Development Application

Proposed Road House | Lot 101 Forrest Highway, Vittoria

PREPARED BY HARLEY DYKSTRA PTY LTD FOR SARACEN DEVELOPMENTS PTY LTD
DOCUMENT CONTROL

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Prepared for: Saracen developments Pty Ltd
Prepared by: DM
Reviewed by: LB
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1. INTRODUCTION

This submission has been prepared by Harley Dykstra on behalf of Saracen Property Pty Ltd.

This application seeks development approval for a Road House (and associated pylon signage) at Lot 101 Forrest Highway, Vittoria (the 'subject site').

A development application was submitted and thereafter accepted by the City of Bunbury on 16 May 2018 for assessment and processing as a Joint Development Assessment Panel (JDAP) application. The application was subsequently referred for comment to various state government departments and agencies and publicly advertised.

Objections were received from Main Roads WA and Southern Ports Authority (SPA), with the Department of Planning, Lands and Heritage (DPLH) subsequently advising it did not support the proposal, notwithstanding earlier advice it did not object to the proposal ‘in principle’.

The Applicant has reviewed the submissions received on the original application and attended meetings with the City of Bunbury, Main Roads WA and SPA to identify and clarify key issues requiring further response. Accordingly, the application has been updated including amended development plans (Appendix A), a revised Traffic Impact Assessment and updated storm water management plan to assist the Southern JDAP in its consideration of this application.

It is respectfully requested that the JDAP favourably consider the proposal for a Road House at Lot 101 Forrest Highway, Vittoria to enable the development to proceed.

2. SITE CONTEXT

2.1 SITE TITLE DESCRIPTION

Lot 101 Forrest Highway (Lot 101 on Diagram 93343) has a total lot area of 0.7351 ha. The site is contained on Certificate of Title Vol. 2146 Fol. 208. The registered proprietor is Victor John Howes. A copy of the Certificate of Title is attached at Appendix B.
2.2 SITE LOCATION AND CHARACTERISTICS

The site is situated approximately 4km east of the Bunbury City Centre, on the north side of the Forrest Highway, east of Vittoria Road (refer to Figure 1 below). The site is immediately north-east of the Bunbury Farmer’s Market, on the opposite side of Forrest Highway.

Figure 1 – Location Plan (subject site outlined in red)

The subject site contains a shed, but is otherwise vacant and has been predominantly cleared of vegetation in the past, consistent with its use for low key rural purposes. An Aerial Photograph is included as Figure 2 below which depicts the nature of existing land use.

Figure 2 – Aerial Photograph
2.3 LANDFORM, SOILS AND HYDROLOGY

The subject site is relatively flat, having a height of approximately 2m AHD. A Feature Survey of the subject site is included as Appendix C.

Structerre Consulting Engineers undertook geotechnical investigations over Lot 101 Forrest Highway on 29 May 2017. A copy of the resultant Geotechnical Investigation report is included at Appendix D.

The average subsurface soil profile encountered comprised topsoil to 0.3m, sand to 1.3m overlying the clayey SAND trace gravel to an averaged depth of 1.7m, and underlain with the medium dense to dense, locally loose sand to the investigated depth of 2.5m. The Geotechnical Assessment of Lot 101 Forrest Highway reports that the water table was encountered at a depth of 1.4m below the existing ground level.

A search of the Shared Land Information Platform (SLIP) was conducted in June 2017 in order to ascertain the risk of Acid Sulfate Soils (ASS) on the site. Whilst the search indicates there is a high to moderate risk of ASS occurring within 3m of natural soil surface over the site, no deep excavation is proposed and in fact the site will be filled. Appropriate management of any actual ASS encountered onsite would be undertaken at construction stage.

2.4 BUSHFIRE HAZARD

Lot 101 is not designated as bushfire prone by the Fire and Emergency Services Commissioner as illustrated on the Department of Fire and Emergency Services mapping at Figure 3 below.

![Figure 3 – Bushfire Prone Areas Mapping (subject area outlined in red)](image_url)
2.5 ZONING

2.5.1 Greater Bunbury Region Scheme (GBRS)

The subject site is zoned ‘Rural’ under the Greater Bunbury Region Scheme (GBRS). The site is adjoined by Forrest Highway to the south, which is a Primary Regional Road. Immediately adjoining land to the north, east and west is also zoned Rural. Further to the north-west of the subject site, land is predominantly reserved for ‘Port Installations’. To the south of Forrest Highway, land is zoned ‘Urban’ (Refer to Figure 4 below).

Figure 4 – GBRS zoning (subject site outlined in red)
2.5.2  City of Bunbury Local Planning Scheme No. 8

The subject site is zoned ‘Rural’ under the recently gazetted City of Bunbury Local Planning Scheme No. 8 (LPS 8). Lot 101 is included within a ‘Development Area’ Special Control Area (SCA). The subject site is also partially affected by the ‘Flood Prone Areas’ SCA. **Figure 5** below depicts the Rural zoning of the site and surrounds under LPS 8 and the SCA overlays. The Purpose, Objectives and Additional provisions relevant to the SCAs are set out in Schedule 7 – Table 10 of LPS 8. Further details are provided at section 4 of this Report.

**Figure 5 – LPS 8 zoning (subject site outlined in red)**
2.6 SERVICING

2.6.1 Reticulated Sewer

Existing Water Corporation sewer infrastructure is located on the south side of Forrest Highway. An extension will be required across Forrest Highway in order to service Lot 101. The Water Corporation advised it had no objection to the proposal in its referral response.

It is anticipated current sewer invert levels (1.1m AHD – 1.45m AHD) are able to accommodate development on Lot 101, based on a typical 1:200 fall. In this regard, the Department of Water and Environment Regulation (DWER) have advised the existing level of Lot 101 will need to be filled to approximately 3.5m AHD to achieve adequate flood protection into the future. DWER had no objection to the proposal and provided advice to be considered at construction stage and as part of the ongoing operation of the facility in its referral comments.

2.6.2 Power Supply

Currently power infrastructure is available on the north side of Forrest Highway, with underground services being available at Johnston Road. An extension will be required to provide power to Lot 101.

2.6.3 Water Supply

Reticulated water is currently available at the Johnston Road/Forrest Highway intersection on the north side of the Highway. A mains extension will be required from Johnston Road to service Lot 101 via a 100AC Aqwest main as confirmed by Aqwest in its referral comments.

2.6.4 Telecommunications

Telstra and the NBN network are available at the corner of Johnston Road and Forrest Highway on the north side of the highway and could be extended to service Lot 101.
3. APPLICATION DETAILS

3.1 DEVELOPMENT SUMMARY

This application seeks Development Approval for a Road House comprising the following components:

- A service station with fuel refilling for light vehicles (4 bowsers/8 refueling bays) and associated canopy;
- Convenience store tenancy with maximum retail floor space of 150m$^2$;
- Café/Restaurant/Take-Away outlets within a single building 450m$^2$ in total area;
- Outdoor rest stop facilities.
- Public ablation facilities
- Car parking and landscaped areas;
- Emergency vehicle breakdown area;
- Loading and service areas;
- Parking for freight vehicles and coaches; and
- Signage, including two (2) pylon signs adjacent to Forrest Highway.

The key design and land use changes compared to the original proposal follow:

- Removal of drive-through takeaway and coffee components, with replacement of café/restaurant/takeaway tenancies within a single building (tenants have not yet been confirmed);
- Modification to convenience store to accommodate a single tenancy with retail floor space not exceeding 150m$^2$.
- Increased aisle width adjacent to the fuel canopy to ensure unobstructed traffic flow in the event cars are waiting for a refueling bay to become available;
- Inclusion of public ablations facilities;
- Provision for an interconnected access way within Lot 101, to provide access to adjoining lots.

The siting, layout and design of the Road House is illustrated on the Development Plans at Appendix A.

3.2 BUILDING DESIGN AND SITE LAYOUT

Building design has been undertaken to reflect the requirements of the primary tenant of the Road House facility (Shell). The site layout has also been informed by a Traffic Impact Assessment (included at Appendix E) and as such has been designed to accommodate safe and efficient traffic circulation through the site. The convenience store building is setback 12.7m and the fuel pump canopy is setback 17.4m from Forrest Highway. An underground tank farm will be located adjacent to the canopy, with landscaping provided adjacent to Forrest Highway. The setbacks provided to other lot boundaries follow:

- Western (side) setback: 3.0m
- Northern (rear) setback 5.8m to the refuse room adjoining the convenience store with a 16m setback to the convenience store building itself.
- Eastern (side) setback: 5.0m
3.3 ACCESS AND CAR PARKING

Access to the Road House will be via a left turn pocket which shall be constructed within the Forrest Highway road reserve to provide for a ‘left in’ only arrangement adjacent to the western lot boundary. A ‘left out’ arrangement will enable vehicles to exit the site adjacent to the eastern boundary and continue east bound along Forrest Highway.

A revised Traffic Impact Assessment (TIA) was prepared by Transcore (Appendix E) having regard to technical comments provided by the City of Bunbury and Main Roads on the original proposal. The revised TIA confirms the proposed access and egress arrangements will facilitate safe and efficient traffic circulation through the site and will have a minimal, manageable and therefore acceptable impact on the surrounding road network. Further, the TIA confirms the access arrangements can be integrated to provide connectivity to other lots fronting Forrest Highway when land use planning for these lots is progressed at a later stage. The interim and ultimate access arrangements are detailed in the TIA.

Turn path analysis has been undertaken which demonstrate B-Doubles (the largest heavy vehicles that will enter the site) can be accommodated as well as all other traffic movements anticipated to occur within the development.

The car parking requirements for the facility have been considered having regard to Table 7 – Car Parking Table of LPS 8.

**Car Parking Table – LPS 8**

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<th>LAND USE CLASSES</th>
<th>MINIMUM CAR PARKING REQUIREMENTS</th>
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<td>Road house</td>
<td>• 4 bays per workshop and/or service bay, plus 1 bay per employee.</td>
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<td></td>
<td>• In addition to the service station use, car parking bays are to be provided for each additional land use (e.g. convenience store, fast food outlet, lunch bar, restaurant / café and short-term accommodation uses) in accordance with the Car Parking Table.</td>
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<tr>
<td>Convenience Store</td>
<td>1 bay per 20 square metres of nla of premises used for convenience store purposes.</td>
</tr>
<tr>
<td>Restaurant / Café</td>
<td>1 bay per 15 square metres of nla.</td>
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The proposed development provides 50 car parking bays, including one electric vehicle charging station and four (4) ACROD bays. The development also provides additional vehicle parking spaces at the fuel bowsers (8 fuelling positions), plus additional queuing positions within the driveway system.

In addition to the car bays, small truck and caravan parking is provided, as well as freight vehicle and coach parking capable of accommodating two (2) B-Double vehicles.

The proposed car parking arrangements have been considered by Transcore as part of the TIA, which concludes the proposed number of bays is suitable for a development of this type and accordingly, car parking arrangements satisfy the car parking standards prescribed by LPS 8.
3.4 STORMWATER MANAGEMENT

A revised Stormwater Management Plan and supporting technical note has been prepared by Wood and Grieve Engineers which is included at Appendix F.

The Stormwater Management Plan has been prepared having regard to referral comments received from Main Roads (also noted in the City’s technical comments) which questioned the ability to develop proposed drainage basins and swales without batters significantly encroaching into adjoining land and the Forrest Highway reservation. Accordingly, increased setbacks have been provided between swales/the bio-retention basin and the lot boundaries.

It is noted DWER had no objection to the proposal and provided advice to be considered at construction stage and as part of the ongoing operation of the facility in its referral comments.

The Stormwater Management Plan demonstrates all drainage up to the 100ARI event can be accommodated on site, using a combination of bio-filtration basins/swales and cell storage.

Drainage management shall also include a suitable hydro-carbon interceptor to capture incidental spillages during tank filling and dispensing. Such systems form part of the design of all modern service station developments and are used as a matter of standard practice by the major fuel retailers.

Hardstand areas, car parking and access ways shall be designed to ensure that any fuel spills area are precluded from contact with uncontaminated storm water. Any liquid runoff within these areas will be directed to an oil/water separator for treatment.

Hydro-carbon interceptors (such as the SPEL puraceptor) address pollution prevention, as well as storm water treatment and hydrocarbon capture as follows:

- Are tested and certified to independent European Standard BSEN 858- 1:2002 for the capture and retention of hydrocarbons with a hydrocarbon content of less than 5ppm and discharge quality exceeding the required ‘no visible trace’ from a tested inflow concentrator of >5,000ppm;
- Include integrated alarm and monitoring systems to alert operators with an audible alarm when the oil level reaches 10% of total storage volume providing early warning in the case of a spill or lack of maintenance; and
- Include an integrated auto closure device which is activated when the maximum storage capacity of light liquid (oil) containment is reached. No bypass device is installed to prevent trace hydrocarbons discharging to the storm water network even in the unlikely scenario of the entire volume of a refueling tanker compartment being spilled in the forecourt.

