

# Waurm Ponds Depot Development Project



## Concept of Operations Report June 2015

Prepared for Public Transport Victoria  
Raylink Consulting and John Hearsch Consulting Partnership

**Waurn Ponds (WPS) Depot Development Project**  
**Concept of Operations report**

**Table of Contents**

<b>Executive Summary</b> .....	3
<b>1. Purpose</b> .....	4
<b>2. Context – Geelong line passenger demand, operations, network and rolling stock considerations</b> .....	5
2.1 Passenger demand.....	5
2.2 Train operations.....	6
2.3 Network issues.....	7
2.4 Rolling stock fleet.....	9
2.5 Train stabling and servicing .....	10
2.6 Train maintenance – current arrangements.....	11
2.7 Train maintenance – proposed arrangements .....	11
2.8 Work practices.....	12
<b>3. Overall train processing, stabling, servicing and maintenance functional requirements</b> .....	13
3.1 Train processing requirements .....	13
3.2 Train stabling requirements.....	13
3.3 Train servicing requirements .....	14
3.4 Train maintenance requirements .....	16
3.5 Staff and training requirements.....	17
3.6 Other depot functions .....	17
<b>4. Development timelines</b> .....	18
<b>5. Site considerations</b> .....	19
5.1 Overall land requirements and site selection criteria.....	19
5.2 Location options .....	19
5.3 Preferred site .....	20
5.4 Site availability and acquisition.....	20
<b>6. Detailed site processes</b> .....	21
6.1 Overall process and workflow.....	21
6.2 Train arrival.....	21
6.3 Handover Point on arrival.....	21
6.4 Fuelling station .....	22
6.5 Automated train wash plant.....	22
6.6 Train stabling .....	22
6.7 Train movement from stabling siding to maintenance centre .....	22
6.8 Train movement from maintenance centre to stabling siding .....	23
6.9 Train movement from stabling siding to Handover Point .....	23
6.10 Handover Point pre-departure .....	23
6.11 Train departure .....	23

<b>7. Overall site concept, footprint and configuration .....</b>	<b>24</b>
<b>8. Stage 1a proposed high level project scope.....</b>	<b>26</b>
8.1 Stage 1a overview.....	26
8.2 Initial site development .....	26
8.3 Main line/depot interface.....	26
8.4 Initial track layout.....	27
8.5 Handover Point.....	27
8.6 Train stabling .....	27
8.7 Servicing facilities .....	27
8.8 Maintenance Centre .....	27
8.9 Ancillary facilities .....	28
8.10 Stage 1a preliminary indicative cost estimate.....	29
<b>9. Stage 1b – anticipated additional scope .....</b>	<b>30</b>
9.1 Stage 1b overview.....	30
9.2 Further site development .....	30
9.3 Main line/depot interface.....	30
9.4 Additional arrival/departure track.....	30
9.5 Handover Point.....	31
9.6 Train stabling .....	31
9.7 Servicing facilities .....	31
9.8 Maintenance facilities.....	31
9.9 Ancillary facilities .....	31
9.10 Stage 1b cost estimate .....	31
<b>10 Subsequent stages – potential additional scope .....</b>	<b>33</b>
10.1 Subsequent stages overview .....	33
<b>11 Recommended next steps .....</b>	<b>34</b>
<b>Appendix ‘A’ .....</b>	<b>35</b>
Summary of alternative train stabling and maintenance sites investigated at Waurm Ponds.....	35
<b>Appendix ‘B’ .....</b>	<b>36</b>
Indicative (pre-design) cost estimate for Stage 1a .....	36
<b>Appendix ‘C’ .....</b>	<b>37</b>
Stage 1a proposed track layout and site configuration .....	37
<b>Appendix ‘D’ .....</b>	<b>38</b>
Stages 1A and 1b proposed track layout and site configuration .....	38
<b>Appendix ‘E’ .....</b>	<b>39</b>
Proposed ultimate track layout and site configuration .....	39

## Executive Summary

Patronage on regional rail passenger services increased by an average of 93% across all lines between 2005/06 and 2013/14 with further substantial growth anticipated in coming years. In response, the fleet of VLocity Diesel Multiple Unit (DMU) carriages has been steadily increased from an initial 58 cars in early 2007 to 177 cars when an existing order is fulfilled in 2016. This will increase to 198 cars in 2017 after a further impending order for 21 cars is fulfilled. During the same period, only 10 old cars have been retired.

The progressive fleet increase has necessitated an ongoing increase in stabling facilities and has steadily increased the demand on train maintenance facilities. As a result, the existing maintenance facilities at West Melbourne and Ballarat East are already at capacity and a new facility is required to support the additional order for 21 cars and anticipated subsequent fleet increases. Previous studies have indicated the desirability of the new maintenance facility and additional stabling being located at Waurnd Ponds, some 16km south-west of Geelong on the main Melbourne-Warrnambool rail line.

This Concept of Operations (COO) report has been prepared as a basis for progressing development, design and implementation of the proposed Train Maintenance and Stabling Depot at Waurnd Ponds. The COO is intended to provide preliminary detail of the functional requirements to be met by the facility and a high level scope of the proposed first stage of the facility's development in the wider context of forecast demand and overall operation of the Geelong rail corridor.

Because this project is the intended first stage of a much more extensive facility on property yet to be acquired for this purpose, the COO also considers the longer term requirements to confirm that the land proposed for acquisition will meet these needs. Background information regarding a range of alternative sites that had been previously considered for acquisition is also included.

Staging timelines for the overall facility development are proposed with a view to ensuring that the initial development is a logical first step in the progression towards the more extensive development stages which will be needed as the Geelong line fleet expands and Geelong area train stabling and crew facilities are consolidated at Waurnd Ponds.

The report seeks to link passenger demand forecasts to future train operating requirements within the constraints of existing and proposed network infrastructure capacity. From this data, estimates have been made of the likely train fleet that would be stabled and maintained at Waurnd Ponds. This takes account of the need to retain maximum flexibility given the range of possible technology options for future rolling stock.

The COO establishes requirements for overall train processing, stabling, servicing and maintenance functions at Waurnd Ponds together with additional requirements for accommodating staff and related facilities. Detailed site processes, train movements and workflows within the Depot site are then described and combined with functional and capacity requirements to produce an ultimate track layout and site configuration concept.

Two initial development stages are then proposed from which high level project scopes have been derived and detailed. A preliminary cost estimate is provided for the proposed initial development stage.

Finally, a series of next steps are recommended for progression towards a first stage project implementation.

## **1. Purpose**

This Concept of Operations (COO) document has been prepared as a basis for progressing development, design and implementation of a proposed Train Maintenance and Stabling Facility at Waurnd Ponds, some 16km south-west of Geelong on the main Melbourne-Warrnambool rail line.

The COO is intended to provide preliminary detail of the functional requirements to be met by the facility and a high level scope of the proposed first stage of the facility's development in the wider context of the overall operation of the Geelong rail corridor. This includes issues surrounding the forecast demand for rail services on the Geelong corridor, possible responses to the emerging demand and rail network capacity, particularly in the Geelong – Waurnd Ponds area.

Because this project is the intended first stage of a much more extensive facility on property which is yet to be acquired for this purpose, the COO also considers the longer term requirements for development of the facility with a view to ensuring that the land to be acquired will meet these needs.

The COO also seeks to ensure, as far as is reasonably practicable, that the first stage development will be compatible with subsequent stages which are likely to be progressively implemented to handle the expected procurement of a dedicated Geelong line passenger train fleet, sufficient in quantity and suitable for accommodating projected demand on the Geelong corridor over the coming years.

## 2. Context – Geelong line passenger demand, operations, network and rolling stock considerations

### 2.1 Passenger demand

The Melbourne-Geelong corridor is the busiest of the five principal corridors radiating from Melbourne that comprise the V/Line regional passenger network. Its commuting (InterUrban) zone extends 85km from Southern Cross station to Waurin Ponds, with the latter opened in October 2014 as an extension of the previous commuter zone terminus at Marshall. Beyond Waurin Ponds, the corridor continues to Warrnambool, 267km from Melbourne.

Patronage growth on the Geelong corridor has been consistently strong with aggregate growth of 18.9% over the five year period 2009/10 to 2013/14 inclusive and a record 4.02 million boardings recorded in the 2013/14 financial year notwithstanding various service interruptions during this and the preceding two years due to major works associated with construction of the Regional Rail Link (RRL) project.

With the final stage of the Regional Rail Link corridor via the new stations at Tarneit and Wyndham Vale (29km and 40km respectively from Melbourne via Sunshine) opening in June 2015 coupled with a considerable increase in both weekday peak and off-peak service frequencies, it is expected that a considerable increase in passenger patronage will occur almost immediately coupled with ongoing significant growth thereafter.

The anticipated ongoing patronage growth is being driven by a combination of strong population growth in the Geelong and Wyndham regions coupled with commuting pressures from the growing disconnect between employment and residence location in both areas and ever increasing road congestion. The majority of this growth is occurring in areas directly serviced by the existing Geelong rail corridor stations and others that are planned to be added to the RRL section of line in the Wyndham area.

Official population projections for the Geelong Region<sup>1</sup> and the City of Wyndham to 2031 are as shown below:

Region	2011 (actual)	2021	2031
Geelong	266,400	307,300	355,300
Wyndham	166,700	274,800	367,500
<b>Total</b>	<b>433,100</b>	<b>582,100</b>	<b>722,800</b>

By 2051 (well within the expected economic life of the Waurin Ponds facility), Geelong's projected population will be around 456,000 and the combined Geelong and Wyndham Regions population is expected to be substantially in excess of one million.

Current PTV patronage projections for boardings on the Geelong line corridor<sup>2</sup> during the two-hour AM peak period (defined as arrivals in Melbourne between 7am and 9am) are as shown in the following table:

Region	2016	2021	2026	2031	2041	2051
Geelong	3,380	4,218	4,830	5,531	6,332	7,249
Wyndham Vale	2,897	5,366	9,122	15,505	16,298	17,132
<b>Total</b>	<b>6,277</b>	<b>9,584</b>	<b>13,952</b>	<b>21,036</b>	<b>22,630</b>	<b>24,381</b>

The relevant data for the present exercise are for the years 2016 through to 2031, with forecasts for subsequent years essentially being relatively low growth extrapolations. The obvious observation is the anticipated extremely rapid growth in patronage from the Wyndham Vale area to the point where it is expected to be almost three times Geelong area demand by 2031.

