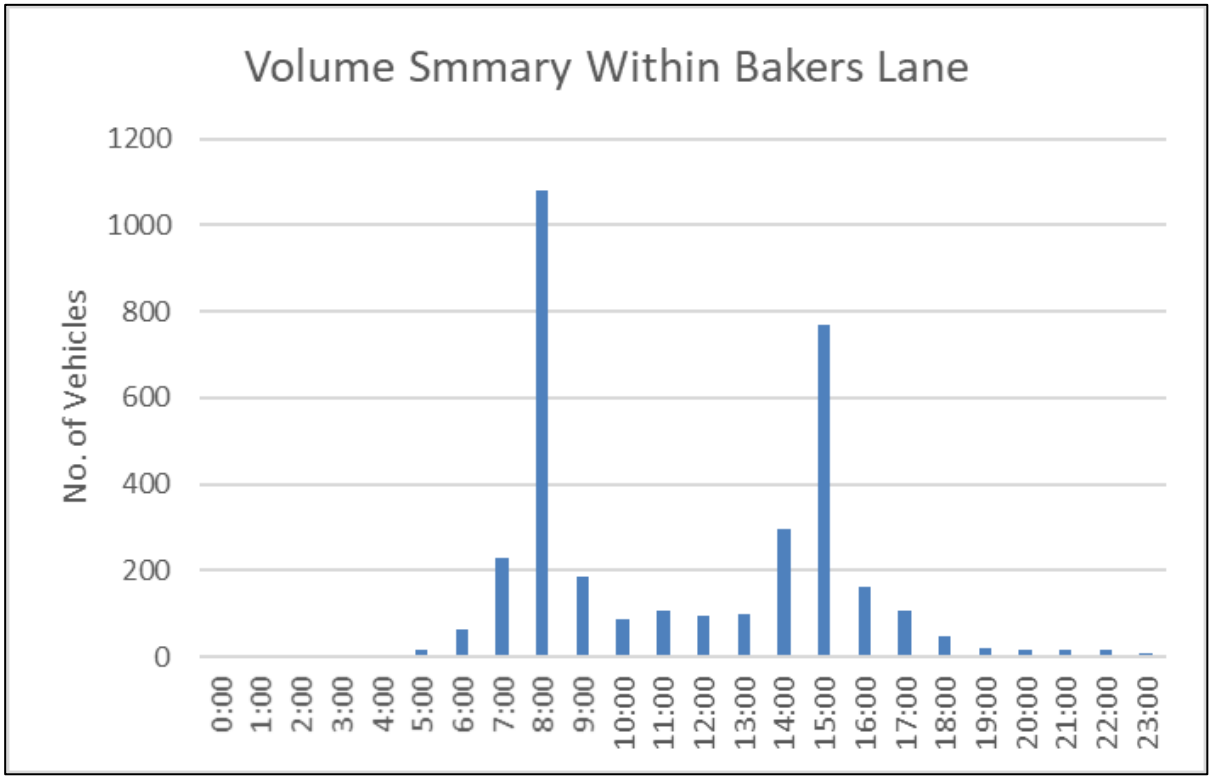

Figure 9: Vehicle Counts within Bakers Lane

Having regard for the above and for the approved operational daily volumes outlined within Section 4 (580 vehicles per hour), it is evident that the operational threshold will not be exceeded and therefore will not result in any unreasonable impacts on the surrounding road network. Notwithstanding, each contractor shall liaise regularly in order to avoid any conflict of large deliveries and to ensure that the cumulative construction impacts are minimised.

Currently, it is unknown if there are any further construction projects planned throughout the duration of the project. In the event that other construction works are to be undertaken, consultation with all projects will be undertaken. Notwithstanding, any additional impacts would be determined on the timing and type of activity, and would be site-specific in nature, so are difficult to define at this stage.

7 Plan Administration

7.1 Monitoring Program

This CTMP shall be subject to ongoing review and will be updated accordingly. Regular reviews will be undertaken by the on-site coordinator. As a minimum, review of the CTMP shall occur monthly. All and any reviews undertaken should be documented, however key considerations regarding the review of the CTMP shall be:

- Tracking deliveries against the volumes outlined within report. Deliveries will be tracked against approved volumes and will keep a vehicle log - including rego & time of entry - for the purpose of assessing the effectiveness of these monitoring programs.
- To identify any shortfalls and develop an updated action plan to address issues that may arise during construction (Parking and access issues)
- To ensure TCP's are updated (if necessary) by "Prepare a Work Zone Traffic Management Plan" card holders to ensure they remain consistent with the set-up on-site.
- Regular checks undertaken to ensure all loads are entering and leaving site covered as outlined within this CTMP.

The development of a program to monitor the effectiveness of this CTMP shall be established by the Contractor. This process is expected to form part of the monitoring plan required to be included as part of the overarching Construction Environmental Management Plan (CEMP), of which this CTMP forms a part.

7.2 Contingency Plan

A contingency plan shall be established by the Contractor and is to be included in the overarching CEMP. Notwithstanding, **Table 7** outlines an indicative plan to be undertaken by the builder in the event that the monitoring program identifies the management plan is not effective in managing the construction impacts.

Table 7: Contingency Plan

Risk		Condition Green	Condition Amber	Condition Red
Construction Movements	Trigger	Construction traffic does not exceed the permissible volume and time constraints	Construction traffic just exceeds the permissible volume and time constraints	Construction traffic far exceeds the permissible volume and time constraints
	Response	No response required Continue monitoring program	Review and investigate construction activities, and where appropriate, implement additional remediation measures such as: - Temporary halting of activities and resuming when conditions have improved - Review CTMP and update where necessary - Provide additional training.	Review and investigate construction activities. If it is concluded that construction activities were directly responsible for the exceedance, submit an incident report to government agencies. Where appropriate, implement additional remediation measures such as: - Temporary halting of activities and resuming when conditions have improved - Stop all transportation into and out of the site. - Review CTMP and update where necessary. - Provide additional training.
Queuing	Trigger	No queuing identified	Queuing identified within site	Queuing identified on the public road
	Response	No response required Continue monitoring program	Review the delivery schedule prepared by the builder. If drivers are not following the correct schedule, then they should be provided with additional training and an extra copy of the Driver Code of Conduct	Review and investigate construction activities. If it is concluded that construction activities were directly responsible for the exceedance, submit an incident report to government agencies. Where appropriate, implement additional remediation measures such as: - Temporary halting of activities and resuming when conditions have improved - Stop all transportation into and out of the site. - Review CTMP and update where necessary. Provide additional training.
Noise	Trigger	Noise levels do not exceed imposed noise constraints	Noise levels in minor excess of imposed noise constraints	Noise levels greatly in excess of imposed noise constraints

Risk		Condition Green	Condition Amber	Condition Red
	Response	No response required Continue monitoring program.	Undertake all feasible and reasonable mitigation and management measures to minimise noise impacts.	Undertake all feasible and reasonable mitigation and management measures to ensure noise levels are below Highly Noise Affected criteria. If noise levels cannot be kept below applicable limits, then a different construction method or equipment must be utilised.
Traffic Control Plans	Trigger	No observable issues	Minor inconsistencies with TCP to onsite operations	Near miss or incident occurring regardless of / as a result of the TCP being implemented
	Response	No response required Continue monitoring TCPs.	Traffic Controller to amend TCP on site and to keep a log of all changes	Stop work until an investigation has been undertake into the incident. There are to be changes made to the TCP to ensure that the safety of all workers, students and civilians are catered for.
Dust	Trigger	No observable dust	Minor quantities of dust in the air and tracking on to the road	Large quantities of dust in the air and tracking on to the road
	Response	No response required Continue monitoring program	Review and investigate construction activities and respective control measures, where appropriate. Implement additional remedial measures, such as: - Deployment of additional water sprays - Relocation or modification of dust-generating sources - Check condition of vibrating grids to ensure they are functioning correctly - Temporary halting of activities and resuming when conditions have improved	Review and investigate construction activities and respective control measures. If it is concluded that construction activities were directly responsible for the exceedance, submit an incident report to government agencies. Implement relevant responses and undertake immediate review to avoid such occurrence in future.

It is therefore proposed to incorporate the above items within the communications strategy. The contingency plan outlines the most effective methods to ensure that each item identified within the Monitoring Program is adhered to, resulting in the impacts to the wider community being minimised. It also represents the efforts undertaken to continually improve CTMP and ensure that the process being utilised are indeed best practice.

7.3 Communications Strategy

A communications strategy shall be established by the Contractor and is included in the overarching CEMP. The contractor is to notify the community liaison representative when traffic is expected to exceed the parameters set within "Condition Green" of Table 7. Notwithstanding, **Table 8** outlines an indicative communication strategy to ensure that adequate communication with key stakeholders have been met.

Table 8: Communication Strategy

Risk	Impact	Comms Channel
Wider Traffic Disruption	Wider community and stakeholders informed through local and wider advertising and notification	Stakeholder Meetings Stakeholder email blast Email to local schools & Dept of Education
Construction related traffic	Ensure construction crews use traffic routes identified in the Traffic Management Plan, and Ensure residents in area are notified in advance to any traffic changes that may affect them	

Recently, communication has been undertaken with Penrith City Council, the care home and schools adjacent to the Site. Comments received has generally been accepting of the proposed construction strategy and have been included within **Appendix A**. The responses of the initial communication to the key stakeholders are as follows.

Table 9: Stakeholder Responses

Stakeholder	Response
Catholic Education Diocese of Parramatta	We note and appreciate the restrictions on heavy vehicle movement during peak drop off and peak times. At this point, we have no further comment, but will monitor traffic flow and raise any safety concerns that may arise as the project progresses
The Anglican Schools Corporation	The current designated "peak periods" nominated appear reasonable but should continue to be assessed during the works to identify as to whether these time periods need to be altered. The school is a "live environment" that can change quickly during any day and we feel that on-going effective communication between the school and those responsible for traffic management during the works should be maintained to provide the school with an avenue for raising any concerns. The peak periods identified are typical for a standard operating day. Each of the schools along Bakers Lane will have a number of "special days and activities" during the course of the year such as "grandparents day and carnivals" where peak period shall need to be extended and we request a mechanism be established for allowing effective communication of these requirements by the school.
Catholic Healthcare	No issues

Following consultation with the key stakeholders, construction related traffic issues shall be monitored (as outlined within Section 7.1), be mitigated through the Community Consultation Strategy, and through meetings held throughout the project. Regular meetings shall be undertaken with key stakeholders in order to inform the stakeholders of any upcoming extra-ordinary activities. These meetings shall be utilised from both the OWE works and any additional school activities (such as carnivals or grandparents' day).

This communications strategy outlines the most effective communication methods to ensure adequate information within the community and assist the project team to deliver the traffic changes with minimal disruption to the road network.

Furthermore, ongoing communication is also to be undertaken so that all stakeholders are kept up to date of works and potential impacts.

Appendix A

Traffic Control Plans

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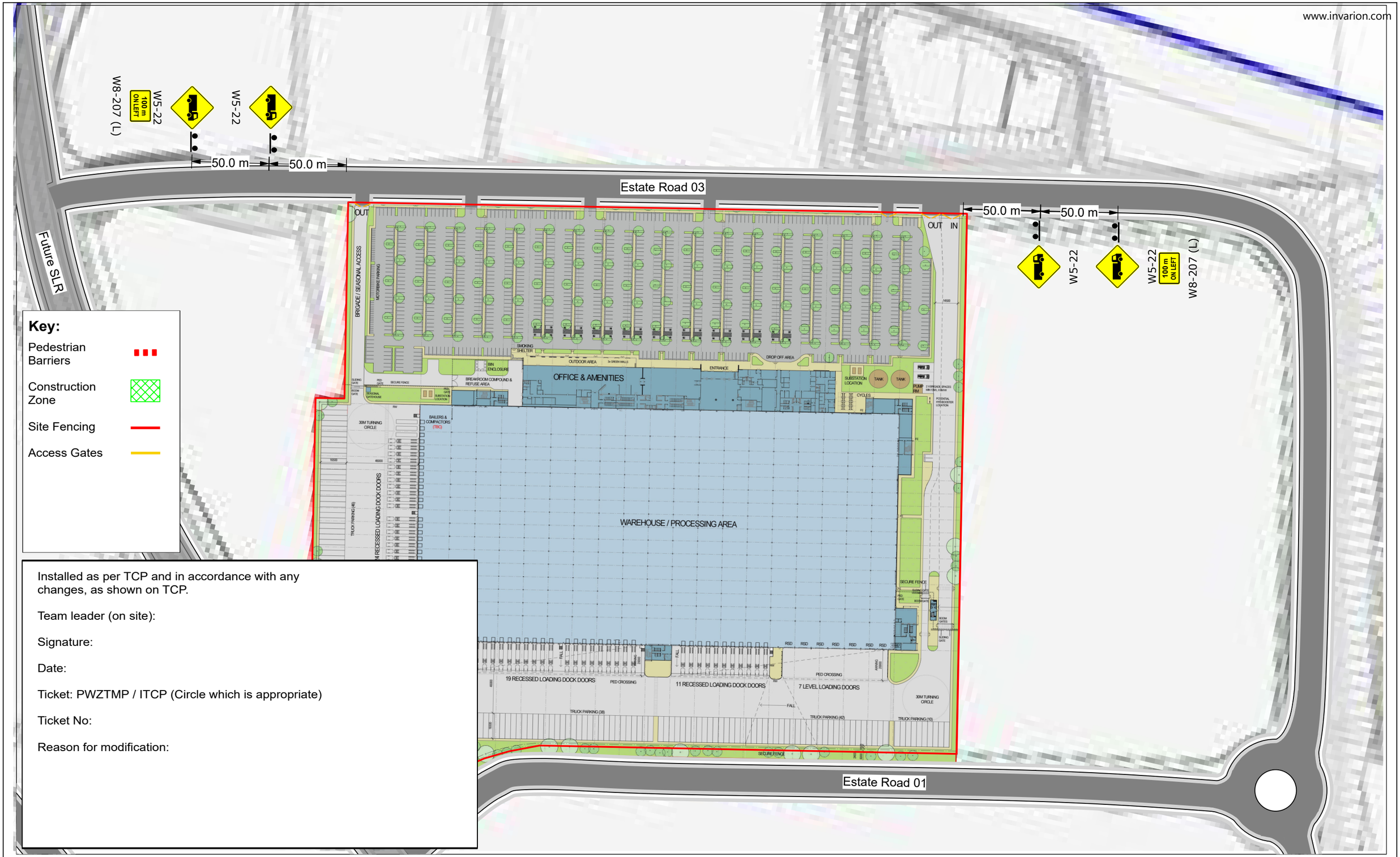

Key:

- Pedestrian Barriers
- Construction Zone
- Site Fencing
- Access Gates

Installed as per TCP and in accordance with any changes, as shown on TCP.

Team leader (on site):

Signature:

Date:

Ticket: PWZTMP / ITCP (Circle which is appropriate)

Ticket No:

Reason for modification:

NOTES

- All vehicles to have flashing orange lights
- Ensure signs are visible to vehicles
- Cover vehicle required for hard protection while TC's or workers are exposed to live traffic
- All staff to have reflective safety vests
- All signs to be Class 1 retro-reflective
- Maintain daily logs of ALL activities
- This PVMP is drawn in accordance with AS1742.3, the RTA's TCWS Manual & WHS Manual
- All staff to have reflective safety vests
- All trucks are to have prior notice of UHF channel to radio Foreman on arrival

Closure: TCP

Client: Goodman Property

Project: Job No: 1086
Address: Project Waratah, Kemps Creek

Drawing Title: 1086-TCP-01-Project Waratah_Kemps Creek

Date: 05/02/2020

Scale @ A3:

Drawing Number: AG.01

asongroup

DESIGNER: JAMES LAIDLER
CERT: 0034322012

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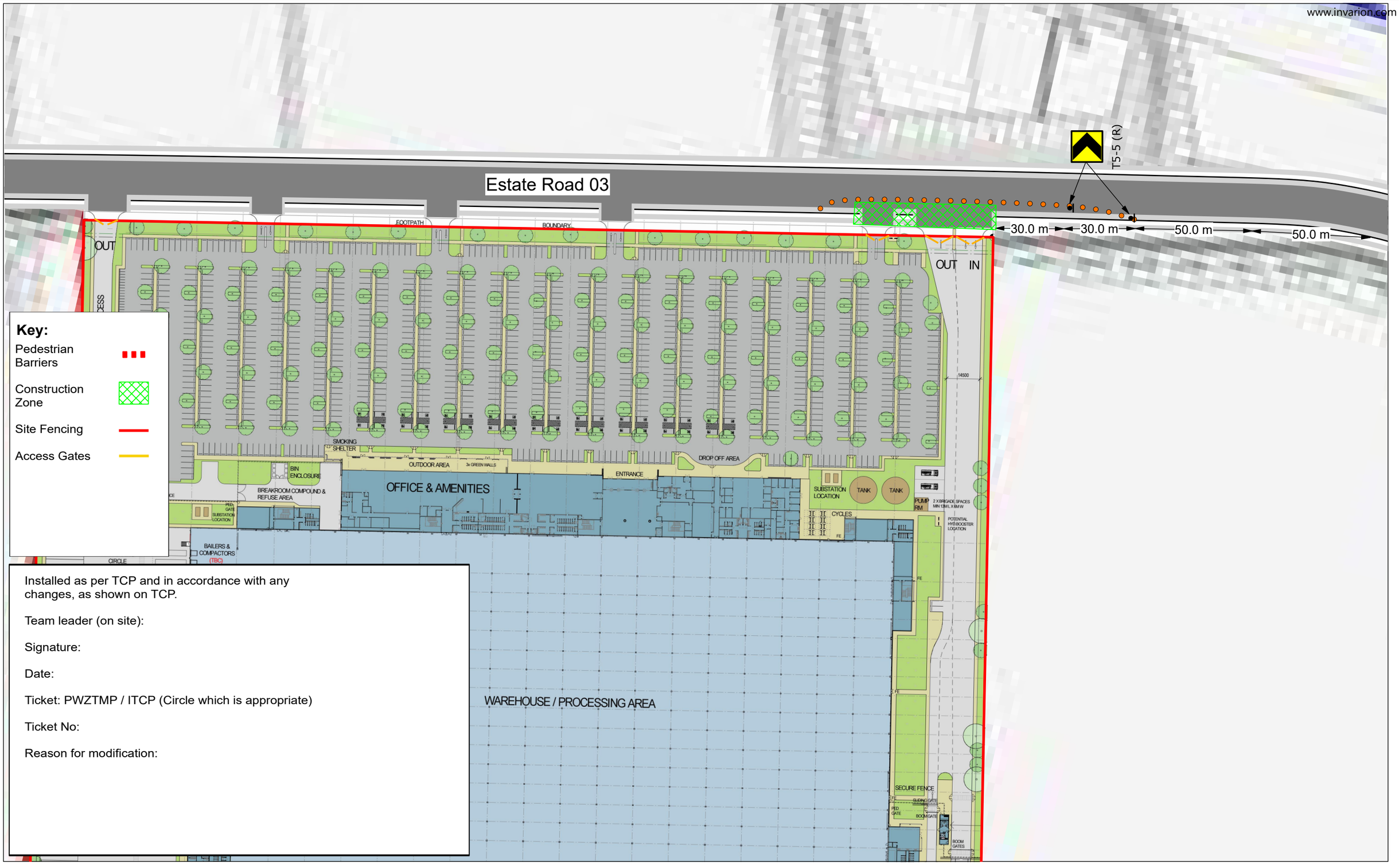

Installed as per TCP and in accordance with any changes, as shown on TCP.

Team leader (on site):

Signature:

Date:

Ticket: PWZTMP / ITCP (Circle which is appropriate)

Ticket No:

Reason for modification:

NOTES
- All vehicles to have flashing orange lights
- Ensure signs are visible to vehicles
- Cover vehicle required for hard protection while TC's or workers are exposed to live traffic
- All staff to have reflective safety vests
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- Maintain daily logs of ALL activities
- This PVMP is drawn in accordance with AS1742.3, the RTA's TCWS Manual & WHS Manual
- All staff to have reflective safety vests
- All trucks are to have prior notice of UHF channel to radio Foreman on arrival

Closure: TCP

Client: Goodman Property

Project: Job No: 1086
Address: Project Waratah, Kemps Creek

Drawing Title: 1086-TCP-02-Project Waratah_Kemps Creek

Date: 05/02/2020

Scale @ A3:

Drawing Number: AG.02

asongroup

DESIGNER: JAMES LAIDLER
CERT: 0034322012

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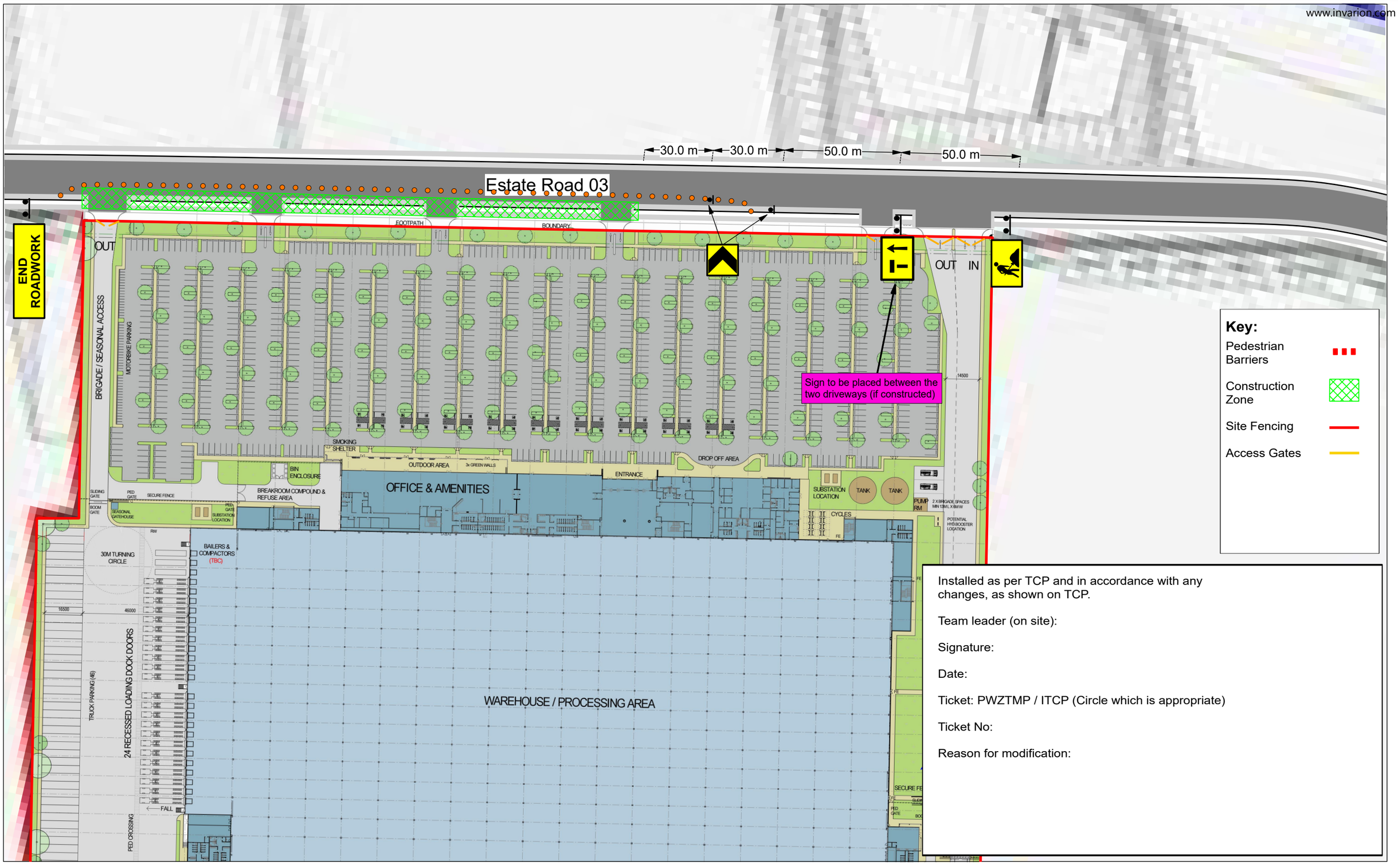

Installed as per TCP and in accordance with any changes, as shown on TCP.

Team leader (on site):

Signature:

Date:

Ticket: PWZTMP / ITCP (Circle which is appropriate)

Ticket No:

Reason for modification:

NOTES

- All vehicles to have flashing orange lights
- Ensure signs are visible to vehicles
- Cover vehicle required for hard protection while TC's or workers are exposed to live traffic
- All staff to have reflective safety vests
- All signs to be Class 1 retro-reflective
- Maintain daily logs of ALL activities
- This PVMP is drawn in accordance with AS1742.3, the RTA's TCWS Manual & WHS Manual
- All staff to have reflective safety vests
- All trucks are to have prior notice of UHF channel to radio Foreman on arrival

Closure: TCP

Client: Goodman Property

Project: Job No: 1086
Address: Project Waratah, Kemps Creek

Drawing Title: 1086-TCP-03-Project Waratah_Kemps Creek

Date: 05/02/2020

Scale @ A3:

Drawing Number: AG.03

asongroup

DESIGNER: JAMES LAIDLER
CERT: 0034322012

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Annexure E

ATTENDEES	Robert Nastasi, Michael Pruscino, Stephanie Partridge, Kym Dracopoulos, Kate McKinnon
APOLOGIES	Nil
MINUTES TAKER	Kate McKinnon

SPEAKER	DISCUSSION
Stephanie Partridge	Meeting's purpose is to provide a progress update and details of future approvals under assessment
Robert Nastasi	School has been experiencing silt flows over pathways and blocking drains, exceeding the off run they would expect from onsite works (Robert acknowledged that there had been significant rainfall which likely contributed to this). Creek line was cleared to the culvert last year. Robert is concerned rectification works undertaken to date are insufficient, inspection of the site required to demonstrate.
Kym Dracopoulos	Prior to works commencing on the Oakdale West site, Goodman's consultant prepared a report on the condition of the creek which identified existing choke points to water flow either side of the culvert within the school. The choked flow was due to existing silt and significant weed infestation.
Stephanie Partridge	Modification 1 involves - Level changes – revised to only involve change to pad 2A - When viewed through the biodiversity area along western boundary – views are not significantly further impacted
Michael Pruscino	The increased pad height is of concern from the Emmaus Village point of view regarding noise
Stephanie Partridge	Acoustic modelling undertaken to support the modification revealed the change in pad height will have a negligible impact on noise at the Village and School Modification 2 involves changes to layout and design in stage 1 Modification 3 involves changes to design and layout of stage 2 New development application lodged for large 4 level facility within stage 2B. Construction program for new facility includes earthworks until June 2020 then building construction from July 2020 to September 2021. Construction hours for the new project are 3am -10pm Monday to Sunday. Works outside of normal construction hours are mainly internal works, including concrete pours. In order to complete the accelerated construction program for the new building and given the large size and quantities of steel and concrete required, Goodman approached DPIE to request use of Aldington Road via Abbotts Road during peak school times (restricted under current approval). This was not supported by the RMS (TfNSW) with Bakers Lane proposed due to the traffic light controlled intersection. Use of Bakers lane will be temporary only – construction of WNSLR is expected to be complete in October 2020 (subject to wet weather), with vehicles then accessing the site from the north via the WNSLR. Worst case forecasting (peak school periods at the peak of construction) identified 25 inward and 25 outward truck movements in a 1.5 hour period (during school drop off/pick up times). Mainly in the AM.

SPEAKER	DISCUSSION
	A range of traffic control/management measures and tools are being considered to assist in the management of school/construction traffic interactions.
Kym Dracopoulos	Measures currently being considered include: - VMS (Variable Message Sign) boards - Additional static signage - Traffic control personnel A traffic management plan is being prepared and will be provided to all affected schools for review and comment
Robert Nastasi	Interactions between kids and traffic is the School's primary concern. The School is accessed using vehicles only – 90% of students arrive via bus (Busway are the bus contractors) with the remaining arriving by private vehicle. The School will need to notify the parents of students with the potential for a backlash to the proposal. A summarised fact sheet drawing details from the traffic management plan should be provided for distribution to the parent community. Busway will need to be notified.
Stephanie Partridge	Goodman will provide: - Traffic Management Plan for review - Summary fact sheet for distribution - Copy of RMS (TfNSW) request
Robert Nastasi	Dust – how is it monitored and dealt with?
Kym Dracopoulos	4 sets of trailer mounted dust monitors which include weather station, dust monitor with some including acoustic recorders Monitoring is provided in real time and instantly notifies of elevated dust levels Elevated dust levels are compared to other local BOM weather stations to determine if dust is site sourced or the result of broader environmental conditions in the region (eg dust storms recently experienced) Where dust is site sourced Goodman have 4x water carts to deploy. These carts are also continuously circulating and operating during works. Water is sourced mainly from dams (not potable water supply) The noise mound constructed along the boundary with the School has been installed for both dust containment and sound suppression When wind is detected blowing from the East (toward the School) works are stopped and monitored to avoid dust issues
Meeting moved to inspect drainage creek located on the northern portion of the School. The meeting participants inspected the creek and surrounds. Goodman advised they will facilitate removal of the central mound of silt approximately 300mm high located just upstream of the culvert. Goodman noted it was apparent that the school had not employed sediment and erosion controls and had contributed to the sediment in the creek.	
Meeting Closed 9:45am	

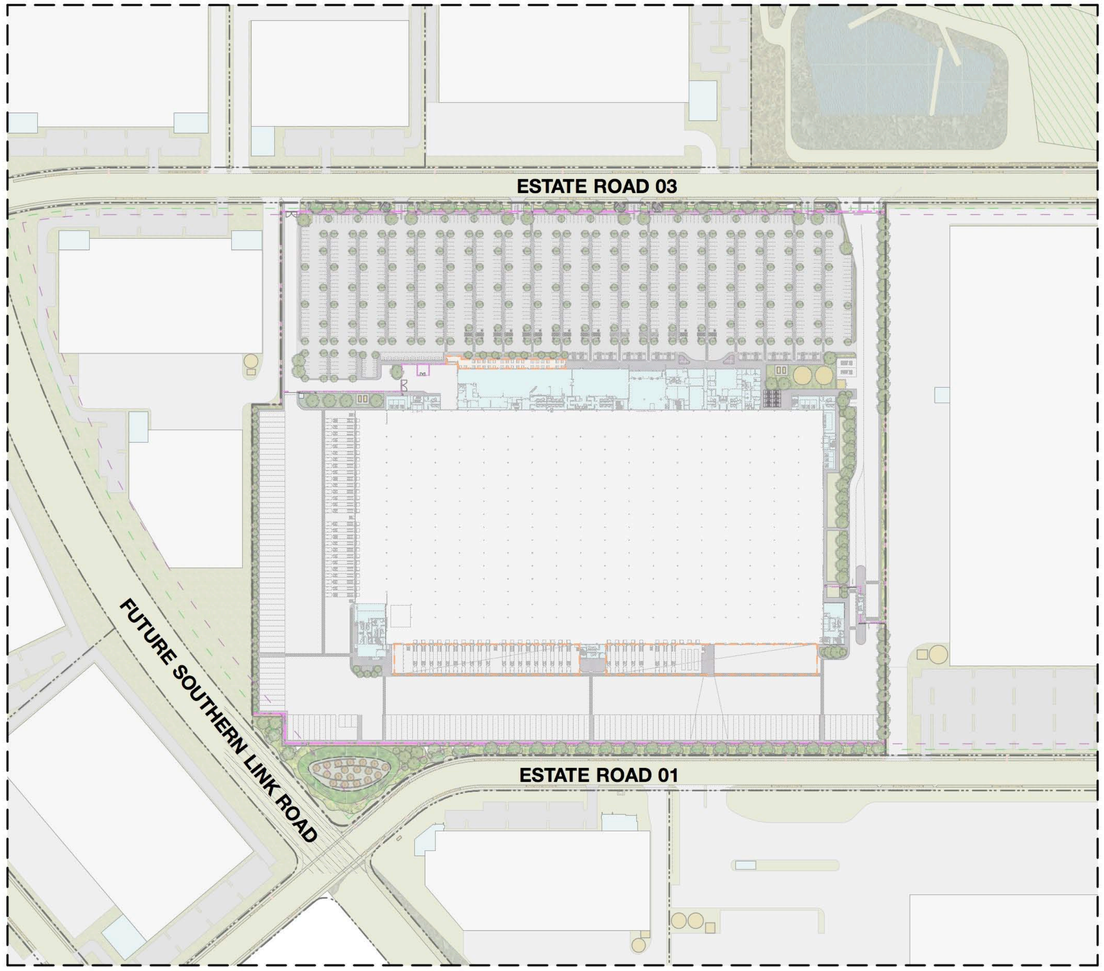
ATTENDEES	Cathy Hey, Cathie Graydon, Mick Morgan, Stephanie Partridge, Kym Dracopoulos, Kate McKinnon
APOLOGIES	Nil
MINUTES TAKER	Kate McKinnon

SPEAKER	DISCUSSION
Stephanie Partridge	Introduced herself and her role with Goodman and the Oakdale West Estate (OWE) Project. Introduced Kym Dracopoulos (Technical contact for the project) and Kate McKinnon (Community Liaison Officer) Outlined currently approved DA for bulk earthworks and Stage 1. Modification 1 (MOD 1) – Revision to Stage 2A pad height
Kym Dracopoulos	There have been some changes to the biodiversity strategy. The removal of trees and habitat requires offsetting – this has been done through a combination of on-site habitat rehabilitation/creation and contributions to the Biodiversity Conservation Trust (BCT). All fauna located during initial clearing has been relocated to biodiversity conservation areas, including turtles, eels and microbats. Kangaroo populations have migrated to the biodiversity conservation area located within the Oakdale South Site. Removal of plant biodiversity has required offsetting by the purchase of credits through various sources including the Biodiversity Conservation Trust.
Cathie Graydon	Snakes have been sighted within the School.
Kym Dracopoulos	Snake fence along western boundary was installed prior to works commencing. Specific habitat for snakes (log piles/rockeries) has been created in appropriate locations to accommodate snake populations
Stephanie Partridge	Modification 2 (MOD 2) relates to Precinct 1 and largely Lot 1A. A 70,000m2 distribution centre is proposed. It will be an automated facility. The site will employ 500 people and operate 24/7. Main modifications involve building height (36m high at highest point, residual building 28m high) and alteration to the road location.
Cathy Hey	How will the new development be accessed?
Stephanie Partridge	A requirement of the approval for the OWE is that no operational traffic shall access the site via Bakers Lane, operations cannot commence until the Western North South Link Road (WNSLR) is open. The opening of the WNSLR is currently targeted for October 2020 subject to wet weather.
Cathy Hey Cathie Graydon	Both noted that traffic related to school activities (pick up and drop off primarily) is currently a significant issue on Bakers Lane.
Stephanie Partridge	New SSDA is currently with DPIE for the construction of a large warehouse and distribution facility on Lot 2B. The facility will be four levels in height, with automated/robotic technology for managing stock. Earthworks are currently being expedited for the 2B pad to facilitate commencement of the project once approval is issued.

SPEAKER	DISCUSSION
	The construction of the project will require the use of large quantities of steel and concrete within a short timeframe. In anticipation of this Goodman requested the use of Aldington Road for construction traffic. TfNSW rejected this request due to the inadequate intersection with Abbots Road at Mamre Rd. TfNSW have advised Bakers Lane is the only road appropriate given its signalised intersection with Mamre Road. Goodman have commenced investigations into projected traffic implications associated with using Bakers Lane during school pick up and drop off times. The investigations identified the worst-case road use would comprise 25 in/25 out traffic movements (50 movements between 8am and 9.30am), during the morning peak. The afternoon peak would be significantly less. Concrete pours would commence internally at 3am – noise is not considered an issue given these works will be internal only during the morning hours (3am-7am).
Cathie Graydon Cathy Hey Mick Morgan	All advised they have concerns relating to the interaction of construction traffic and the existing traffic issues experienced with buses and school parents' vehicles. First bus drop offs occur at 7:50am with the highest level of morning traffic experienced between 8:00am – 8:30am. MM: noted that traffic currently backs up over the crest of the hill on the west of Bakers Lane. CH: traffic issues currently have a significant impact on students and their families and has created issues with timely attendance. CG &CH: complaints have been received from a parent regarding existing traffic issues with these complaints previously forwarded to NSW Police, Penrith City Council (PCC) and Andrew Constance. PCC investigated and found the schools current measures to control traffic in and out (both car and bus) are sufficient and advised the Schools cannot implement traffic measures over the public roads. The schools are concerned this situation may worsen. CH: Complaints have been received regarding mud on Bakers Lane KD: This is unexpected as the contractors have been diligent with street sweepers and liaising with Penrith Council who have not raised this as an issue. CG: Could Aldington Road be utilised for in or out traffic to relieve the pressure on Bakers Lane?
Kym Dracopoulos	This approach has been presented to the TfNSW but was also rejected.
Cathie Graydon	Could traffic control be provided at the three access points to the schools? (2x Mamre 1x Trinity/Emmaus) Could these personnel utilise radio contact to control the flows of traffic and create a safer traffic situation for the Schools and truck drivers? An integrated approach would be required.
Kym Dracopoulos Stephanie Partridge	A Traffic Management Plan is being developed to address this issue. Mitigation measures are being considered, including Variable Message Boards (VMS) and traffic control personnel. These measures will be temporary only (until WNSLR is open- expected December 2020 incl weather allowance) A copy of the TMP will be forwarded to all Schools for review/comment and an information sheet will be provided for provision to parents/carers on the proposed traffic management measures.
Meeting Closed	
KD/SP	Post meeting inspection of Bakers Lane: • identified discolouration of the asphalt pavement adjacent the entry and exit to the site. • Pavement discolouration and silt was identified on the entry/exit to Little Smarties on Bakers Lane as they use an unsealed carpark.

Annexure F

KEY MAP



scape DESIGN

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PROJECT

Oakdale West Estate, Stage 2 Development Application

Oakdale West, NSW

Cover Sheet

PHASE

Development Application
Landscape Drawing Set

CLIENT

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TRANSMITTAL

Dwg. Number	Dwg. Name	Revision	Date
L.SK.00	Cover Sheet	J	2/3/20
L.SK.01	Landscape Sketch Plan	G	25/2/20
L.SK.02	Planting Plan	G	25/2/20
L.SK.03	Planting Schedule	G	26/2/20
L.SK.04	Character & Materials	I	2/3/20
L.SK.105	Landscape - Detailed Plan & Notes	H	2/3/20
L.SK.200	Carpark Details	H	2/3/20
L.SK.201	Landscape - Typical Street Sections	G	25/2/20

SSD 10397 - Stage 2 Development Application

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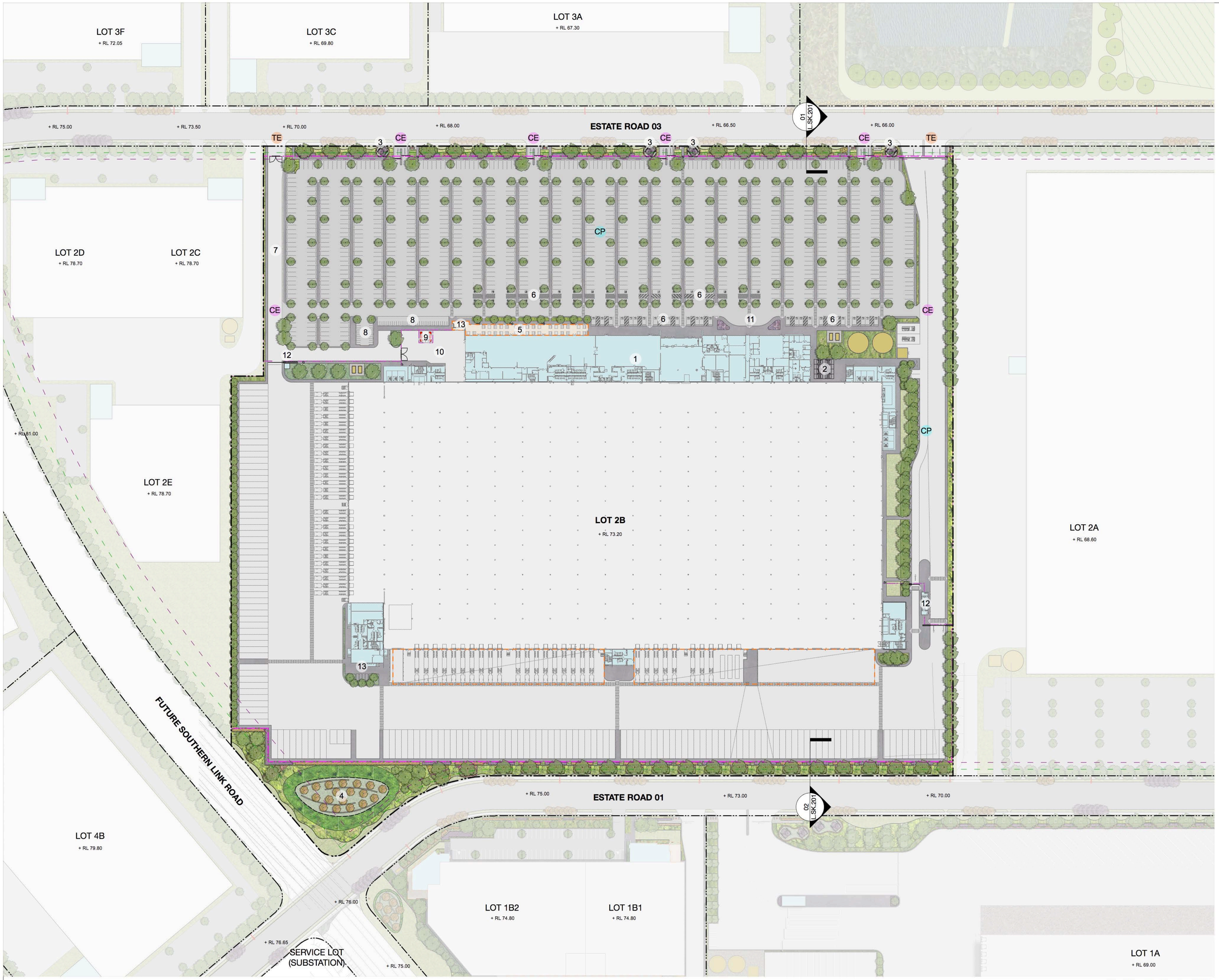

Note: All finished levels subject to change +/- 1000mm.

LEGEND

PROGRAMME

1 Office
2 Bike Racks
3 Entry Marker
4 Site Marker
5 Staff Rest Area
6 Accessible Parking
7 Brigade/seasonal Access
8 Motorbike Parking
9 Bins
10 Breakroom Compound & Refuse Area
11 Drop off Area
12 Gatehouse
13 Smoking Shelter
CE Car entry/exit
CP Carparking
TE Truck entry/exit

GENERAL

Site Boundary
Lot Boundary
+ FFL 562.00 Finished Floor Level
+ RL 562.00 Reduced Level
Fence
Building Setback
Landscape Setback
Proposed Ramp

PREPERATION & GROUNDWORKS

Proposed Stairs
Building
Amenities Lot
Services

WALLS & EDGES

Steel Edge
Flush Concrete Kerb
Raised Concrete Kerb
Freestanding Gabion Wall
Freestanding Insitu Wall
Freestanding Precast Wall
Retaining Gabion Wall
Retaining Insitu Wall
Retaining Precast Wall
Steel Wall

PAVEMENTS

Temporary Recycled Aggregate
Coarse Aggregate
Asphaltic Concrete
Insitu Concrete
Precast Concrete
Stone Tiles
Feature paving
Pram Ramp

FURNITURE & FITTINGS

Proposed Table Setting
Proposed Bollards
Proposed Street Lighting
Proposed Sleeper Mullion
Proposed Sandstone Block
Gate
Signage
Proposed Seating
Proposed Pergola

PLANTING

TF1-General Turf
TF2-Feature Turf
PM1A-Car park edge mix-sun
PM1B-Car park edge mix-shade
PM2A-Car park island mix-sun
PM2B-Car park island mix-shade
PM3A-Site edge mix - sun
PM3B-Site edge mix - shade
PM4-Site markers mix
PM5A-Feature planting mix-sun
PM6A-Site hedge mix-sun
PM7A-Groundcover mix A
PM7B-groundcover mix B
Existing Vegetation

TREES

Existing Tree to be Removed Refer ARBORISTS REPORT
Existing Tree to be Transplanted/ original location
Existing Tree to be Transplanted/ new location
Existing Tree to be Retained
Proposed Tree - General
Proposed Tree - Entry Marker
Proposed Tree - Site Marker

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SSD 10397
Stage 2 DA

PROJECT
Oakdale West Estate, Stage 2
Oakdale West, NSW

CLIENT
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revision	revision description	by	date
G	DEVELOPMENT APPLICATION	MF	25/2/20
F	DEVELOPMENT APPLICATION	MF	18/2/20
E	DEVELOPMENT APPLICATION	ZZ	13/1/20
D	FOR APPROVAL	MF	12/12/19
C	CLIENT REVIEW	MF	29/11/19

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Landscape Sketch Plan

scale	1:1000@A1
drawn	MF/ZZ
checked	CH
project no.	163-18
project phase	Development Application

L.SK.01 G

LOT 3F

LOT 3C

LOT 3A

4-Corymbia maculata

10-Tristaniopsis laurina 'Luscious'

6-Melaleuca linariifolia

3-Lagerstroemia indica 'Tuscarora'

ESTATE ROAD 03

24-Melaleuca linariifolia

6-Lagerstroemia indica 'Tuscarora'

21-Corymbia maculata

3-Lagerstroemia indica 'Tuscarora'

36-Eucalyptus amplifolia

LOT 2D

LOT 2C

92-Angophora floribunda

37-Eucalyptus amplifolia

10-Cupaniopsis anacardioides

7-Corymbia maculata

2-Pyrus calleryana 'Capital'

16-Eucalyptus moluccana

2-Angophora bakeri

8-Pyrus calleryana 'Capital'

3-Corymbia maculata

2-Angophora bakeri

LOT 2E

LOT 2B

LOT 2A

40-Elaeocarpus eumundii

13-Angophora bakeri

15-Corymbia maculata

2-Angophora bakeri

2-Tristaniopsis laurina 'Luscious'

5-Pyrus calleryana 'Capital'

2-Corymbia maculata

4-Corymbia eximia

3-Eucalyptus crebra

9-Eucalyptus moluccana

FUTURE SOUTHERN LINK ROAD

3-Corymbia eximia

4-Eucalyptus crebra

2-Corymbia eximia

21-Eucalyptus crebra

37-Corymbia eximia

ESTATE ROAD 01

LOT 4B

18-Lagerstroemia indica 'Tuscarora'

LOT 1B2

LOT 1B1

SERVICE LOT (SUBSTATION)

LOT 1A

0 10 20 30 40 50 M

Note: All finished levels subject to change +/- 1000mm.

