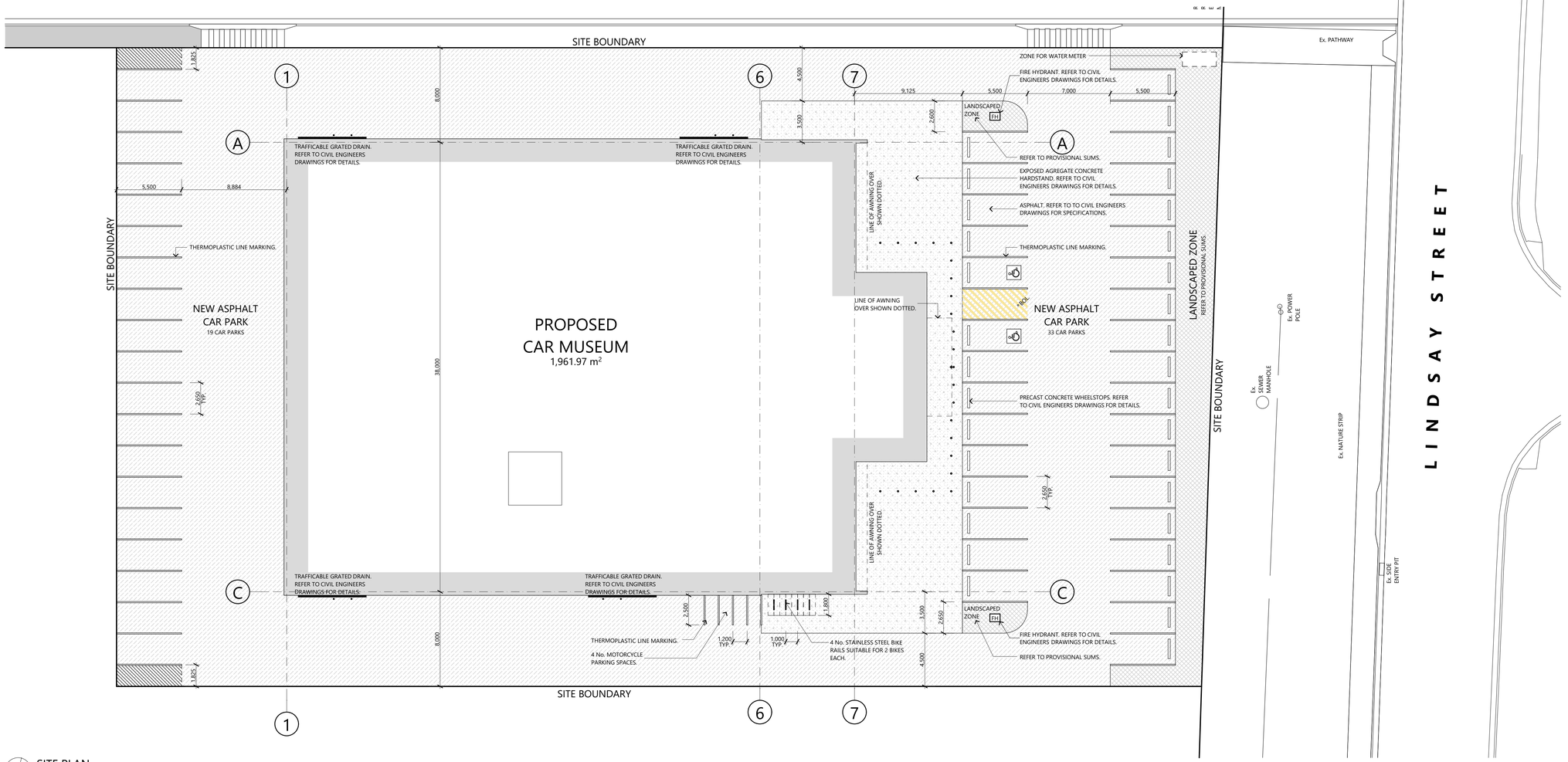
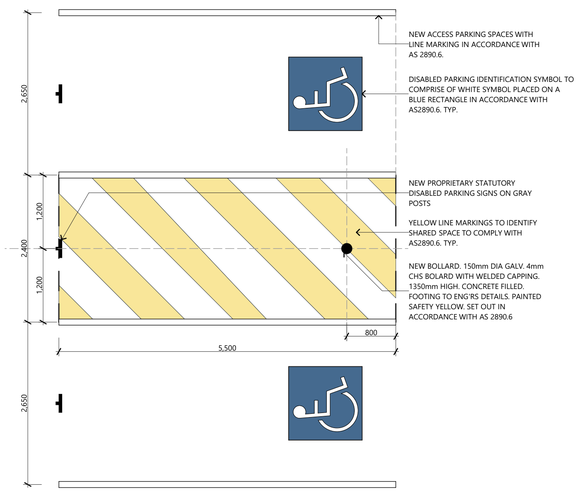


SITE PLAN
SCALE 1:200
North
0mm 2000 4000 6000 8000 10000



2 TYPICAL ACCESS PARKING SETOUT
SCALE 1:50
0mm 500 1000 1500 2000 2500

PLANNING EXHIBITED DOCUMENTS

Ref. No: DA 0446/2018
Date advertised: 08/08/2018
Planning Administration

REVISION

Rev	Description	Date	Int.	App
DA01	ISSUED FOR DEVELOPMENT APPLICATION	6/08/2018	BT	SC

ALL DRAWINGS TO BE READ IN CONJUNCTION WITH ALL ENGINEERS DOCUMENTATION AND SPECIFICATION.

CONTRACTOR TO ENSURE ALL NEW BUILDING WORKS, NEW FITTINGS AND FIXTURES ARE INSTALLED TO THE CURRENT BCA, AUSTRALIAN STANDARDS AND WORK COVER REGULATIONS.

THE CONTRACTOR SHALL USED FIGURED DIMENSIONS IN PREFERENCE TO SCALED DIMENSIONS. ALL DIMENSIONS SHALL BE VERIFIED ON SITE.

SITE PLAN LEGEND

- CONCRETE PAVING — NEW CONCRETE PATHWAYS BROOM FINISH. REFER CIVIL ENGINEERS DOCUMENTATION FOR DETAILS.
- NEW ASPHALT ROAD — NEW ASPHALT ROAD TO MARRY IN WITH EXISTING. REFER CIVIL ENGINEERS DOCUMENTATION FOR DETAILS.
- LANDSCAPING AREA — NEW LANDSCAPING AREA. REFER TO PROVISIONAL SUMS
- NEW BUILDING — REFER FLOOR PLANS FOR BUILDING LAYOUT
- SHARED ZONE — LINE MARKINGS (SAFETY YELLOW) TO IDENTIFY SHARED SPACE TO COMPLY WITH AS2890.6. REFER DETAIL FOR SETOUT
- DISABLED SYMBOL — DISABLED PARKING IDENTIFICATION SYMBOL TO COMPRISE OF WHITE SYMBOL PLACED ON A BLUE RECTANGLE IN ACCORDANCE WITH AS2890.6. REFER DETAIL FOR SETOUT
- NEW LINE MARKINGS — NEW THERMOPLASTIC LINE MARKINGS
- BOLLARDS — INSTALL NEW BOLLARDS. REFER TO FLOOR PLAN FOR SPECIFICATIONS.

REFER TO ENGINEERS DOCUMENTATION FOR DETAILS ON ALL RELOCATED LIGHT POLES & FIRE HYDRANTS

EXISTING & NEW GRATED PITS SHALL BE INSTALLED IN CONJUNCTION WITH THE HYDRAULIC/CIVIL DRAWINGS. ENSURE ALL PITS ARE CONNECTED INTO EXISTING STORMWATER SYSTEM AND EXISTING PITS SHALL BE CLEANED OUT AT END OF CONSTRUCTION PERIOD.

DIAL BEFORE YOU DIG www.1100.com.au

ARTAS ARCHITECTS

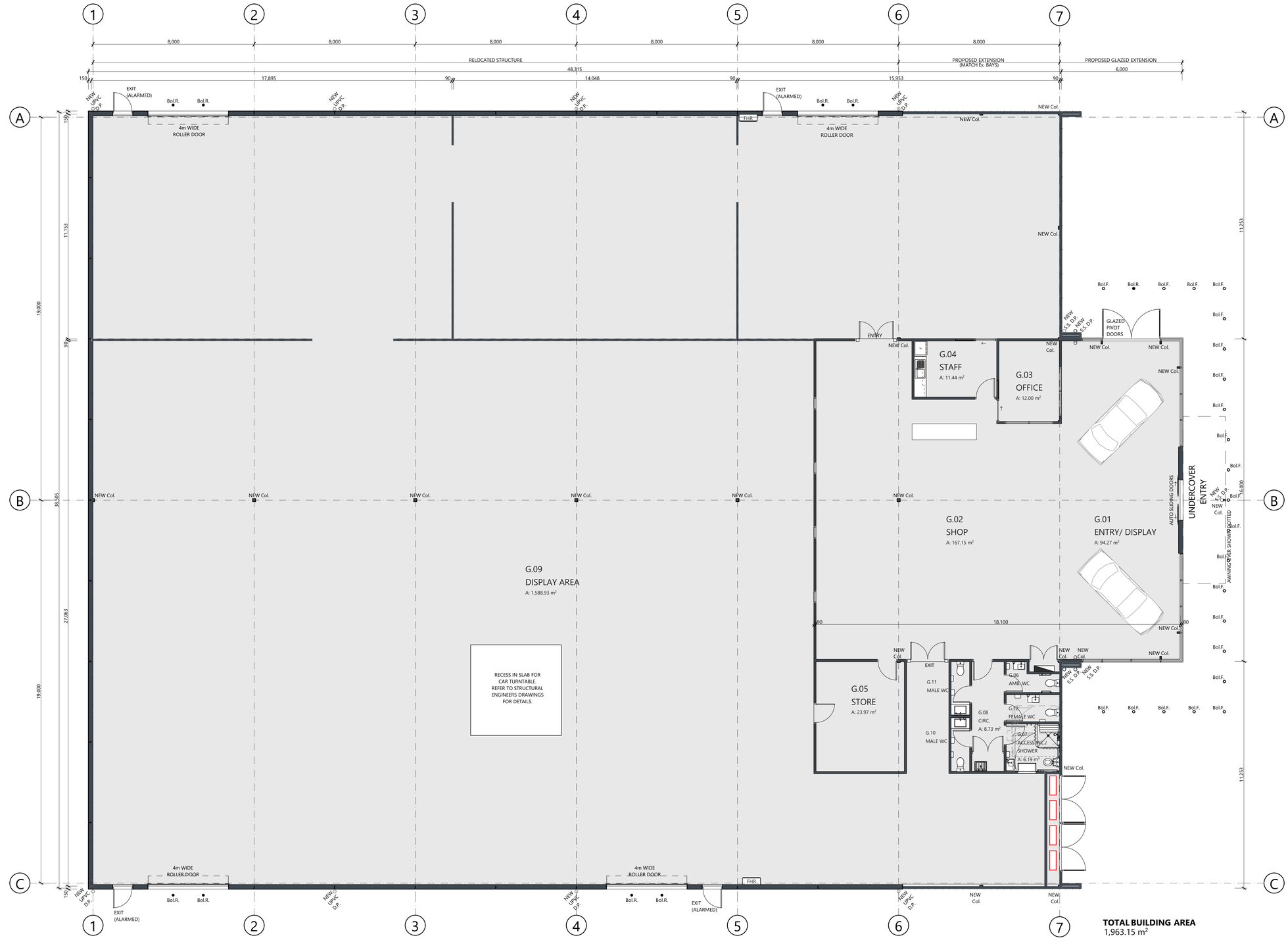
PROJECT NAME
LOT 4 - LINDSAY STREET AUTOMOBILE MUSEUM

CLIENT NAME
KINGS WHARF DEVELOPMENTS PTY LTD

DRAWING NAME
SITE PLAN

DRAWN	APPROVED	SHEET SIZE
BT	SC	A1 (LANDSCAPE)

DRAWING ISSUE: APPROVAL
PROJECT NUMBER: 171051
DRAWING NUMBER: A0001-DA01



GROUND FLOOR PLAN
SCALE 1:100
Project North
0mm 1000 2000 3000 4000 5000

PLANNING EXHIBITED DOCUMENTS

Ref. No: DA 0446/2018
Date advertised: 08/08/2018
Planning Administration

Document Set ID: 3859598
Version: 2, Version Date: 07/08/2018

REVISION

Rev	Description	Date	Int.	App
DA01	ISSUED FOR DEVELOPMENT APPLICATION	18/10/2017	BT	SC
DA02	ISSUED FOR DEVELOPMENT APPLICATION	27/10/2017	BT	SC
DA03	ISSUED FOR DEVELOPMENT APPLICATION	1/05/2018	BT	BT
DA04	ISSUED FOR DEVELOPMENT APPLICATION	6/08/2018	BT	SC

ALL DRAWINGS TO BE READ IN CONJUNCTION WITH ALL ENGINEERS DOCUMENTATION AND SPECIFICATION.

CONTRACTOR TO ENSURE ALL NEW BUILDING WORKS, NEW FITTINGS AND FIXTURES ARE INSTALLED TO THE CURRENT BCA, AUSTRALIAN STANDARDS AND WORK COVER REGULATIONS.

THE CONTRACTOR SHALL USED FIGURED DIMENSIONS IN PREFERENCE TO SCALED DIMENSIONS. ALL DIMENSIONS SHALL BE VERIFIED ON SITE.

FLOOR PLAN LEGEND:

NEW Col. ⊡	NEW STEEL COLUMN. REFER TO STRUCTURAL ENGINEERS DRAWINGS FOR DETAILS.
Ex.COL	EXISTING COLUMNS.
NEW U.P.V.C. D.P.	NEW 150mm DIA UPVC DOWN PIPE. CONNECT TO STORMWATER SYSTEM. REFER TO HYDRAULIC ENGINEERS DRAWINGS FOR DETAILS. PAINT FINISH.
Bol.F. ○	NEW FIXED BOLLARD. REFER TO STRUCTURAL ENGINEERS DRAWINGS FOR DETAILS. PAINT FINISH.
Bol.R. ●	NEW REMOVABLE BOLLARD. REFER TO STRUCTURAL ENGINEERS DRAWINGS FOR DETAILS. PAINT FINISH.

ARTAS ARCHITECTS

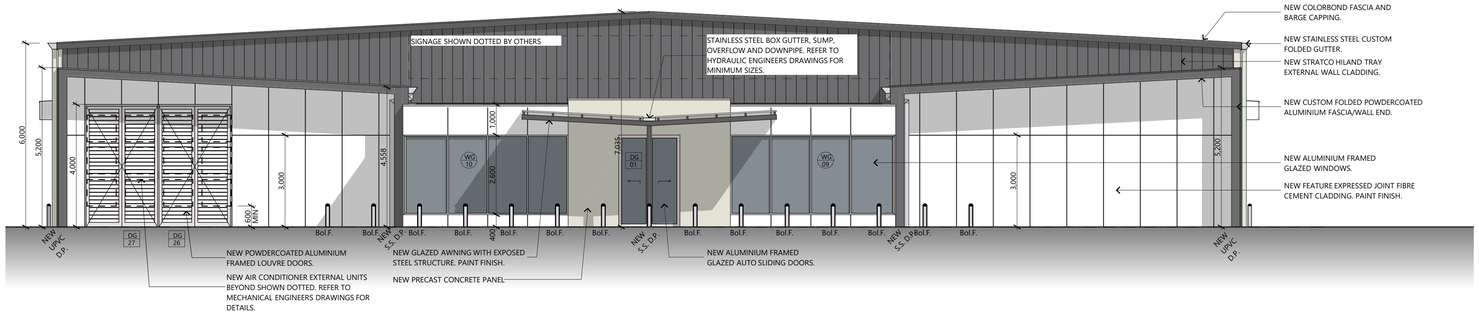
PROJECT NAME
LOT 4 - LINDSAY STREET AUTOMOBILE MUSEUM

CLIENT NAME
KINGS WHARF DEVELOPMENTS PTY LTD

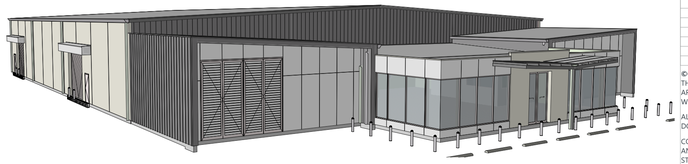
DRAWING NAME
GROUND FLOOR PLAN

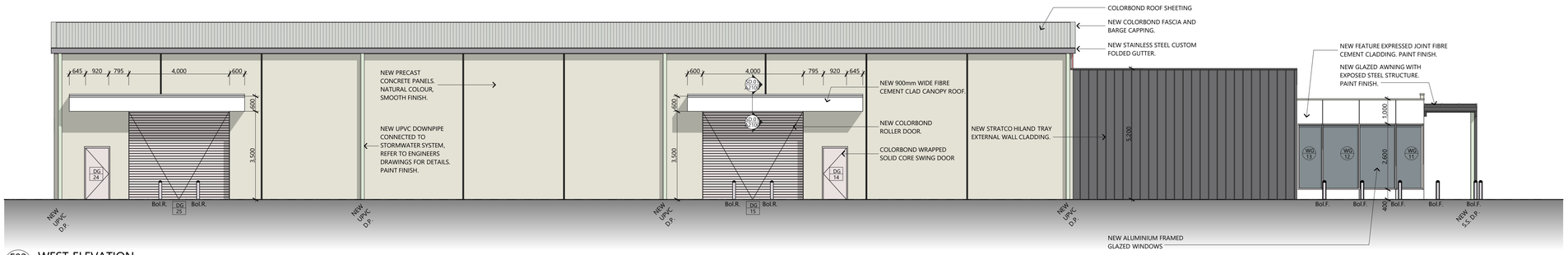
DRAWN	APPROVED	SHEET SIZE
BT	SC	A1 (LANDSCAPE)

DRAWING ISSUE: APPROVAL
PROJECT NUMBER: 171051
DRAWING NUMBER: A1400-DA04

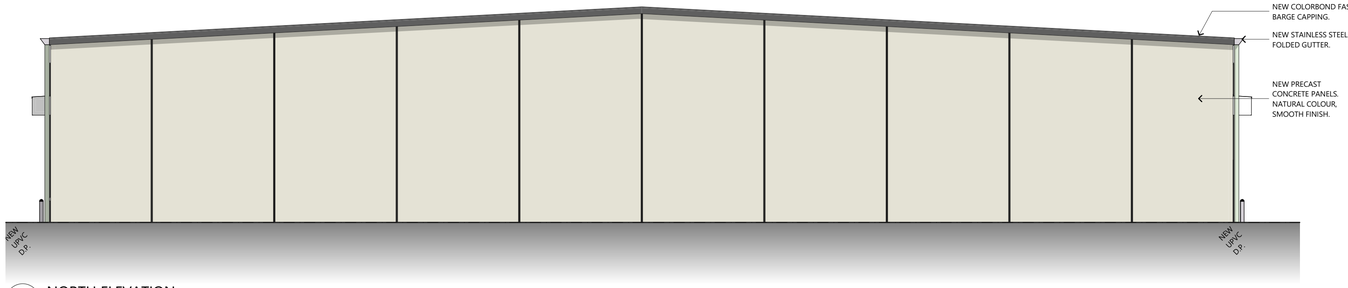


E01 SOUTH ELEVATION
SCALE 1:100
0mm 1000 2000 3000 4000 5000



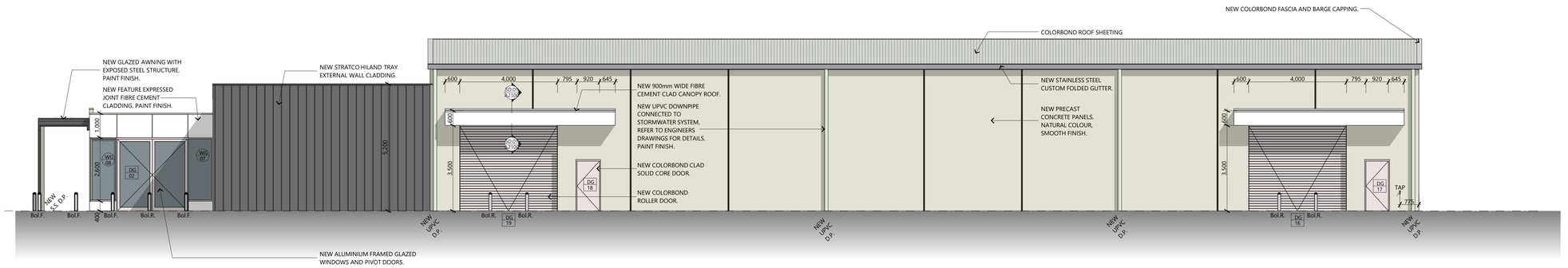


E02 WEST ELEVATION
SCALE 1:100
0mm 1000 2000 3000 4000 5000



E03 NORTH ELEVATION
SCALE 1:100
0mm 1000 2000 3000 4000 5000

SD.01 CANOPY ROOF SECTION DETAIL
SCALE 1:5
0mm 50 100 150 200 250



E04 EAST ELEVATION
SCALE 1:100
0mm 1000 2000 3000 4000 5000

REVISION

Rev	Description	Date	Int.	App
DA01	ISSUED FOR DEVELOPMENT APPLICATION	18/10/2017	BT	SC
DA02	ISSUED FOR DEVELOPMENT APPLICATION	27/10/2017	BT	SC
DA03	ISSUED FOR DEVELOPMENT APPLICATION	1/05/2018	BT	BT
DA04	ISSUED FOR DEVELOPMENT APPLICATION	6/08/2018	BT	SC
DA05	ISSUED FOR DEVELOPMENT APPLICATION	16/08/2018	BT	SC

ALL DRAWINGS TO BE READ IN CONJUNCTION WITH ALL ENGINEERS DOCUMENTATION AND SPECIFICATION.

CONTRACTOR TO ENSURE ALL NEW BUILDING WORKS, NEW FITTINGS AND FIXTURES ARE INSTALLED TO THE CURRENT BCA, AUSTRALIAN STANDARDS AND WORK COVER REGULATIONS.

THE CONTRACTOR SHALL USED FIGURED DIMENSIONS IN PREFERENCE TO SCALED DIMENSIONS. ALL DIMENSIONS SHALL BE VERIFIED ON SITE.

ARTAS ARCHITECTS

PROJECT NAME
LOT 4 - LINDSAY STREET AUTOMOBILE MUSEUM

CLIENT NAME
KINGS WHARF DEVELOPMENTS PTY LTD

DRAWING NAME
EXTERNAL ELEVATIONS

DRAWN	APPROVED	SHEET SIZE
BT	SC	A1 (LANDSCAPE)

DRAWING ISSUE: APPROVAL
PROJECT NUMBER: 171051
DRAWING NUMBER: A2100-DA05

Hydrological Management Plan
National Motor Museum of Tasmania Relocation
Inveresk

transport | community | mining | industrial | food & beverage | carbon & energy



Prepared for:	**Kings Wharf Developments Pty Ltd**
Client representative:	**Errol Stewart**
Date:	**31 July 2018** **Rev00**

Inspired thinking embracing
the challenges of a changing world.

pitt&sherry

Table of Contents

Appendices

Appendix A: Risk Assessment

Appendix B: Emergency Management Plan

Prepared by: ..... Date: 31 July 2018

Ian Abernethy

Reviewed by: ..... Date: 31 July 2018

Andy Turner

Authorised by: ..... Date: 31 July 2018

Andy Turner

Revision History					
Rev No.	**Description**	**Prepared by**	**Reviewed by**	**Authorised by**	**Date**

1. Scope of Report

pitt&sherry have been commissioned by Kings Wharf Developments Pty Ltd to assist with the development of an Emergency Flood Management Plan for the relocation of the National Motor Museum of Tasmania (NMMT) to a site fronting Lindsay St, Inveresk

The need for this report follows a request for further information from Launceston City Council, which highlights (amongst other things) the need for a report which addresses Code E16 in the Launceston Interim Planning Scheme – the Inveresk/Invermay Flood Inundation Area Code:

E16.7.2 Flood Impact

P2. *Buildings not in the Residential use class must be sited and designed in accordance with a hydrological report and an emergency management plan prepared by a suitably qualified engineer. The report and plan must:*

(a) detail:

(i) the risks to life;

(ii) the likely impact on the use or development; and

(iii) how the use or development will manage the risk to tolerable levels;

during either an overtopping of the levee or a levee breach at the closest point in the levee during a 5% AEP, 2% AEP or a 1% AEP flood event; and

(b) consider the following:

(i) the likely velocity and depth of flood waters;

(ii) the need to locate electrical equipment and other fittings above the 1% AEP flood level;

(iii) the likely effect of the use or development on flood characteristics;

(iv) the development and incorporation of evacuation plans into emergency management procedures for the precinct; and

(v) the ability of the use or development to withstand flood inundation and debris damage and the necessity for the incorporation of any flood proofing measures in the development.