The specific hydro-carbon interceptor which shall be installed to service the proposed development shall be determined at a subsequent design stage which meets best practice methods for the capture and treatment of runoff and complies with all regulatory requirements.
4. PLANNING CONSIDERATIONS

4.1 GREATER BUNBURY REGION SCHEME

The site is currently zoned Rural under the Greater Bunbury Region Scheme (GBRS). The purpose of the Rural Zone as stated in the GBRS is:

‘to provide for the sustainable use of land for agriculture, assist in the conservation and wise use of natural resources including water, flora, fauna and minerals, provide a distinctive rural landscape setting for the urban areas and accommodate carefully planned rural living developments’.

The GBRS does not contain a land use permissibility table as is the case with the Local Planning Scheme. However, it is noteworthy that the WAPC’s DC Policy 1.10 recommends that where a Region Scheme applies, service centres (including Road Houses) should generally be located on Rural zoned land. As evidenced by LPS 8, which includes a ‘Road House’ as a permissible land use within the Rural zone, the proposed use of the site for a Road House is consistent with the Rural zoning of the land under the Region Scheme.

In the initial referral response from the DPLH, advice was provided that the proposed Road House would **not be inconsistent** with the purposes of the Rural zone (under the GBRS). This advice rebuts the contention by SPA that the use of the land for a Road House is inconsistent with the Rural zoning under the Region Scheme.

Land to the north of the site (although not directly abutting Lot 101) is reserved for ‘Port Installations’. The purpose of the Port Installations reserve as stated in the GBRS is:

‘to provide for the current and future expansion needs of the Port of Bunbury’

It is noted there is no special control area extending beyond the reservation which provides for SPA to exercise any statutory land use control over the subject site.

The development of a Road House on Lot 101 will in no way compromise the current or future operations of the Port.

In April 2018, the DPLH provided advice to the Applicant relating to the Minister for Planning’s decision in December 2013 to decline to grant approval to advertise a GBRS amendment to rezone land fronting Forrest Highway to Industrial (including the subject site). Amongst other planning reasons either already addressed by, or not relevant to this proposal, it was advised that any proposal for the land should only contemplate low traffic generating uses (possibly Marine Service Industry or Port Related office uses or the relocation of the Leschenault homestead to the site).

It is understood, following consultation with the City, the reference to ‘low traffic generating uses’ was primarily intended to ensure land uses were not established in proximity to the Port which resulted in a high number of customers attending the site, particularly over an extended period of time and a large number of employees engaged in outdoor activities, as may have eventuated if the previous GBRS rezoning proposal had been progressed. The view at the time was that the introduction of more intensive uses close to the Port may, in the future, have prejudiced Port operations due to actual or perceived nuisance from noise, dust or other potential health or amenity impacts on customers and employees.

The proposed Road House is not a sensitive use and is not in itself a high traffic generating activity. The development would result in relatively low additional traffic generation, where most of the
traffic attending the site is passing trade. Further, customers attending the site would only do so for a short period of time and would not have a high expectation of amenity given traffic noise is inherently associated with both the operation of a Road House and also due to the adjacent Forrest Highway. There would be a relatively low number of employees on site, who would generally be located within air conditioned buildings and hence would be unaffected by any Port related operations.

Aside from the matter of amenity considerations, the Port is not reliant on the subject site for access or any other purpose. In this regard, the land is privately owned and is not subject to any statutory controls related to Port functions.

It is also noted that the subject site abuts Forrest Highway which is reserved as a ‘Primary Regional Road’. Further details are provided at section 4.5 below.

4.2 CITY OF BUNBURY LOCAL PLANNING SCHEME NO.8

4.2.1 Land Use Permissibility

Under LPS 8, a Freeway Service Centre is defined as:

...premises that has direct access to a freeway and which provides all the following services or facilities and may provide other associated facilities or services but does not provide bulk fuel services -

(a) service station facilities;
(b) emergency breakdown repair for vehicles;
(c) charging points for electric vehicles;
(d) facilities for cyclists;
(e) restaurant, cafe or fast food services excluding the sale or consumption of alcohol under the Liquor Licencing Act 1988;
(f) take-away food retailing without a drive-through facility;
(g) public ablution facilities, including provision for disabled access and infant changing rooms;
(h) parking for passenger and freight vehicles;
(i) outdoor rest stop facilities such as picnic tables and shade areas; and
(j) dump points for the disposal of black and/or grey water from recreational vehicles.

Under LPS 8, a Road House is defined as follows:

...premises that has direct access to a State road other than a freeway and which provides the services or facilities provided by a freeway service centre and may provide any of the following facilities or services (bold text added for emphasis)-

(a) a full range of automotive repair services;
(b) wrecking, panel beating and spray painting services;
(c) transport depot facilities;
(d) short-term accommodation for guests;
(e) facilities for being a muster point in response to accidents, natural disasters and other emergencies; and

(f) dump points for disposal of black and/or grey water from recreational vehicles.

A Road House is an ‘A’ use in the Rural zone under LPS 8, meaning the use is not permitted unless the local government (or other determining authority) has exercised its discretion by granting development approval after giving notice in accordance with clause 64 of the deemed provisions.

Given Forrest Highway is a ‘state road not designated as a freeway’, and the range of facilities and services which shall be provided, the proposed use clearly falls into the category of a Road House. The proposed use includes each of the ‘required’ elements for a Road House. The additional ‘discretionary’ facilities or services that may be considered for a Road House are not proposed in this instance. This notwithstanding, the proposed use of the premises is entirely consistent with the definition of a Road House. In correspondence dated 30 August 2018, the City confirmed the revised plans submitted for comment, which were fundamentally the same as the development plans included at Appendix A, met the nature and range of land uses for a Road House under LPS 8.

4.2.2 Special Control Areas

The Purpose, Objectives and Additional provisions relevant to the SCAs are set out in Schedule 7 – Table 10 of LPS 8.

Development Area SCA

Purpose:

To designate areas requiring further investigations and structure and/or local development planning in relation to environmental and natural resource values, natural hazards, land use options, infrastructure servicing requirements, transportation infrastructure needs, landscaping and urban design.

Objectives:

(a) To identify areas requiring structure planning and/or local development planning prior to subdivision and/or development.

(b) To coordinate and integrate orderly subdivision, infrastructure provision, land use and development in areas requiring structure planning and/or local development planning;

(c) To guide the layout and design of lots, land uses and developments on land within a structure plan and/or a local development plan area;

(d) To establish a framework for the assessment of applications for development approval within a structure plan and/or a local development plan area; and

(e) To institute arrangements for the implementation of the plan by landowners, infrastructure providers and the local government.

Additional Provisions:

1. A Structure Plan is required in accordance with the provisions of Schedule 2, Part 4 of the Planning and Development (Local Planning Schemes) Regulations 2015.
2. Structure planning for any locality affected by these provisions shall take into consideration mechanisms to limit impact to Carnaby's cockatoo habitat.

With respect to structure planning, the Planning and Development (Local Planning Schemes) Regulations 2015 ('the Regulations') at Schedule 2, Part 4 Clause 27 (2) state:

(2) A decision-maker for an application for development approval or subdivision approval in an area referred to in clause 15 as being an area for which a structure plan may be prepared, but for which no structure plan has been approved by the Commission, may approve the application if the decision-maker is satisfied that —

(a) the proposed development or subdivision does not conflict with the principles of orderly and proper planning; and

(b) the proposed development or subdivision would not prejudice the overall development potential of the area.

In this instance, approval of the proposed Road House in the absence of an approved structure plan is able to satisfy the above tests for the following reasons:

• The land use is consistent with the objectives of the Rural zoning of the land under the GBRS, as evidenced by WAPC DC Policy 1.10 and confirmed by the DPLH in its initial referral response.

• The land use is consistent with the relevant objectives of the Rural zoning of the land under LPS 8 and in particular, the following objective:

  'To provide for a range of non-rural land uses where they have demonstrated benefit and are compatible with surrounding rural uses'.

The proposed Road House shall provide significant benefit to the travelling public in this ‘edge of centre’ location in terms of providing safe and convenient access to an appropriate range of facilities and services. The location of the site fronting Forrest Highway within a relatively narrow band of land adjoined by land reserved for port functions to the north-west makes it particularly suited to this purpose.

• Traffic access from Forrest Highway has been thoroughly investigated, including ongoing consultation with Main Roads and has demonstrated the proposal provides for both interim and ultimate access scenarios along this section of Forrest Highway. Future road planning shall not be compromised and access arrangements for adjacent properties fronting Forrest Highway can be accommodated should they be developed in the future.

• Storm water management can be accommodated and given the limited fill and retention of all water on site, the development is not expected to impact adversely on, or be negatively impacted by the surrounding development areas.

• All services can readily be extended to the site.
Flood Prone Areas SCA

Purpose:

To minimise the potential for flood damage resulting from decisions relating to land use and development on defined river floodplains.

Objectives:

(a) To identify land within the Scheme area at risk of being affected by flooding consistent with the Greater Bunbury Region Scheme - Floodplain Management Policy.

(b) To assist in the protection of life, property and community infrastructure from flood hazard.

(c) To assist the natural flood carrying capacity of floodplains by ensuring any use or development maintains the free passage and temporary storage of flood waters.

(d) To protect water quality and waterways as natural resources in accordance with Statement of Planning Policy No. 2 - Environment and Natural Resources Policy.

Additional Provisions:

Land use, subdivision and development within this Special Control Area is to comply with all the matters set out in the Greater Bunbury Region Scheme - Floodplain Management Policy.

The Stormwater Management Plan at Appendix F has considered the recommendations of the Floodplain Management Policy and following discussions with DWER, concludes the development is supported on the basis filling of the site will achieve clearance to flood levels and the impact on floodplain storage volume is expected to be minimal.

4.2.2 Development Standards

Within the Rural zone, the following setbacks are specified:

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<td>5m</td>
<td>7.5m</td>
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The development achieves a 17.4m setback to the canopy and 12.7m to the convenience store from the front boundary with only the corner of this structure marginally encroaching into the setback area. This minor encroachment is readily balanced by compensating open space behind the setback line. The side and rear setbacks of buildings generally comply with the standards in LPS 8, although a reduced side setback is proposed from the western lot boundary (3.0m) and a minor variation to the rear setback is proposed (5.8m to the refuse room adjoining the convenience store) along a short length of the overall rear boundary. It is not anticipated these minor side and rear setback variations will impact on adjacent properties.

No significant clearing of vegetation is required to accommodate the development.
4.3 CITY OF BUNBURY LOCAL PLANNING STRATEGY

Lot 101 is included within a ‘Rural Area’ designation under the recently endorsed City of Bunbury Local Planning Strategy (‘the Strategy’).

In addition to the Rural Area designation, the Strategy shows a ‘Future Fast Rail’ link across the southern portion of the subject site adjacent to Forrest Highway.

The concept of a Future Fast Rail service is an unfunded, long term strategic planning consideration, and as such the indicative alignment should not be viewed as a seriously entertained proposal which would prevent approval of an appropriate land use on Lot 101. In the event more detailed planning for a fast rail link is progressed in the future, there are a range of other alignment options that could be explored, particularly given the alignment that has currently been depicted has significant constraints. As such, approval of the proposed Road House on Lot 101 would not prejudice future planning for a fast rail link as envisaged by the Strategy.

It is noted the PTA, in its referral response noted the potential impact on the Bunbury fast rail proposal but did not object to the Road House development.

The Strategy also shows a visual amenity corridor along the north side of Forrest Highway. This planning objective is recognised via the layout, built form and landscaping for the Road House which acknowledges the location of the site at the gateway to the City of Bunbury.

4.4 BUNBURY PORT INNER HARBOUR STRUCTURE PLAN

The Bunbury Port Inner Harbour Structure Plan was finalised in 2009. Under the provisions of the Port Authority Act, the Public Works Act, the P&D Act and the GBRS, the Port Authority is exempted from requiring formal planning approval for any port related development or other public work. As a consequence of the ‘Port Installation’ reservation under the GBRS, the reserved land was not subject to the structure plan process under the former LPS 7 nor is it capable of being subject to the structure planning requirements under LPS 8.

Whilst the Inner Harbour Structure Plan boundary extends to Forrest Highway and hence includes the subject site, there is no special control area or other statutory mechanism beyond the reserve boundary to control or limit development for Port related purposes over the adjacent rural zoned land. As such, the Inner Harbour Structure Plan does not have any statutory effect under the GBRS or LPS 8 and there is no mechanism for its adoption under either Scheme. Rather, the Inner Harbour Structure Plan is used by the Bunbury Port Authority as a policy document to guide future development and decision making within the Inner Harbour which is reviewed from time to time. It is understood SPA is not committed to all aspects of the Inner Harbour Structure Plan, including the proposed Preston River realignment and hence the Structure Plan is currently under review.

An extract from the Inner Harbour Structure Plan is included as Figure 6 overpage. The development proposal for a Road House on Lot 101 is not bound by the land use and development intent for this site reflected in the Inner Harbour Structure Plan. This notwithstanding, the proposal has regard to a key objective of the SPA being to protect land reserved for port related purposes in the long term and to ensure incompatible land uses are not developed on adjoining land.

The rural zoned land between the Port and this section of Forrest Highway (Vittoria Road to Willenge Drive) is identified as ‘subject to further planning’ with indicative land uses being ‘low impact uses’.
Low impact uses are described in the Inner Harbour Structure Plan as having low impacts associated with least noise, least dust and least risk (relative to higher impact uses), although they may have equipment activity 24 hours per day, seven days per week. Further, the Inner Harbour Structure Plan advises uses which generate least noise (low impact) should occupy areas closest to the Port boundary and adjacent residential areas in order to minimise effects on sensitive land uses. Table 3 of the Inner Harbour Structure Plan report includes ‘service station’ as an example of a low impact use.