LEGEND

PLANTING

- TF1-General Turf
- TF2-Feature Turf
- PM1A-Car park edge mix-sun
- PM1B-Car park edge mix-shade
- PM2A-Car park island mix-sun
- PM3A-Site edge mix low - sun
- PM4-Site markers mix
- PM5A-Feature planting mix
- PM6A-Site hedge mix - sun
- PM7A-Groundcover mix A
- PM7B-Groundcover mix B
- Proposed tree/specimen plant

scape DESIGN

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SSD 10397
Stage 2 DA

PROJECT

Oakdale West Estate, Stage 2

Oakdale West, NSW

CLIENT

Goodman Property Services

revision	revision description	by	date
G	DEVELOPMENT APPLICATION	MF	25/2/20
F	DEVELOPMENT APPLICATION	MF	18/2/20
E	DEVELOPMENT APPLICATION	ZZ	14/1/20
D	FOR APPROVAL	MF	12/12/19
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Planting Plan

scale	1:1000@A1
drawn	MF/ZZ
checked	CH
project no.	163-18
project phase	Development Application

L.SK.02 G

PLANTING SCHEDULE

	Botanical Name	Common Name	Height (m)	Spread (m)	Pot Size	Rate (m2)	
Trees							
	Angophora bakeri	Narrow-leaved Apple	12.0	6.0	75L	As Shown	
	Angophora floribunda	Rough-barked Apple	20.0	10.0	100L	As Shown	
	Corymbia eximia	Yellow Bloodwood	12.0	8.0	75L	As Shown	
	Corymbia maculata	Spotted Gum	30.0	10.0	75L	As Shown	
	Cupaniopsis anacardioides	Tuckeroo	12.0	6.0	75L	As Shown	
	Elaeocarpus eumundii	Eumundi Quandong	10.0	4.0	75L	As Shown	
	Eucalyptus amplifolia	Cabbage Gum	25.0	8.0	75L	As Shown	
	Eucalyptus crebra	Narrow leaved Ironbark	30.0	10.0	75L	As Shown	
	Eucalyptus moluccana	Grey Box	25.0	10.0	75L	As Shown	
	Lagerstroemia indica 'Tuscarora'	Tuscarora Crepe Myrtle	6.0	4.5	200L	As Shown	
	Melaleuca linariifolia	Snow-in-Summer	8.0	4.0	75L	As Shown	
	Pyrus calleryana 'Capital'	Capital Flowering Pear	10.0	3.0	200L	As Shown	
	Tristaniopsis laurina 'Luscious'	Water Gum	12.0	5.0	75L	As Shown	
PM1A - Car Park Edge Mix - Sun						Area =	3879 sq.m
	Callistemon viminalis 'Little John'	Little John Bottlebrush	0.6	0.8	140mm	2	
	Pennisetum alopecuroides 'Nafray'	Pennisetum Nafray	0.5	0.5	140mm	1	
	Trachelospermum jasminoides	Star Jasmine	0.9	0.3	140mm	2	
PM1B - Car Park Edge Mix - Shade						Area =	593 sq.m
	Hibbertia scandens	Climbing Guinea-Flower	2.0	2.0	140mm	2	
	Pennisetum alopecuroides 'Nafray'	Pennisetum Nafray	0.5	0.5	140mm	1	
	Viola hederacea	Native Violet	0.1	0.2	140mm	2	
PM2A - Car Park Island Mix - Sun						Area =	720 sq.m
	Carex appressa	Tall Sedge	0.7	0.5	140mm	2	
	Gazania tomentosa	Silver Gazania	0.3	1.5	140mm	2	
	Lomandra longifolia	Spiny-headed Mat-Rush	0.8	1.0	140mm	1	
	Pennisetum alopecuroides 'Nafray'	Pennisetum Nafray	0.5	0.5	140mm	1	
PM3A - Site Edge Mix Low - Sun						Area =	2983 sq.m
	Callistemon 'White Anzac'	Bottlebrush	1.0	2.0	140mm	1	
	Gazania tomentosa	Silver Gazania	0.3	1.5	140mm	2	
	Pennisetum alopecuroides 'Nafray'	Pennisetum Nafray	0.5	0.5	140mm	1	
PM4 - Site Markers Mix						Area =	964 sq.m
	Nandina domestica 'Gulf Stream'	Dwarf Sacred Bamboo	0.8	0.8	140mm	2	
	Pennisetum alopecuroides 'Nafray'	Pennisetum Nafray	0.5	0.5	140mm	1	
PM5A - Feature Planting Mix						Area =	470 sq.m
	Doryanthes excelsa	Gymea Lily	2.0	1.5	200mm	2	
	Lorapetalum chinense rubrum 'China Pink'	Chinese Fringe Flower	1.5	1.5	200mm	2	
	Photinia x fraseri 'Red Robin'	Red Robin	3.0	2.0	200mm	1	
PM6A - Site Hedge Mix - Sun						Area =	488 sq.m
	Acmena smithii 'Hot Flush'	Lilly Pilly	4.0	2.0	300mm	1	
	Metrosideros thomasii	New Zealand Christmas Bush	4.0	4.0	300mm	1	
	Rhaphiolepis indica 'Oriental Pearl'	Oriental Pearl Indian Hawthorn	1.0	1.0	300mm	2	
	Rhaphiolepis indica 'Snow Maiden'	Snow Maiden Indian Hawthorn	0.5	1.0	300mm	2	
PM7A - Groundcovers Mix A						Area =	773 sq.m
	Gazania tomentosa	Silver Gazania	0.3	1.5	140mm	2	
PM7B - Groundcovers Mix B						Area =	673 sq.m
	Trachelospermum jasminoides 'tricolor'	Tricolor Star Jasmine	0.5	1.0	140mm	2	
TF1 - General Turf						Area =	2309 sq.m
	Stenotaphrum secundatum 'Sir Walter'	Sir Walter Buffalo			Turf Roll		
TF2 - Feature Turf (Planted)						Area =	996 sq.m
	Zoysia tenuifolia	No-Mow Grass/Velvet Grass			200mm		

NOTE:
1. Mass planting to be undertaken in large groupings of the same species to approval of landscape architect.
2. Hedging species are to be set out in linear arrangements of same speceies to approval of landscape architect.
3. All planting and turf areas to be irrigated with subsurface drip line.

PLANTING PALETTE

Trees

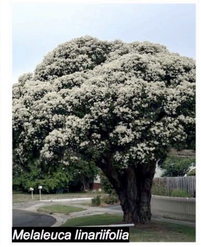

Angophora floribunda


Corymbia maculata

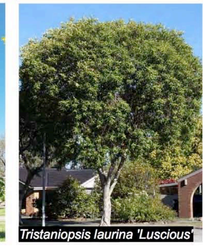

Elaeocarpus eumundii


Eucalyptus moluccana

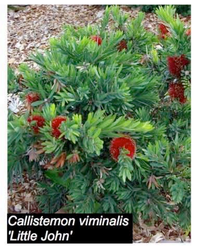

Lagerstroemia indica 'Tuscarora'


Melaleuca linariifolia


Pyrus calleryana 'Captial'


Tristaniopsis laurina 'Luscious'

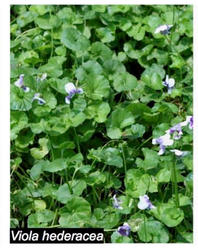
PM1A - Car Park Edge Mix - Sun


Callistemon viminalis 'Little John'

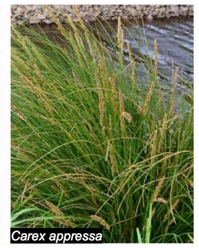

Pennisetum alopecuroides 'Nafray'

PM1B - Car Park Edge Mix - Shade


Hibbertia scandens

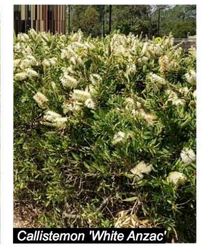

Viola hederacea

PM2A - Car Park Island Mix - Sun


Carex appressa


Lomandra longifolia

PM3A - Site Edge Mix Low - Sun


Callistemon 'White Anzac'

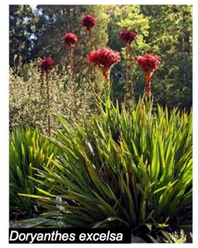

Gazania tomentosa

PM4-Site Markers Mix

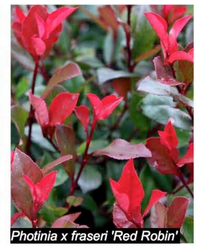

Nandina 'Gulf Stream'


Pennisetum alopecuroides 'Nafray'

PM5A - Feature Planting Mix


Doryanthes excelsa


Loropetalum rubrum chinense 'China Pink'


Photinia x fraseri 'Red Robin'

PM6A - Site Hedge Mix - Sun


Acmena smithii 'Hot Flush'

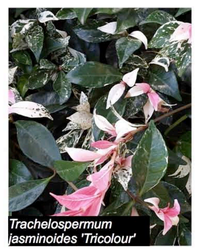

Metrosideros thomsanii


Rhaphiolepis indica 'Oriental Pearl'

PM7A - Groundcovers


Gazania tomentosa

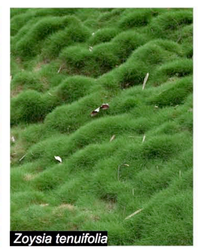
PM7B - Groundcovers


Trachelospermum jasminoides 'Tricolour'

TF1 - General Turf


Stenotaphrum secundatum 'Sir Walter'

TF2 - Feature Turf


Zoysia tenuifolia

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PROJECT
Oakdale West Estate, Stage 2
Oakdale West, NSW

CLIENT
Goodman Property Services

revision	revision description	by	date
G	DEVELOPMENT APPLICATION	MF	26/2/20
F	DEVELOPMENT APPLICATION	MF	18/2/20
E	DEVELOPMENT APPLICATION	ZZ	14/1/20
D	FOR APPROVAL	MF	12/12/19
C	CLIENT REVIEW	MF	29/11/19

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Planting Schedule

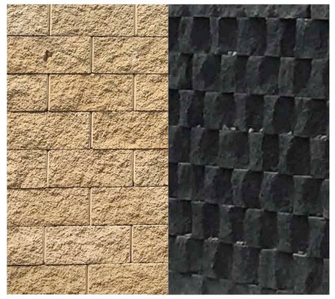
scale	NTS
drawn	MF/ZZ
checked	CH
project no.	163-18
project phase	Development Application

L.SK.03 G

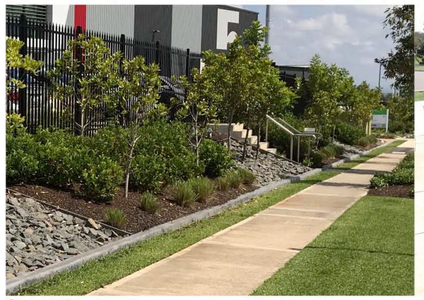
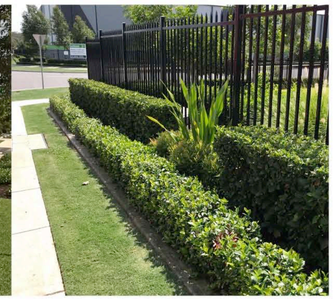
EXISTING SITE CHARACTER


Weathering steel


Mounding and grasses

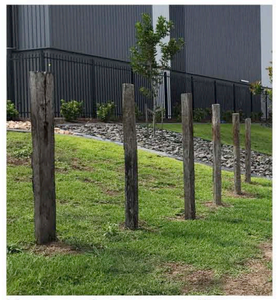

Textured walling


Verge landscape



Street frontage



Signage and detailed planting at vehicle entries/exits


Hardwood sleeper mullions

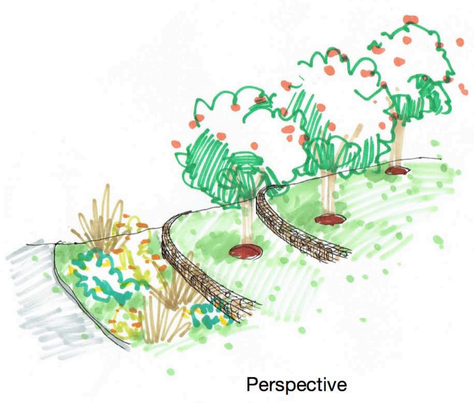
CARPARK CHARACTER


Feature sandstone blocks at pedestrian nodes and driveway intersections


Resin bonded aggregate for internal roads adjacent to buildings and car park islands in conjunction with low level planting


Stratacell soil structure system or similar facilitating positive tree growth

SITE MARKERS CONCEPT


Perspective

CAR PARK PLANTING CONCEPT



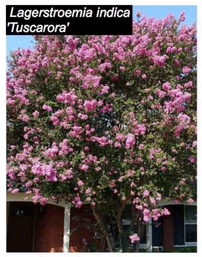
ENTRY MARKERS CONCEPT




Rigid gabion stone wall


1000mm wide tree pits with weathering steel edging


Mass planting bold texture and colour within native plant matrix

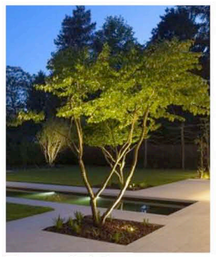


Feature trees



Green mounds


Weathering steel blades


Tree uplighting

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revision	revision description	by	date
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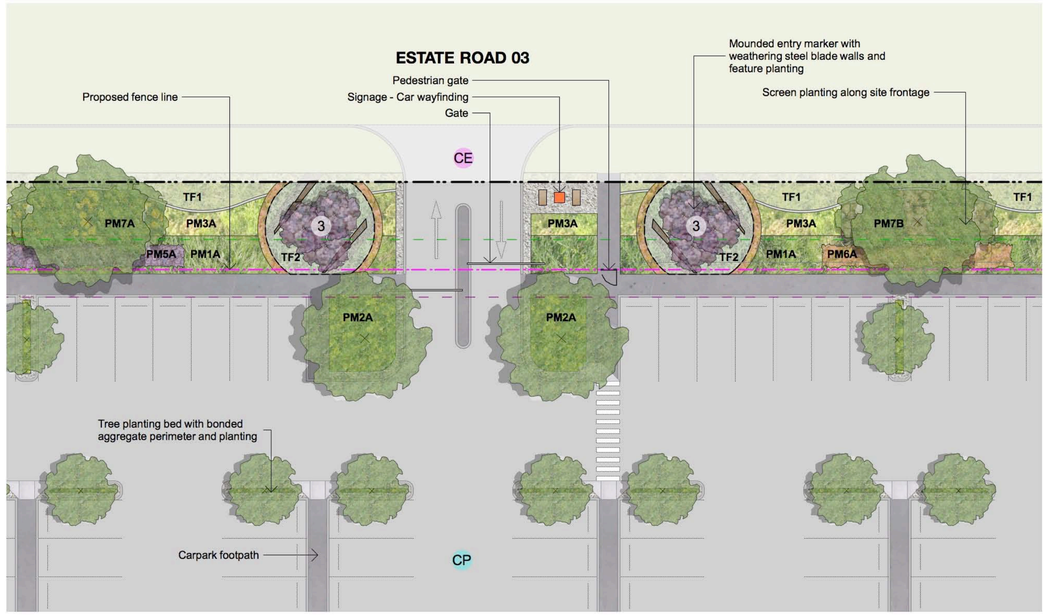
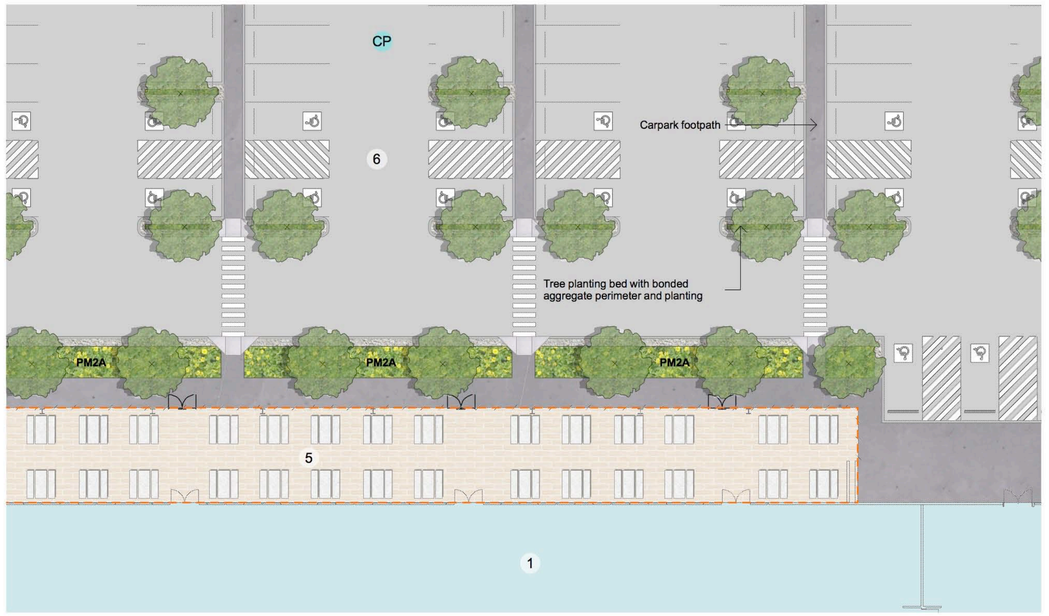
Character & Materials

scale	NTS
drawn	ZZ
checked	CH
project no.	163-18
project phase	Development Application

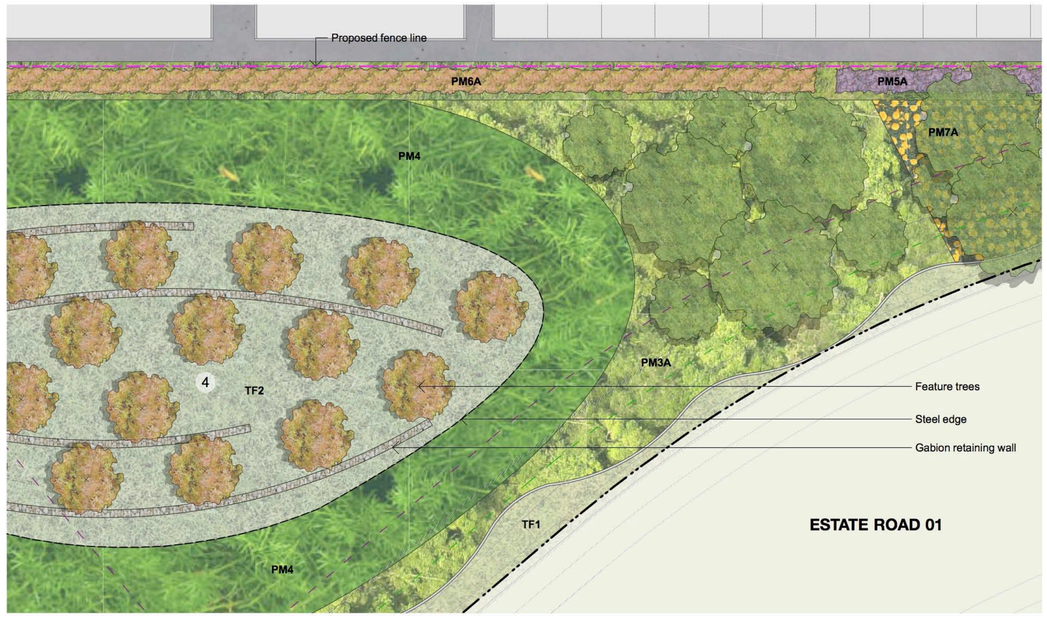
L.SK.04 I



01 Carpark - Entry Marker
Detail Plan - Scale 1:200 @ A1



02 Carpark - Staff Rest Area
Detail Plan - Scale 1:200 @ A1



03 East Corner - Site Marker
Detail Plan - Scale 1:200 @ A1

Note: All finished levels subject to change +/- 1000mm.

Landscape Design Statement - Stage 2 DA

The landscape design prepared for Oakdale West Estate – Stage 2, aims to expand on the proposed Stage 1 design in order to cement the first two stages of development, both Precinct 1 and part of Precinct 2, as the cornerstone developments of Oakdale West Estate, setting a high standard for future precinct developments to adopt. Stage 2 will encompass substantial planting of over 500 native and exotic trees to further ensure that the large expanses of built form, parking and utility spaces are visually screened by vegetation. Permeable surfaces of planting, low maintenance turf and gravel, will be maximised in order to reduce run-off. Plant typologies implemented are to be low maintenance and drought resistant, ensuring all new landscaped areas are water sensitive and tolerant of the harsh Western Sydney climate. With the utilisation of water sensitive elements in carparks such as stratacell soil strucutre systems or similar, as well as slotted kerbs that allow surface run-off into the tree island planters, the large amounts of carpark hardscape will be broken up with significant tree planting.

Prior to the construction of Stage 2, the vegetated bund along the western edge of the estate will be completed, in order to maximise the growth period and to mitigate visual impacts to the sensitive receivers to the West. As a result of existing native vegetation along the Southern edge being retained, visual amenity is also improved for sensitive receivers to the South. In addition, the generous landscape setbacks within Stage 2 will foster a clustered, yet dense approach to tree planting with native species, further providing visual screening to the immediate neighbours of the site, but also for users of internal roads and footpaths.

When combined with the proposed estate streetscape design, large, meaningful strips of canopy trees with mass planting of shrubs and groundcovers will form a dense vegetative screen for the development. Once within the site, tall feature trees help define the building edge and reinforce the main pedestrian entry points. Landscape verticality will also be provided through site marker mounds, and entry markers, used at precinct nodes and driveway entry points to establish a network of wayfinding features. These elements reference the cultural history of the site through their materiality and form.

Overall, the planting palette aspires to balance council environmental and planning requirements, while also staying consistent to the high-quality Goodman landscape identity that is reflected throughout each of their estates both in Oakdale and more broadly in Western Sydney. With Goodman taking ownership of the landscape maintenance and on-going care of all landscape areas within Oakdale West Estate, the health and function both during the establishment period and beyond, will be carefully monitored and driven towards a successful and robust outcome.

Planning Secretary's Environmental Assessment Requirements

Key Issues		Design Response
Visual	An assessment of the adequacy of the proposed landscaping for minimising the overall visual impacts of the development, which shows any landscaping over various periods of time	Substantial use of native canopy trees with dense shrubs and groundcover beneath implemented in landscape setbacks to provide visual screening to immediate neighbours, internal roads and pedestrians. Pot sizes in these areas are to be larger to provide instant presence and help provide this visual screening immediately.

0 2 4 6 8 10 M

LEGEND

PROGRAMME
1 Office
2 Bike Racks
3 Entry Marker
4 Site Marker
5 Staff Rest Area
6 Accessible Parking
7 Brigade/seasonal Access
8 Motorbike Parking
9 Bins
10 Breakroom Compound & Refuse Area
11 Drop off Area
12 Gatehouse
13 Smoking Shelter
CE Car entry/exit
CP Carparking
TE Truck entry/exit

GENERAL
Site Boundary
Lot Boundary
+ FFL 562.00 Finished Floor Level
+ RL 562.00 Reduced Level
Fence
Building Setback
Landscape Setback
Proposed Ramp

PREPERATION & GROUNDWORKS
Proposed Stairs
Building
Amenities Lot
Services

WALLS & EDGES
Steel Edge
Flush Concrete Kerb
Raised Concrete Kerb
Freestanding Gabion Wall
Freestanding Insitu Wall
Freestanding Precast Wall
Retaining Gabion Wall
Retaining Insitu Wall
Retaining Precast Wall
Steel Wall

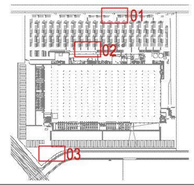
PAVEMENTS
Temporary Recycled Aggregate
Coarse Aggregate
Asphaltic Concrete
Insitu Concrete
Precast Concrete
Stone Tiles
Feature paving
Pram Ramp

FURNITURE & FITTINGS
Proposed Table Setting
Proposed Bollards
Proposed Street Lighting
Proposed Sleeper Mullion
Proposed Sandstone Block
Gate
Signage
Proposed Seating
Proposed Pergola

PLANTING
TF1-General Turf
TF2-Feature Turf
PM1A-Car park edge mix-sun
PM1B-Car park edge mix-shade
PM2A-Car park island mix-sun
PM2B-Car park island mix-shade
PM3A-Site edge mix - sun
PM3B-Site edge mix - shade
PM4-Site markers mix
PM5A-Feature planting mix-sun
PM6A-Site hedge mix-sun
PM7A-Groundcover mix A
PM7B-groundcover mix B
Existing Vegetation

TREES
Existing Tree to be Removed Refer ARBORISTS REPORT
Existing Tree to be Transplanted/ original location
Existing Tree to be Transplanted/ new location
Existing Tree to be Retained
Proposed Tree - General
Proposed Tree - Entry Marker
Proposed Tree - Site Marker

KEY PLAN



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E	FOR APPROVAL	MF	12/12/19
D	CLIENT REVIEW	MF	3/12/19

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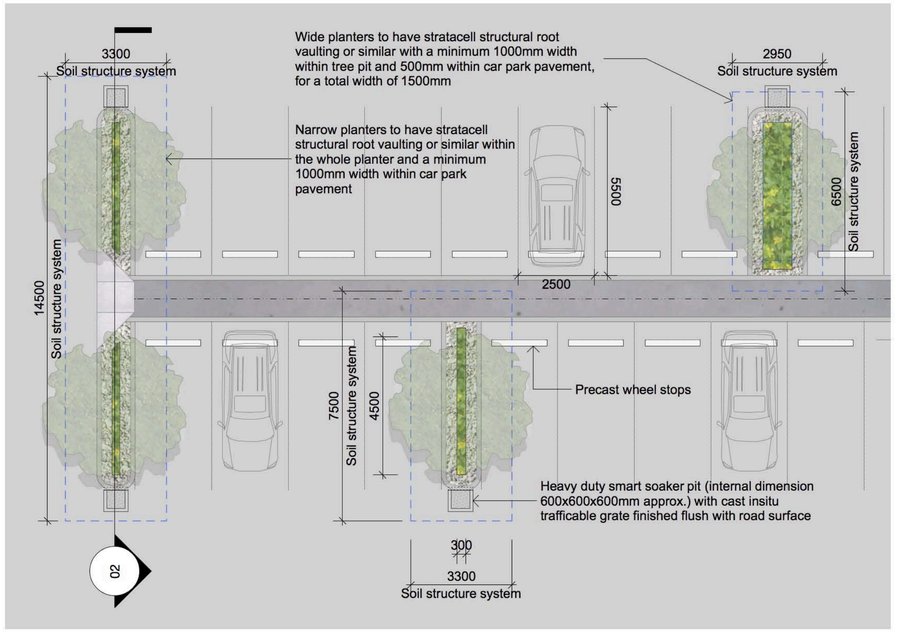
Landscape Detailed Plan & Notes

scale	1:200@A1
drawn	MF/ZZ
checked	CH
project no.	163-18
project phase	Development Application

L.SK.105 H

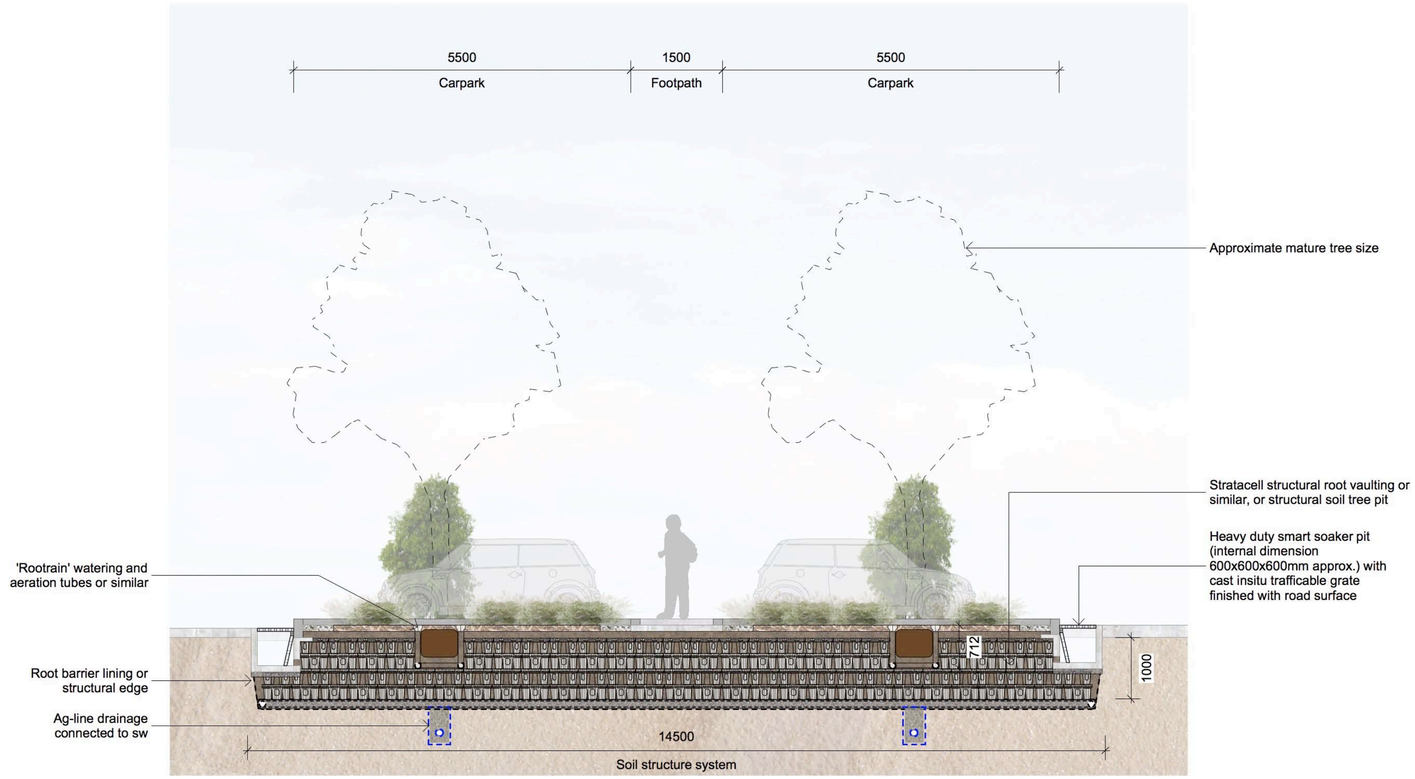


01 Carpark Tree Pit System
Detailed Plan - Scale 1:100 @ A1

0 1 2 3 4 5 M

MATERIALS SCHEDULE

Description		Volume
SOIL STRUCTURE SYSTEM - STRATA CELL OR SIMILAR		
Type 1 - Soil Structure System 2950x6500mm		566.2 m3
Paving-Soil Structure System Type 1	*566.2*	
Type 2 - Soil Structure System 3300x7500mm		1707.7 m3
Paving-Soil Structure System Type 2	*1707.7*	
Type 3 - Soil Structure System 3300x14500mm		1770.4 m3
Paving-Soil Strucutre System Type 3	*1770.4*	
Total Area		4044.4 m3



02 Carpark Tree Pit System
Detailed Section - Scale 1:50 @ A1

0 1 2 3 M

Note: All finished levels subject to change +/- 1000mm.

LEGEND

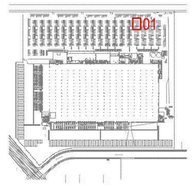
GENERAL
- Architecture Below

PAVEMENTS
- Concrete Insitu Vehicular

FURNITURE & FITTINGS
- Precast Wheel Stop

TREES
- Proposed Tree - General

KEY PLAN



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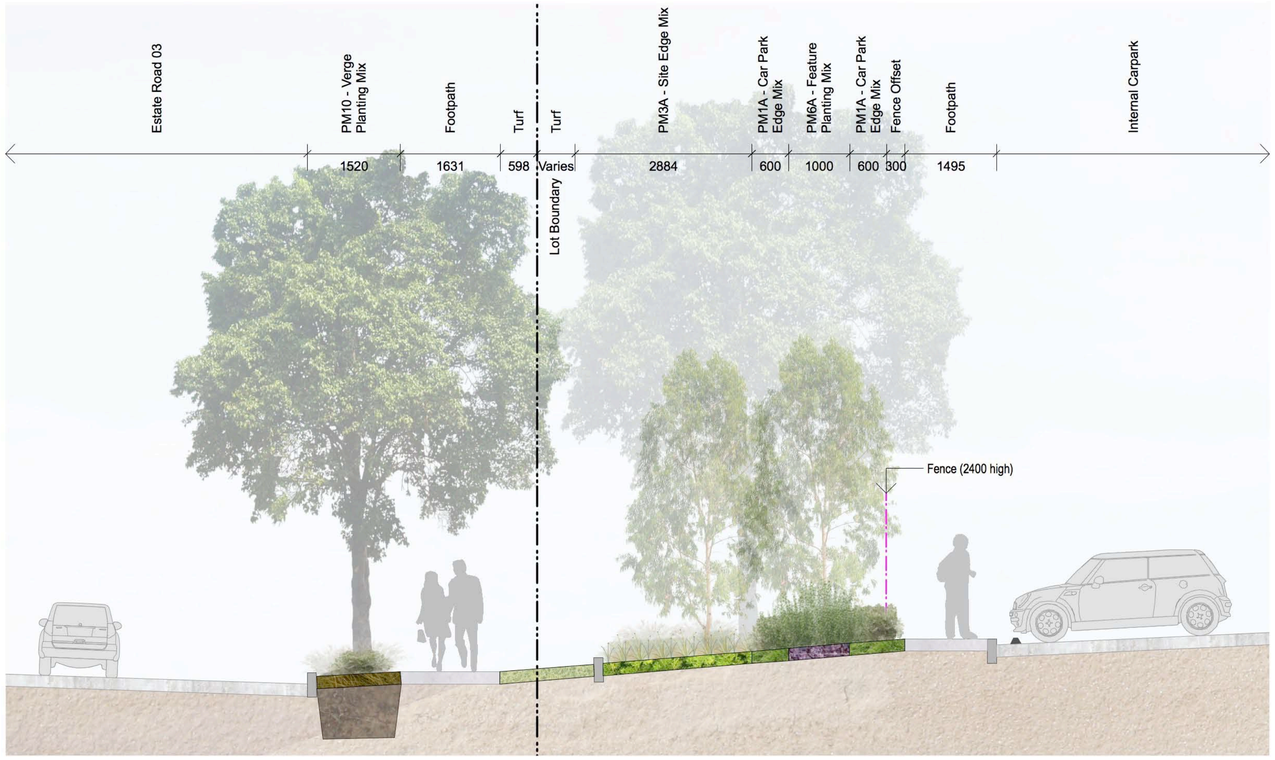
Carpark Details

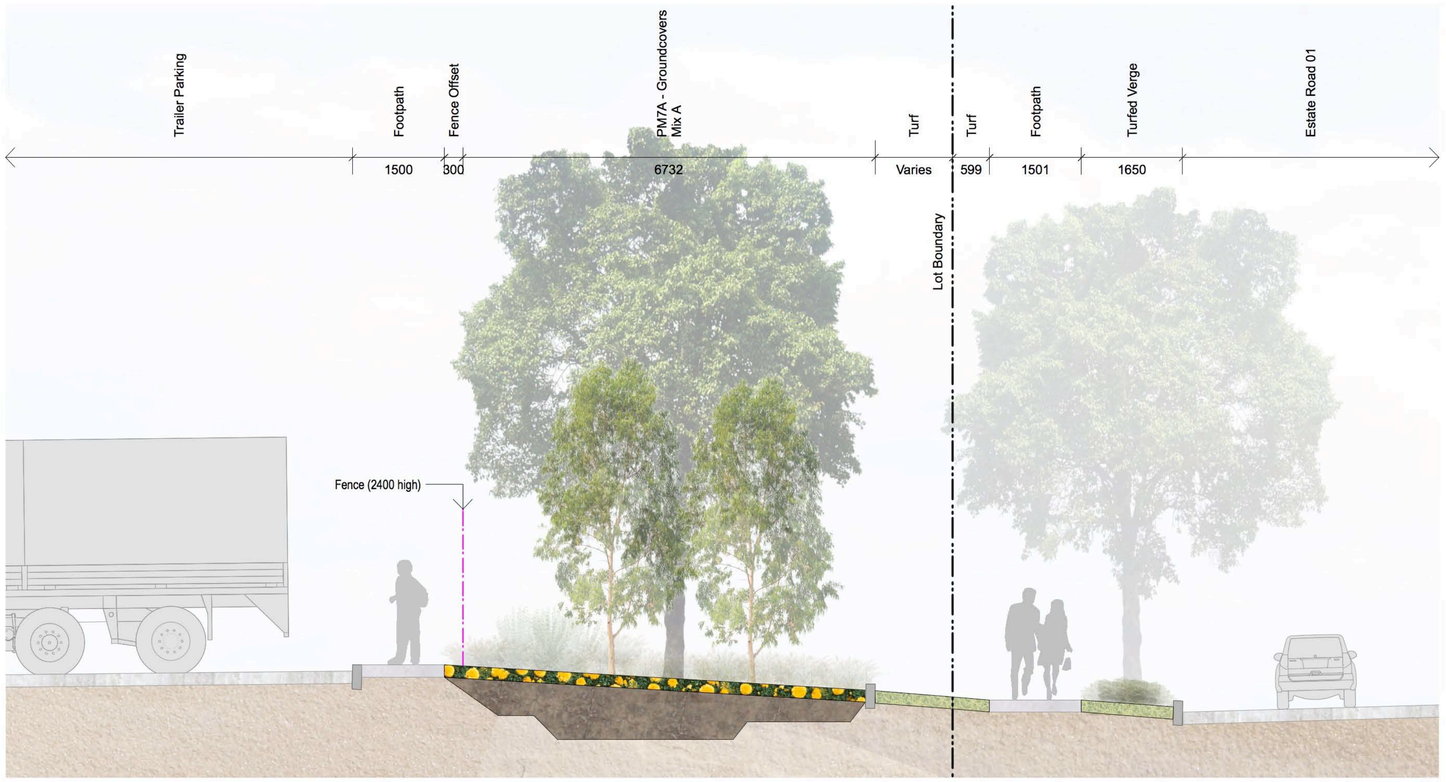
scale	1:100 & 1:50@A1
drawn	MF/ZZ
checked	CH
project no.	163-18
project phase	Development Application

L.SK.200 H



01 Estate Road 03 - Planted Verge
Typical Street Section - Scale 1:50 @ A1

0 1 2 3 M



02 Estate Road 01 - Turfed Verge
Typical Street Section - Scale 1:50 @ A1

0 1 2 3 M

Note: All finished levels subject to change +/- 1000mm.

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Landscape - Typical Street Sections

scale	1:50 & 1:100@A1
drawn	MF/ZZ
checked	CH
project no.	163-18
project phase	Development Application

L.SK.201 G

Annexure G

Easement Enquiry Design Advice

Project Services / Engineering / Transmission Line and Cable Design

Response to Easement Enquiry: 2020-023 – Modification to Oakdale West (SSD-7348-MOD-1)

Enquiry Details

The following information has been provided as a basis of the enquiry:

Item	Notes
Customer/Project	Goodman – Industrial Development, Oakdale West Estate
Date Enquiry Received	14/01/2020
Date Response Required by	ASAP
Outline of Proposed Works by Customer	This enquiry is for a section 4.55 (1A) modification (V7 drawings) to an existing application. The modifications include; • The addition of batter and earthworks either side of the Western/North-South link road into TransGrid easement • The addition of Bio-retention Basin No.1 • The relocation of Bio-retention Basin No.5 (now called Basin No.4) closer to TransGrid structures and more directly under conductors The previous assessment completed by TransGrid was in 2017 and was under assessment 2017-363. This assessment viewed drawing suite V1.
Details of Assets Impacted	330kV TL 30 Sydney West - Liverpool, Span 6-10 330kV TL 14 Sydney North – Kemps Creek, Span 104-108
Type of Impact on TransGrid Assets	Clearance of proposed road and ground level changes within TransGrid easement
Supporting Documents Provided by Customer	Appendix A - Architectural Plans.pdf Appendix D - Civil Masterplan Concept Drawings (1).pdf Appendix F - Traffic Impact Statement.pdf 2020-01-24 - OWE INFRA MOD3 DRAFT BULK EARTHWORKS (EXCLUDING SEDIMENT AND EROSION).dxf 2020-01-24 - OWE INFRA MOD3 DRAFT BULK EARTHWORKS (INCLUDING SEDIMENT AND EROSION).dxf 2020-01-24 - OWE INFRA MOD3 DRAFT PROPOSED STRINGS.dxf 2020-01-24 - OWE INFRA MOD3 DRAFT PROPOSED STRINGS.12da

Design Assessment Criteria

The following criteria are used to assess any impacts from the proposed customer works in accordance with the relevant easement and fencing guidelines:

Item	Criterion
Required Clearances	• 330kV ground clearances as per AS7000. 8m clearance to roads and 8m clearance to traversable ground. • 17m metre Exclusion Zone clearance from Transmission centre line

Safety Buffer Around Structure	• 20m Exclusion Zone (per former Easement guidelines)
Earthing/EMF Compliance	1. EMF - ARPANSA for the current Standard for Radiation Protection Standard for Exposure Limits to Electrical and Magnetic Fields 0 Hz–3 kHz. 2. Earthing – AS7000
Civil and/or subsidence Compliance	• Excavation works must be no greater than 2.0 metres in depth and must employ dust suppression
Fence Earthing Compliance	TransGrid Fencing Guidelines

Design Assessment Findings

The following information outlines the finding following assessment of the proposal against the above criteria:

Item	Notes
Actual Clearances	• Span 106-107 of **TL14**, of 9.35m • Span of 107-108 **TL14**, of 8.76m • Span of 8-9 of **TL30**, of 9.73m • Span of 9-10 **TL30**, of 8.85m
Safety Buffer Around Structure	• Tower TL14-106 is 87.2m • Tower TL14-107 is 22.5m • Tower TL30-9 is 21.5m • Tower TL30-8 is 30m
Earthing/EMF Compliance	N/A
Civil and/or subsidence Compliance	• Excavation works must be no greater than 2.0 metres in depth and must employ dust suppression • Batter must be no greater than 1 in 6
Other	Any construction work for the proposed work within the easement shall maintain safe approach distance to the exposed conductors when performing work which requires that plant to approach electrical apparatus.

Summary of Findings

A summary of the findings and recommendations is as follows;

- This assessment is carried out in regards to 2019-597 – DA 2019/20/2 – A/3493 – CNR 3335. The proposed works within this assessment fall within the scope of previous easement enquiry, reference 2017-363, which was completed by TLCD and submitted to Property on 18th December 2017.
- This assessment proposes a section 4.55 modification to an approved industrial subdivision to include additional batter and earthworks, add an additional bio-retention basin, and relocation an existing bio-retention basin.
- The proposed work falls within the easement of 330kV TL 30 Sydney West - Liverpool, Span 10-8, and 330kV TL 14 Sydney North – Kemps Creek, Span 106-108.