There is an Acceptable solution within the Code being:

A3

All buildings not in the Residential use class must have a:

(a) *floor level of at least 3.4m AHD; and*

(b) *gross floor area of not more than:*

(i) *400 m²; or*

(ii) *10% more than that existing or approved on the 1st January 2008.*

2. Background to Development

2.1 Relocation

As part of the re-location of UTAS to Inveresk and the Willis St car park the NMMT has to be relocated. A suitable site has been identified adjacent to the Officeworks development in Lindsay St.

Figure 1 - Site in Lindsay St

Figure 2 - Officeworks and other similar developments adjacent to the site

Figure 3 - Flood levee and Silo Hotel Development opposite the site

2.2 Mechanics to Allow Relocation

To facilitate the relocation of the NMMT to the subject site a Planning Scheme Amendment was required.

The Tasmanian Planning Commission (TPC) approved the Planning Scheme Amendment in July 2018. The approved amendment is shown below:

Modified amendment 43 of Launceston Interim Planning Scheme 2015

At subclause E16.6.1 Unacceptable Uses of the Invermay/Inveresk Flood Inundation Area Code, delete Acceptable Solution A3 and replace with the following words:

A3

Must not be Community meeting and entertainment in the Riveredge Industrial or Inveresk Residential precincts, unless:

(a) a museum in the Riveredge Industrial precinct and located in the Light Industrial Zone or Commercial Zone.

In addressing the matter of flooding the TPC report makes the following comments:

In regard to the Deed of Funding Agreement signed between Council, State and Commonwealth Governments which attempts to better manage flood risk on Invermay the TPC determined:

The Deed has no statutory weight in the assessment of the draft amendment in accordance with the Act. However, it provides useful background to the policy underpinning the planning provisions in the Code. In this context, the Commission accepts the planning authority's submission that the Deed does not require a museum to be prohibited in the RI precinct, and the draft amendment aligns with the intention of the Deed.

In considering the amendment alongside the Regional Land Use Strategy the TPC noted:

The Commission has considered the evidence submitted in relation to the structural integrity of the levees, in context of the proposed change in the draft amendment. The Commission is satisfied with the evidence of Mr Birchmore and Mr Eberhardt that the best principles of engineering were applied to the design and construction of the levee system to withstand a 1:200 year flood event.

In weighing up the evidence about public risk in relation to natural hazards, the Commission has questioned firstly what is considered to be a tolerable level of risk to the community and secondly, does the draft amendment present planning controls that are proportional to the level of exposure to a natural hazard and the nature of the proposed use.

The Commission is satisfied from the LFA's and planning authority's submissions that the levee system mitigates the risk presented by the flood hazard to an acceptable level in context of the draft amendment to allow a museum use in the RI precinct, but only on land protected in a 1:200 year flood event. This means the draft amendment requires modification to exclude the northern area of the RI precinct, which is shown will be flooded in a 1:200 year flood event, which is zoned Rural Resource. There is insufficient evidence to support an additional use on this land because of the demonstrated unacceptable flooding hazard risk.

The Commission relies on the evidence of the LFA and planning authority regarding the established system of flood response and emergency management arrangements (including warnings and evacuations).

In regard to restricting development in the Inveresk/Invermay area the Planning Authority noted:

The planning authority submitted that the levees have been upgraded and designed for a 1:200 year flood event with a high level of construction integrity throughout. Mr Jamieson for the planning authority submitted there is no longer the reason to limit use or development in the area to the same extent when the planning provisions were first introduced.

After considering all relevant matters the TPC approved the amendment to allow Museums in the Riverside industrial precinct as modified above.

3. Reference Material

In preparing this report reference has been made to the following documents/sources:

3.1 SES Northern Region

Discussions and input with Regional Manager, Northern Region SES. Should there be a need to evacuate the facility the Regional manger will be ultimately responsible for the safe and efficient evacuation process. Comments received from SES have been translated into a model Emergency Management Plan attached to this report (**Appendix B**).

3.2 Australian Standard AS3745-2010 "Planning for Emergencies in Facilities"

The objective of this Standard is to enhance the safety of people in facilities, by providing a framework for emergency planning, utilizing the built facilities as appropriate.

The key to sound emergency planning is to provide a greater distinction between emergency plans and emergency/evacuation procedures. Clearly, the distinction comes through defined roles and responsibilities around development of emergency plans; duties of emergency planning committee; provisions relevant to all sectors of the community (including those with special needs); education and training and communication.

The Standard provides guidance for managing emergency situations – it is however targeted at emergency planning committees and emergency control organisations procedures, covering emergency situations up until the appropriate Emergency Service arrives to manage the situation.

To that end the Emergency Plan attached to this report has been formulated with the Standard in mind.

3.3 Emergency Management Australia, "Evacuation Planning: Handbook 4"

The purpose of this handbook is to provide guidelines to assist in the development of evacuation plans and to ensure the principles and concepts of evacuation planning remain consistent nationally. It is designed to assist agencies in developing and revising community evacuation plans.

The handbook aligns a number of key messages used emergency management, which are:

- Disasters will happen
- Disaster resilience is your business
- Connected communities are resilient communities
- Know your risk
- Get ready – then act
- Learn from experience.

These key messages underpin each of the five stages of evacuation planning: from the decision to evacuate, through to the warning, withdrawal, shelter and return. Evacuation is a complex process and careful planning will aid community engagement and minimise risks associated with the evacuation process.

The principles expressed in the handbook have been used to develop the Emergency Management Plan attached to this report.

3.4 Plans of the Development

The plans of the development provide full details of how the building/structures will function. Relevant to this report are:

- The layout on site
- The nature of the business to be carried out on site.
- The historic connection NMMT has with the local area – they are aware of the risks and plan accordingly.

The following site plan has been provided:

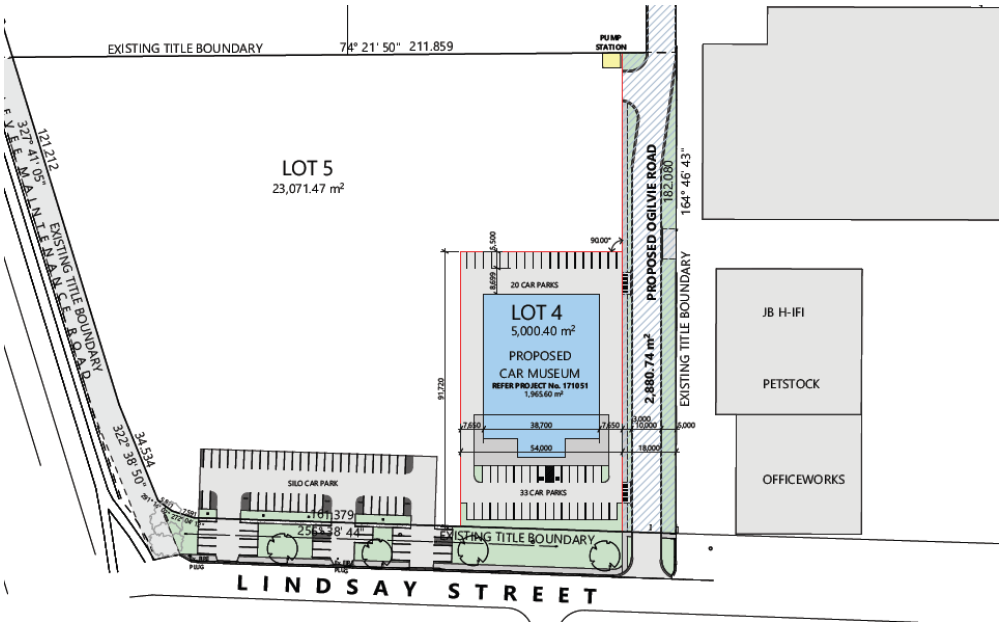


Figure 4 - Site Plan

The following detailed floor plan has been provided:

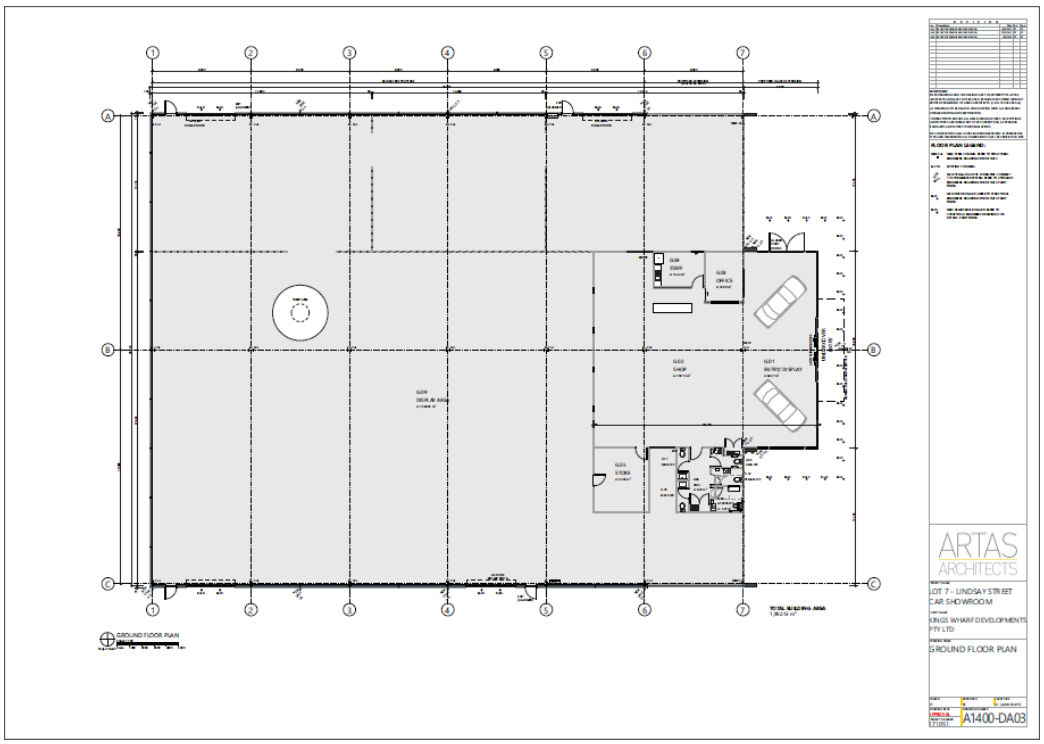


Figure 5 - Floor Plan of NMMT

The following information has been secured from discussions with the NMMT as to current operations if there is an emergency:

- They currently operate on two levels – cars, etc lower level and motor bikes upper level.
- They have a shop
- They also have historic memorabilia around the walls (and on the floor in some cases)
- The display vehicles are on loan from the owners, many of whom live outside Tassie. The most valuable vehicle is/was recorded at $3m
- Two people operate the facility at any one time
- There is a centre manager (but he is not there all the time)
- They have an emergency plan – fire is seen as their greatest risk at present
- There are 50 cars and 40 plus motor bikes – the new facility will be capable of holding 120 vehicles
- Not all cars and bikes start –the current evacuation plan relies on someone ringing around volunteers to help come and move the display vehicles whilst the other person tries to start as many as possible. As the motor bikes are on an upper level they can be given a lower priority in terms of flooding
- However, evacuating the bikes would have to take place one at a time using the small elevator to the mezzanine floor
- A ring around may generate 10 volunteers many of whom will be in their 70/80's (years of age)
- The floor level at the current facility is approx. 650mm above natural ground level on the Willis St elevation and 150mm on the opposite side, reflecting the fall of the land.

4. Characteristics of a Flood

For the Inveresk and Invermay area flooding can come from a number of sources:

- **Direct Rainfall** – the levees hold back water falling within the protected area and pumps are turned off due to high water levels on the river side of the levees.

Given the modelling done by LCC and others, precipitation from a 1% AEP rainfall event (for events of duration up to 24 hours) will not cause significant ponding on site

- **Overtopping of the levees** – this would require an exceedance of the 1:200AFI and be well above the design capacity of the levees
- **Structural Failure prior to or during a flood** – given the recent works on the levee system this event is highly unlikely. Regular maintenance would keep this as a low risk scenario
- **Geotechnical failure** – hydraulic slumps, piping failures or seismic events. Hydraulic slumps can occur at any time but are more likely after high water levels and at low tide. Regular inspections and specific inspections prior to the onset of heavy rain should identify any potential weaknesses. Seismic risk has been examined and reported in a memorandum to Council by **pitt&sherry** dated 15 July 2010 (refer Table 5 of that memorandum - below) provided the safe exceedance probability for various ground accelerations.

Table 5. Annual Exceedance Probability for New Earth Levees

Scenario	Exceedance Probability	a_{ground}
Levee - immediately after construction	1:170	0.026
Levee - long term with strength increase due to consolidation	1:500	0.04
Levee during a flood	1:1000	0.06

The probability of a seismic event during a flood event having sufficient flow to cause rapid flooding within the SAP Concept area, is much lower than 1:200 AEP.

- Other event which causes failure (attack) – these are deemed to be low during time of flood as the levees are under nearly continuous inspection.

5. Risk to life

The first element to consider is Risk to Life. In similar reports to support developments in this area the statements have been made:

"The Flood Report & Response Plan submitted with the application indicates that constructed levees have significantly reduced the risk of flooding to the proposal and that the land within the site is generally high enough to be free of local flooding within Invermay."

These comments have been supported in various Council reports on a range of developments and sum up the risk of flooding to this development taking into account the completed levee system.

In 2006 Launceston City Council took steps to address the levee issues by commencing a major programme of levee rebuilding. This project was undertaken with funding from both Federal and State Governments. The review of the Launceston Levee system has included:

- Review and reassessment of all previous geotechnical investigations on and around the levee system
- Review of the construction of the Scottsdale and Kings Warf levee systems that enclose Invermay
- The most detailed and sophisticated geotechnical investigation of the existing levees and the underlying materials ever undertaken
- Generation of a complex and comprehensive hydrographical model of the North and South Esk Rivers and the resulting effect on the Tamar River in different tidal conditions for a wide range of statistically probable rainfall events
- Complete redesign of the levee system from Murphy St Invermay through to Churchill Park
- Reconstruction of the levee system from Churchill Park through to the UTAS site in Invermay

- Reconstruction of the levee between Tamar Bridge and Charles St Bridge
- Reconstruction of between 3 and 6 new Levee gates
- Building of the levee along Lindsay St and Kings Warf.

The completed levee system has been designed for a 1 in 200 year return interval flood with a high level of construction integrity throughout. The following table identifies the current accepted flood levels for different return periods.

These levels have been used in the levee construction works and have been used in the risk assessment below and **Appendix A**.

Flood ARI in Years in the Tamar River	Estimated flood elevation without levee in metre AHD
10	2.40
20	2.75
50	3.27
100	3.62
200	4.36
500	4.75

The table is reproduced from the Tamar River Flood Water Surface Profiles for Multiple Discharge Emergency Management Flood Level and reproduced with permission of the Launceston Flood Authority (LFA).

The highlighted row shows the level of the estimated flood for a 100 ARI event which is specified in the planning scheme as the design event. The Planning Scheme also asks for consideration of 1:20 and 1:50 ARI events.

Given the design parameter for the levees of 1:200 ARI the newly completed levees provide a level of protection well above the planning scheme requirements.

Considerable public money has been spent on the levee system around Inveresk/Invermay. The section around the subject site has been designed in earth and has upgraded flood gates (see photos below).


Figures 6 and 7 - The levees close to the subject site during construction

The integrity of any levee system is only as sound as the level of on-going maintenance and assessment.

The newly completed levees and emergency response procedures were tested in June 2016 with a flood event representing a 1:100 year event.

The levees were not breached and the systems in place worked well. Inveresk was evacuated as a precautionary measure and all businesses in the suburb closed for one day. Given this event, any impact from a 1:20 and 1:50 ARI event will be negligible.

Part of the NMMT evacuation plan relates to moving valuable assets. This action relies on persons being drawn into a potential evacuation situation to move valuable vehicles. This action in itself is increasing risk to life. Given the degree of warning of flooding in most circumstances this is deemed a tolerable risk.

6. Likely Impact of Use and Development

The second element to consider is likely impact (of flood water) on the Use and Development.

The structural engineering of the development was designed and will be certified by qualified engineers.

Discussion in regard to the specifics of the requirements of the relevant planning scheme provisions are summarised below:

- Overtopping will be a gradual increase in flood water – there are no implications for the structural integrity of the building/structures in these circumstances
- Failure of the levee is highly unlikely given the structure is new and has been engineered
- The levee will require on-going maintenance to retain its integrity
- The building has been designed to withstand loading from 1:100AFI flood waters
- The building/structures have been designed and will be certified by professional engineers and will be assessed as compliant by qualified Building Surveyors.

Given the above comments it is argued that the design of the building/structures has addressed

b) The likely impact on the use or development;

as contained within the planning scheme.

With a proposed finished floor level of 3m AHD the building is still 400mm below the Acceptable Solution within the planning scheme. This is less than ideal when dealing with valuable assets which are not kept in a totally drivable condition and a small volunteer workforce not trained in the methods of evacuation. However, this situation is not life threatening. Neither is it fatal in terms of impact on equipment.

Some simple design elements can significantly reduce the likelihood of flooding and thus protect the display material:

- Stop logs to a depth of 400mm at each personnel door
- Stop logs and centre strengthening points (bar/chock) at each roller door to depth of 400mm
- Solid, sealed panel to 400mm at all glazing panels – so glazing would not go to ground level.

7. Managing the Risks – Emergency Management Planning

The matters considered above are presented in the form of an Emergency Management Plan specific to this site/development.

It has been developed in close consultation with the SES (as lead agency in times of emergency). The Plan uses as its basis the relevant Australian Standard AS3745-2010 and the Emergency Management Australia; "Evacuation Planning: handbook 4.

Relevant in this instance is the comprehensive Flood Response Plan submitted with this EMP for the site in Invermay. The principles of this plan are reproduced in **Appendix B** – noting that on completion of the works the building plans required to complete the Flood Response Plan can be inserted into the appropriate places in this document.

More importantly it is developed around the *Invermay Evacuation Plan Version 2.0* and details the governance, coordination, control and command arrangements for the evacuation standby, evacuation, shelter and return of persons residing, working or visiting the Invermay and North Launceston areas in the event that a major flood threatens to inundate the area/s.

The Invermay Evacuation Plan Version 2 is written in accordance with the *Emergency Management Act 2006*. It is issued under the authority of the Regional Controller (Northern District Police Commander) and is maintained by the Northern Region Emergency Management Committee's (NREMC) Executive Officer (Regional Manager, SES).

The plan outlines five key stages for the evacuation of Invermay:

- **Standby** – residents and businesses are placed on standby for evacuation. During this phase, the need for evacuation is considered likely but not certain. Residents and businesses are notified of an evacuation standby via the delivery a flood information kit by Australia post.
- **Withdrawal/Evacuation** - This phase of the plan is activated in the event that major flood inundation is considered imminent. During this phase, all residences and businesses are doorknocked by SES and Tasmania Police and directed to evacuate the area. Residents and businesses are issued with an evacuation notice. Evacuation is compulsory.
- **Shelter –** There are two nominated evacuation centres in the Launceston area which cater for the short-term shelter of persons requiring emergency accommodation and assistance.
- **Exclusion –** During this phase, all persons are excluded from entering the evacuation zone due to associated risks. More than likely, there will be no supply of gas, water or power to the evacuation zone during this phase. The evacuation zone will be cordoned off by Tasmania Police who will manage specified traffic control points.
- **Return –** There are two stages to the return phase. Stage 1 Return allows for persons to return on day visits only to begin the expected cleanup. Stage 2 Return allows for the full return of members of the community to the affected area (24/7 habitation).

8. Performance of Building

The final point within clause E16.7.2 P3 to the planning scheme relates to the performance of the building during times of flood. This point has been effectively covered in the points above. However, to re-iterate:

The structural engineering of the development was designed and will be certified by qualified engineers.

Discussion in regard to the specifics of the requirements of the relevant planning scheme provisions are summarised below:

- Overtopping will be a gradual increase in flood water – there are no implications for the structural integrity of the building/structures in these circumstances.
- Failure of the levee is highly unlikely given the structure is new and has been engineered.
- The levee will require on-going maintenance to retain its integrity.
- The building has been designed to withstand loading from 1:100AFI flood waters.
- The building/structures have been designed and will be certified by professional engineers and will be assessed as compliant by qualified Building Surveyors.

9. Conclusion

The following changes to the design should be considered as a way of significantly reducing the risk and impact of flooding on the proposed NMMT facility:

- Stop logs to a depth of 400mm at each personnel door
- Stop logs and centre strengthening points (bar/chock) at each roller door to depth of 400mm
- Solid, sealed panel to 400mm at all glazing panels – so glazing would not go to ground level.

It is felt the matters covered off in this report adequately deal with the matters covered in Code E16 – Invermay/Inveresk Flood Inundation Area. As such this matter can now be endorsed by Council as compliant in regard to addressing the Performance Criteria within the relevant section of the Code.

Appendix A

Risk Assessment

Option Risk Assessment

The table below is presented as a full risk assessment of the levee system and the impact of flooding within the precinct.

The coloured area of the table is presented in order to show how the risk profile changes pre and during construction to post construction (where we are at present).

Stage in levee life	Risk Scenario During Design Flood Event	Risk Assessment					
		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6
		Base Case	Bauer Wall at Traverser	Concrete Wall at Traverser	Diagonal earth levee	Earth Levee through rail sheds	Concrete wall through rail sheds
Before construction of new levees (up to 2 years)	Existing concrete levee wall collapses	High	High	High	High	High	High
	Existing levee overtopped	Extreme	Extreme	Extreme	Extreme	Extreme	Extreme
	Design issues delays completion of design.	Extreme	Extreme	Extreme	Extreme	Extreme	Extreme
	Selection of preferred alignment / type for new levee delayed.	Extreme	Extreme	Extreme	Extreme	Extreme	Extreme
	Project delayed by stakeholder engagement (Inveresk Precinct Authority, Don Railway).	High	Extreme	Extreme	Extreme	Extreme	Extreme
	Project delayed due to approval process.	Extreme	Extreme	Extreme	Extreme	Extreme	Extreme
	Project delayed by heritage issues.	High	High	High	Extreme	Extreme	Extreme
During construction	New levee partly constructed, design issue not resolved promptly and construction delayed. Substantial area of levee below design flood level.	Extreme	Extreme	Extreme	Extreme	Extreme	Extreme
	Levee under construction and emergency response to flood is too late. Substantial area of levee below flood level.	Extreme	High	High	High	High	High

	New levee under construction, existing wall partly demolished and small gap in flood protection.	Extreme	Moderate	Moderate	Moderate	Moderate	Moderate
	Difficult / challenging construction method delays construction. Substantial amount of levee below design flood level.	Extreme	High	High	High	High	Extreme
	Construction speed is slow. Substantial amount of levee below design flood level.	Extreme	Extreme	High	High	High	Extreme
	Construction delayed by inclement weather. Substantial amount of levee below design flood level	High	High	High	High	High	High
	Construction delayed by discovery of unforseen heritage issue. Substantial amount of levee below design flood level.	High	High	High	High	Extreme	Extreme
In service							
Inspection and Maintenance	Regular inspections does not identify localised defect (cracks, settlement, slumps) and minor breach in levee results	Low	Low	Low	Moderate	Moderate	Low
	Gates and penstocks not tested / maintained and fail in flood event.	Low	Low	Low	Low	Low	Low
	Bauer barrier in poor condition, not stored or maintained correctly or missing components. Substantial leaks	na	Moderate	na	na	na	na
During Flood	Existing / old walls have collapsed or reached end of useful life	Low	Low	Low	Low	Low	Low
	Emergency flood response is delayed: penstocks not closed, gates not closed, Bauer barrier not installed to full height.	Moderate	High	Moderate	Moderate	Moderate	Moderate
	Gates leak when closed	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
	Gates won't close and alternative barrier needed.	Low	Low	Low	Low	Low	Low
	Baeur gates leak and further response required.	na	Moderate	na	na	na	na

	Drainage outfalls leak and further response required.	Moderate	Moderate	Moderate	Low	Moderate	Moderate

	Piping / underflow occurs and further response required.	Moderate	Low	Low	Low	Low	Low
	Significant breach in earth levee occurs due stability issues and further significant response required.	Extreme	Low	Low	Moderate	Moderate	Moderate
	River scours river bank and levee collapses causing significant breach.	Extreme	High	High	High	High	High
	Earthquake damages levee and major levee failure occurs.	Extreme	Extreme	Extreme	Extreme	Extreme	Extreme
Other	Underground services crossing the levee are not installed correctly.	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
	Damage to levee after flood not repaired promptly.	High	High	High	High	High	High
	levee reaches the end of its useful life and needs to be reconstructed	Extreme	High	High	High	High	High

Risk assessed against design flood – Low 1:200 year flood.