An indicative road connection is shown between Forrest Highway and Thomson Road adjacent to the realigned Preston River and three site options are proposed as potential sites to accommodate the relocation of the Leschenault Homestead (one of which includes Lot 101).

It is considered alternative options (other than Lot 101) are available for the relocation of Leschenault Homestead and that the proposed development will in no way compromise future planning for the Port land, given it is compatible with Port related activities and serves as an appropriate transitional land use between Port land and residential land on the opposite side of Forrest Highway.

Figure 6 – Inner Harbour Structure Plan

4.5 DEVELOPMENT CONTROL POLICY 1.10

The WAPC has prepared Development Control Policy 1.10 – Freeway service centres and roadhouses, including signage. The Policy applies to development applications and hence it is relevant to this proposal. This development application has been informed by a TIA (Appendix E) which has been prepared having regard to the provisions of DC Policy 1.10.

The proposal is considered to satisfy all relevant aspects of the Policy including applicable locational, siting and design measures and will function as an ‘edge of centre’ facility as described by the Policy.
Clause 3.2 of DC 1.10 – *Siting measures* advises sites should generally be a minimum of two to five hectares in size. Further, the Policy advises sites should be of an appropriate size and configuration to provide safe and efficient traffic circulation, easy access to all facilities and safe pedestrian movement. Lot 101 is 7351m² in area and hence is smaller than the site area recommended by DC 1.10. This notwithstanding, all of the required elements of a Road House can be accommodated on the site. The TIA confirms the site layout will facilitate safe and efficient circulation through the site for vehicles including fuel tankers and trucks as large as B-Doubles.

In accordance with clause 3.3.5 of DC 1.10, to facilitate pedestrian safety, parking and refuelling facilities for cars have been segregated from freight vehicle and coach parking by locating parking for freight vehicles and coaches in a separate lane at the front of the facility. Refuelling facilities for freight vehicles are not proposed. These facilities are not required for a Road House and are available at other locations.

It is noted DC 1.10 provides for convenience shopping to occupy an aggregate retail floor space of up to 150 m² in the case of a Road House (or greater, under special circumstances). The convenience store component is consistent with this provision of DC 1.10 in that a maximum retail floor space of 150 m² is proposed.

The café/restaurant/take-away tenancies are located within a single building and no drive through facilities for take-away food outlets are proposed.

With regard to signage, DC 1.10 provides for a single, multi-tenancy pylon sign up to 12m in height. The intent of specifying a single pylon sign is to avoid a proliferation of signage and ‘visual clutter’. In this instance, two pylon signs are proposed, being an illuminated sign 12m in height and a multi-tenancy illuminated sign 7m in height. From the proponent’s perspective, it is desirable for two pylon signs to be located along the 107m lot frontage to Forrest Highway, given the mix and distribution of uses proposed on the site. It is also relevant that one of the signs is only 7m in height and therefore significantly smaller than the maximum height of 12m contemplated by DC 1.10. It is noted approval for the proposed signage will also need to be obtained from Main Roads WA.

### 4.6 LOCAL PLANNING POLICY – SIGNAGE AND ADVERTISEMENTS

The City of Bunbury has adopted a Local Planning Policy – *Signage and Advertisements*. The purpose of the Policy is to control and guide the development of signage and advertisements on zoned land in order to safeguard and enhance the character and amenity of the built and natural environment of the Local Planning Policy Area.

Table 2 of the Policy – *Maximum Luminance Levels* prescribes a maximum permitted luminance (candelas per m²) of 300 cd/m² within the Rural zone. A condition of planning approval can be applied to ensure the luminance of the proposed signage is appropriate having regard to the location of the site fronting Forrest Highway.

Table 5 of the Policy – *Assessment Categories for Signs and Advertisements* applies an ‘I’ level of assessment (impact assessable) for pylon signs and ‘-‘ (likely to be inconsistent with Scheme objectives, the Regulations and the Policy) for pylon sign – large in the Rural zone. However, the nature of the proposed use adjacent to the Forrest Highway should also be considered, having regard to the provisions of DC 1.10.
Appendix A of the Policy includes Table 6 - Standard Design Requirements for Signs and Advertisements. Some specific standards for pylon signs are considered below:

**Pylon sign**

- The maximum height above the ground is to be 6.5m or the height of a building in close proximity, whichever is the greater, but is not to exceed 10m. The height of a building is defined as the height of the uppermost part of the building above ground level.

**Pylon sign - large**

- The maximum height above the ground is to be 6.5m or the height of a building in close proximity, whichever is the greater, but should not exceed 8.4m. The height of a building is defined as the height of the uppermost part of the building above ground level.
- A pylon sign large is not to be located along a street frontage of a property, along which is located another pylon sign large, billboard sign, pylon sign, billboard sign large or pole sign, and in no case less than 3.0m from the front boundary.
- Where pylon signs large are to be erected on a property on which a building/s with multiple tenancies (such as shopping centres) is erected or is to be erected, the pylon signs may be required to be consolidated into one sign.

It is apparent there is some inconsistency in the Policy. For example, it would be assumed a ‘Pylon sign – large’ category would describe a larger category of sign than the standard ‘Pylon sign’ category, which appears to provide for larger signs up to 10m. There is also inconsistency between the height of signs provided for in DC 1.10 which allows for signs up to 12m and under special circumstances, up to 20m in height. It is also relevant to note the Policy does not prohibit more than one pylon sign on a property where multiple tenancies are proposed, as is the case with the Road House development at Lot 101 Forrest Highway. For these reasons, a flexible approach should be applied to the consideration of the pylon signs proposed as part of this development.

4.7 EPA GUIDANCE NO.3 – SEPARATION DISTANCES BETWEEN INDUSTRIAL AND SENSITIVE USES

EPA Guidance No. 3 recommends generic separation distances between industrial land uses and sensitive land uses. With respect to a Freeway Service Centre with 24 hour operation, a 100m buffer is recommended for sensitive uses. The proposed Road House satisfies this recommended buffer distance given there are no sensitive land uses within 100m of Lot 101.

5. CONCLUSION

Development approval is sought for a Road House (and associated pylon signage) as detailed in this report. The proposed use is permissible in the Rural zone under LPS 8 and satisfies Scheme requirements. In this regard, this submission has demonstrated the development can proceed in the absence of a structure plan, in a manner that is consistent with orderly and proper planning and will not prejudice the overall development potential of the locality.

The site can be provided with suitable traffic and drainage management to provide for a sustainable form of development. In view of the details provided in the report, it is respectfully requested that the JDAP approve the Road House proposed at Lot 101 Forrest Highway, Vittoria.
Development Plans

Development Site Plan – prepared by Harley Dykstra

Complete Plan Set – prepared by EXZO Drafting
PROPOSED ROADHOUSE,
9850 FORREST HIGHWAY, VITTORIA, W.A., 6230.
LOT: 101
SITE AREA = 7351SQM
SARACEN PROPERTIES PTY LTD
Proposed Roadhouse,
9850 Forrest Highway,
Vittoria, W.A., 6230.

Lot: 101

Site Area = 7351sqm

General Notes:
1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. WRITTEN DIMENSIONS SHALL TAKE PRECEDENCE OVER SCALED DIMENSIONS.
3. LARGE SCALE DRAWINGS SHALL TAKE PRECEDENCE OVER SMALLER SCALE DRAWINGS.
4. THE CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO THE COMMENCEMENT OF ANY BUILDING WORK.
5. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL CONSULTANT DRAWINGS AND THE SPECIFICATIONS.

Proposed Roadhouse, 9850 Forrest Highway, Vittoria, W.A., 6230
Lot: 101
Site Area = 7351sqm
**Landscaping Legend**

1. **Existing Trees**
2. **Existing Trees to be Confirmed**
3. **Landscape Retention**
4. **Soft Landscaping**
5. **Reticulation**
6. **Hard Landscaping**
7. **Trenching**

**Project Description**


Lot: 101

Site Area = 7351sqm

**Scale**

1:200

**Drawing Number**

A008

**Revision Schedule**

- **No.** Description Date
- **1** Drawings first issue for DA 05/10/2017
- **2** Passenger vehicle parking, breakdown area, electrical charging station and picnic area added. 20/11/2017
- **3** FFL’s Updated. Service road and crossovers as per Transcore’s recommendation 27/11/2017
- **4** Crossovers & Service Road revised 01/12/2017
- **5** Truck parkings added 22/03/2018
- **6** Retail expansion removed 23/04/2018
- **7** General Revision 30/04/2018
- **8** Crossovers revised 08/05/2018
- **9** Fuel retail & cafe update & carpark 25/10/2018
- **10** Cafe updated 26/10/2018

**General Notes:**

1. **All dimensions are in millimetres.**
2. **Written dimensions shall take precedence over scaled dimensions.**
3. **Large scale drawings shall take precedence over smaller scale drawings.**
4. **The contractor shall check and verify all dimensions on site prior to the commencement of any building work.**
5. **This drawing is to be read in conjunction with all consultant drawings and the specifications.**

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APPENDIX B

Certificate of Title
RECORD OF CERTIFICATE OF TITLE
UNDER THE TRANSFER OF LAND ACT 1893

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

REGISTRAR OF TITLES

LAND DESCRIPTION:
LOT 181 ON DIAGRAM 93343

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)
VICTOR JOHN HOWES OF 58 VICKERY CRESCENT, SOUTH BUNBURY
(A 93343) REGISTERED 20/10/1998

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


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

END OF CERTIFICATE OF TITLE

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

SKETCH OF LAND: 2146-208 (101/D93343)
PREVIOUS TITLE: 1547-654
PROPERTY STREET ADDRESS: LOT 101 FORREST HWY, VICTORIA.
LOCAL GOVERNMENT AUTHORITY: CITY OF BUNBURY

NOTE 1: DUPLICATE CERTIFICATE OF TITLE NOT ISSUED AS REQUESTED BY DEALING L107554

LANDGATE COPY OF ORIGINAL NOT TO SCALE  Fri May 11 11:46:20 2018  JOB 56682193
APPENDIX C

Feature Survey
This plan has been prepared for Saracen Properties Pty Ltd from a combination of field survey and existing records for the purpose of showing the physical features of the land to assist in designing future development. It should not be used for any other purpose.

The title boundaries shown hereon were not verified or marked at the time of survey but are derived from the SCDB 04/2017, D93343, P16050 and DP 31758. They are estimated to be accurate only to +/- 0.05m. This plan should not be used for building to boundary, or to prescribed set-backs, without further boundary survey.

Before starting any demolition, excavation or construction on the site, the relevant person should make an independent and updated enquiry of 'Dial Before You Dig' and any relevant service providers to ascertain the existence of further services (if any) and the accurate location of those not surveyed at the time of survey.

Failure to reproduce this note on providing this plan or accompanying data or any part thereof to any third party will render this plan or data invalid.

NOTE: This drawing is the property of Harley Dykstra Pty Ltd and may not be copied or altered without the consent of the owner.

Lot 101 on D 93343 Forrest Highway Vittoria

Harley Dykstra disclaims any liability whatsoever and howsoever caused for loss or damage arising from any party who uses or relies upon this plan for any purpose other than that for which it was intended.

Offices also at Albany, Busselton, Kelmscott and Perth
APPENDIX D

Geotechnical Assessment
GEOTECHNICAL INVESTIGATION

For: Saracen Developments Pty Ltd

Project Address: Lot 101 Forrest Highway, Victoria

Project Number: D167019

Job Number: J178846

Revision Number: 0

Author: Amy Yates

Date: 14/6/2017
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1. PROJECT DETAILS

1.1. Introduction

At the request of Saracen Developments Pty Ltd (The Client), Structerre Consulting Engineers (Structerre) have conducted a Geotechnical Investigation at Lot 101 Forrest Highway, Vittoria. The purpose of the investigation was to provide the following:

- Desk top study including a summary of geology, groundwater and site history (obtained from historical photographs);
- Summary of encountered ground and groundwater conditions;
- Site classification in accordance with AS 2870-2011 Residential Slabs and Footings;
- Wind Classification in accordance with AS 4055-2012 Wind Loads for Housing;
- Recommendations for stormwater drainage design;
- Site preparation requirements (earthworks); and
- Preliminary footing detail considering surface movement and sand pad thickness.

Terms of reference for this investigation were presented in a Structerre Consulting Engineers proposal reference Q68571 (dated 20 April 2017), which was submitted to and accepted by The Client.

1.2. Site Description & Proposed Development

The site is located at Lot 101 Forrest Hwy Vittoria, City of Bunbury. Forrest Highway lies to the south of the site and vacant land to the northeast and southeast.

The site is generally flat and level as is the surrounding topography. At the time of the field investigation a shed occupied the site. The front and the rear areas of the property were covered in vegetation.

We understand that it is proposed to subdivide the site for residential purposes.