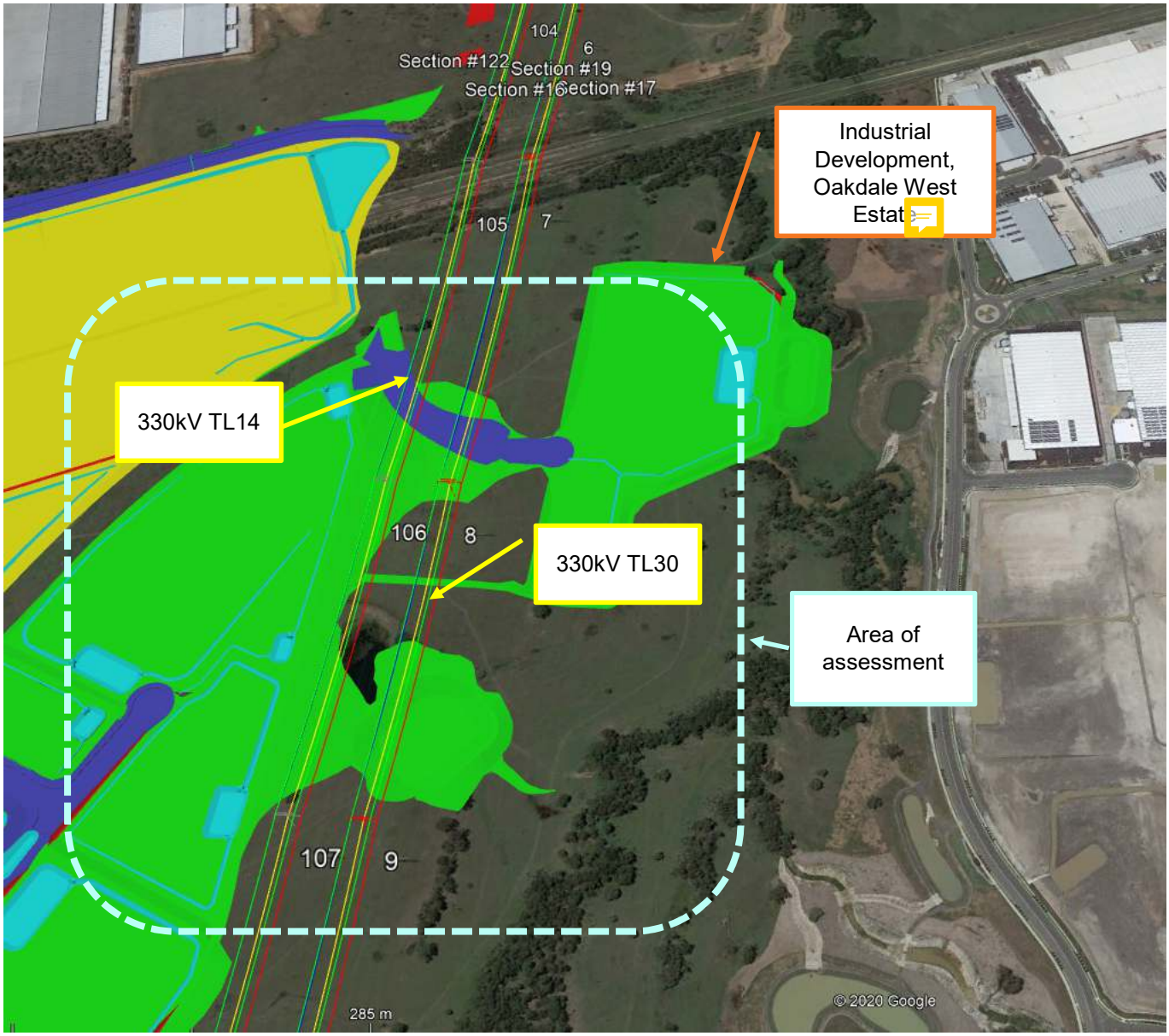


Figure 1 – Proposed development works & 330kV feeder #37 Google Earth layout

TL14 Assessment

- Proposed ground has clearance to the 330kV aerial conductors at span of 106-107 of **TL14**, of 9.35m, where the conductor is sagged at maximum operation temperature of 120°C. This is compliant to AS/NZS:7000 clearances.
- Proposed ground has clearance to the 330kV aerial conductors at span of 107-108 **TL14**, of 8.76m, where the conductor is sagged at maximum operation temperature of 120°C. This is compliant to AS/NZS:7000 clearances.
- Structure Exclusion Zone;
    - To Tower 106 is 87.2m
    - To Tower 107 is 22.5m

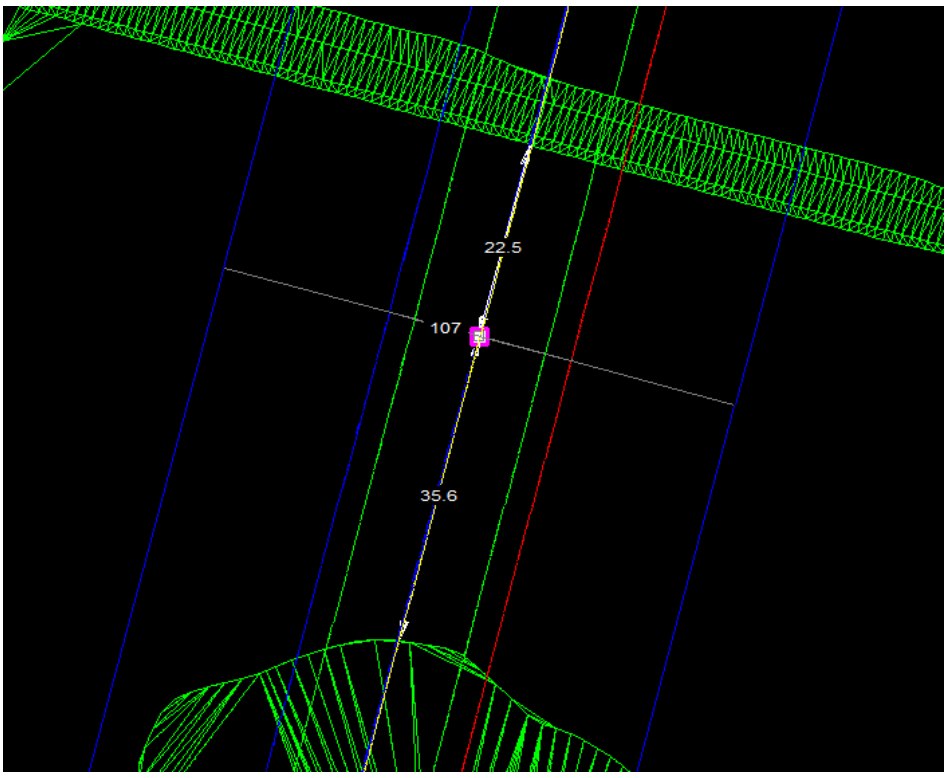


Figure 3 – Clearance from Tower 107 to batter earthworks and bio-retention basin No.4

TL30 Assessment

- Proposed ground has clearance to the 330kV aerial conductors at span of 8-9 of **TL30**, of 9.73m, where the conductor is sagged at maximum operation temperature of 120°C. This is compliant to AS/NZS:7000 clearances.
- Proposed ground has clearance to the 330kV aerial conductors at span of 9-10 **TL30**, of 8.85m, where the conductor is sagged at maximum operation temperature of 120°C. This is compliant to AS/NZS:7000 clearances.
- Structure Exclusion Zone;
    - To Tower 9 is 21.5mm to Lot 5A access road

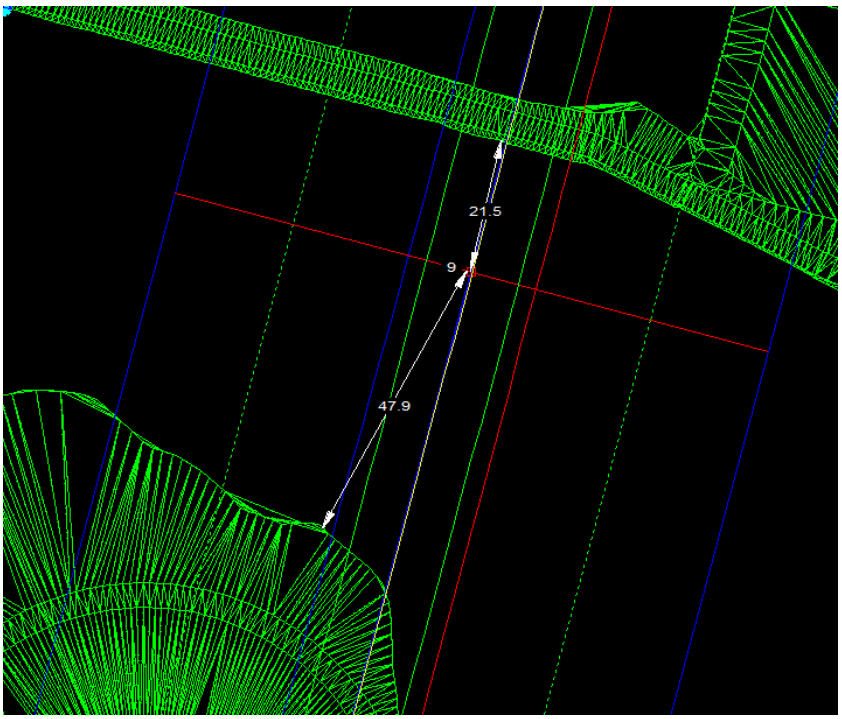


Figure 4 – Clearance from Tower 9 to batter earthworks and bio-retention basin No.4

    - To Tower 8 is 30m. Lot 5A batter is outside 20m structure clearance zone.

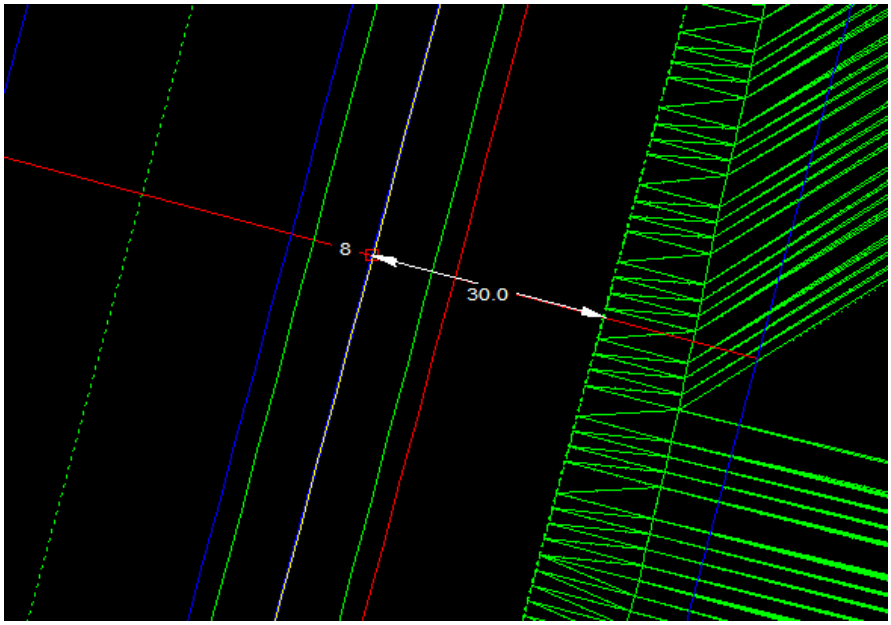


Figure 5 – Clearance from Tower 8 to Lot 5A batter earthworks

Clearance to ground for TL14:

Back Structure Number	Ahead Structure Number	Controlling Weather Case	Clearance Margin Radial (m)	OK	Controlling Point Feature Code Description	Controlling Point Station (m)	Controlling Point Offset (m)	Controlling Point Z (m)	AS:7000 Clearance required radial (m)
106	107	Tmax	1.35	OK	Oakdale West Ground Data	39389.17	-10.89	65.39	8
107	108	Tmax	0.76	OK	Oakdale West Ground Data	39763.57	10.92	67.78	8

Clearance to ground for TL30:

Back Structure Number	Ahead Structure Number	Controlling Weather Case	Clearance Margin Radial (m)	OK	Controlling Point Feature Code Description	Controlling Point Station (m)	Controlling Point Offset (m)	Controlling Point Z (m)	AS:7000 Clearance required radial (m)
8	9	Tmax	1.73	OK	Oakdale West Ground Data	2640.46	10.69	66.27	8
9	10	Tmax	0.85	OK	Oakdale West Ground Data	2921.26	11.05	63.30	8

Summary: The proposal is acceptable.

Advice provided by: Beau Stoner – Senior Design Engineer
Reviewed By: Sharmeen Sultana – Professional Engineer
Date: 18/03/2020

Annexure H

Matters Raised	Applicant Response
Penrith City Council	
1. Scope of Works Between Modification and Staged Applications As an overarching comment relating to the various applications, it is considered essential that the scope of works within the modification applications be amended to ensure that only one application is seeking approval of amendments to the spatial arrangement of allotments, finished ground levels and road configurations. The current overlay of applications and difference in development outcomes is creating problematic interim ground conditions and unsupportable level transitions throughout the development. Various documents submitted in support of MOD 1 amendments are predicated on a substantially different road and subdivision arrangement which is not part of MOD 1, but instead forms part of MOD 3. Any suggestion to amend land form to facilitate an altered configuration (as per MOD 3) should form part of the MOD 1 application to ensure that the resulting finished ground levels can be considered in the assessment as the ultimate development scenario. In the event that the works within MOD3 are not supported or do not proceed, the land form approved within Mod 1 provides an unsatisfactory level difference between the developable lots and road configuration. This may or may not be resolved through later modifications or later separate built form development applications however reliance or dependency on separate of future applications	▪ Noted. The scope and extent of MOD1,2 & 3 applications were subject to extensive discussion between Goodman and DPIE prior to lodgement, and was agreed to adequately compartmentalise different aspects of the development and for ease of assessment. We do not agree with the difficulties discussed by Council and note the applications are being assessed concurrently and will have the same outcome to if they were reorganised as suggested by Council. However, to update the Modifications as proposed by Council, at this late stage of assessment would require update to all lodgement documentation. Without any appreciable utility, this would result in significant and unnecessary delay and cost to the approval process, and cause confusion among stakeholders, most whom have already reviewed and provided their comments on the applications. ▪ For the above reasons we seek that DPIE continue with the scope of to MOD1,2,3 applications as originally agreed.

Matters Raised	Applicant Response
is not sufficient planning grounds to support the creation of the suggested transitions as part of these current applications. It is therefore considered essential that the following is addressed in the scope of works proposed:- 1. MOD 1 be amended to include all spatial arrangement amendments and land form changes. This means that the changes pursued through MOD 2 and MOD 3 with respect to lot configurations and finished ground levels are removed from those respective applications so that the implications of the finished design scenario can be considered holistically and in an orderly fashion. The subdivision pattern and road arrangements should be deemed suitable and sufficient irrespective of the intended potential tenant of the created allotments. 2. MOD 2 would then include the amendments to the Stage 1 built form and the building and landscape embellishments within the allotments considered and addressed through the MOD 1 application. The finished ground levels (other than minor site regrading to facilitate the built form works) would have already been addressed through the MOD 1 application. 3. MOD 3 could potentially be withdrawn as there is a separate SSD for the Stage 2 building form, site landscape treatment and car parking arrangement. As per above, the finished ground levels (other than minor site regrading to facilitate the built form works) would have already been addressed through the MOD 1. If the above suggested changes to the scope of works is not adopted and pursued with the applicant, then it is Council's recommendation that the documentation and information supporting each application be confined to the works in each application alone,	

Matters Raised	Applicant Response
and that each individual application is assessed as being suitable and supportable on its own merits without reliance on separate or future unrelated works (such as a separate modification application).	
2. Acoustic Analysis and Recommendation Condition The additional information submitted in support of Mod 1, 2 and 3 has been considered by Council's Environmental Management Officers and is considered to demonstrate compliance with approved noise levels. The exceptions to this are the receivers to the south however it is understood that they have all reached a noise agreement. The impacts of the agreement, and the suitable nature of those agreed works is matter for the Department to consider and determine. It would still be Council's recommendation that there is a mechanism imposed through conditions of consent that limits the amount of any agreed and approved exceedance to the satisfaction of the consent authority, and that a protocol is in place to address this potential scenario.	▪ The noise agreements are available for review by DPIE. We note these agreements do not restrict the level of noise that the site can generate. There is no upper limit.
3. Amended Earthworks (MOD 1 with reliance on MOD 3) Amended plans and supporting cross sectional drawings submitted by the Applicant for MOD 1 include references and reliance to works and a building form that is not subject of MOD 1, or MOD 3 and appears to suggest an intention for a future building form. Plan revisions notes on the amended documentation suggest they exist for information only, but there is still a resulting suggestion that the interface treatments resulting from the MOD 1 works are intended to be resolved / managed through the MOD 3 or future separate applications which is not acceptable.	▪ It seems Council has not referred to the detail Civil Engineering drawings (the 1000 series). Please refer to these drawings to better understand the detailed design of the civil works. It should be evident that the proposed civil design provides for an optimal design outcome compared to that approved for the site. This is particularly the case around Precinct 2 where there has been a reduction in retaining walls. See below further responses to the queries raised. ▪ The Western Lots (3A-E in MOD 3 or 2E-J in SSDA Consent) have always had retaining walls to step down from Road 3. The future SLR levels constrains the height of Road 3. The modification originally sought to raise the Western Lots which would have reduced the height of these walls. This was not preferred by Council

Matters Raised	Applicant Response
While the deletion / reduction of additional fill within Lots 2E – J within MOD 1 is supported, this change is not sufficient to resolve the comments raised by Council for the precinct as a whole. A separate plan exists, which does not rely on any works within MOD 3, and retains the allotment and road alignments as currently approved. This plan (amended on 19 February 2020) titled as the "General Arrangements Master Plan" (Issue A8) suggests finished ground levels within Lot 2A and 2B which are approximately 700mm above the indicated road level. This is assuming that the spot levels on the plan within the road reserve are the finished road levels and not natural topography in which case the finished road levels need to be reflected. While a level transition of 700mm is minor and manageable through landscape design treatments, the indicated finished ground level within Lot 3A and 3B is between 4 – 6m higher than the finished road level. This is an unsupportable interface outcome that appears to stem from the retention of Road 3 levels to achieve requirements to remove fill within Lots 2E-J. Lot 3D is also challenging as the resulting levels are now 6.3m below Road 3 or 6.6m above Road 3. It is evident from the cross sectional drawings (with MOD 3 notations) that Road 3 is largely a result of filling works, and the resulting interface outcomes stem from the creation of flat developable allotments that do not respond to the topography of the site and the need to step the building form and spatial arrangement of future development to respond to that topography. The proposed finished levels in fact do the opposite, with little to nil excavation within the allotments to balance the cut and fill ratios through the development. This was the key concern outlined within Council's previous comments and the amendments undertaken have not	so the levels have been returned to the approved levels and wall heights. ▪ Lot 2A in the SSDA Consent had retaining walls of maximum height of 4m, and walls on the entire frontage of Road 3 and Road 1. Lot 2A (in MOD 3) now has no designed walls and only potential for future on lot walls for around 25% of the site boundary. This is an improvement. ▪ Lot 3D in SSDA Consent (Lot 2C-E in MOD 3) have stabilised batters of a similar height above and below Road 3. In MOD 3, the frontage is now shorter and the height below the Road 3 at the SLR end is reduced from 5m high in SSDA to just 1.2m high. There is now also more space to accommodate visual relief in the revised indicative building layout shown in the architectural drawings. ▪ This section is accurate to its location. The Lot 2B building level falls gently towards Road 3 providing a seamless interface at the property boundary. Refer C1000 series earthwork drawings submitted for MOD 3 that show the future on-grade car park area shaped to grade from building to road. This an improved outcome requiring no retaining walls facing Road 3. This is in line with the landscaping and civil drawings provided. ▪ The area that is now Lot 1B-C was previously 5m lower than Road 1 in the SSDA Consent. Now it is at a very similar level to Road 1. ▪ Should Council have any further concerns this can be discussed between DPIE and Goodman's civil engineer. ▪ Refer to **Annexure A** for a copy of the final civil set for MOD 2 and **Annexure B** for the civil set for MOD 3.

Matters Raised	Applicant Response
sufficiently acknowledged this need, or appropriately responded to this need. Notwithstanding the above, a separate revision to the General Arrangements Plan (Revision A11) has also been submitted as part of MOD1, which is not related to MOD1, but is reflective of the scope of works within MOD 3. This is not reliable and doesn't form part of the MOD 1 application as it stands. It is however recommended that this plan (albeit amended) should be the replacement plan that ensures that these works and the spatial arrangement of the works is part of MOD 1, negating the need or reliance of any MOD 3 application. This separate and later revision provides a substantially different arrangement to that discussed above, with resulting level differences as follows: - - Lot 2B (as amended) is 4.5m higher than the finished ground level of Road 3. This a poor outcome necessitating extensive retaining walls as presenting to the streetscape. - Lots 2A (as amended) is 2.5m higher than the finished ground levels of Road 3, being a substantially worse interface outcome that than reflected within the existing SSD consent or that indicated by virtue of the MOD 1 amended earthworks as discussion above. - Lot 2C, D & E with a finished ground level of 78.4 ranges from 1.2m below Road 3 (southern end) to 8.0m above Road 3 at the northern end. This is another example of a considerable worse outcome that reflected within the existing SSD consent or that indicated by virtue of the MOD 1 amended earthworks as discussion above.	

Matters Raised	Applicant Response
It is also important to note that the architectural plans submitted in support of Mod 3 and the separate Stage 2 built form works don't appear to reflect a design scenario that is consistent with the resulting finished ground levels in the above amended plans. Council's comments on MOD 3 and SSD10397 were predicated on architectural plans and landscape plans that did not suggest any significant level changes or interface transitions in the form suggested by the MOD 1 amendments. Please refer to Landscape Street Sections for Road 3 which suggest a gentle batter slope between the car parking areas and the front property boundary. This outcome will not be realised by the level transitions resulting from the above amendments. The requirement to reduce fill should extent further east lowering the finished pad levels within the development lots to better respect and relate to the finished levels of the road and existing topographic conditions. It is not suitable to modify the landform at the expense of the future public domain, nor is it reasonable to justify the poor interface outcomes on the basis that a separate Modification Application (MOD 3) will resolve the issue created by the proposed MOD 1. This issue underpins Council's suggestion that MOD 1 should include all proposed amendments relating to levels, lot arrangement and road configuration so that a holistic and orderly development assessment can be undertaken in one assessment process. Given the complexity and overlayed nature of all the current modification applications, it is not considered that the proposals under consideration are suitable, orderly or reflective of good planning practice. As such, the Department is urged to consider the	

Matters Raised	Applicant Response
nature and scope of works within each application, ensure that a single spatial arrangement is under consideration in one application and that the resulting finished ground levels are respectful to natural topography and the levels endorsed through the original SSD consent. If amendments ae sought, better planning outcomes must be demonstrated.	
4. Amendments to MOD 2 – Site 1B and 1C The amendments to delete car parking and driveway areas within the 20m setback to the Link Road is noted and supported as positive change. Further the setback of Warehouse 1B Road 2 has been increased to 7.5m which is also a supported amendment. The spatial configuration of 1C is still questionable and it has been Council's position that 1C should be deleted to enable reconfiguration of Lot 1A (to better locate parking) or enable a larger and more orderly spatial arrangement for 1B alone. This consideration however is a matter for the Department to consider and address if such a change is not considered to result in a better or preferred design outcome for the site. Having regard to the earthworks concerns above, the MOD 1 General Arrangements Plan (not reliant on MOD 2 or MOD 3 spatial arrangement changes will result in a level difference of 5.5m between Lot 1C and Road 1. This is an excessive and poor internal interface outcome noting that Lot 3A and 3V by virtue of created flat developable areas.	▪ Goodman do not agree with council's comments regarding the design of 1C. The design provided complies with the existing development controls approved under the SSD consent. ▪ It's unclear what the final comment relates too. The area that is now Lot 1B-C was previously 5m lower than Road 1 in the SSDA Consent. Now it is at a very similar level to Road 1.
5. Amendments to MOD 2 – Site 1A The proposed amended car park arrangement removes the previously indicated driveway access off the Western North South Link Road. This removal is supported. Suggestions were made that widening of the driveway to accommodate an additional entry lane	▪ The car parking entry and exit for Site 1A have both been widened. This width of the car exit allows for two cars exiting at any point in time. Our traffic engineer does not support two cars entering the site at one time. Refer to **Annexure C** for a copy of the latest site plan.

Matters Raised	Applicant Response
could be considered however it is noted that this has not been reflected and as such it is assumed that the traffic modelling and vehicle frequency does not warrant any widening.	
6. Landscaping Amendments – MOD 1, MOD 2, and MOD 3 In light of the earthworks comments provided above, Council is yet to review the amended landscape plans however it is noted that the setbacks and space afforded to landscaping is generally supported. This view may change however if the earthworks are retained and the level transitions (without retaining walls) necessitate increased or terraced setbacks. It has been noted that the applicant suggests that Council's request for amended landscaping and suitable landscape setbacks is 'contradictory' to the issued SSD consent and 'unjustified'. Council reiterates that the recommendations made to the Department are both justified and necessary to ensure a suitable public domain interface is provided. It is also reiterated that the setback now indicated in the amended plans should be replicated and carried through for the remainder of the development along the Link Road as future stages progress.	▪ We refer to the following link for the final set of landscaping plans. Goodman confirms that no changes are required to the landscaping plans. The landscaping plans that show a batter transitioning the grades is correct (per our comments above). ▪ Goodman notes the landscape setback requested by Council is in excess of that required under the existing development controls and hence consent. Precinct 1 Link: https://spaces.hightail.com/space/ORCyV9ha8t Precinct 2 Link: https://spaces.hightail.com/space/Xp2PePHEjE
7. Advertising Signage – Pylon Signage Dimensions The applicant in recent email correspondence to Council dated 25 February 2020 does not appear to have addressed the signage comments raised previously. This should be addressed or alternatively addressed through conditions if the application is supported.	▪ We are unsure which part of Council's concerns have not been addressed. We refer DPIE and PCC to our RTS for MOD 2 which confirms the following; - All signage shown on the MOD 2 and 3 application are consistent with the design and intent already approved as part of the concept plan approval. - The size of this signage has been increased having regard to the larger height and scale of the building proposed. - Design detail for directional signage and tenant signage (signage zones) has been provided.

Matters Raised	Applicant Response
	- In relation to sign s8, Goodman has confirmed that this can be a condition of consent such that Goodman provides the signage plan to DPIE prior to installation, for approval. This is consistent with similar signage conditions implemented in the Oakdale South (SSD6917) approval. - Refer to **Annexure D** for a copy of the design detail for the directional signage.

Annexures

Annexure	Document
A	MOD 2 Civil Set
B	MOD 3 Civil Set
C	Site 1A site plan
D	Signage

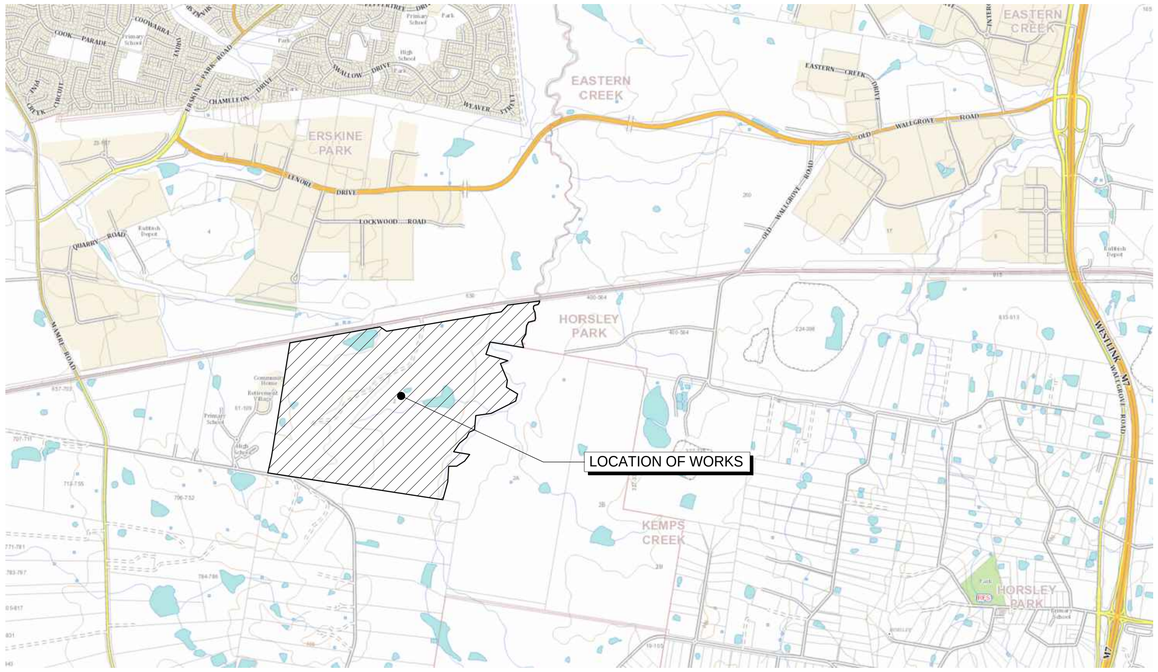
Annexure A

OAKDALE WEST

2000-SERIES STAGE 1 ON-LOT

CIVIL WORKS PACKAGE

STATE SIGNIFICANT DEVELOPMENT APPLICATION



LOCALITY PLAN
NTS

NOTE:
THIS APPLICATION RELATES TO THE FOLLOWING :-

1. BULK EARTHWORKS SITE WIDE
2. STORMWATER BASINS AND ASSOCIATED STORMWATER INLET AND OUTLET
3. BOUNDARY AND ROAD\LOT RETAINING WALLS
4. WESTERN NORTH -SOUTH LINK ROAD
5. PRECINCT 1 INFRASTRUCTURE WORKS

Bar Scales

Issue	Description	Date
A8	ISSUED FOR SSD APPROVAL MOD 2	01-08-19
A7	ISSUED FOR SSD APPROVAL MOD 2	31-07-19
A6	ISSUED FOR SSD APPROVAL MOD 2	26-07-19
A5	ISSUED FOR INFORMATION	23-07-19
A4	ISSUED FOR INFORMATION MOD 2	12-06-19
A3	ISSUED FOR SSD APPROVAL	21-09-18

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Status: MOD 2 APPROVAL
NOT TO BE USED FOR CONSTRUCTION — A1

Scales		15-272-C2000.dwg	
		Drawn	GB
		Designed	GB
Height Datum	AHD	Checked	AM
Grid	MGA	Approved	AM

Client: Goodman

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Project
PROPOSED INDUSTRIAL DEVELOPMENT
OAKDALE WEST

Title
COVER SHEET

Drawing No.	Project No.	Issue
15-272-C2000	15-272	A8

100mm on Original

DRAWING LIST

DRAWING No.	DRAWING TITLE
15-272-C2000	COVER SHEET
15-272-C2001	DRAWING LIST
15-272-C2002	GENERAL NOTES
15-272-C2003	GENERAL ARRANGEMENT PLAN
15-272-C2010	SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 1 OF 14
15-272-C2011	SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 2 OF 14
15-272-C2012	SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 3 OF 14
15-272-C2013	SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 4 OF 14
15-272-C2014	SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 5 OF 14
15-272-C2015	SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 6 OF 14
15-272-C2016	SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 7 OF 14
15-272-C2017	SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 8 OF 14
15-272-C2018	SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 9 OF 14
15-272-C2019	SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 10 OF 14
15-272-C2020	SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 11 OF 14
15-272-C2021	SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 12 OF 14
15-272-C2022	SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 13 OF 14
15-272-C2023	SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 14 OF 14
15-272-C2030	PAVEMENT PLAN

Bar Scales

Issue	Description	Date
A8	ISSUED FOR SSD APPROVAL MOD 2	01-08-19
A7	ISSUED FOR SSD APPROVAL MOD 2	31-07-19
A6	ISSUED FOR SSD APPROVAL MOD 2	26-07-19
A5	ISSUED FOR INFORMATION	23-07-19
A4	ISSUED FOR INFORMATION MOD 2	12-06-19
A3	ISSUED FOR SSD APPROVAL	21-09-18

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Status
MOD 2 APPROVAL
NOT TO BE USED FOR CONSTRUCTION

A1

Scales		15-272-C2001.dwg	
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		Designed	GB
Height Datum	AHD	Checked	AM
Grid	MGA	Approved	AM

Client
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Project
PROPOSED INDUSTRIAL DEVELOPMENT
OAKDALE WEST

Title
DRAWING LIST

Drawing No.	Project No.	Issue
15-272-C2001	15-272	A8

SITEWORKS NOTES

1. ORIGIN OF LEVELS:- REFER SURVEY NOTES.
2. CONTRACTOR MUST VERIFY ALL DIMENSIONS AND EXISTING LEVELS ON SITE PRIOR TO COMMENCEMENT OF WORK. ANY DISCREPANCIES TO BE REPORTED TO AT & L.
3. MAKE SMOOTH CONNECTION WITH EXISTING WORKS.
4. ALL TRENCH BACKFILL MATERIAL SHALL BE COMPACTED TO THE SAME DENSITY AS THE ADJACENT MATERIAL.
5. ALL SERVICE TRENCHES UNDER VEHICULAR PAVEMENTS SHALL BE BACKFILLED WITH SAND TO 300mm ABOVE PIPE. WHERE PIPE IS UNDER PAVEMENTS BACKFILL REMAINDER OF TRENCH TO UNDERSIDE OF PAVEMENT WITH SAND OR APPROVED GRANULAR MATERIAL COMPACTED IN 150mm LAYERS TO MINIMUM 98% MODIFIED MAXIMUM DRY DENSITY IN ACCORDANCE WITH AS 1289 5.2.1. (OR A DENSITY INDEX OF NOT LESS THAN 75)
6. PROVIDE 10mm WIDE EXPANSION JOINTS BETWEEN BUILDINGS AND ALL CONCRETE OR UNIT PAVEMENTS.
7. ASPHALTIC CONCRETE SHALL CONFORM TO R.M.S SPECIFICATION R116.
8. ALL BASECOURSE MATERIAL SHALL BE IGNEOUS ROCK QUARRIED MATERIAL TO COMPLY WITH R.M.S FORM 3051 (UNBOUND), R.M.S FORM 3052 (BOUND) COMPACTED TO MINIMUM 98% MODIFIED DENSITY IN ACCORDANCE WITH AS 1289 5.2.1
   FREQUENCY OF COMPACTION TESTING SHALL NOT BE LESS THAN 1 TEST PER 50m^3 OF BASECOURSE MATERIAL PLACED.
9. ALL SUB-BASE COURSE MATERIAL SHALL BE IGNEOUS ROCK QUARRIED MATERIAL TO COMPLY WITH R.M.S FORM 3051, 3051.1 AND COMPACTED TO MINIMUM 95% MODIFIED DENSITY IN ACCORDANCE WITH A.S 1289 5.2.1
   FREQUENCY OF COMPACTION TESTING SHALL NOT BE LESS THAN 1 TEST PER 50m^3 OF SUB-BASE COURSE MATERIAL PLACED.
10. AS AN ALTERNATIVE TO THE USE OF IGNEOUS ROCK AS A SUB-BASE MATERIAL IN (9) A CERTIFIED RECYCLED CONCRETE MATERIAL COMPLYING WITH R.M.S FORM 3051 AND 3051.1 WILL BE CONSIDERED. SUBJECT TO MATERIAL SAMPLES AND APPROPRIATE CERTIFICATIONS BEING PROVIDED TO THE SATISFACTION OF AT & L.
11. SHOULD THE CONTRACTOR WISH TO USE A RECYCLED PRODUCT THE CONTRACTOR IS TO SEEK ACCEPTANCE OF THE PRODUCT FROM AT&L. THE PRICE DIFFERENCE BETWEEN AN IGNEOUS PRODUCT AND A RECYCLED PRODUCT SHALL BE CLEARLY INDICATED.
12. WHERE NOTED ON THE DRAWINGS THAT WORKS ARE TO BE CARRIED BY OTHERS, (eg. ADJUSTMENT OF SERVICES), THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CO-ORDINATION OF THESE WORKS.

SURVEY NOTES

THE EXISTING SITE CONDITIONS SHOWN ON THE FOLLOWING DRAWINGS HAVE BEEN INVESTIGATED BY CARDNO HARD & FORESTER PTY LTD, BEING REGISTERED SURVEYORS. THE INFORMATION IS SHOWN TO PROVIDE A BASIS FOR DESIGN. AT & L DOES NOT GUARANTEE THE ACCURACY OR COMPLETENESS OF THE SURVEY BASE OR ITS SUITABILITY AS A BASIS FOR CONSTRUCTION DRAWINGS.

SHOULD DISCREPANCIES BE ENCOUNTERED DURING CONSTRUCTION BETWEEN THE SURVEY DATA AND ACTUAL FIELD DATA, CONTACT AT & L.

THE FOLLOWING NOTES HAVE BEEN TAKEN DIRECTLY FROM THE ORIGINAL SURVEY DOCUMENTS.

IMPORTANT NOTE:
THIS PLAN IS PREPARED FROM A COMBINATION OF FIELD SURVEY AND EXISTING RECORDS FOR THE PURPOSE OF DESIGNING NEW CONSTRUCTIONS ON THE LAND AND SHOULD NOT BE USED FOR ANY OTHER PURPOSE. THE TITLE BOUNDARIES SHOWN HEREON WERE NOT MARKED BY THE AUTHOR AT THE TIME OF SURVEY AND HAVE BEEN DETERMINED BY PLAN DIMENSIONS ONLY AND NOT BY FIELD MEASUREMENT.

A SERVICES SEARCH OF THE AREA SURVEYED ABOVE HAS NOT BEEN UNDERTAKEN. VISIBLE SERVICES SHOWN HEREON HAVE BEEN LOCATED WHERE POSSIBLE BY FIELD SURVEY. PRIOR TO ANY DEMOLITION, EXCAVATION OR CONSTRUCTION ON THE SITE, THE RELEVANT AUTHORITY SHOULD BE CONTACTED FOR POSSIBLE LOCATION OF FURTHER UNDERGROUND SERVICES AND DETAILED LOCATIONS OF ALL SERVICES. THIS NOTE IS AN INTEGRAL PART OF THIS PLAN.

EXISTING UNDERGROUND SERVICES NOTES

THE LOCATIONS OF UNDERGROUND SERVICES SHOWN IN THIS SET OF DRAWINGS HAVE BEEN PLOTTED FROM SURVEY INFORMATION AND SERVICE AUTHORITY INFORMATION. THE SERVICE INFORMATION HAS BEEN PREPARED ONLY TO SHOW THE APPROXIMATE POSITIONS OF ANY KNOWN SERVICES AND MAY NOT BE AS CONSTRUCTED OR ACCURATE.

AT & L CAN NOT GUARANTEE THAT THE SERVICES INFORMATION SHOWN ON THESE DRAWINGS ACCURATELY INDICATES THE PRESENCE OR ABSENCE OF SERVICES OR THEIR LOCATION AND WILL ACCEPT NO LIABILITY FOR INACCURACIES IN THE SERVICES INFORMATION SHOWN FROM ANY CAUSE WHATSOEVER.

CONTRACTORS SHALL TAKE DUE CARE WHEN EXCAVATING ONSITE INCLUDING HAND EXCAVATION WHERE NECESSARY.

CONTRACTORS ARE TO CONTACT THE RELEVANT SERVICE AUTHORITY PRIOR TO COMMENCEMENT OF EXCAVATION WORKS.

CONTRACTORS ARE TO UNDERTAKE A SERVICES SEARCH, PRIOR TO COMMENCEMENT OF WORKS ON SITE. SEARCH RESULTS ARE TO BE KEPT ON SITE AT ALL TIMES.

DIAL 1100 BEFORE YOU DIG

CONTRACTOR SHALL CALL;
DIAL BEFORE YOU DIG 1100
PRIOR TO COMMENCEMENT OF WORK TO OBTAIN ALL CURRENT SERVICE AUTHORITY PLANS

CONCRETE NOTES

1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS 3600 CURRENT EDITION WITH AMENDMENTS, EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS.
2. CONCRETE QUALITY
   ALL REQUIREMENTS OF THE CURRENT ACSE CONCRETE SPECIFICATION DOCUMENT 1 SHALL APPLY TO THE FORMWORK, REINFORCEMENT AND CONCRETE UNLESS NOTED OTHERWISE.

ELEMENT	AS 3600 F'c MPa AT 28 DAYS	SPECIFIED SLUMP	NOMINAL AGG. SIZE
VEHICULAR BASE	32	60	20
KERBS, PATHS, AND PITS	25	80	20

   - CEMENT TYPE SHALL BE (ACSE SPECIFICATION) TYPE SL
   - PROJECT CONTROL TESTING SHALL BE CARRIED OUT IN ACCORDANCE WITH AS 1379.
3. NO ADMIXTURES SHALL BE USED IN CONCRETE UNLESS APPROVED IN WRITING BY AT & L.
4. CLEAR CONCRETE COVER TO ALL REINFORCEMENT FOR DURABILITY SHALL BE 40mm TOP AND 70mm FOR EXTERNAL EDGES UNLESS NOTED OTHERWISE.
5. ALL REINFORCEMENT SHALL BE FIRMLY SUPPORTED ON MILD STEEL PLASTIC TIPPED CHAIRS, PLASTIC CHAIRS OR CONCRETE CHAIRS AT NOT GREATER THAN 1m CENTRES BOTH WAYS. BARS SHALL BE TIED AT ALTERNATE INTERSECTIONS.
6. THE FINISHED CONCRETE SHALL BE A DENSE HOMOGENEOUS MASS, COMPLETELY FILLING THE FORMWORK, THOROUGHLY EMBEDDING THE REINFORCEMENT AND FREE OF STONE POCKETS. ALL CONCRETE INCLUDING SLABS ON GROUND AND FOOTINGS SHALL BE COMPACTED AND CURED IN ACCORDANCE WITH R.M.S SPECIFICATION R83.
7. REINFORCEMENT SYMBOLS:
   N DENOTES GRADE 450 N BARS TO AS 1302 GRADE N
   R DENOTES 230 R HOT ROLLED PLAIN BARS TO AS 1302
   SL DENOTES HARD-DRAWN WIRE REINFORCING FABRIC TO AS 1304

   NUMBER OF BARS IN GROUP — BAR GRADE AND TYPE
   17 N 20 250
   NOMINAL BAR SIZE IN mm — SPACING IN mm

   THE FIGURE FOLLOWING THE FABRIC SYMBOL SL IS THE REFERANCE NUMBER FOR FABRIC TO AS 1304.
8. FABRIC SHALL BE LAPPED IN ACCORDANCE WITH THE FOLLOWING DETAIL:

KERBING NOTES

1. ALL CONCRETE TO HAVE A MINIMUM COMPRESSIVE STRENGTH OF 25 MPa U.N.O IN REINFORCED CONCRETE NOTES.
2. ALL KERBS, GUTTERS, DISH DRAINS AND CROSSINGS TO BE CONSTRUCTED ON MIN. 100mm GRANULAR BASECOURSE COMPACTED TO MINIMUM 95% MODIFIED DRY DENSITY (AS 1289 5.2.1).
3. EXPANSION JOINTS (E.J) TO BE FORMED FROM 10mm COMPRESSIBLE CORK FILLER BOARD FOR THE FULL DEPTH OF THE SECTION AND CUT TO PROFILE. EXPANSION JOINTS TO BE LOCATED AT DRAINAGE PITS, ON TANGENT POINTS OF CURVES AND ELSEWHERE AT MAX 12m CENTRES EXCEPT FOR INTEGRAL KERBS WHERE THE EXPANSION JOINTS ARE TO MATCH THE JOINT LOCATIONS IN THE SLABS.
4. WEAKENED PLANE JOINTS TO BE MIN 3mm WIDE AND LOCATED AT 3m CENTRES EXCEPT FOR INTEGRAL KERBS WHERE THE WEAKENED PLANE JOINTS ARE TO MATCH THE JOINT LOCATIONS IN THE SLABS.
5. BROOMED FINISH TO ALL RAMPED AND VEHICULAR CROSSINGS. ALL OTHER KERBING OR DISH DRAINS TO BE STEEL FLOAT FINISHED.
6. IN THE REPLACEMENT OF KERB AND GUTTER :-
   EXISTING ROAD PAVEMENT IS TO BE SAWCUT 900mm U.N.O FROM THE LIP OF GUTTER. UPON COMPLETION OF THE NEW KERB AND GUTTER NEW BASECOURSE AND SURFACE TO BE LAID 900mm WIDE U.N.O.

   EXISTING ALLOTMENT DRAINAGE PIPES ARE TO BE BUILT INTO THE NEW KERB AND GUTTER WITH 100mm DIA HOLE.

   EXISTING KERB AND GUTTER IS TO BE COMPLETELY REMOVED WHERE NEW KERB AND GUTTER IS SHOWN.

STORMWATER DRAINAGE NOTES

1. STORMWATER DESIGN CRITERIA:
   (A) AVERAGE RECURRENCE INTERVAL:
   1:100 YEARS MAJOR STORM (OVERLAND FLOW)
   1:20 YEARS MINOR STORM (PIPED NETWORK)
   (B) RAINFALL INTENSITIES:
   TIME OF CONCENTRATION: 5 MINUTES
   1:100 YEARS= 219 mm/hr
   1:20 YEARS= 167 mm/hr
   (C) RUNOFF COEFFICIENTS:
   ROOF AREAS: C_{100} =1.0
   EXTERNAL PAVEMENTS: C_{100} =1.0
2. PIPES 300 DIA. AND LARGER TO BE REINFORCED CONCRETE CLASS '2' APPROVED SPIGOT AND SOCKET WITH RUBBER RING JOINTS. U.N.O.
3. PIPES UP TO 300 DIA SHALL BE SEWER GRADE uPVC WITH SOLVENT WELDED JOINTS.
4. EQUIVALENT STRENGTH VCP OR FRC PIPES MAY BE USED, SUBJECT TO THE APPROVAL OF PENRITH CITY COUNCIL.
5. ALL STORMWATER DRAINAGE LINES UNDER PROPOSED BUILDING SLABS TO BE uPVC PRESSURE PIPE GRADE 6. ENSURE ALL VERTICALS AND DOWNPIPES ARE uPVC PRESSURE PIPE, GRADE 6 FOR A MIN OF 3.0m IN HEIGHT.
6. PIPES TO BE INSTALLED TO TYPE HS1 SUPPORT IN ACCORDANCE WITH AS 3725 (2007) IN ALL CASES BACKFILL TRENCH WITH SAND TO 300mm ABOVE PIPE. WHERE PIPE IS UNDER PAVEMENTS BACKFILL REMAINDER OF TRENCH TO UNDERSIDE OF PAVEMENT WITH SAND OR APPROVED GRANULAR MATERIAL COMPACTED IN 150mm LAYERS TO MINIMUM 98% STANDARD MAXIMUM DRY DENSITY IN ACCORDANCE WITH AS 1289 5.2.1. (OR A DENSITY INDEX OF NOT LESS THAN 75)
7. ALL INTERNAL WORKS WITHIN PROPERTY BOUNDARIES ARE TO COMPLY WITH THE REQUIREMENTS OF AS 3500 3.1 (1998) AND AS/NZS 3500 3.2 (1998).
8. PRECAST PITS MAY BE USED EXTERNAL TO THE BUILDING SUBJECT TO APPROVAL BY AT & L.
9. ENLARGERS, CONNECTIONS AND JUNCTIONS TO BE PREFABRICATED FITTINGS WHERE PIPES ARE LESS THAN 300 DIA.
10. WHERE SUBSOIL DRAINS PASS UNDER FLOOR SLABS AND VEHICULAR PAVEMENTS, UNSLOTTED uPVC SEWER GRADE PIPE IS TO BE USED.
11. CARE IS TO BE TAKEN WITH LEVELS OF STORMWATER LINES. GRADES SHOWN ARE NOT TO BE REDUCED WITHOUT APPROVAL.
12. GRATES AND COVERS SHALL CONFORM TO AS 3996.
13. AT ALL TIMES DURING CONSTRUCTION OF STORMWATER PITS, ADEQUATE SAFETY PROCEDURES SHALL BE TAKEN TO ENSURE AGAINST THE POSSIBILITY OF PERSONNEL FALLING DOWN PITS.
14. ALL EXISTING STORMWATER DRAINAGE LINES AND PITS THAT ARE TO REMAIN ARE TO BE INSPECTED AND CLEANED. DURING THIS PROCESS ANY PART OF THE STORMWATER DRAINAGE SYSTEM THAT WARRANTS REPAIR SHALL BE REPORTED TO THE SUPERINTENDENT/ENGINEER FOR FURTHER DIRECTIONS.