<sup>1</sup> Refer to "Victoria in Future 2014 - Population and Household Projections to 2051", Department of Transport, Planning and Local Infrastructure, May 2014. These projections cover the majority of the defined G21 Region Alliance area comprising the City of Greater Geelong, Borough of Queenscliffe, Surf Coast Shire and Colac Otway Shire areas.

<sup>2</sup> Projections for the Geelong Region cover stations Little River to Waurin Ponds, inclusive. Those for Wyndham Vale cover it and Tarneit stations, together with several planned new stations on the RRL line section between Manor Junction and Deer Park Junction.

## 2.2 Train operations

From 21 June 2015, all Geelong line passenger services use the recently constructed RRL alignment and operate via Sunshine, Deer Park Junction, Wyndham Vale and Manor Junction and no longer need to be dovetailed with Metro suburban services between South Kensington, Newport and Werribee. The Geelong line services also interact with Ballarat line services between Southern Cross and Deer Park Junction and with Bendigo line services between Southern Cross and Sunshine.

Commuter zone (InterUrban) AM peak services variously originate from stabling at Geelong or in Melbourne to commence from Waurin Ponds, Marshall, South Geelong or Geelong according to available track capacity on the single line sections beyond Geelong. In addition, four AM peak “short starter” services operate from Southern Cross to Wyndham Vale and return. A maximum of nine services arrive at Southern Cross from the Geelong corridor during the busiest hour, comprising six from Geelong and three “short starter” services originating from Wyndham Vale.

Weekday Geelong line off-peak services now operate at approximately 20 minute intervals with alternate stopping and semi-express services, terminating at South Geelong and Waurin Ponds respectively.

PM peak services variously terminate at Geelong, South Geelong, Marshall and Waurin Ponds and stable overnight in Geelong or Melbourne. A maximum of nine services now depart Southern Cross for the Geelong corridor during the busiest hour in the afternoon peak. Of these, seven operate to Geelong or beyond and two to Wyndham Vale.

Beyond Waurin Ponds to Warrnambool, the corridor carries three daily return InterCity passenger services on weekdays which generally operate between Southern Cross and Waurin Ponds outside of peak hours. One freight train also operates between Melbourne and Warrnambool via Werribee in each direction on weekdays, together with one or more daily local freight train movements to and from North Geelong Yard which service the Blue Circle Cement Company’s Waurin Ponds plant located some 3km beyond Waurin Ponds station. One of these movements continues from North Geelong Yard to Somerton and return on weekdays via Werribee, Brooklyn Sunshine and Albion.

As the necessary additional rolling stock becomes available, it is planned to operate up to twelve trains per hour on the Geelong corridor during AM and PM peak periods, generally with six per hour from or to Geelong or beyond and six per hour to and from Wyndham Vale. These will ultimately dovetail with up to three trains per hour on each of the Ballarat and Bendigo corridors<sup>3</sup>, at which stage the RRL tracks between Southern Cross and Sunshine will be operating at around 90% of their practical capacity.

Based on the projected demand estimates, six trains per hour (each comprising 6 VL cars or similar with average capacity of 444) will meet Geelong Region demand until at least 2026<sup>4</sup> while new trains with capacity of around 700 seats procured progressively from the early 2020s would accommodate projected Geelong Region demand until at least 2041 and possibly for the full economic life (around 35 years) of such vehicles.

However, Wyndham Vale area demand projections are such that a further 6 trains per hour of 444 seat capacity originating at Wyndham Vale would on average be loaded during peak hours to over 100% of capacity by 2021. Using trains of similar capacity, at 100% seat utilisation, the Wyndham Vale area alone would require 11 trains per hour in 2026 and up to 18 trains per hour by 2031. Both of the latter scenarios, taken in combination with Geelong, Ballarat and Bendigo line services, would substantially exceed the practical capacity of the RRL corridor between Southern Cross and Deer Park Junction.

This suggests a need for much higher capacity trains such as the proposed new generation metropolitan trains (HCMTs) to service the Wyndham Vale area by around 2026, or preferably earlier, whether via an electrified RRL corridor or via the proposed extension from Werribee, or both.

---

<sup>3</sup> These numbers represent the expected situation following electrification to Melton. Prior to that, an additional 3-4 trains per hour from/to Melton or Bacchus Marsh will also operate on the RRL and Ballarat corridors during peak periods, thus effectively constraining available capacity from Geelong and the Wyndham Vale areas to 10 or 11 trains in the busiest hour.

<sup>4</sup> This assessment is only valid if passengers from the Wyndham Vale area are no longer carried to and from the CBD and intermediate stations on Geelong trains.

## 2.3 Network issues

Completion of the RRL project provides the Geelong corridor with a dedicated double track infrastructure between Wyndham Vale and Geelong which should provide ample capacity to meet Geelong Region rail travel demand for the foreseeable future. Between Deer Park Junction and the Wyndham Vale area, the RRL double track should also provide sufficient capacity for around a decade with the likely inhibitors being provision of additional stations on this line section and consequent disparity in running times between stopping and express services. Medium term, additional tracks forming long passing loops for overtaking purposes will probably be required on the RRL line between Deer Park Junction and Wyndham Vale to address this issue.

As indicated above, interaction with Ballarat and Bendigo line services inbound from Deer Park Junction and Sunshine respectively will constrain peak period capacity in the medium term between Wyndham Vale and Deer Park Junction to around 10-11 trains per hour pre-Melton electrification and to 12 trains per hour (or perhaps slightly more) after the Sunshine-Melton line section is electrified and Melton services migrate to separate suburban tracks between Deer Park Junction and Southern Cross. Given expected demand, the response to this constraint will be the need to progressively operate higher capacity and longer trains on the Geelong corridor and especially between the CBD and the Wyndham Vale area.

The single line sections in the 12km distance between Geelong and Waurnd Ponds already act as a constraint to service delivery, both in terms of corridor capacity and in provision of consistently reliable service. There are presently no train crossing facilities at South Geelong as it has a single platform and two sidings that can only be used for short term stabling or locomotive run-arounds. Marshall has a very short (217 metre) crossing loop and single platform on the main running line. Waurnd Ponds has a single platform on the main running line and a single dead-ended 380 metre holding siding some 2km beyond Waurnd Ponds station. This is used to hold empty trains (up to 2 x 6-car VLocity consists) brought from stabling at Geelong prior to commencing AM peak services and to refuge off-peak trains to allow the passage of Warrnambool InterCity services.

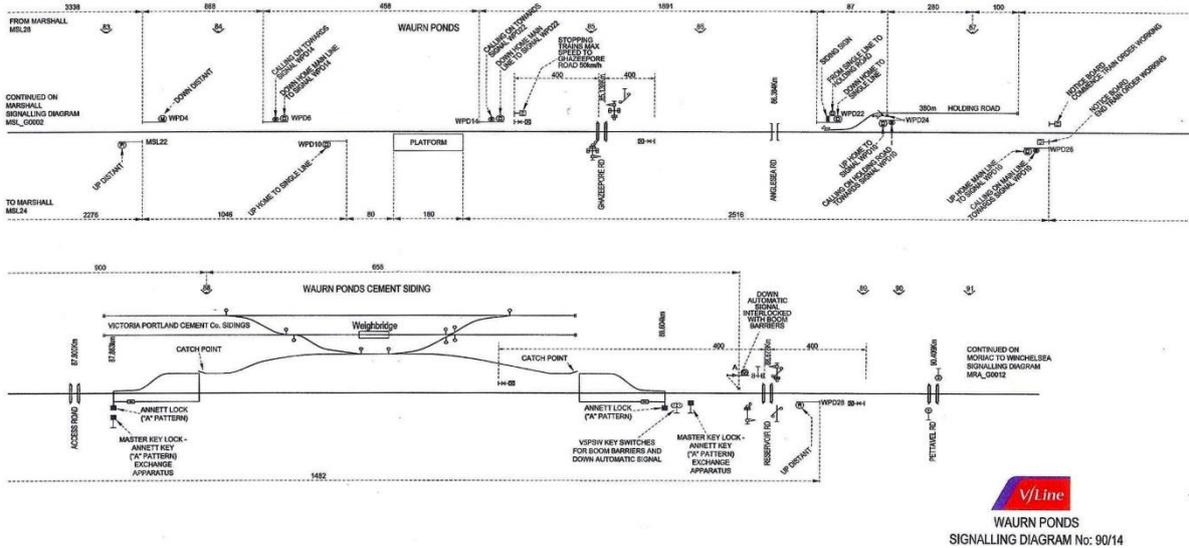


Waurnd Ponds station – platform on the single main line



Holding siding some 2km beyond Waurnd Ponds station

The current signalling and safeworking arrangements between Geelong and Waurnd Ponds are also fairly basic with the Track Block system of safeworking in force as far as the Waurnd Ponds holding siding and Train Order working in force beyond that point. Track Block and Train Order safeworking systems effectively mimic the old systems of token-based safeworking in that they only permit one train to occupy each single line section at a time and do not allow for follow-on movements except under very restrictive conditions. In this area, the single line sections are presently defined as between the respective stations at Geelong, South Geelong, Marshall, Waurnd Ponds and Moriac Block Point location. An operative cement siding located between Waurnd Ponds station and the future Waurnd Ponds maintenance and stabling facility adds to the operational complications in this area.