1.3. Field Investigation – Scope of Works

The field investigation was carried out on 29 May 2017 and comprised:

- 7 x Sample Retrieval Probe (SRP) boreholes to a depth of 2.5m over the site for material assessment and soil profiling;
- 7 x Dynamic Cone Penetrometer (DCP) tests in accordance with AS 1289.6.3.2 (1997) to a depth of 2.0m for evaluation of relative densities of the upper layers; and
- 3 x In situ percolation tests to determine the permeability of the materials within the upper 1.0m.

The borehole, percolation and DCP test locations are shown on the attached site plan in Appendix 1.

A geotechnical engineer from Structerre supervised the fieldwork and all fieldwork, interpretation and terminology used in this report are in accordance with the guidelines presented in AS1726-1993 Geotechnical Site Investigations.
2. DESK STUDY

2.1. Geological Setting

The Collie sheet 1: 250,000 Environmental Geology Series (Sheet SI 50-6, 1983) prepared by the Geological Survey of Western Australia indicates that the following geological layers underlie the site:

- Alluvium (Qra) – clay, sand and loam.

2.2. Ground Surface and Groundwater Level

The Perth Groundwater Atlas (Waters & Rivers Commission) indicates the ground surface level at this site was approximately 5.0m Australian Height Datum (AHD).

No groundwater information is available to the site, however it should be noted that the groundwater levels can vary significantly due to seasonal variation and the data from the recorded maximum levels should be used only as a guide.

2.3. Earthquake Coefficient

In accordance with AS 1170.4-2007 Structural Design Actions the site is located within an area with an earthquake acceleration coefficient of 0.09.

2.4. Wind Classification

In accordance with AS 4055-2012 Wind Loads for Housing, wind classification of this site falls within the non-cyclonic “N2” category.

2.5. Site History

Historical aerial photographs dating back to 1996 are publically available through Landgate Map Viewer were assessed and a summary is presented in Table 1.

Table 1 – Historical Site Information

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>The shed has been built. The immediate areas to the north, east and west were vacant.</td>
</tr>
<tr>
<td>2017</td>
<td>The site and the immediate boundaries remain relatively unchanged to the current day.</td>
</tr>
</tbody>
</table>
3. RESULTS OF THE INVESTIGATION

3.1. Subsurface Soil Profile

The subsurface soil profile presented below was determined from the ground conditions encountered within the SRP boreholes and through the interpretation of the DCP test results:

<table>
<thead>
<tr>
<th>Depth to Base of Strata (m)</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2 – 0.3 (Ave. 0.3)</td>
<td>Topsoil</td>
</tr>
<tr>
<td>0.9 – 2.5 (Ave. 1.3)</td>
<td>SAND, trace silt, loose to medium dense, locally very loose near surface</td>
</tr>
<tr>
<td>1.3 – 2.0 (Ave. 1.7)</td>
<td>Clayey SAND, trace gravel, loose to medium dense</td>
</tr>
<tr>
<td>Not Penetrated (&gt;2.5m)</td>
<td>SAND, trace silt, medium dense to dense, locally loose to medium dense</td>
</tr>
</tbody>
</table>

The soils encountered are consistent with the expected site conditions as predicted from the Environmental Geology Map. It is important to note that there may be pockets of fill on site that are deeper than that encountered by the investigation boreholes. The subsurface soil conditions encountered are presented in the borehole logs, within Appendix 3.

3.2. Groundwater

Groundwater was encountered in all of the SRP boreholes, and was established at depth of 1.4m. Based on our understanding of the proposed development, shallow excavations are envisaged. Therefore, it is considered unlikely that groundwater would be encountered.

If however deeper excavation or an undercroft/basement construction is proposed, groundwater would potentially be encountered during construction and allowance should be made for localised dewatering if groundwater is to be encountered during construction.
3.3. Percolation Testing

Percolation testing of the in situ soils was undertaken in three locations. Results of the testing are summarised below:

**Table 3 – In Situ Percolation Test Results**

<table>
<thead>
<tr>
<th>Test Location</th>
<th>Testing Depth (m)</th>
<th>Soil Type</th>
<th>Permeability (m/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PERC1</td>
<td>0 - 1.0</td>
<td>Clayey SAND</td>
<td>0.5</td>
</tr>
<tr>
<td>PERC2</td>
<td>0 - 1.0</td>
<td>Clayey SAND</td>
<td>0.7</td>
</tr>
<tr>
<td>PERC3</td>
<td>0 - 1.0</td>
<td>SAND - Clayey SAND</td>
<td>0.9</td>
</tr>
</tbody>
</table>

*Permeability exceeded maximum reading on apparatus in accordance with AS 1547:2000.*

3.4. Laboratory Test Results

Selected representative soil samples were tested by Structerre’s in-house NATA accredited laboratory for Atterberg Limits and Particle Size Distribution. The results are attached in Appendix 4.

**Table 4 – Laboratory Test Results**

<table>
<thead>
<tr>
<th>Test Hole</th>
<th>Depth (m)</th>
<th>Soil Description</th>
<th>Liquid Limit % AS1289 3.1.2</th>
<th>Plastic Limit % AS1289 3.2.1</th>
<th>Plasticity Index % AS1289 3.3.1</th>
<th>Linear Shrinkage % AS1289 3.4.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>BH01</td>
<td>1.1–1.5</td>
<td>Clayey SAND trace gravel</td>
<td>33</td>
<td>18</td>
<td>15</td>
<td>3</td>
</tr>
</tbody>
</table>

Test results indicate that the natural soil material has no low shrink swell capacity or degree of expansion.
4. GEOTECHNICAL CONSTRUCTION CONSIDERATIONS

4.1. Site Classification

AS 2870-2011 Residential Slabs and Footings provides guidance on site classification for residential slabs and footing design based on the expected ground surface movement and depth of expected moisture changes.

Table 5 – Classification Based on Site Reactivity

<table>
<thead>
<tr>
<th>Class</th>
<th>Foundation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Most sand and rock sites with little or no ground movement from moisture changes</td>
</tr>
<tr>
<td>S</td>
<td>Slightly reactive clay sites, which may experience only slight ground movement from moisture changes (0&lt;(y_s)≤20mm)</td>
</tr>
<tr>
<td>M</td>
<td>Moderately reactive clay or silt sites, which may experience moderate ground movement from moisture changes (20&lt;(y_s)≤40mm)</td>
</tr>
<tr>
<td>H1</td>
<td>Highly reactive clay sites, which may experience high ground movement from moisture changes (40&lt;(y_s)≤60mm)</td>
</tr>
<tr>
<td>H2</td>
<td>Highly reactive clay sites, which may experience very high ground movement from moisture changes (60&lt;(y_s)≤75mm)</td>
</tr>
<tr>
<td>E</td>
<td>Extremely reactive sites, which may experience extreme ground movement from moisture changes ((y_s)&gt;75mm)</td>
</tr>
</tbody>
</table>

Clause 2.1.3 Classification of other Sites

| P     | Sites which include soft or unstable foundations such as soft clay or silt or loose sands, landslip, mine subsidence, collapsing soils and soils subject to erosion, reactive sites subject to abnormal moisture conditions and site that cannot be classified in accordance to Table 2.1 |

The site in its current condition is classified as Class “P”. Based on results of this investigation the site can be upgraded to a Class “S” in accordance with AS 2870-2011 provided that all unsuitable materials are removed and replaced with engineer-controlled sand fill materials in accordance with the earthwork recommendations outlined in Section 4.3 of this report.

Footings suitable for this site should be adopted to accommodate expected ground surface movements of approximately \(y_s = 6\)mm associated with the presence of low reactive clayey sand deposits within the building site.
4.2. Drainage

The existing ground conditions are not suitable for on-site disposal of stormwater runoff through the use of soakwells. It is recommended that all stormwater from roofed, paved and driveway areas be collected and detained to reduce peak flow rates prior to discharging offsite as per council requirements. Sub soil drainage may be required at this site to control groundwater perching in the upper soil layers.

4.3. Earthworks

All earthworks shall be undertaken in accordance with AS 3798-2007 Guidelines on earthworks for commercial and residential developments and are to include the following:

- All unsuitable materials to be stripped and removed from the site. Unsuitable materials include topsoil, deleterious and organic materials.
- It is considered that the near surface very loose to loose sand requires improvement. Therefore, it is proposed to excavate and stockpile the materials for reuse, provided it is free from clay/silt (i.e. <5%), deleterious and organic materials. The depth of excavation may vary depending on conditions encountered and is subject to inspection. However, it is envisaged that the average depth of excavation would be approximately 0.8m. Should the site levels be reduced the excavated materials can be reused or removed off site.
- Excavation should not be greater than 2.0m and/or undermine the surrounding structures. A 1V: 2H slope should be maintained for temporary excavations. If excavation is required closer than the 1V: 2H slope would allow or deeper, it is recommended that this office be contacted for retaining system design.
- Proof compact the exposed base. The compaction requirements are set out in the table below, as per AS 3798-2007:

<table>
<thead>
<tr>
<th>Item</th>
<th>Application</th>
<th>Minimum relative compaction, %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Minimum density ratio</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Standard Compaction Effort)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Cohesive soils)</td>
</tr>
<tr>
<td>1</td>
<td>Residential - lot, fill, house, sites</td>
<td>95</td>
</tr>
<tr>
<td>2</td>
<td>Fill to support pavements</td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) General fill</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td>b) Subgrade (to a depth of 0.3m)</td>
<td>98</td>
</tr>
</tbody>
</table>

Table 6 – Compaction Requirements
After excavation and proof compaction, the excavated base is to be inspected and approved by a representative from this office prior to backfilling. At this stage it can be assessed whether any further materials need to be removed or whether further compaction of the base is required.

A minimum of 0.6m sand cover is to be maintained above the reactive material in order to achieve a Class “S” site with $y_s = 6\text{mm}$.

The ground level should be built up to design levels with the stockpiled sand FILL and imported fill, if required. The imported fill should consist of free draining sand with not more than 5% passing a 75$\mu\text{m}$ sieve and be free of organic matter and other deleterious materials. The fill materials should be placed in layers not exceeding 300mm loose thickness and compacted to achieve a minimum 8 Perth Sand Penetrometer (PSP) blows over the interval of 150 – 450mm, 9 PSP blows over the interval 450 – 750mm and 11 PSP blows over the interval 750 – 1050mm.

After remedial earthworks have been completed, the earthworks should be inspected and approved by a representative from this office.

5. CONCLUSIONS

A site investigation has been carried out at the site of the proposed residential development to assess the geotechnical conditions. Parameter and design recommendations are incorporated in the body of the report. The following conclusions have been drawn from the site investigation:

- The average subsurface soil profile encountered comprised topsoil to 0.3m, sand to 1.3m overlying the clayey SAND trace gravel to an averaged depth of 1.7m, and underlain with the medium dense to dense, locally loose sand to the investigated depth of 2.5m.
- The water table was encountered at the depth of 1.4m below the existing ground.
- It is considered that the site is not suitable for on-site drainage.
- The site can be classified as Class “S” in accordance with AS 2870-2011, provided that the recommended earthworks are undertaken.
- The full scope of the recommended earthworks is presented in Section 4.3, but generally comprises:
  - Stripping of topsoil and unsuitable materials
  - Proof compaction of the base
  - Placement of sand fill to required level
  - Compaction to final level
6. LIMITATION OF FIELD INVESTIGATIONS

This report has been prepared in accordance with generally accepted consulting practice for The Client using information supplied at the time and for the project specific requirements as understood by Structerre. To the best of our knowledge the information contained in this report is accurate at the date of issue, however it should be emphasised that any changes to ground conditions and/or the proposed structures may invalidate the recommendations given herein.

The conclusions and recommendations in this report are based on the site conditions revealed through selective point sampling, representing the conditions of the site in total, although the area investigated represents only a small portion of the site. The actual characteristics may vary significantly between successive test locations and sample intervals other than where observations, explorations and investigations have been made.

The materials and their geotechnical properties presented in this report may not represent the full range of materials and strengths that actually exist on site and the recommendations should be regarded as preliminary in nature. Allowances should be made for variability in ground conditions and any consequent impact on the development. Structerre accepts no responsibility and shall not be liable for any consequence of variations in ground conditions.

If ground conditions encountered during construction are different to that described in this report, this office should be notified immediately.