EMBANKMENT CONSTRUCTION SEQUENCE

1. STRIP VEGETATION AND TOPSOIL FROM EMBANKMENT AREA AND STOCKPILE TOPSOIL FOR LATER USE. CUT BACK AREA TO FIRM GROUND.
2. CONSTRUCT EMBANKMENT IN PRESENCE OF QUALIFIED AND EXPERIENCED GEOTECHNICAL ENGINEER IF NOT ROCK.
3. IN THE CASE WHERE THE EMBANKMENT AREAS SLUSH, GROUTING AND DENTAL CONCRETE MAY BE REQUIRED, AS DIRECTED BY A QUALIFIED AND EXPERIENCED GEOTECHNICAL ENGINEER.
4. COMPACT CLAY STABILIZED WITH GYPSUM (3% BY DRY MASS, MINIMUM) AS APPROVED BY A QUALIFIED AND EXPERIENCED GEOTECHNICAL ENGINEER INTO THE CUT-OFF TRENCH OF LAYERS NOT EXCEEDING 150mm LOOSE THICKNESS TO A DRY DENSITY EQUIVALENT TO 98% OF THAT DETERMINED BY STANDARD COMPACTION (AS 1289.5.1.1) AND AT A MOISTURE CONTENT OF -2% TO +2% OF OPTIMUM MOISTURE CONTENT.
5. GYPSUM STABILIZED NATURAL SOILS EXPOSED IN EMBANKMENT AREA WITH MINIMUM 3% GYPSUM BY DRY MASS AND COMPACT AS FOR #4. ALL TO THE APPROVAL OF A QUALIFIED AND EXPERIENCED GEOTECHNICAL ENGINEER.
6. CONSTRUCT BODY OF EMBANKMENT WITH CLAYEY MATERIAL WON FROM SITE. COMPACT THE CLAYEY MATERIAL APPROVED BY A QUALIFIED AND EXPERIENCED GEOTECHNICAL ENGINEER IN LAYERS NOT EXCEEDING 150mm THICKNESS TO A DRY DENSITY EQUIVALENT TO 98% OF THAT DETERMINED BY STANDARD COMPACTION (AS 1289.5.1.1) AND AT A MOISTURE CONTENT OF -2% TO +2% OF OPTIMUM MOISTURE CONTENT. MOST IMPORTANTLY, IF SHRINKAGE CRACKS OCCUR, AS DIRECTED BY A QUALIFIED AND EXPERIENCED GEOTECHNICAL ENGINEER.
7. OVERFILL THE EMBANKMENT AND TRIM OFF, SO THAT THE ENTIRE BODY OF THE EMBANKMENT IS COMPACTED.
8. TRIM THE EMBANKMENTS BATTERS TO THE OVERFILLED MATERIAL, STABILIZE THE UPSTREAM CLAY BATTERS WITH WELL MIXED GYPSUM (3% BY DRY MASS, MINIMUM) AND COMPACT TO MIN. 98% STD -2% TO +2% OMC.
9. PLACE ROCK RIP-RAP AS SHOWN.
10. RECOVER TOPSOIL FROM STOCKPILE AND SPREAD OVER EMBANKMENT AND CUT BATTERS (A THIN COVER OF TOPSOIL ONLY HAS BEEN NOMINATED). ONLY LIGHTLY TRACK-ROLL THE TOPSOIL AND THEN LANDSCAPE IN ACCORDANCE WITH THE LANDSCAPE AREA DRAWINGS.
11. WATER AND FERTILIZE LANDSCAPE AS REQUIRED BY CLIMACTIC CONDITIONS TO ENSURE THE LANDSCAPE IS SUCCESSFUL.
12. AT THE COMPLETION OF WORK WRITTEN CONFIRMATION & CERTIFICATION IS TO BE PROVIDED FROM A QUALIFIED & EXPERIENCED GEOTECHNICAL ENGINEER THAT THE EMBANKMENTS HAVE BEEN CONSTRUCTED IN ACCORDANCE WITH THESE DRAWINGS.

EROSION AND SEDIMENT CONTROL NOTES

GENERAL INSTRUCTIONS

1. THE SITE SUPERINTENDENT/ENGINEER WILL ENSURE THAT ALL SOIL AND WATER MANAGEMENT WORKS ARE LOCATED AS DOCUMENTED.
2. ALL WORK SHALL BE GENERALLY CARRIED OUT IN ACCORDANCE WITH
   a. LOCAL AUTHORITY REQUIREMENTS
   b. EPA REQUIREMENTS
   c. NSW DEPARTMENT OF HOUSING MANUAL "MANAGING URBAN STORMWATER, SOILS AND CONSTRUCTION", 4th EDITION, MARCH 2004.
3. MAINTAIN THE EROSION CONTROL DEVICES TO THE SATISFACTION OF THE SUPERINTENDENT AND THE LOCAL AUTHORITY.
4. WHEN STORMWATER PITS ARE CONSTRUCTED, PREVENT SITE RUNOFF ENTERING UNLESS SEDIMENT FENCES ARE ERECTED AROUND PITS.
5. CONTRACTOR IS TO ENSURE ALL EROSION & SEDIMENT CONTROL DEVICES ARE MAINTAINED IN GOOD WORKING ORDER AND OPERATE EFFECTIVELY. REPAIRS AND OR MAINTENANCE SHALL BE UNDERTAKEN AS REQUIRED, PARTICULARLY FOLLOWING STORM EVENTS.

LAND DISTURBANCE

6. WHERE PRACTICAL, THE SOIL EROSION HAZARD ON THE SITE WILL BE KEPT AS LOW AS POSSIBLE. TO THIS END, WORKS SHOULD BE UNDERTAKEN IN THE FOLLOWING SEQUENCE:
   (A) INSTALL A WIND FENCE ALONG THE BOUNDARIES AS SHOWN ON PLAN. REFER DETAIL.
   (B) INSTALL A SEDIMENT FENCE ALONG THE BOUNDARIES AS SHOWN ON PLAN. REFER DETAIL.
   (C) CONSTRUCT STABILISED CONSTRUCTION ENTRANCE TO LOCATION AS DETERMINED BY SUPERINTENDENT/ENGINEER. REFER DETAIL.
   (D) INSTALL SEDIMENT BASIN AS SHOWN ON PLAN
   (E) INSTALL SEDIMENT TRAPS AS SHOWN ON PLAN.
   (F) UNDERTAKE SITE DEVELOPMENT WORKS IN ACCORDANCE WITH THE ENGINEERING PLANS. WHERE POSSIBLE, PHASE DEVELOPMENT SO THAT LAND DISTURBANCE IS CONFINED TO AREAS OF WORKABLE SIZE.

EROSION CONTROL

7. DURING WINDY WEATHER, LARGE, UNPROTECTED AREAS WILL BE KEPT MOIST (NOT WET) BY SPRINKLING WITH WATER TO KEEP DUST UNDER CONTROL.
8. FINAL SITE LANDSCAPING WILL BE UNDERTAKEN AS SOON AS POSSIBLE AND WITHIN 20 WORKING DAYS FROM COMPLETION OF CONSTRUCTION ACTIVITIES.

SEDIMENT CONTROL

9. STOCKPILES WILL NOT BE LOCATED WITHIN 2 METRES OF HAZARD AREAS, INCLUDING LIKELY AREAS OF CONCENTRATED OR HIGH VELOCITY FLOWS SUCH AS WATERWAYS. WHERE THEY ARE BETWEEN 2 AND 5 METRES FROM SUCH AREAS, SPECIAL SEDIMENT CONTROL MEASURES SHOULD BE TAKEN TO MINIMISE POSSIBLE POLLUTION TO DOWNSLOPE WATERS, E.G. THROUGH INSTALLATION OF SEDIMENT FENCING.
10. ANY SAND USED IN THE CONCRETE CURING PROCESS (SPREAD OVER THE SURFACE) WILL BE REMOVED AS SOON AS POSSIBLE AND WITHIN 10 WORKING DAYS FROM PLACEMENT.
11. WATER WILL BE PREVENTED FROM ENTERING THE PERMANENT DRAINAGE SYSTEM UNLESS IT IS RELATIVELY SEDIMENT FREE, I.E. THE CATCHMENT AREA HAS BEEN PERMANENTLY LANDSCAPED AND/OR ANY LIKELY SEDIMENT HAS BEEN FILTERED THROUGH AN APPROVED STRUCTURE.
12. TEMPORARY SOIL AND WATER MANAGEMENT STRUCTURES WILL BE REMOVED ONLY AFTER THE LANDS THEY ARE PROTECTING ARE REHABILITATED.

OTHER MATTERS

13. ACCEPTABLE RECEPTORS WILL BE PROVIDED FOR CONCRETE AND MORTAR SLURRIES, PAINTS, ACID WASHINGS, LIGHT-WEIGHT WASTE MATERIALS AND LITTER.
14. ANY EXISTING TREES WHICH FORM PART OF THE FINAL LANDSCAPING PLAN WILL BE PROTECTED FROM CONSTRUCTION ACTIVITIES BY:
   (A) PROTECTING THEM WITH BARRIER FENCING OR SIMILAR MATERIALS INSTALLED OUTSIDE THE DRIP LINE
   (B) ENSURING THAT NOTHING IS NAILED TO THEM
   (C) PROHIBITING PAVING, GRADING, SEDIMENT WASH OR PLACING OF STOCKPILES WITHIN THE DRIP LINE EXCEPT UNDER THE FOLLOWING CONDITIONS.
      (I) ENCROACHMENT ONLY OCCURS ON ONE SIDE AND NO CLOSER TO THE TRUNK THAN EITHER 1.5 METRES OR HALF THE DISTANCE BETWEEN THE OUTER EDGE OF THE DRIP LINE AND THE TRUNK, WHICH EVER IS THE GREATER
      (II) A DRAINAGE SYSTEM THAT ALLOWS AIR AND WATER TO CIRCULATE THROUGH THE ROOT ZONE (E.G. A GRAVEL BED) IS PLACED UNDER ALL FILL LAYERS OF MORE THAN 300 MILLIMETRES DEPTH
      (III) CARE IS TAKEN NOT TO CUT ROOTS UNNECESSARILY NOR TO COMPACT THE SOIL AROUND THEM.

STAGING

SUITABLE EROSION AND SEDIMENT CONTROLS SHALL BE DESIGNED, PROVIDED AND MAINTAINED BY THE CONTRACTOR THROUGHOUT ALL STAGES OF WORKS, INCLUDING AT COMPLETION OF THE BULK EARTHWORKS WHERE SHOWN ON AT&L DRAWINGS OR WHERE DIRECTED BY THE SUPERINTENDENT OR PENRITH CITY COUNCIL'S ENGINEERS.
SEDIMENT AND EROSION CONTROLS ARE TO BE DESIGNED AND DOCUMENTED BY A SUITABLY QUALIFIED EXPERT ENGAGED BY THE CONTRACTOR AND APPROVED AS PART OF THE CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN PRIOR TO THE COMMENCEMENT OF CONSTRUCTION. SUCH CONTROLS SHALL BE IN ACCORDANCE WITH THE RELEVANT REQUIREMENTS IN THE LATEST VERSION OF THE MANAGING URBAN STORMWATER: SOILS AND CONSTRUCTION GUIDELINE (LANDCOM).

BULK EARTHWORKS NOTES

1. ORIGIN OF LEVELS: REFER SURVEY NOTES
2. REFER PELLS SULLIVAN MEYNINK REPORT PSM1541-020S REV 0 (DATED 16-03-12) FOR BULK EARTHWORKS SPECIFICATIONS OF THE BIO-RETENTION BASIN AND ESTATE ROAD.
3. REFER PELLS SULLIVAN MEYNINK REPORT PSM1541-003S REV 2 (DATED 06/05/13) FOR BULK EARTHWORKS SPECIFICATIONS OF ALL AREAS EXCEPT THE BIO-RETENTION BASIN AND ESTATE ROAD.

FINISHED SURFACE LEVELS

1. ALL FINISHED SURFACE LEVELS ARE ±1000mm U.N.O.

Bar Scales

Issue	Description	Date
A8	ISSUED FOR SSD APPROVAL MOD 2	01-08-19
A7	ISSUED FOR SSD APPROVAL MOD 2	31-07-19
A6	ISSUED FOR SSD APPROVAL MOD 2	26-07-19
A5	ISSUED FOR INFORMATION	23-07-19
A4	ISSUED FOR INFORMATION MOD 2	12-06-19
A3	ISSUED FOR SSD APPROVAL	21-09-18

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Status: MOD 2 APPROVAL
NOT TO BE USED FOR CONSTRUCTION
A1

Scales		15-272-C2002.dwg	
		Drawn	GB
		Designed	GB
Height Datum	AHD	Checked	AM
Grid	MGA	Approved	AM

Client: Goodman

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www.atl.net.au
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Project: PROPOSED INDUSTRIAL DEVELOPMENT OAKDALE WEST

Title: GENERAL NOTES

Drawing No.	Project No.	Issue
15-272-C2002	15-272	A8

ROAD No.1

AMENITIES LOT

WESTERN NORTH-SOUTH LINK ROAD

LOT 2A

LOT 1A

FUTURE ROAD No.3

ROAD No.1

LINEWORK IN 'GREEN' DENOTES FUTURE NORTH-SOUTH LINK ROAD EXTENSION AND SOUTHERN LINK ROAD AND DOES NOT FORM PART OF THIS APPLICATION

LOT 3A

LOT 1B

LOT 4D

TRANSGRID EASEMENT

FUTURE ROAD No.8

FUTURE SOUTHERN LINK ROAD

LOT 4C

LOT 5A

LOT 3C

SERVICES LOT

A11

Bar Scales

0 25 50 75 100

1 : 1250 @ A1 1 : 2500 @ A3

Issue	Description	Date
A11	ISSUED FOR SSD APPROVAL MOD 2	05-03-20
A10	ISSUED FOR SSD APPROVAL MOD 2	29-10-19
A9	ISSUED FOR SSD APPROVAL MOD 2	18-09-19
A8	ISSUED FOR SSD APPROVAL MOD 2	01-08-19
A7	ISSUED FOR SSD APPROVAL MOD 2	31-07-19
A7	ISSUED FOR SSD APPROVAL MOD 2	26-07-19

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A1

Scales	1 : 1250	15-272-C2003.dwg	
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		Designed	GB
Height Datum	AHD	Checked	AM
Grid	MGA	Approved	AM

Client: Goodman

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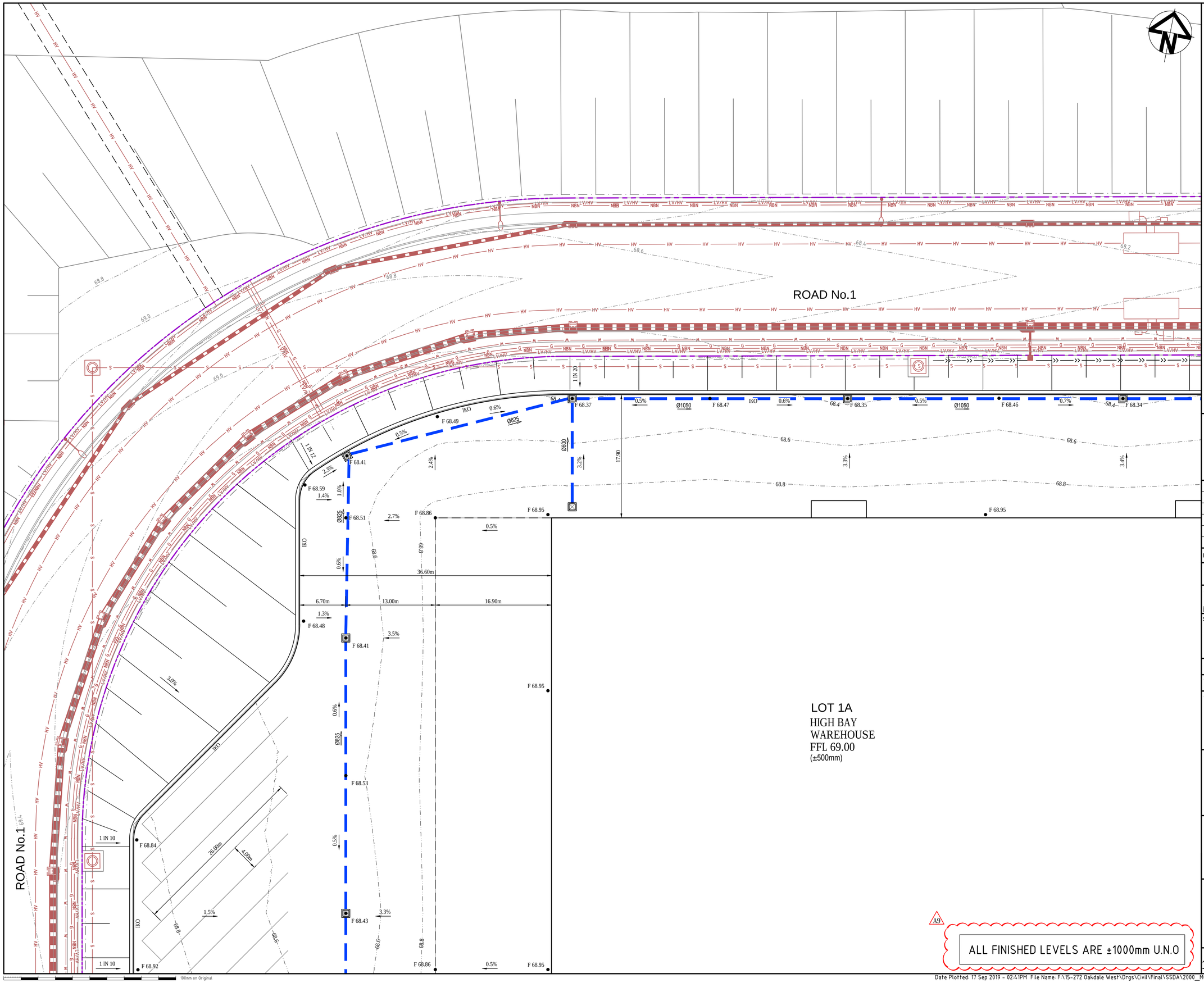
Project: PROPOSED INDUSTRIAL DEVELOPMENT OAKDALE WEST

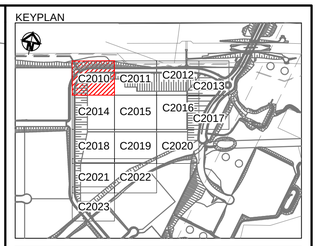
Title: GENERAL ARRANGEMENT PLAN

Drawing No.	Project No.	Issue
15-272-C2003	15-272	A11

100mm on Original



KEYPLAN



LEGEND

- EXISTING BOUNDARY
- PROPOSED BOUNDARY
- 65.0 PROPOSED CONTOUR
- K&G KERB AND GUTTER
- KO KERB ONLY
- IKO INTEGRAL KERB ONLY
- DD DISH DRAIN
- F74.00 FINISHED SURFACE LEVEL
- Ø375 STORMWATER PIPE WITH SIZE
- STORMWATER OVERLAND FLOWPATH
- GD STORMWATER GRATED DRAIN
- KERB INLET PIT
- SURFACE INLET PIT
- JUNCTION PIT
- GUARDRAIL SAFETY BARRIER
- EXISTING STORMWATER PIPE
- S EXISTING SEWER MAIN
- W EXISTING WATER MAIN
- NBN EXISTING NBN
- LV/HV EXISTING ELECTRICAL
- G EXISTING GAS MAIN

Bar Scales

0 5 10 15 20

1 : 250 @ A1 1 : 500 @ A3

Issue	Description	Date
A9	ISSUED FOR SSD APPROVAL MOD 2	18-09-19
A8	ISSUED FOR SSD APPROVAL MOD 2	01-08-19
A7	ISSUED FOR SSD APPROVAL MOD 2	31-07-19
A6	ISSUED FOR SSD APPROVAL MOD 2	26-07-19
A5	ISSUED FOR INFORMATION	23-07-19
A4	ISSUED FOR INFORMATION MOD 2	12-06-19

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A1

Scales	1 : 250	15-272-C2010.dwg	
		Drawn	GB
		Designed	GB
Height Datum	AHD	Checked	AM
Grid	MGA	Approved	AM

Client: Goodman

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Project
PROPOSED INDUSTRIAL DEVELOPMENT
OAKDALE WEST

Title
SITEWORKS AND STORMWATER DRAINAGE PLAN
SHEET 1 OF 14

Drawing No.	Project No.	Issue
15-272-C2010	15-272	A9

100mm on Original

ROAD No.1

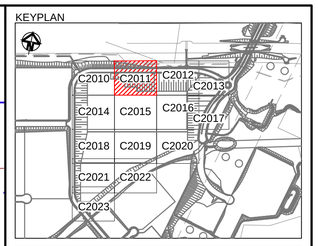
LOT 1A
HIGH BAY
WAREHOUSE
FFL 69.00
(±500mm)

LOW BAY
WAREHOUSE
FFL 70.00
(±500mm)

REFTAINING WALL

A9
ALL FINISHED LEVELS ARE ±1000mm U.N.O

KEYPLAN



LEGEND

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- PROPOSED BOUNDARY
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- IKO INTEGRAL KERB ONLY
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- STORMWATER OVERLAND FLOWPATH
- GD STORMWATER GRATED DRAIN
- KERB INLET PIT
- SURFACE INLET PIT
- JUNCTION PIT
- GUARDRAIL SAFETY BARRIER
- EXISTING STORMWATER PIPE
- S EXISTING SEWER MAIN
- W EXISTING WATER MAIN
- NBN EXISTING NBN
- LV/HV EXISTING ELECTRICAL
- G EXISTING GAS MAIN

Bar Scales

0 5 10 15 20

1 : 250 @ A1 1 : 500 @ A3

Issue	Description	Date
A9	ISSUED FOR SSD APPROVAL MOD 2	18-09-19
A8	ISSUED FOR SSD APPROVAL MOD 2	01-08-19
A7	ISSUED FOR SSD APPROVAL MOD 2	31-07-19
A6	ISSUED FOR SSD APPROVAL MOD 2	26-07-19
A5	ISSUED FOR INFORMATION	23-07-19
A4	ISSUED FOR INFORMATION MOD 2	12-06-19

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Status: MOD 2 APPROVAL
NOT TO BE USED FOR CONSTRUCTION
A1

Scales	1 : 250	15-272-C2011.dwg	
		Drawn	GB
		Designed	GB
Height Datum	AHD	Checked	AM
Grid	MGA	Approved	AM

Client: Goodman

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Project
PROPOSED INDUSTRIAL DEVELOPMENT
OAKDALE WEST

Title
SITEWORKS AND STORMWATER DRAINAGE PLAN
SHEET 2 OF 14

Drawing No.	Project No.	Issue
15-272-C2011	15-272	A9

100mm on Original

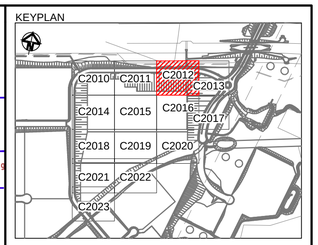
ALL FINISHED LEVELS ARE ±1000mm U.N.O

ROAD No.1

LOT 1A
LOW BAY
WAREHOUSE
FFL 70.00
(±500mm)

RETAINING WALL

KEYPLAN



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- EXISTING BOUNDARY
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- EXISTING STORMWATER PIPE
- S EXISTING SEWER MAIN
- W EXISTING WATER MAIN
- NBN EXISTING NBN
- LV/HV EXISTING ELECTRICAL
- G EXISTING GAS MAIN

Bar Scales

0 5 10 15 20

1 : 250 @ A1 1 : 500 @ A3

Issue	Description	Date
A10	ISSUED FOR SSD APPROVAL MOD 2	05-03-20
A9	ISSUED FOR SSD APPROVAL MOD 2	18-09-19
A8	ISSUED FOR SSD APPROVAL MOD 2	01-08-19
A7	ISSUED FOR SSD APPROVAL MOD 2	31-07-19
A6	ISSUED FOR SSD APPROVAL MOD 2	26-07-19
A5	ISSUED FOR INFORMATION	23-07-19

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Status: MOD 2 APPROVAL NOT TO BE USED FOR CONSTRUCTION — A1

Scales	1 : 250	15-272-C2012.dwg	
		Drawn	GB
		Designed	GB
Height Datum	AHD	Checked	AM
Grid	MGA	Approved	AM

Client: Goodman

Civil Engineers and Project Managers
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www.atl.net.au
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Project: PROPOSED INDUSTRIAL DEVELOPMENT OAKDALE WEST

Title: SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 3 OF 14

Drawing No.	Project No.	Issue
15-272-C2012	15-272	A10

100mm on Original

ALL FINISHED LEVELS ARE ±1000mm U.N.O

ROAD No.1

AMENITIES LOT

LOT 1A

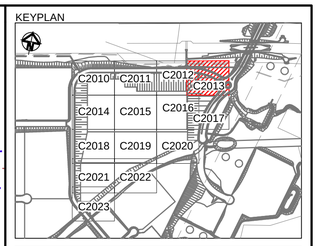
PROPOSED GROSS POLLUTANT TRAP

RETAINING WALL

PROPOSED SIGNAGE.

WESTERN NORTH-SOUTH LINK ROAD

KEYPLAN



LEGEND

- EXISTING BOUNDARY
- PROPOSED BOUNDARY
- 65.0 PROPOSED CONTOUR
- K&G KERB AND GUTTER
- KO KERB ONLY
- IKO INTEGRAL KERB ONLY
- DD DISH DRAIN
- F74.00 FINISHED SURFACE LEVEL
- Ø375 STORMWATER PIPE WITH SIZE
- STORMWATER OVERLAND FLOWPATH
- GD STORMWATER GRATED DRAIN
- KERB INLET PIT
- SURFACE INLET PIT
- JUNCTION PIT
- GUARDRAIL SAFETY BARRIER
- EXISTING STORMWATER PIPE
- S EXISTING SEWER MAIN
- W EXISTING WATER MAIN
- NBN EXISTING NBN
- LV/HV EXISTING ELECTRICAL
- G EXISTING GAS MAIN

Bar Scales

0 5 10 15 20

1 : 250 @ A1 1 : 500 @ A3

Issue	Description	Date
A10	ISSUED FOR SSD APPROVAL MOD 2	05-03-20
A9	ISSUED FOR SSD APPROVAL MOD 2	18-09-19
A8	ISSUED FOR SSD APPROVAL MOD 2	01-08-19
A7	ISSUED FOR SSD APPROVAL MOD 2	31-07-19
A6	ISSUED FOR SSD APPROVAL MOD 2	26-07-19
A5	ISSUED FOR INFORMATION	23-07-19

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Status: MOD 2 APPROVAL
NOT TO BE USED FOR CONSTRUCTION — A1

Scales	1 : 250	15-272-C2013.dwg	
		Drawn	GB
		Designed	GB
Height Datum	AHD	Checked	AM
Grid	MGA	Approved	AM

Client: Goodman

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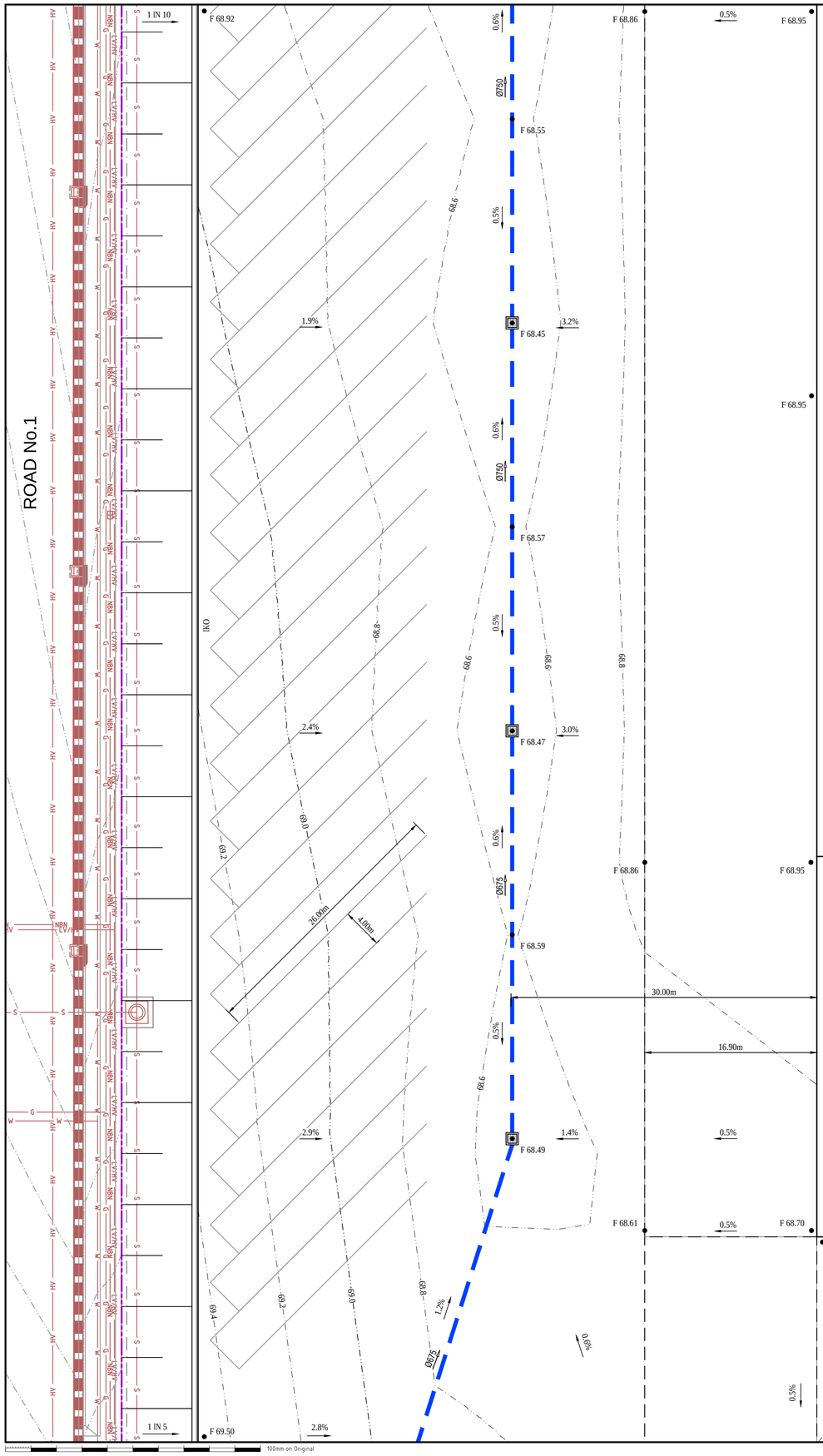
Project: PROPOSED INDUSTRIAL DEVELOPMENT OAKDALE WEST

Title: SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 4 OF 14

Drawing No.	Project No.	Issue
15-272-C2013	15-272	A10

100mm on Original



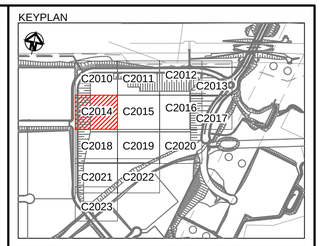
LOT 1A
HIGH BAY
WAREHOUSE
FFL 69.00
(±500mm)

LOW BAY
WAREHOUSE
FFL 70.00
(±500mm)

A9

ALL FINISHED LEVELS ARE ±1000mm U.N.O

KEYPLAN



LEGEND

- EXISTING BOUNDARY
- PROPOSED BOUNDARY
- 65.0 PROPOSED CONTOUR
- K&G KERB AND GUTTER
- KO KERB ONLY
- IKO INTEGRAL KERB ONLY
- DD DISH DRAIN
- F74.00 FINISHED SURFACE LEVEL
- Ø375 STORMWATER PIPE WITH SIZE
- STORMWATER OVERLAND FLOWPATH
- GD STORMWATER GRATED DRAIN
- KERB INLET PIT
- SURFACE INLET PIT
- JUNCTION PIT
- GUARDRAIL SAFETY BARRIER
- EXISTING STORMWATER PIPE
- S EXISTING SEWER MAIN
- W EXISTING WATER MAIN
- NBN EXISTING NBN
- LV/HV EXISTING ELECTRICAL
- G EXISTING GAS MAIN

Bar Scales

0 5 10 15 20

1 : 250 @ A1 1 : 500 @ A3

Issue	Description	Date
A9	ISSUED FOR SSD APPROVAL MOD 2	18-09-19
A8	ISSUED FOR SSD APPROVAL MOD 2	01-08-19
A7	ISSUED FOR SSD APPROVAL MOD 2	31-07-19
A6	ISSUED FOR SSD APPROVAL MOD 2	26-07-19
A5	ISSUED FOR INFORMATION	23-07-19
A4	ISSUED FOR INFORMATION MOD 2	12-06-19

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Status
MOD 2 APPROVAL
NOT TO BE USED FOR CONSTRUCTION

A1

Scales	1 : 250	15-272-C2014.dwg	
		Drawn	GB
		Designed	GB
Height Datum	AHD	Checked	AM
Grid	MGA	Approved	AM

Client
Goodman

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Project
PROPOSED INDUSTRIAL DEVELOPMENT
OAKDALE WEST

Title
SITEWORKS AND STORMWATER DRAINAGE PLAN
SHEET 5 OF 14

Drawing No.	Project No.	Issue
15-272-C2014	15-272	A9

100mm on Original

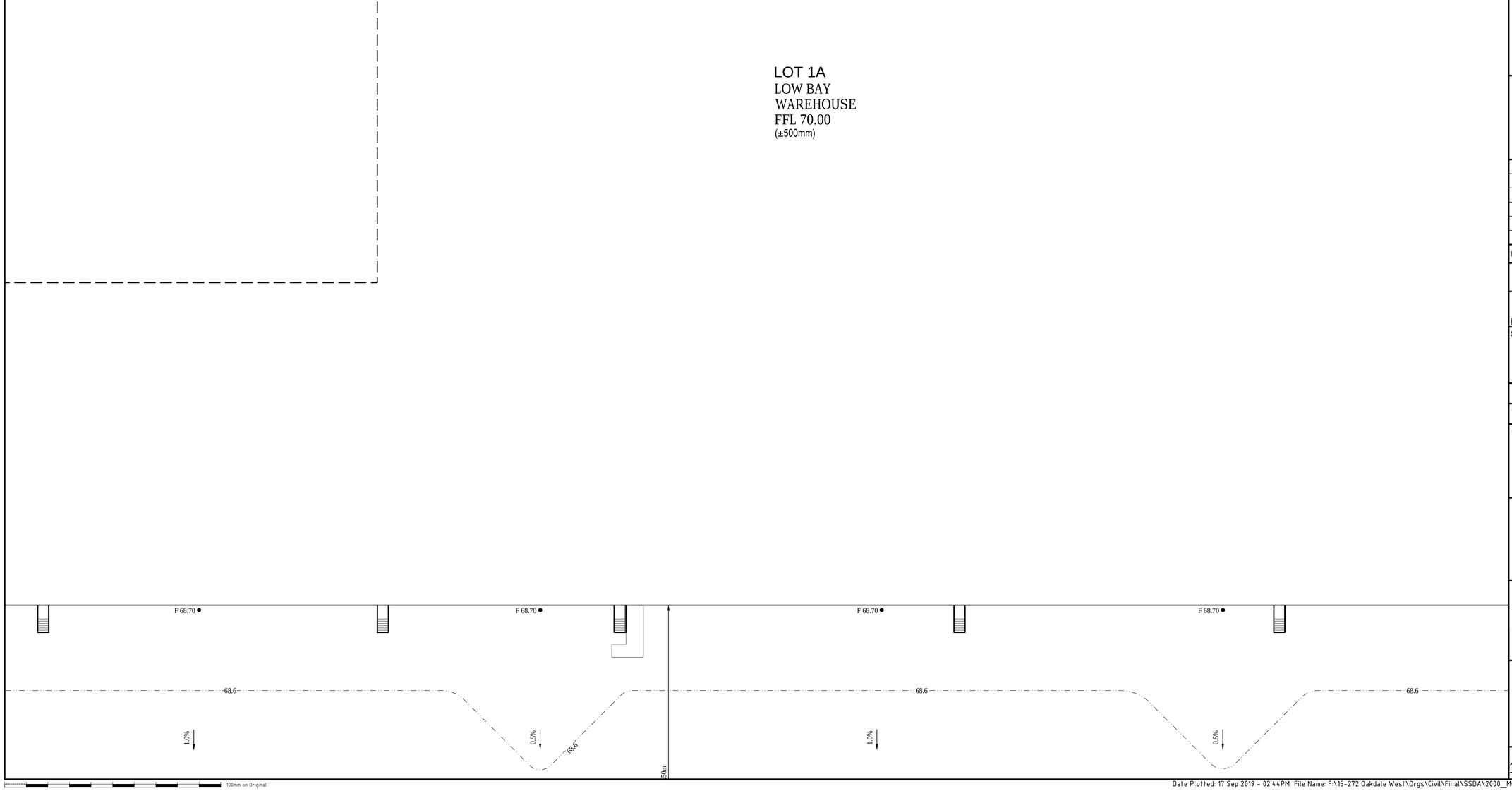
A9

ALL FINISHED LEVELS ARE ±1000mm U.N.O

LOT 1A
HIGH BAY
WAREHOUSE
FFL 69.00
(±500mm)

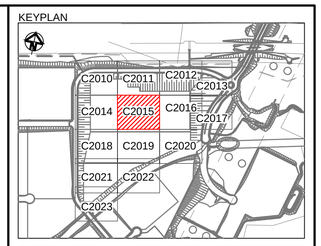
LOT 1A
LOW BAY
WAREHOUSE
FFL 70.00
(±500mm)

LOT 1A



100mm on Original

KEYPLAN



LEGEND

- EXISTING BOUNDARY
- PROPOSED BOUNDARY
- 65.0 PROPOSED CONTOUR
- K&G KERB AND GUTTER
- KO KERB ONLY
- IKO INTEGRAL KERB ONLY
- DD DISH DRAIN
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- Ø375 STORMWATER PIPE WITH SIZE
- STORMWATER OVERLAND FLOWPATH
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- KERB INLET PIT
- SURFACE INLET PIT
- JUNCTION PIT
- GUARDRAIL SAFETY BARRIER
- EXISTING STORMWATER PIPE
- S EXISTING SEWER MAIN
- W EXISTING WATER MAIN
- NBN EXISTING NBN
- LV/HV EXISTING ELECTRICAL
- G EXISTING GAS MAIN

Bar Scales

0 5 10 15 20

1 : 250 @ A1 1 : 500 @ A3

Issue	Description	Date
A9	ISSUED FOR SSD APPROVAL MOD 2	18-09-19
A8	ISSUED FOR SSD APPROVAL MOD 2	01-08-19
A7	ISSUED FOR SSD APPROVAL MOD 2	31-07-19
A6	ISSUED FOR SSD APPROVAL MOD 2	26-07-19
A5	ISSUED FOR INFORMATION	23-07-19
A4	ISSUED FOR INFORMATION MOD 2	12-06-19

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Status
MOD 2 APPROVAL
NOT TO BE USED FOR CONSTRUCTION

A1

Scales	1 : 250	15-272-C2015.dwg	
		Drawn	GB
		Designed	GB
Height Datum	AHD	Checked	AM
Grid	MGA	Approved	AM

Client

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Project
PROPOSED INDUSTRIAL DEVELOPMENT
OAKDALE WEST

Title
SITEWORKS AND STORMWATER DRAINAGE PLAN
SHEET 6 OF 14

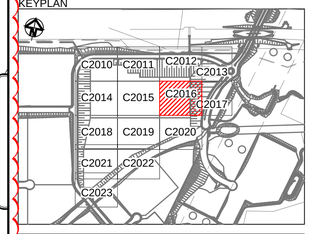
Drawing No.	Project No.	Issue
15-272-C2015	15-272	A9

ALL FINISHED LEVELS ARE ±1000mm U.N.O

LOT 1A
LOW BAY
WAREHOUSE
FFL 70.00
(±500mm)

OFFICE
FFL 70.00
(±500mm)

KEYPLAN



LEGEND

- EXISTING BOUNDARY
- PROPOSED BOUNDARY
- 65.0 PROPOSED CONTOUR
- K&G KERB AND GUTTER
- KO KERB ONLY
- IKO INTEGRAL KERB ONLY
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- S EXISTING SEWER MAIN
- W EXISTING WATER MAIN
- NBN EXISTING NBN
- LV/HV EXISTING ELECTRICAL
- G EXISTING GAS MAIN

Bar Scales

0 5 10 15 20

1 : 250 @ A1 1 : 500 @ A3

Issue	Description	Date
A10	ISSUED FOR SSD APPROVAL MOD 2	05-03-20
A9	ISSUED FOR SSD APPROVAL MOD 2	18-09-19
A8	ISSUED FOR SSD APPROVAL MOD 2	01-08-19
A7	ISSUED FOR SSD APPROVAL MOD 2	31-07-19
A6	ISSUED FOR SSD APPROVAL MOD 2	26-07-19
A5	ISSUED FOR INFORMATION	23-07-19

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Status
MOD 2 APPROVAL
NOT TO BE USED FOR CONSTRUCTION

A1

Scales	1 : 250	15-272-C2016.dwg	
		Drawn	GB
		Designed	GB
Height Datum	AHD	Checked	AM
Grid	MGA	Approved	AM

Client

Goodman

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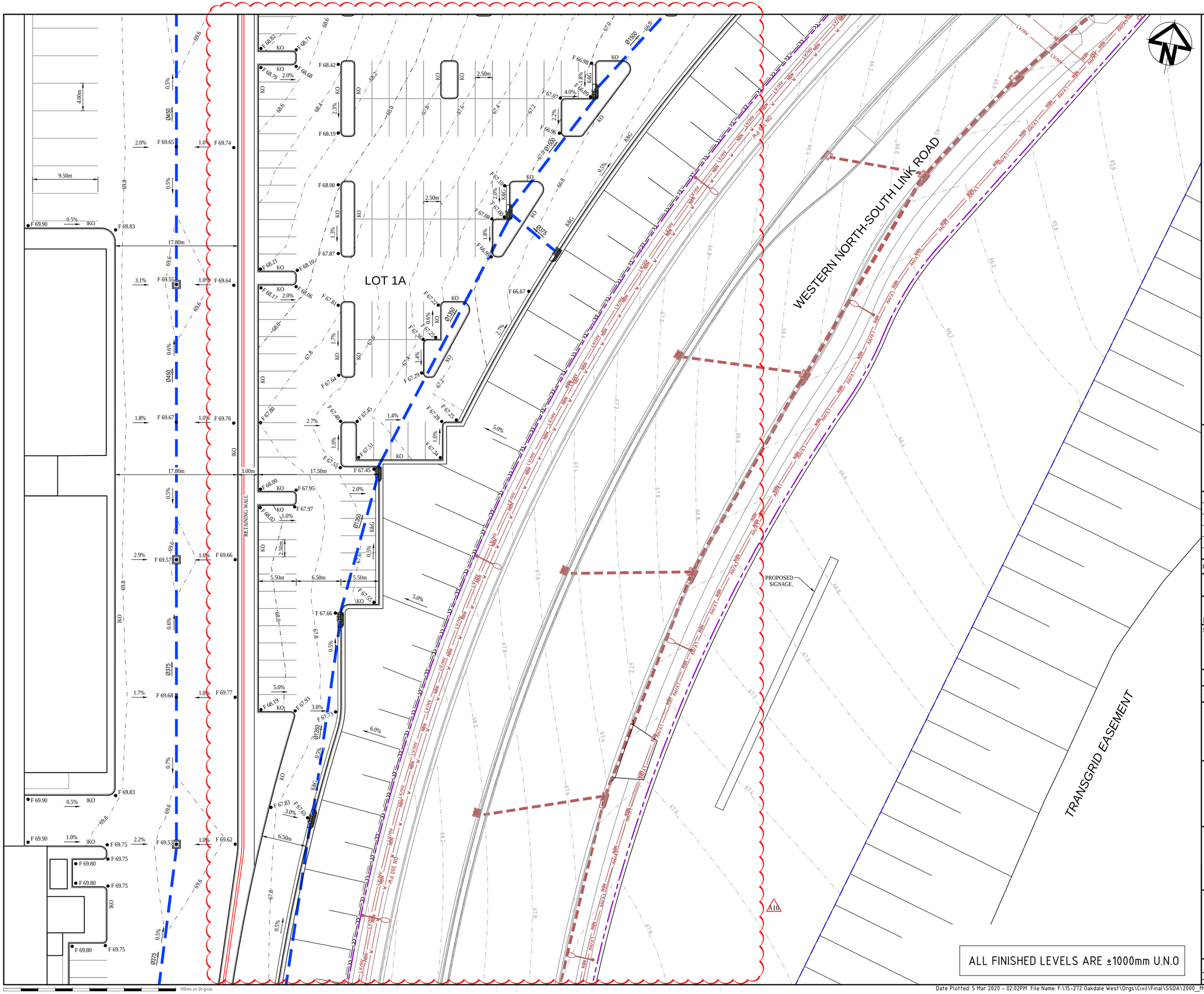
Project
PROPOSED INDUSTRIAL DEVELOPMENT
OAKDALE WEST

Title
SITEWORKS AND STORMWATER DRAINAGE PLAN
SHEET 7 OF 14

Drawing No.	Project No.	Issue
15-272-C2016	15-272	A10

100mm on Original



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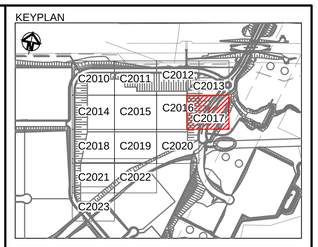

LEGEND

- EXISTING BOUNDARY
- PROPOSED BOUNDARY
- 65.0 PROPOSED CONTOUR
- K&G KERB AND GUTTER
- KO KERB ONLY
- IKO INTEGRAL KERB ONLY
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- GUARDRAIL SAFETY BARRIER
- EXISTING STORMWATER PIPE
- S EXISTING SEWER MAIN
- W EXISTING WATER MAIN
- NBN EXISTING NBN
- LV/HV EXISTING ELECTRICAL
- G EXISTING GAS MAIN

Bar Scales

0 5 10 15 20

1 : 250 @ A1 1 : 500 @ A3

Issue	Description	Date
A10	ISSUED FOR SSD APPROVAL MOD 2	05-03-20
A9	ISSUED FOR SSD APPROVAL MOD 2	18-09-19
A8	ISSUED FOR SSD APPROVAL MOD 2	01-08-19
A7	ISSUED FOR SSD APPROVAL MOD 2	31-07-19
A6	ISSUED FOR SSD APPROVAL MOD 2	26-07-19
A5	ISSUED FOR INFORMATION	23-07-19

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Status: MOD 2 APPROVAL
NOT TO BE USED FOR CONSTRUCTION

A1

Scales	1 : 250	15-272-C2017.dwg	
		Drawn	GB
		Designed	GB
Height Datum	AHD	Checked	AM
Grid	MGA	Approved	AM