Current track and signalling arrangements at Waurnd Ponds



Reservoir Road level crossing and Waurnd Ponds cement siding in background

The following table provides references by the relevant rail chainage distances between Geelong and the Moriac Block Point:

Rail chainage	Location
72.567	Geelong Station
74.412	South Geelong Station
79.600	Marshall Station
84.902	Waurnd Ponds Station
85.138	Ghazeepore Road level crossing
86.638	Waurnd Ponds Holding Siding
87.238	Start of Train Order working
88.271	Waurnd Ponds Cement Siding
88.678	Reservoir Road level crossing
88.730	Potential entry to new Depot
89.735	Occupation crossing (to be closed)
90.409	Pettavel Road level crossing
90.587	Former Pettavel Station site
98.000	Moriac Block Point

The advent of a first stage maintenance and stabling facility at Waurnd Ponds will considerably add to the need for capacity enhancement between Geelong and Waurnd Ponds by virtue of a single line operation, effectively lengthened to more than 16km. It will also be needed to “fleet” trains from and to the facility in order to

commence early morning services and to progressively wind services down during late afternoons and evenings.

Therefore, short term improvement to services between Geelong and Waurnd Ponds, particularly peak services, and to provide a robust operation capable of consistently meeting much more demanding reliability targets will require infrastructure enhancement in this line section, both in relation to track and signalling. Ultimately, the line from Geelong to Waurnd Ponds will require full duplication with the probable exception of the short tunnel and 1.8km section between Geelong and South Geelong.

## 2.4 Rolling stock fleet

In recent years, rail passenger operations on the Geelong corridor have been increasingly dominated by VLocity (VL) diesel multiple units (DMU's) operating in various combinations of between 3 and 7 cars. By late 2016, all VLs will be standardised into 59 x 3-car sets (177 vehicles) so that all services will normally operate as either 3-car or 6-car consists. A further 21 VL cars (7 x 3-car sets) will shortly be ordered for expected delivery during 2017, thus bringing the total VL fleet to 66 x 3-car sets or a total of 198 powered vehicles.

During peak and shoulder peak periods other services are operated with Sprinter DMU's with up to 5-car consists and locomotive-hauled N/Z type carriages in either 4 or 5-car consists. Warrnambool InterCity services are also operated with the same loco-hauled N/Z carriage consists.

In the context of ongoing forecast significant increases in Geelong line travel demand, it has become increasingly apparent that VLocity DMUs will become less than ideal vehicles for the operation of Geelong services, primarily because of their inadequate capacity of 222 seats per 3-car set (444 seats per 6-car consist) and limited space for standees. With all VL vehicles powered, they also have relatively high capital and operating costs when considered on a per seat basis by comparison with other potential rolling stock options<sup>5</sup> suited to average journey times of less than one hour and maximum journey times that rarely exceed 80 minutes under normal conditions.

However, the VL fleet has proved very suitable and popular with customers for somewhat longer trips of around 2 to 2½ hours duration, typified by services on the Ballarat, Bendigo and Traralgon corridors, limited service extensions to Ararat, Maryborough and Echuca and potentially to other middle distance destinations such as Colac, Shepparton or Sale. All of these corridors also show substantial ongoing patronage growth potential thus providing the opportunity over time to progressively cascade that portion of the VL fleet currently committed to Geelong line operations to accommodate demand growth on other lines.

For these reasons, the intention is to evaluate the option of acquiring a dedicated Geelong line passenger fleet as an alternative to further VLocity procurement, possibly after the planned fleet of 198 VL vehicles is fully operational in 2018, or subsequently. A preliminary business case for a new Geelong line fleet would need to be submitted later in 2015 if initial funding was to be available to commence the procurement process during 2016/17. Even so, given the likely lead times involved in specifying, tendering, contracting, constructing and successfully commissioning a completely new train type, it is most unlikely that a supply contract would be in place before late 2017 or early 2018 or that a useful fleet of such trains would be available for revenue operation much before the mid-2020s.

A related factor is the consideration of options for partial or complete Geelong line electrification and/or continued diesel operation for at least the medium term. Any new rolling stock acquired during the 2020s would be expected to have an economic and physical life of at least 35 years which almost certainly suggests their likely continued operation beyond 2050. For comparison, the oldest VL sets have already been in service for 10 years, the Sprinter DMU fleet for over 20 years, the N class locomotives and N type carriages for

---

<sup>5</sup> Most overseas railways use a "rule of thumb" that Diesel Multiple Units (DMUs) consists comprising five or more powered cars are generally more costly to acquire and operate than locomotive-hauled consists of conventional unpowered cars with equivalent capacity.

between 29 and 35 years and by 2016 some of the Z type carriages used on the same trains will have operated continuously for 60 years. The H type carriages currently used on some peak period services to Wyndham Vale are between 44 and 59 years old, having been converted from Harris suburban carriages in the 1980's.

Because the short to medium term prospects for full Geelong line electrification are uncertain at best and probably unaffordable by government in the short term given numerous other pressing priorities, as are uncertainties around other potential rail traction technologies (such as hybrid systems), any new Geelong line fleet should be capable of adaptation to an alternative traction technology should this prove warranted in future. The same principle should therefore apply to facilities provided for the servicing and maintenance of a dedicated Geelong line fleet.

Inextricably linked to the traction power options for a dedicated Geelong line fleet, include the questions of overall train length, vehicle configuration, external dimensions and equipment positioning. At this stage in advance of preparation of specifications for these and other relevant parameters, the task for this COO is to ensure that the specified requirements and scope for both the initial and potential ultimate development of the Waurnd Ponds facility are kept as neutral as possible in the context of these parameters. This will require the depot design to preserve options for accommodating a wide range of future motive power and rolling stock types, including the possibility of double deck and/or articulated carriages, reversion to locomotive haulage and/or AC or DC electrification.

Although the characteristics of a dedicated Geelong line passenger fleet are yet to be determined, an approximate fleet size assessment is necessary to dimension the maximum required footprint for an ultimate facility at Waurnd Ponds. For this purpose, an initial assessment has been made based on the peak period service frequencies indicated previously, i.e. a maximum of 6 services per hour from or to Geelong or beyond and at least a further six per hour to and from Wyndham Vale, noting the previous indication that services from the Wyndham Vale area are likely to require much greater capacity than those from the Geelong Region.

If the fleet is only to service the Geelong Region, it is estimated that approximately 18 train sets of around 700 seat capacity would be needed. If it is to also service the Wyndham Vale area, at least an additional 9 train sets would be needed, making a minimum total fleet of 27 train sets, with each having capacity for around 1,000 passengers. As such, the Waurnd Ponds facility will need a footprint and potential ultimate track layout capable of accommodating trains of up to 240 metres in length.

## **2.5 Train stabling and servicing**

For those Geelong line trains that are held and serviced overnight in the Geelong area, two facilities are presently used for that purpose, one being the Geelong Passenger Yard comprising several tracks immediately to the west of Geelong station and the other being in the Geelong Locomotive Depot area in Pakington Street, Geelong West. These facilities currently provide practical capacity for at least 35 cars on 6 tracks and 48 cars on 7 tracks respectively.

Train servicing requirements presently undertaken at Geelong generally comprise fuelling of VL sets and N class locos at the Geelong Loco Depot, toilet extraction and water replenishment of all loco-hauled carriages, Sprinters and VL sets at both locations and internal cleaning of all vehicles (other than locomotive cabs) by contractors at both locations. A carriage wash plant is located in the northern portion of the Geelong Passenger yard which is presently only used to wash loco-hauled carriages. To facilitate this, a Y class shunting locomotive and spacer wagon is used to propel the carriage consists through the wash plant. Industrial bans have been in place for some time which prevent washing of any DMUs (Sprinters or VLs) at this wash plant.

By 2018 when delivery of the additional 21 VL cars should be completed, stabling (and therefore servicing) requirements will slightly increase given the current intention to deploy 12 of these cars on the Geelong

corridor<sup>6</sup>, however this is expected to be partly offset by the replacement of two loco-hauled 4-car consists. Unless further VL cars are to be procured in addition to the 21 cars, these requirements are likely to then remain unchanged until the first deliveries of a dedicated Geelong line passenger fleet during the early 2020s.

As described above, basic parameters for the design of a new Geelong line passenger fleet are yet to be developed at the time of preparing this COO, hence the need to maintain maximum practical neutrality in terms of any facility requirements or location that might vary according to the type of train and technologies that are subsequently determined. However, a footprint has to be determined now in relation to several basics including ultimate maximum train length (now assessed as a maximum of 240 metres), numbers of stabling sidings and maintenance tracks. The required number of stabling sidings is discussed in a subsequent section.

## **2.6 Train maintenance – current arrangements**

Normally, no train maintenance functions are currently undertaken in the Geelong area. Routine maintenance, including most component change-outs and scheduled examinations for the VLocity fleet are shared between the Ballarat East depot and the West Melbourne Carriage Maintenance depot. All routine maintenance on the Sprinter DMU fleet and all broad gauge loco-hauled carriages are also normally undertaken at West Melbourne. The V/Line locomotive fleet is routinely maintained at the South Dynon Locomotive Maintenance depot (operated by Downer EDI), with minor reactive work also performed at West Melbourne. Locomotive overhauls are also undertaken at South Dynon.

More substantial work such as major overhauls, heavy component change-outs and substantial body repairs or major modifications for the VL fleet are normally undertaken at Bombardier's Dandenong plant. Similar work on the Sprinter fleet is either undertaken at the former Bendigo North Workshops (operated by SSR) or at Newport Workshops (operated by Downer EDI). Major overhauls or modifications to the loco-hauled carriage fleet are also undertaken at Newport.

## **2.7 Train maintenance – proposed arrangements**

An important context for the Waurnd Ponds project is that, with the considerably expanded and well utilised VL fleet that will comprise 198 powered vehicles by 2018, the combined maintenance capacities of Ballarat East and West Melbourne will be exceeded once the current contract for 43 additional VL cars has been completed in late 2016. It is therefore proposed to develop Waurnd Ponds as an additional facility for VL fleet maintenance, with a view to it sharing the routine VL maintenance workload with Ballarat East on an approximate 50:50 basis. West Melbourne's role in VL fleet maintenance will then be limited to short term reactive work requiring urgent attention at the Melbourne end. The West Melbourne facility will then be essentially dedicated to providing routine maintenance support for the Sprinter DMU and loco-hauled carriage fleets, work which it is best equipped to handle.