For and behalf of

STRUCTERRE CONSULTING ENGINEERS

Author: Amy Yates
Title: Engineering Geologist
Credentials: BSc (Hons), FGS

Checked By: Prasudi Atmajaya
Title: Geotechnical Engineer
Credentials: BE Civil & Construction (Hons), MIEAust

Disclaimer
This report is at the request of the addressee and no liability is accepted by Structerre Consulting Engineers to any third person reading or relying upon the report, not withstanding any rule of law and/or equity to the contrary and that this report is strictly confidential and intended to be read and relied upon only by the addressee.
7. REFERENCES

Department of Water – Perth Groundwater Atlas

Geological Survey of Western Australia 1:250,000 Environmental Geology Series

AS 1170.4-2007 Structural design actions – Earthquake actions in Australia

AS 1289.3.1.2-2009 Methods of testing soils for engineering purposes – Soil classification tests
– Determination of the liquid limit of a soil

AS 1289.3.2.1-2009 Methods of testing soils for engineering purposes – Soil classification tests
– Determination of the plastic limit of a soil

AS 1289.3.3.1-2009 Methods of testing soils for engineering purposes – Soil classification tests
– Calculation of the plasticity index of a soil

AS 1289.3.4.1-2009 Methods of testing soils for engineering purposes – Soil classification tests
– Determination of the linear shrinkage of a soil

AS 1289.6.3.2-1997 Methods of testing soils for engineering purposes – Soil strength and consolidation tests – Determination of the penetration resistance of a soil – 9kg dynamic cone penetrometer test

AS 1726-1993 Geotechnical site investigation

AS 2870-2011 Residential slabs and footings

AS 3798-2007 Guidelines on earthworks for commercial and residential developments

AS 4055-2012 Wind loads for housing
APPENDIX 1 – GEOTECHNICAL INVESTIGATION SITE PLAN
Lot 101 Forrest Highway, VITTORIA

LEGEND
SRP: Sample Retrieval Probe
DCP: Dynamic Cone Penetrometer Test
PERC: Percolation Test

PROJECT:
D167019
J178846

CLIENT:
Saracen Developments Pty Ltd

JOB:
Geotechnical Investigation Site Plan

SCALE: NTS

DATE:
29 May '17

© COPYRIGHT STRUCterre Consulting Group - JUL'05
APPENDIX 2 – SITE PHOTOGRAPHS
APPENDIX 3 – BOREHOLE LOGS & TERMINOLOGY
<table>
<thead>
<tr>
<th>Depth</th>
<th>Graphic</th>
<th>Stratum Description</th>
<th>Consistency</th>
<th>DCP Blows/150mm</th>
<th>Samples</th>
<th>Moisture</th>
<th>Water Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Topsoil</td>
<td>SP: SAND: fine to medium grained, non-plastic, trace silt, brown (Alluvium)</td>
<td>VL</td>
<td>5, 10, 15, 20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>MD</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>MD - D</td>
<td></td>
<td></td>
<td></td>
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<tr>
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<td>MD-D</td>
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<tr>
<td>2</td>
<td>SC: Clayey SAND: fine to medium grained, medium plasticity, trace gravel, grey (Alluvium)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>1.1 - 1.5 B</td>
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<td></td>
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<td>MD</td>
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<td></td>
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<td>MD-D</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>SP: SAND: fine to medium grained, non-plastic, trace silt, grey (Alluvium)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
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<td>MD</td>
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Remarks:
1. Termination reason: Target depth
2. Hole stability: Hole stable
3. Samples taken: As indicated
4. Co-ordinate system: WGS 84

Terminated at 2.50 m
### Depth 1

**Graphic Description**
- Topsoil:
  - SP: SAND: fine to medium grained, non-plastic, trace silt, brown (Alluvium)

### Depth 2

**Graphic Description**
- SC: Clayey SAND: fine to medium grained, medium plasticity, trace gravel, dark grey/brown (Alluvium)

### Depth 3

**Graphic Description**
- SP: SAND: fine to medium grained, non-plastic, trace silt, brown (Alluvium)

**Remarks**
1. Termination reason: Target depth
2. Hole stability: Hole stable
3. Samples taken: None
4. Co-ordinate system: WGS 84

### DCP Blows/150mm

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<td>VL</td>
<td>5 10 15 20</td>
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<td>2</td>
<td>L-MD</td>
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<tr>
<td>3</td>
<td>MD</td>
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### Water Level

- S
### Depth of Stratigraphic Layers

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<td>Topsoil:</td>
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<td>SC: Clayey SAND: fine to medium grained, medium plasticity, trace gravel, grey/brown (Alluvium)</td>
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<td>2</td>
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<td>SP: SAND: fine to medium grained, non-plastic, trace silt, grey (Alluvium)</td>
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**Terminated at 2.50 m**

### Soil Consistency

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<th>Water Level</th>
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### Remarks

1. Termination reason: Target depth
2. Hole stability: Hole stable
3. Samples taken: As indicated
4. Co-ordinate system: WGS 84
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<td>SP: SAND: fine to medium grained, non-plastic, trace silt, dark grey (Alluvium)</td>
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<tr>
<td>2</td>
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<td>L-MD</td>
</tr>
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<td></td>
<td></td>
<td>L</td>
</tr>
<tr>
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<td>VL</td>
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<td>3</td>
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<td>MD</td>
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</table>

- Terminated at 2.50 m

### Remarks
1. Termination reason: Target depth
2. Hole stability: Hole stable
3. Samples taken: None
4. Co-ordinate system: WGS 84
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<th>Depth</th>
<th>Graphic</th>
<th>Stratum Description</th>
<th>Consistency</th>
<th>DCP Blows/150mm</th>
<th>Samples</th>
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<tbody>
<tr>
<td></td>
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<tr>
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<td></td>
<td>SP: SAND: fine to medium grained, non-plastic, trace silt, dark grey (Alluvium)</td>
<td>VL</td>
<td></td>
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<tr>
<td>1</td>
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<td>L-MD</td>
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<td>2</td>
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**Remarks**
1. Termination reason: Target depth
2. Hole stability: Hole stable
3. Samples taken: None
4. Co-ordinate system: WGS 84
Topsoil:

SP: SAND: fine to medium grained, non-plastic, trace silt, dark brown (Alluvium)
with gravel, brown

SC: Clayey SAND: fine to medium grained, medium plasticity, trace gravel, grey/brown (Alluvium)

Terminated at 2.50 m

Remarks
1. Termination reason: Target depth
2. Hole stability: Hole stable
3. Samples taken: None
4. Co-ordinate system: WGS 84
**Stratum Description**

**Topsoil:**
- SP: SAND: fine to medium grained, non-plastic, trace silt, brown (Alluvium)

**SC:**
- Clayey SAND: fine to medium grained, medium plasticity, trace gravel, grey/brown (Alluvium)

**SP:**
- SAND: fine to medium grained, non-plastic, trace silt, brown (Alluvium)

**Remarks**
1. Termination reason: Target depth
2. Hole stability: Hole stable
3. Samples taken: None
4. Co-ordinate system: WGS 84
**BORELOG TERMINOLOGY**

### Particle Size Distribution

<table>
<thead>
<tr>
<th>Major Division</th>
<th>Subdivision</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boulders</td>
<td></td>
<td>&gt;200mm</td>
</tr>
<tr>
<td>Gravel</td>
<td>Coarse</td>
<td>63 - 20mm</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>20 - 6mm</td>
</tr>
<tr>
<td></td>
<td>Fine</td>
<td>6 - 2.36mm</td>
</tr>
<tr>
<td>Sand</td>
<td>Coarse</td>
<td>2.36 - 0.8mm</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>0.6 - 0.2mm</td>
</tr>
<tr>
<td></td>
<td>Fine</td>
<td>0.2 - 0.075mm</td>
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</table>

### Consistency of Cohesive Soils

<table>
<thead>
<tr>
<th>Term</th>
<th>Undrained Strength Su (kPa)</th>
<th>Field Guide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Soft</td>
<td>&lt; 12</td>
<td>Exudes between the fingers when squeezed in hand</td>
</tr>
<tr>
<td>Soft</td>
<td>12 - 25</td>
<td>Can be moulded by light finger pressure</td>
</tr>
<tr>
<td>Firm</td>
<td>25 - 50</td>
<td>Can be moulded by strong finger pressure</td>
</tr>
<tr>
<td>Stiff</td>
<td>50 - 100</td>
<td>Cannot be moulded by Fingers. Can be indented by thumb.</td>
</tr>
<tr>
<td>Very Stiff</td>
<td>100 - 200</td>
<td>Can be indented by thumb nail</td>
</tr>
<tr>
<td>Hard</td>
<td>&gt; 200</td>
<td>Can be indented with difficulty by thumb nail.</td>
</tr>
<tr>
<td>Friable</td>
<td>-</td>
<td>Crumbles or powders when scraped by thumbnail.</td>
</tr>
</tbody>
</table>

### Consistency/Density of Non-Cohesive Soils

<table>
<thead>
<tr>
<th>Term</th>
<th>Density Index (%)</th>
<th>SPT &quot;N&quot; Value Comparison</th>
<th>Moisture Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Loose</td>
<td>&lt; 15</td>
<td>0 - 4</td>
<td>D Dry</td>
</tr>
<tr>
<td>Loose</td>
<td>15 - 35</td>
<td>4 - 10</td>
<td>M Moist</td>
</tr>
<tr>
<td>Medium Dense</td>
<td>35 - 65</td>
<td>10 - 30</td>
<td>W Wet</td>
</tr>
<tr>
<td>Dense</td>
<td>65 - 85</td>
<td>30 - 50</td>
<td>S Saturated</td>
</tr>
<tr>
<td>Very Dense</td>
<td>&gt; 85</td>
<td>&gt; 50</td>
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</table>

### Minor Components

<table>
<thead>
<tr>
<th>Term</th>
<th>Assessment Guide</th>
<th>Proportion of Minor Component In:</th>
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</thead>
<tbody>
<tr>
<td>Trace</td>
<td>Presence just detectable by feel or eye, but soil</td>
<td>Coarse grained soils: &lt; 5 %</td>
</tr>
<tr>
<td></td>
<td>properties little or no different to general properties of primary component</td>
<td>Fine grained soils: &lt;15%</td>
</tr>
<tr>
<td>With</td>
<td>Presence easily detected by feel or eye, soil</td>
<td>Coarse grained soils: 5 - 12 %</td>
</tr>
<tr>
<td></td>
<td>properties little different to general properties of primary component</td>
<td>Fine grained soils: 15 - 30%</td>
</tr>
</tbody>
</table>

### Soil Legend

- **FILL**
- **TOPSOIL**
- **PEAT**
- **CLAY**
- **SILT**
- **GRAVEL**
- **CONCRETE**
- **LIMESTONE**
- **COMBINATIONS**

### USCS

- **GW** Well graded gravel
- **GP** Poorly graded gravel
- **SW** Well graded sand
- **SP** Poorly graded sand
- **SC** Clayey sand
- **SM** Silty sand
- **OL** Organic low plasticity silt
- **ML** Low plasticity silt
- **MH** High plasticity silt
- **OH** Organic high plasticity silt
- **CL** Low plasticity clay
- **CI** Intermediate plasticity clay
- **CH** High plasticity clay

Doc: GE 2.2.3
APPENDIX 4 – LABORATORY TEST RESULTS
### SAMPLE DETAILS

- **BH No. / Depth**: 1 1.1-1.5m
- **Sample History**: Air Dried
- **Sampling Method**: 50°C Oven Dried
- **Sample Preparation**: Oven Dried
- **Client**: AS 1289 1.1

### ATTERBERG LIMITS

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<thead>
<tr>
<th>Description</th>
<th>Method</th>
<th>Result (%)</th>
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<tr>
<td>Liquid Limit</td>
<td>AS 1289.3.1.2</td>
<td>33</td>
</tr>
<tr>
<td>Plastic Limit</td>
<td>AS 1289.3.2.1</td>
<td>18</td>
</tr>
<tr>
<td>Plasticity Index</td>
<td>AS 1289.3.3.1</td>
<td>15</td>
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<tr>
<td>Linear Shrinkage</td>
<td>AS 1289.3.4.1</td>
<td>3</td>
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<tr>
<td>Nature of Shrinkage</td>
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<td>Flat</td>
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### PARTICLE SIZE DISTRIBUTION

- **Method**: AS 1289.3.6.1
- **Description**: Particle size distribution by sieve analysis

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<thead>
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<th>Sieve Size (mm)</th>
<th>% Passing</th>
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<tr>
<td>19.0</td>
<td>100</td>
</tr>
<tr>
<td>2.36</td>
<td>98</td>
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<tr>
<td>0.425</td>
<td>78</td>
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<tr>
<td>0.075</td>
<td>17</td>
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**Material Description**: Clayey SAND trace gravel

AS 1726 Appendix A Section A2: SC

**Authorised Signatory**: Wayne Rozmianiec

**Date**: 06-Jun-17
APPENDIX E

Traffic Impact Assessment
Document history and status

<table>
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<th>Revision</th>
<th>Approved by</th>
<th>Date approved</th>
<th>Revision type</th>
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<td>r01</td>
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<td>r01a</td>
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Project: North-east Cnr Johnston Rd & Forrest Hwy, Bunbury

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1.0 Summary

This revised Transport Impact Assessment (TIA) is prepared with respect to the proposed roadhouse at Lot 101 Forrest Highway, Vittoria.

The City of Bunbury and Main Roads have provided technical comments regarding traffic generation, access and layout of the proposal. The proposed development site plan has been revised to address the proposal comments received.

Transcore has been engaged to review the comments provided by City of Bunbury and Main Roads, to undertake updated swept path analysis for the revised layout and to revise the TIA report.

The proposed access arrangement entails provision of a left turn pocket and access road for the eastbound direction of traffic flow on Forrest Highway. A single left out crossover is proposed for the development, to be located east of the traffic signals.

Two access concept design sketches have been prepared which consider the existing and ultimate geometry of Forrest Highway. The proposed development layout and access arrangements consider other future potential developments on nearby properties in the area by permitting shared access and egress to and from Forrest Highway. Accordingly, allowance has been made to accommodate an internal service road which can provide future connectivity between the proposed development and other adjoining Lots in the immediate locality.

The proposed development layout has been assessed with respect to truck access, egress and circulation. Swept path analysis confirms that the proposed access and egress arrangements facilitate safe and efficient circulation through the site for fuel tankers and trucks as large as B-Doubles.