Client: Goodman

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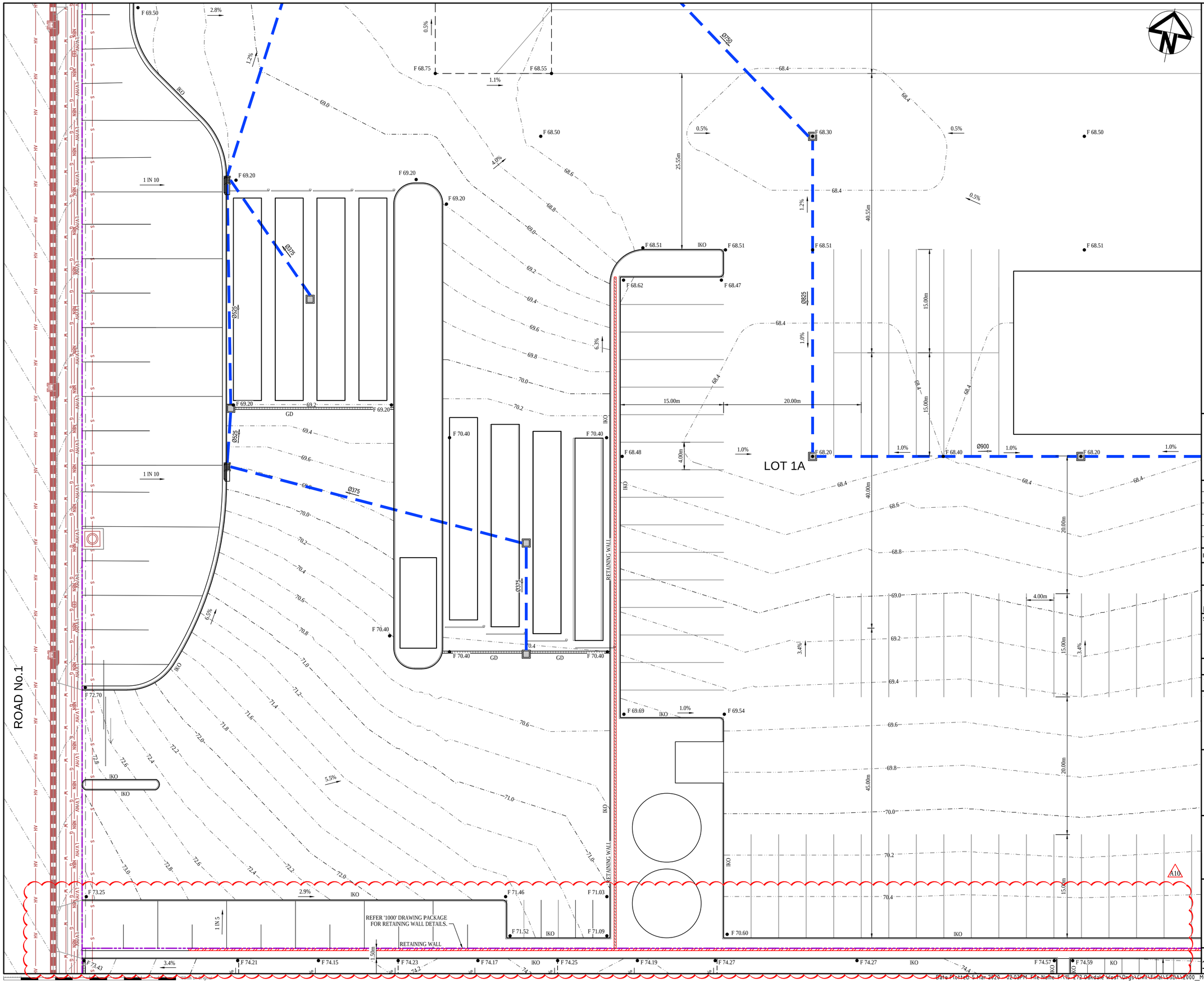
Project
PROPOSED INDUSTRIAL DEVELOPMENT
OAKDALE WEST

Title
SITEWORKS AND STORMWATER DRAINAGE PLAN
SHEET 8 OF 14

Drawing No.	Project No.	Issue
15-272-C2017	15-272	A10



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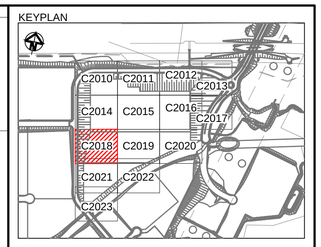

LEGEND

- EXISTING BOUNDARY
- PROPOSED BOUNDARY
- 65.0 PROPOSED CONTOUR
- K&G KERB AND GUTTER
- KO KERB ONLY
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- DD DISH DRAIN
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- S EXISTING SEWER MAIN
- W EXISTING WATER MAIN
- NBN EXISTING NBN
- LV/HV EXISTING ELECTRICAL
- G EXISTING GAS MAIN

Bar Scales

0 5 10 15 20

1 : 250 @ A1 1 : 500 @ A3

Issue	Description	Date
A10	ISSUED FOR SSD APPROVAL MOD 2	05-03-20
A9	ISSUED FOR SSD APPROVAL MOD 2	18-09-19
A8	ISSUED FOR SSD APPROVAL MOD 2	01-08-19
A7	ISSUED FOR SSD APPROVAL MOD 2	31-07-19
A6	ISSUED FOR SSD APPROVAL MOD 2	26-07-19
A5	ISSUED FOR INFORMATION	23-07-19

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Status: MOD 2 APPROVAL — NOT TO BE USED FOR CONSTRUCTION — A1

Scales	1 : 250	15-272-C2018.dwg	
		Drawn	GB
		Designed	GB
Height Datum	AHD	Checked	AM
Grid	MGA	Approved	AM

Client: Goodman

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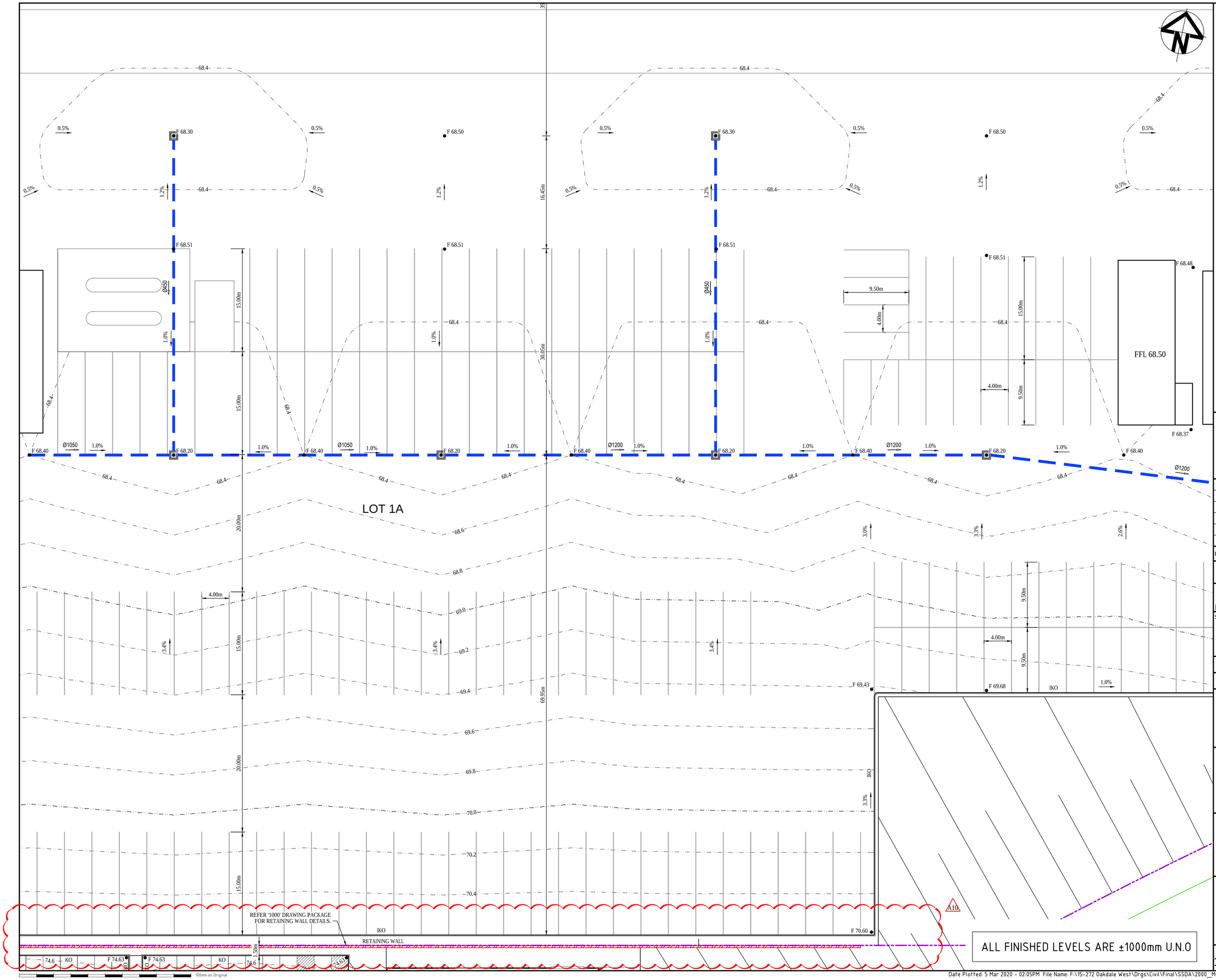
Project: PROPOSED INDUSTRIAL DEVELOPMENT OAKDALE WEST

Title: SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 9 OF 14

Drawing No.	Project No.	Issue
15-272-C2018	15-272	A10



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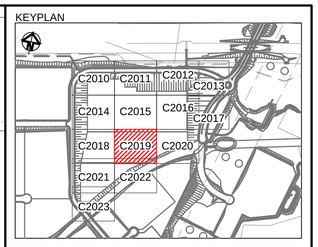

LEGEND

- EXISTING BOUNDARY
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- K&G KERB AND GUTTER
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- NBN EXISTING NBN
- LV/HV EXISTING ELECTRICAL
- G EXISTING GAS MAIN

Bar Scales

0 5 10 15 20

1 : 250 @ A1 1 : 500 @ A3

Issue	Description	Date
A10	ISSUED FOR SSD APPROVAL MOD 2	05-03-20
A9	ISSUED FOR SSD APPROVAL MOD 2	18-09-19
A8	ISSUED FOR SSD APPROVAL MOD 2	01-08-19
A7	ISSUED FOR SSD APPROVAL MOD 2	31-07-19
A6	ISSUED FOR SSD APPROVAL MOD 2	26-07-19
A5	ISSUED FOR INFORMATION	23-07-19

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Status: MOD 2 APPROVAL
NOT TO BE USED FOR CONSTRUCTION

A1

Scales	1 : 250	15-272-C2019.dwg	
		Drawn	GB
		Designed	GB
Height Datum	AHD	Checked	AM
Grid	MGA	Approved	AM

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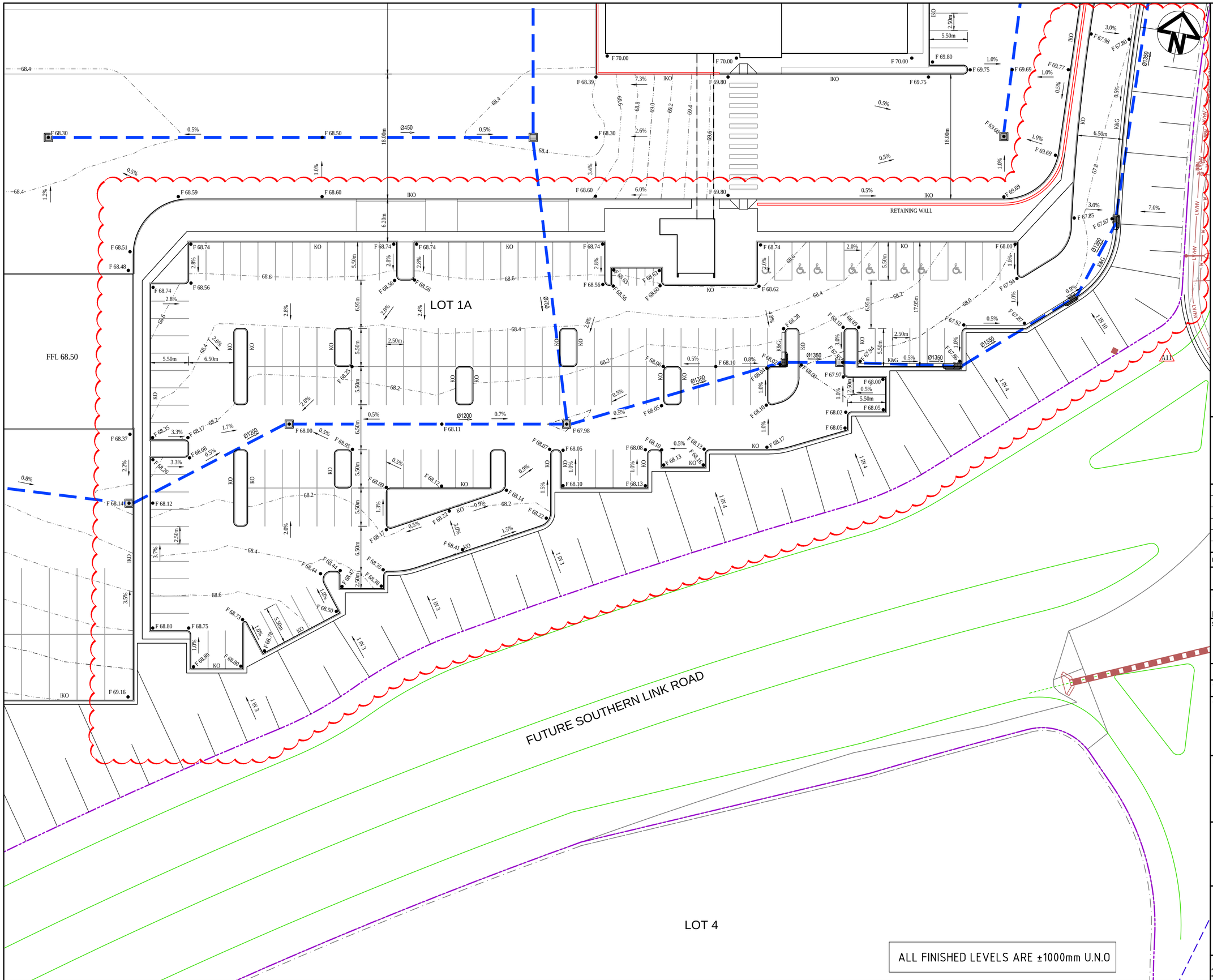
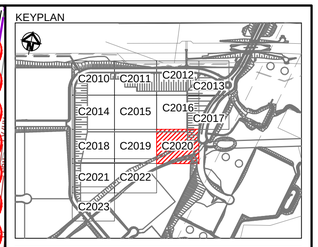
Project
PROPOSED INDUSTRIAL DEVELOPMENT
OAKDALE WEST

Title
SITEWORKS AND STORMWATER DRAINAGE PLAN
SHEET 10 OF 14

Drawing No.	Project No.	Issue
15-272-C2019	15-272	A10



KEYPLAN



LEGEND

- EXISTING BOUNDARY
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- 65.0 PROPOSED CONTOUR
- K&G KERB AND GUTTER
- KO KERB ONLY
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- W EXISTING WATER MAIN
- NBN EXISTING NBN
- LV/HV EXISTING ELECTRICAL
- G EXISTING GAS MAIN

Bar Scales

0 5 10 15 20

1 : 250 @ A1 1 : 500 @ A3

Issue	Description	Date
A11	ISSUED FOR SSD APPROVAL MOD 2	05-03-20
A10	ISSUED FOR SSD APPROVAL MOD 2	29-10-19
A9	ISSUED FOR SSD APPROVAL MOD 2	18-09-19
A8	ISSUED FOR SSD APPROVAL MOD 2	01-08-19
A7	ISSUED FOR SSD APPROVAL MOD 2	31-07-19
A6	ISSUED FOR SSD APPROVAL MOD 2	26-07-19

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Status: MOD 2 APPROVAL — NOT TO BE USED FOR CONSTRUCTION — A1

Scales	1 : 250	15-272-C2020.dwg	
		Drawn	GB
		Designed	GB
Height Datum	AHD	Checked	AM
Grid	MGA	Approved	AM

Client: Goodman

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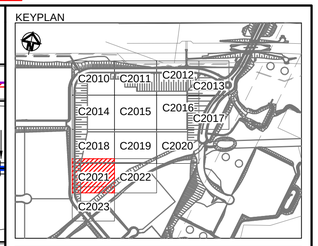
Project: PROPOSED INDUSTRIAL DEVELOPMENT OAKDALE WEST

Title: SITEWORKS AND STORMWATER DRAINAGE PLAN SHEET 11 OF 14

Drawing No.	Project No.	Issue
15-272-C2020	15-272	A11

A10

KEYPLAN



LEGEND

- EXISTING BOUNDARY
- PROPOSED BOUNDARY
- 65.0 PROPOSED CONTOUR
- K&G KERB AND GUTTER
- KO KERB ONLY
- IKO INTEGRAL KERB ONLY
- DD DISH DRAIN
- F74.00 FINISHED SURFACE LEVEL
- Ø375 STORMWATER PIPE WITH SIZE
- STORMWATER OVERLAND FLOWPATH
- GD STORMWATER GRATED DRAIN
- KERB INLET PIT
- SURFACE INLET PIT
- JUNCTION PIT
- GUARDRAIL SAFETY BARRIER
- EXISTING STORMWATER PIPE
- S EXISTING SEWER MAIN
- W EXISTING WATER MAIN
- NBN EXISTING NBN
- LV/HV EXISTING ELECTRICAL
- G EXISTING GAS MAIN

Bar Scales

0 5 10 15 20

1 : 250 @ A1 1 : 500 @ A3

Issue	Description	Date
A10	ISSUED FOR SSD APPROVAL MOD 2	05-03-20
A9	ISSUED FOR SSD APPROVAL MOD 2	18-09-19
A8	ISSUED FOR SSD APPROVAL MOD 2	01-08-19
A7	ISSUED FOR SSD APPROVAL MOD 2	31-07-19
A7	ISSUED FOR SSD APPROVAL MOD 2	26-07-19
A6	ISSUED FOR INFORMATION	23-07-19

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Status: MOD 2 APPROVAL
NOT TO BE USED FOR CONSTRUCTION

A1

Scales	1 : 250	15-272-C2021.dwg	
		Drawn	GB
		Designed	GB
Height Datum	AHD	Checked	AM
Grid	MGA	Approved	AM

Client: Goodman

Civil Engineers and Project Managers
at&l
Level 7, 153 Walker Street
North Sydney NSW 2060
ABN 96 130 882 405
Tel: 02 9439 1777
Fax: 02 9923 1055
www.atl.net.au
info@atl.net.au

Project
PROPOSED INDUSTRIAL DEVELOPMENT
OAKDALE WEST

Title
SITEWORKS AND STORMWATER DRAINAGE PLAN
SHEET 12 OF 14

Drawing No.	Project No.	Issue
15-272-C2021	15-272	A10

LOT 1B
WAREHOUSE
FFL 74.80
(±500mm)

LOT 1B
WAREHOUSE
FFL 74.80
(±500mm)

ROAD No.1

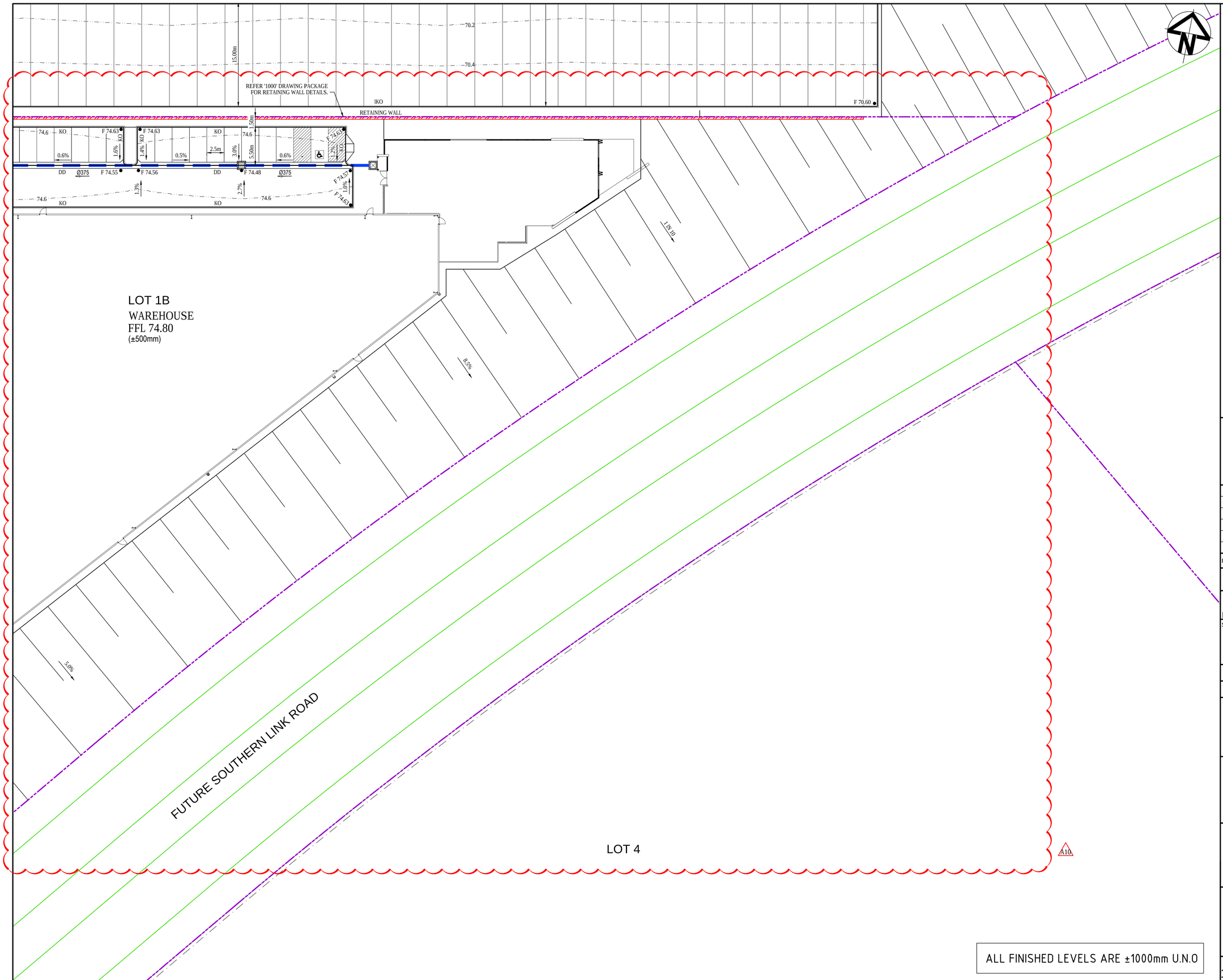
REFER '1000' DRAWING PACKAGE FOR RETAINING WALL DETAILS.

RETAINING WALL

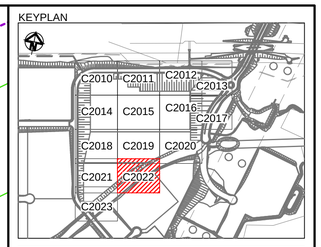
PROPOSED GROSS POLLUTANT TRAP

ALL FINISHED LEVELS ARE ±1000mm U.N.O

100mm on Original



KEYPLAN



LEGEND

- EXISTING BOUNDARY
- PROPOSED BOUNDARY
- 65.0 PROPOSED CONTOUR
- K&G KERB AND GUTTER
- KO KERB ONLY
- IKO INTEGRAL KERB ONLY
- DD DISH DRAIN
- F74.00 FINISHED SURFACE LEVEL
- Ø375 STORMWATER PIPE WITH SIZE
- STORMWATER OVERLAND FLOWPATH
- GD STORMWATER GRATED DRAIN
- KERB INLET PIT
- SURFACE INLET PIT
- JUNCTION PIT
- GUARDRAIL SAFETY BARRIER
- EXISTING STORMWATER PIPE
- S EXISTING SEWER MAIN
- W EXISTING WATER MAIN
- NBN EXISTING NBN
- LV/HV EXISTING ELECTRICAL
- G EXISTING GAS MAIN

Bar Scales

0 5 10 15 20

1 : 250 @ A1 1 : 500 @ A3

Issue	Description	Date
A10	ISSUED FOR SSD APPROVAL MOD 2	05-03-20
A9	ISSUED FOR SSD APPROVAL MOD 2	18-09-19
A8	ISSUED FOR SSD APPROVAL MOD 2	01-08-19
A7	ISSUED FOR SSD APPROVAL MOD 2	31-07-19
A7	ISSUED FOR SSD APPROVAL MOD 2	26-07-19
A6	ISSUED FOR INFORMATION	23-07-19

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Status: MOD 2 APPROVAL
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A1

Scales	1 : 250	15-272-C2022.dwg	
		Drawn	GB
		Designed	GB
Height Datum	AHD	Checked	AM
Grid	MGA	Approved	AM

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Project
PROPOSED INDUSTRIAL DEVELOPMENT
OAKDALE WEST

Title
SITEWORKS AND STORMWATER DRAINAGE PLAN
SHEET 13 OF 14

Drawing No.	Project No.	Issue
15-272-C2022	15-272	A10

LOT 1B
WAREHOUSE
FFL 74.80
(±500mm)

SERVICE
LOT

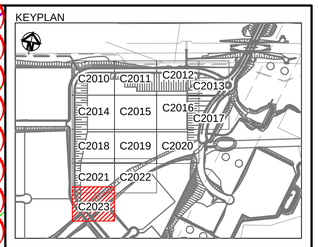
FUTURE SOUTHERN LINK ROAD

ROAD No.1

PROPOSED
SUBSTATION

ALL FINISHED LEVELS ARE ±1000mm U.N.O

KEYPLAN



LEGEND

- EXISTING BOUNDARY
- PROPOSED BOUNDARY
- 65.0 PROPOSED CONTOUR
- K&G KERB AND GUTTER
- KO KERB ONLY
- IKO INTEGRAL KERB ONLY
- DD DISH DRAIN
- F74.00 FINISHED SURFACE LEVEL
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- STORMWATER OVERLAND FLOWPATH
- GD STORMWATER GRATED DRAIN
- KERB INLET PIT
- SURFACE INLET PIT
- JUNCTION PIT
- GUARDRAIL SAFETY BARRIER
- EXISTING STORMWATER PIPE
- S EXISTING SEWER MAIN
- W EXISTING WATER MAIN
- NBN EXISTING NBN
- LV/HV EXISTING ELECTRICAL
- G EXISTING GAS MAIN

Bar Scales

0 5 10 15 20

1 : 250 @ A1 1 : 500 @ A3

Issue	Description	Date
A10	ISSUED FOR SSD APPROVAL MOD 2	05-03-20
A9	ISSUED FOR SSD APPROVAL MOD 2	18-09-19
A8	ISSUED FOR SSD APPROVAL MOD 2	01-08-19
A7	ISSUED FOR SSD APPROVAL MOD 2	31-07-19
A7	ISSUED FOR SSD APPROVAL MOD 2	26-07-19
A6	ISSUED FOR INFORMATION	23-07-19

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Status: MOD 2 APPROVAL
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A1

Scales	1 : 250	15-272-C2023.dwg	
		Drawn	GB
		Designed	GB
Height Datum	AHD	Checked	AM
Grid	MGA	Approved	AM

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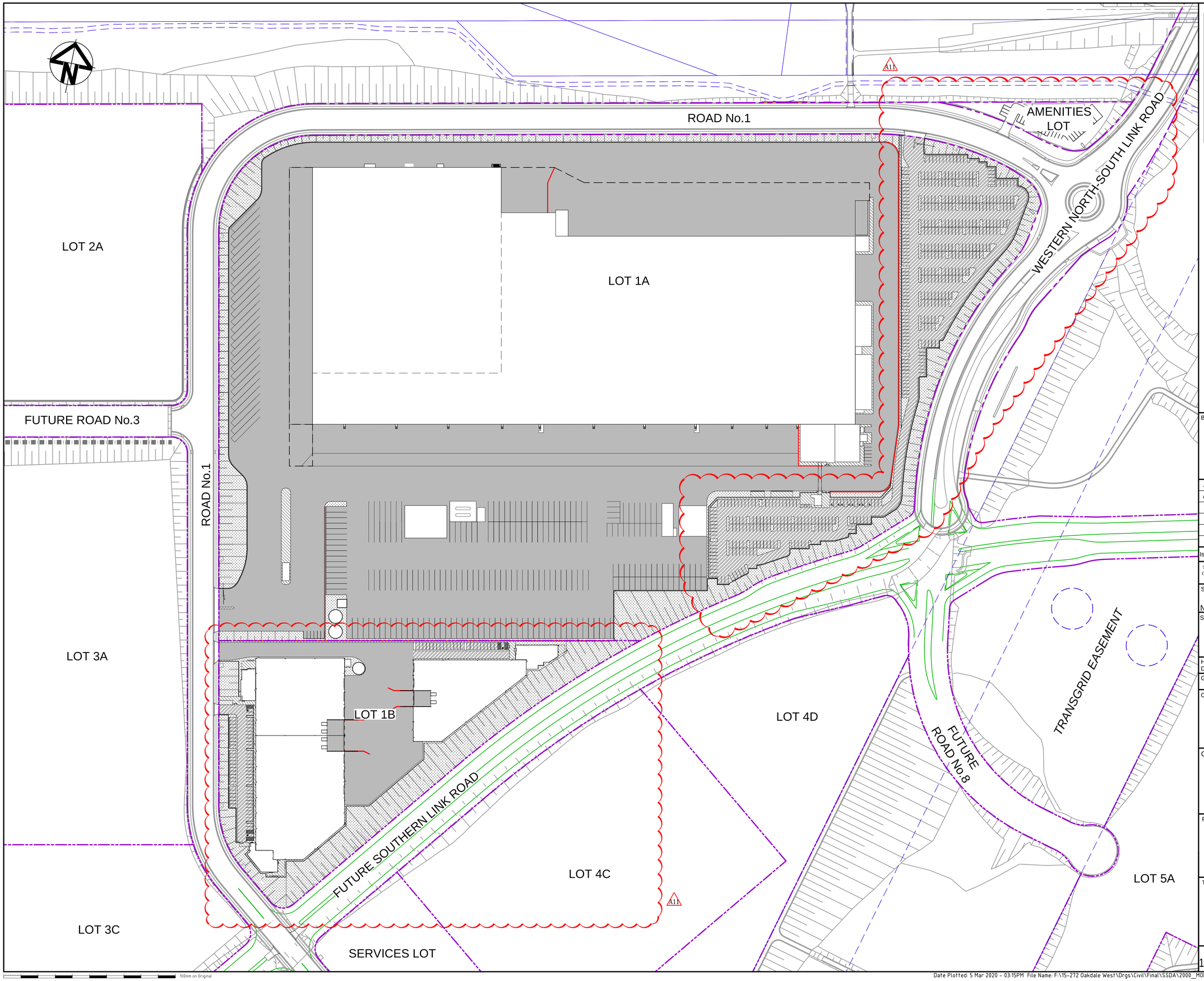
Project
PROPOSED INDUSTRIAL DEVELOPMENT
OAKDALE WEST

Title
SITEWORKS AND STORMWATER DRAINAGE PLAN
SHEET 14 OF 14

Drawing No.	Project No.	Issue
15-272-C2023	15-272	A10

100mm on Original



LEGEND

- HEAVY DUTY RIGID PAVEMENT
- LIGHT DUTY FLEXIBLE PAVEMENT
- LANDSCAPING
- FIRE ACCESS TRACK
- FOOTPATH

Bar Scales

0 25 50 75 100

1 : 1250 @ A1 1 : 2500 @ A3

Issue	Description	Date
A11	ISSUED FOR SSD APPROVAL MOD 2	05-03-20
A10	ISSUED FOR SSD APPROVAL MOD 2	29-10-19
A9	ISSUED FOR SSD APPROVAL MOD 2	18-09-19
A8	ISSUED FOR SSD APPROVAL MOD 2	01-08-19
A7	ISSUED FOR SSD APPROVAL MOD 2	31-07-19
A7	ISSUED FOR SSD APPROVAL MOD 2	26-07-19

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Status: MOD 2 APPROVAL
NOT TO BE USED FOR CONSTRUCTION

A1

Scales	1 : 1250	15-272-C2030.dwg	
		Drawn	GB
		Designed	GB
Height Datum	AHD	Checked	AM
Grid	MGA	Approved	AM

Client: Goodman

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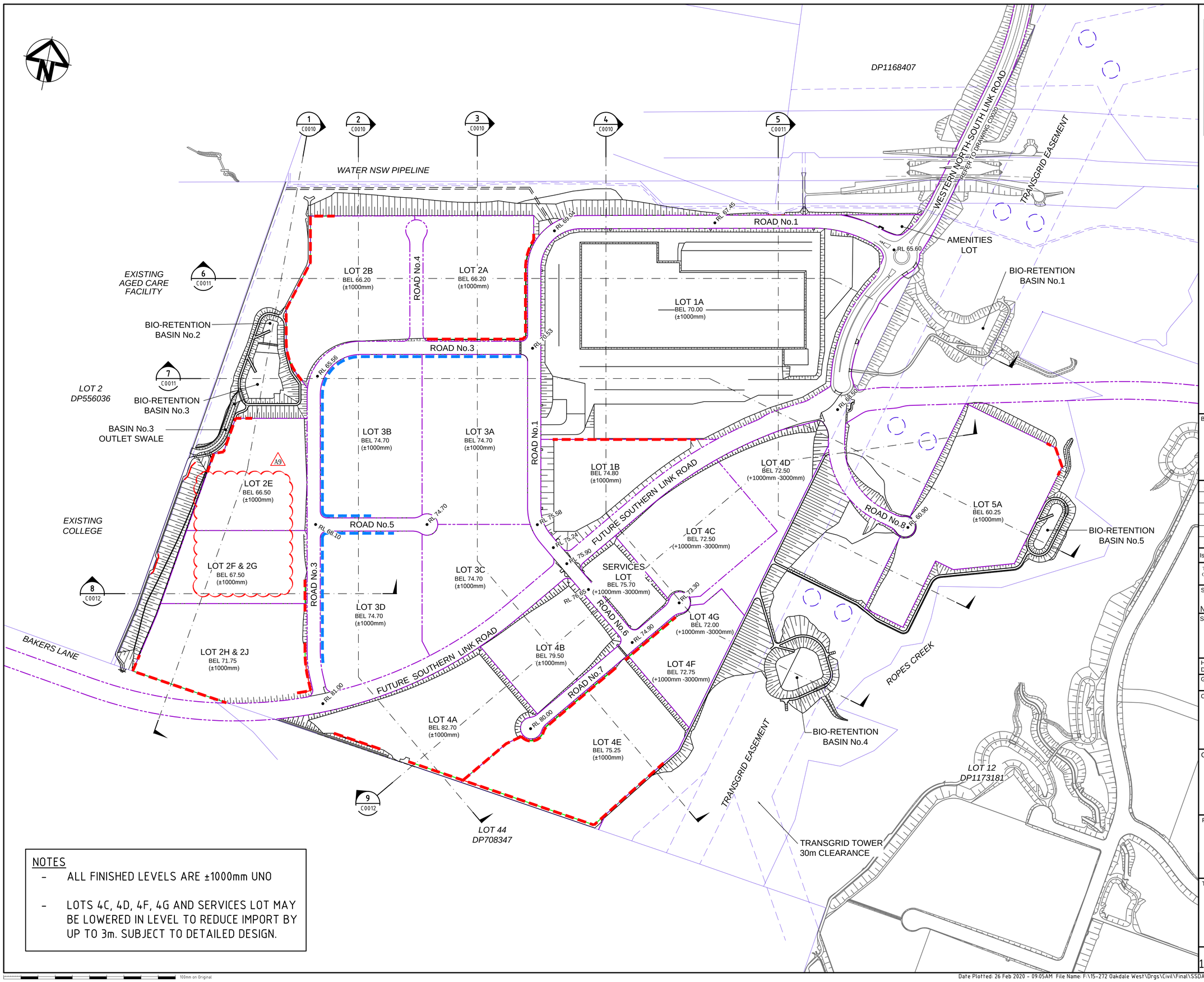
Project: PROPOSED INDUSTRIAL DEVELOPMENT OAKDALE WEST

Title: PAVEMENT PLAN

Drawing No.	Project No.	Issue
15-272-C2030	15-272	A11

100mm on Original

Date Plotted: 5 Mar 2020 - 03:15PM File Name: F:\15-272 Oakdale West\Drgs\Civil\Final\SSDA\2000_MOD 2_On-Lot Works Package Stage 1\15-272-C2030.dwg



LEGEND

- EXISTING BOUNDARY
- EXISTING EASEMENT
- PROPOSED BOUNDARY
- STAGE 1 RETAINING WALL
- FUTURE RETAINING WALL
- BEL 74.70 — AVERAGE BULK EARTHWORKS LEVEL

Bar Scales

0 50 100 150 200 250

1 : 3000 @ A1

Issue	Description	Date
A9	ISSUED FOR SSD APPROVAL MOD 2	26-02-20
A8	ISSUED FOR SSD APPROVAL MOD 2	18-09-19
A7	ISSUED FOR SSD APPROVAL MOD 2	21-08-19
A6	ISSUED FOR SSD APPROVAL MOD 2	24-07-19
A5	ISSUED FOR INFORMATION MOD 2	07-06-19
A4	ISSUED FOR SSD APPROVAL	05-10-18

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Status: MOD 2 APPROVAL — NOT TO BE USED FOR CONSTRUCTION

A1

Scales	1 : 3000	15-272-C0001.dwg	
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		Designed	GB
Height Datum	AHD	Checked	AM
Grid	MGA	Approved	AM

Client: Goodman

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ABN 96 130 882 405
Tel: 02 9439 1777
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www.atl.net.au
info@atl.net.au

Project: PROPOSED INDUSTRIAL DEVELOPMENT OAKDALE WEST

Title: GENERAL ARRANGEMENT MASTER PLAN

Drawing No.	Project No.	Issue
15-272-C0001	15-272	A9

NOTES

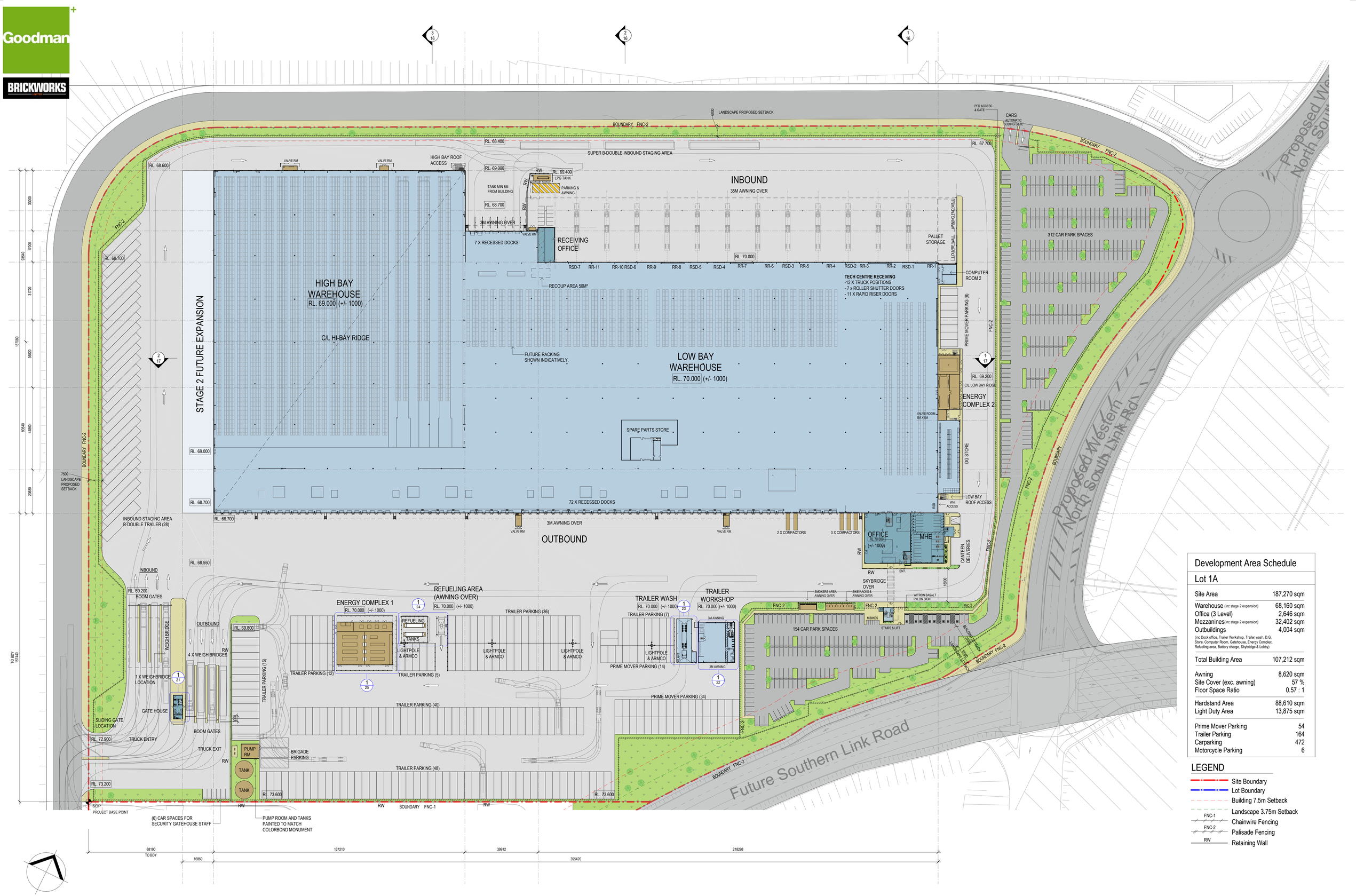
- ALL FINISHED LEVELS ARE ±1000mm UNO
- LOTS 4C, 4D, 4F, 4G AND SERVICES LOT MAY BE LOWERED IN LEVEL TO REDUCE IMPORT BY UP TO 3m. SUBJECT TO DETAILED DESIGN.