With the advent of a dedicated Geelong line passenger fleet from the early 2020s, the VL fleet would be progressively cascaded to other lines and the Waurnd Ponds maintenance facility will need to be adjusted and expanded to become the "home" of the new fleet. The ultimate size of that fleet will be a key issue for assessing the required footprint of the fully expanded Waurnd Ponds maintenance facility, an issue that largely revolves around the question of whether and for what period travel demand from the Wyndham Vale/Tarneit area (including additional stations that are planned there) will continue to be met by Geelong/Waurnd Ponds services or whether, at a later stage, it will be separately served by an electrified suburban service.

---

<sup>6</sup> A further three of the additional cars are planned for deployment on each of the Bendigo and Traralgon corridors with a further three being added to the maintenance pool.

As previously noted, and irrespective of the ultimate size of the dedicated Geelong line passenger fleet, the facilities to be provided at Waurm Ponds will be designed to be as neutral as possible in terms of the technology and configuration options that might be selected in future for that fleet. These could include diesel, electric or even dual power or some form of hybrid traction systems. Train configurations could include divisible or non-divisible multiple units with all powered or some unpowered vehicles or locomotive power in push-pull formation with motive power at each end (like XPT sets) or at one end only a separate driving trailer position. At this stage, it is simply noted that options involving locomotives will require different (or additional) maintenance facilities by comparison with those needed for DMU or EMU equipment or for non-powered vehicles. Such facilities are discussed later in this report.

The final issue is that by around the mid-2020s, the cascaded VL fleet is likely to drive the need for a further new maintenance facility at another location, requirements for which can be determined at a future time.

## **2.8 Work practices**

Being a greenfield site of generous proportions, a new Waurm Ponds facility offers the opportunity to implement “best practice” logistics and working arrangements and therefore substantially improve on the efficiency and productivity of maintenance and stabling processes at other locations, most of which face difficult site constraints and consequential lack of clear delineation between operational and maintenance accountabilities.

At Waurm Ponds, it will be possible to establish a defined handover point for arriving trains at which train crews would stop and handover to depot staff together with advice of any issues requiring their attention. From that point, depot staff would handle all subsequent processes and vehicle movements within the defined depot operational area.

Conversely, for departing trains, depot staff would position the required consist at the defined handover point at a stipulated time together with appropriate certification that the train has been fully serviced and is ready to enter traffic. Train crews would step on board, undertake basic checks from the driving position and depart the facility following signal clearance.

### 3. Overall train processing, stabling, servicing and maintenance functional requirements

#### 3.1 Train processing requirements

Given the opportunity to design and operate the Waurn Ponds facility in accordance with recognised best practice, the proposed facility will require a layout which will facilitate the routine processing of all trains, from time of arrival into the depot precinct until departure for re-entry to revenue service, through a logical, sequential process that ensures clear accountability between operational and maintenance functions and staff performing those functions.

Most importantly, as described in Section 2.7 above, the proposed process involves a formal handover from train crew to depot staff at a defined location immediately upon entry from the main running line. This process would be reversed at the same location shortly prior to departure from the depot precinct towards the main running line.

Following handover of a recently arrived train, depot staff would undertake a series progression of the train through defined processes for fuelling, external wash and stabling. A reverse movement would then occur from stabling to maintenance (if scheduled or otherwise required) and vice versa following completion of all required processes within the maintenance facility.

At a stipulated time, depot staff would then move each train from stabling to the defined handover point where train crew would again assume responsibility for the train's operation once in receipt of formal certification from depot staff that the train is roadworthy and safe to operate on main running lines.

#### 3.2 Train stabling requirements

The generalised train stabling requirements at Waurn Ponds will be similar to that which is applicable at other train stabling locations, i.e. dedicated sidings normally used only for stabling purposes, site security, high intensity lighting, appropriate access for maintenance and internal cleaning staff and in-ground services provided for toilet extraction and water replenishment.

From commencement of the June 2015 timetable, 12 trains are stabled in the Geelong area, as follows:

- At the Geelong Passenger yard – 2 x 5-car N sets + locos, 2 x 4-car N sets + locos, 1 x 5 Sprinters = total of 23 cars + 4 locos
- At the Geelong Loco Depot - 1 x 3-car VL, 1 x 4-car VL, 2 x 5-car VL and 3 x 6-car VL = total of 35 cars.

Therefore the present overall requirement for Geelong stabling is to accommodate 58 cars and 4 locos.

Following anticipated delivery of 21 additional cars by 2018, there will still be a requirement for overnight stabling of 12 trains in the Geelong area but with the following altered consists:

- 2 x 5-car N sets + locos = 10 cars + 2 locos
- 1 x 5 Sprinters = 5 cars
- 1 x 3-car VL and 8 x 6-car VL = 51 cars

Therefore, by 2018 through to commencement of delivery of the dedicated Geelong line passenger fleet (assumed for the early 2020s), the overall requirement for Geelong stabling will be for 66 cars and 2 locos.

The short term (from 2018) requirement for stabling at Waurn Ponds should therefore be based on the assumed maximum practical utilisation of the recently upgraded Geelong Loco Depot facility and adoption of one of the following three options:

- Base Case – continuing to use the existing Geelong Passenger Yard to the extent necessary and deferring the introduction of stabling (as distinct from accommodating the maintenance pool) at Waurn Ponds to a later date; or

- Option 1 - continuing to use the existing Geelong Passenger Yard on a limited basis and moving the residual VL stabling requirement to Waurnd Ponds; or
- Option 2 - vacating the Geelong Passenger Yard, moving the two loco-hauled consists to the Geelong Loco Depot facility and moving the increased residual VL stabling requirement to Waurnd Ponds.

These options would involve the following stabling arrangements:

- Base Case
  - Geelong Loco Depot – 1 x 3-car VL and 7 x 6-car VLs = 45 cars
  - Geelong Passenger Yard – 2 x 5-car N sets + locos, 5 Sprinters and 1 x 6-car VL = 21 cars + 2 locos
  - Waurnd Ponds – nil except for maintenance pool (assume 3 x 3-car VLs) = 9 cars
- Option 1
  - Geelong Loco Depot – 1 x 3-car VL and 7 x 6-car VLs = 45 cars
  - Geelong Passenger Yard – 2 x 5-car N sets + locos and 5 Sprinters = 15 cars + 2 locos
  - Waurnd Ponds – 1 x 6-car VL plus part VL maintenance pool (assume 3 x 3-car VLs) = 15 cars
- Option 2
  - Geelong Loco Depot – 2 x 5-car N sets + locos, 1 x 3-car VL and 5 x 6-car VLs = 43 cars + 2 locos
  - Geelong Passenger Yard – nil
  - Waurnd Ponds – 1 x 5 Sprinters and 3 x 6-car VLs plus part VL maintenance pool (assume 3 x 3-car VLs) = 32 cars

The Base Case would not initially require stabling sidings at Waurnd Ponds but would require suitable access to the proposed maintenance facility. Option 1 would initially require 3 stabling tracks; Option 2 would initially require 6 stabling tracks at Waurnd Ponds – in each the actual requirement for overnight stabling plus two additional tracks to facilitate movement of vehicles between stabling and maintenance facilities.

Medium term, procurement of a dedicated Geelong line passenger fleet providing services and meeting projected demand at the levels previously described is likely to require a fleet of approximately 18 train sets to only service the Geelong Region or at least 27 train sets if the same fleet is to also service the Wyndham Vale area. Of these, under either scenario, 12 or 13 train sets would be stabled and serviced overnight at Waurnd Ponds. Train sets serving the Wyndham Vale area would likely to be stabled overnight at Wyndham Vale and/or in Melbourne.

Three train sets (as part of an 18 train fleet) or 4 train sets (as part of a 27 train fleet) would form the maintenance and standby pool, the majority of which would also be in the Waurnd Ponds depot precinct at any given time. Overall, the number of complete train sets ultimately requiring stabling siding capacity at Waurnd Ponds is unlikely to exceed approximately 16, of which two sidings would be allocated to accommodate movements between the stabling and maintenance facilities.

Therefore, the ultimate footprint and track configuration for stabling at Waurnd Ponds has been set at 20 sidings, each of up to 250 metres length, although the land area proposed for acquisition could, if necessary accommodate up to 24 stabling sidings of similar length.

### 3.3 Train servicing requirements

The fundamental train servicing facilities required at Waurnd Ponds are for the functions that are necessarily linked to overnight train stabling, i.e. internal cleaning, toilet extraction, water replenishment and fuelling. With the exception of fuelling, these functions are undertaken within the train stabling sidings. Fuelling is undertaken in separate area from the stabling sidings in order to comply with EPA and safety requirements. Associated with fuelling are other less apparent essentials such as sand supply top-up (if required) and cleaning of driver's windscreens. All of these are basic functional requirements that a servicing facility must deliver overnight so that the vehicles concerned are fully prepared for the start of the following day's services.

Secondary to the above, but still important, is the need for frequent programmed external cleaning, preferably daily, by means of an automated drive-through wash plant that can effectively remove accumulated dirt and grime from carriage sides and carriage ends without the need for significant manual intervention.



Examples of overseas automated train washing plants

A less frequent but equally important function is periodic heavy internal cleaning using specialist equipment and personnel to thoroughly clean less accessible and less obvious parts of carriages or attend to other “hygiene factors” that routine daily cleaning cannot remedy. A discrete area will be needed to handle this function, quite separately from daily cleaning undertaken within the normal stabling sidings. The same discrete area would also attend to urgent unscheduled work when necessary, including internal and external graffiti removal.



Heavy cleaning platform and awning under construction at Dry Creek (Adelaide) train maintenance depot

The capacity of fuelling and train wash facilities will be important in order to facilitate the uninterrupted progression of arriving trains as they are processed through the Waurn Ponds Depot precinct. As indicated above, it is anticipated that 12 or 13 train sets would eventually be stabled and serviced overnight at Waurn Ponds, some of which are expected to arrive at 10 minute intervals. In order to avoid queueing that could block operations on the main running line, the footprint and design of these facilities will need to provide for

these functions to be duplicated on two parallel tracks, either initially or as a subsequent stage of development, whichever is the more cost-effective and also affordable.