The analysis undertaken as part of this revised Transport Impact Assessment confirms minimal, manageable and therefore acceptable impact on the surrounding road network.


2.0 Introduction

This revised Transport Impact Assessment has been prepared by Transcore on behalf of Saracen Developments Pty Ltd. The subject of this report is the proposed roadhouse development at Lot 101 Forrest Highway, Vittoria.

As shown in Figure 1, the subject site is located on the northern side of Forrest Highway, approximately 220m east of the intersection of Forrest Highway / Vittoria Road. The subject site is located within and forms part of Bunbury Port Inner Harbour Structure Plan.

The proposed access and egress arrangements for the proposed development have given due consideration to potential future integration with adjacent properties in the locality and support the principle of limited direct property access to Forrest Highway.

The location of the site in the context of the Greater Bunbury Region Scheme is indicated in Figure 2.

Key issues that will be addressed in this report include the traffic generation of the proposed development, future planning for Forrest Highway, operation of the site crossovers and heavy vehicle access, egress and circulation.

The Development Application and Transport Impact Assessment report was submitted earlier this year. The City of Bunbury and Main Roads have provided technical comments regarding traffic generation, access and layout of the proposal. The proposed development site plan has been revised to address the proposal comments received.

Transcore has been engaged to review the comments provided by City of Bunbury and Main Roads, to undertake updated swept path analysis for the revised layout and to revise the TIA report.
Figure 1: Location of the subject site

Figure 2: Location of the subject site in context of the Greater Bunbury Region Scheme
3.0 Existing Situation

3.1 Existing Site Use, Access and Parking

As shown in Figure 3 the site is mostly vacant and fenced off. A storage shed is currently located on the site. An unsealed driveway connecting to Forrest Highway is currently provided at the site.

The site is surrounded by primarily vacant land north of Forrest Highway. The Bunbury Farmers Markets, an existing Shell Service Station and residential development is located nearby south of Forrest Highway.

![Figure 3: Subject site from Forrest Highway](image-url)

3.2 Existing Site Traffic Generation

The subject site is mostly vacant and generates negligible traffic.
3.3 Surrounding Road Network and Traffic Management on Frontage Roads

Forrest Highway

Forrest Highway at this location is constructed to a four-lane, divided carriageway standard with sealed shoulders on both sides of the road.

Forrest Highway is classified as a Primary Distributor road in the Main Roads WA Functional Road Hierarchy. Forrest Highway also forms part of the State road network and is covered by a Primary Regional Roads (PRR) reservation in the GBRS (Red Road) and as such is under care and control of Main Roads WA.

Forrest Highway operates with a sign-posted speed limit of 80km/h in the immediate vicinity of the subject site.

As detailed in Figure 4, the signalised intersection of Forrest Highway / Vittoria Road is controlled on the south approach for left and right turn movements, the east approach for left and through movements and the west approach for right turn movements. The through movement on the west approach is uninterrupted, resulting in continuous traffic flow in the eastbound direction on Forrest Highway through the intersection. Right turn movements from Vittoria Road are provided with an acceleration and merging lane in the eastbound direction on Forrest Highway.

Two median breaks are currently provided on Forrest Highway near the existing Shell service station. The eastern median break is provided with a U-turn facility including turn pocket for eastbound traffic on Forrest Highway. The U-turn facility is provided near the left turn pocket and access into the Shell service station, and therefore also allows eastbound traffic on Forrest Highway to access the Shell service station on the southern side of the road. The western median break permits right out movements from the Shell service station.

Figure 4: Traffic treatments near the subject site
3.4 Existing Traffic Volumes on Roads and Major Intersections

Traffic count data obtained from Main Roads WA indicates that Forrest Highway carried average weekday traffic flows of approximately 29,100 vehicles per day (vpd) in August 2013 west of Vittoria Road. The recorded heavy vehicle traffic component was 8% of total weekday traffic volume.

The weekday AM peak hour at this location on Forrest Highway occurs between 8:00am and 9:00am and the PM peak hour occurs between 4:00pm and 5:00pm.

To establish existing base traffic flows at the intersection of Forrest Highway / Vittoria Road, Transcore requested SCATS intersection data for both this intersection and the next signalised intersection to the east (Forrest Highway / Thomson Road).

The existing peak hour traffic flows are outlined in Section 7.3 of this report.

3.5 Public Transport Access

The following bus routes run pass the subject site on Forrest Highway:

- **841 - Bunbury – Kingston** via Bunbury Forum and Australind Shop Ctr;
- **844 - Bunbury – Eaton** via Bunbury Forum and Eaton Fair Shop Ctr; and,
- **845 - Bunbury – Eaton / Millbridge** via Bunbury Forum and Eaton Fair Shop Ctr.

The existing bus routes are detailed in Figure 5. The nearest bus stops are in place on Forrest Highway approximately 350m west of the subject site.

The roadhouse development is intended to cater for passing traffic and is primarily motor vehicle oriented. Therefore, public transport connectivity is not a significant consideration in this assessment.
Figure 5: Existing bus routes
3.6 Pedestrian and Cyclist Facilities

No footpaths or off-road cycle facilities are provided within the vicinity of the site due to the low density of development in this area.

Footpaths and cycle facilities are not considered to be significant issues for the proposed development which is intended to be vehicle orientated.

As the surrounding land is developed in future, it is anticipated that the pedestrian and cycle network would be developed as required, and facilities for cyclists would be provided within the development.

3.7 Crash Data

Information available on the Main Roads WA website indicates that the intersection of Forrest Highway / Vittoria Road near the subject site recorded a total of 36 road crashes including 6 casualties during the five-year period ending in December 2017. This intersection is ranked 505 in the state in terms of the number of crashes.
* denotes a result higher than expected. Some categories may overlap, eg: some crashes may have occurred both at night and in the wet.

L = Local Road  
S = State Road

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**Summary of Intersection Crashes**

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State and Local Roads

**Crash Details**

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**Figure 6: Crash statistics for Forrest Highway / Vittoria Road**
4.0 Changes to Surrounding Transport Networks

4.1 Meeting with Main Roads WA – 20 February 2017

Transcore met with Main Roads WA in Bunbury on 20 February 2017 to discuss key considerations relevant to the transport assessment. The key considerations of note include:

- The access system to the site needs to consider access to the whole precinct.
- Main Roads are likely to require closure of the U-turn facilities on Forrest Highway for the existing Shell service station.
- The design of the access system will need to allow for the future upgrading of Forrest Highway to three lanes each way.
- A left-turn in crossover should be provided only (no right turn entry from Forrest Highway).
- The left-turn lane will need to be a minimum length of 125m including taper.
- The design of the left turn lane may impact the existing bus stop in the verge, but its relocation if required, is not an issue.

4.2 Bunbury Port Inner Harbour Structure Plan

The Bunbury Port Inner Harbour Structure Plan, attached in Appendix A, shows a planned waterway running along the rear of the subject site and neighbouring properties. The proposed railway alignment shown in the structure plan is located to the north of the waterway. The Inner Harbour Structure Plan does not and is not intended to have a statutory effect in terms of LPS 7 or the GBRS. Rather, it has been approved by the Bunbury Port Authority as a policy document to guide future development and decision making within the Inner Harbour.

4.3 Main Roads WA Forrest Highway Upgrade Plans

Transcore has reviewed the preliminary ultimate concept plans for the planned upgrading of Forrest Highway, provided by Main Roads WA. Revision B of the plans (attached in Appendix B) show the following items of note:

- Three traffic lanes in each direction.
- Two-lane busway in the median.
- Construction of bus platforms east and west of the intersection with Vittoria Road with modification of the signalised intersection to accommodate bus priority and access.
• Double right turn pocket from Vittoria Road into Forrest Highway.
• Full signalisation of the intersection of Forrest Highway / Vittoria Road, with eastbound traffic becoming signal controlled.
• A Principal Shared Path (PSP) running along the southern side of Forrest Highway.
• An alternative rail alignment running immediately north of Forrest Highway.

The Local Planning Strategy shows a ‘Future Fast Rail’ link across the site adjacent to Forrest Highway. Given the proposal for a Future Fast Rail service is an unfunded, long term strategic planning consideration, it could not at this stage be viewed as a seriously entertained proposal and hence has not been considered in this Transport Impact Assessment.

If more detailed planning for a fast rail link is progressed in the future, there are a range of alternative alignment options that could be explored, particularly given the alignment that is currently depicted has significant constraints. As such, approval of the proposed development would not prejudice future planning for a fast rail link as envisaged by the strategy.

4.4 Advice from Department of Planning

Based on email information provided to Transcore, Harley Dykstra has been advised by the Department of Planning that Forrest Highway is planned for 4 lanes each direction (including bus and cycle lanes). Traffic is forecast to be in the range of 70,000 to 80,000 vehicles per day.

The planned cross-section of 3 traffic lanes plus 1 bus lane in each direction is consistent with the Main Roads WA, Forrest Highway upgrade concepts provided to Transcore and has been considered in the interim and ultimate access concept sketches prepared by Transcore for the proposed development.

4.5 Comments from City of Bunbury (July/August 2018)

Following feedback from City of Bunbury and Main Roads WA, the proposed development plans were revised as following:
• Removal of drive-through takeaway and coffee components, with replacement of café/restaurant/takeaway tenancies within a single building (please note the tenants have not yet been confirmed);
• Modification to convenience store tenancies with an aggregate retail floor space of 150m2.
• Increased aisle width adjacent to the fuel canopy to ensure unobstructed traffic flow in the event cars are waiting for a refuelling bay to become available;
• Inclusion of public ablutions facilities;
• Area reserved for a future interconnected access way to adjoining lots.
The City of Bunbury provided the following preliminary advice on 30 August 2018:

Transcore has addressed the first two dot points of the above email as following:

- This Transport Impact Assessment has been revised to address comments provided by the City and Main Roads WA.
- The proposed land uses are not anticipated to generate significant additional traffic in the locality. The development is a roadhouse and its purpose is to cater for traffic passing the site on Forrest Highway. Therefore, most of the traffic will be passing trade. The traffic will turn left-in and left-out of the site directly on Forrest Highway and will not interfere with Bunbury Port.

The comments provided by the City Engineer have been addressed in this revised TIA as following:
Comment:

“The Traffic Impact Assessment estimates traffic generation of 144 vehicles per hour at the peak hour, when combining all land uses (takeaway coffee, service station, convenience store and fast food outlet). This figure is considered highly unlikely given the RTA guidelines reference a typical McDonald’s outlet as generating 180 vehicles per hour. It also notes for sensitivity testing, the effect of 230 vehicles per hour should be assessed. Even with conservative discounts for passing trade, the assumptions behind the assessment need to be reviewed in line with accepted standards.”

Response:

The traffic analysis has been revised with more conservative trip assumptions as requested by the City. The revised traffic analysis also reflects the revised land use schedule in the updated site layout. Refer to Section 7.2 of this report for further detail.

Comment:

“For the fast food drive through, stacking capacity should typically be 10 car lengths from pick-up point, however it should be able to accommodate 12 car lengths without unreasonably disrupting car park operations (RTA Guidelines). Approximately ten vehicles would stack back past parking bay 16, providing a blockage to vehicle circulation. 12 car lengths equate to stacking approximately half way down the length of the fuel canopy, presenting a significant disruption to traffic flow.”

“In regards to the take away coffee drive through, approximately seven cars can stack from the pick-up point back to the boundary of the site (slip lane entry). A typical drive through take away facility requires anywhere from 5 to 12 car lengths to be provided for stacking. Based on the location of this site and passing traffic volumes it is expected that the higher side of this number should be catered for. Even with the 7 car lengths that can stack to the boundary under this proposal, there is potential for vehicles to block the entry slip lane and subsequently effect the operation of the Forrest Highway (as noted in Main Roads WA comments).”

Response:

The drive through lane and the coffee drive through have been removed from the revised site plan.
Comment:

“The swept path analysis for semi-trucks and b-doubles demonstrates that a considerable sweep area is required upon entry into the site from the slip lane to manoeuvre into the designated bays (particularly if there are other trucks already parked in one or more of the bays). The possibility of this sweep is also determined by any stacking at the drive through coffee facility. As trucks are not provided with their own separate access or circulating area, it is likely that heavy vehicle movements will be difficult on-site. Stacking cars will have an effect on the efficient movement on site and also potentially on the performance of the Forrest Highway.

The swept path for the Semi-Rigid Vehicle (SRV) shows the exit sweep going over ‘freight vehicle and coach parking 02’. If a vehicle is parked in this bay, a SRV will not be able to manoeuvre out of the site.

Heavy vehicle swept paths shown in the TIA suggest that vehicle parking movements cannot occur without any vehicle conflict occurring should the northern bay be occupied. This may cause traffic conflict at the ingress which could spill out of the site and reduce safety and detract from the function of the highway. Further, heavy vehicles moving toward egress cannot view other traffic approaching the exit which is a safety concern.”

Response:

The site plan has been revised to provide more area for truck manoeuvring and removal of conflicting uses such as the coffee drive through.