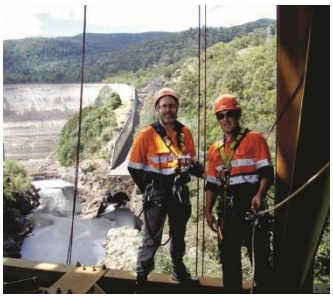
Appendix B

Emergency Management and Flood Response Plan

Flood Response Plan
National Motor Museum of Tasmania

transport | community | mining | industrial | food & beverage | energy





Prepared for:	Kings Wharf Developments Pty Ltd
Client representative:	Errol Stewart
Date:	31 July 2018 Rev00

pitt&sherry

Table of Contents

Appendices

Prepared by: ..... Date: 31 July 2018
Ian Abernethy

Reviewed by: ..... Date: 31 July 2018
Andy Turner

Authorised by: ..... Date: 31 July 2018
Haydn Betts

Revision History					
Rev No.	**Description**	**Prepared by**	**Reviewed by**	**Authorised by**	**Date**

1. Introduction

This flood response plan has been prepared for Kings Wharf Developments to support the application to relocate the National Motor Museum of Tasmania (NMMT) to a site in Lindsay St, Invermay. The plan forms part of the Emergency Response Plan required under Clause E16 of the Launceston Interim Planning Scheme 2015.

2. Aim

The aim of this plan is to prevent loss of life and to minimise damage to and loss of property resulting from flooding. Business continuity is also covered.

3. Standby

3.1 Pre Flooding Activities

The Bureau of Meteorology issues a flood watch if it is likely flood producing rain is expected to occur in the near future. They will then issue a flood warning which is monitored by the Launceston City Council employees.

If a flood in the Invermay area is likely a letter drop is conducted to put residents and businesses on standby for evacuation. Updates will be broadcast over the local emergency notification station ABC Radio 91.7FM. Local radio stations LAFM 89.3FM and Chilli 90.1FM will also provide updates.

Once on standby the Facility Manager (as identified by the NMMT) shall listen to one of the radio stations above for information preceding evacuation.

3.1.1 What to do when we are on standby

The following tasks are required for the museum. The trigger for action comes from the radio announcements or when directed by Police/SES/Emergency personnel.

What	Who
Phone around volunteers asking for help to move vehicles to higher ground	Facility Manager
Commence starting vehicles – jump start if needed	Volunteers
Move vehicles to higher ground – making each vehicle secure before leaving to pick up others	Volunteers
Divert telephones to Manager's mobile	Facility Manager
Any money on site is to be taken to the bank.	Facility Manager
Arrange manual back up of main computer. Log off all computers and remove to vehicles for storage off site if possible. Laptops to remain with personnel.	Facility Manager and Volunteer

What	Who
Ensure all documentation is located in a secure storage and that any that cannot be replaced is positioned at the highest point or stored off-site.	Facility Manager and Volunteer
Stock – ensure the more valuable stock is displayed/stored above the flood level. Try and move as much other stock to higher levels pre-evacuation.	Volunteers under direction of Facility Manager
Headed Paper/Stationary - Identify any that cannot be replaced easily and move a quantity to a high storage area or store off-site.	Facility Manager and Volunteer
Ensure all power points are switched off	Volunteer nominated by Facility Manager
When doing final close – ensure power is turned off at the switchboard	Facility Manager

4. Evacuation

If there is a need to evacuate the site:

- Emergency personnel will door knock in the area.
- A siren will also be activated which sounds similar to an air raid siren. It will sound for 1 (one) minute every 15 (fifteen) minutes.
- All power is to be switched off at the switchboards as identified on the plans in Attachment 1. (**once building plans are finalised the electrical layout needs to be attached to this plan**).
- All personnel are to meet at the Emergency Assembly Point ready to leave the site immediately.
- The Facility Manger shall ensure that everyone has left their area and are at the Emergency Assembly Point. When everyone has been accounted for they will leave the site in a safe manner.
- If you are unable to return home due to flooding and are unable to go to alternative accommodation there are Evacuation Centres at the University of Tasmania – Mowbray and the Silverdome – Prospect.

The Facility Manager is to ensure everyone has left the site prior to locking the doors. A sign is to be placed on the door informing people that the site has been evacuated and is not to be entered until further notice.

Role	Responsibility
Check site to ensure everyone has evacuated	Facility Manager
Lock front door and display sign	Facility Manager

5. Business Continuity

5.1 Administration

With some computers being safe and the stock of stationary the Facility Manager will operate from home until the site is safe to re-open. The diverted calls should ensure that those making enquires around the status of the museum (either visitors or owners of vehicles) are given answers.

5.2 Display Vehicles

Once the site has been evacuated a team of volunteers shall be assembled to move the vehicles to a secure location. It should be noted that depending on the characteristics of a flood vehicles might be off site for an extended period. Records need to be kept of where each vehicle has been stored and who to contact to get it returned after the flood event has passed.

5.3 Advising the Owners of Vehicles

As many of the display vehicles are owned by people living interstate a team of volunteers should be assembled with the intent of contacting each owner to advise them of the flooding incident and to give the owner an update of how their vehicle has been impacted.

Where a vehicle has been damaged either by flood water or in moving to higher ground it is important that the first contact is with the museum's insurer and legal representatives.

6. Returning to Site

The Facility Manager will appoint a responsible person(s) who will co-ordinate all aspects of coming back onto site such as:

- Insurance – need to liaise with insurance company to work out what they need before we can arrange clean up. Video/Photograph damage.
- Electricity – Need to check with provider to find out whether supplies have been affected. Arrange electrician to check everything before turning power back on.
- Cleaning (buildings) – arrange cleaners (probably through insurance company) complete safety paperwork such as SWMS/copies of insurance certificates.
- Cleaning (yard) – the external cleaning will have to be done in conjunction with others around the site to avoid duplication of effort.
- Infrastructure – Sweep/wash down, check telephone/computer lines. Replacement of damaged items such as photocopier/computers/printers/ etc.
- Water supply. Check system has not been damaged.
- Structural damage assessment for building. Bring in expert engineers to carry out check of buildings.

Only after the above has been completed can the display items be returned to the museum and the facility opened to the public.

7. Location of Switchboards

The location of switchboards and power points is shown in **Appendix A. To Be attached once Plan has been prepared.**

Appendix A

Location of Switchboards and Power Points

Contact
Ian Abernethy
0417 233 732
iabernethy@pittsh.com.au

Flood Response Plan
National Motor Museum of Tasmania

transport | community | mining | industrial | food & beverage | energy




Brisbane
Level 10
241 Adelaide Street
PO Box 5243
Brisbane City QLD 4000
T: (07) 3058 7499

Devonport
Level 1
35 Oldaker Street
PO Box 836
Devonport TAS 7310
T: (03) 6451 5599

Hobart
Level 1, Surrey House
199 Macquarie Street
GPO Box 94
Hobart TAS 7001
T: (03) 6210 1400
F: (03) 6223 1299

Launceston
Level 4
113 Cimitiere Street
PO Box 1409
Launceston TAS 7250
T: (03) 6323 1900
F: (03) 6334 4651

Melbourne
Level 1, HWT Tower
40 City Road
Southbank VIC 3006
PO Box 259
South Melbourne VIC 3205
T: (03) 9682 5290
F: (03) 9682 5292

Newcastle
Level 1
81 Hunter Street
Newcastle NSW 2300
T: (02) 4910 3600

Sydney
Suite 902, Level 9,
North Tower
1-5 Railway Street
Chatswood NSW 2067
PO Box 5487
West Chatswood NSW 1515
T: (02) 9468 9300

E: info@pittsh.com.au
W: www.pittsh.com.au

incorporated as
Pitt & Sherry (Operations) Pty Ltd
ABN 67 140 184 309

pitt&sherry

Contact
Ian Abernethy
0417 233 732
iabernethy@pittsh.com.au

transport | community | mining | industrial | food & beverage | carbon & energy




Brisbane
Level 2
276 Edward Street
Brisbane QLD 4000
T: (07) 3221 0080
F: (07) 3221 0083

Canberra
LGF, Ethos House
28-36 Ainslie Place
Canberra City ACT 2601
PO Box 122
Civic Square ACT 2608
T: (02) 6274 0100

Devonport
Level 1
35 Oldaker Street
PO Box 836
Devonport TAS 7310
T: (03) 6424 1641
F: (03) 6424 9215

Hobart
199 Macquarie Street
GPO Box 94
Hobart TAS 7001
T: (03) 6210 1400
F: (03) 6223 1299

Launceston
Level 4
113 Cimitiere Street
PO Box 1409
Launceston TAS 7250
T: (03) 6323 1900
F: (03) 6334 4651

Melbourne
Level 1, HWT Tower
40 City Road
Southbank VIC 3006
PO Box 259
South Melbourne VIC 3205
T: (03) 9682 5290
F: (03) 9682 5292

E: info@pittsh.com.au
W: www.pittsh.com.au

incorporated as
Pitt & Sherry (Operations) Pty Ltd
ABN 67 140 184 309

CONSULT AUSTRALIA
Member Firm

AS/NZS 4801 www.intlcert.com JAS-ANZ
ISO 9001 www.intlcert.com JAS-ANZ
ISO 14001 www.intlcert.com JAS-ANZ

PLANNING EXHIBITED DOCUMENTS

Ref. No: DA 0446/2018
Date advertised: 08/08/2018

Planning Administration

pitt&sherry

King Wharf Developments

Goderich - Lindsay Street Site Development

Transport Impact Assessment

July 2018

Table of contents

Table index

Figure index

Appendices

Appendix A – Site Layout

Appendix B – SIDRA Network Outputs – Existing

Appendix C – SIDRA Network Outputs - Proposed

1. Introduction

1.1 Background

GHD were engaged by King Wharf Developments to prepare a Transport Impact Assessment report for a 6-lot commercial/industrial subdivision at Lindsay Street and Gleadow Street in Invermay.

1.2 Purpose of This Report

The purpose of this report is to investigate the potential traffic and road safety impacts of the proposal in the context of the existing road network and other approved developments in the immediate area.

A particular concern is the performance of the Goderich Street and Lindsay Street intersection. A traffic model has been developed to assess the impacts on this junction.

1.3 Scope and limitations

This report has been prepared by GHD for King Wharf Developments and may only be used and relied on by King Wharf Developments for the purpose agreed between GHD and the King Wharf Developments as set out Section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than King Wharf Developments arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer Section 1.4 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by King Wharf Developments and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

1.4 Assumptions

The analysis contained in this report is based on a range of assumptions made by GHD including, but not limited to, the following:

- Traffic generation rates of the various land uses proposed are as per the assumptions detailed in Section 3.2 of this report
- The traffic generation of the proposed Northbank development has been adopted from the North Bank Redevelopment Transport Impact Assessment (GHD 2017)

1.5 Study Area

The Subject Site comprises Lot 15 Lindsay Street (Title Ref. 169539/15) and Lot 2 Gleadow Street (Title Ref. 171174/2), Invermay. It has frontage onto Lindsay Street, Goderich Street and Gleadow Street. A right-of-way currently provides an access to Bunnings from Gleadow Street for trucks. The Subject Site and surrounds are presented in Figure 1.

Figure 1 Subject Site

Base imagery obtained from TheLIST © State of Tasmania

1.6 Referenced Materials

A number of documents and materials were referred to during the preparation of this report including the following:

- *Guide to Traffic Generating Developments, Version 2.2,* Roads and Traffic Authority, October 2002
- *Guide to Traffic Generating Developments, Updated Traffic Surveys, TDT 2013/04,* Roads and Maritime Services, May 2013
- *Launceston Interim Planning Scheme 2015* (the Planning Scheme)
- *Goderich-Lindsay Street Site Development*, drawing set, Artas Architects, dated 04/04/2018
- Australian Standard AS/NZS 2890.1, *Parking facilities – Part 1: Off-street car parking,* 2004 (AS/NZS 2890.1)
- Australian Standard AS 2890.2, *Parking facilities – Part 2: Off-street commercial vehicle facilities,* 2002 (AS/NZS 2890.2)
- *Guide to Traffic Management – Part 3: Traffic Studies and Analysis,* Austroads, 2013
- *North Bank Redevelopment Transport Impact Assessment,* GHD December 2017

2. Existing Conditions

2.1 Transport Network

For the purpose of this assessment the transport network comprises the following roads:

- East Tamar Highway
- Lindsay Street
- Gleadow Street
- Forster Street

Each of the above roads are examined in detail in the following sections.

2.1.1 East Tamar Highway

East Tamar Highway, of which Charles Street and Goderich Street form part, is a Category 1 State Road and part of the National Land Transport Network. The East Tamar Highway connects between Launceston and George Town, providing the primary access route to Mowbray, Newnham, the University of Tasmania and Bell Bay, and numerous small towns north of Launceston.

In the vicinity of the subject site, East Tamar Highway is known as:

- Goderich Street (north of Lindsay Street)
- Charles Street (south of Lindsay Street)

Both Goderich Street and Charles Street have two lanes travelling in each direction. At the Lindsay Street junction, short right-turn lanes are provided for turns into Lindsay Street as well as a northbound left-turn slip lane. The Lindsay Street junction is signalised, and forms part of the Launceston SCATS network along with other closely spaced signalised junctions to the north and south including Forster Street, Esplanade and William Street.

East Tamar Highway is subject to consistently heavy traffic volumes throughout the day, with two-way traffic flows exceeding 1,650 vehicles per hour between 8:00 am and 6:00 pm. SCATS data was not available for the Lindsay Street/East Tamar Highway junction, however key traffic statistics for the section of highway on approach to Forster Street have been estimated based on SCATS data for that junction as follows:

- Average daily traffic 25,760 vpd
- Weekday AM peak (8:00 - 9:00 am) 2,750 vph
- Weekday PM peak (4:00 - 5:00 pm) 2,490 vph
- Saturday midday peak (12:00 - 1:00 pm) 1,790 vph

The daily traffic profile on East Tamar Highway (Goderich Street) is presented in Figure 2.

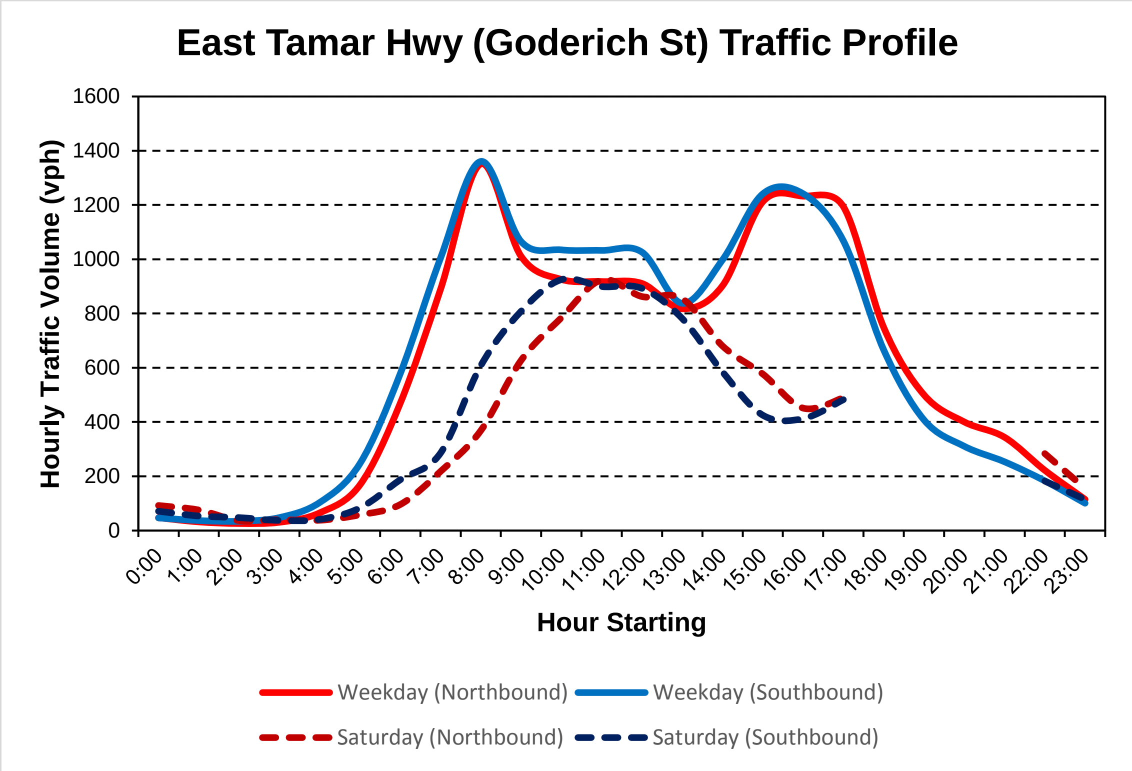


Figure 2 East Tamar Highway (Goderich Street) Traffic Profile

Data source: Department of State Growth, September 2017

Weekday commuter peak volumes on Goderich Street exceeded 2,500 vehicles per hour typically, with relatively even directional split during the both peak periods. Weekend (including Saturday) traffic volumes are generally much lower by comparison.

2.1.2 Lindsay Street

Lindsay Street is a local road connecting between Kings Wharf Road and Invermay Road via Goderich Street. It runs in a predominantly east-west direction parallel to, and on the northern side of, the North Esk River. West of the Goderich Street junction, Lindsay Street provides access to the existing Boral plant, the North Esk Rowing Club, large format retail (including Bunnings, Officeworks and JB-HiFi), and the Silos Hotel (currently under construction).

Lindsay Street is a two-lane, two-way road. A footpath is provided along the northern side of the road, between the Goderich Street junction and the extents of the Officeworks site, and along the southern side of the road for its full length. Unrestricted on-street car parking is available along Lindsay Street, west of the Goderich Street junction, and this is typically used by commuters.

The default urban speed limit of 50 km/h applies to Lindsay Street.

Traffic data was collected by Council from Wednesday 12 July to Tuesday 18 July 2017 on Lindsay Street, east of the Bunnings site access. The data shows that traffic volumes on Lindsay Street peak during the middle of the day, with a maximum of around 1,200 vehicles per hour (two-way) during the Saturday midday peak.

Traffic statistics for Lindsay Street are summarised as follows:

- Average daily traffic 7,270 vpd
- Weekday AM peak (8:00 - 9:00 am) 300 vph
- Weekday midday peak (1:00 - 2:00 pm) 842 vph

- Weekday PM peak (4:00 - 5:00 pm) 673 vph
- Saturday midday peak (12:00 - 1:00 pm) 1,200 vph

The daily traffic profile on Lindsay Street is presented in Figure 3.

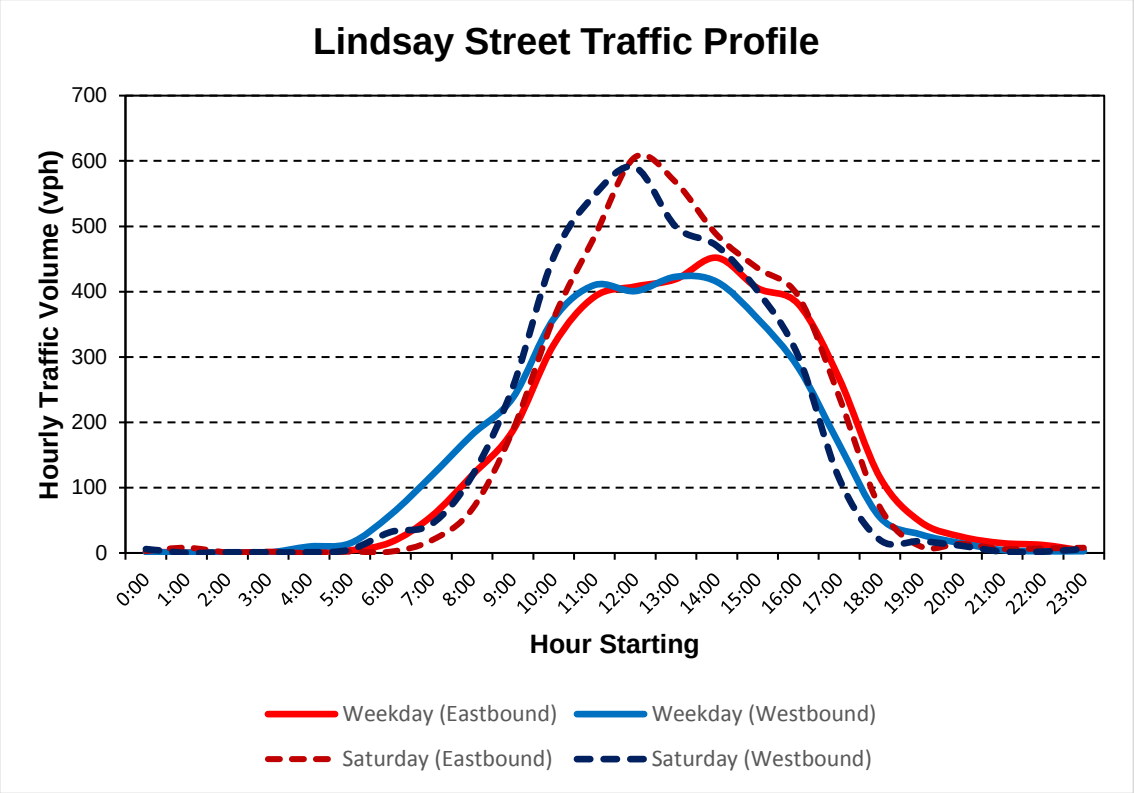


Figure 3 Lindsay Street (east of Bunnings access) Traffic Profile

Data source: City of Launceston, July 2017

Note that traffic volumes on Lindsay Street peak in the middle of the day on Saturday, which is the highest traffic generating period of the Bunnings site (which also includes Officeworks, JB Hi-Fi and Pet Stock). The vast majority of traffic using this section of Lindsay Street is traveling to and from the Bunnings Site.

2.1.3 Gleadow Street

Gleadow Street is a local road providing access to the Invermay industrial area. It connects to Goderich Street at a left-in/left-out, give-way controlled junction. Several side streets connect to Gleadow Street including Northcote Street and Montague Street, which also connects through to Forster Street.

Gleadow Street has a concrete pavement with bitumen shoulders and a wide, grassed verge. Informal on-street parking occurs along Gleadow Street and is a mix of parallel and 90° angle parking. Existing traffic data was not available for Gleadow Street, however traffic volumes are expected to be relatively low and no more than around 2,000 to 3,000 vehicles per day with peak flows of around 200 to 250 vehicles per hour. Heavy vehicles make up a high proportion of the traffic stream.

2.1.4 Forster Street

Forster Street is a major collector road connecting between Churchill Park Drive at its eastern end, Invermay Road, Holbrook Street, Goderich Street and the Invermay industrial area. Junctions at Invermay Road, Holbrook Street and Goderich Street are signalised. Montague Street connects to Forster Street at a roundabout and provides a connection to Gleadow Street.

West of Goderich Street, Forster Street has a concrete pavement with bitumen shoulders and concrete kerb and channel. A number of residential dwellings have direct access on Forster Street between Goderich Street and Montague Street.

Traffic volumes for Forster Street were determined based on SCATS data for the Forster Street / East Tamar Highway junction provided by Department of State Growth (September 2017). Key traffic statistics for Forster Street are summarised as follows:

- Average daily traffic 5,780 vpd
- Weekday AM peak (8:00 - 9:00 am) 430 vph
- Weekday midday peak (1:00 - 2:00 pm) 390 vph
- Weekday PM peak (4:00 - 5:00 pm) 560 vph
- Saturday midday peak (12:00 - 1:00 pm) 230 vph

The daily traffic profile on Forster Street is shown in Figure 4.