All of the above facilities could be required to ultimately accommodate train sets up to 240 metres in length although the short term requirement will be for the processing of VL sets operating in 6-car consists 150 metres in length. The ultimate configuration of the Waurnd Ponds train servicing facilities will be designed to accommodate these requirements.

### **3.4 Train maintenance requirements**

The intention is for Waurnd Ponds to operate as a depot for rolling stock running maintenance, as distinct from a workshop which undertakes heavy repairs or major overhauls on rail vehicles. The objective of a running maintenance facility is to ensure that trains allocated to that depot achieve defined levels of availability, consistently excellent reliability and meet all other stipulated performance measures.

Running maintenance primarily comprises all scheduled checks and examinations, component change-out and unscheduled repairs that can be undertaken within a stipulated time, usually less than 72 hours. Repair work that is likely to involve longer downtime of the vehicle/s would in most cases be reallocated to a workshop facility.

Other functions undertaken within a running maintenance depot include periodic heavy internal cleaning, external cleaning that cannot be undertaken or satisfactorily completed by a conventional drive-through wash plant and underbody steam cleaning or bio-washing where necessary to remove biological material caused for example by animal strikes.

Subject to a sufficient number of vehicles being allocated to the depot, an underfloor wheel lathe facility for both programmed and unscheduled restoration of correct wheel profiles will be an important efficiency tool for meeting a critical safety requirement. As an alternative to dismantling of wheelsets and bogies for workshop attention, an underfloor wheel lathe allows this work to be completed within a few hours, after which the vehicle can be immediately returned to service. This is a highly desirable feature for achieving ongoing required availability levels for a pre-existing fleet and would become essential for a new fleet within about five years from initial entry into service.

The maintenance centre will also provide an inventory function for holding required consumable items, spare parts and major components for unit exchange, e.g. wheelsets, bogies, couplers, etc. To support this function, an associated facility for the secure storage (both indoor and outdoor) of these items will be required of a size compatible with the maintenance facility and its planned throughput.

In its initial stage, the Waurnd Ponds Train Maintenance Centre will be undertaking scheduled work on 3-car VLocity sets, most likely to the extent of a shared 50:50 workload with Ballarat East. This will include all required running maintenance on the allocated portion of the VL fleet including scheduled examinations, component change-out, unscheduled repairs and/or minor modifications as determined by fleet management. Based on a planned fleet of 198 VL Cars by 2018, this is expected to involve three 3-car VL sets receiving attention at Waurnd Ponds at any given time.

The preliminary assessment is that three maintenance tracks 100 metres in length will be required within an enclosed building of around 3,000m<sup>2</sup> to handle this task comprising one track with jacking facilities and two tracks with pits and equipped for working also at ground level and on elevated platforms.

Longer term in the context of a dedicated Geelong line fleet, up to five maintenance tracks may be required depending upon fleet size and configuration, each possibly up to 250 metres in length. In its ultimate configuration, the Train Maintenance Centre could need two tracks with jacking facilities and three tracks with pits and also equipped for working at ground level and on elevated platforms.

Should the future fleet incorporate a locomotive component, a separate locomotive maintenance bay is likely to be required that would include a drop table for the exchange of bogies or traction motors and overhead crane/s for lifting relatively heavy items such as engine, alternator or cooling system components.

### **3.5 Staff and training requirements**

The depot will provide a range of other functions related to staffing, supervision, administration and training. Staff facilities and amenities requirements at Waurnd Ponds will need to accord with currently agreed standards including those specified under the relevant legislation. To the maximum practicable extent, common staff amenities and facilities will be provided for the use of depot staff and train crew. This is to include classroom and related facilities for staff training purposes.

Related requirements will include staff car parking, defined roadways and walkways to ensure safe movement of vehicles and personnel as required throughout the depot precinct.

The initial facilities should be designed so as to be readily expandable to service the needs of future growth in maintenance staff numbers and be capable of being shared with train crew personnel at the time they are transferred to Waurnd Ponds from Geelong. Waurnd Ponds will also become the primary train crew depot for Geelong area passenger services once at least 50% of trains stabled in the Geelong area are accommodated overnight at Waurnd Ponds, including provision for train crew supervision and administration.

### **3.6 Other depot functions**

With the exception of train departures from the Handover Point towards the main running line, Depot management will be responsible for the coordination and control of all train movements within the depot precinct, including the granting of signal release to the Train Controller for all entry movements into the depot. For this purpose a Depot Controller will be provided with suitable communication facilities for liaison with depot staff who are involved in train movements within the depot precinct and suitable CCTV coverage or other suitable technology to ensure visibility of all train movements.

## 4. Development timelines

The subsequent sections of this COO document assume the following general timelines in relation to rolling stock deployment and therefore, initial and subsequent progressive staged development of the Waurnd Ponds facility:

**Stage 1a** – 21 additional VL cars have been delivered and initial facilities (constrained within available funding) are operative at Waurnd Ponds – assume by late 2017 or early 2018

**Stage 1b** – Full depot functionality is achieved for processing VL consists – assume between 2018 and early 2020s

**Stage 2** – Start of delivery of Dedicated Geelong Line Fleet (DGLF), Waurnd Ponds facility partly expanded and modified to support the DGLF – assume early 2020s (commence operation of mixed DGLF and VL fleet with progressive cascading of VL sets to other lines)

**Stage 3** – All Geelong line services operated with DGLF, Waurnd Ponds further developed and expanded to accommodate DGLF – assume late 2020s (all VLs cascaded to other lines)

**Stage 4** – Long term requirements for DGLF, Waurnd Ponds progressively expanded to designed ultimate capacity to accommodate ongoing growth beyond 2031

## 5. Site considerations

### 5.1 Overall land requirements and site selection criteria

The Waurn Ponds area has been selected as the most appropriate location in the Geelong Region for a future train maintenance and stabling depot. This was based on the principle that such a depot should be beyond the outer reach of regular commuter services to and from Melbourne in order that trains can be efficiently “fleeted” into their starting position for morning trips to Melbourne and with the reverse process applying during late afternoons and evenings. Waurn Ponds is expected to be the outer terminus for Geelong line commuter services for the foreseeable future.

The peculiarities of rail track geometry and related facilities require land parcels that are relatively long and narrow, and either roughly rectangular or triangular in shape. Where site length is constrained but ample site width is available, for example in Site ‘E’ below, some unusual track configurations become necessary such as semi-circular loops that endeavour to fold the layout into half the normally required length. Such layouts may be feasible in specific cases but create other constraints and are generally more expensive to construct.

The specific requirements at Waurn Ponds were to require sufficient site length that trains of maximum potential length (up to approximately 240 metres) could arrive in reasonably quick succession (e.g. at 10 minute intervals) and be processed in a series progression through the necessary servicing facilities without the risk of queueing back onto the main running line.

Following servicing, trains will need to be directed into as many as 20 parallel stabling sidings that could be eventually required, with these features and the required clearance between parallel tracks being the principal driver of desired site length and width. In addition, space is required for a separate maintenance facility building with up to five internal tracks that would accommodate the maximum length of future rolling stock, together with indoor and outdoor storage for parts inventories. Areas for staff amenities including staff car parking, train crew administration and training rooms will also be required.

In addition, the 24/7 almost continuous nature of activity at such a depot (and particularly at night) will likely require appropriate perimeter buffering to ameliorate noise and lighting emissions.

### 5.2 Location options

A total of 9 sites in the Waurn Ponds area were assessed for suitability for the proposed stabling and maintenance facility, all of which are located to the west of Waurn Ponds station. These are shown below.



Waurn Ponds area sites assessed for suitability for a proposed Train Stabling and Maintenance Facility

Details of each of the above sites, their characteristics and assessment outcomes are set out in Appendix 'A'.

### **5.3 Preferred site**

The preferred site for the proposed facility is shown as Site 'G' on the above aerial photograph and is located approximately 4km beyond Waurm Ponds station alongside the main Geelong-Warrnambool rail corridor. It is bounded to the north by the existing rail reserve, to the east by Bogans Lane and to the west by Pettavel Road. Both of these roads are formed but not sealed. The north-eastern corner of the preferred site adjoins the level crossing at the junction of Reservoir Road and Bogans Lane which is actively protected by flashing lights and boom barriers. The site of the former Pettavel station and siding (closed in 1952) is immediately to west of the Pettavel Road level crossing.

The overall property, of which Site 'G' forms part, extends to Mount Duneed Road on its southern boundary. Dimensions of the site proposed for acquisition are approximately 1,600 metres east-west and 200 metres north-south or approximately 32ha. This is confirmed as adequate for meeting the proposed facility functionality and scope for both the short and longer term, inclusive of any perimeter buffering requirements. The proposed site is relatively level within approximately  $\pm 8$  metres on its east-west axis and slopes down from the rail reserve on its north-south axis with a maximum fall of approximately 9 metres.

The major Blue Circle Southern Cement works (owned by Boral) and associated sidings are located immediately to the east of the Reservoir Road/Bogans Lane level crossing on the south side of the railway. Boral also owns the land to the south of Reservoir Road and east of Bogans Lane. It is reserved for future extractive purposes.

### **5.4 Site availability and acquisition**

The proposed site is understood to be privately owned and comprises predominantly open farmland used for grazing purposes and with no evident permanent structures. The Property Division of the Department of Economic Development, Jobs, Transport and Resources (DEDJTR) has accepted responsibility for the necessary land rezoning and purchase.

## 6. Detailed site processes

### 6.1 Overall process and workflow

The overall operational concept for the proposed Waurm Ponds depot is to provide an efficient series progression for servicing, maintenance (if required) and stabling of trains from initial train arrival until its next scheduled departure into revenue service, as shown in the accompanying flowchart.

The overall objective of such a system is to maximise the efficiency and productivity of these activities and to ensure that when trains are ready to re-enter service all servicing and maintenance processes have been completed and they meet appropriate standards for presentation and passenger amenity.