4.6 Comments from Main Roads (July 2018)

Main Roads provided comments regarding the proposed development in July 2018. The development plans have been subsequently revised. Transcore’s response to relevant traffic comments are included as following:

Comment:

“Forrest Highway is a major urban highway with current traffic volumes of approximately 30,000 vpd in the Vittoria location. Current modelling indicates this corridor will continue to carry significant traffic volumes, ultimately doubling to around 60,000 vpd. Ultimately, Forrest Highway will be developed to a 6 lane Highway with provision for two bus lanes in the median, should a demand for dedicated bus lanes arise. The proposed development will generate significant traffic demands which will increase the potential for adverse traffic impacts and conflicts to occur, and detract from the safety and function of the Highway.”
Response:
Traffic accessing the proposed roadhouse is mostly passing trade with limited additional traffic demand on Forrest Highway. Access is proposed to be left-in / left-out with a high-standard left turn pocket provided for vehicle deceleration outside the through traffic lane. The additional traffic generated by a single roadhouse would be minimal in comparison with the future traffic demand and capacity of Forrest Highway.

Similar observations can be made at other existing roadhouses and freeway service centres in WA, which cater for passing traffic on major arterial roads.

Comment:
“*The Commissioner of Main Roads has declared “Control of Access” for this section of Forrest Highway under the Main Roads Act 1930, hence any access which may be approved under the planning framework requires a separate determination by Main Roads. Access for Lot 101 is currently restricted to a basic “Agricultural” access ('rural’ access) under the approved access controls for lots fronting the Highway in this location, which was determined at the time of land acquisition. Access is restricted to this type of access only, unless otherwise approved by Main Roads.”*

Response:
This detailed TIA report aims to assist MRWA with their decision making and demonstrates that no adverse impacts are anticipated from Main Roads exercising their authority to approve one-left-in and one left-out access on Forrest Highway.

Main Roads need to consider the advantages of the proposed development which provides a service station for eastbound traffic and reduces right turn traffic movements at the existing service station which is located on the southern side of Forrest Highway. As detailed in Section 4.1 of this report, Main Roads has previously mentioned that they would like to see the existing U-turn facilities on Forrest Highway closed if this development is approved. It is considered that granting access for left-in/left-out movements to and from the proposed development and closing U-turn facilities would result in an improvement in the traffic flow and safety on Forrest Highway.

Comment/Response:
Main Roads has provided several comments regarding the site layout compliance with DC Policy 1.10. The site layout has been revised and complies with DC Policy 1.10, as discussed in Section 4.5 of this report. Additionally, all drive throughs have been removed in the revised site plan.
5.0 Development Proposal

5.1 Proposed Site Use

The proposed development is for a roadhouse with convenience store and ancillary food offerings, comprising:

- Light vehicle canopy with 8 fuelling points for light vehicles;
- Associated convenience store tenancies (~350m² total);
- Café / Fast food / restaurant outlets (total ~450m²);
- Service vehicle areas / loading bays;
- Freight vehicle and coach parking 2 bays which will be converted to 1 bay if the service road is constructed in the future;
- Small truck and caravan parking;
- Emergency vehicle breakdown area; and,
- Approximately 50 car parking spaces (including one electric vehicle charging station and four ACROD bays).

The layout of the proposed development is shown in the concept plan included in Appendix C.

5.2 Proposed Access for all Modes

Vehicle access to the site is proposed via a single left-in crossover and a single left-out crossover on Forrest Highway.

Transcore has prepared two concept access design sketches for the proposed development which consider the interim (existing) configuration of Forrest Highway, and the ultimate (planned) configuration of Forrest Highway.

Both concept options feature a left-turn pocket for the development access for the eastbound direction of traffic flow on Forrest Highway. The interim concept sketch proposes the extension of the existing eastbound merging lane on Forrest Highway, which entails approximately 1.5m of widening into the median and extension of the concrete island separating merging traffic (turning right from Vittoria Road into Forrest Highway).

The total length of the turn pocket exceeds minimum 125m length required by Main Roads WA.

The left turn pocket and service road cannot be accessed by vehicles which turn right from Vittoria Road into Forrest Highway in the interim scenario. This is to prevent any weaving of these vehicles across Forrest Highway to enter the site which would conflict with uninterrupted eastbound through traffic on Forrest Highway.
The concept options provide a single left turn out crossover at the eastern end of the site for egress to Forrest Highway.

The proposed development and access concepts can potentially integrate with and be shared by other neighbouring Lots within the immediate locality. This supports the principle of minimising direct property access to this section of Forrest Highway.

As requested by Main Roads WA the revised access concept sketches now locate the service road outside of the Forrest Highway road reserve. Main Roads has also provided recent comment that they may not support access to Forrest Highway due to potential grade separation of the Forrest Highway / Vittoria Road intersection. The future upgraded Forrest Highway plans provided by Main Roads and previous advice from both Main Roads and DPLH do not suggest any plans for grade separation.

The proposed access concept sketches are included in Appendix D.
6.0 Integration with Surrounding Area

The proposed development will be consistent with other developments fronting sections of Forrest Highway and will integrate well with surrounding future planned land uses and road network changes in the area.

The proposed access arrangements integrate well with the existing road environment to prevent weaving of traffic. The access arrangements also make allowance for the ultimate design of Forrest Highway.
7.0 Traffic Assessment

7.1 Assessment Years and Time Periods

The proposed development is expected to generate highest traffic movements during the peak hour periods of the adjacent road network.

Review of the Main Roads WA traffic count data indicates that the peak weekday traffic hours on Forrest Highway are between 8:00am and 9:00am and between 4:00pm and 5:00pm.

7.2 Development Generation and Distribution

7.2.1 Proposed Development Traffic Generation

The traffic volume that would be generated by the proposed development has been estimated using trip generation rates derived from various sources as following:

- Roads and Traffic Authority of New South Wales Guide to Traffic Generating Developments (2002); and

The trip rates which were used to estimate the proposed development traffic generation are listed for each land use component as following:

Gasoline/Service Station with Convenience Market (945) – Regular Fuelling Points

- AM Peak hour: 10.16 trips per fuelling point.
- PM Peak hour: 13.51 trips per fuelling point.
- Weekday: 163 trips per fuelling point.

Assume conservatively 70% passing trade for a robust assessment as the site is adjacent to Forrest Highway.
Restaurant / Café / Take Away Food Outlets

It is noted that the three food tenancies have a combined floor area of 450m$^2$, this is the approximate size of a single regular fast food outlet such as a McDonald’s restaurant. It is also noted that the food tenancies do not have drive-through facilities.

The RTA trip generation of 180 vehicles per hour for an average McDonald’s has been adopted for the food tenancies in combination. It is assumed that this equates to a daily trip generation of 1,800 vehicles per day. This relatively high trip rate has been adopted to address comments made by the City of Bunbury Engineer and is highly conservative.

The food tenancies will likely operate as a single trip attractor which provides alternative food options for patrons, similar to a food court scenario in a shopping centre.

Assumed 50% passing trade discount as the land use forms part of a motor vehicle-oriented roadhouse development.

Total Development Traffic Generation

It is conservatively estimated that the proposed development would generate approximately 3,104 vehicular trips per day (both inbound and outbound) with approximately 262 and 288 trips during the weekday AM and PM peak hours respectively.

The net addition of traffic when accounting for passing trade of the site is $+1,291\text{vpd (daily)}$, $+114\text{vph (AM peak hour)}$ and $+122\text{vph (PM peak hour)}$ on the surrounding road network.

The directional split of inbound and outbound trips for the proposed development is estimated to be about 50/50 for inbound/outbound trips during the peak hour.

Two traffic distributions have been modelled for the weekday AM and PM peak hours for the interim & ultimate access scenarios:

- Passing trade traffic as detailed in Figure 7 for both the interim and ultimate access scenarios.
- Non-passing trade traffic as detailed in Figure 8 (interim access) & Figure 9 (ultimate access).

The total proposed development traffic is detailed in Figure 10 (interim access) & Figure 11 (ultimate access).

All traffic is assumed to turn left in from Forrest Highway and left out onto Forrest Highway.
Figure 7: Passing trade component - weekday AM & PM peak hour traffic for the proposed development (interim & ultimate access)

Figure 8: Additional (non-passing trade) component weekday AM & PM peak hour traffic for the proposed development (interim access)

Figure 9: Additional (non-passing trade) component weekday AM & PM peak hour traffic for the proposed development (ultimate access)
Figure 10: Net change in peak hour traffic generated by the proposed development – Weekday AM and PM peak hours (interim access)

Figure 11: Net change in peak hour traffic generated by the proposed development – Weekday AM and PM peak hours (ultimate access)
7.3 Traffic Flows

The existing traffic flows near the subject site are presented in Figure 12. The existing traffic volumes were derived from Main Roads WA SCATS and midblock traffic data.

![Figure 12: Existing traffic flows near the subject site – Weekday AM & PM peak hours](image)

The combined base and development traffic volumes are presented in Figure 13 (interim access) & Figure 14 (ultimate access).

![Figure 13: Immediately post-development traffic flows near the subject site – Weekday AM and PM peak hours (interim access)](image)
Figure 14: Immediately post-development traffic flows near the subject site – Weekday AM and PM peak hours (ultimate access)
7.4 Impact on Surrounding Roads

The WAPC Transport Impact Assessment Guidelines (2016) provides guidance on the assessment of traffic impacts:

“As a general guide, an increase in traffic of less than 10 per cent of capacity would not normally be likely to have a material impact on any particular section of road, but increases over 10 per cent may. All sections of road with an increase greater than 10 per cent of capacity should therefore be included in the analysis. For ease of assessment, an increase of 100 vehicles per hour for any lane can be considered as equating to around 10 per cent of capacity. Therefore, any section of road where development traffic would increase flows by more than 100 vehicles per hour for any lane should be included in the analysis.”

The proposed development will not increase traffic flows anywhere near the quoted WAPC threshold to warrant further detailed analysis. As detailed in Section 7.2, the proposed development will not increase traffic on any lanes on the surrounding road network by more than 100vph, therefore the impact on the surrounding road network is insignificant.

The proposed development crossover on Forrest Highway will permit left turn exit movements only and therefore operation of this crossover will be satisfactory. No impact on the signalised intersection operation is anticipated either, due to the very low percentage increase in traffic (<5%).
7.5 Impact on Neighbouring Areas

The traffic generated by the proposed development is not expected to significantly affect surrounding areas and the road network has been designed to accommodate this type of development traffic. Therefore, there is not expected to be any impact on neighbouring areas that would require any further consideration.

7.6 Traffic Noise and Vibration

It generally requires a doubling of traffic volumes on a road to produce a perceptible 3dB (A) increase in road noise. The proposed development will not increase traffic volumes or noise on surrounding roads anywhere near this level to result in any perceptible increase in noise.
8.0 Parking

The proposed development provides 50 car parking bays including one electric vehicle charging station and four ACROD bays.

A freight vehicle/coach parking zone is provided along the southern frontage of the site. A dedicated waste collection/loading zone is provided adjacent to the convenience store.

One parking lane is also provided within the site for small truck and/or caravan parking.

The proposed development also provides additional vehicle parking spaces at the fuel bowsers (8 fuelling positions).

It is considered that the proposed parking provision is sufficient to accommodate the needs of the proposed development.
9.0 Provision for Heavy Vehicles

The proposed development plan makes provision for loading at the convenience store and drive through takeaway. 8.8m SRVs or smaller are anticipated to service these areas of the site.

The proposed development plan has been revised to accommodate parking for B-Double trucks and it will be finalised during the project stage of detailed design.

Turn path analysis was undertaken for 27.5m B-Doubles to confirm satisfactory access, egress and circulation. The turn path diagrams are included in Appendix E, and confirm that there is enough space available to accommodate fuel tanker and B-Double circulation through the site.

Turn path analysis was also undertaken of the loading zones and caravan parking lane to confirm satisfactory circulation.
10.0 Conclusions

This revised Transport Impact Assessment has been prepared by Transcore on behalf of Saracen Developments Pty Ltd. The subject of this report is the proposed roadhouse development at Lot 101 Forrest Highway, Vittoria.

Vehicle access to the site is proposed via a single left-in crossover and a single left-out crossover on Forrest Highway.

Transcore has prepared two concept access design sketches for the proposed development which consider the interim and the ultimate configuration of Forrest Highway, which is planned to be widened to four lanes each way in the future.

Both concept options feature a left-turn pocket for the development access in the eastbound direction of traffic flow on Forrest Highway. The concept options provide a single left turn out crossover at the eastern end of the site for egress to Forrest Highway. The concepts also make allowance for the future provision of a two-way service road between the proposed development and Forrest Highway to provide access to properties to the east of the subject site. As requested by MRWA, the service road is proposed to be located outside the Forrest Hwy road reserve.

Revised traffic generation modelling has been undertaken to address City of Bunbury comments and the proposed development is anticipated to generate traffic flows of approximately 262 and 288 vph during the weekday AM and PM peak hours respectively. Most of this traffic is related to pass-by trips already passing the site on the surrounding road network.

The proposed access arrangement and relatively low additional traffic generation will result in minimal impact on the road network. No impact on the operation of the Forrest Highway / Vittoria Road intersection is anticipated.