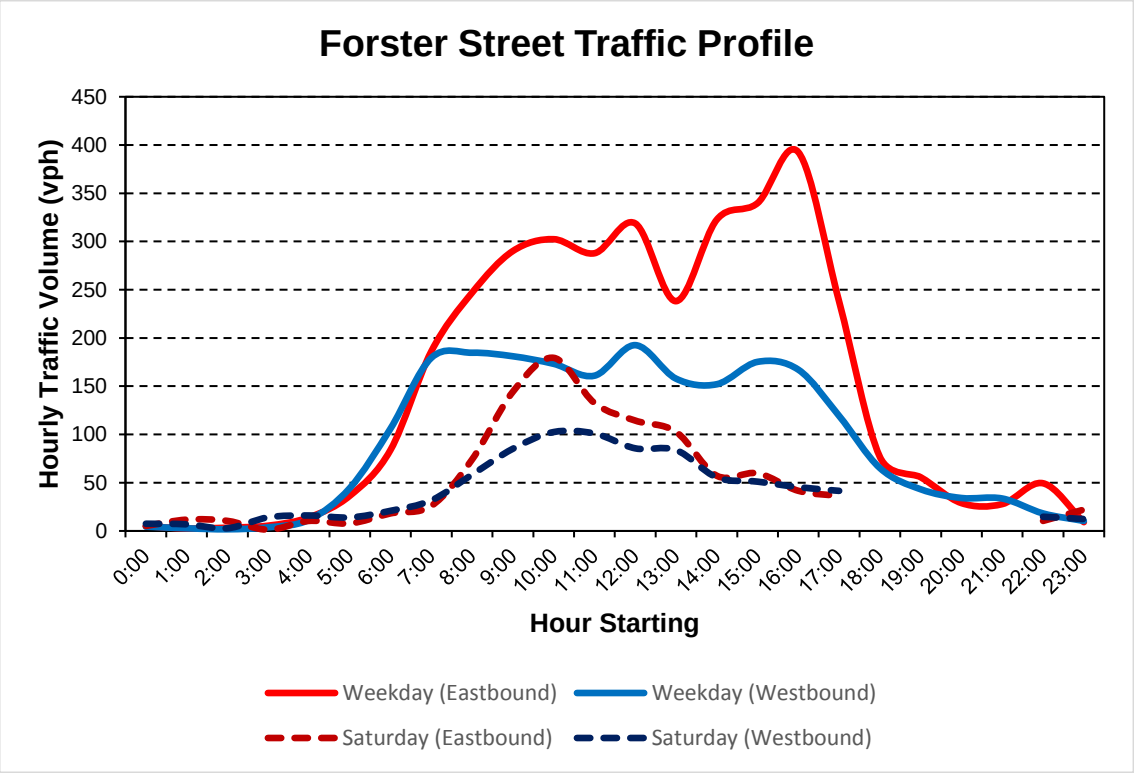


Figure 4 Forster Street Traffic Profile

Data source: Department of State Growth, September 2017

Traffic volumes on Forster Street peak during the evening (between 4:00 pm and 5:00 pm) with up to 560 vehicles per hour. Throughout the remainder of the day, traffic flows are relatively consistent. There is a generally higher eastbound traffic flow on Forster Street, which is representative of the alternative access to this area via Gleadow Street.

2.2 Road Safety Performance

Crash data was obtained from the Department of State Growth for the 5-year time period from 1 September 2012 to 31 August 2017 for Goderich Street (between Lindsay Street and Forster Street) and Lindsay Street, Gleadow Street and Forster Street (west of Forster Street). The crash history is summarised in Table 1.

Table 1 Crash History (2012 to 2017)

Location	Number of Crashes		Dominant Crash Type(s)
	Total	Casualty	
Mid-block Locations			
Goderich Street	26	5	Rear end (14), Off carriageway (4), Side swipe (3)
Lindsay Street	1	0	Rear end (1)
Gleadow Street	1	1	On straight (1)
Forster Street	3	1	Cross traffic (3)
Intersections			
Goderich Street / Lindsay Street	25	7	Rear end (13), Right turning (3), Cross traffic (3)
Goderich Street / Forster Street	21	7	Rear end (13), Right turning (6)
Gleadow Street / Montague Street	1	0	On path (1)
Total	***78***	***21***	

There were a total of 78 crashes recorded on the key roads assessed in this report, with 21 of those resulting in injury. The largest crash rates happened on Goderich Street, which accounted for 72 (or 92%) of all crashes. This is representative of the very high traffic volumes using this road rather than any specific road safety deficiency. The crash profile, containing primarily rear end type collisions, is typical of a congested, urban highway environment.

The higher incidence of right turning crashes at intersections (Lindsay Street and Forster Street) is likely a result of relatively short diamond phases at these junctions brought about by limited cycle time and priority green time allocated to the through movements along Goderich Street.

3. Traffic Generation

3.1 The Proposal

The site is to be subdivided into 6 lots as detailed in Table 2. With the exception of Lot 5 (proposed car museum), the ultimate land uses are unknown at this stage, however a likely land use has been assumed in this report for the purpose of estimating the overall traffic generation of the site. Note that Lot 1 contains existing buildings, driveways and car parking areas which are to be retained.

Table 2 Proposed Subdivision

Lot	Likely land use	Site area	Gross floor area
1	Warehouse and showroom	24,920 m^2	NA
2	Warehouse	3,702 m^2	NA
3	Wholesaler	2,567 m^2	NA
4	Museum	5,000 m^2	1,966 m^2
5	Business/industrial	23,071 m^2	NA
6	Business/industrial	11,323 m^2	NA

A master plan of the proposed development is provided in Appendix A.

3.2 Ogilvie Road

A new public road will be provided as part of this development. Ogilvie Road will connect between Lindsay Street and Gleadow Street on a relatively straight alignment, with a minor deviation between Lot 5 and Lot 1. An additional public road connection will be provided between Goderich Street (with left in access only) and Ogilvie Road.

3.3 Adopted Rates

3.3.1 Lot 1 – Storage and Showroom

Lot 1 has a total site area of approximately 24,920 m^2. There are four existing warehouses on this lot which are currently being utilised by JMC for construction and storage. For the purpose of this assessment, the following uses are assumed for Lot 1:

Eastern end adjacent to Goderich Street (approx. 8,400 m^2)

While unconfirmed at this stage of the development, it is likely that this area of the site may be used for a car showroom at some stage in the future. The RMS publication, Guide to Traffic Generating Developments (2002), suggests that the evening peak hour traffic generation for motor showrooms is around 0.7 vehicle movements per 100 m2 of site area.

The Guide states that rates for motor showrooms vary widely, however the above rate is based on showrooms with both new and used car sales as well as servicing facilities. It is considered that given the nature of the development, providing car sales and servicing, the above rate is appropriate.

The Guide does not provide daily traffic generation rates for motor showrooms. A rate of 3.5 vehicle movements per 100 m2 of site area (5 times evening peak) has been assumed. This

accounts for daily employee movements, pick-up and drop-off associated with car servicing and customer traffic movements throughout the day.

While Saturday rates are not available, the weekday evening peak hour traffic generation has been adopted for the midday Saturday peak. While there would be significantly less activity associated with car servicing, this would be offset by an increase in activity associated with vehicle sales.

In addition to the above, the proposed showroom would attract 2 to 3 car carriers per week.

Central area including existing warehouses (approx. 11,150 m^2)

The existing warehouses on this part of Lot 1 are currently being utilised for construction and storage. This is considered not significantly different from their current, approved use and therefore this area of the site has been excluded from the analysis in this report.

Western end adjacent to Ogilvie Road (approx. 5,370 m^2)

The eventual development at the western end of Lot 1 is unknown at this stage. For the purpose of this assessment, it is assumed to form part of a business/industrial subdivision along with Lots 5 and 6 which are also unknown. The 2013 update to the *Guide to Traffic Generating Developments* includes the results of surveys for subdivisions of this nature. From these surveys, the average traffic generation rates for similar size sites based on site area are as follows:

- Daily vehicle trips 208 trips per hectare
- Peak hour vehicle trips 22.7 trips per hectare

The operating days of businesses that will eventually take up these lots are unknown at this stage. It is likely that there will be a mix of light industrial, warehousing, trade supplies and other similar uses. For this assessment, around half of these businesses have been assumed to operate on Saturdays, giving a Saturday midday peak traffic generation of:

- Saturday peak vehicle trips 11.4 trips per hectare

On average, around 11% of generated vehicle movements are commercial vehicles (trucks).

3.3.2 Lot 2 – Warehouse

The RMS publication, *Guide to Traffic Generating Developments* (2002) provides indicative traffic generation rates for warehouses as follows:

- Daily vehicle trips 4 trips per 100 m^2 gross floor area
- Peak hour vehicle trips 0.5 trips per 100 m^2 gross floor area

The above rates have been adopted for the purpose of this assessment with the peak hour rate applying to morning, evening and Saturday peak traffic generation.

On average, it is assumed that around 5% of generated vehicle movements are commercial vehicles (typically light rigid trucks).

Note that since floor areas are unknown at this stage, a site coverage of approximately 30% has been assumed for warehouse uses.

3.3.3 Lot 3 – Wholesaler

Lot 3 is expected to be taken up by an electrical supplies wholesaler. For the purpose of this assessment, traffic generation rates applicable to bulky goods retail developments have been assumed. The 2013 update to the *Guide to Traffic Generating Developments* included updated surveys for bulky goods retail stores as follows:

- Daily vehicle trips 17 trips per 100 m2 gross floor area
- Peak hour vehicle trips 2.7 trips per 100 m2 gross floor area
- Saturday peak vehicle trips 3.9 trips per 100 m2 gross floor area

Commercial vehicles make up around 6% of the total traffic generation for bulky goods retail.

Note that since floor areas are unknown at this stage, a site coverage of approximately 30% has been assumed for bulky goods retail uses.

3.3.4 Lot 4 – Museum

Traffic generation rates for the proposed museum were not available. Instead a first principles assessment has been undertaken based on the assumption of up to 50 visitors per day on a typical weekday with up to 250 visitors per day on a Saturday. Assuming an average car occupancy rate of 2.2 people per vehicle, the traffic generation would be as follows:

- Daily vehicle trips 45 trips per day
- Peak hour vehicle trips 5 trips per hour
- Saturday peak trips 23 trips per hour

It is assumed that all traffic generated by the museum is light vehicle traffic.

3.3.5 Lots 5 and 6 – Business/Industrial Park

Traffic generation rates as per the western end of Lot 1. Note that part of Lot 5 will be utilised for overflow car parking for the Silos Hotel. The traffic generation of this use is assumed to be captured in the traffic generation estimates of the Silos Hotel and has been excluded from this assessment.

3.4 Summary Table

Based on the adopted traffic generation rates provided in Sections 3.3.1 to 3.3.5, the proposed development is anticipated to generate up to 1,342 vehicle movements per day (on a typical weekday) including up to 101 movements per day by commercial vehicles (trucks). A summary of traffic generation for each proposed use is provided in Table 3.

Table 3 Summary of Traffic Generation

Lots	Land Use	Daily Traffic Generation (vpd)	Peak Hour Traffic Generation (vph)		
			AM Peak	PM Peak	Saturday
1	Warehouse/Showroom	406	71	71	65
2	Warehouse	44	6	6	6
3	Bulky goods	131	21	21	30
4	Museum	45	5	5	23
5	Business/industrial	480	52	52	26
6	Business/industrial	236	26	26	13
Total		**1,342**	**180**	**180**	**162**

3.5 Traffic Access Distribution

A general access distribution has been adopted as follows:

- North (East Tamar Highway) 15%
- East (Inveresk via Lindsay Street) 10%
- North (Invermay via Forster Street) 20%
- South (Launceston and beyond) 35%
- Local trips (Invermay) 20%

It has been assumed that a significant proportion of all trips to and from the site will be local to the immediate surrounding area. This takes into account internal trips (i.e. between lots on the site) as well as linked and multi-purpose trips with other key traffic generators surrounding the site, including Bunnings, Officeworks and JB-HiFi, as well as Northbank and other industrial sites within Invermay west of Goderich Street.

The access distribution is visualised in Figure 5.

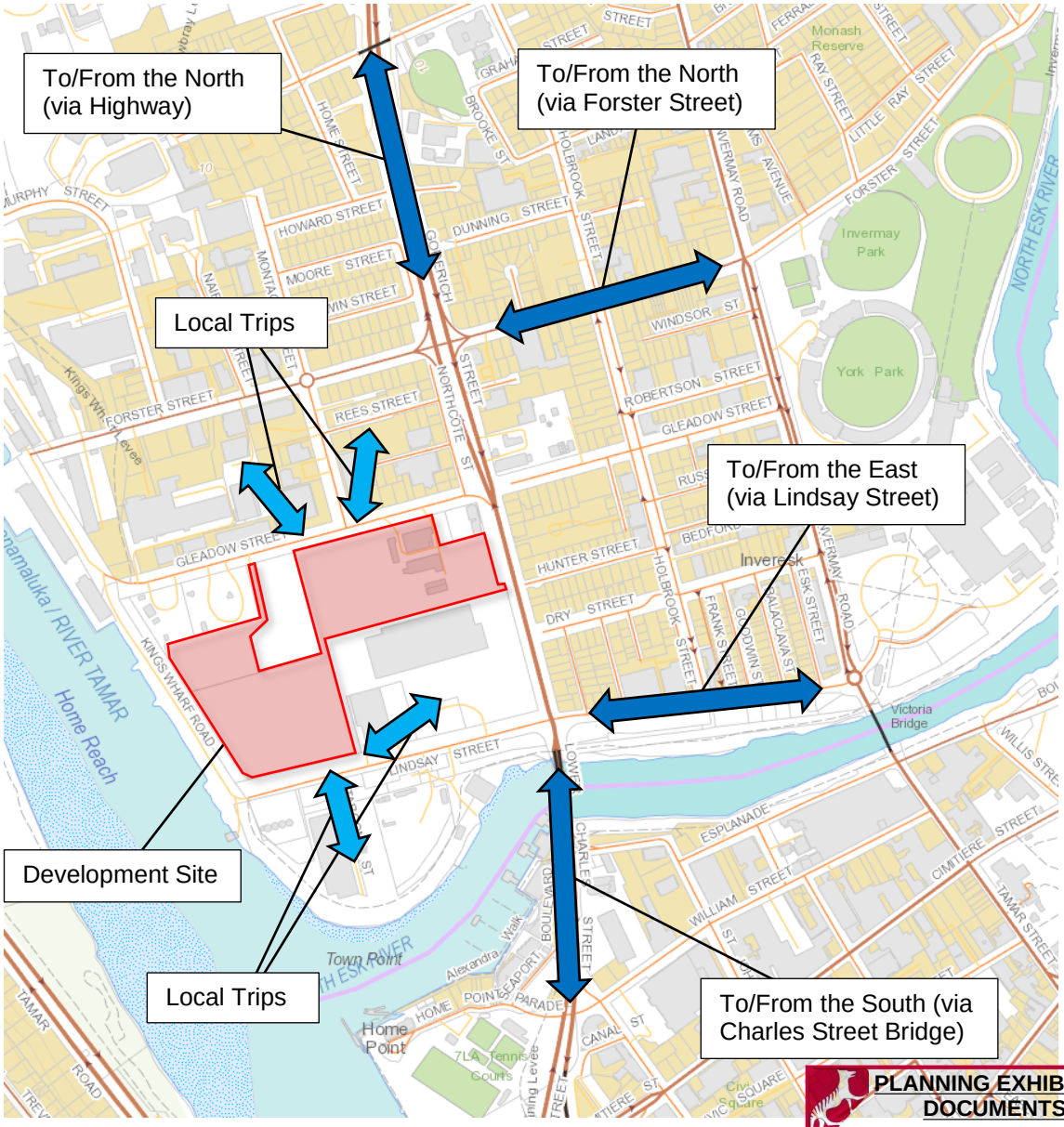


Figure 5 Traffic Access Distribution

Base map obtained from TheLIST © State of Tasmania

3.6 Planning Scheme Assessment

Clause E4.5.1-A3 of the Planning Scheme states that: *"The annual average daily traffic (AADT) of vehicle movements, to and from a site, using an existing access or junction, in an area subject to a speed limit of 60km/h or less, must not increase by more than 20% or 40 vehicle movements per day, whichever is the greater."*

The proposed development will generate greater than 40 vehicle movements per day on average and therefore relies on performance criteria which are as follows:

> *"Any increase in vehicle traffic at an existing access or junction in an area subject to a speed limit of 60km/h or less, must be safe and not unreasonably impact on the efficiency of the road…"*

The performance criteria are addressed in Section 6 of this report.

4. Site Access

4.1 Access Arrangements

The proposal includes a new public road through the site (Ogilvie Road) which will provide a new north-south link between Lindsay Street and Gleadow Street. A second public road will be provided between Goderich Street and Ogilvie Road, along the southern boundary of Lot 1. The connection at Goderich Street will allow one-way, left-in movements only, facilitated by a new left-turn slip lane. Each proposed subdivision lot will have access onto the public road network via either Lindsay Street, Gleadow Street, Goderich Street or the two new public roads.

It is expected that some public traffic is expected to utilise the new public roads in order to avoid congestion at the Goderich Street / Lindsay Street junction.

A diagram showing access arrangements is presented in Figure 6.

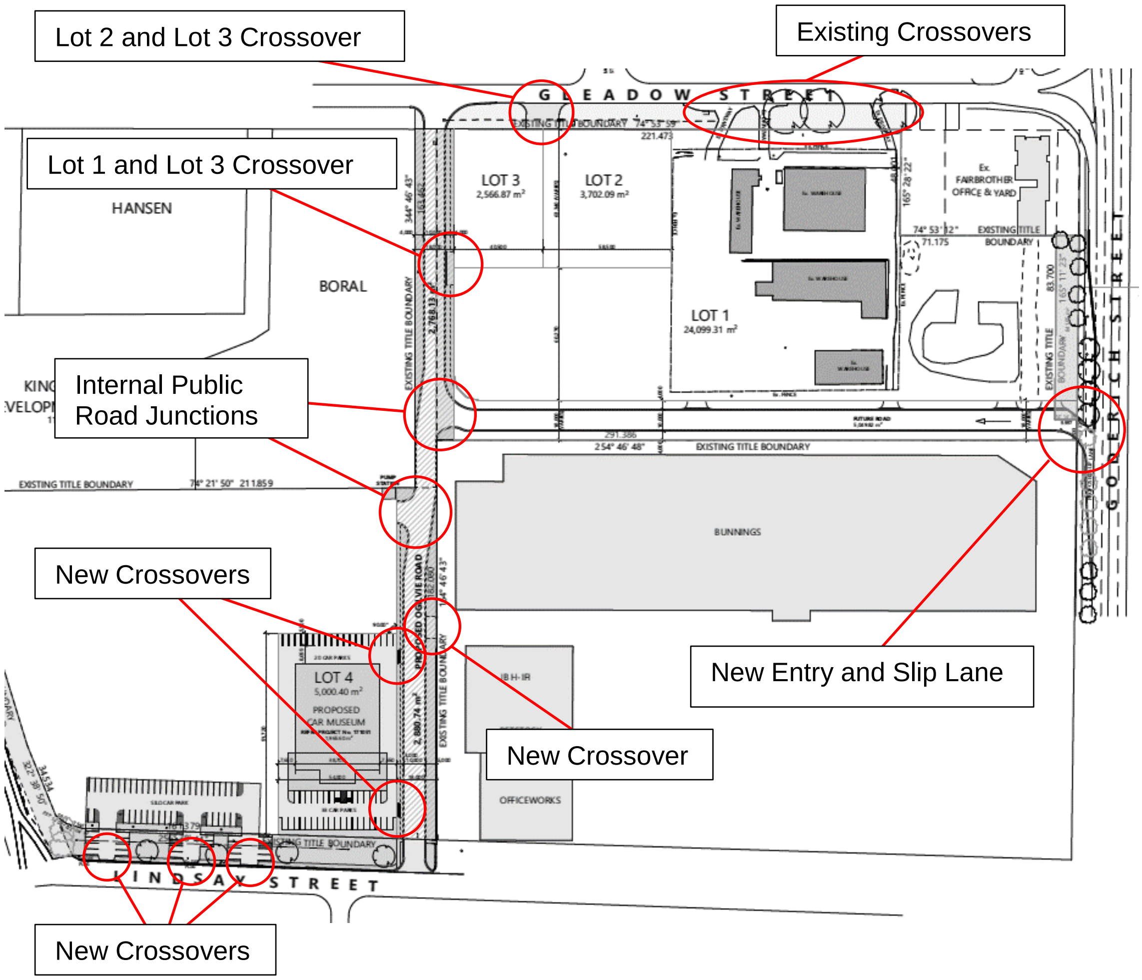


Figure 6 Proposed Access Arrangements

Image source: Goderich-Lindsay Street Site Development, Dwg No. A7101-DA11, Artas Architects, dated 28/06/2018

Clause E4.6.2-A2 of the Planning Scheme states: *"No more than one access providing both entry and exit, or two accesses providing separate entry and exit, to roads in an area subject to a speed limit of 60km/h or less."*

The proposed development will include a total of eight new crossovers, with three on Lindsay Street, one on Gleadow Street and four on Ogilvie Road. Most lots will contain multiple access points. In addition to new crossovers, there will be five new public road junctions including:

- Goderich Street Entry
- Ogilvie Road / Lindsay Street
- Ogilvie Road / Gleadow Street
- Ogilvie Road minor junctions (x2)

The proposal therefore relies on performance criteria which are as follows:

> *"For roads in an area subject to a speed limit of 60km/h or less, accesses and junctions must be safe and not unreasonably impact on the efficiency of the road, having regard to:*
>
> *(a) the nature and frequency of the traffic generated by the use;*
>
> *(b) the nature of the road;*
>
> *(c) the speed limit and traffic flow of the road;*
>
> *(d) any alternative access to a road;*
>
> *(e) the need for the access or junction;*
>
> *(f) any traffic impact assessment; and*
>
> *(g) any written advice from the road authority."*

In this case, the proposed development is for a 6-lot, light industrial subdivision with frontage onto three existing roads (Lindsay Street, Gleadow Street and Goderich Street). The development includes a new public road (Ogilvie Road) which travels through the site, linking Lindsay Street to Gleadow Street and providing access to individual lots, as well as a new cross-link between Goderich Street and Ogilvie Road.

The proposed access arrangements are assessed as follows:

- The site is likely to generate up to 1,342 vehicle movements per day, with peak flows of up to 180 vehicle movements per hour during the weekday commuter peak (Section 3.4). It is preferable to have a wide range of access routes available to disperse this traffic through the road network.
- Each of Lindsay Street and Gleadow Street are local roads such that new accesses on these roads are not contrary to their intended function. The new access on Goderich Street will be a left-in access only, with a new left turn slip lane, and will not impact on the operation of this road.
- The proposed public roads are intended to encourage access and egress via Goderich Street and/or Gleadow Street to reduce reliance on the Lindsay Street / Goderich Street intersection for access to the site.
- The site is located in a low speed environment, with a speed limit of 60 km/h on Goderich Street, and 50 km/h on both Lindsay Street and Gleadow Street. Existing traffic volumes on the primary access roads are relatively low (Sections 2.1.2 and 2.1.3).
- Each individual lot within the development site requires convenient access to the external road network, particularly in the event of potential future subdivision of the site. This is facilitated by the proposed public roads and connections within the site.
- The traffic impacts of the proposal are discussed in detail in Section 6 of this report and do not indicate significant detriment to either traffic efficiency or road safety in the vicinity of the site as a result of the proposal.

Based on the above assessment, the proposed development is considered to comply with the performance criteria outlined in Clause E4.6.2-P2 of the Planning Scheme.

4.2 Access Design

Clause E6.6.2-A1.1(b) of the Planning Scheme states that: *"Car parking, access ways, manoeuvring and circulation spaces must … have a width of vehicular access no less than the requirements in Table E6.2, and no more than 10% greater than the requirements in Table E6.2."*

In most cases, the accesses associated with the proposed development exceed the requirements in Table E6.2 by greater than 10% and therefore the proposal relies on performance criteria P1 which are as follows:

> *"Car parking, access ways, manoeuvring and circulation spaces must be convenient, safe and efficient to use."*

The performance criteria for each access are addressed in the following sections.

4.2.1 New Public Road Treatment

The existing ROW will be extended to connect between Lindsay Street and Gleadow Street and upgraded to a public road standard. It is proposed to provide a nominal 18 metre road reserve and widen the existing roadway to a minimum width of 10 metres along its full length in accordance with Table 2 of LGAT Standard Drawing TSD-R06-v1 *Urban Roads Typical Section and Pavement Widths* (30-11-2013).

Lindsay Street Junction

The proposed junction at Lindsay Street is presented in Figure 7.