The fundamental enablers for the successful achievement of this objective are:

- the physical layout of the depot
- suitability of equipment and facilities
- an appropriately trained and skilled workforce
- appropriate work practices
- appropriate systems support

This Concept of Operations primarily deals with the first two of the above items but also assumes that the other enablers will have been put in place by the depot operator at the time of the facility's first stage opening.

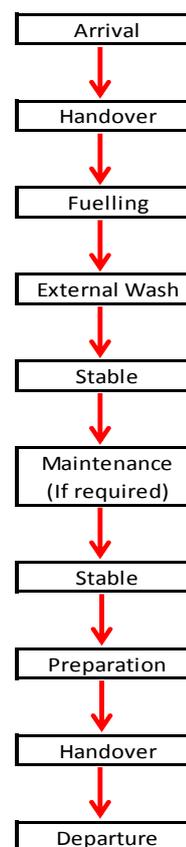
### 6.2 Train arrival

Having discharged all passengers at Waurm Ponds station, trains would be signalled to proceed a further 4km in the Down direction and, provided an arrival track is clear to the proposed Handover Point, would be further signalled to arrive directly into the depot by means of a Low Speed or Calling-on arrival signal. This signal indication requires Drivers to approach the Depot at a defined speed (usually 15km/h) and to be prepared to stop where indicated or within a shorter distance if necessary. Operation of the arrival signal would be remotely controlled by the Train Controller subject to a release granted by the local Depot Controller.

### 6.3 Handover Point on arrival

A defined Handover Point will be established on the Arrival/Departure tracks once the train is clear of the main running line and fouling point with other tracks. A mandatory Stop Board will be erected at each end of the Handover Point to face arriving and departing trains respectively. All trains will be required to stop within the defined Handover Point area.

On arrival from the main running line, Train Crews will handover control of their train to an authorised depot employee, together with advice of any defects or other matters requiring attention before the train re-enters service.



## 6.4 Fuelling station

When all handover procedures have been completed and provided the track ahead is clear, the authorised depot employee will move the train forward to the defined fuelling station location and then arrange for the required fuelling and associated processes to be completed.

(Note that in some circumstances, movement from the Handover Point may be authorised by the Depot Controller to take place via the bypass track, in which case the processes for fuelling and train washing will be omitted and the train will move directly to a designated stabling siding, as per Section 6.6 below).

## 6.5 Automated train wash plant

When the required processes have been completed at the fuelling station and provided the track ahead is clear, the authorised depot employee will move the train forward and proceed into and through the automated wash plant in accordance with the stipulated speed and/or stopping points for completion of the automated train washing cycle.

## 6.6 Train stabling

When the train washing cycle has been completed and provided the track ahead is clear, the authorised depot employee will move the train forward into a designated stabling siding in accordance with directions from the Depot Controller. Once the train has been secured within the designated stabling siding, the required processes for toilet servicing and water replenishment will take place.



Typical train toilet servicing process

## 6.7 Train movement from stabling siding to maintenance centre

If a train is required at the maintenance centre for examination, repairs or other attention, such movement will be authorised by the Depot Controller, most likely by means of radio voice communication. Once so authorised and provided the track ahead is clear, the depot employee will move the train into the designated maintenance centre track in accordance with standing or other instructions for entering the maintenance centre precinct, position it as directed and secure it.

## **6.8 Train movement from maintenance centre to stabling siding**

If a train is ready to leave the maintenance centre having completed its examination, repairs or other attention, such movement will be authorised by the Depot Controller. Once so authorised and provided the track ahead is clear, the depot employee will move the train into the designated stabling siding and secure it.

## **6.9 Train movement from stabling siding to Handover Point**

At a stipulated time and when authorised by the Depot Controller, provided the track ahead is clear, an authorised depot employee will move a specified train from a stabling siding to the departure Stop Board at the defined Holding Point, usually via the bypass track.

## **6.10 Handover Point pre-departure**

Having positioned a train at the Holding Point at a stipulated time, an authorised depot employee will handover to the designated Train Crew, together with formal certification that all necessary servicing has been completed, and the train is roadworthy and safe to operate at normal speed on main running lines.

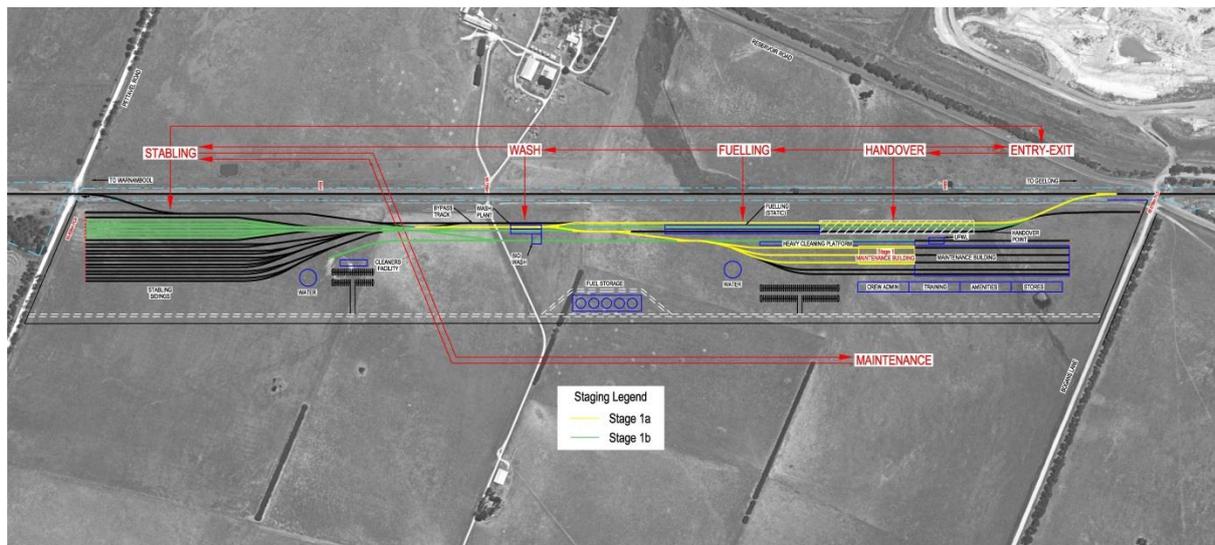
## **6.11 Train departure**

Departure from the depot facility will be authorised by the Train Controller initiating a Proceed indication on a fixed signal positioned in advance of the fouling point on one of the arrival/departure tracks. When the Proceed indication is given, the train can exit the depot at a defined speed (usually up to 40km/h until the entry turnout is cleared) and then proceed at authorised line speed towards Waurnd Ponds station.

## 7. Overall site concept, footprint and configuration

As described in previous sections of this COO, the overall configuration of the Waurm Ponds Depot site has been designed to facilitate the logical progression and processing of trains progression for servicing, maintenance (if required) and stabling from initial train arrival until its next scheduled departure into revenue service. For maximum efficiency, these steps are best physically arranged in linear fashion with a separate but inter-connected area for a maintenance facility that is capable of being operationally isolated from the other operational areas, primarily for safety reasons.

Broadly speaking, the operational concept when fitted to the generalised shape and size of the proposed Waurm Ponds site will be consistent with the process described in Section 6. This is illustrated below:



Potential ultimate configuration of Waurm Ponds Stabling and Maintenance Facility

(See Appendices C, D and E for greater detail of proposed staging sequence of the site as shown above)

The overall site when buffered by an assumed 10 metre wide low earth bund and plantings on its perimeter, provides a useable area approximately 1,580 metres long by 180 metres wide or approximately 28.4ha. Allowing for track geometry with standard turnout curvature, efficient use of the available site length will provide for a conceptual track layout derived from the following indicative requirements:

Track elements	Indicative Length (metres)	Indicative Cumulative Length (m)	Curves or tangent
Entrance track and arrival track fan	200	200	Curves
Handover area	250	450	Tangent
Static fuelling facility	250	700	
Wash plant approach	200	900	
Drive through wash plant facility	50	950	
Wash plant overrun, Maintenance Centre trailing connection and start of stabling sidings track fan	200	1,150	Curves
Remainder of stabling sidings track fan	150	1,300	
Stabling sidings	250	1,550	Tangent
Stabling sidings buffer stops and overrun	30	1,580	

Site width utilisation is driven by the following indicative maximum requirements (subject to confirmation at the next stage of project design development):

Eastern portion of site				
Track and other elements	Element width (metres)	Lateral clearance (metres)	Cumulative width (metres)	Notes
Potential roadway, footpath and/or landscaping	10	3	13	
No.1 arrival/departure (bypass) track	3	3	19	
Handover Point platforms and fuelling facility island	6	nil	25	
Nos. 2 & 3 arrival/departure tracks	6	6	37	
No.3 track Handover platform	3	3	43	
Potential roadway, paths and/or landscaping	10	nil	53	
Outside Maintenance Centre track & UFWL building	10	3	66	
Main Maintenance Centre building (Stage 1)	35	nil	101	Includes 3 tracks
Main Maintenance Centre building (Stage 2)	30	nil	131	Includes 2 tracks
Stores and amenities annex building/s	20	10	161	
Main roadway and two footpaths	15		176	
Landscaping	4	nil	180	

Western portion of site				
Track and other elements	Element width (metres)	Lateral clearance (metres)	Cumulative width (metres)	Notes
Potential roadway, footpath and/or landscaping	10	3	13	
Down end (emergency) entry track	3	3	19	
Stabling sidings Group 1 (tracks 1-4)	12	10	31	Alternate sidings 4m and 6m track centres
Stabling sidings Group 2 (tracks 5-8)	12	10	53	
Stabling sidings Group 3 (tracks 9-12)	12	10	75	
Stabling sidings Group 4 (tracks 13-16)	12	10	97	
Stabling sidings Group 4 (tracks 17-20)	12	10	119	
Landscaping	4	nil	123	
Main roadway and two footpaths	15	nil	138	
Landscaping	4	nil	142	
Uncommitted area	38	nil	180	

In summary, the ultimate site configuration is likely to have the following principal elements:

- single Up end entry track from main running line
- three parallel arrival/departure tracks – two via servicing zones and one bypass
- handover point, fuelling zone and drive-through wash plant in series progression
- single backshunt and headshunt tracks to Train Maintenance Centre
- up to 20 stabling sidings with toilet servicing and water replenishment equipment
- single Down end entry track from main running line (emergency use)
- three (and ultimately up to five) tracks into Train Maintenance Centre (TMC) building
- one (and ultimately two) flat tracks in TMC with continuous jacking support pads
- two (and ultimately three) tracks in TMC with underfloor pit access, ground level and elevated platforms and overhead crane/s
- one external track in TMC precinct with bio-wash, heavy cleaning platform and underfloor wheel lathe (UFWL) in series progression
- contiguous building/s for stores inventory, staff amenities, training and train crew depot
- car parking areas (eastern end for depot staff/train crew, western end for contract train cleaners)
- contract train cleaners store and amenities building
- fuel storage
- water collection and storage (2 locations)

A concept plan for the potential ultimate site configuration is in Appendix 'E'.