In conclusion, the findings of this Transport Impact Assessment are supportive of the proposed development.
Appendix A

BUNBURY PORT INNER HARBOUR STRUCTURE PLAN
Appendix B

MAIN ROADS FORREST HIGHWAY CONCEPT PLANS
Appendix C

PROPOSED SITE PLAN
Appendix D

PROPOSED ACCESS CONCEPT SKETCHES
PROPOSED SERVICE STATION AND FAST FOOD - LOT101, FORREST HIGHWAY, VICTORIA
PROPOSED CROSSOVER ARRANGEMENT - INTERIM STAGE
PROPOSED SERVICE STATION AND FAST FOOD - LOT101, FORREST HIGHWAY, VITTORIA
PROPOSED CROSSOVER ARRANGEMENT - ULTIMATE STAGE
Appendix E

SWEPT PATH ANALYSIS
APPENDIX F

Stormwater Management Plan
TO: Sebastian Bolhuis (Harley Dykstra)
FROM: Fred Wallefeld/ Greg Basden
PROJECT: Lot 101 Forrest Highway, Vittoria
PROJECT NUMBER: 32854    DATE: 26 October 2018

SUBJECT: Lot 101 Forrest Highway, Vittoria – Stormwater Management Plan

Wood and Grieve Engineers have been engaged by Harley Dykstra to prepare a Stormwater Management Plan (SWMP) for the proposed development of Lot 101 Forrest Highway, Vittoria.

Relevant Documents
We have prepared this SWMP based on the following information.

- Site Feature Survey by Harley Dykstra 30/03/2017 (DWG 21169-02A)
- Site Plan by EXZO Drafting 23/10/2018 REV 8
- Geotechnical Investigation by Structerre 14/06/2017 (J178846 Rev 0)
- Groundwater Bore Monitoring results by Harley Global.
- Greater Bunbury Region Scheme – Floodplain Policy 2016 (DRAFT)
- MPM Development – Preston River Flood Study 2012 (by SKM. Excerpt only provided, status unknown)

Consultation
WGE have had preliminary discussions with the City of Bunbury and Department of Water and Environmental Regulation (DWER) in relation to this Stormwater Management Plan.

The City of Bunbury have advised both Harley Dykstra and ourselves of the need to ensure that the SWMP accommodates a 1 into a 100 year event given the site is located on a Main Roads WA highway.

DWER has provided advice on regional flood levels and has stipulated a minimum FFL for buildings of 3.5m AHD.

Strategic Stormwater Planning and Flood Studies
No information on applicable District Water Management Strategies has been provided to date by the City of Bunbury.

A review of the Draft GBRS Floodplain Management Policy 2016 indicates that the site is on the edge of the Preston river flood plain, and such the recommendations of the Policy shall be applicable.
Subsequent discussions with DWER indicate that the development is supported on the basis that filling of the site will achieve clearance to flood levels, and the impact on floodplain storage volume is expected to be minimal. (DWER Advice Attached)

**Stormwater Management Methodology**
The design approach to manage stormwater runoff is in line with Department of Water (Better Urban Water Management) and Local Authority guidelines. The intention is to collect runoff from impervious services and treat via biofiltration to remove pollutants and sediments. Storage infrastructure will be sized to accommodate the 100ARI event.

**Regional Context**
This development is sited on higher ground relative to surrounding lots on the north side of this section of Forrest Highway and, given the additional fill proposed and retention of all water on site, the development is not expected to impact negatively on or be negatively impacted by the surrounding development areas.

The cumulative impact of filling in the flood zone on the existing flooding regime will need to be confirmed with the DWER. It is noted that at this point the Preston River flood plain is wide (~1km) and the area impact by the development minor.

Further development of adjacent lots in this area will also require filling to similar standards in order to meet drainage requirements.
Design Criteria

- Min finished floor level (FFL) of 3.5m AHD, as advised by DWER.

- Finished floor levels are set to achieve min 300mm freeboard to internal 100ARI water levels.

- Rainfall from events up to the critical 100ARI event will be contained onsite, ponded and infiltrated.

- Design infiltration rate is 0.5m/day.

- Approximate depth of ponding in basins will be 300mm (for 100ARI event).

- Biofiltration basins will be to FAWB design guidelines, with target minimum base area of 2% of connected impervious surfaces.

- Minimum offset from the base of biofiltration basin or swale to AAMGWL is to be 0.5m.

- Minimum offset from the base of cell storage structures to AAMGWL is to be 0.5m.

Please refer to the attached documents.

Should you have any questions please don’t hesitate to contact the undersigned.

Yours faithfully

Greg Basden
for Wood & Grieve Engineers

Attachments: – Correspondence from DWER, Lot 101 Forrest Highway - Stormwater Management Plan SWMP1 (Rev 6), Calculations
Fred Wallefeld

From: Simon Rodgers <simon.rodgers@dwer.wa.gov.au>
Sent: Wednesday, 15 November 2017 2:41 PM
To: Krish Seewraj; Fred Wallefeld; kdaly@bunbury.wa.gov.au
Cc: Daniel Wong
Subject: Floodplain management advice - Lot 101 Forest Highway Vittoria - Fred Wallefeld - 15112017
Attachments: 21169-01C DA.PDF
Categories: Filed by Newforma

Fred

The following guiding principles are used by the DoW to ensure proposed development in floodprone areas is acceptable with regard to major flooding:

- proposed development has adequate flood protection from a 1 in 100 AEP flood
- proposed development does not detrimentally impact on the existing 1 in 100 AEP flooding regime of the general area

The DoW has 1 in 100 AEP floodplain mapping and floodplain development strategies for the Preston River (includes scenarios of breaching of existing levee banks, Stages 1 & 2 Moorlands, proposed diversion of Preston River due to the expansion of Bunbury Port Authority, etc).

This modelling shows that the entire land is effected by flooding with the 1 in 100 AEP flood level currently estimated to be ~2.7 m AHD. Should mean sea level rise as expected over the next century (ie, 0.9 m by 2110) the 1 in 100 AEP flood level will reach ~ 3.0 m AHD. The available survey information shows that the general natural surface level of the Lot is ~ 2.2 to 2.5 m AHD.

When development is proposed within a floodplain our department assesses each proposal based on its merits and the factors examined include depth of flooding, velocity of flow, its obstructive effects on flow, possible structural and potential flood damage, difficulty in evacuation during major floods and its regional benefit.

For this particular proposal,
- the lot is located on the edge of the existing relatively broad floodplain (~1 kilometre wide) with the level of Forrest Highway at the front of the property above the 1 in 100 AEP flooding
- the proposed development would result in a minor loss in flood storage and will not detrimentally impact on the existing flooding regime. However, the cumulative impact of similar development of other lots in the area could result in detrimental impacts to the existing flooding regime.
- The proposed building floor levels of 2.65 m AHD do not provide 1 in 100 AEP flood protection. Minimum habitable floor levels of 3.5 m AHD are recommended to provide adequate 1 in 100 AEP flood protection into the future.

If you require any further information please contact me on 6364 6923.

Regards

Simon Rodgers
Supervising Engineer
Floodplain management

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RAINFALL DISCHARGE / BASIN VOLUME ESTIMATE

Estimation by Rational Method - 1987 Australian Rainfall and Runoff

Job : Lot 101 Forrest Highway  Client : Harley Dyksra  Catchment : 2
Job # : 32854  Date : 27/09/2018  By : G Basden

Design Rainfall Intensity
- Location : Bunbury
- Storm Event : 100 year

Duration
- Intensity : 44.7 mm/hr
- 56 minutes

Catchment Details
- Area : 1,359 m²
- Run-off Coefficient : 0.90
- Flow Rate : 15.2 L/s

Outflow Details
- Soil Type : Silt
- Soakage Rate : 0.00000579 m/s → 0.0009 m³/s (Total Soakage)
- Outlet : 0.0 m³/s

Storage Details
- Volume at 6 hours : 65.77 m³
- Surface Area : 150.00 m²
- Base Area : 150.00 m²
- Depth : 0.44 m
- Freeboard : 0 mm

Output
- Current base area, depth and batter slopes can hold a Volume of : 65.77 m³
- The Volume required to store a 100 year storm is : 65.77 m³
- Does the proposed basin hold the design storm ? Yes

Note: Volume Calculated is based on a circular base and top shape. It is the volume between the RL of the outlet and the RL of the overflow point.
RAINFALL DISCHARGE / BASIN VOLUME ESTIMATE

Estimation by Rational Method - 1987 Australian Rainfall and Runoff

Job : Lot 101 Forrest Highway
Client : Harley Dykstra
Catchment : 2
Job #: 32854
Date : 27/09/2018
By : GKB

Location
Duration
Storm Event
Intensity
29.6 mm/hr

Area
Run-off Coefficient
Flow Rate
1.359 m²
0.90
10.1 L/s

Outflow Details
Soil Type
Soakage Rate
Outlet
0.0 m³/s

Volume
Surface Area
Base Area
Volume at 6 hours
150.00 m²
150.00 m²
41.41 m³

Flow Rate
56 minutes

Volume Calculated is based on a circular base and top shape.
It is the volume between the RL of the outlet and the RL of the overflow point.
**RAINFALL DISCHARGE / BASIN VOLUME ESTIMATE**

*Estimation by Rational Method - 1987 Australian Rainfall and Runoff*

**Job**: Lot 101 Forrest Highway  
**Client**: Harley Dyks  
**Catchment**: 3  
**Date**: 27/09/2018  
**By**: GKB

**Design Rainfall Intensity**
- **Location**: Bunbury  
- **Storm Event**: 100 year

**Catchment Details**
- **Area**: 5,070 m²  
- **Run-off Coefficient**: 0.85  
- **Flow Rate**: 53.5 L/s

**Outflow Details**
- **Soil Type**: Silt  
- **Soakage Rate**: 0.00000579 m/s → 0.0037 m³/s (Total Soakage)

**Storage Details**
- **Volume at 6 hours**: 217.80 m³
- **Surface Area**: 640.00 m²  
  - **no freeboard**
- **Base Area**: 640.00 m²
- **Depth**: 0.34 m

**Output**
- **Current base area, depth and batter slopes can hold a Volume of**: 217.80 m³
- **The Volume required to store a 100 year storm is**: 217.80 m³
- **Does the proposed basin hold the design storm?** Yes

**Note**: Volume Calculated is based on a circular base and top shape. It is the volume between the RL of the outlet and the RL of the overflow point.
RAINFALL DISCHARGE / BASIN VOLUME ESTIMATE

Estimation by Rational Method - 1987 Australian Rainfall and Runoff

Job : Lot 101 Forrest Highway
Job #: 32854
Client : Harley Dyks
Catchment : 3
Date : 27/09/2018
By : GKB

Location:

Duration:

Storm Event:

Intensity:

29.6 mm/hr

Run-off Coefficient:

Area:

Soil Type:

Flow Rate:

Flow Rate:

Soil Type:

Soakage Rate:

Outlet:

Volume at 3 hours:

Volume at 3 hours:

Volume at 3 hours:

Surface Area:

Base Area:

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RAINFALL DISCHARGE / BASIN VOLUME ESTIMATE

Estimation by Rational Method - 1987 Australian Rainfall and Runoff

Job : Lot 101 Forrest Highway        Client : Harley Dykstra            Catchment : 1
Job # : 32854                        Date : 27/09/2018               By : GKB

Location: Bunbury
Duration: 56 minutes

Storm Event: 10 year
Intensity: 29.6 mm/hr

Catchment Details:
Area: 880 m²
Run-off Coefficient: 0.85
Flow Rate: 6.2 L/s

Outflow Details:
Soil Type: Silt
Soakage Rate: 0.00000579 m/s ➔ 0.0007 m³/s
Outlet: 0.0 m³/s

Volume at 3 hours: 22.33 m³
Surface Area: 120.00 m²
Freeboard: 0 mm
Batter/Slope: Vertical
Depth: 0.19 m

Storage Details:
Base Area: 120.00 m²

Current base area, depth and batter slopes can hold a Volume of:
22.33 m³

The Volume required to store a 10 year storm is:
22.33 m³

Does the proposed basin hold the design storm?
Yes

Note: Volume Calculated is based on a circular base and top shape.
It is the volume between the RL of the outlet and the RL of the overflow point.
RAINFALL DISCHARGE / BASIN VOLUME ESTIMATE

Estimation by Rational Method - 1987 Australian Rainfall and Runoff

Job : Lot 101 Forrest Highway  Client : Harley Dyks
Job # : 32854  Catchment : 1
Date : 27/09/2018  By : GKB

Location : Bunbury
Storm Event : 100 year
Duration : 56 minutes
Intensity : 44.7 mm/hr

Soil Type : Silt
Soakage Rate : 0.00000579 m/s → 0.0007 m³/s
Outlet : 0.0 m³/s
Draining time : 14.676 hours

Area : 880 m²
Run-off Coefficient : 0.85
Flow Rate : 9.3 L/s

Volume at 6 hours : 36.69 m³
Surface Area : 120.00 m²
Base Area : 120.00 m²
Freeboard : 0 mm
Batter/Slope : Vertical
Depth : 0.31 m

Current base area, depth and batter slopes can hold a Volume of : 36.69 m³
The Volume required to store a 100 year storm is : 36.69 m³
Does the proposed basin hold the design storm ? Yes

Note: Volume Calculated is based on a circular base and top shape. It is the volume between the RL of the outlet and the RL of the overflow point.

Wood & Grieve ENGINEERS 16 Altona Street, West Perth, WA 6005