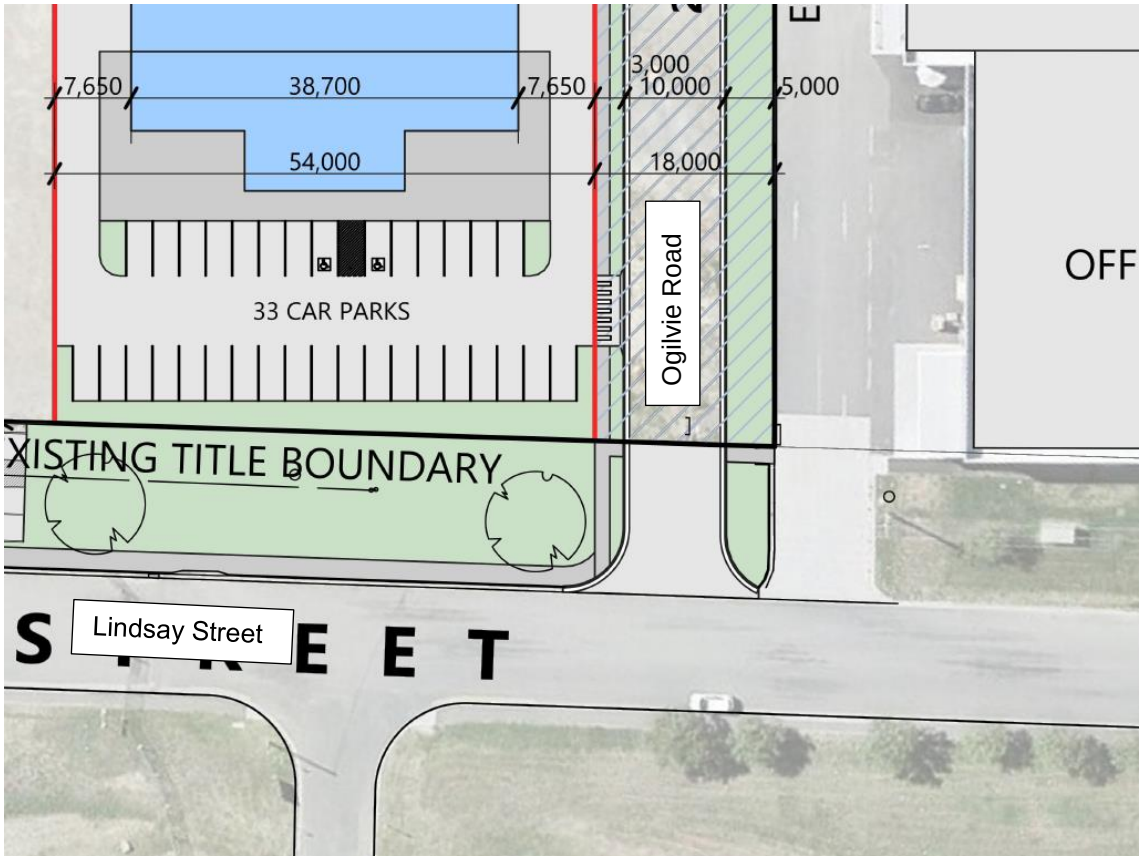


Figure 7 Proposed Road – Lindsay Street Junction

Base imagery obtained from TheLIST © State of Tasmania, Goderich-Lindsay Street Site Development, Dwg No. A7101-DA11, Artas Architects, dated 28/06/2018

The junction will be designed and constructed as a give-way intersection complete with all statutory line marking and signage and kerb returns on either side. The existing footpath travelling along the northern side of Lindsay Street (east of the site) should be continued across the junction with kerb ramps to connect to the proposed footpath along the proposed development site frontage.

Based on the traffic generation and distribution assumptions described in this report, it is expected that the Lindsay Street / Ogilvie Road junction would attract around 70 to 80 vehicle movements per hour associated with the proposed development. The actual use will vary depending on the amount of public traffic (not associated with this development) using Ogilvie Road to travel between Lindsay Street and Gleadow Street.

No capacity issues are expected at the new Lindsay Street junction given the expected level of use, and the existing traffic flow on Lindsay Street west of the Bunnings site.

Interaction with Bunnings Laneway

Ogilvie Road will be located immediately adjacent to the existing Bunnings laneway, which experiences light to moderate traffic movements including access and egress for delivery vehicles, customer pick-ups and other general traffic. It is necessary to maintain existing connectivity between the Bunnings laneway and Gleadow Street via Ogilvie Road.

The edge of Ogilvie Road will have approximately 5 m separation to the edge of the Bunnings laneway. This is considered sufficient to provide an appropriate kerb return. The intersection will be designed and constructed as a public road junction with kerb and channel and asphalt surfacing to contrast with the private access, which consists of a concrete crossover. It is recommended that additional physical separation be provided in the form of landscaping and/or fencing in order to provide visual separation between the two roadways.

Connectivity between the Bunnings laneway and Ogilvie Road will be provided by a new crossover approximately 110 metres from the Lindsay Street junction and existing access will be maintained at the rear of the Bunnings site. These are shown in Figure 8.

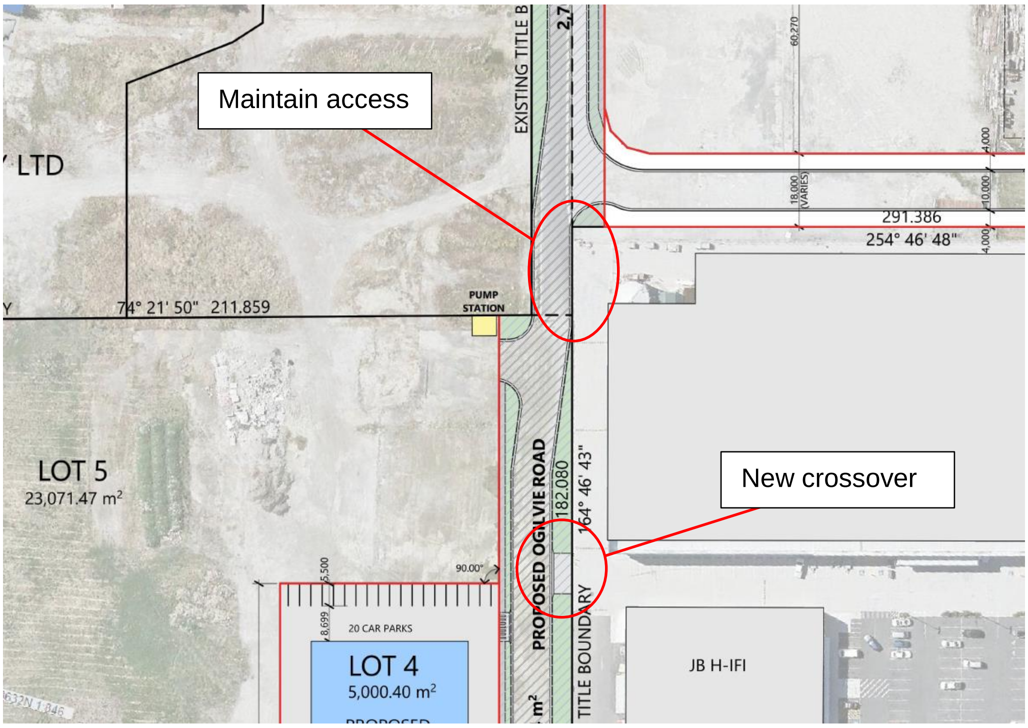


Figure 8 Proposed Road – Connectivity with Bunnings Laneway

Base imagery obtained from TheLIST © State of Tasmania, Goderich-Lindsay Street Site Development, Dwg No. A7101-DA11, Artas Architects, dated 28/06/2018

Ogilvie Road Pinch Point

Between the northern and southern sections of the site (i.e. between Lot 5 and Lot 1), the proposed Ogilvie Road reservation width is limited to 10 metres. This limits the maximum road width to around 9.7 metres and requires the alignment of Ogilvie Road to deviate slightly to the east as it travels northbound. It is recommended that a centre line be provided on Ogilvie Road to delineate the travel path through this section.

Council should consider acquiring additional land on either side to provide a minimum road reservation width of 18 metres for the full length of Ogilvie Road. This would allow for a road width of 10 metres to be provided along with continuation of the footpath between Lindsay Street and Gleadow Street.

Internal Public Road Junctions

There will be two public road junctions along Ogilvie Road as identified in Figure 6. These should be designed and constructed as formal, give-way controlled junctions with all statutory line-marking and signage as required.

New Gleadow Street Junction

The proposed junction at Gleadow Street is presented in Figure 9. Note that the existing roadway and junction will need to be realigned and widened to match the proposed 18 metre road reservation and 10 metre road width for Ogilvie Road.

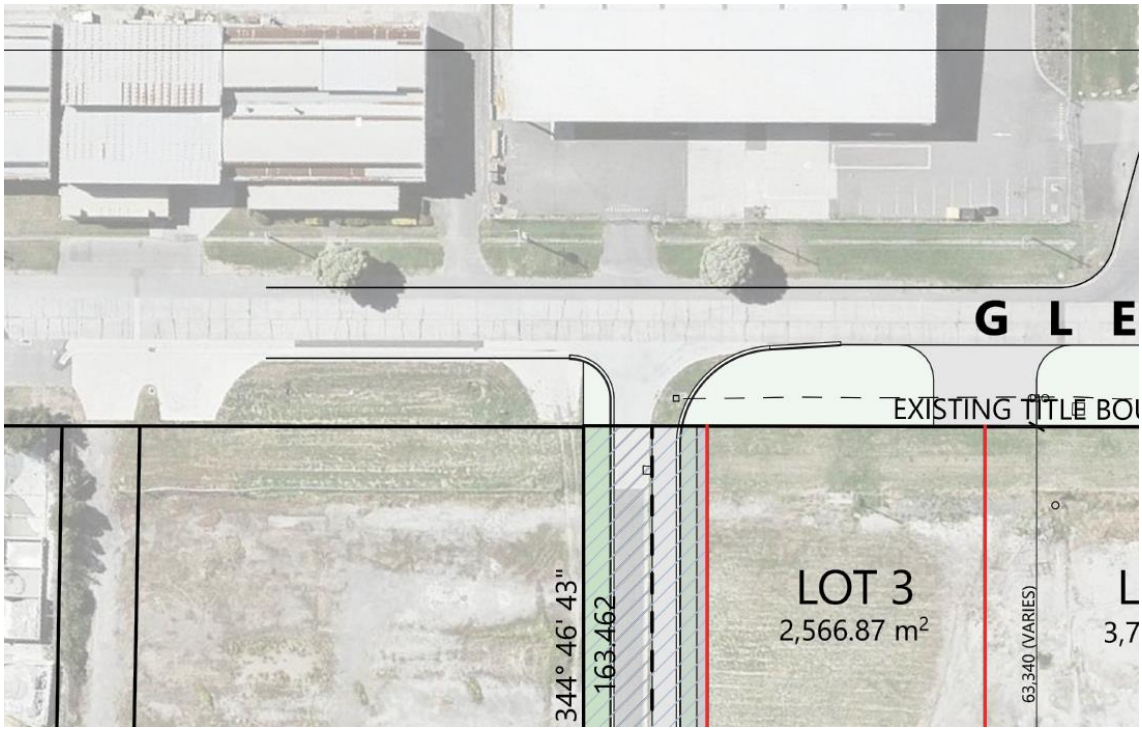


Figure 9 Proposed Road – Gleadow Street Junction

Base imagery obtained from TheLIST © State of Tasmania, Goderich-Lindsay Street Site Development, Dwg No. A7101-DA11, Artas Architects, dated 28/06/2018

The junction will be designed and constructed as a give-way intersection complete with all statutory line marking and signage and kerb returns on either side. There are no significant conflicts introduced by the proposed modifications to this junction.

Based on the traffic generation and distribution assumptions described in this report, it is expected that the Gleadow Street / Ogilvie Road junction would attract around 30 to 40 vehicle movements per hour associated with the proposed development. The actual use will vary

depending on the amount of public traffic (not associated with this development) using Ogilvie Road to travel between Lindsay Street and Gleadow Street.

No capacity issues are expected at the new Gleadow Street junction given the expected level of use, and the existing traffic flow on Gleadow Street.

Goderich Street Junction

Alternative access to Ogilvie Road will be provided via a new public road link connecting to Goderich Street. The Goderich Street junction will be left-in only and includes an auxiliary left turn slip lane. The minimum length of the slip lane (including taper) should be 55 metres based on Table 5.2 of the Austroads publication, *Guide to Road Design – Part 4A: Unsignalised and Signalised Intersections* (2017). The proposed Goderich Street junction is presented in Figure 10.

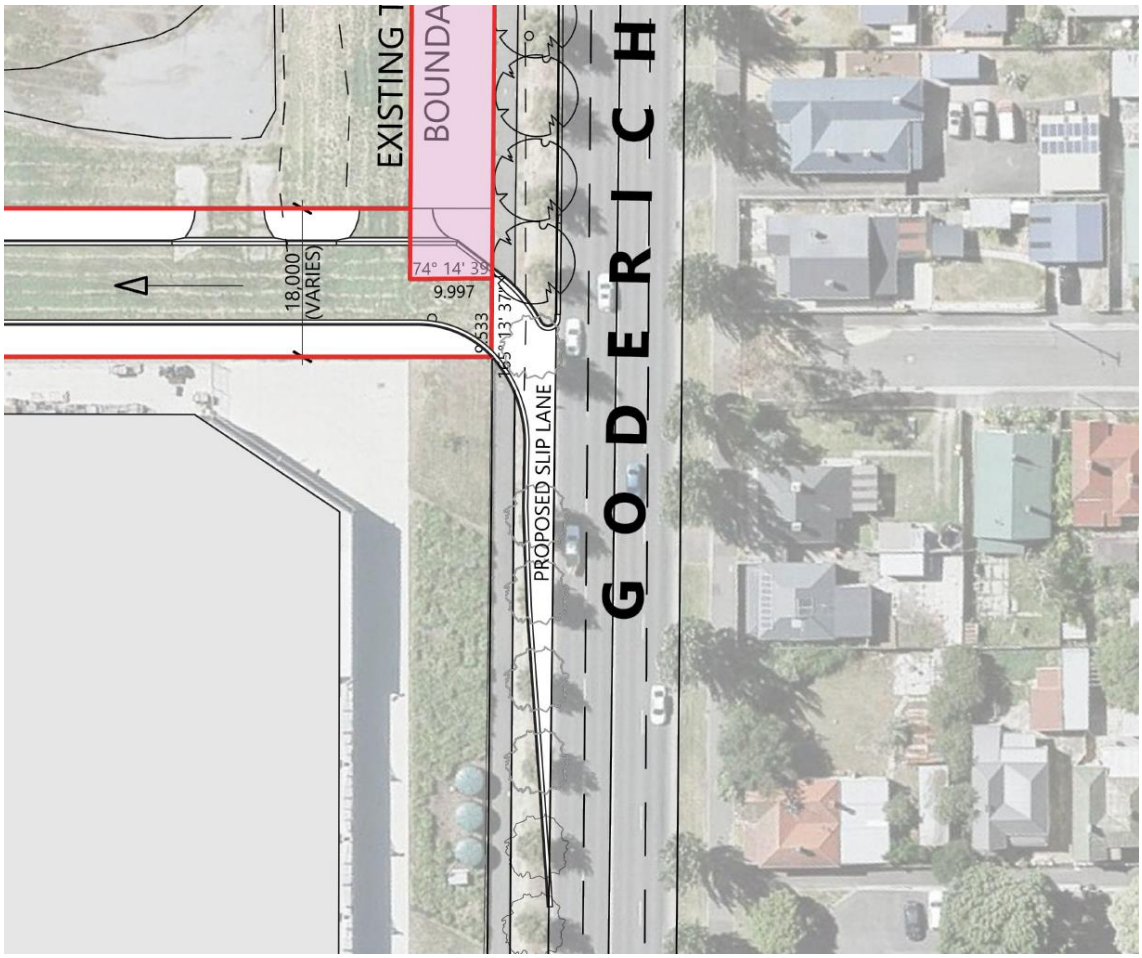


Figure 10 Proposed Junction – Goderich Street

Base imagery obtained from TheLIST © State of Tasmania, Goderich-Lindsay Street Site Development, Dwg No. A7101-DA11, Artas Architects, dated 28/06/2018

Based on the traffic generation and distribution assumptions described in this report, it is expected that the new Goderich Street junction would attract up to 35 vehicle movements per hour associated with the proposed development. The actual use will vary depending on the amount of public traffic (not associated with this development) using Ogilvie Road to access Lindsay Street or Gleadow Street.

There is an existing shared use path travelling parallel to Goderich Street alongside the Lot 1 site boundary. The proposed junction creates a potential new conflict between pedestrians and cyclists on the shared use path, and vehicles entering the site. In order to minimise the potential for conflict, it is recommended that:

- The junction include formal barrier kerb and channel, with pram ramps for pedestrian and cyclists crossings, to provide clear indication of vehicle priority at this location; and
- Signage and pavement markings (e.g. LOOK LEFT and LOOK RIGHT) be provided for pedestrians and cyclists to watch for entering vehicles prior to crossing.

The impacts of the proposed junction on the operation of the shared use path are considered to be minimal as there are already existing interruptions to the path at the Lindsay Street and Gleadow Street junctions located a short distance south and north of the site access.

4.2.2 Lindsay Street Crossovers

Three new crossovers are proposed on Lindsay Street, in addition to the Ogilvie Road junction, to provide access to a new car park on Lot 5. The new car park is intended to serve as overflow car parking for the Launceston Silos hotel located directly opposite. The proposed car park would contain around 60 car parking spaces, and therefore each access would be considered a Category 2 access based on AS/NZS 2890.1 with a combined width of 6.0 to 9.0 metres. The proposed accesses comply with these requirements.

4.2.3 Gleadow Street Crossovers

One new crossover is proposed for Gleadow Street to provide access to Lot 2 and Lot 3. These accesses would also be considered Category 2 accesses with a combined width of 6.0 to 9.0 metres. The proposed crossover has a total width of 15 metres, resulting in 7.5 metres for each of Lots 2 and 3, and therefore complies with AS/NZS 2890.1.

It is noted that these accesses will also be used by commercial vehicles and will be required to comply with the requirements of AS 2890.2. Access for heavy vehicles is discussed in Section 4.4 of this report.

4.2.4 Ogilvie Road Crossovers

New crossovers to be provided on Ogilvie Road include:

- Lot 4 (museum)
  - Two crossovers with nominal 7 m width
- Bunnings
  - New crossover between JB Hi-Fi and Bunnings buildings with nominal 10 m width (commercial vehicle accesses)
  - Maintain existing access at rear of Bunnings laneway
- Lots 1 & 3
  - New (combined) crossover with nominal 15 m width

Based on the discussion of requirements provided in Section 4.2.2 and 4.2.3, the proposed crossovers on Ogilvie Road are considered to comply with the requirements of the relevant standards. Note that access for heavy vehicles is discussed in further detail in Section 4.4 of this report.

4.2.5 Summary

The proposed development is considered to comply with the performance criteria outlined in Clause E6.6.2-P2 of the Planning Scheme based on the following assessment:

- Given the size of the site, and the range of different uses proposed, an internal road network with multiple access points is desired in order to maintain efficient and convenient access for each use.

- The proposed development will generate moderate traffic movements spread across multiple access points on Goderich Street, Lindsay Street and Gleadow Street.
- Heavy traffic activity will not be concentrated at any particular access point to create any safety or efficiency issues.
- There is sufficient sight distance at all access points in accordance with the Planning Scheme requirements (Section 4.3).
- Both Lindsay Street and Gleadow Street are local access roads with speed limit of 50 km/h.
- The proposed junction on Goderich Street (arterial road) is left-in only and will not impact on the operation of that road.

With the exception of the new public road junctions and the Goderich Street entry (each of which will be designed as a junction rather than an access), access points comply with the widths specified in Australian Standards.

4.3 Sight Distance Assessment

Clause E4.6.4-A1 of the Planning Scheme states that: *"Sight distances at … an access or junction must comply with the Safe Intersection Sight Distance shown in Table E4.6.4."* From Table E4.6.4, the minimum sight distance for a frontage road speed of 50 km/h is 80 metres. Both Lindsay Street and Gleadow Street are straight, and there are no major obstructions to sight distance, such that the minimum sight distance required by the Planning Scheme is available at all proposed access points. The proposal is considered to comply with the acceptable solution.

Note that the low wall and chain link fence adjacent to the proposed intersection at Ogilvie Road and Lot 5 (see Figure 11) is not considered likely to cause significant obstruction to sight distances at this location.

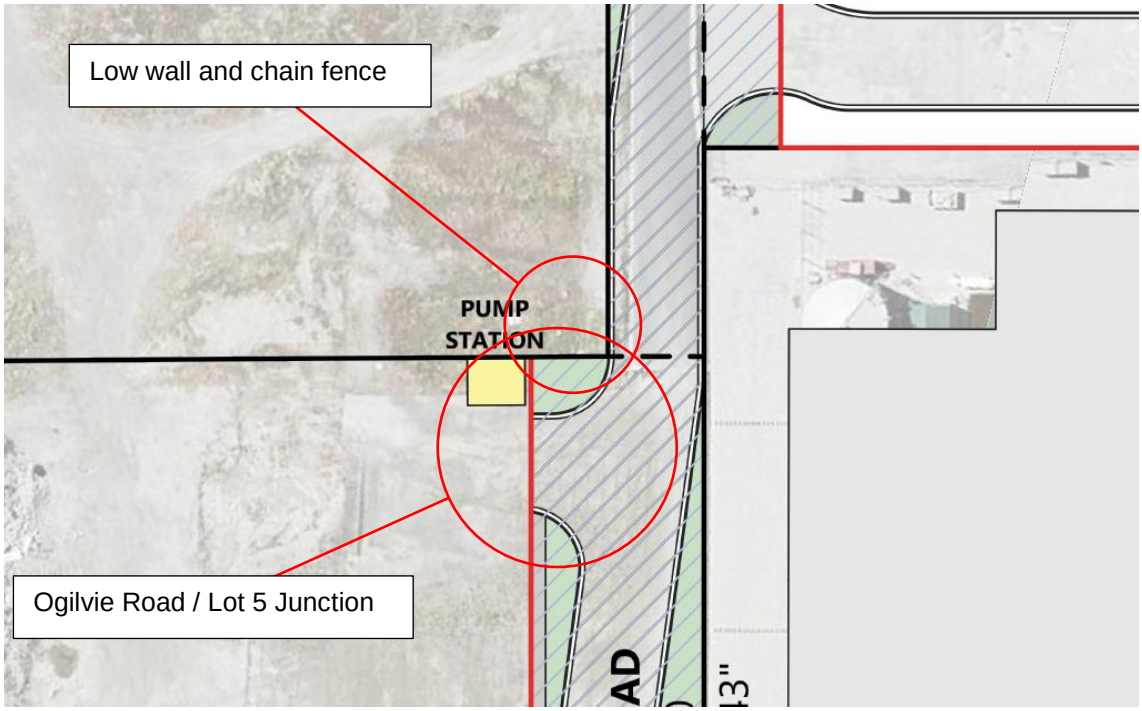


Figure 11 Ogilvie Road and Lot 5 Junction

Base imagery obtained from TheLIST © State of Tasmania, Goderich-Lindsay Street Site Development, Dwg No. A7101-DA11, Artas Architects, dated 28/06/2018

4.4 Heavy Vehicle Access

Clause E6.5.5-A1 of the Planning Scheme states that: *"A loading bay must be provided for uses with a gross floor area greater than 1000 m^2 in a single occupancy."* With the exception of the proposed car museum on Lot 4, floor areas and layouts for new lots have not been confirmed. Each individual lot will be required to provide for delivery vehicle access and loading bays in accordance with the requirements of the Scheme.

Clause E6.6.4-A1 of the Planning Scheme states that: *"The area and dimensions of loading bays and access way areas must be designed in accordance with AS2890.2 – 2002, Parking Facilities, Part 2: Parking facilities – Off-street commercial vehicle facilities, for the type of vehicles likely to use the site."* Similarly, Clause E6.6.4-A2 states that: *"It must be demonstrated that the type of vehicles likely to use the site can enter, park and exit the site in a forward direction, without impact or conflicting with areas set aside for parking or landscaping, in accordance with AS2890.2 – 2002."*

All public roads will be required to accommodate general access vehicles up to the 19 metre semi-trailer design vehicle.

4.5 Pedestrian Access

Clause E6.6.3-A1.1 of the Planning Scheme states that: *"Uses that require 10 or more parking spaces must … have a 1m wide footpath that is separated from the access ways or parking aisles, except where crossing access ways or parking aisles … be signed and line marked at points where pedestrians cross access ways or parking aisles."*

Footpaths will be provided along the Lindsay Street frontage with access to the site in accordance with the acceptable solution.

In addition, it is recommended that:

- A minimum 1.5 metre wide footpath be provided alongside Ogilvie Road as shown in Figure 12.
- A minimum 1.5 metre wide footpath be provided along the Lot 1 frontage connecting to the existing shared use path on Goderich Street
- A minimum 1.5 metre wide footpath be provided between the proposed Silo overflow car park on Lot 5 and the Lindsay Street footpath

Note that the footpath cannot be provided for the full length of Ogilvie Road due to the pinch point where the road reserve width decreases (see Section 4.2.1). Council should consider acquiring additional land in order to increase the road reserve width and continue the footpath through this section.

The above recommendations are presented in Figure 12.