## 8. Stage 1a proposed high level project scope

### 8.1 Stage 1a overview

The Stage 1a project scope will be constrained by the current budget allocation. Deleted - Confidential As a greenfield site of substantial size, a significant portion of initial funding (around 25%) will necessarily be devoted to providing road and rail access and securing the site, together with provision of all required services connections.

Almost 60% of the estimated total cost of Stage 1a will be absorbed by the proposed Train Maintenance Centre which will become a key priority for providing essential maintenance capacity for up to half of the VLocity fleet as it approaches 200 vehicles. By 2018, the VL fleet will range in age between zero and 13 years, with each vehicle averaging around 200,000km of running per annum. As such, many vehicles are becoming due for major component change-out and overhaul.

As a result, other than the need to accommodate an average of 3 x 3-car VL sets at the Depot for scheduled maintenance, it will not be possible to install sidings and associated servicing facilities for overnight stabling until funding becomes available for Stage 1b (see Section 9, below). Therefore, for the short term at least, train stabling requirements in the Geelong area will continue to rely on existing facilities at Geelong Loco Depot and the Geelong Passenger Yard in accordance with the Base Case option as set out in Section 3.2, above.

Importantly however, at the outset, the depot precinct would be physically arranged to facilitate the initial introduction of more efficient work practices and train processing arrangements as described in Sections 2.7, 3.1 and 6.1 of this COO document.

### 8.2 Initial site development

- On-site mobilisation
- Connections to key services (electricity, water, sewerage, drainage, communications)
- Security fencing (approximately 3,600 metres) and entrance/exit gates (2)
- Earthworks to support initial facilities and trackwork
- Perimeter buffering comprising 3m earth bund and plant screening
- Road access from Bogans Lane and provision for exit at Pettavel Road
- Sundry environmental works

### 8.3 Main line/depot interface

- Main line turnout (1:9) installed approximately 50m beyond Reservoir Road level crossing, facing in Down direction – remote control with auto-normalisation function
- Signalling to provide:
  - Remote control of Up end of Cement Siding (Separable option only for pricing as an alternative to retaining the present unsignalled arrangement) – assume Down end of siding disconnected
  - Main line Down Arrival Home signal protecting level crossing and Calling-on indication for entry to depot arrival track as far as Handover Point Stop Board (with provision for future entry selection to three arrival tracks) if two-position signalling retained (or 3-position equivalent). This replaces present Down Automatic signal at 88.658km.
  - Interlocked entry gate

- Depot Up Departure Home signal from depot departure track with provision to resume normal speed when train clear of turnout and with separate Calling-on indication (with provision for future departure from three tracks) if two-position signalling retained (or 3-position equivalent).
- Roll-out protection from Depot
- Arrival/departure track to be track circuited to Handover Point Stop Board
- Main line Up Home signal to protect Depot turnout with separate Calling-on indication to replace present Up Distant WPD 28 at 88.720km.
- Main line Up Distant signal beyond Pettavel Road level crossing if two-position signalling retained (or 3-position equivalent)
- Block Section - Depot to Waurnd Ponds Holding Siding (if Track Block safeworking retained)
- Train Order working commencement beyond Depot, CCTV and related signage
- TPWS at all Home signals
- Signalling to be remotely controlled however depot entry to be subject to release granted by the Waurnd Ponds Depot Controller.
- Track occupancy indication within the Depot Handover Point to be provided to the main line Signaller.

#### **8.4 Initial track layout**

- To be consistent with later Stages 1b and the ultimate proposed configuration to ensure avoidance of unnecessary re-work
- Arrival/departure track (to become future No.1 bypass track) approximately 1,000 metres in length
- Headshunt approximately 200 metres in length beyond backshunt turnout to Maintenance Centre with buffer stop
- Backshunt lead towards Maintenance Centre track fan.
- Leads to Maintenance Centre (3 tracks) each with approximately 200 metres standing room clear of Maintenance Centre building derailleurs or other protection
- Depot yard turnouts hand worked with WSA levers

#### **8.5 Handover Point**

- Clearly delineated Handover Point area 160 metres in length located on No.1 arrival track clear of future fouling point (noting future provision for two additional parallel arrival tracks and length extension to 250 metres)
- 10 metre (future island) platforms (3) at VL cab positions for 6-car consist and Stop signage for arrival and departure movements

#### **8.6 Train stabling**

Not included in Stage 1a

#### **8.7 Servicing facilities**

Not included in Stage 1a

#### **8.8 Maintenance Centre**

From Stage 1a, the Waurnd Ponds Train Maintenance Centre will undertake all required running maintenance on the allocated portion of the VL fleet including scheduled examinations, component change-out, unscheduled repairs and/or minor modifications as determined by fleet management.

For these purposes, the maintenance centre main building will have at least one track with jacking facilities capable of lifting a 3-car VL set and at least two tracks with underfloor pit access, ground level and elevated platforms and overhead crane/s capable of handling air-conditioning units or other roof mounted equipment. As such, the general scope of the Maintenance Centre will be similar to that recently provided at Ballarat East, as illustrated below.



Ballarat East depot – flat jacking track



Ballarat East depot – tracks with pit access

- Overall design must be neutral in terms of future traction technologies and expandable to handle foreseeable train configurations and length not exceeding around 240 metres
- Main building approximately 3000m<sup>2</sup>, approximate dimensions 30m x 100m
- The initial main building should be located clear of the future expanded building footprint so that it can continue to operate without interference from any new building construction
- Stores building (expandable) annex approximately 200m<sup>2</sup>
- One level track with continuous footings for flexible jacking points
- Two tracks with underfloor pit access, ground level and elevated platforms and overhead crane
- Synchronous two-stage jacking system (12 jacks)
- Overhead crane spanning two pit tracks
- Building systems (e.g. heating, power and other supplies) as specified by PTV and V/Line
- Additional plant, equipment and fit-out as specified by PTV and V/Line
- Warning devices, derailleurs and other protection systems to meet current standards and OH&S requirements.

## 8.9 Ancillary facilities

- Staff amenities and training room (expandable) building approximately 250m<sup>2</sup>
- Contract cleaners store and amenities 50m<sup>2</sup>
- Formed and sealed roadways – approximately 2,000m
- Asphalt footpaths – approximately 1,000m<sup>2</sup>
- Car parking for depot staff (expandable) – 40 spaces
- Car parking for contract cleaners (expandable) – 10 spaces
- Yard lighting coverage – approximately 2,000m<sup>2</sup>
- Water storage for Maintenance Centre
- Fire services to meet current standards
- CCTV as specified by PTV and V/Line
- Local radio communications for use within the Depot precinct

### 8.10 Stage 1a preliminary indicative cost estimate

The Stage 1a budget is Deleted - Confidential plus land acquisition cost. Inclusive of standard on-costs, levies and risk allowance Deleted - Confidential the concept cost estimate at June 2015 rates for the major components proposed for Stage 1a is as shown in the following summary table:

Items	Construction cost* (\$000's)	On-costs, levies, risk (\$000's)	Total estimate (\$000's)
Services connections (electricity, water, sewerage, drainage, communications)	Deleted - Confidential		
Security fencing, perimeter buffering, road access and environmental works			
Essential earthworks and site drainage			
Essential trackwork construction for access to maintenance facility			
Maintenance building, fit-out, essential equipment and staff facilities			
Signalling for main line interface (including automated entry gate)			
Ancillaries (yard lighting, fire services, pathways, internal roads, car parking, CCTV, etc.)			
<b>Total scope for Stage 1a</b>			

(\* - includes contingency allowances and contractor's overheads and margins)

A more detailed indicative (pre-design) cost estimate covering the above project elements is in Appendix 'B'.

A concept plan and preliminary track layout for Stage 1a is shown in Appendix 'C'.

## **9. Stage 1b – anticipated additional scope**

### **9.1 Stage 1b overview**

Stage 1b would be expected to provide for initial overnight stabling and servicing of around four train consists (see Option 2, as described in Section 3.2, above), in addition to accommodating the maintenance pool allocated to Waurm Ponds which should average 3 x 3-car VL sets.

Therefore, this stage would include the construction of a second (No.2) arrival/departure track, one side of a future twin track fuelling facility, installation of one side of a future twin track drive-through automated train wash facility and at least six stabling sidings, including provision for toilet extraction and water replenishment.

Stage 1b would also involve an expansion of the Maintenance Centre facility to add a separate outside track of sufficient length to accommodate three separate functions:

- a bio-wash facility located contiguous to or as close as possible to the main train wash plant and used for underbody washing or removal of biological matter when needed;
- a heavy cleaning facility with side platform and awning for weather protection capable of accommodating a full length train consist to be primarily used for undertaking scheduled periodic heavy internal cleaning and also for unscheduled external cleaning (e.g. graffiti removal) that cannot be satisfactorily completed by the main train wash plant; and
- provision for an underfloor wheel lathe facility (for installation in Stage 2 or later).