100mm on Original

Annexure B

Annexure C

https://atl.sharefile.com/d-s6707de18965426e8



Development Area Schedule

Lot 1A

Site Area	187,270 sqm
Warehouse (inc stage 2 expansion)	68,160 sqm
Office (3 Level)	2,646 sqm
Mezzanines (inc stage 2 expansion)	32,402 sqm
Outbuildings	4,004 sqm
(inc Dock office, Trailer Workshop, Trailer wash, D.G. Store, Computer Room, Gatehouse, Energy Complex, Refueling area, Battery charge, Skybridge & Lobby)	
Total Building Area	107,212 sqm
Awning	8,620 sqm
Site Cover (exc. awning)	57 %
Floor Space Ratio	0.57 : 1
Hardstand Area	88,610 sqm
Light Duty Area	13,875 sqm
Prime Mover Parking	54
Trailer Parking	164
Carparking	472
Motorcycle Parking	6

LEGEND

- Site Boundary
- Lot Boundary
- Building 7.5m Setback
- Landscape 3.75m Setback
- FNC-1 Chainwire Fencing
- FNC-2 Palisade Fencing
- RW Retaining Wall

SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Proposed Industrial Facility - Building 1A

Site Plan

1 : 750 @ B1

25th February 2020

OAK-1A-DA- 10 (X)

Job No 15117

851

Goodman

BRICKWORKS LIMITED

VALVE ROOM

VALVE ROOM

3/16

HIGH BAY STAIR ACCEES

2/16

1/16

LPG CANOPY

TRUCK POSITIONS BELOW

3M AWNING

AWNING ROOF

MAINTENANCE WALKWAY

STEP IN ROOF

STEP IN ROOF

COMPUTER ROOM 2

HIGH BAY ROOF

C/L HI-BAY RIDGE

FUTURE SOLAR PANEL LOCATION

STEP IN ROOF

LOW BAY ROOF

ENERGY COMPLEX 2 ROOF

C/L LOW BAY RIDGE

VALVE ROOM

DG STORE ROOF

LOW BAY STAIR ACCESS

2/17

1/17

ROOF MOUNTED A/C UNITS SHOWN INDICATIVELY TO MECH.ENG DETAIL DESIGN WITH ACOUSTIC SCREENING IN ACCORDANCE WITH NOISE ASSESSMENT REPORT

HIGH BAY 137525

VALVE ROOM

3M AWNING

LOW BAY 257895

VALVE ROOM

OFFICE ROOF

SKYBRIDGE

LIFT & STAIRS

REFUELING AREA

ENERGY COMPLEX 1

TRAILER WORKSHOP

TRAILER WASH

GATEHOUSE

LEGEND

BG	Box Gutter
EG	Eaves Gutter
MR	Metal Roof Sheeting
TR	Translucent Sheeting
EJ	Expansion Joint

SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Proposed Industrial Facility - Building 1A

Roof Plan

1 : 500 @ B1

25th February 2020

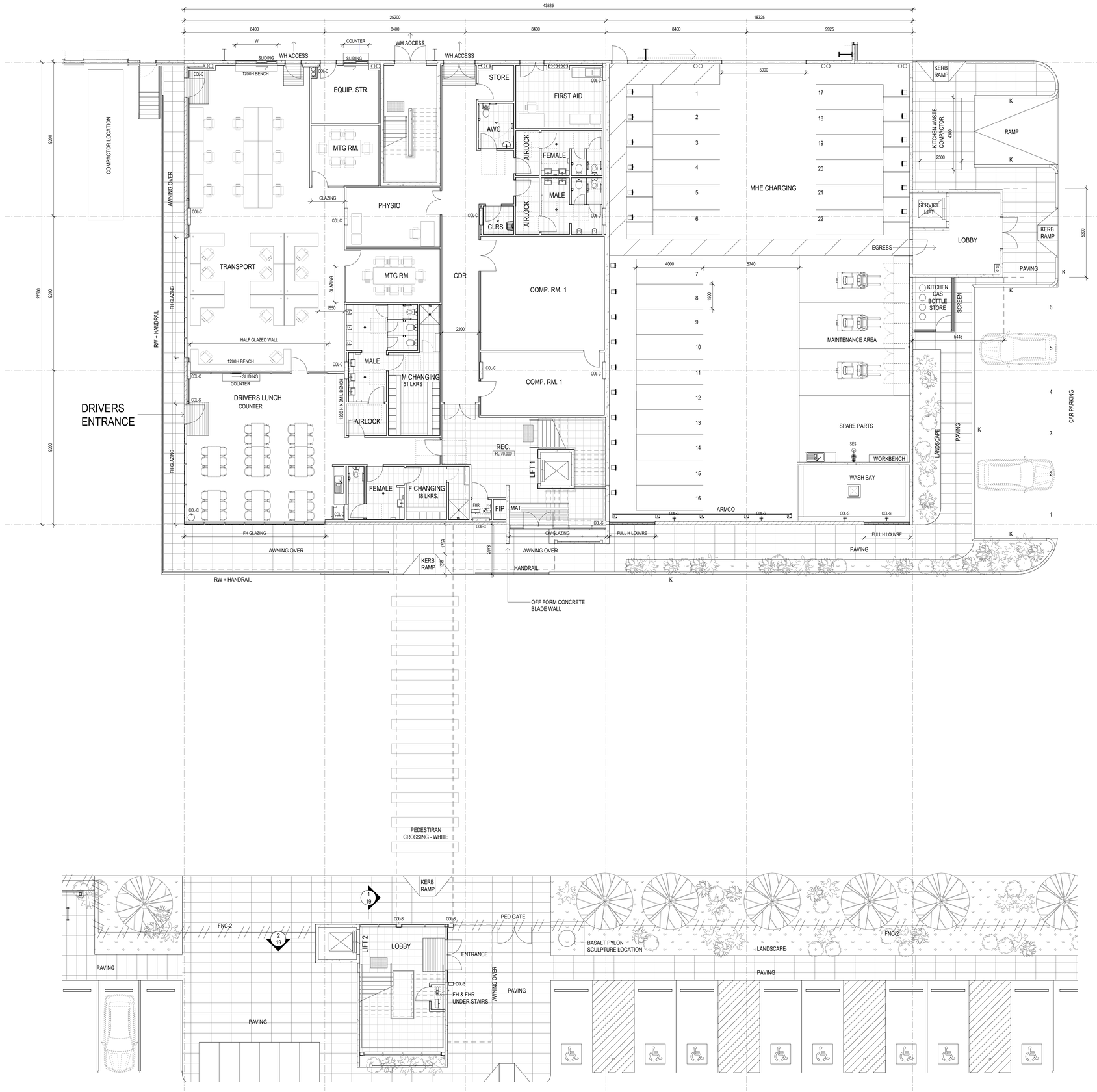
OAK-1A-DA-11 (Q)

Job No 15117

852

Goodman

BRICKWORKS LIMITED



SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Proposed Industrial Facility - Building 1A

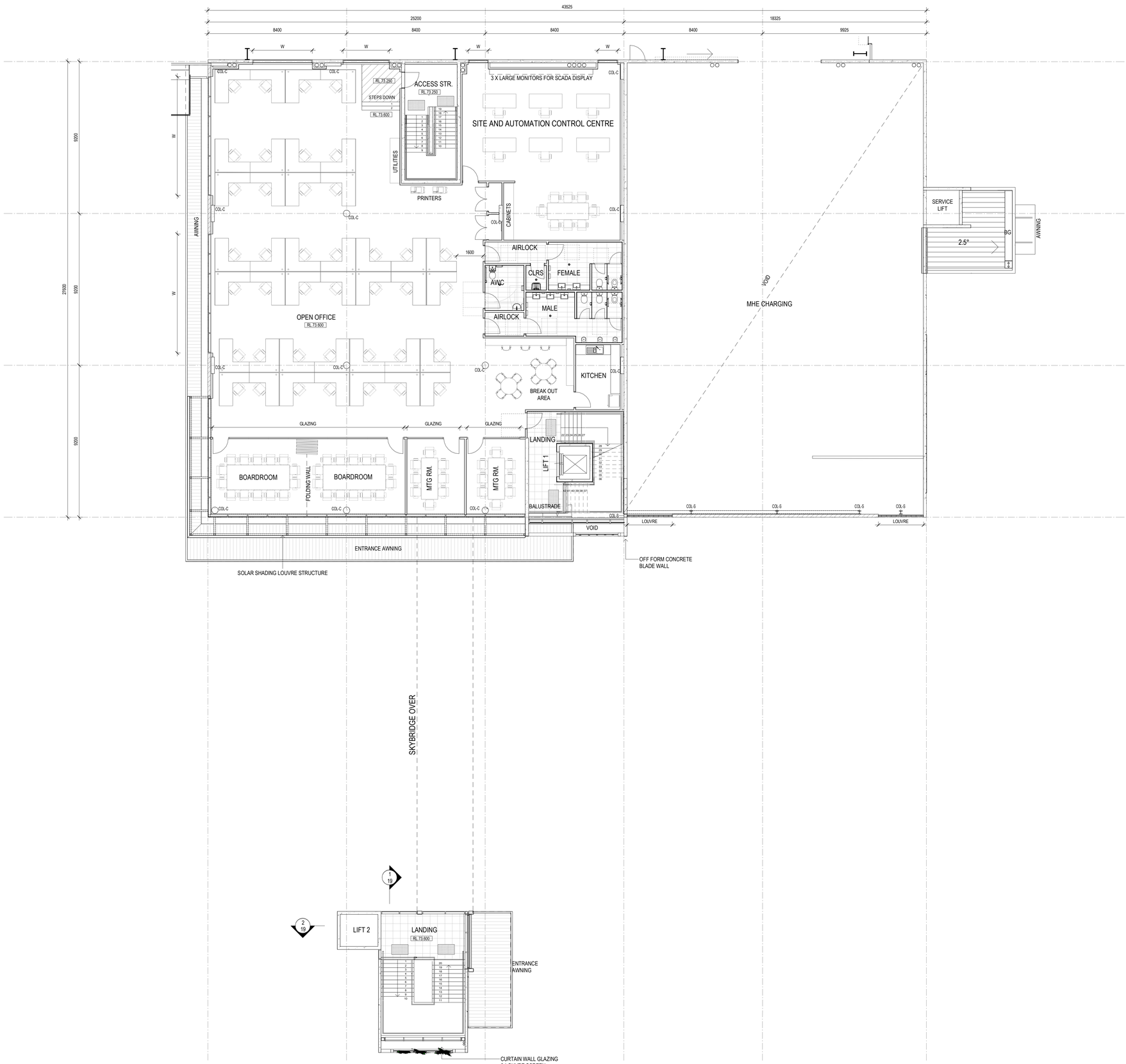
Office - Ground Floor Plan

1 : 100 @ B1

25th February 2020

OAK-1A-DA- 12 (P)

Job No 15117

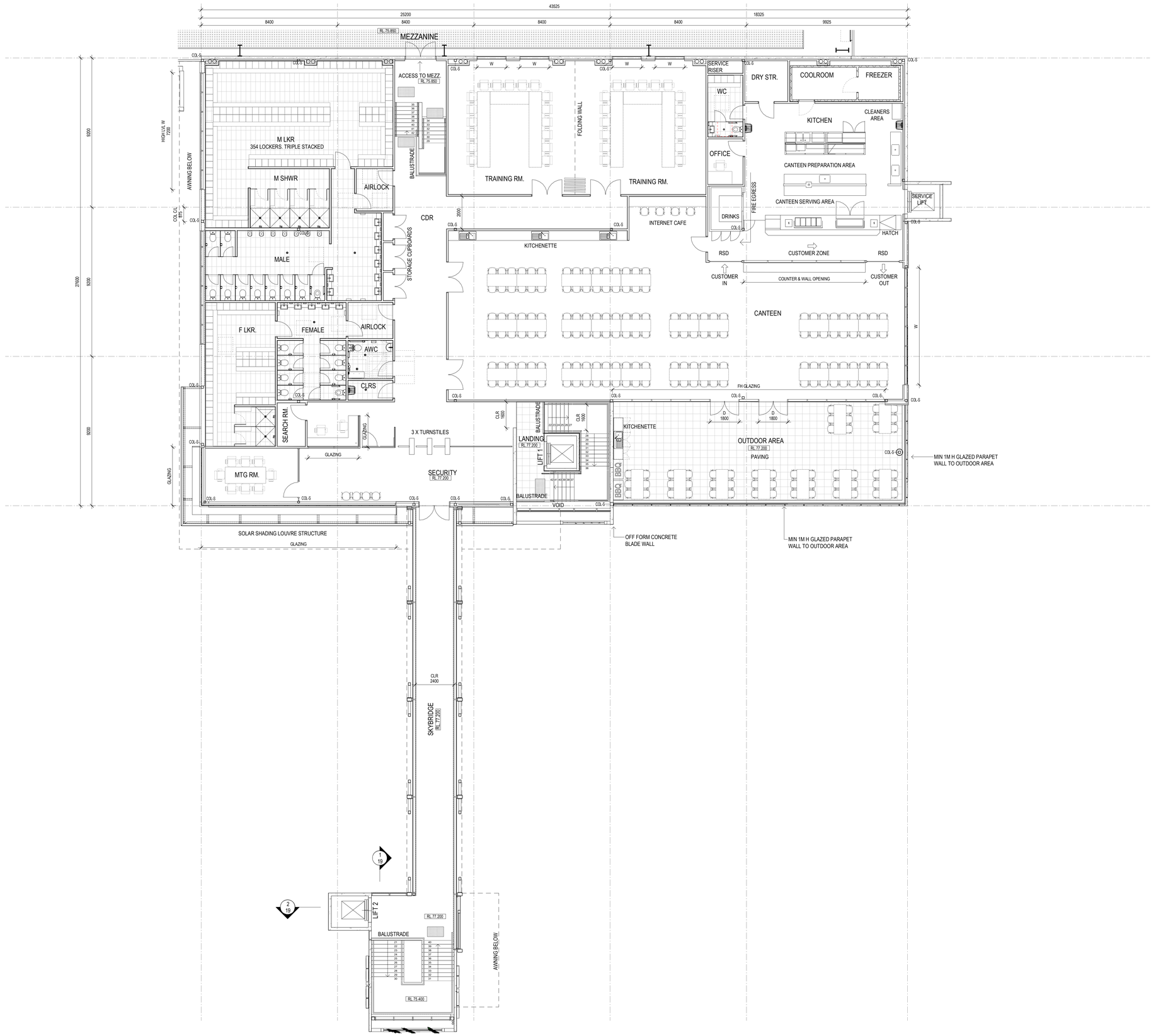


SBA ARCHITECTS	Oakdale West Estate	Proposed Industrial Facility - Building 1A	**Office - First Floor Plan**	1 : 100 @ B1
	Horsley Park			25th February 2020

OAK-1A-DA- 13 (P)
Job No 15117

Goodman

BRICKWORKS LIMITED



SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Proposed Industrial Facility - Building 1A

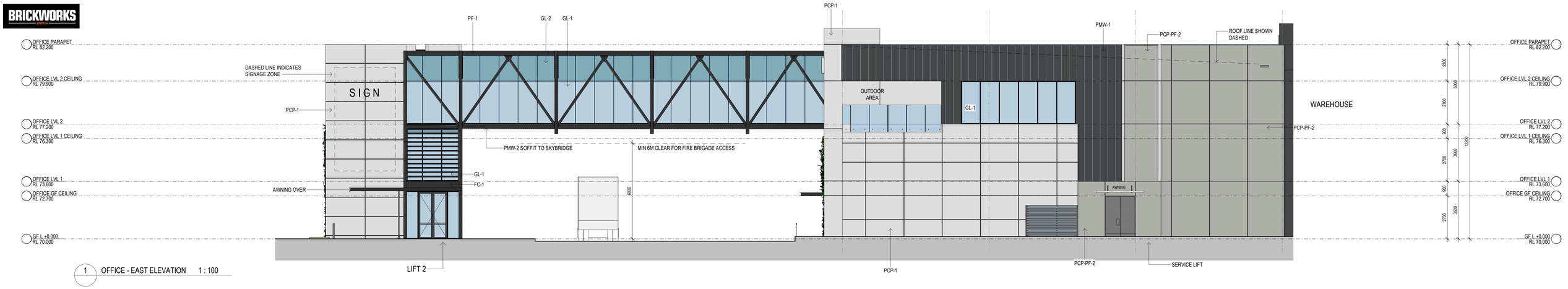
Office - Second Floor Plan

1 : 100 @ B1

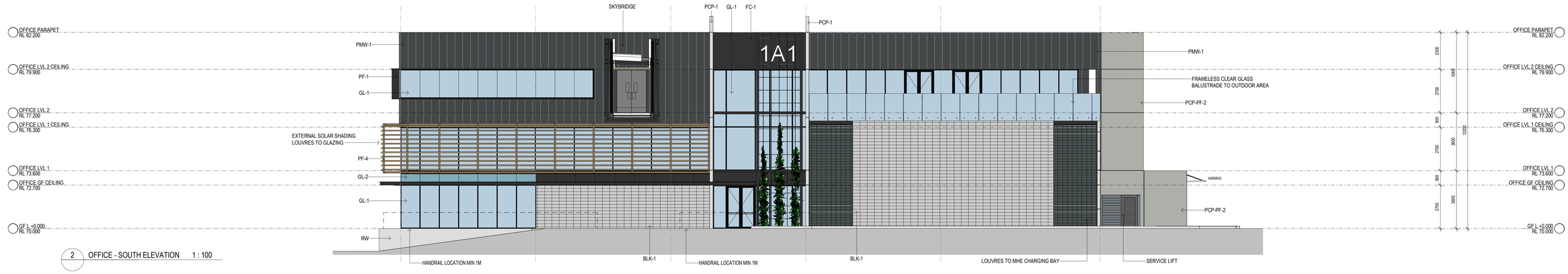
25th February 2020

OAK-1A-DA13A (K)

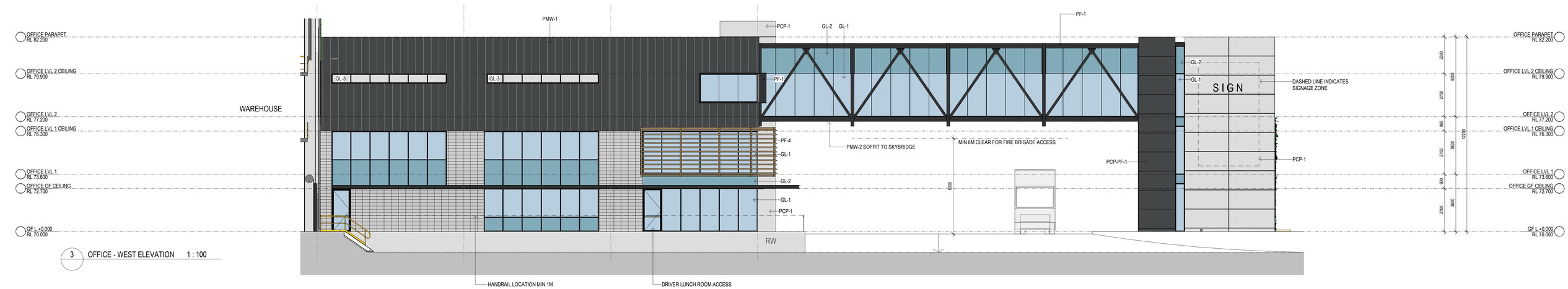
Job No 15117



1 OFFICE - EAST ELEVATION 1 : 100



2 OFFICE - SOUTH ELEVATION 1 : 100



3 OFFICE - WEST ELEVATION 1 : 100

INDICATIVE EXTERNAL FINISHES LEGEND

- **BLK-1** STACKED BOND BLOCK LIGHT GREY
- **FC-1** PREFINISHED FIBRE CEMENT WALL SHEETING
- **GL-1** GLAZING DARK GREY TINT
- **GL-2** SPANDREL GLAZING DARK GREY (OPAQUE)
- **GL-3** PRIVACY GLAZING - TRANSLUSCENT
- **GL-4** CLEAR GLASS
- **IWP-1** INSULATED WALL PANEL COLORBOND - MONUMENT
- **IWP-2** INSULATED WALL PANEL COLORBOND - SHALE GREY
- **IWP-3** INSULATED WALL PANEL COLORBOND - WHITE
- **MDR-1** METAL DECK ROOFING COLORBOND - SURFMIST
- **MDR-2** METAL DECK ROOFING COLORBOND - COOLMAX
- **PCP-1** PRECAST CONCRETE PANELS OFF FORM CONCRETE
- **PCP-PF-1** PRECAST CONCRETE PANELS PAINT FINISH - MONUMENT
- **PCP-PF-2** PRECAST CONCRETE PANELS PAINT FINISH - MID GREY
- **PF-1** PAINT FINISH - 1 MONUMENT
- **PF-2** PAINT FINISH - 2 MID GREY
- **PF-3** PAINT FINISH - 3 SHALE GREY
- **PF-4** ANODISED BRONZE FINISH
- **PMW-1** PREFINISHED METAL WALL SHEETING MONUMENT (OR SIMILAR)
- **PMW-2** PREFINISHED METAL WALL SHEETING DARK GREY (OR SIMILAR)
- **PMW-3** PREFINISHED METAL WALL SHEETING WHITE (OR SIMILAR)
- **PMW-4** PREFINISHED METAL WALL SHEETING "GOODMAN GREEN"
- **TRS-1** TRANSLUCENT ROOF SHEET - OPAL COLOUR (OR SIMILAR)
- **TRS-2** DANPALON TRANSULCENT WALL CLADDING - OPAL COLOUR

SBA ARCHITECTS

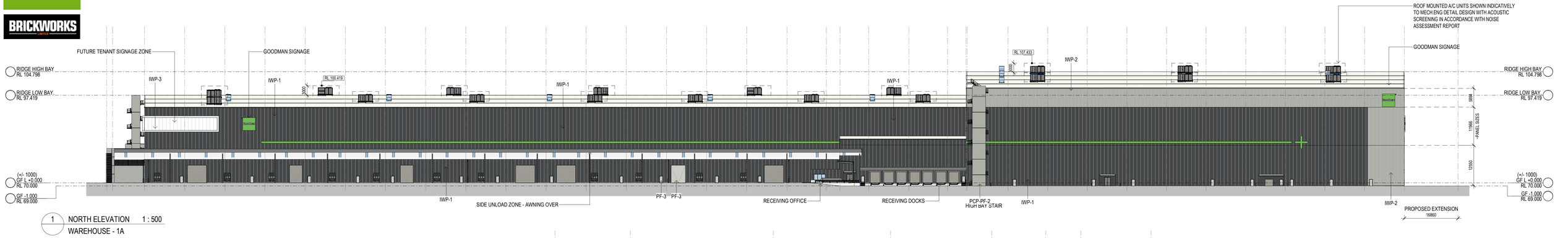
Oakdale West Estate
Horsley Park

Proposed Industrial Facility - Building 1A

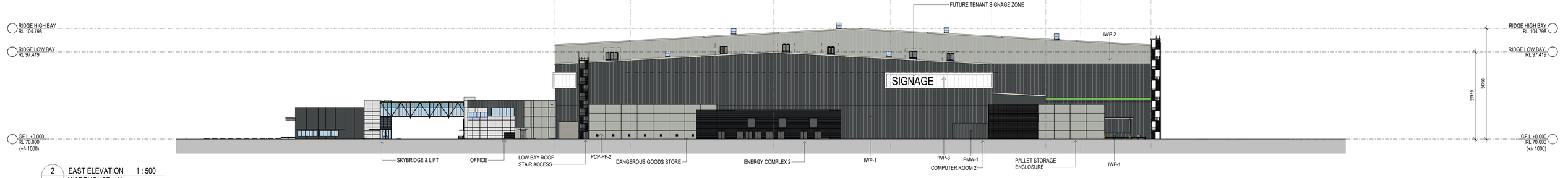
Office Elevations

As indicated @ B1
25th February 2020

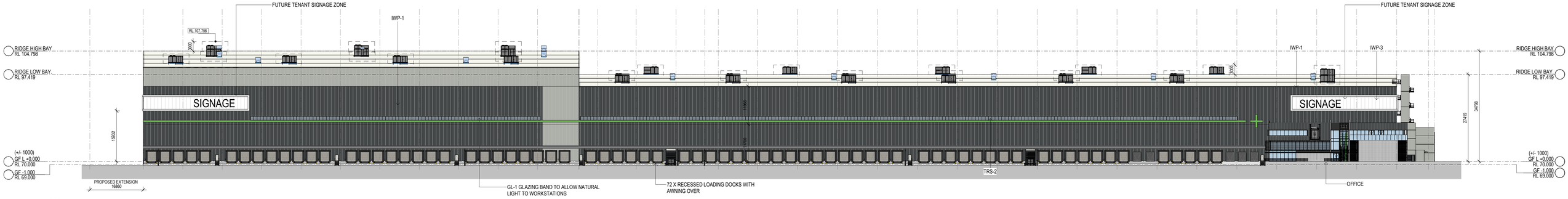
OAK-1A-DA- 14 (P)
Job No 15117



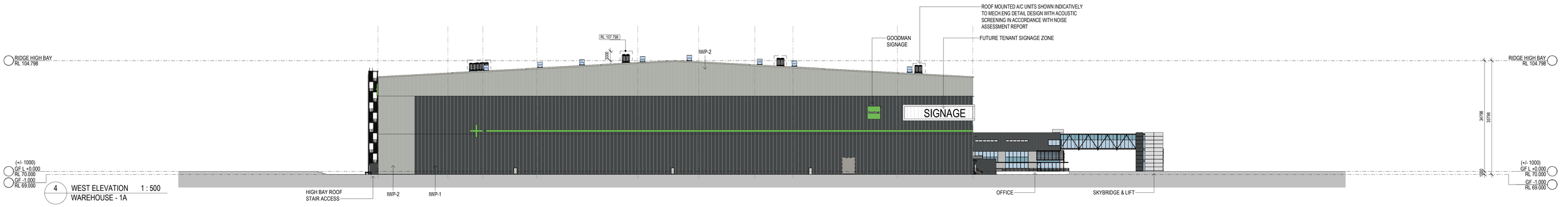
1 NORTH ELEVATION 1 : 500
WAREHOUSE - 1A



2 EAST ELEVATION 1 : 500
WAREHOUSE - 1A



3 SOUTH ELEVATION 1 : 500
WAREHOUSE - 1A



4 WEST ELEVATION 1 : 500
WAREHOUSE - 1A

INDICATIVE EXTERNAL FINISHES LEGEND

- **BLK-1** STACKED BOND BLOCK LIGHT GREY
- **FC-1** PREFINISHED FIBRE CEMENT WALL SHEETING
- **GL-1** GLAZING DARK GREY TINT
- **GL-2** SPANDREL GLAZING DARK GREY (OPAQUE)
- **GL-3** PRIVACY GLAZING - TRANSLUSCENT
- **GL-4** CLEAR GLASS
- **IWP-1** INSULATED WALL PANEL COLORBOND - MONUMENT
- **IWP-2** INSULATED WALL PANEL COLORBOND - SHALE GREY
- **IWP-3** INSULATED WALL PANEL COLORBOND - WHITE
- **MDR-1** METAL DECK ROOFING COLORBOND - SURFMIST
- **MDR-2** METAL DECK ROOFING COLORBOND - COOLMAX
- **PCP-1** PRECAST CONCRETE PANELS OFF FORM CONCRETE
- **PCP-PF-1** PRECAST CONCRETE PANELS PAINT FINISH - MONUMENT
- **PCP-PF-2** PRECAST CONCRETE PANELS PAINT FINISH - MID GREY
- **PF-1** PAINT FINISH - 1 MONUMENT
- **PF-2** PAINT FINISH - 2 MID GREY
- **PF-3** PAINT FINISH - 3 SHALE GREY
- **PF-4** ANODISED BRONZE FINISH
- **PMW-1** PREFINISHED METAL WALL SHEETING MONUMENT (OR SIMILAR)
- **PMW-2** PREFINISHED METAL WALL SHEETING DARK GREY (OR SIMILAR)
- **PMW-3** PREFINISHED METAL WALL SHEETING WHITE (OR SIMILAR)
- **PMW-4** PREFINISHED METAL WALL SHEETING "GOODMAN GREEN"
- **TRS-1** TRANSLUCENT ROOF SHEET - OPAL COLOUR (OR SIMILAR)
- **TRS-2** DANPALON TRANSLUCENT WALL CLADDING - OPAL COLOUR

SBA ARCHITECTS

Oakdale West Estate
Horsley Park

Proposed Industrial Facility - Building 1A

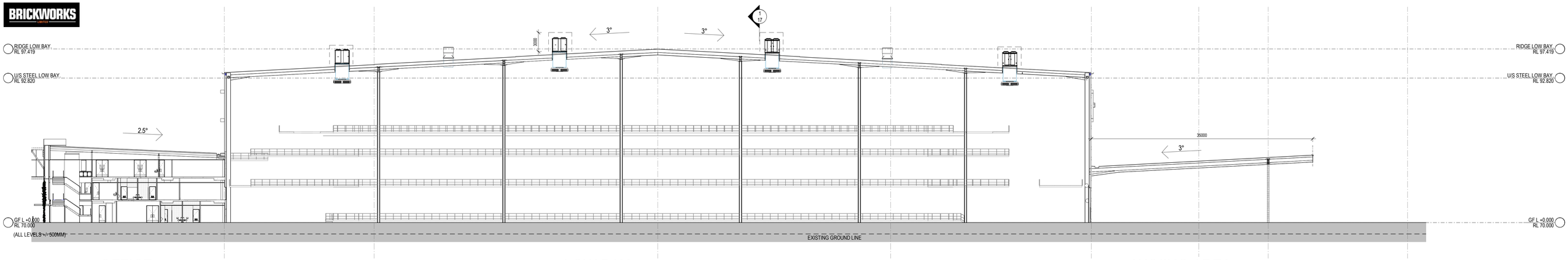
Warehouse Elevations

As indicated @ B1
25th February 2020

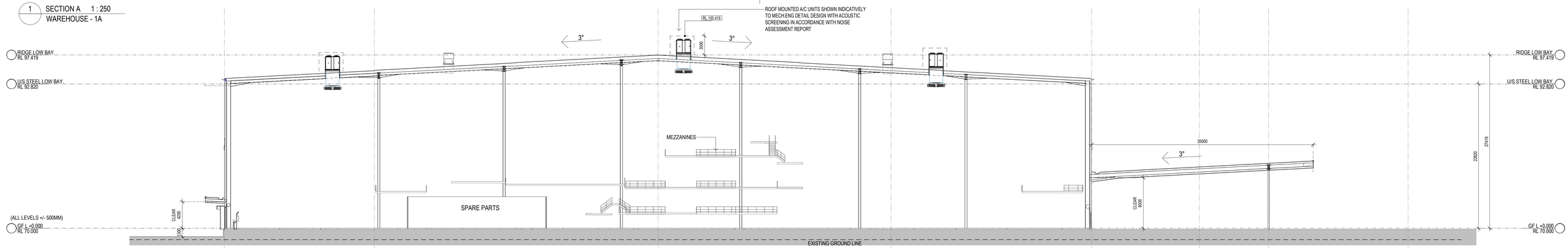
OAK-1A-DA-15 (Q)
Job No 15117

Goodman

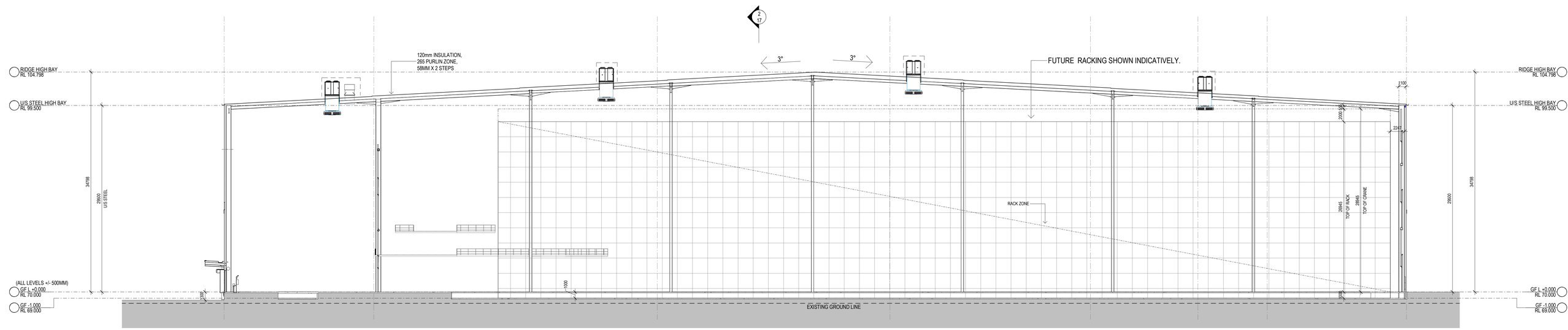
BRICKWORKS LIMITED



1 SECTION A 1 : 250
WAREHOUSE - 1A



2 SECTION B. 1 : 250
WAREHOUSE - 1A

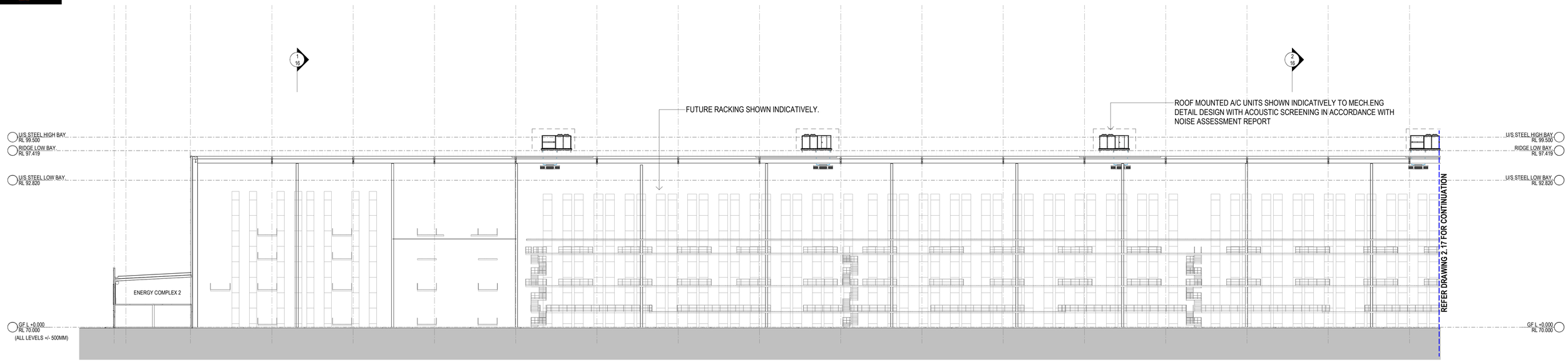


3 SECTION C 1 : 250
WAREHOUSE - 1A

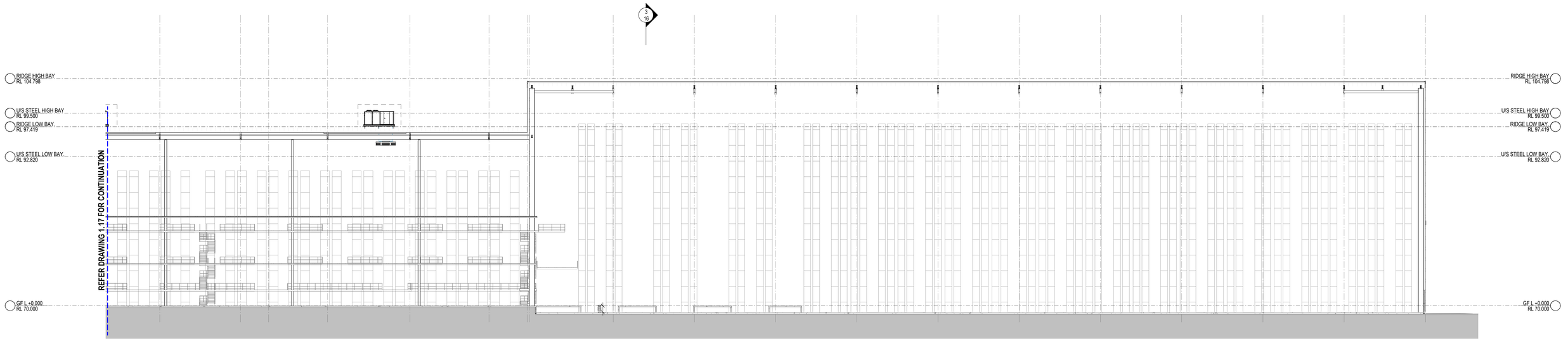
SBA ARCHITECTS

Oakdale West Estate	Proposed Industrial Facility - Building 1A	**Warehouse Sections - 1**	1 : 250 @ B1	OAK-1A-DA- 16 (Q)
Horsley Park			25th February 2020	Job No 15117

858



1 SECTION D - PART 1 1 : 250
WAREHOUSE - 1A



2 SECTION D - PART 2 1 : 250
WAREHOUSE - 1A

SBA ARCHITECTS

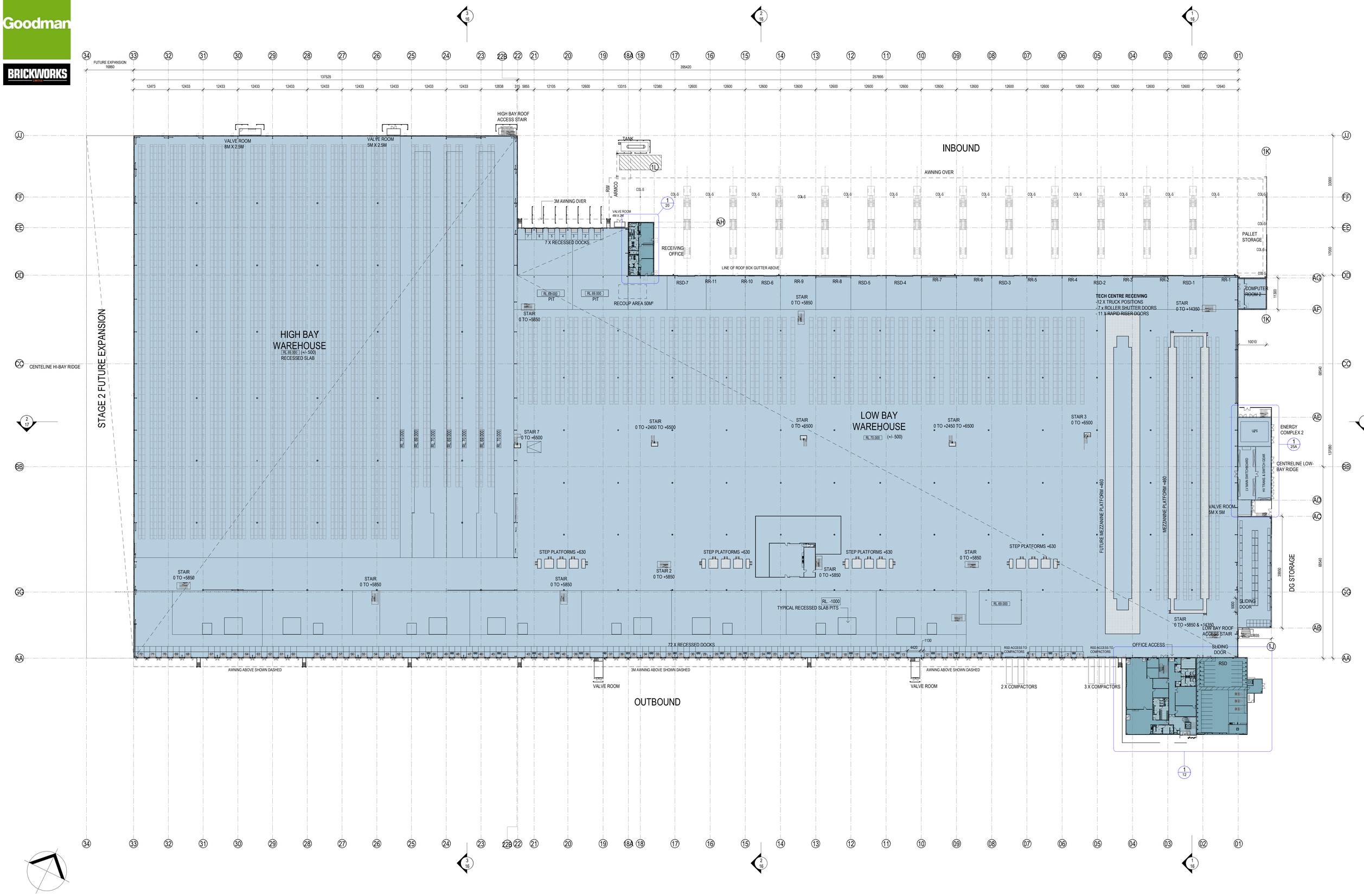
Oakdale West Estate
Horsley Park

Proposed Industrial Facility - Building 1A

Warehouse Sections - 2

1 : 250 @ B1
25th February 2020

OAK-1A-DA- 17 (K)
Job No 15117



SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Proposed Industrial Facility - Building 1A

Warehouse Plan

1 : 500 @ B1

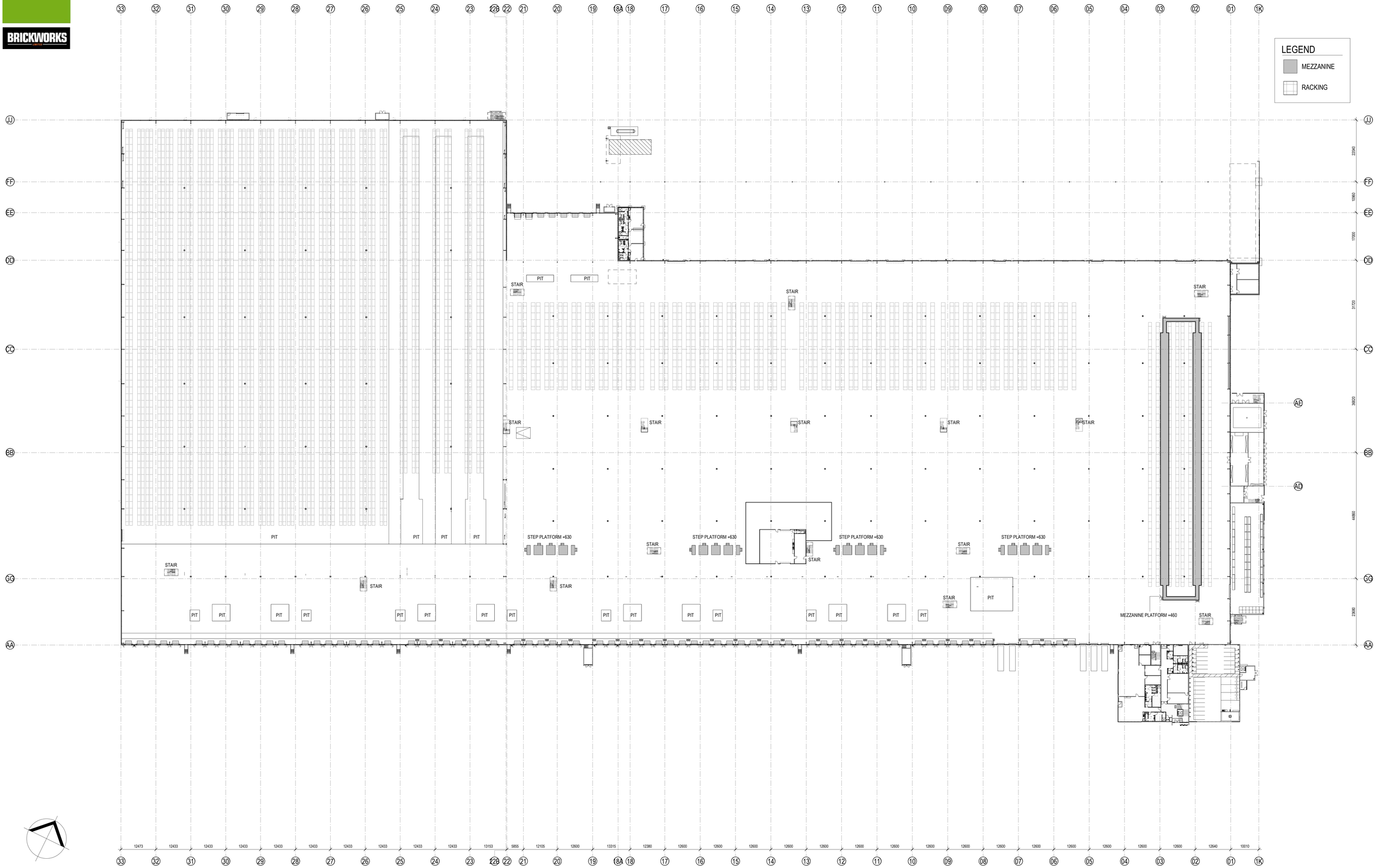
25th February 2020

OAK-1A-DA- 18 (K)

Job No 15117

Goodman

BRICKWORKS LIMITED



SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Proposed Industrial Facility - Building 1A

Mezzanine Plan - 1

1 : 500 @ B1

25th February 2020

OAK-1A-DA18A (H)

Job No 15117

Goodman

BRICKWORKS LIMITED

LEGEND

- MEZZANINE
- RACKING

MEZZANINE PLATFORM +2450

MEZZANINE PLATFORM +2370

GANTRY ACCESS +3900

SERVICE PLATFORM +2370

STAIR

PIT

33	32	31	30	29	28	27	26	25	24	23	22B	22	21	20	19	18A	18	17	16	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	1K
12473	12433	12433	12433	12433	12433	12433	12433	12433	12433	12433	13153	5855	12105	12600	13315		12380	12600	12600	12600	12600	12600	12600	12600	12600	12600	12600	12600	12600	12600	12600	12600	12640	10010

JJ	FF	EE	DD	CC	BB	AE	AD	GG	AA
	22940	15960	17000	31720	39600			14560	23680

SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Proposed Industrial Facility - Building 1A

Mezzanine Plan - 2

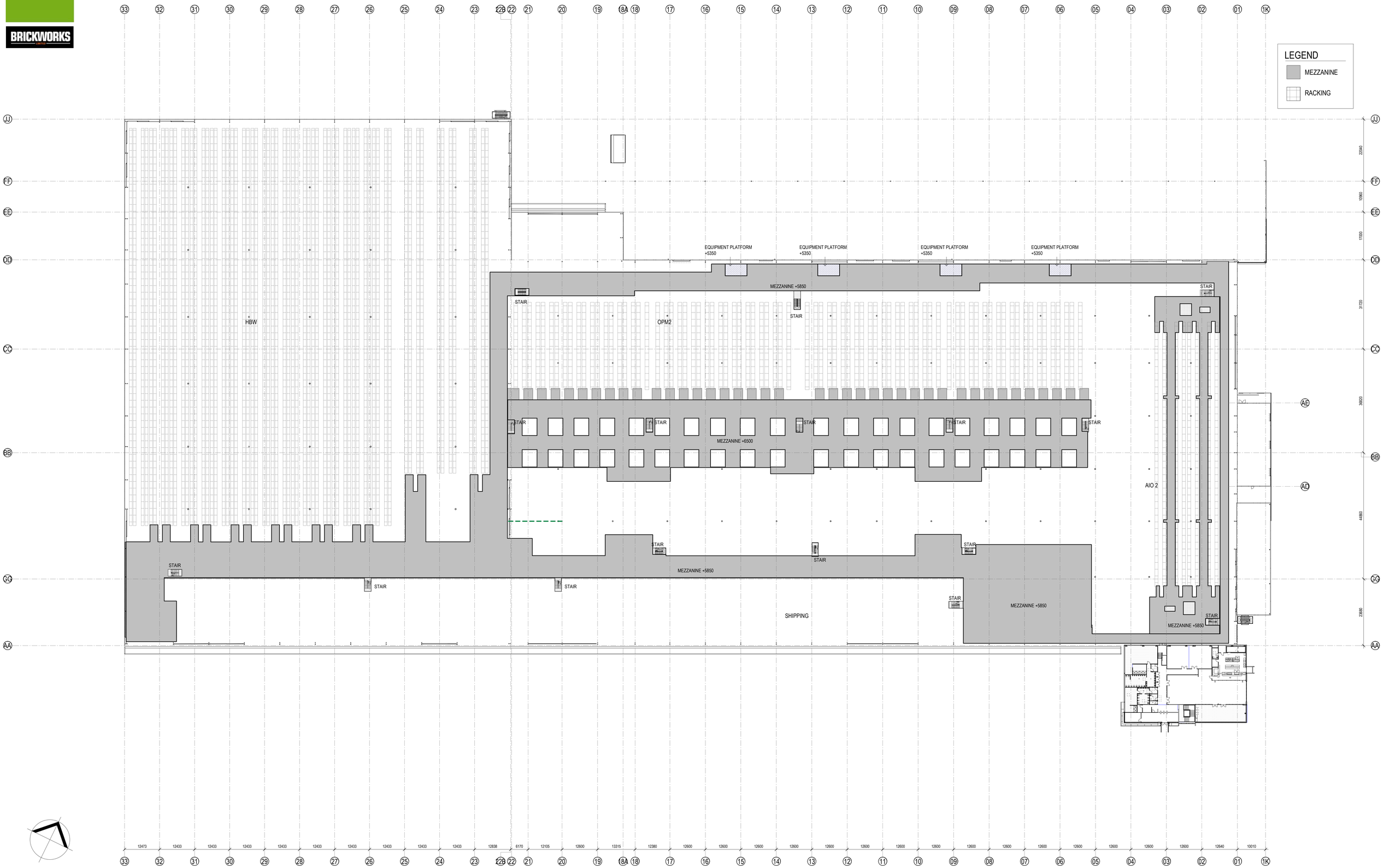
1 : 500 @ B1

25th February 2020

OAK-1A-DA18B (H)

Job No 15117

862



SBA ARCHITECTS

Oakdale West Estate
Horsley Park

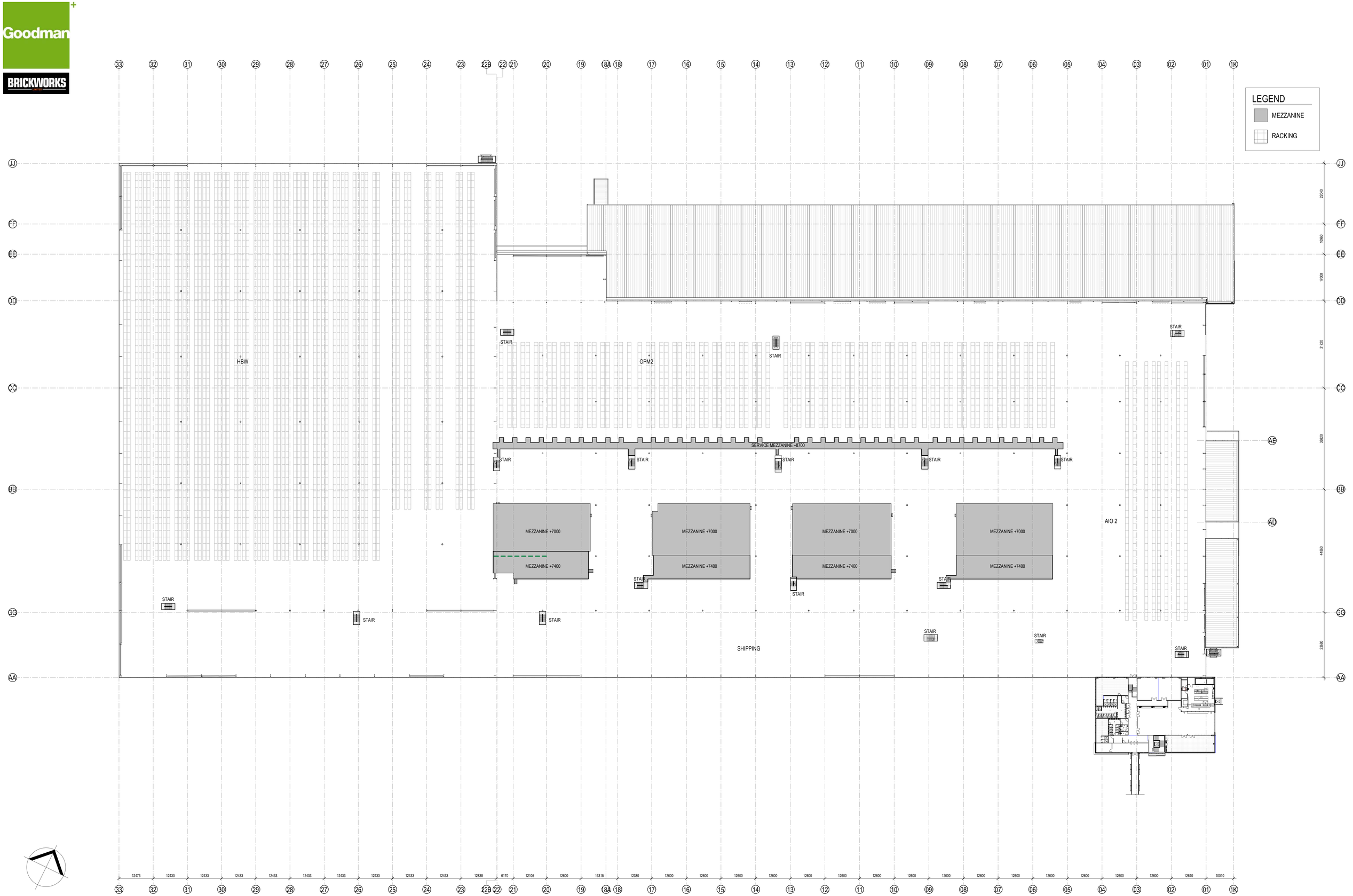
Proposed Industrial Facility - Building 1A