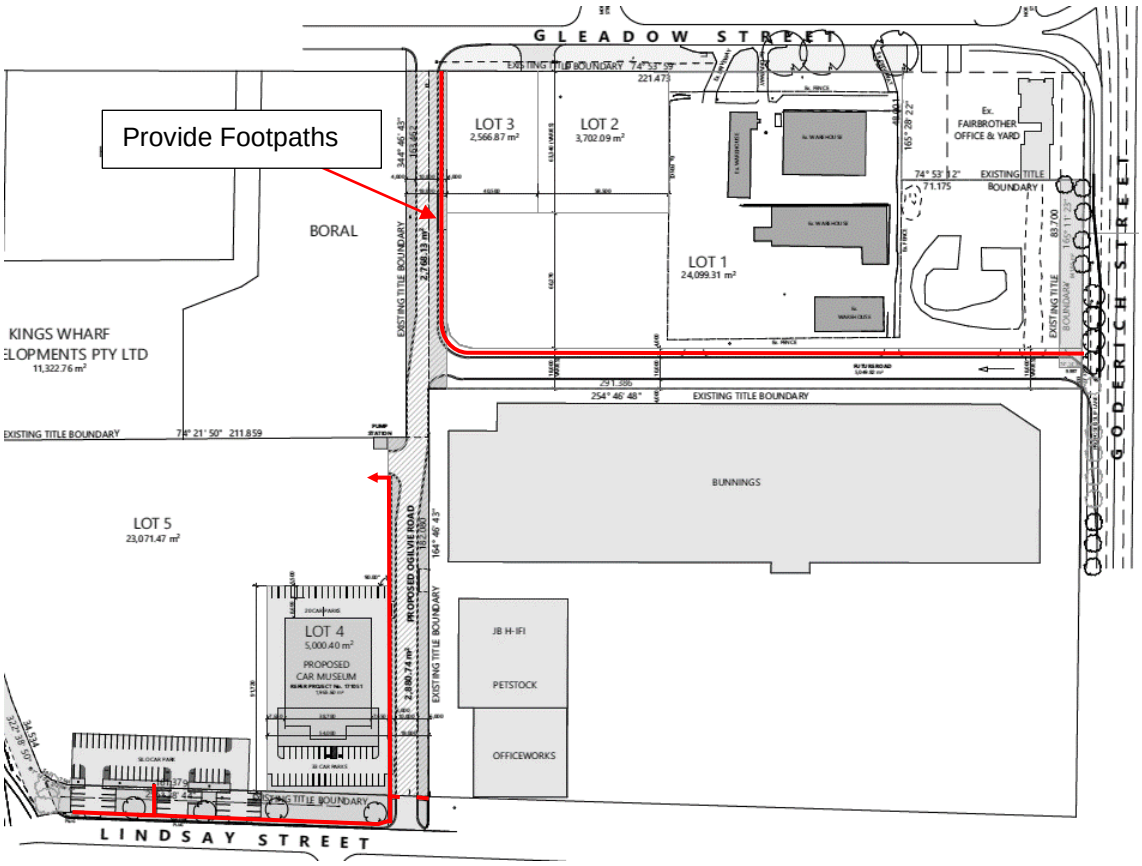


Figure 12 Recommended Pedestrian Access Arrangements

Image source: Goderich-Lindsay Street Site Development, Dwg No. A7101-DA11, Artas Architects, dated 28/06/2018

5. Parking Assessment

5.1 Car Parking Supply

The proposed development includes car parking to be provided on Lot 4 and Lot 5. The parking supply is required to comply with Clause E6.5.1 of the Planning Scheme. The acceptable solution A1 requires:

> *"The number of car parking spaces must … not be less than 90% of the requirements of Table E6.1 … not exceed the requirements of Table E6.1 by more than 2 spaces or 5% whichever is the greater."*

The proposed car parking supply has been assessed against the requirements of Table E6.1 below. Note that the uses for 2-3 are vacant and have been excluded from this assessment. Similarly, Lot 1 contains existing buildings, access points and parking areas and has also been excluded. Lot 4 is intended for a museum for which the community meeting and entertainment land use applies.

Table 4 Planning Scheme Requirements

Land Use	Parking Requirement
Community meeting and entertainment	1 space per 20 m^2 of floor area available to the public

Source: Launceston Interim Planning Scheme 2015

Table 5 Car Parking Assessment

Lot	Use	Planning Scheme Requirement	Number of Spaces Provided
4	Community meeting and entertainment	99 spaces	53 spaces

Based on Table 5, there is a deficiency of parking on Lot 4. Therefore the proposal relies on performance criteria which are as follows:

> *"The number of car parking spaces for other than residential uses, must be provided to meet the reasonable needs of the use."*

The available parking supply allocated to Lot 4 is significantly less than the requirements of the Planning Scheme, having a deficit of 46 car parking spaces. It is noted that the *community meeting and entertainment* land use covers a wide range of potential uses including churches, function centres, museums and other public facilities. It is likely that the parking demand of these uses that fall within the *community meeting and entertainment* land use vary significantly.

The proposed museum on Lot 4 is estimated to attract up to 50 visitors per day on a typical weekday, increasing to up to 250 visitors per day on a peak Saturday. Assuming an average car occupancy of 2.2 persons per vehicle, and an average stay duration of 2 hours over a 7-hour period (10 am to 5 pm), the typical peak car park occupancy would be around 35-40 vehicles. The proposed parking supply of 53 spaces is considered sufficient to meet the expected demand.

5.2 Special Parking Requirements

5.2.1 Accessible Car Parking

Clause E6.5.1-A2 of the Planning Scheme states that: *"The number of accessible car parking spaces for use by persons with a disability for uses that require 6 or more parking spaces must be in accordance with Part D3 of the National Construction Code 2014, as amended from time to time."*

The current document is the *National Construction Code 2016*. Based on the Code, the proposed development will include a building on Lot 4 which fall into Class 9b (museum). The minimum requirements are as follows:

- Class 9b 1 space for every 50 car parking spaces or part thereof

Based on the above, accessible car parking is required as summarised in Table 6.

Table 6 Accessible Car Parking Requirements

Lot	Use	Class	Parking Supply	Accessible Car Parking Requirement
4	Museum	9b	53 spaces	2 spaces

The current Master Plan shows 2 accessible parking spaces on Lot 4 in accordance with the requirement outlined in Table 6. The proposed development therefore complies with the acceptable solution.

5.2.2 Bicycle Parking

Clause E6.5.2-A1 of the Planning Scheme states that: *"The number of bicycle parking spaces must be provided on either the site or within 50m of the site in accordance with the requirements of Table E6.1."* The planning scheme requirements for bicycle parking are summarised in the following table.

Table 7 Planning Scheme Requirements

Land Use	Bicycle Parking Requirement
Community meeting and entertainment	1 space per 50 m^2 of gross floor area

Source: Launceston Interim Planning Scheme 2015

The bicycle parking requirements outlined in Table E6.1 are considered excessive for the proposed use on the site, noting that *Community meeting and entertainment* can have varying parking demand as discussed above. The Planning Scheme requirement and the recommended bicycle parking supply are summarised in Table 8.

Table 8 Bicycle Parking Assessment

Lot	Use	Planning Scheme Requirement	Recommended Supply
4	Community meeting and entertainment	40 bicycles	8 bicycles

Clause E6.6.5-A1 of the Planning Scheme states that: *"Uses that require 5 or more bicycle spaces by Table E6.1 must provide 1 shower and change room facility on site, with one additional shower and change room on site for each 10 additional bicycle spaces required."*

Shower and change room facilities should be provided to comply with the requirements of Clause E6.6.5-A1 for those uses providing greater than 5 bicycle parking spaces.

5.2.3 Taxi Spaces

Clause E6.5.3-A1 of the Planning Scheme states that: *"Uses that require greater than 50 car spaces by Table E6.1 must provide one parking space for a taxi on site, with one additional taxi parking space provided for each additional 50 car parking spaces required."*

The proposed car museum on Lot 4 requires greater than 50 car parking spaces when calculated in accordance with Table E6.1. Based on the discussion in Section 5.1 of this report, the actual peak parking demand for the proposed museum is likely to be much less than the parking requirement in the Planning Scheme and closer to 35-40 spaces.

On this basis, it is considered that no dedicated taxi parking should be required on Lot 4.

5.2.4 Motorcycle Parking

Clause E6.5.4-A1 of the Planning Scheme states that: *"Uses that require greater than 20 car parking spaces by Table E6.1 must provide one motorcycle parking space on site with one additional motorcycle parking space on site for each additional 20 car parking spaces required."*

It is recommended that motorcycle parking should be provided as summarised in Table 9.

Table 9 Motorcycle Parking Requirements

Lot	Use	Parking Requirement (Table E6.1)	Motorcycle Parking Requirement
4	Community meeting and entertainment	99 spaces	4 spaces

5.3 Car Park Layout

Clause E6.6.2-A1.1 of the Planning Scheme states that: *"Car parking, access ways, manoeuvring and circulation spaces must: (a) provide for vehicles to enter and exit the site in a forward direction where providing for more than 4 parking spaces; … (c) have parking space dimensions in accordance with the requirements in Table E6.3; (d) have a combined access and manoeuvring width adjacent to parking spaces not less than the requirements in Table E6.3 where there are 3 or more car parking spaces."*

Each of the proposed car parks on the site provide full circulation and allow for vehicles to enter and exit the site in a forward direction. The proposed car parking areas have been assessed against the requirements of Table E6.3 and were found to comply as summarised in Table 10.

Table 10 Car Parking Dimensions

Dimension	Required	Proposed
Combined access and manoeuvring width	6.4 m	6.6-8.7 m
Car park widths	2.6 m	2.6-2.7 m
Car park Length	5.4 m	5.4-6.0 m

6. Traffic Impacts

6.1 Network Performance

The proposed development is expected to generate up to a total of 1,342 vehicle movements per day. Local, linked and multi-purpose trips are anticipated to account for around 20% of all traffic generated by the proposal (see Section 3.5) and these trips will not result in additional traffic on the external road network (i.e. Goderich Street) however they will add local traffic movements at site access points.

The change in daily traffic volumes on key roads is summarised in Table 11.

Table 11 Change in Daily Traffic Volumes

Road	Existing	Additional	Proposed	Change
Lindsay Street (W of Goderich Street)	7,270	+497	7,767	+6.8%
Gleadow Street (W of Goderich Street)	~3,000	+302	~3,300	+10%
Montague Street	~2,500	+261	~2,760	+10%
Forster Street (W of Goderich Street)	5,780	+261	6,041	+4.5%
Goderich Street (NB carriageway)	12,730	+465	13,195	+3.7%
Goderich Street (SB carriageway)	13,030	+236	13,266	+1.8%
Charles Street Bridge	32,100	+470	32,570	+1.5%
East Tamar Highway (N of Forster Street)	25,300	+201	25,501	+0.8%

The largest impacts will be experienced at the intersections along Goderich Street including Lindsay Street, Gleadow Street and Forster Street. These intersections have been modelled using a SIDRA Intersection 7.0 network model for the commuter peak periods and the Saturday midday peak period. The results of the traffic modelling are presented in the following sections.

6.1.1 Current Year (2018) Conditions

The performance of Goderich Street under current (2018) conditions is characterised by moderate delays on the East Tamar Highway corridor (Charles Street and Goderich Street) and high delays for right turn movements. The Level of Service for each of the three intersections under existing and proposed conditions are summarised in the following tables.

Table 12 Lindsay Street / Goderich Street – 2018 Level of Service

Movement		AM Peak		PM Peak		Saturday Peak	
		Base	Prop.	Base	Prop.	Base	Prop.
Charles Street (NB)	L	D	B	D	C	D	E
	T	D	B	D	B	D	E
	R	F	F	E	F	F	E
Lindsay Street (WB)	L	B	B	C	C	B	B
	T	D	D	D	D	C	C
	R	E	E	D	D	C	C
Goderich Street (SB)	L	C	D	E	E	E	D
	T	C	D	D	D	D	D
	R	D	E	D	E	E	E
Lindsay Street (EB)	L	B	B	B	B	B	B
	T	D	D	D	D	C	C
	R	E	E	E	E	E	E
Overall		***D***	***D***	***D***	***D***	***D***	***D***

Table 13 Gleadow Street / Goderich Street – 2018 Level of Service

Movement		AM Peak		PM Peak		Saturday Peak	
		Base	Prop.	Base	Prop.	Base	Prop.
Goderich Street (NB)	L	A	A	A	A	A	A
	T	A	A	A	A	A	A
Gleadow Street (EB)	L	B	B	B	B	A	A
Overall		***A***	***A***	***A***	***A***	***A***	***A***

Table 14 Forster Street / Goderich Street – 2018 Level of Service

Movement		AM Peak		PM Peak		Saturday Peak	
		Base	Prop.	Base	Prop.	Base	Prop.
Goderich Street (NB)	L	A	A	A	A	A	A
	T	B	C	A	B	C	C
	R	D	E	E	E	C	D
Forster Street (WB)	L	B	B	B	B	B	A
	T	D	D	D	D	E	D
	R	E	E	E	E	E	E
Goderich Street (SB)	L	A	A	A	A	A	A
	T	C	C	C	C	E	C
	R	E	D	D	E	C	D
Forster Street (EB)	L	E	D	E	E	D	D
	T	D	D	D	E	D	C
	R	E	E	E	E	E	E
Overall		***C***	***C***	***C***	***C***	***D***	***C***

Based on the results presented in Table 12, Table 13 and Table 14, the proposed development is not expected to significantly impact on the performance of the three junctions assessed in this report.

6.1.2 Future Year (2028) Conditions

Future traffic conditions were forecast by applying a background traffic growth rate onto each road (0.5% to 1.0% p.a.) over ten years and superimposing the traffic generation of known future developments on Lindsay Street including:

- Northbank redevelopment
- Silos hotel development
- Boral development

The Level of Service for each of the three intersections under baseline 2028 conditions and proposed 2028 conditions are summarised in the following tables.

Table 15 Lindsay Street / Goderich Street – 2028 Level of Service

Movement		AM Peak		PM Peak		Saturday Peak	
		Base	Prop.	Base	Prop.	Base	Prop.
Charles Street (NB)	L	D	B	D	C	F	F
	T	D	B	D	C	F	F
	R	F	F	F	F	F	F
Lindsay Street (WB)	L	C	C	D	D	C	C
	T	E	E	D	D	C	C
	R	F	F	E	E	D	C
Goderich Street (SB)	L	C	D	E	E	F	E
	T	C	D	E	D	E	E
	R	E	F	E	F	F	F
Lindsay Street (EB)	L	B	B	B	B	B	B
	T	E	E	D	D	C	C
	R	F	F	F	F	F	F
Overall		***D***	***D***	***E***	***E***	***E***	***F***

Table 16 Gleadow Street / Goderich Street – 2028 Level of Service

Movement		AM Peak		PM Peak		Saturday Peak	
		Base	Prop.	Base	Prop.	Base	Prop.
Goderich Street (NB)	L	A	A	A	A	A	A
	T	A	A	A	A	A	A
Gleadow Street (EB)	L	B	B	B	B	A	A
Overall		***A***	***A***	***A***	***A***	***A***	***A***

Table 17 Forster Street / Goderich Street – 2028 Level of Service

Movement		AM Peak		PM Peak		Saturday Peak	
		Base	Prop.	Base	Prop.	Base	Prop.
Goderich Street (NB)	L	A	A	A	A	A	A
	T	D	B	C	C	A	C
	R	E	F	F	F	E	D
Forster Street (WB)	L	B	C	B	B	A	A
	T	D	D	D	D	E	D
	R	E	E	D	D	E	E
Goderich Street (SB)	L	A	B	A	A	A	A
	T	C	D	D	D	C	C
	R	E	E	E	F	F	D
Forster Street (EB)	L	E	E	D	D	E	D
	T	E	E	D	D	E	C
	R	F	F	E	E	E	E
Overall		***D***	***E***	***D***	***D***	***C***	***C***

Based on the results presented in Table 15, Table 16 and Table 17, the performance of the two signalised intersections at Lindsay Street / Goderich Street and Forster Street / Goderich Street will continue to deteriorate over the next 10 years regardless of the proposed development proceeding. The impacts of the additional traffic generated by the proposal are marginal.

It is noted that the overall Level of Service for each junction will remain within acceptable bounds for this type of environment (typically LOS D/E), indicating that there is sufficient capacity within each junction to accommodate the additional traffic even if some specific movements operate with high delays and congestion.

6.1.3 Discussion

Based on the traffic modelling, the impacts on traffic performance due to this proposed development are relatively minor in the context of existing and forecast traffic network performance. It is clear that many movements at the intersection of Lindsay Street and Goderich Street will become oversaturated within the next 10 years regardless of this proposed development proceeding due to background traffic growth on the corridor, and known developments in the immediate surrounding area.

It should be noted that the forecast deterioration of network performance is due to a number of recent and future developments in the immediate surrounding area rather than any one development, including this proposed development. It is further noted that once the traffic generation of this current development has been realised (including full development of Lots 1, 2, 3 and 5) there is not expected to be any additional growth on Lindsay Street, west of Goderich Street as all available land will have been developed.

It is anticipated that the proposed Ogilvie Road connecting between Lindsay Street and Gleadow Street may alleviate some of the traffic performance issues at Goderich Street and Lindsay Street by providing an alternative access route for the proposed development and allowing vehicles to bypass congested areas during periods of high activity. Notwithstanding, it is likely that the demand for right turns at Lindsay Street will remain relatively high.

It is understood that the Department of State Growth and City of Launceston are currently investigating options for infrastructure in the area as a result of future development growth and in the context of the proposed relocation of University of Tasmania's Launceston campus to Inveresk. At this stage, potential options include the following:

- Signalisation of the Gleadow Street / Goderich Street intersection to provide alternative right-turn options at Goderich Street.
- Banning of some turns at the Lindsay Street/ Goderich Street intersection and reallocation of that green time to other movements.

It is recommended that Council and the Department of State Growth continue to monitor traffic performance at this junction, and intervene as necessary, when congestion begins to become intolerable.

6.2 Road Safety Impacts

No significant detrimental road safety impacts are foreseen for the project. This is based on the following:

- The existing crash history does not indicate any specific road safety deficiencies in the external road network that might be exacerbated by the additional traffic generated by the proposal
- There is sufficient sight distance at each access point to comply with Planning Scheme requirements
- The proposed public road connection between Lindsay Street and Gleadow Street offers drivers an opportunity to bypass intolerable congestion at the Lindsay Street / Goderich Street junction during periods of heavy activity

It is acknowledged that the traffic generated by the proposed development will likely increase congestion at the busy intersection of Lindsay Street and Goderich Street. This may result in increased potential for 'red light running' incidents and acceptance of smaller gaps in the opposing traffic flow.

The Department of State Growth and City of Launceston are currently investigating options for infrastructure in the area to alleviate some traffic concerns at this location.

7. Conclusions

This Transport Impact Assessment report has investigated the potential traffic and transport related impacts associated with a 6 lot commercial/industrial subdivision at Lindsay Street and Gleadow Street in Invermay.

The key findings are as follows:

- The proposed development is anticipated to generate up to a total of 1,342 vehicle movements per day, with around 180 movements per hour during the commuter peak periods (AM and PM) and around 162 movements per hour during the Saturday midday peak.
- Around 20% of all trips are expected to be local to the immediate surrounding area, taking into account internal trips (i.e. between lots on the site) as well as linked and multi-purpose trips (e.g. Bunnings).
- The proposed access arrangements are considered to be sufficient to service the proposed development subject to the following recommendations:
  - The proposed slip lane entry on Goderich Street (adjacent to Lot 1) should have a minimum length of 55 metres to comply with Austroads guidelines.
  - Footpaths be provided throughout the site as shown in Figure 12.
  - Centre line be provided on Ogilvie Road to delineate the travel path through the 'pinch point' between Lots 1 and 5.
- The proposed car parking supply for Lot 4 is considered sufficient to cater for the expected demand.
- Accessible car parking, bicycle parking and motorcycle parking should be provided as recommended in the relevant section of this report.
- Intersections along Goderich Street were modelled using SIDRA Intersection 7.0 modelling software with the following results:
  - It is clear that many movements at the intersection of Lindsay Street and Goderich Street will become oversaturated regardless of the proposed development proceeding due to background traffic growth on the corridor and known developments in the surrounding area.
  - The proposed development will not significantly impact on the performance of the junctions assessed in this report in the context of the existing traffic network performance.
  - The overall Level of Service for each junction will remain within acceptable bounds for this type of environment (typically LOS D/E) indicating that there is sufficient capacity within each junction to accommodate the additional traffic even if some specific movements operate with high delays and congestion.
  - It is recommended that Council and the Department of State Growth continue to monitor traffic performance at this junction, and intervene as necessary, when congestion begins to become intolerable.

Based on the findings of this report, and subject to the recommendations outlined above, the proposed development is supported on traffic and transport grounds.

7.1.1 Planning Scheme Assessment

Subject to the recommendations outlined above, the proposed development is considered to comply with the relevant provisions of the Road and Railway Assets Code and the Parking and Sustainable Transport Code as summarised in Table 18 and Table 19 below.

Table 18 E4.0 Road and Railway Assets Code

Clause	Title	Response
E4.5.1	Existing road accesses and junctions	Complies with performance criteria P3 subject to the recommendations contained in this report. **Reference:** Section 3.6 and Section 6
E4.5.2	Existing level crossings	Not applicable.
E4.6.1	Development adjacent to roads and railways	Not applicable since speed limit on Goderich Street is 60 km/h.
E4.6.2	Road accesses and junctions	Complies with performance criteria P2 subject to the recommendations contained in this report. **Reference:** Section 4.1
E4.6.3	New level crossings	Not applicable.
E4.6.4	Sight distance at accesses, junctions and level crossings	Complies with acceptable solution A1. **Reference:** Section 4.3

Table 19 E6.0 Parking and Sustainable Transport Code

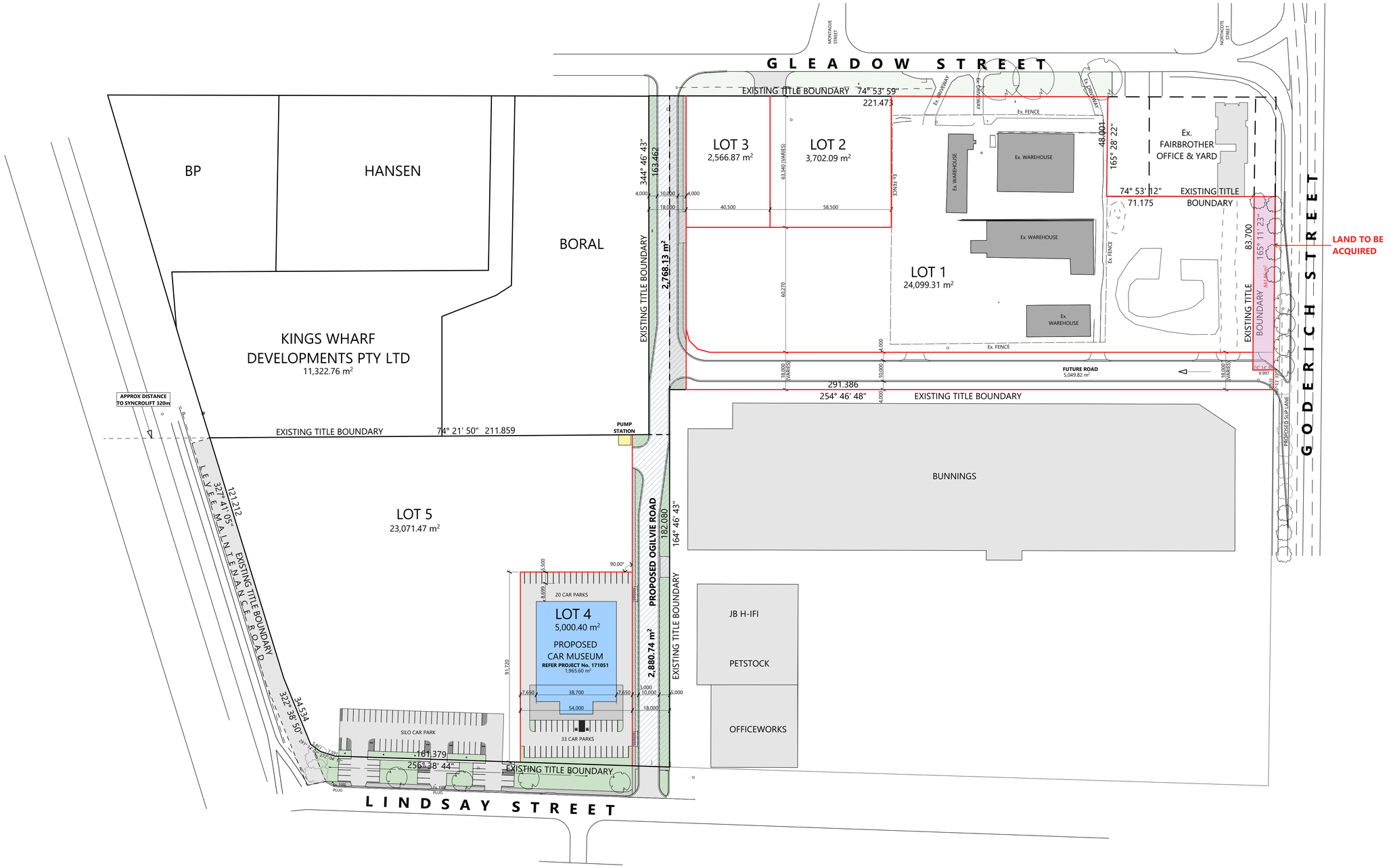
Clause	Title	Response
E6.5.1	Car parking numbers	Complies with performance criteria P1. **Reference:** Section 5.1
E6.5.2	Bicycle parking numbers	Complies with performance criteria P1 subject to the recommendations in Table 8. **Reference:** Section 5.2.2
E6.5.3	Taxi spaces	Complies with acceptable solution A1. **Reference:** Section 5.2.3
E6.5.4	Motorcycle parking	Complies with acceptable solution A1 subject to recommendations in Table 9. **Reference:** Section 5.2.4
E6.5.5	Loading bays	Complies with acceptable solution A1. **Reference:** Section 4.4
E6.6.1	Construction of parking areas	Not assessed in this report.
E6.6.2	Design and layout of parking areas	Complies with acceptable solution A1.1. **Reference:** Section 5.3

Clause	Title	Response
E6.6.3	Pedestrian access	Complies with acceptable solution A1.1 and A1.2 subject to recommendations. **Reference:** Section 4.5
E6.6.4	Loading bays	Complies with acceptable solutions A1 and A2. **Reference:** Section 4.4
E6.6.5	Bicycle facilities	Complies with performance criteria P1 subject to recommendations. **Reference:** Section 5.2.2
E6.6.6	Bicycle parking and storage facilities	Not assessed in this report.

Appendices

Appendix A – Site Layout

REVISION				
Rev	Description	Date	Int.	App
DA01	ISSUED FOR DEVELOPMENT APPLICATION	1/05/2018	BT	BT
DA02	ISSUED FOR DEVELOPMENT APPLICATION	1/05/2018	BT	BT
DA03	ISSUED FOR DEVELOPMENT APPLICATION	3/05/2018	BT	BT
DA04	ISSUED FOR DEVELOPMENT APPLICATION	3/05/2018	BT	BT
DA05	ISSUED FOR DEVELOPMENT APPLICATION	5/06/2018	BT	SC
DA06	ISSUED FOR DEVELOPMENT APPLICATION	7/06/2018	BT	SC
DA07	ISSUED FOR DEVELOPMENT APPLICATION	8/06/2018	BT	SC
DA08	ISSUED FOR DEVELOPMENT APPLICATION	21/06/2018	BT	SC
DA09	ISSUED FOR DEVELOPMENT APPLICATION	21/06/2018	BT	SC
DA10	ISSUED FOR DEVELOPMENT APPLICATION	25/06/2018	BT	SC
DA11	ISSUED FOR DEVELOPMENT APPLICATION	28/06/2018	BT	SC



MASTER PLAN - OVERALL
SCALE 1:1000
North
0mm 10000 20000 30000 40000 50000

PLANNING EXHIBITED DOCUMENTS
Ref. No: DA 0446/2018
Date advertised: 08/08/2018
Planning Administration

GODERICH-LINDSAY STREET SITE DEVELOPMENT

KINGS WHARF DEVELOPMENTS PTY LTD

APPROVAL
181001
SHEET SIZE: A1 (LANDSCAPE)

A7101-DA11

ARTAS ARCHITECTS

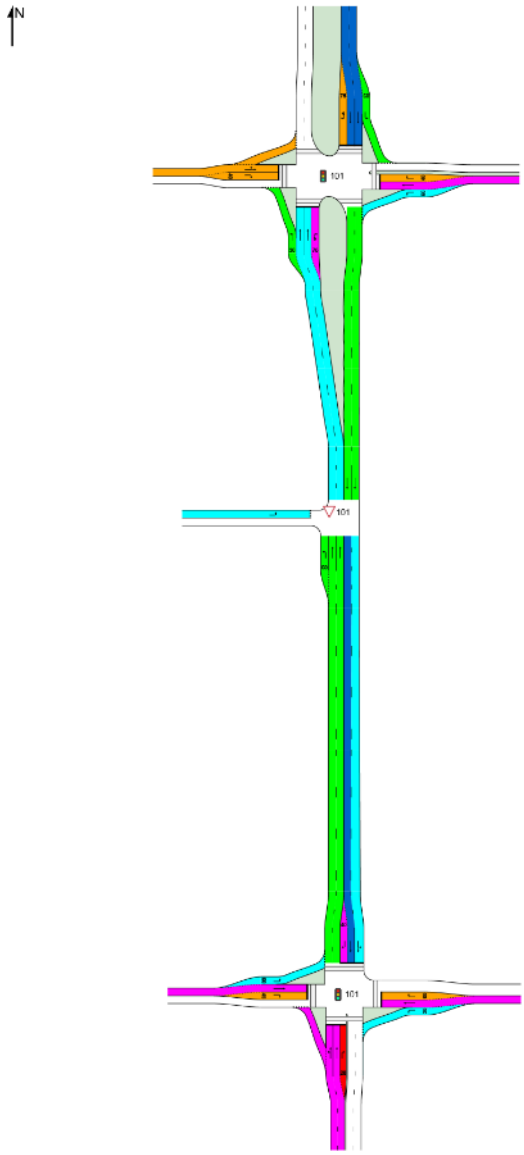
Appendix B – SIDRA Network Outputs – Existing

LANE LEVEL OF SERVICE

Lane Level of Service for Network Sites

Network: N101 [2018 AM Peak Existing]

New Network
Network Cycle Time = 120 seconds (Network Cycle Time - User-Given)



Colour code based on Level of Service

LOS A | LOS B | LOS C | LOS D | LOS E | LOS F

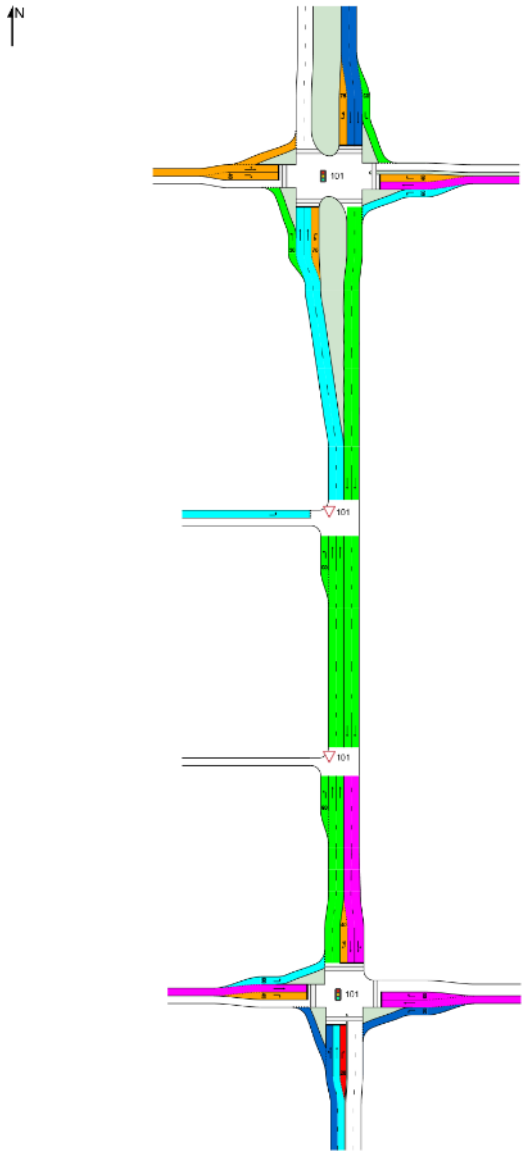
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Delay model settings are specified for individual Sites forming the Network.

LANE LEVEL OF SERVICE

Lane Level of Service for Network Sites

Network: N101 [2018 PM Peak Proposed]

New Network
Network Cycle Time = 120 seconds (Network Cycle Time - User-Given)



Colour code based on Level of Service

LOS A | LOS B | LOS C | LOS D | LOS E | LOS F

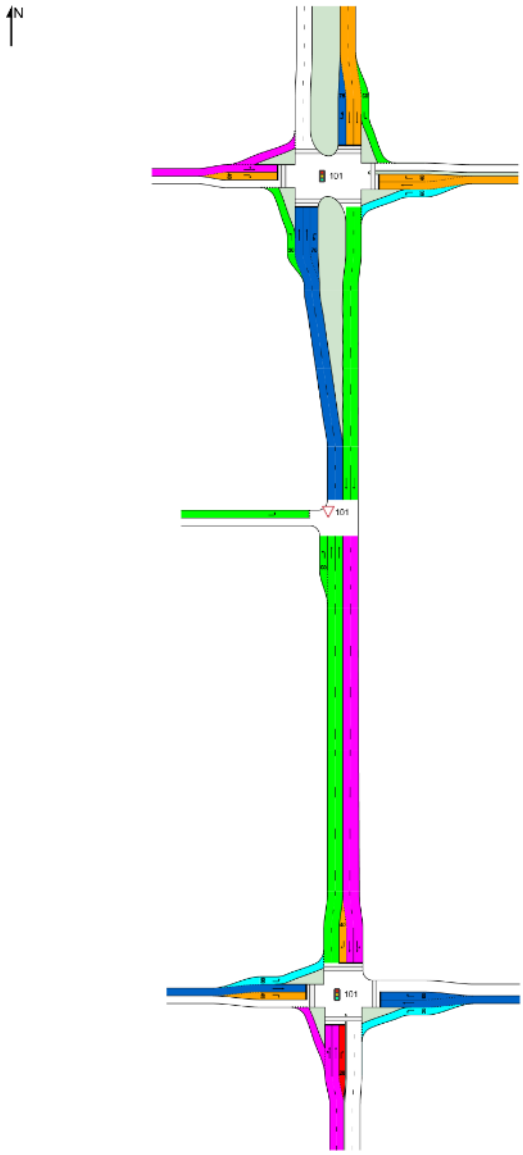
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Delay model settings are specified for individual Sites forming the Network.

LANE LEVEL OF SERVICE

Lane Level of Service for Network Sites

Network: N101 [2018 Sat Peak Existing]

New Network
Network Cycle Time = 120 seconds (Network Cycle Time - User-Given)



Colour code based on Level of Service

LOS A	LOS B	LOS C	LOS D	LOS E	LOS F

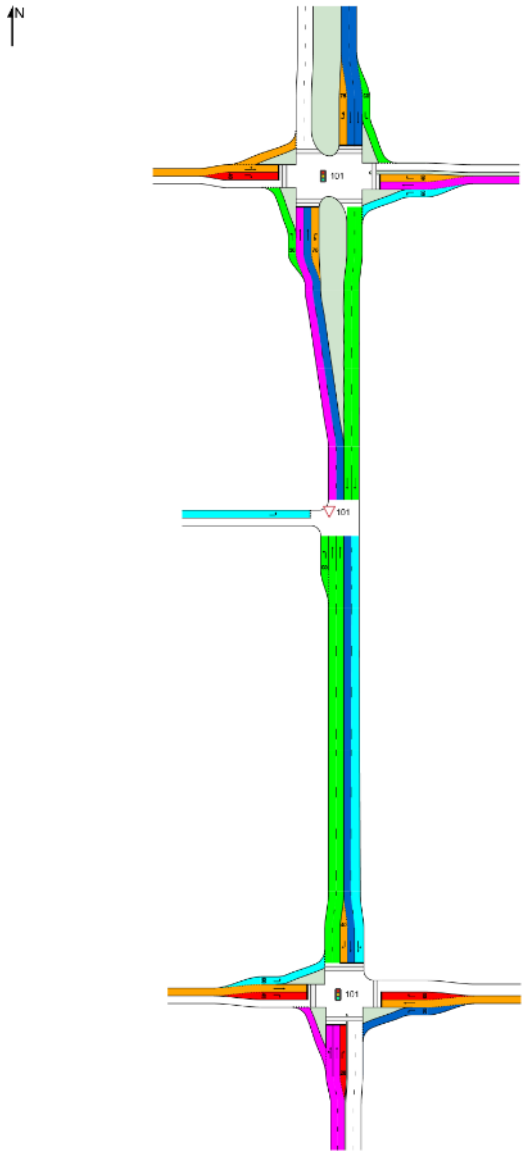
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Delay model settings are specified for individual Sites forming the Network.

LANE LEVEL OF SERVICE

Lane Level of Service for Network Sites

Network: N101 [2028 AM Peak Existing]

New Network
Network Cycle Time = 140 seconds (Network Cycle Time - User-Given)



Colour code based on Level of Service

LOS A | LOS B | LOS C | LOS D | LOS E | LOS F

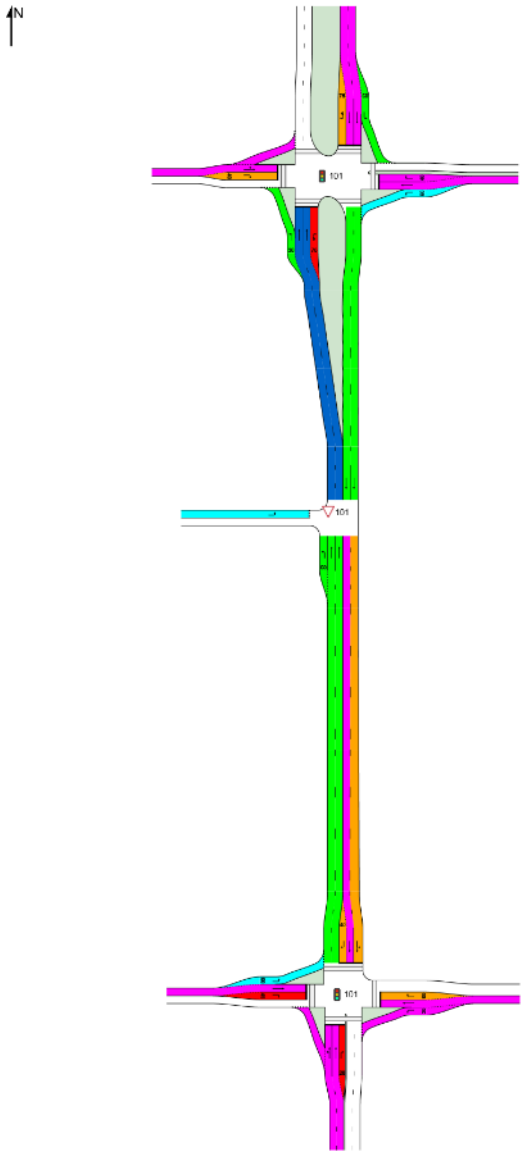
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Delay model settings are specified for individual Sites forming the Network.

LANE LEVEL OF SERVICE

Lane Level of Service for Network Sites

Network: N101 [2028 PM Peak Existing]

New Network
Network Cycle Time = 140 seconds (Network Cycle Time - User-Given)



Colour code based on Level of Service

LOS A	LOS B	LOS C	LOS D	LOS E	LOS F

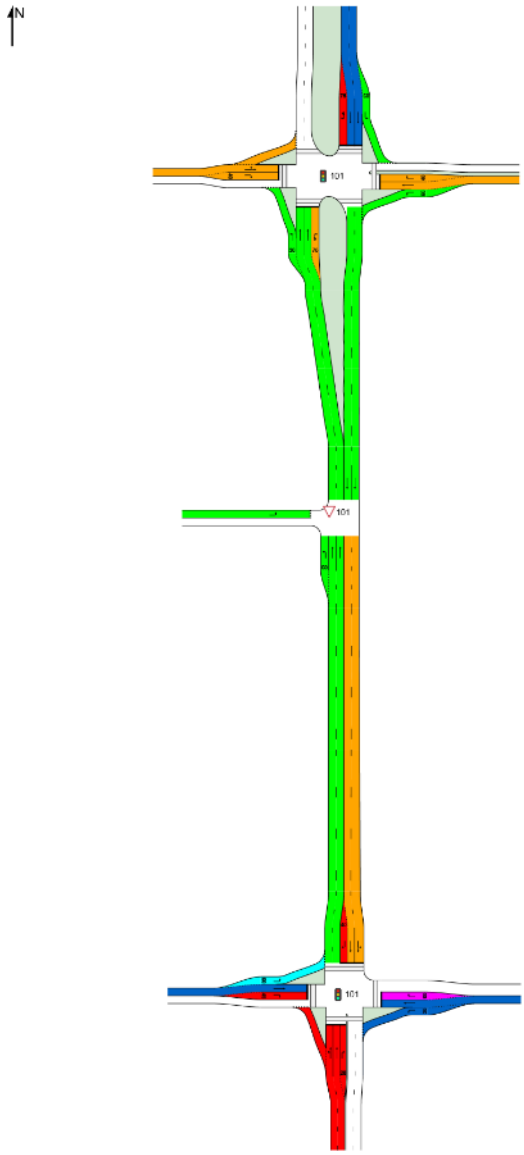
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Delay model settings are specified for individual Sites forming the Network.

LANE LEVEL OF SERVICE

Lane Level of Service for Network Sites

Network: N101 [2028 Sat Peak Existing]

New Network
Network Cycle Time = 140 seconds (Network Cycle Time - User-Given)



Colour code based on Level of Service

LOS A | LOS B | LOS C | LOS D | LOS E | LOS F

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Delay model settings are specified for individual Sites forming the Network.

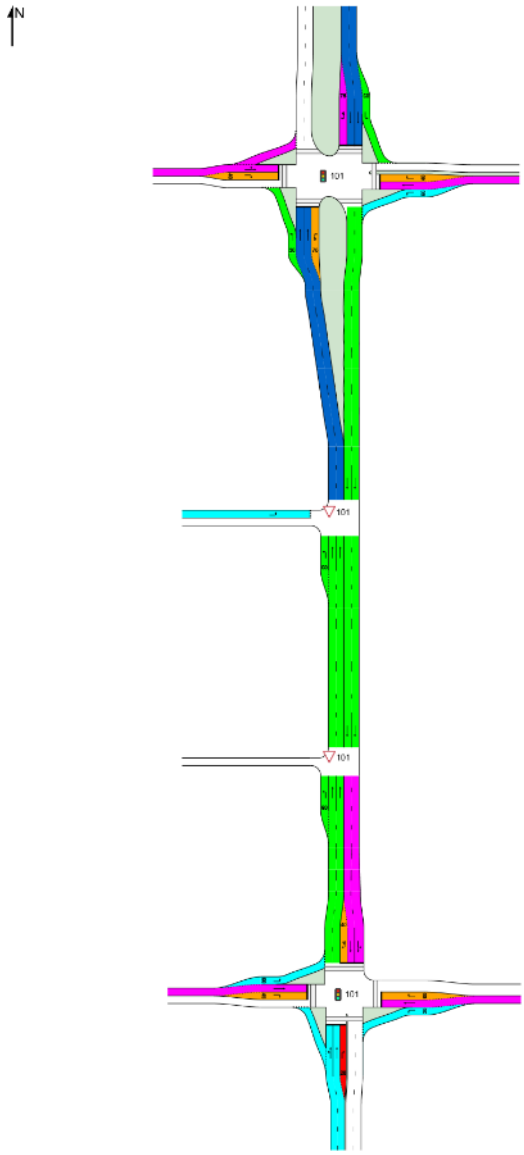
Appendix C – SIDRA Network Outputs - Proposed

LANE LEVEL OF SERVICE

Lane Level of Service for Network Sites

Network: N101 [2018 AM Peak Proposed]

New Network
Network Cycle Time = 120 seconds (Network Cycle Time - User-Given)



Colour code based on Level of Service

LOS A | LOS B | LOS C | LOS D | LOS E | LOS F

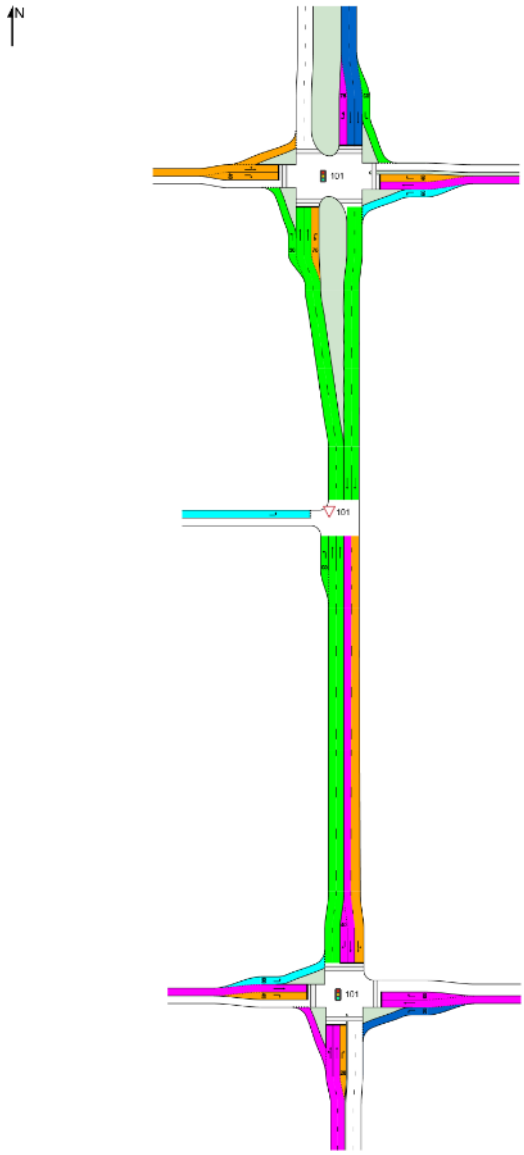
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Delay model settings are specified for individual Sites forming the Network.

LANE LEVEL OF SERVICE

Lane Level of Service for Network Sites

Network: N101 [2018 PM Peak Existing]

New Network
Network Cycle Time = 120 seconds (Network Cycle Time - User-Given)



Colour code based on Level of Service

LOS A | LOS B | LOS C | LOS D | LOS E | LOS F

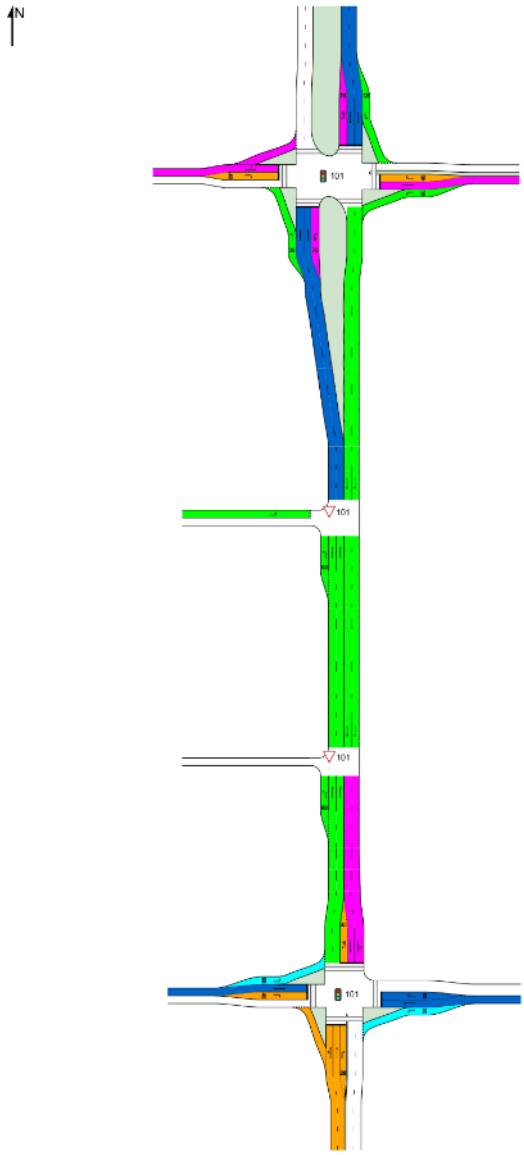
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Delay model settings are specified for individual Sites forming the Network.