Mezzanine Plan - 3

1 : 500 @ B1
25th February 2020

OAK-1A-DA18C (H)
Job No 15117

863



SBA ARCHITECTS

Oakdale West Estate
Horsley Park

Proposed Industrial Facility - Building 1A

Mezzanine Plan - 4

1 : 500 @ B1
25th February 2020

OAK-1A-DA18D (H)
Job No 15117

864

Goodman

BRICKWORKS LIMITED

LEGEND

MEZZANINE

RACKING

HBW

OPM2

SERVICE MEZZANINE +10400

MEZZANINE +11500

STAIR

AIO 2

MEZZANINE +9600

MEZZANINE +10000

MEZZANINE +8400

MEZZANINE +10660

SERVICE MEZZANINE +9600

SHIPPING

12473 12433 12433 12433 12433 12433 12433 12433 12433 12433 12433 12838 6170 12105 12600 13315 12380 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12640 10010

22940 10960 17000 31720 38820 44860 23830

33 32 31 30 29 28 27 26 25 24 23 22B 22 21 20 19 18A 18 17 16 15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 1K

JJ FF EE DD CC BB GG AA AE AD

SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Proposed Industrial Facility - Building 1A

Mezzanine Plan - 5

1 : 500 @ B1

25th February 2020

OAK-1A-DA18E (H)

Job No 15117

865

Goodman

BRICKWORKS LIMITED

LEGEND

MEZZANINE

RACKING

OPM2

SERVICE MEZZANINE +13700

HBW

MEZZANINE +14350

AIO 2

SHIPPING

MEZZANINE +14350

12473 12433 12433 12433 12433 12433 12433 12433 12433 12433 12433 13153 5855 12105 12600 13315 12380 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12600 12640 10010

22040 10960 11000 31720 38820 44880 23680

SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Proposed Industrial Facility - Building 1A

Mezzanine Plan - 6

1 : 500 @ B1

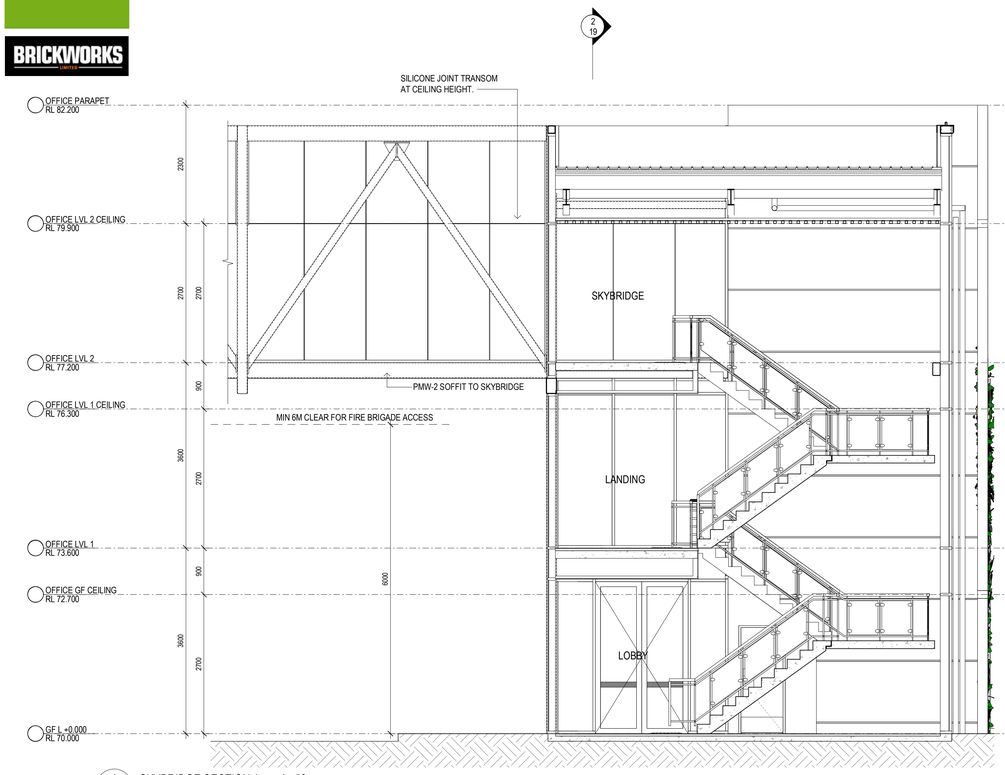
25th February 2020

OAK-1A-DA18F (H)

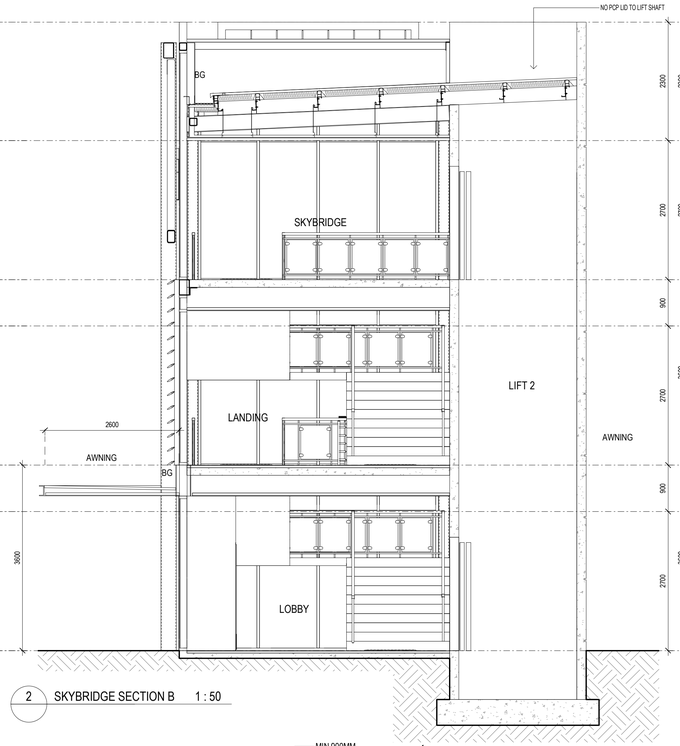
Job No 15117

Goodman

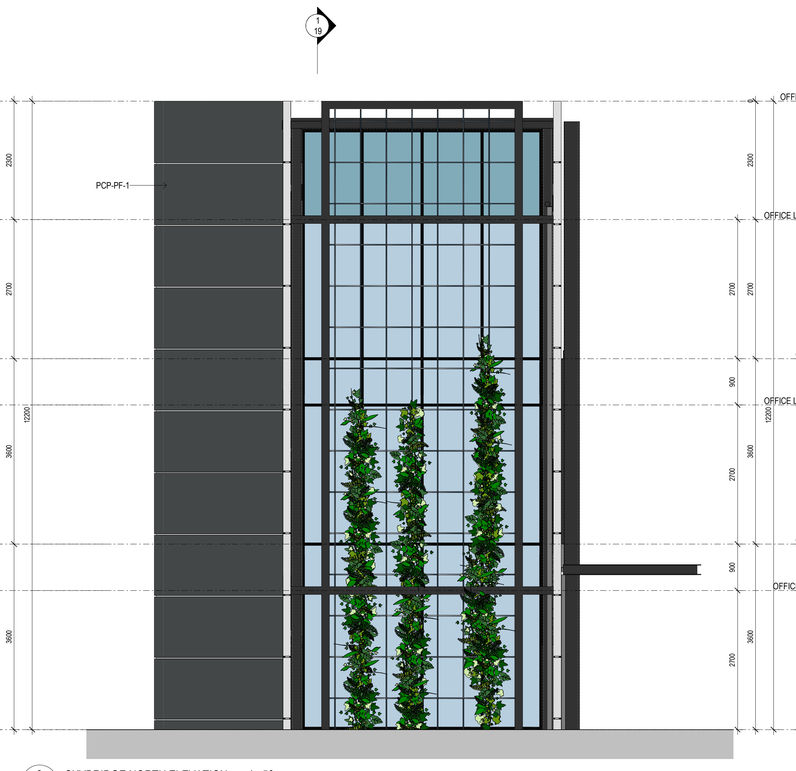
BRICKWORKS LIMITED



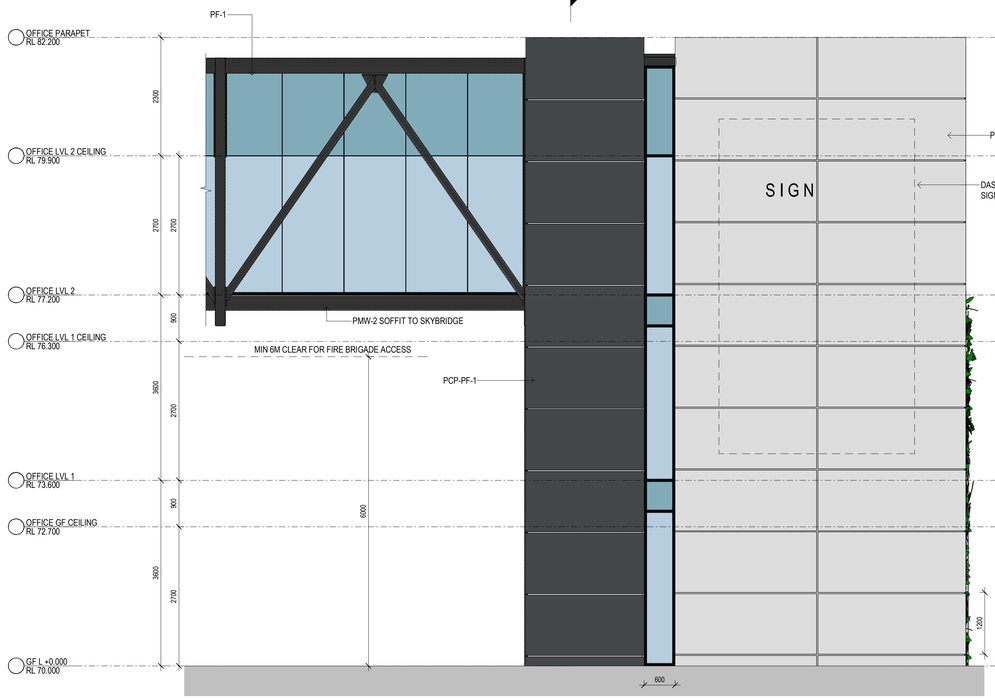
1 SKYBRIDGE SECTION A 1 : 50



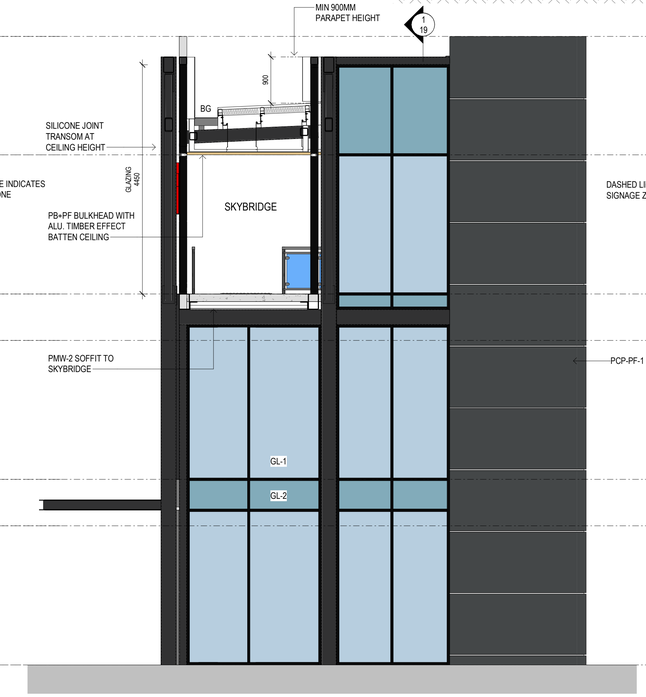
2 SKYBRIDGE SECTION B 1 : 50



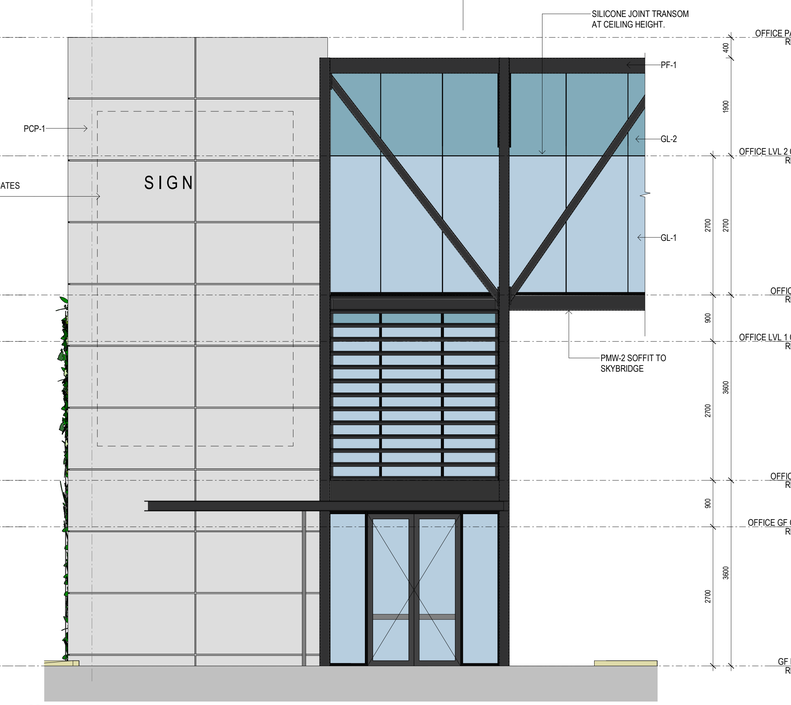
3 SKYBRIDGE NORTH ELEVATION 1 : 50



4 SKYBRIDGE EAST ELEVATION 1 : 50



5 SKYBRIDGE SOUTH ELEVATION 1 : 50



6 SKYBRIDGE WEST ELEVATION 1 : 50

SBA ARCHITECTS

Oakdale West Estate

Horsley Park

Proposed Industrial Facility - Building 1A

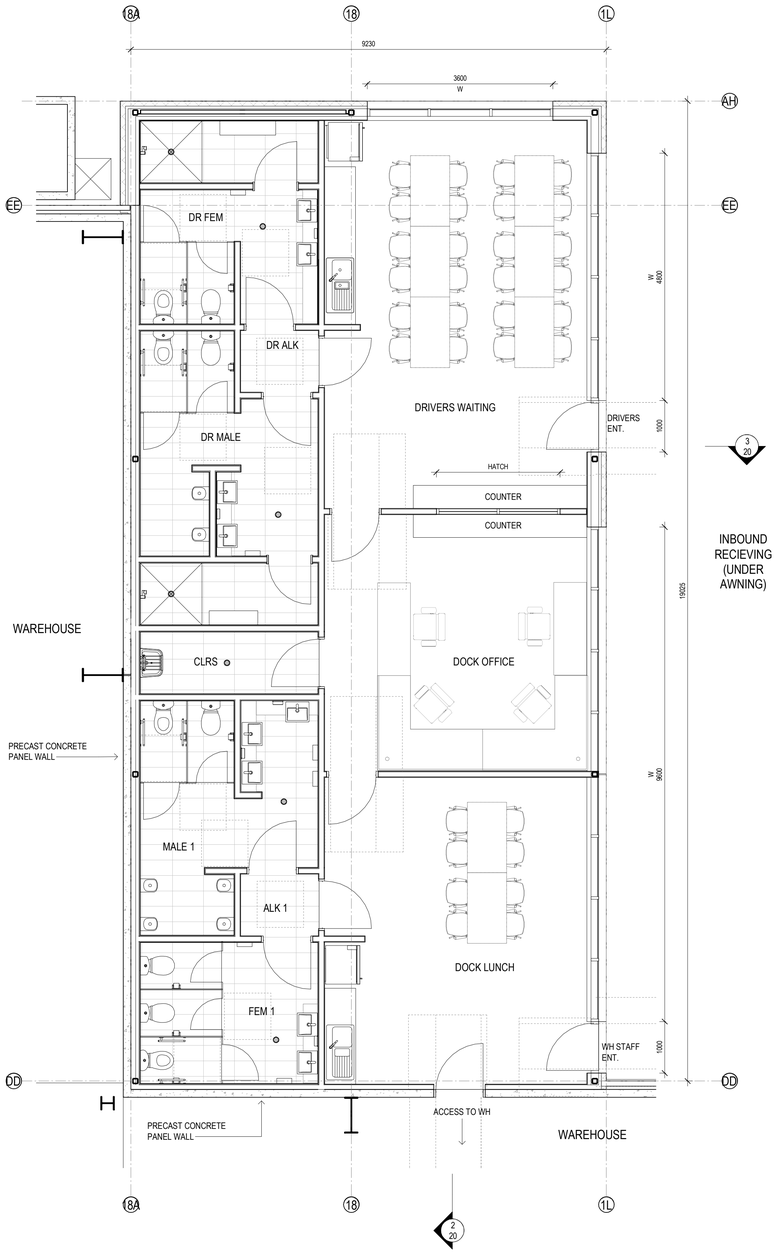
Skybridge Sections & Elevations

1 : 50 @ B1

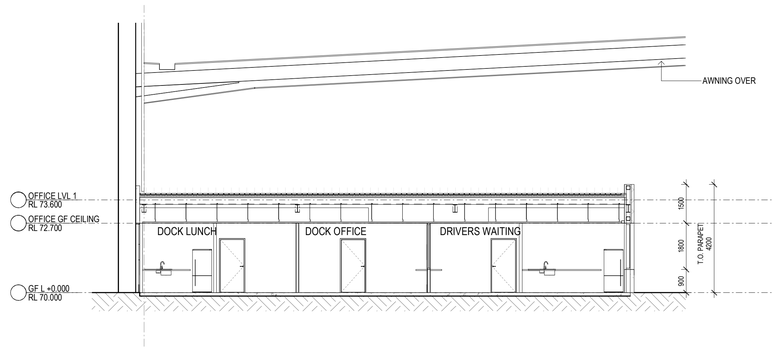
25th February 2020

OAK-1A-DA- 19 (K)

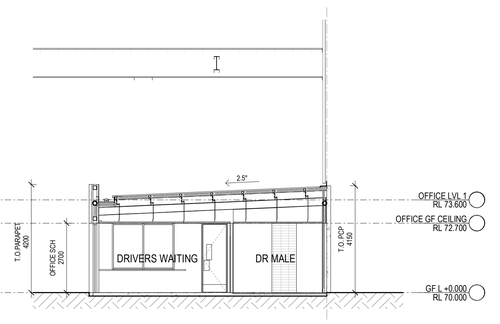
Job No 15117



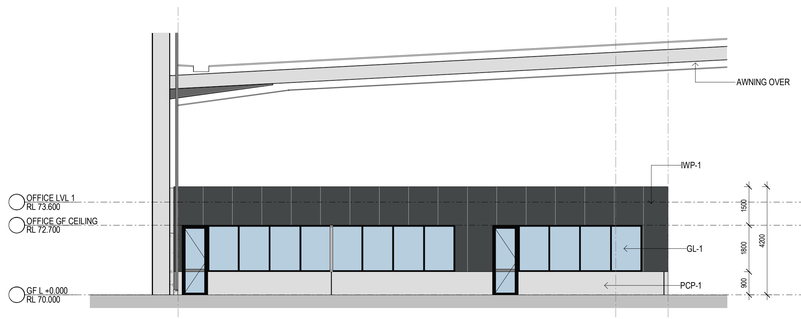
1 DOCK OFFICE - PLAN 1 : 50
WAREHOUSE 1A



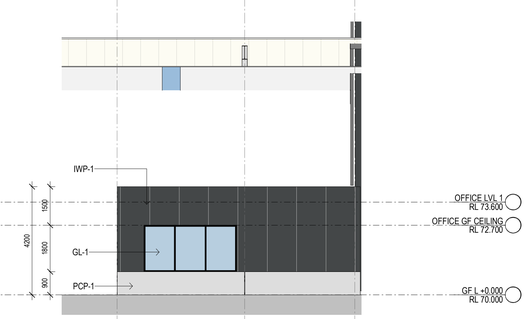
2 SECTION A 1 : 100
WAREHOUSE 1A



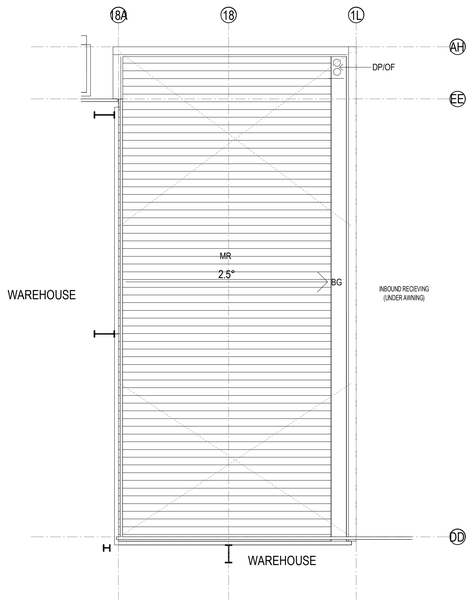
3 SECTION B 1 : 100
WAREHOUSE 1A



4 EAST ELEVATION 1 : 100
WAREHOUSE 1A



5 NORTH ELEVATION 1 : 100
WAREHOUSE 1A



6 ROOF PLAN 1 : 100
WAREHOUSE 1A

LEGEND	
BG	Box Gutter
EG	Eaves Gutter
MR	Metal Roof Sheeting
TR	Translucent Sheeting
EJ	Expansion Joint

INDICATIVE EXTERNAL FINISHES LEGEND

- **BLK-1** STACKED BOND BLOCK LIGHT GREY
- **FC-1** PREFINISHED FIBRE CEMENT WALL SHEETING
- **GL-1** GLAZING DARK GREY TINT
- **GL-2** SPANDREL GLAZING DARK GREY (OPAQUE)
- **GL-3** PRIVACY GLAZING - TRANSLUSCENT
- **GL-4** CLEAR GLASS
- **IWP-1** INSULATED WALL PANEL COLORBOND - MONUMENT
- **IWP-2** INSULATED WALL PANEL COLORBOND - SHALE GREY
- **IWP-3** INSULATED WALL PANEL COLORBOND - WHITE
- **MDR-1** METAL DECK ROOFING COLORBOND - SURFMIST
- **MDR-2** METAL DECK ROOFING COLORBOND - COOLMAX
- **PCP-1** PRECAST CONCRETE PANELS OFF FORM CONCRETE
- **PCP-PF-1** PRECAST CONCRETE PANELS PAINT FINISH - MONUMENT
- **PCP-PF-2** PRECAST CONCRETE PANELS PAINT FINISH - MID GREY
- **PF-1** PAINT FINISH - 1 MONUMENT
- **PF-2** PAINT FINISH - 2 MID GREY
- **PF-3** PAINT FINISH - 3 SHALE GREY
- **PF-4** ANODISED BRONZE FINISH
- **PMW-1** PREFINISHED METAL WALL SHEETING MONUMENT (OR SIMILAR)
- **PMW-2** PREFINISHED METAL WALL SHEETING DARK GREY (OR SIMILAR)
- **PMW-3** PREFINISHED METAL WALL SHEETING WHITE (OR SIMILAR)
- **PMW-4** PREFINISHED METAL WALL SHEETING "GOODMAN GREEN"
- **TRS-1** TRANSLUCENT ROOF SHEET - OPAL COLOUR (OR SIMILAR)
- **TRS-2** DANPALON TRANSLUCENT WALL CLADDING - OPAL COLOUR

SBA ARCHITECTS

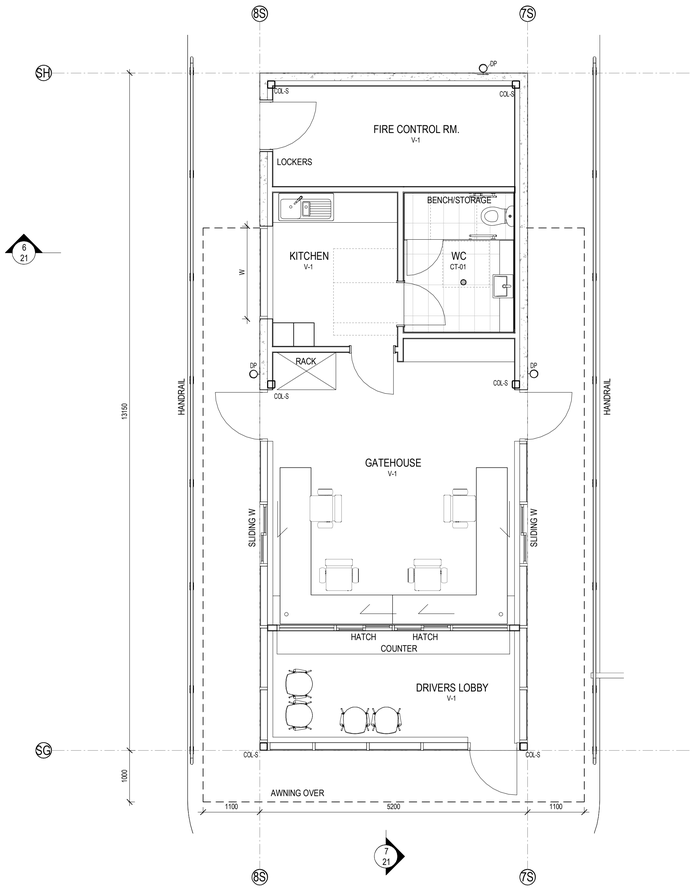
Oakdale West Estate
Horsley Park

Proposed Industrial Facility - Building 1A

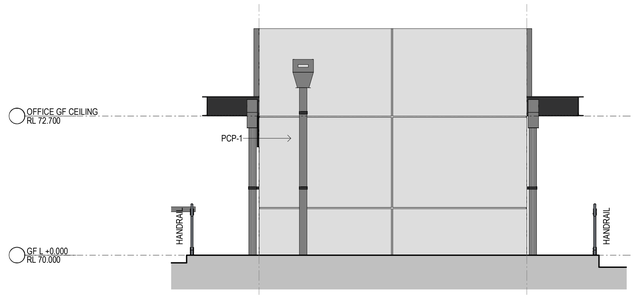
Dock Office Plans

As indicated @ B1
25th February 2020

OAK-1A-DA- 20 (J)
Job No 15117



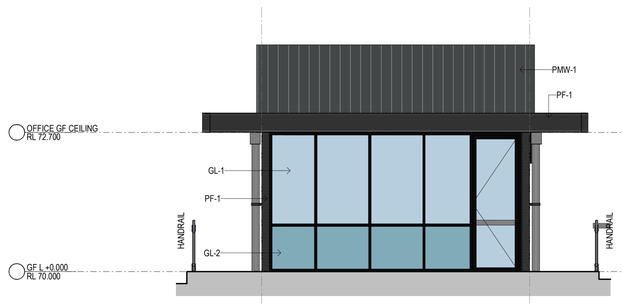
1 GATEHOUSE FLOOR PLAN 1 : 50
WAREHOUSE 1A



2 GATEHOUSE - NORTH 1 : 50
WAREHOUSE 1A



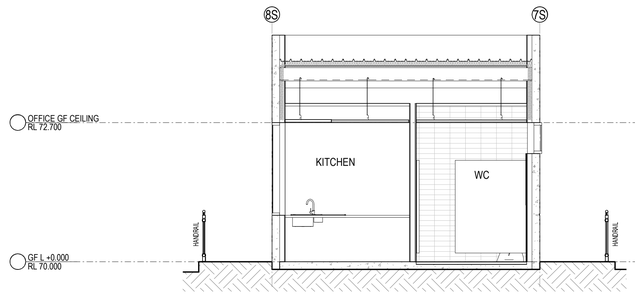
3 GATEHOUSE - EAST 1 : 50
WAREHOUSE 1A



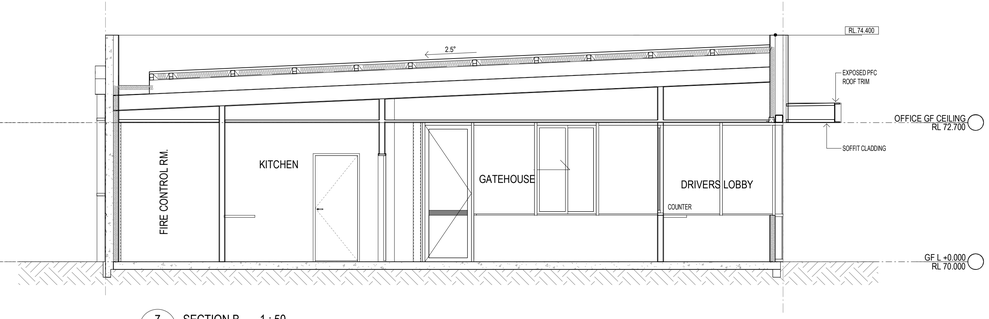
4 GATEHOUSE - SOUTH 1 : 50
WAREHOUSE 1A



5 GATEHOUSE - WEST 1 : 50
WAREHOUSE 1A



6 SECTION A 1 : 50
WAREHOUSE 1A



7 SECTION B 1 : 50
WAREHOUSE 1A

INDICATIVE EXTERNAL FINISHES LEGEND

- **BLK-1** STACKED BOND BLOCK LIGHT GREY
- **FC-1** PREFINISHED FIBRE CEMENT WALL SHEETING
- **GL-1** GLAZING DARK GREY TINT
- **GL-2** SPANDREL GLAZING DARK GREY (OPAQUE)
- **GL-3** PRIVACY GLAZING - TRANSLUSCENT
- **GL-4** CLEAR GLASS
- **IWP-1** INSULATED WALL PANEL COLORBOND - MONUMENT
- **IWP-2** INSULATED WALL PANEL COLORBOND - SHALE GREY
- **IWP-3** INSULATED WALL PANEL COLORBOND - WHITE
- **MDR-1** METAL DECK ROOFING COLORBOND - SURFMIST
- **MDR-2** METAL DECK ROOFING COLORBOND - COOLMAX
- **PCP-1** PRECAST CONCRETE PANELS OFF FORM CONCRETE
- **PCP-PF-1** PRECAST CONCRETE PANELS PAINT FINISH - MONUMENT
- **PCP-PF-2** PRECAST CONCRETE PANELS PAINT FINISH - MID GREY
- **PF-1** PAINT FINISH - 1 MONUMENT
- **PF-2** PAINT FINISH - 2 MID GREY
- **PF-3** PAINT FINISH - 3 SHALE GREY
- **PF-4** ANODISED BRONZE FINISH
- **PMW-1** PREFINISHED METAL WALL SHEETING MONUMENT (OR SIMILAR)
- **PMW-2** PREFINISHED METAL WALL SHEETING DARK GREY (OR SIMILAR)
- **PMW-3** PREFINISHED METAL WALL SHEETING WHITE (OR SIMILAR)
- **PMW-4** PREFINISHED METAL WALL SHEETING "GOODMAN GREEN"
- **TRS-1** TRANSLUCENT ROOF SHEET - OPAL COLOUR (OR SIMILAR)
- **TRS-2** DANPALON TRANSILUCENT WALL CLADDING - OPAL COLOUR

SBA ARCHITECTS

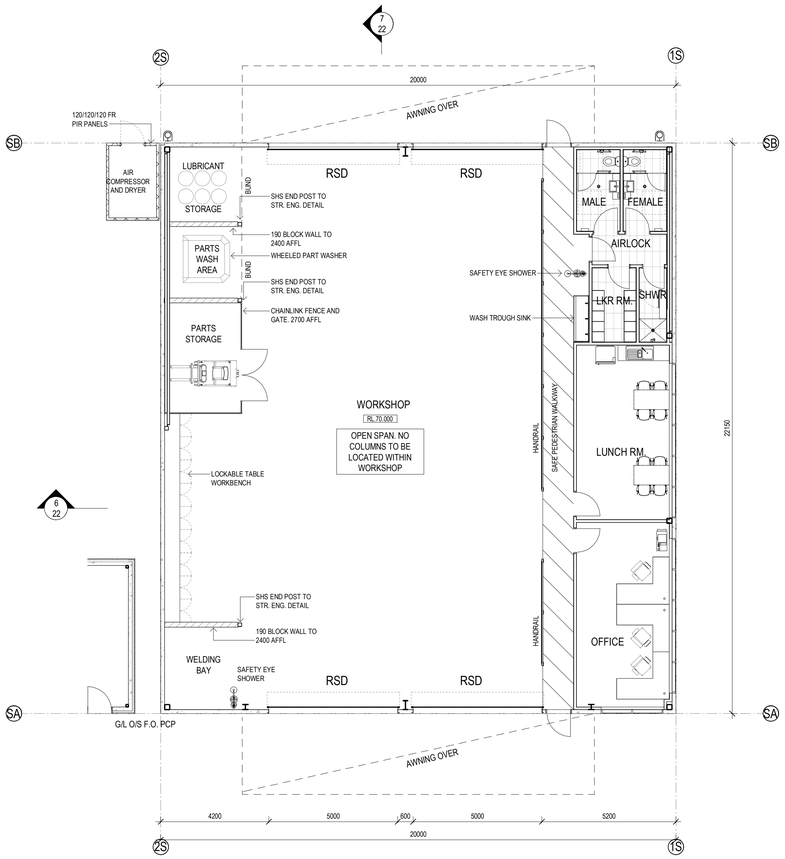
Oakdale West Estate
Horsley Park

Proposed Industrial Facility - Building 1A

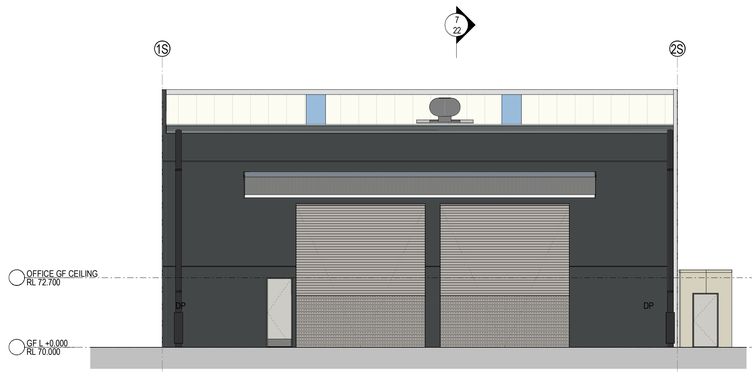
Gatehouse Plans

As indicated @ B1
25th February 2020

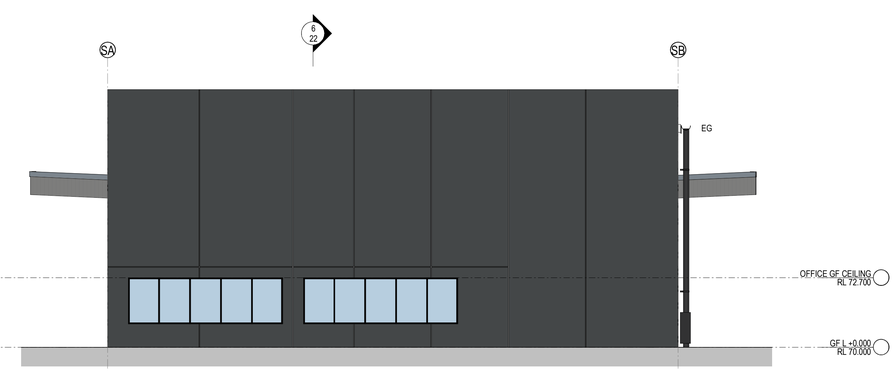
OAK-1A-DA- 21 (K)
Job No 15117



1 WORKSHOP FLOOR PLAN - DA 1 : 100
WAREHOUSE 1A



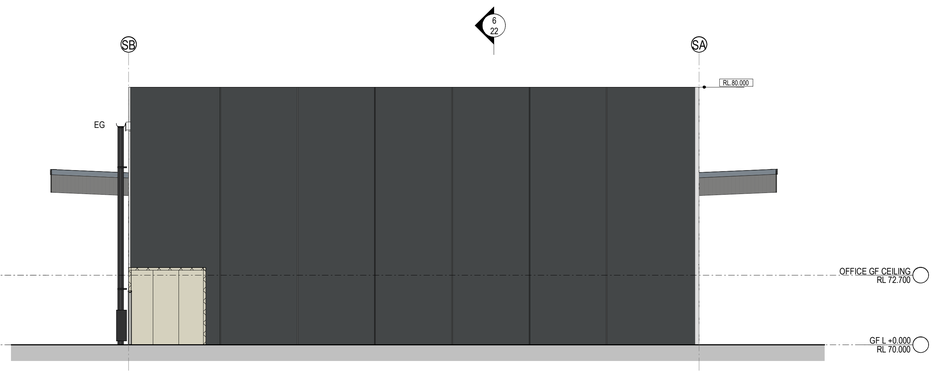
2 WORKSHOP - NORTH ELEVATION 1 : 100
WAREHOUSE 1A



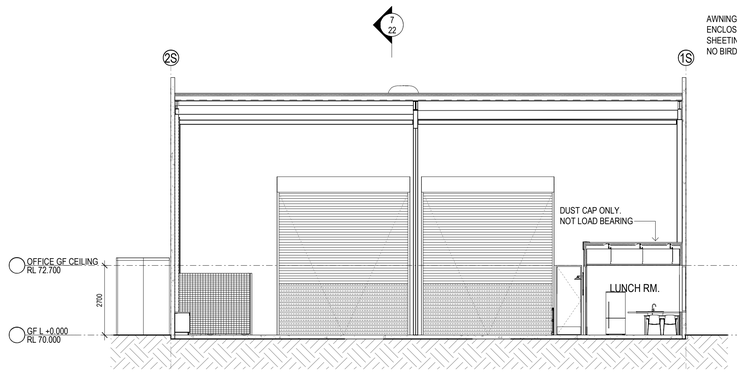
3 WORKSHOP - EAST ELEVATION 1 : 100
WAREHOUSE 1A



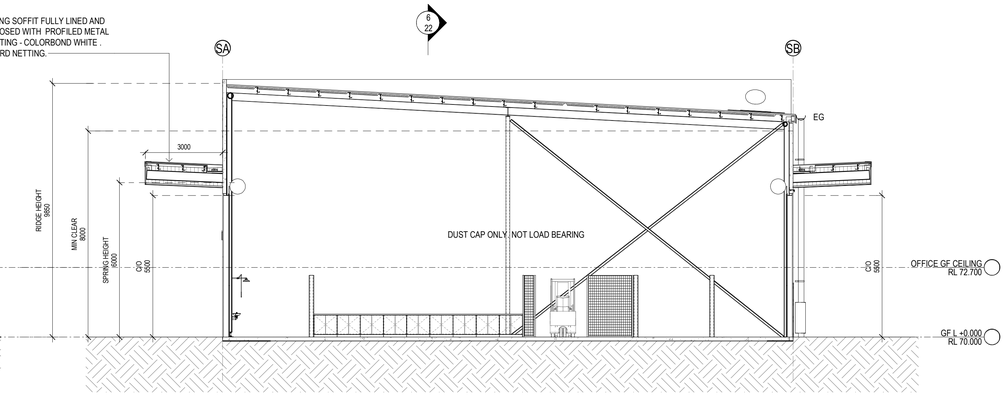
4 WORKSHOP - SOUTH ELEVATION 1 : 100
WAREHOUSE 1A



5 WORKSHOP - WEST ELEVATION 1 : 100
WAREHOUSE 1A



6 TRAILER WORKSHOP - SECTION A 1 : 100
WAREHOUSE 1A



7 TRAILER WORKSHOP - SECTION B 1 : 100
WAREHOUSE 1A

INDICATIVE EXTERNAL FINISHES LEGEND

- **BLK-1** STACKED BOND BLOCK LIGHT GREY
- **FC-1** PREFINISHED FIBRE CEMENT WALL SHEETING
- **GL-1** GLAZING DARK GREY TINT
- **GL-2** SPANDREL GLAZING DARK GREY (OPAQUE)
- **GL-3** PRIVACY GLAZING - TRANSLUSCENT
- **GL-4** CLEAR GLASS
- **IWP-1** INSULATED WALL PANEL COLORBOND - MONUMENT
- **IWP-2** INSULATED WALL PANEL COLORBOND - SHALE GREY
- **IWP-3** INSULATED WALL PANEL COLORBOND - WHITE
- **MDR-1** METAL DECK ROOFING COLORBOND - SURFMIST
- **MDR-2** METAL DECK ROOFING COLORBOND - COOLMAX
- **PCP-1** PRECAST CONCRETE PANELS OFF FORM CONCRETE
- **PCP-PF-1** PRECAST CONCRETE PANELS PAINT FINISH - MONUMENT
- **PCP-PF-2** PRECAST CONCRETE PANELS PAINT FINISH - MID GREY
- **PF-1** PAINT FINISH - 1 MONUMENT
- **PF-2** PAINT FINISH - 2 MID GREY
- **PF-3** PAINT FINISH - 3 SHALE GREY
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- **PMW-4** PREFINISHED METAL WALL SHEETING "GOODMAN GREEN"
- **TRS-1** TRANSLUCENT ROOF SHEET - OPAL COLOUR (OR SIMILAR)
- **TRS-2** DANPALON TRANSLUCENT WALL CLADDING - OPAL COLOUR

SBA ARCHITECTS

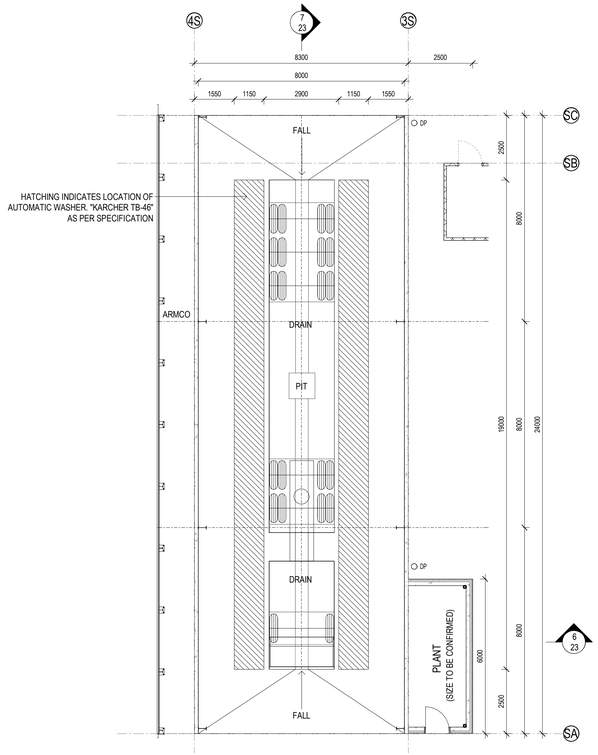
Oakdale West Estate
Horsley Park

Proposed Industrial Facility - Building 1A

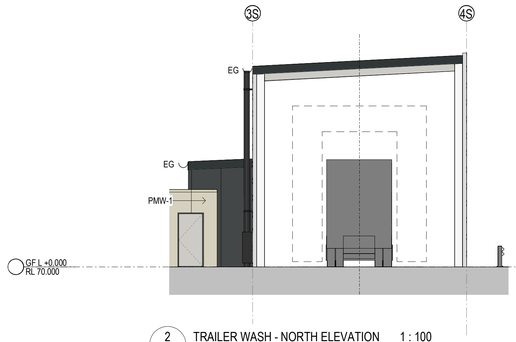
Trailer Workshop Plans

As indicated @ B1
25th February 2020

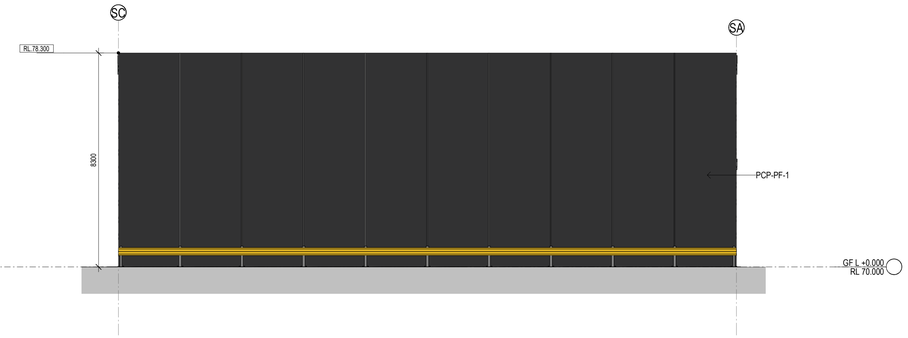
OAK-1A-DA- 22 (K)
Job No 15117



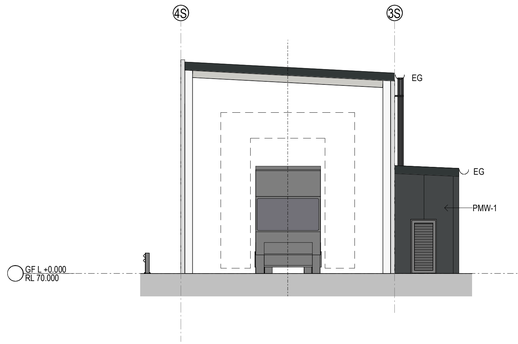
1 TRAILER WASH PLAN 1 : 100
WAREHOUSE 1A