LANE LEVEL OF SERVICE

Lane Level of Service for Network Sites

Network: N101 [2018 Sat Peak Proposed]

New Network
Network Cycle Time = 120 seconds (Network Cycle Time - User-Given)



Colour code based on Level of Service

LOS A | LOS B | LOS C | LOS D | LOS E | LOS F

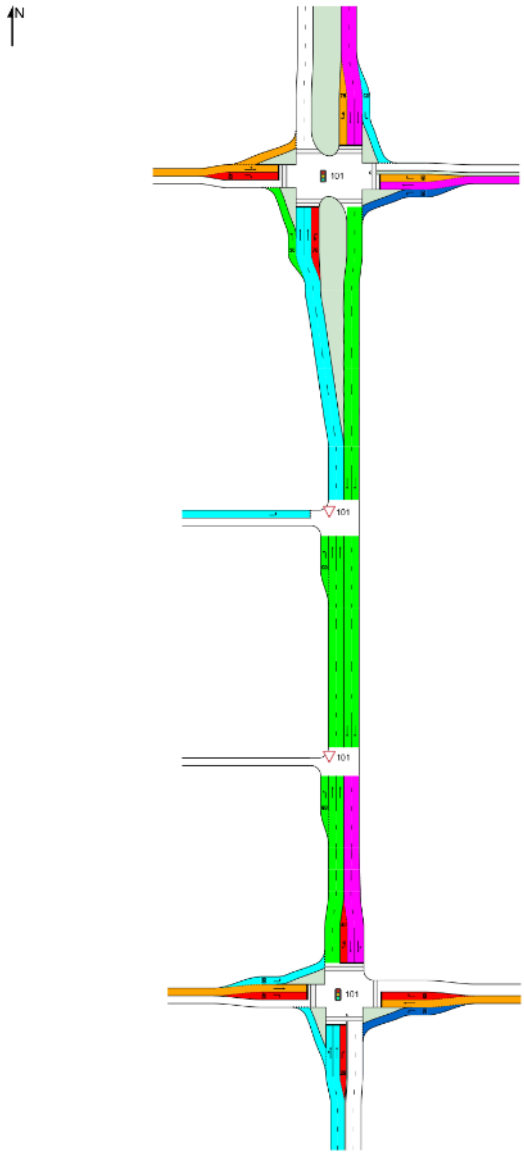
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Delay model settings are specified for individual Sites forming the Network.

LANE LEVEL OF SERVICE

Lane Level of Service for Network Sites

Network: N101 [2028 AM Peak Proposed]

New Network
Network Cycle Time = 140 seconds (Network Cycle Time - User-Given)



Colour code based on Level of Service

LOS A | LOS B | LOS C | LOS D | LOS E | LOS F

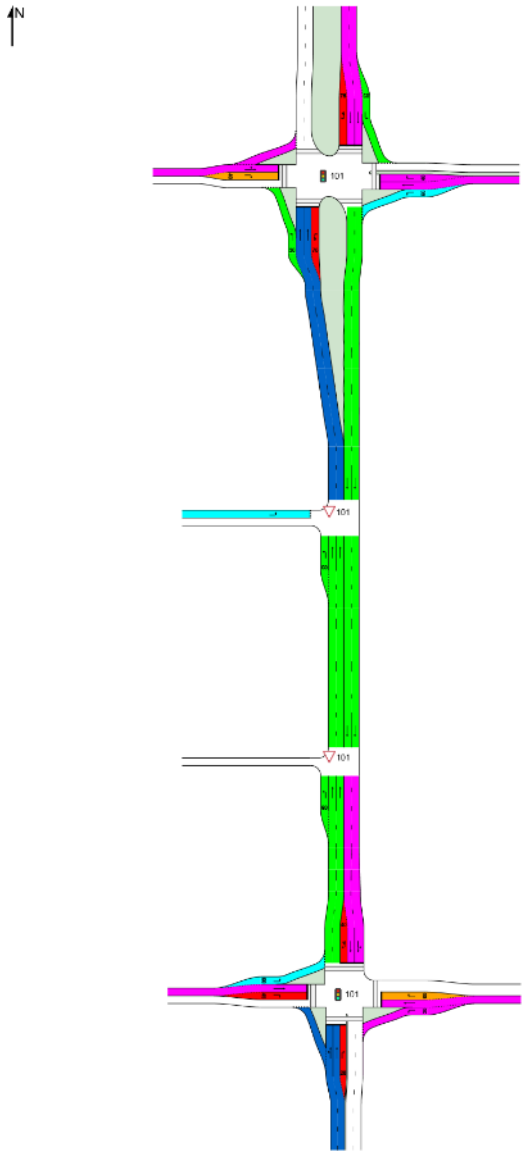
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Delay model settings are specified for individual Sites forming the Network.

LANE LEVEL OF SERVICE

Lane Level of Service for Network Sites

Network: N101 [2028 PM Peak Proposed]

New Network
Network Cycle Time = 140 seconds (Network Cycle Time - User-Given)



Colour code based on Level of Service

LOS A | LOS B | LOS C | LOS D | LOS E | LOS F

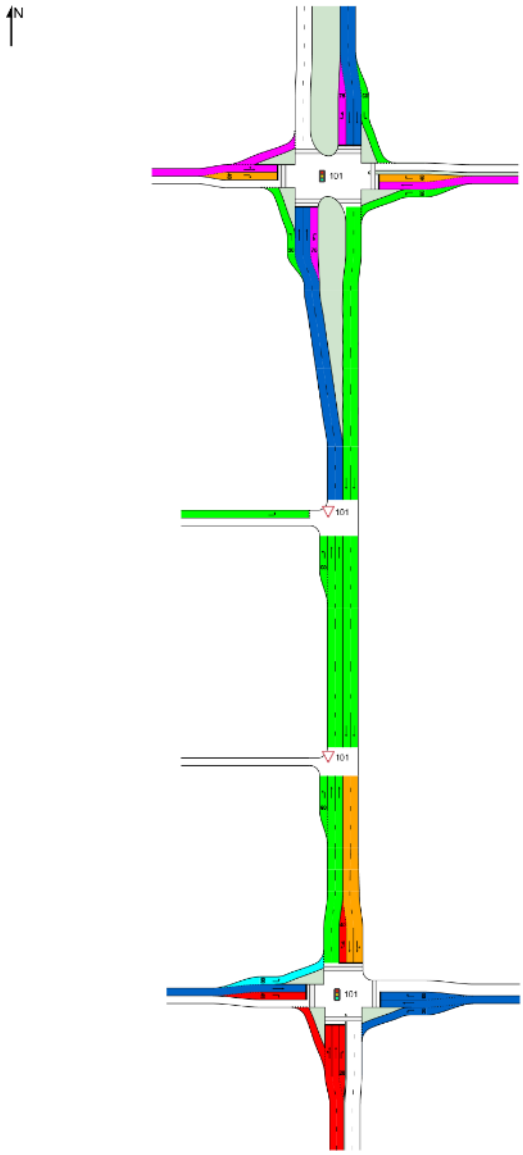
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Delay model settings are specified for individual Sites forming the Network.

LANE LEVEL OF SERVICE

Lane Level of Service for Network Sites

Network: N101 [2028 Sat Peak Proposed]

New Network
Network Cycle Time = 120 seconds (Network Cycle Time - User-Given)



Colour code based on Level of Service

LOS A | LOS B | LOS C | LOS D | LOS E | LOS F

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Delay model settings are specified for individual Sites forming the Network.

GHD

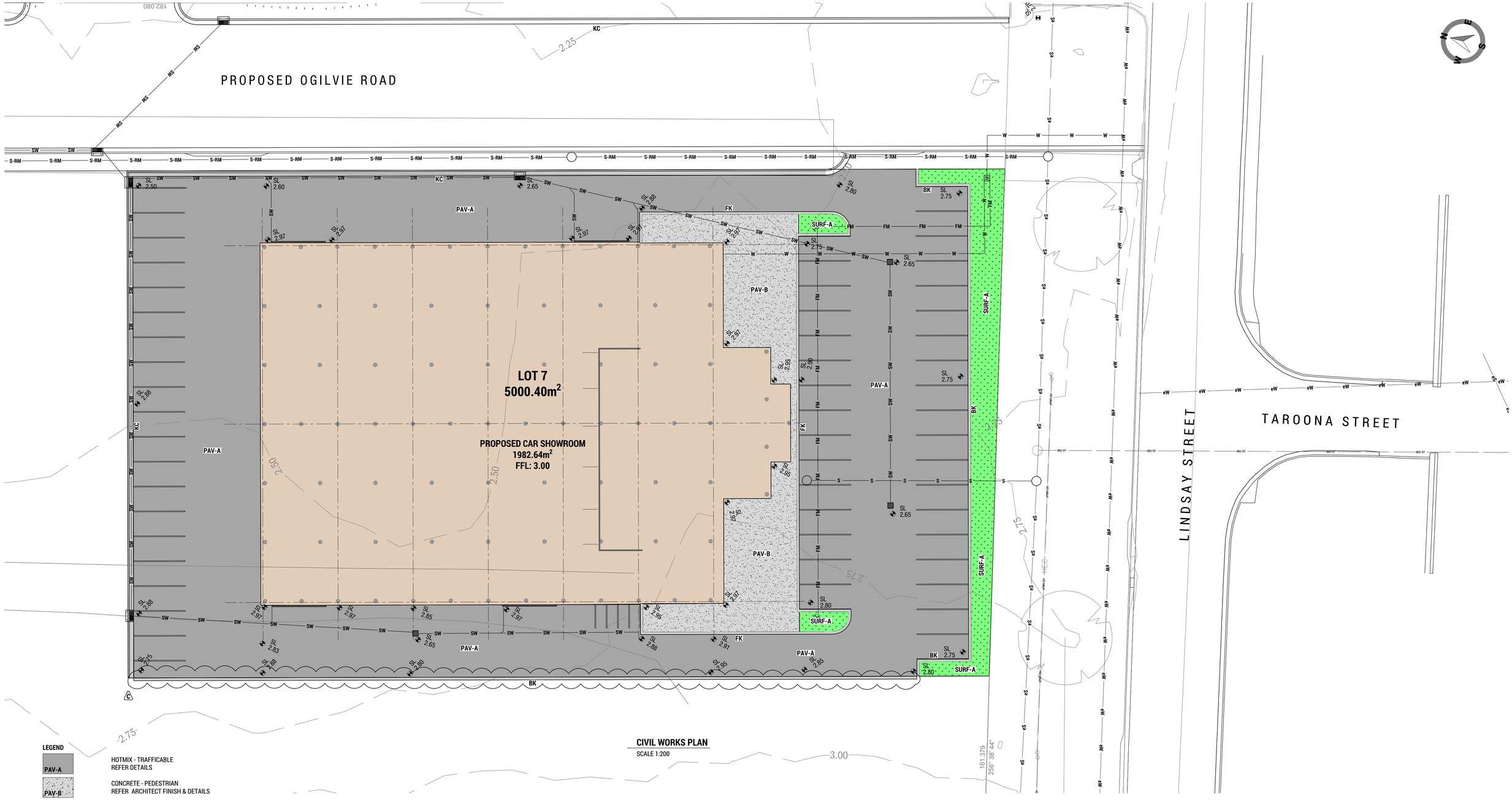
Level 8
180 Lonsdale Street
T: 61 3 8687 8000 F: 61 3 8687 8111 E: melmail@ghd.com

321860901-56328/https://projects.ghd.com/oc/Tasmania/goderichlindsaysited3/Delivery/Documents/3218609-REP_Goderich_Lindsay_St_TIA_June.docx

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
Rev 0	M. Petrusma	E. Jackson	On file	T. Bickerstaff	On file	20.10.17
Rev 1	M. Petrusma	E. Jackson	On file	T. Bickerstaff	On file	06.04.18
Rev 2	M. Petrusma	E. Jackson	On file	T. Bickerstaff	On file	13.04.18
Rev 3	M. Petrusma	E. Jackson		T. Bickerstaff		6.7.18

www.ghd.com



CIVIL WORKS PLAN
SCALE 1:200

LEGEND

PAV-A	HOTMIX - TRAFFICABLE REFER DETAILS
PAV-B	CONCRETE - PEDESTRIAN REFER ARCHITECT FINISH & DETAILS
SURF-A	GRASSED / TURFED / LANDSCAPED AREA REFER ARCH. SPEC. 200mm MIN GOOD QUALITY TOP SOIL
MH	MANHOLE
SEP	SIDE ENTRY PIT
GP	GRATED PIT
BK	BARRIER KERB
ME	MATCH EXISTING
SSL 2.54	EXISTING LEVEL
SL 3.00	DESIGN LEVEL

REV:	DESCRIPTION:	BY:	DATE:
C	BARRIER KERB ADDED	BG	07-08-18
B	BUILDING APPROVAL	NEM	26-07-18
A	ISSUED FOR TENDER	BG	28-06-18

STATUS:
CONTROLLED DOCUMENT
DO NOT SCALE - IF IN DOUBT, ASK
THIS DOCUMENT MAY ONLY BE USED FOR THE PURPOSE FOR WHICH IT WAS PREPARED. © RARE INNOVATION PTY LTD. ABN 51 619 598 257

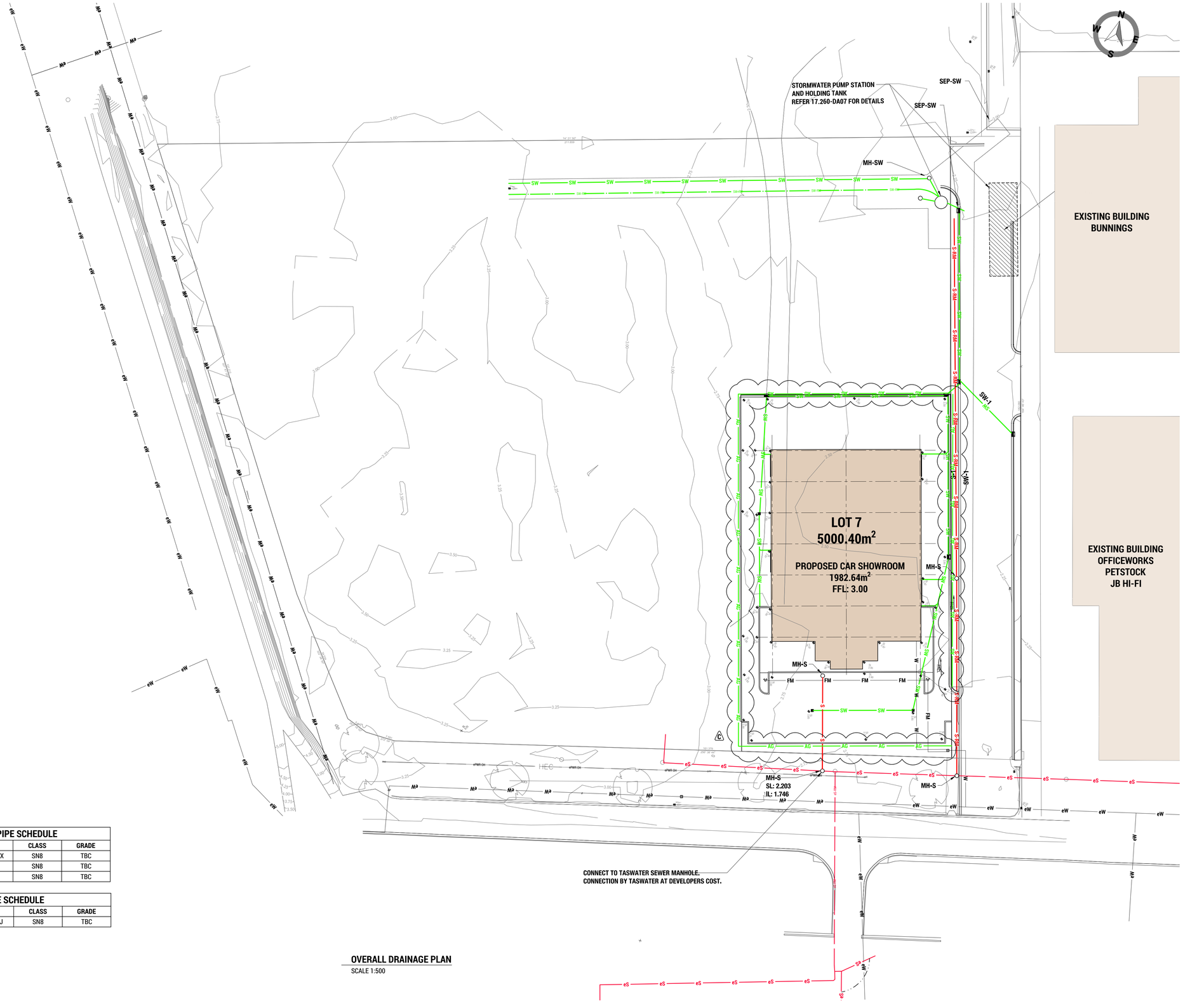
APPROVED: R.LEGGEDN | ACRED. No: CC5858A

DESIGN BY: RJ
DESIGN CHK: JTA
DRAWN BY: BG
DRAFT CHK: JTA
DATE: 28-06-18

rare.
Level 1a, 10-14 Paterson Street
Launceston TAS 7250
rarein.com.au
P. 03 6388 9200

CLIENT: KING WHARF DEVELOPMENTS PTY LTD
PROJECT: AUTOMOBILE MUSEUM
ADDRESS: LOT 4 LINDSAY STREET, LAUNCESTON

TITLE: CIVIL WORKS PLAN
SCALE: 1:200 SHEET SIZE: A1 DWGs IN SET: -
PROJECT No: 18012 DWG No: C401 REV: C



OVERALL DRAINAGE PLAN
SCALE 1:500

LEGEND

eSW eSW	DENOTES EXISTING STORM WATER MAIN (CONFIRM EXACT LOCATION)
SW SW	DENOTES PROPOSED STORMWATER MAIN
eS eS	DENOTES EXISTING SEWER MAIN (CONFIRM EXACT LOCATION)
S S	DENOTES PROPOSED SEWER MAIN
MH-S	SEWER MANHOLE
MH-SW	STORMWATER MANHOLE
SEP-SW	SIDE ENTRY PIT
GP-SW	GRATED PIT
eSL 2.54	EXISTING LEVEL
SL 3.00	DESIGN LEVEL

STORMWATER PIPE SCHEDULE

MARK	PIPE SIZE	TYPE	CLASS	GRADE
SW-1	Ø300	BLACKMAX	SN8	TBC
SW-2	Ø225	uPVC	SN8	TBC
SW-3	Ø150	uPVC	SN8	TBC

SEWER PIPE SCHEDULE

MARK	PIPE SIZE	TYPE	CLASS	GRADE
S-1	Ø150	uPVC RRJ	SN8	TBC

REV:	DESCRIPTION:	BY:	DATE:
C	AGG DRAIN BEHIND KERB ADDED	BG	07-08-18
B	BUILDING APPROVAL	NEM	26-07-18
A	ISSUED FOR TENDER	BG	28-06-18

STATUS: **CONTROLLED DOCUMENT**

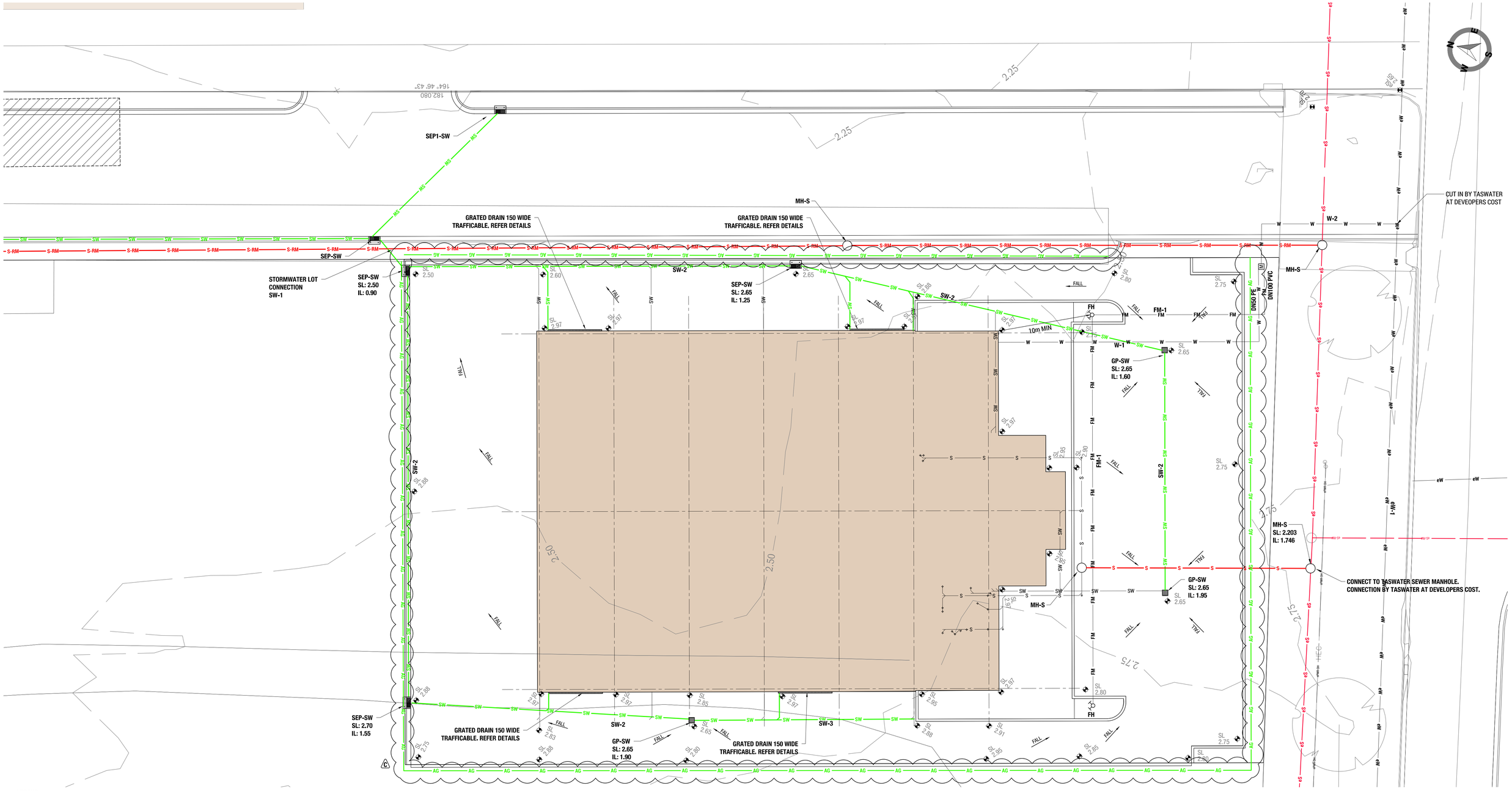
APPROVED: R. JESSON | ACRED. No: CC5848I

DESIGN BY: RJ
DESIGN CHK: JTA
DRAWN BY: BG
DRAFT CHK: JTA
DATE: 28-06-18

rare.
Level 1a, 10-14 Paterson Street
Launceston TAS 7250
rarein.com.au
P. 03 6388 9200

CLIENT: KING WHARF DEVELOPMENTS PTY LTD
PROJECT: AUTOMOBILE MUSEUM
ADDRESS: LOT 4 LINDSAY STREET, LAUNCESTON

TITLE: OVERALL DRAINAGE PLAN
SCALE: 1:500 SHEET SIZE: A1 DWGs IN SET: -
PROJECT No: 18012 DWG No: C501 REV: C



LEGEND

eSW — eSW	DENOTES EXISTING STORM WATER MAIN (CONFIRM EXACT LOCATION)
SW — SW	DENOTES PROPOSED STORMWATER MAIN
eS — eS	DENOTES EXISTING SEWER MAIN (CONFIRM EXACT LOCATION)
S — S	DENOTES PROPOSED SEWER MAIN
MH-S	SEWER MANHOLE
MH-SW	STORMWATER MANHOLE
SEP-SW	SIDE ENTRY PIT
GP-SW	GRATED PIT
eSL 2.54	EXISTING LEVEL
SL 3.00	DESIGN LEVEL

STORMWATER PIPE SCHEDULE

MARK	PIPE SIZE	TYPE	CLASS	GRADE
SW-1	Ø300	BLACKMAX	SN8	TBC
SW-2	Ø225	uPVC	SN8	TBC
SW-3	Ø150	uPVC	SN8	TBC

SEWER PIPE SCHEDULE

MARK	PIPE SIZE	TYPE	CLASS	GRADE
S-1	Ø150	uPVC RRJ	SN8	TBC

LOCAL DRAINAGE PLAN

SCALE 1:200

REV:	DESCRIPTION:	BY:	DATE:
C	AGG DRAIN BEHIND KERB ADDED	BG	07-08-18
B	BUILDING APPROVAL	NEM	26-07-18
A	ISSUED FOR TENDER	BG	28-06-18

STATUS: **CONTROLLED DOCUMENT**

DO NOT SCALE - IF IN DOUBT, ASK

APPROVED: R. JESSON | ACRED. No: CC5848I

DESIGN BY:	RJ
DESIGN CHK:	JTA
DRAWN BY:	BG
DRAFT CHK:	JTA
DATE:	28-06-18

rare.
Level 1a, 10-14 Paterson Street
Launceston TAS 7250
rarein.com.au
P. 03 6388 9200

CLIENT: KING WHARF DEVELOPMENTS PTY LTD

PROJECT: AUTOMOBILE MUSEUM

ADDRESS: LOT 4 LINDSAY STREET, LAUNCESTON

TITLE: LOCAL DRAINAGE PLAN

SCALE: 1:200 | SHEET SIZE: A1 | DWGs IN SET: -

PROJECT No: 18012 | DWG No: C502 | REV: C