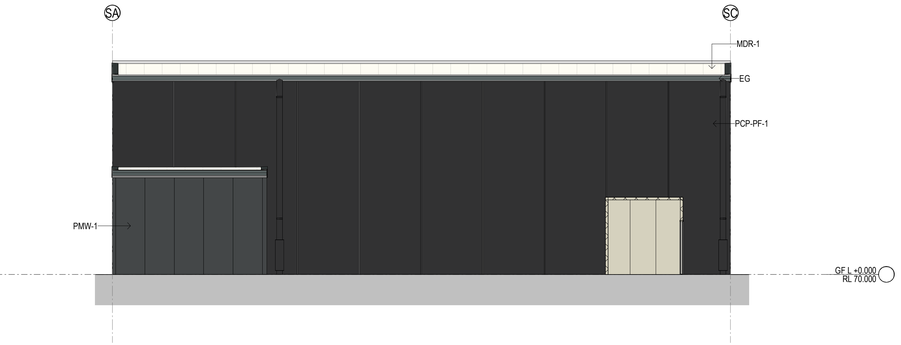
2 TRAILER WASH - NORTH ELEVATION 1 : 100
WAREHOUSE 1A



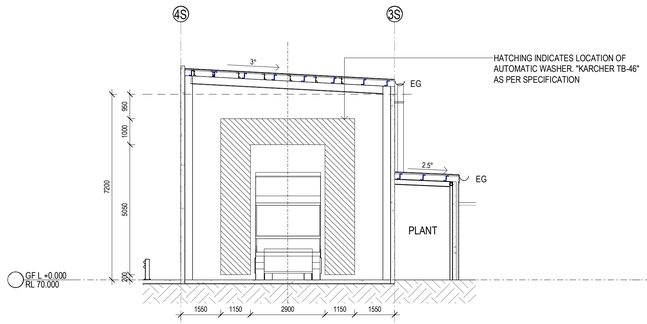
3 TRAILER WASH - WEST ELEVATION 1 : 100
WAREHOUSE 1A



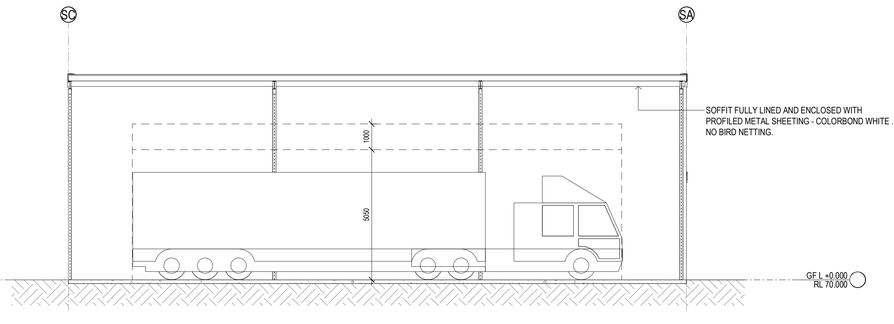
4 TRAILER WASH - SOUTH ELEVATION 1 : 100
WAREHOUSE 1A



5 TRAILER WASH - EAST ELEVATION 1 : 100
WAREHOUSE 1A



6 TRAILER WASH - SECTION A 1 : 100
WAREHOUSE 1A



7 TRAILER WASH - SECTION B 1 : 100
WAREHOUSE 1A

INDICATIVE EXTERNAL FINISHES LEGEND

- **BLK-1** STACKED BOND BLOCK LIGHT GREY
- **FC-1** PREFINISHED FIBRE CEMENT WALL SHEETING
- **GL-1** GLAZING DARK GREY TINT
- **GL-2** SPANDREL GLAZING DARK GREY (OPAQUE)
- **GL-3** PRIVACY GLAZING - TRANSLUSCENT
- **GL-4** CLEAR GLASS
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SBA ARCHITECTS

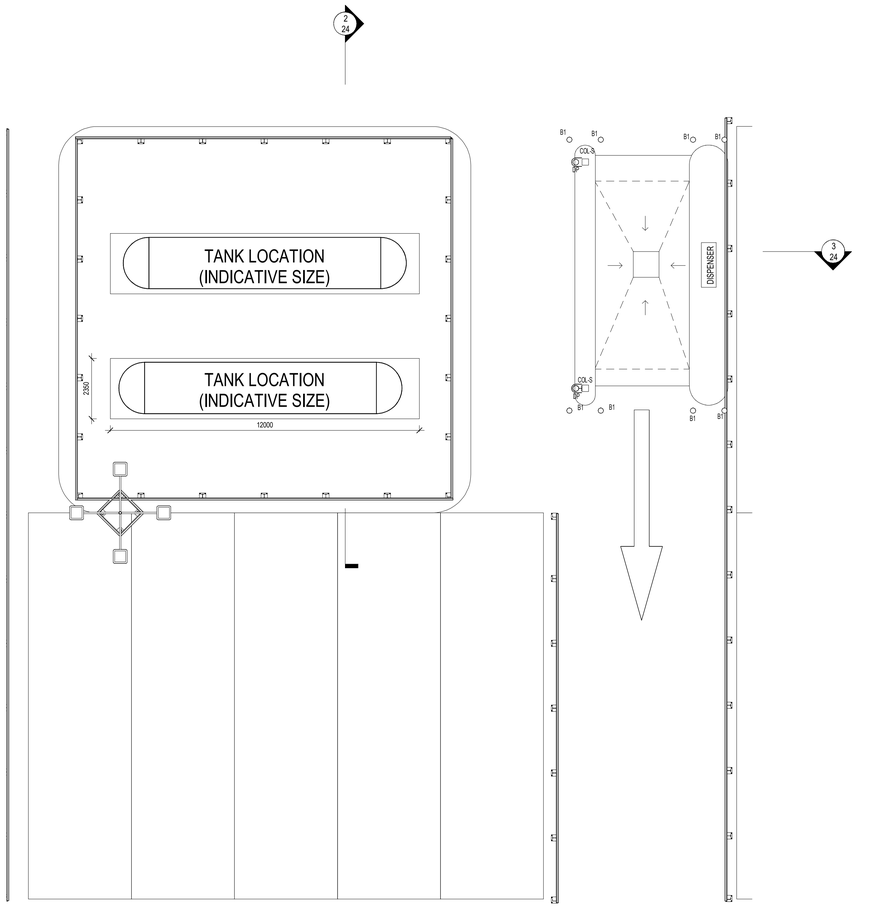
Oakdale West Estate
Horsley Park

Proposed Industrial Facility - Building 1A

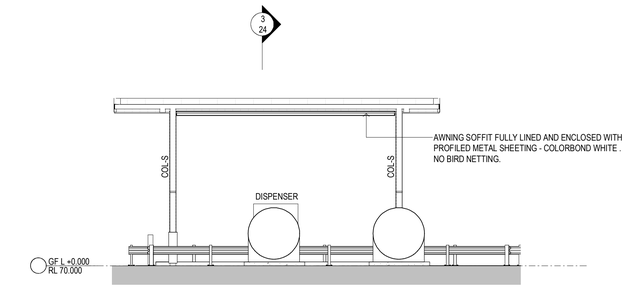
Trailer Wash Plans

As indicated @ B1
25th February 2020

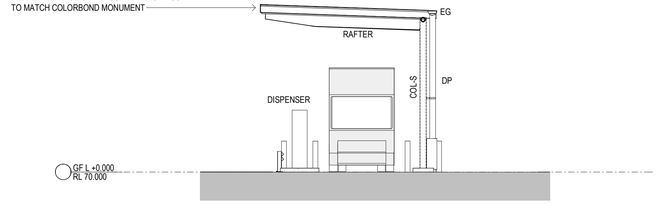
OAK-1A-DA- 23 (L)
Job No 15117



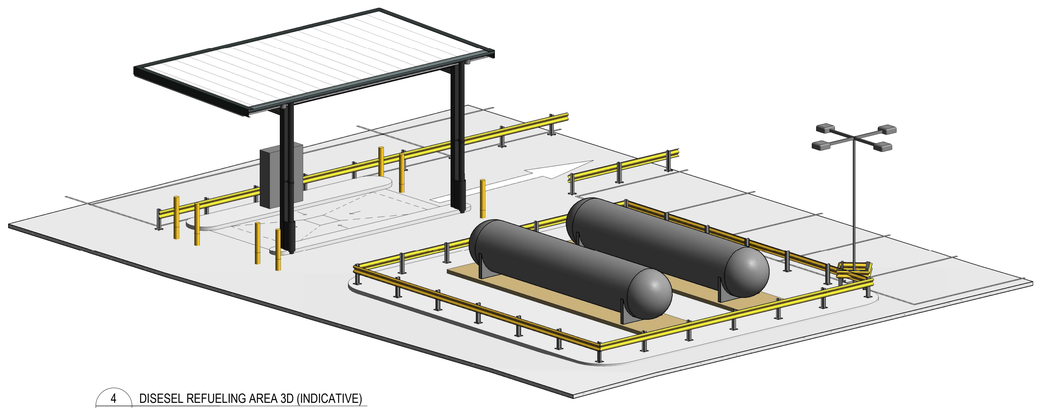
1 DIESEL REFUELING AREA - GA PLAN 1 : 100
WAREHOUSE 1A



2 DIESEL REFUELING AREA - SECTION A 1 : 100
WAREHOUSE 1A



3 DIESEL REFUELING AREA - SECTION B 1 : 100
WAREHOUSE 1A



4 DISESEL REFUELING AREA 3D (INDICATIVE)
WAREHOUSE 1A

SBA ARCHITECTS

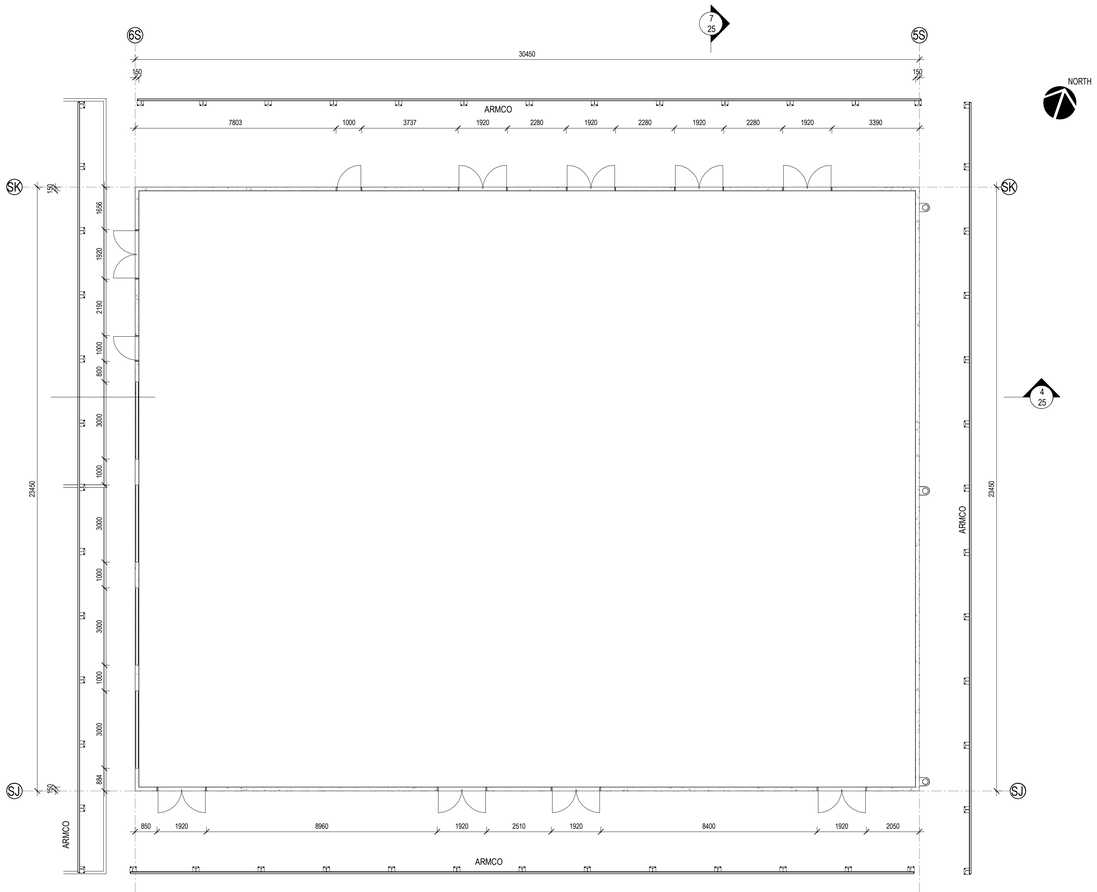
Oakdale West Estate
Horsley Park

Proposed Industrial Facility - Building 1A

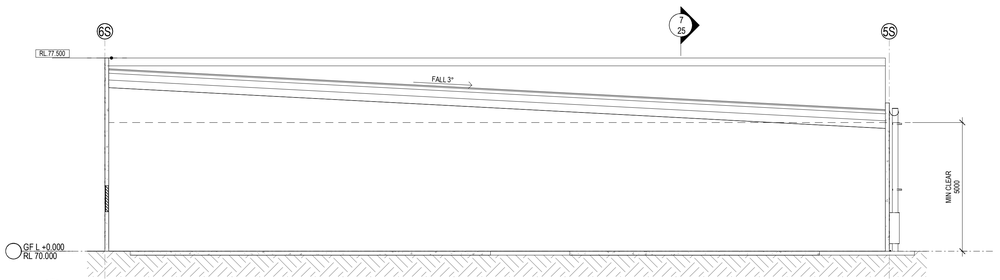
Diesel Refueling Area Plans

1 : 100 @ B1
25th February 2020

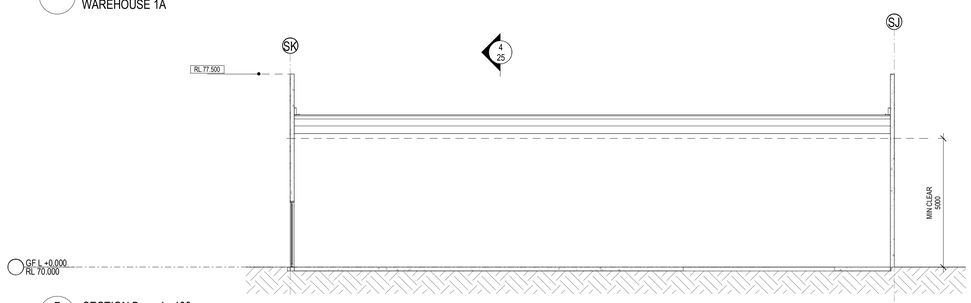
OAK-1A-DA- 24 (J)
Job No 15117



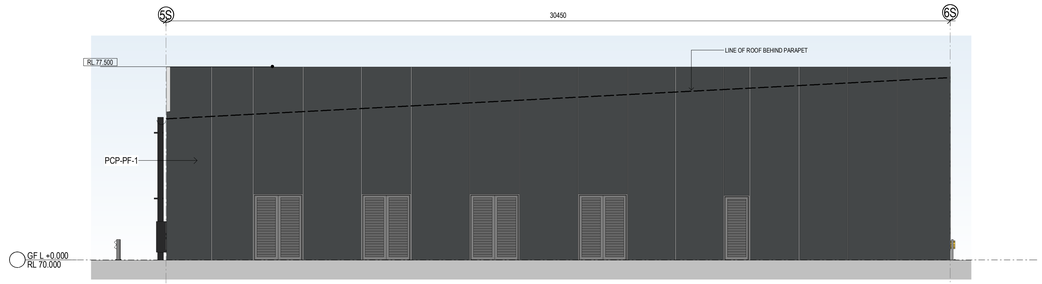
1 ENERGY COMPLEX 1 - FLOOR PLAN 1 : 100
WAREHOUSE 1A



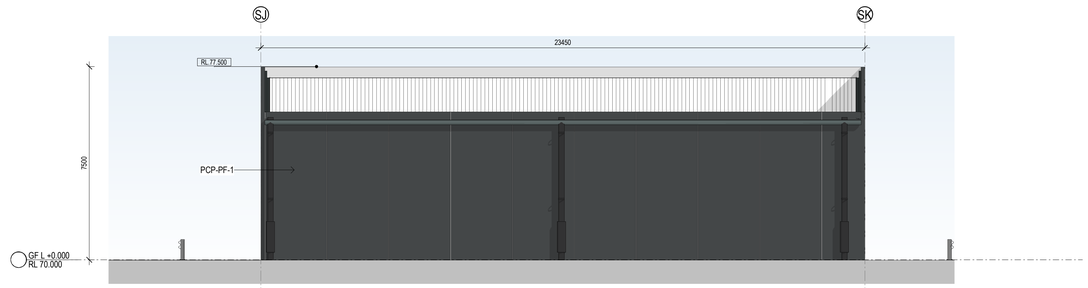
4 SECTION A 1 : 100
WAREHOUSE 1A



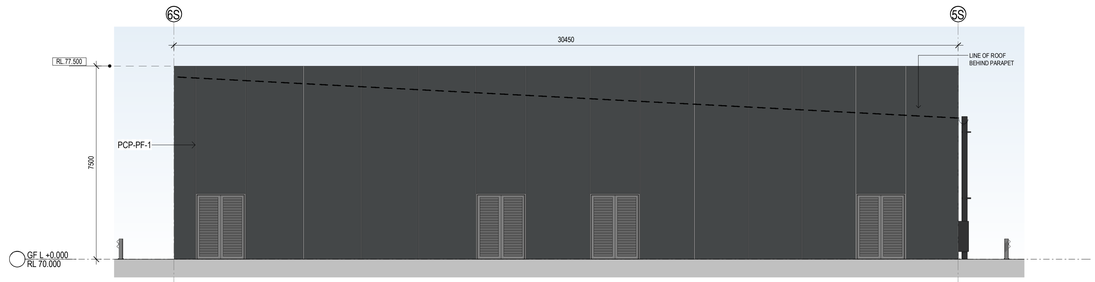
7 SECTION B 1 : 100
WAREHOUSE 1A



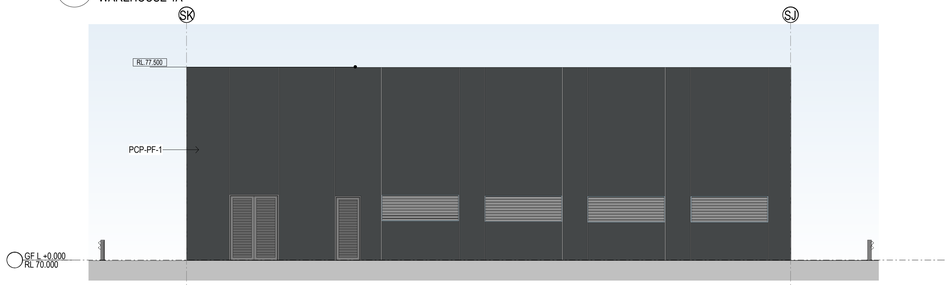
2 NORTH ELEVATION 1 : 100
WAREHOUSE 1A



3 EAST ELEVATION 1 : 100
WAREHOUSE 1A



5 SOUTH ELEVATION 1 : 100
WAREHOUSE 1A



6 WEST ELEVATION 1 : 100
WAREHOUSE 1A

INDICATIVE EXTERNAL FINISHES LEGEND

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- **GL-4** CLEAR GLASS
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- **TRS-2** DANPALON TRANSULCENT WALL CLADDING - OPAL COLOUR

SBA ARCHITECTS

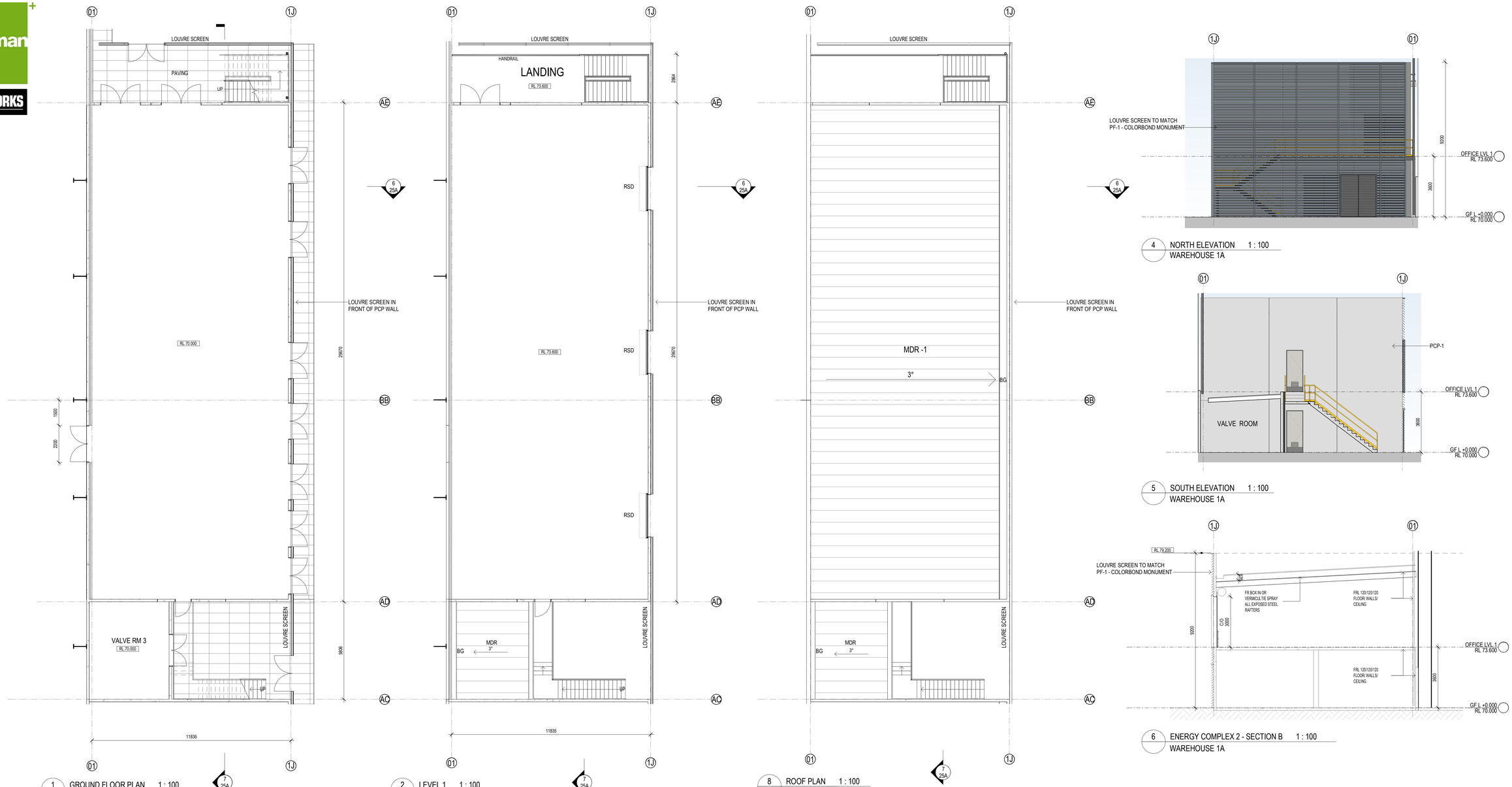
Oakdale West Estate
Horsley Park

Proposed Industrial Facility - Building 1A

Energy Complex - 1

As indicated @ B1
25th February 2020

OAK-1A-DA- 25 (K)
Job No 15117



1 GROUND FLOOR PLAN 1 : 100
WAREHOUSE 1A

2 LEVEL 1 1 : 100
WAREHOUSE 1A

8 ROOF PLAN 1 : 100
WAREHOUSE 1A

4 NORTH ELEVATION 1 : 100
WAREHOUSE 1A

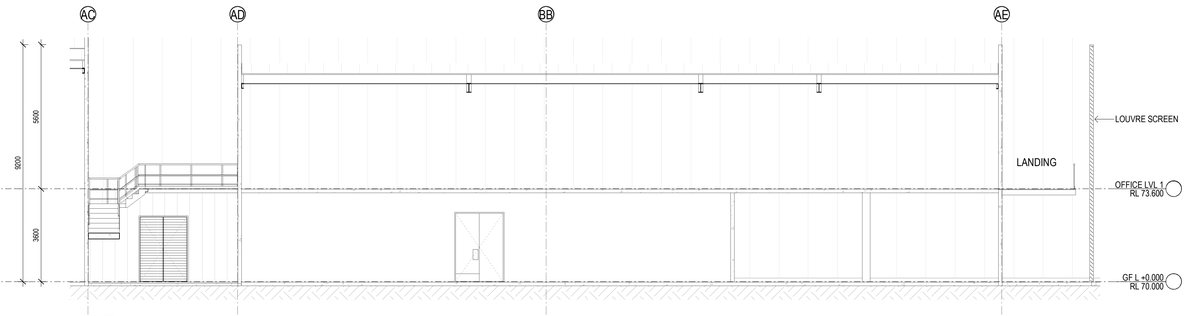
5 SOUTH ELEVATION 1 : 100
WAREHOUSE 1A

6 ENERGY COMPLEX 2 - SECTION B 1 : 100
WAREHOUSE 1A



3 EAST ELEVATION 1 : 100
WAREHOUSE 1A

LOUVRE SCREEN TO MATCH PF-1 - COLORBOND MONUMENT
PCP WALL OF ENERGY COMPLEX BEYOND



7 SECTION A 1 : 100
WAREHOUSE 1A

INDICATIVE EXTERNAL FINISHES LEGEND

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SBA ARCHITECTS

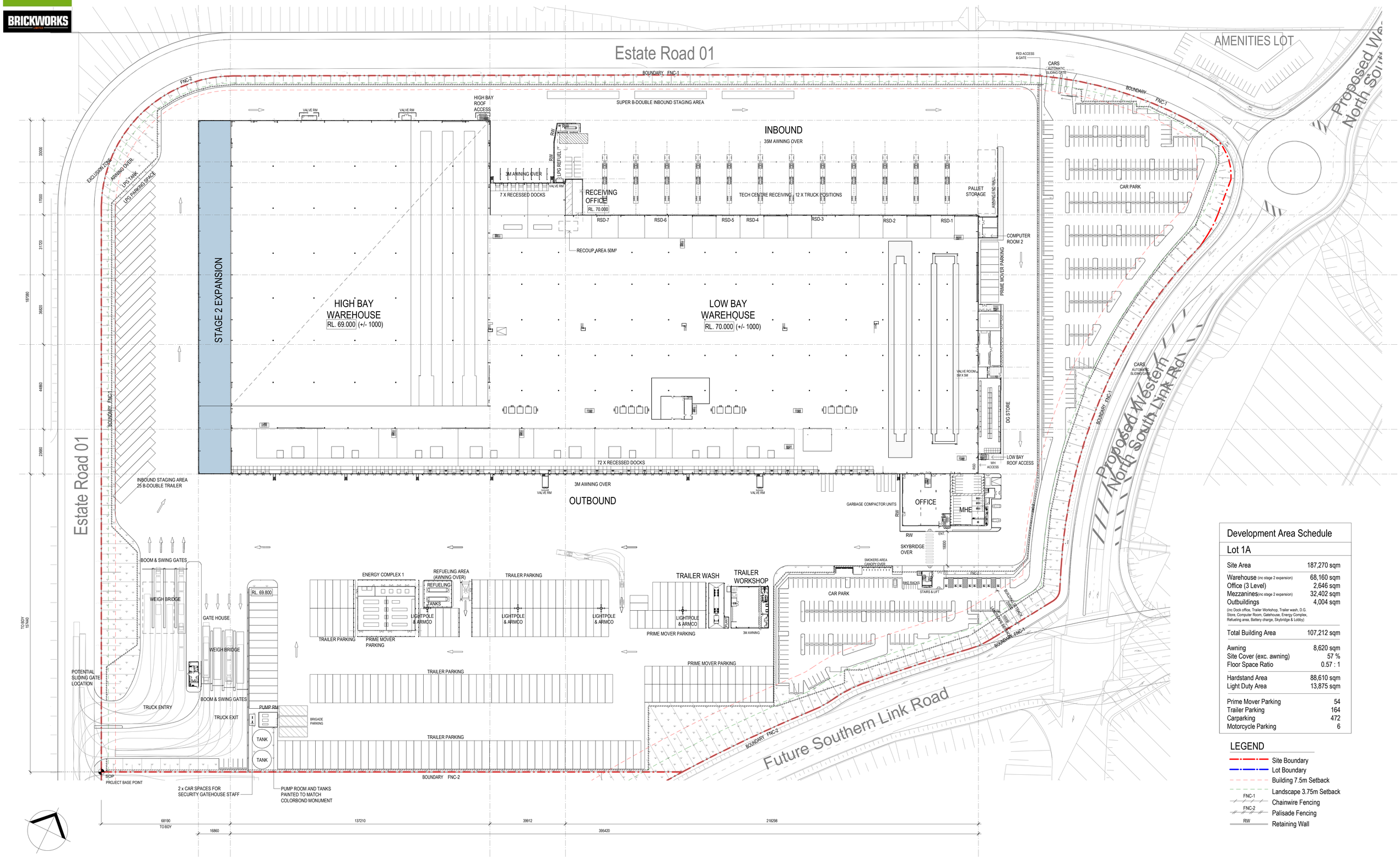
Oakdale West Estate
Horsley Park

Proposed Industrial Facility - Building 1A

Energy Complex - 2

As indicated @ B1
25th February 2020

OAK-1A-DA25A (H)
Job No 15117



Development Area Schedule

Lot 1A

Site Area	187,270 sqm
Warehouse (inc stage 2 expansion)	68,160 sqm
Office (3 Level)	2,646 sqm
Mezzanines (inc stage 2 expansion)	32,402 sqm
Outbuildings	4,004 sqm
(inc Dock office, Trailer Workshop, Trailer wash, D.G. Store, Computer Room, Gatehouse, Energy Complex, Refueling area, Battery charge, Skybridge & Lobby)	
Total Building Area	107,212 sqm
Awning	8,620 sqm
Site Cover (exc. awning)	57 %
Floor Space Ratio	0.57 : 1
Hardstand Area	88,610 sqm
Light Duty Area	13,875 sqm
Prime Mover Parking	54
Trailer Parking	164
Carparking	472
Motorcycle Parking	6

LEGEND

- Site Boundary
- Lot Boundary
- Building 7.5m Setback
- Landscape 3.75m Setback
- FNC-1 Chainwire Fencing
- FNC-2 Palisade Fencing
- RW Retaining Wall

SBA ARCHITECTS

Oakdale West Estate
Horsley Park

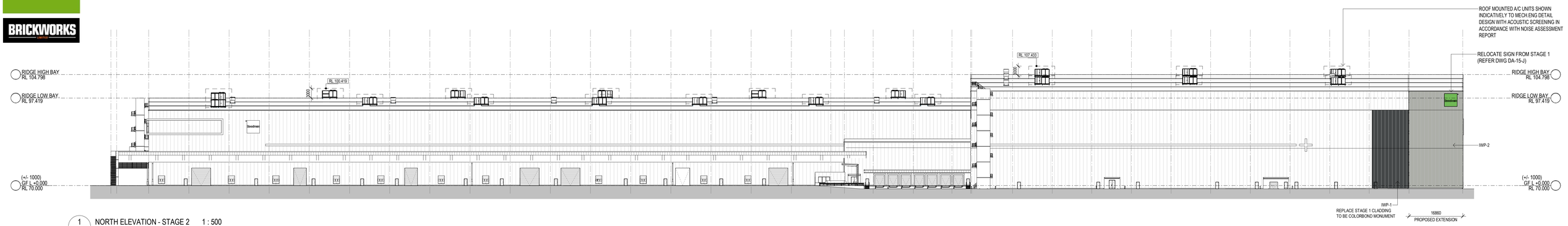
Proposed Industrial Facility - Building 1A

Stage 2 - Site Plan

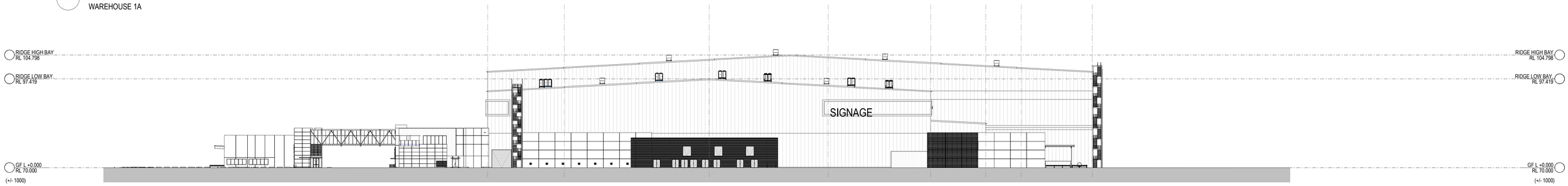
1 : 750 @ B1
25th February 2020

OAK-1A-DA- 28 (L)
Job No 15117

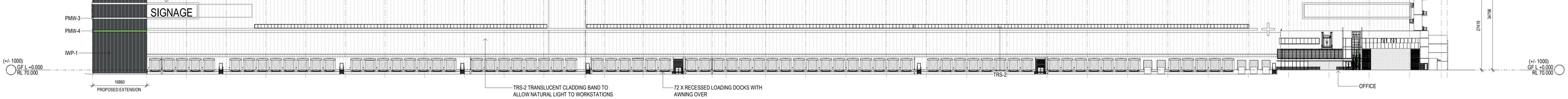
875



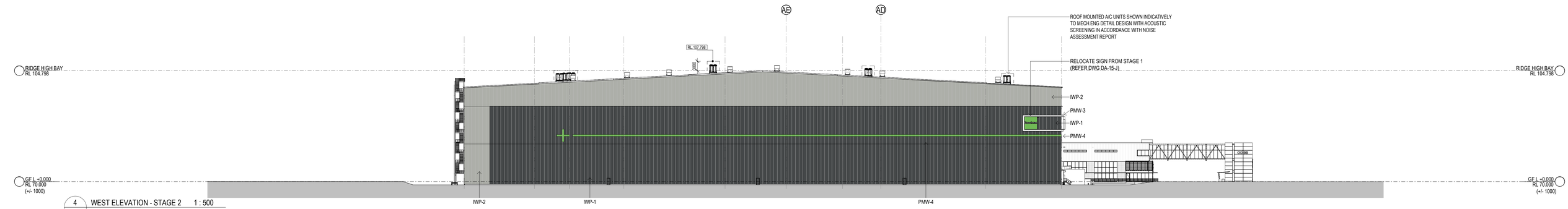
1 NORTH ELEVATION - STAGE 2 1 : 500
WAREHOUSE 1A



2 EAST ELEVATION - STAGE 2 1 : 500
WAREHOUSE 1A



3 SOUTH ELEVATION - STAGE 2 1 : 500
WAREHOUSE 1A



4 WEST ELEVATION - STAGE 2 1 : 500
WAREHOUSE 1A

INDICATIVE EXTERNAL FINISHES LEGEND

- **BLK-1** STACKED BOND BLOCK LIGHT GREY
- **FC-1** PREFINISHED FIBRE CEMENT WALL SHEETING
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SBA ARCHITECTS

Oakdale West Estate
Horsley Park

Proposed Industrial Facility - Building 1A

Stage 2 - Elevations

As indicated @ B1
25th February 2020

OAK-1A-DA- 29 (K)
Job No 15117

Annexure D

Goodman OWE – Estate Signage Illumination

The following components of the proposed OWE signage is proposed for illumination. It should be noted that the illumination will be of low intensity and will mirror illumination approved of Goodman signage across NSW and Australia.

The following components of the signage is proposed for illumination:

+ **Sign S1** – proposed to be illuminated as follows:
  - ‘Goodman’ lettering within the Goodman square logo / Estate name lettering / RHS (side) section (refer to area highlighted for sign S1 below)

+ **Signs S2, S3, S4, S5, S6** – all proposed to be illuminated as follows:
  - ‘Goodman’ square logo / numbering / ‘Entry’ wording (where relevant) / arrows (Refer to Fig.1 - 3 below for example)

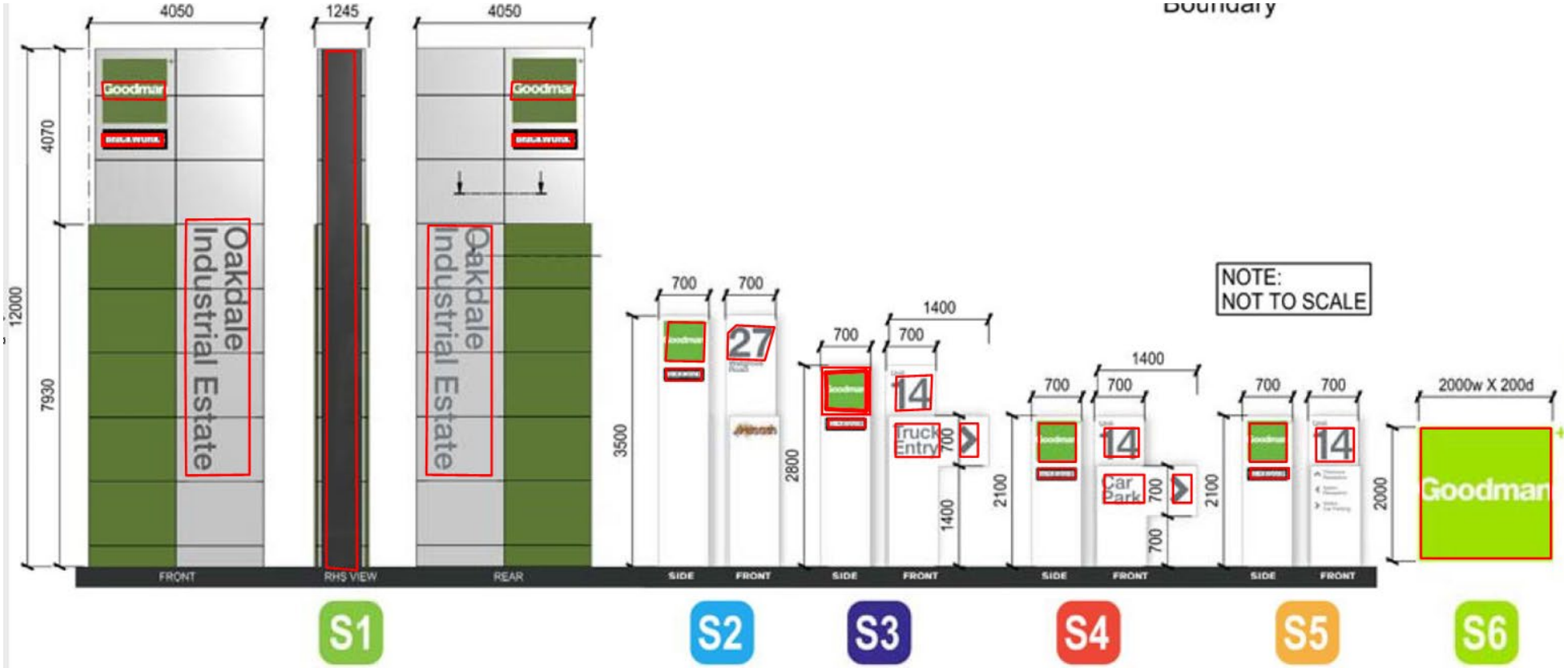

Figure 1 - Proposed OWE signage illumination



S1

Identification site

Day view



S1

Identification site

Night view

Fig. 2: Sign S1 – proposed illumination



Figure 3: S2, 3, 4, 5 example illumination

Assessment Criteria

Part 2 of SEPP 64 provides that a consent authority must consider the matters in Schedule 1 of the SEPP prior to granting consent to development involving signage. The assessment criteria under Schedule 1 of the SEPP are addressed in the table below.

Illumination

Would illumination result in unacceptable glare?	No. Illumination will be muted in nature, with only certain portion of the signage illuminated for a sophisticated yet recessive presentation (refer to Fig. 2 & 3 above).
Would illumination affect safety for pedestrians, vehicles or aircraft?	The illumination is not proposed to be of an intensity which would have any unacceptable impact on either pedestrian, vehicles or aircraft. The illumination levels propose have been tried and tested throughout Goodman's numerous estates to be of an acceptable level which provides adequate visual appearance at night, while not creating glare.
Would illumination detract from the amenity of any residence or other form of accommodation?	There are no residences within proximity to the signage which would be impacted by proposed illumination.
Is the illumination subject to a curfew?	Due to the industrial character of the area, the fact it operated 24/7 and has no nearby sensitive receivers, no curfew is proposed.
Can the intensity of the illumination be adjusted, if necessary?	As the light will be of low intensity, this will not be necessary, however it is possible for the illumination intensity to be adjusted.

Annexure I

CLOUSTON associates

LANDSCAPE ARCHITECTS
URBAN DESIGNERS
LANDSCAPE PLANNERS

Development Manager
Goodman Property Services (Aust) Pty Ltd
Level 17, 60 Castlereagh Street
Sydney NSW 2000

Attention: Stephanie Partridge

S19-0071_Oakdale West Industrial Estate MOD 3 and Stage 2 LCVIA
13th March 2020

Dear Stephanie,

OAKDALE WEST INDUSTRIAL ESTATE SSD 7348 MODIFICATION 3 AND SSD 10397 STAGE 2 DEVELOPMENT APPLICATION LCVIA - RESPONSE TO SUBMISSION

As per Council's comments, pad levels have been reduced to BEL 66.5 for LOT 2E and BEL 67.5 for LOT 2F and 2G. As a result the finished floor levels (FFL) of buildings 3A, 3B and 3C have been reduced. The following table shows the modifications accordingly:

	Building 3A G/F Level	Building 3A Ridge Height Level	Building 3B & 3C G/F Level	Building 3B & 3C Ridge Height
Modification 3 master plan	FFL 67.300	RL 81.000	FFL 69.800	RL 83.500
Revised Modification 3 master plan based on Council's comments	FFL 66.800	RL 80.500	FFL 67.800	RL 81.500
Comparison between the Modification 3 master plan and the Revised Modification 3 master plan based on Council's comments	Ground floor FFL has been decreased by 0.5 m	Ridge height has been reduced by 0.5 m	Ground floor FFLs have been decreased by 2.0 m	Ridge heights have been reduced by 2.0 m

The following views have been affected by the Revised Modification 3 master plan due to the changes on pad levels and resulting FFLs of building:

- View 2 - Modification 3 Master Plan Visual Impact Assessment
- View 3 - Modification 3 Master Plan Visual Impact Assessment
- View 4 - Stage 2 DA Visual Impact Assessment
- View 4 - Modification 3 Master Plan Visual Impact Assessment

See the following pages for visual impact assessments and revised photomontages for the above viewpoints.

MODIFICATION 3 MASTER PLAN VISUAL IMPACT ASSESSMENT



*Viewpoint 2 - Modification 3 photomontage (Planting approaching full maturity eg 15-20 years subject to soil and weather conditions with noise wall and Modification 3 Master Plan Building(s), Stage 2 DA Building is not visible from this viewpoint)**

IMPACT ASSESSMENT - MODIFICATION 3 (SSD 7348)

Receptor Type	Public
Viewpoint Number	2
Sensitivity rating of receptor	HIGH
Magnitude - Distance	HIGH
Magnitude - Quantum of view	LOW
Magnitude - Period of View	HIGH
Magnitude Scale of change	LOW
Overall Magnitude rating	MODERATE
Overall VISUAL IMPACT RATING (combination of sensitivity and magnitude ratings)	MODERATE/HIGH

**Minor adjustment of viewpoint 2 position to better demonstrate the full impact compared to the 2019 Approved Master Plan viewpoint*

Stage 2 DA Building

Modification 3 Master Plan Building(s)

MODIFICATION 3 MASTER PLAN VISUAL IMPACT ASSESSMENT



Viewpoint 3 - Modification 3 photomontage (Planting approaching full maturity, eg 15-20 years subject to soil and weather conditions)

IMPACT ASSESSMENT - MODIFICATION 3 (SSD 7348)

Receptor Type	Public
Viewpoint Number	3
Sensitivity rating of receptor	HIGH
Magnitude - Distance	HIGH
Magnitude - Quantum of view	LOW
Magnitude - Period of View	MODERATE
Magnitude Scale of change	LOW
Overall Magnitude rating	LOW
Overall VISUAL IMPACT RATING (combination of sensitivity and magnitude ratings)	MODERATE/LOW

Stage 2 DA Building

Modification 3 Master Plan Building(s)

STAGE 2 DA VISUAL IMPACT ASSESSMENT



*Viewpoint 4 - Stage 2 DA photomontage (Planting at 1 year maturity)**

IMPACT ASSESSMENT - STAGE 2 DA (SSD 10397)

Receptor Type	PRIVATE
Viewpoint Number	4
Sensitivity rating of receptor	HIGH
Magnitude - Distance	HIGH
Magnitude - Quantum of view	HIGH
Magnitude - Period of View	HIGH
Magnitude Scale of change	HIGH
Overall Magnitude rating	HIGH
Overall VISUAL IMPACT RATING (combination of sensitivity and magnitude ratings)	HIGH

**Minor adjustment of viewpoint 2 position to better demonstrate the full impact compared to the 2019 Approved Master Plan viewpoint*

Stage 2 DA Building

MODIFICATION 3 MASTER PLAN VISUAL IMPACT ASSESSMENT



*Viewpoint 4 - Modification 3 photomontage (Planting at full maturity. Note that visible planting shrubs only, no trees visible from this location)**

IMPACT ASSESSMENT - MODIFICATION 3 (SSD 7348)

Receptor Type	PRIVATE
Viewpoint Number	4
Sensitivity rating of receptor	HIGH
Magnitude - Distance	HIGH
Magnitude - Quantum of view	HIGH
Magnitude - Period of View	HIGH
Magnitude Scale of change	HIGH
Overall Magnitude rating	HIGH
Overall VISUAL IMPACT RATING (combination of sensitivity and magnitude ratings)	HIGH

**Minor adjustment of viewpoint 2 position to better demonstrate the full impact compared to the 2019 Approved Master Plan viewpoint*

Stage 2 DA Building

Modification 3 Master Plan Building(s)

In conclusion, the modification to buildings 3A, 3B and 3C have reduced the FFLs of all three buildings, however the overall form and profile of the buildings are unchanged.

This modification to the buildings has required the previously produced photomontages to be updated to match the revised design. These changes are largely visually imperceptible from the previously assessed viewpoints due to the overall quantum of view, scale and magnitudes for the viewpoints.

As such the visual impact ratings for all viewpoints have been deemed unchanged.

Yours faithfully
CLOUSTON Associates



Chak Chan, AILA
Project Landscape Architect
Registered Landscape Architect No 12337