### **9.2 Further site development**

No further work required.

### **9.3 Main line/depot interface**

- Additional signalling requirements will be:
  - A second motorised turnout leading to the second (No.2) arrival/departure track
  - Alteration to the main line Down Home signal protecting the level crossing and depot entry to provide a supplementary indication as to the specific arrival/departure track that trains will enter.
  - Roll-out protection (if required) from the second (No.2) arrival/departure track.
  - Second arrival/departure (No.2) track to be track circuited to Handover Point Stop Board
  - An additional Depot Up Departure Home signal leading from No.2 arrival/departure track.
- Signalling to be remotely controlled however depot entry and arrival/departure track selection to be subject to release granted by the Waurm Ponds Depot Controller.
- Track occupancy indication on the second arrival/departure track within the Depot Handover Point to be provided to the main line Signaller.

### **9.4 Additional arrival/departure track**

- Second Arrival/departure track approximately 1,000 metres in length (required to avoid queueing on main line) to provide No.2 arrival track.
- Previous headshunt extended into two track fans, each extending into 3 x 160m stabling tracks to form Stabling sidings Nos. 2 to 7, inclusive with buffer stops. (Stabling siding No.1 not provided at this stage).

- Backshunt towards Maintenance Centre to have independent headshunt 200 metres in length to allow movements within the Maintenance Centre precinct without impinging on stabling siding movements.
- Additional depot yard turnouts hand worked with WSa levers except for motorised entry to second arrival/departure track.

### 9.5 Handover Point

- Clearly delineated Handover Point area 160 metres in length provided on No.2 arrival track clear of fouling point (noting future provision for one additional (No.3) parallel arrival track and length extension to 250 metres)
- 3 x 10 metre platforms on No.1 arrival/departure track at VL cab positions for 6-car consist converted to island configuration to also serve No.2 arrival track and additional Stop signage provided on No.2 arrival track for arrival and departure movements.

### 9.6 Train stabling

- 6 x 160m stabling sidings provided as noted in 9.3, above with provision for future extension to 250 metres, if and when needed.

### 9.7 Servicing facilities

- Static fuelling facility provided on No.2 arrival/departure track configured for a 6-car VL consist and designed as an island facility with provision to also service a future No.3 arrival/departure track and future extension to 250 metres..
- One track of a future two track drive-through automated train wash facility provided on No.2 arrival/departure track 200 metres beyond the future (extended) Down end of the fuelling facility with provision to also service a future No.3 arrival/departure track.
- Toilet extraction and water replenishment equipment provided on Nos. 2 to 7 stabling tracks.

### 9.8 Maintenance facilities

- Additional external track 250 metres in length on north side of Maintenance Centre building with provision for future further extension to 500 metres for future inclusion of an underfloor wheel lathe.
- Additional external track to include Bio-wash and 160 m heavy cleaning platform with full length awning (with provision for future extension to 250m).
- Additional independent headshunt 200 metres in length as set out in 9.3, above.

### 9.9 Ancillary facilities

- Bunded fuel storage area
- Water storage and supply for stabling sidings
- Additional asphalt footpaths – approximately 1,500m<sup>2</sup>
- Additional yard lighting coverage – approximately 2,000m<sup>2</sup>
- Additional CCTV to cover stabling sidings area, as specified by PTV and V/Line

### 9.10 Stage 1b cost estimate

A specific cost estimate has not been prepared for Stage 1b at this stage although a preliminary concept cost estimate was prepared for Stage 1 as a whole (Stages 1a and 1b combined) which indicated an overall cost of approximately \$1.2 billion.

Therefore, the most that can be indicated at present is that, if undertaken as a subsequent package of works following full implementation of Stage 1a, the additional Stage 1b works shown above could cost in the range of Deleted - Confidential at June 2015 rates.

A concept plan and preliminary track layout for Stage 1b is shown in Appendix 'D'.

(Note – In Section 2.3, attention was drawn to the inadequacy of infrastructure capacity between Geelong and Waurin Ponds and the additional pressure a Waurin Ponds facility might put on this capacity. Consideration might therefore be given to packaging relevant capacity enhancement works with a Stage 1b proposal).

## 10 Subsequent stages – potential additional scope

### 10.1 Subsequent stages overview

Stage 2 and subsequent stages of the proposed concept for Waurm Ponds facility development are assumed to be implemented from the time that a dedicated Geelong line passenger train fleet is about to commence operation on the Geelong corridor.

This will require expansion of maintenance, servicing and stabling facilities in ways that should be possible without the need for re-working of the initial works previously undertaken under Stages 1a and 1b. The actual scope of Stage 2 and subsequent works that are linked to procurement of a dedicated Geelong line fleet will largely be a function of:

- Planned fleet size
- Train length and configuration
- Motive power technology

At a high level, Stage 2 and subsequent works which can be progressively implemented in anticipation of emerging needs are likely to include some or all of:

- A third arrival/departure track
- Provision of a Down (western end) connection to the main running line
- Extension of the Handover Point and fuelling facility to accommodate longer consists
- Duplication of the fuelling facility and automated wash plant to cover two parallel tracks
- Extension of existing stabling sidings to accommodate longer consists and related servicing equipment
- Construction of additional stabling sidings of required length
- Possible extension of signalling to control internal movements to and from stabling sidings
- Extension of the Train Maintenance Centre building to accommodate longer consists
- Extension of the Train Maintenance Centre building to provide additional parallel tracks
- Adaptation of the Train Maintenance Centre facilities to maintain locomotives (if applicable)
- Adaptation of a Train Maintenance Centre track for commissioning new trains or special projects
- Construction of separate annex/tracks for locomotive maintenance (if relevant to the new fleet)
- Extension of the heavy cleaning platform and awning to accommodate longer consists
- Extension of the Train Maintenance Centre external track for an underfloor wheel turning lathe
- Expansion of the Train Maintenance Centre stores building
- Expansion of staff amenities and training facilities
- Provision of train crew administration facilities
- Expansion of staff car parking

A concept plan for the potential ultimate site configuration is in Appendix 'E'.

## 11 Recommended next steps

In order to progress the project at Stage 1a level towards construction and implementation, the following further steps are recommended:

- Progress and, if possible, expedite the required planning amendment and land acquisition processes
- Determine required stakeholder engagement and communications processes
- Undertake a full site survey
- Undertake soil testing as appropriate
- Undertake environmental and heritage studies as appropriate
- Confirm feasibility and suitability of the ultimate track layout and site configuration in consultation with relevant stakeholders
- Formally confirm and approve the proposed site functions and Stage 1a scope of works in consultation with relevant stakeholders
- Prepare more detailed schedules of the proposed Stage 1a scope of works
- Prepare concept (not for construction) designs for Stage 1a works
- Prepare more robust cost estimates for Stage 1a works
- Undertake a detailed project risk assessment
- Determine and implement required project governance processes
- Determine relevant procurement processes
- Submit required supplementary documentation to DTF as basis for approval to release project funds
- Prepare required tender documentation
- Progress tendering and contract finalisation processes

## Appendix 'A'

### Summary of alternative train stabling and maintenance sites investigated at Waurm Ponds

Site	Description	Distance from Waurm Ponds Station (Rail entry to site)	Gradient	Length	Other Issues	Comments
A	Between Ghazeeopore Road and Anglesea Road (North Side)	600 metres	The mainline is on a 1 in 50 gradient between Ghazeeopore Road and Anglesea Road.	Maximum length of around 700 metres.	<ul style="list-style-type: none"> <li>A watercourse runs through the northern part of the site.</li> <li>Housing located on the north side of the site would be impacted by the facility.</li> <li>Electrical switch station encroaches on the site.</li> <li>Road access is constrained.</li> </ul>	The land is too steep and has too many issues (watercourse, housing, road access, gradient).
B	Between Ghazeeopore Road and Anglesea Road (South Side)	1,200 metres	The mainline is on a 1 in 50 gradient between Ghazeeopore Road and Anglesea Road.	Maximum length of around 1,000 metres. Difficult to adopt a circular stabling layout given the falling grade, i.e. construct the facility in two parts on either side of the site that are linked by a loop line.	<ul style="list-style-type: none"> <li>A watercourse runs through the middle of the site.</li> <li>Rail access to the site is constrained by the location of the two road bridges.</li> <li>Good road access.</li> <li>This land has been set aside for future mining operations.</li> </ul>	<p>Rail access to the site is constrained by the location of the two road bridges.</p> <p>A circular track configuration could be adopted, but would be expensive and inefficient.</p>
C	Between Anglesea Road and the cement works underline bridge (Used by the cement works to access the crushing plant). (North side)	1,900 metres	Entry to the site is level. However, approximately half the site is on a gradient as steep as 1 in 50.	Maximum length of around 950 metres and a width of around 150 metres.	<ul style="list-style-type: none"> <li>Constrained site with limited life for expansion.</li> <li>Potentially susceptible to dust from manufacturing and mining operations.</li> <li>May be difficult to achieve acceptable road access.</li> </ul>	<p>Site is very constrained.</p> <p>May not be able to provide a maintenance facility and the required stabling.</p>
D	Between Anglesea Road and the cement works underline bridge (Used by the cement works to access the crushing plant). (South side)	1,900 metres				Currently used for mining operations.
E	North of cement works on the disused open cut mine.	3,800 metres	Mainline entry reasonably level.  Site had to be filled and compacted.	Roughly 1,200 metres long.	<ul style="list-style-type: none"> <li>The site needed to be filled (4 million cubic metres) and compacted. Blue Circle offered to move the fill for a negotiated cost, but would not guarantee compaction.</li> <li>Compaction was very expensive before land was ready.</li> <li>Compaction would take around 3 to 4 years to complete.</li> </ul>	<p>Discussions commenced with Boral (Blue Circle Southern) in June 2008 and were terminated in October 2010.</p> <p>Cost to fill mine were excessive:</p> <ul style="list-style-type: none"> <li>Deleted - Confidential buy land (28 hectares)</li> <li>Deleted - Confidential to transport fill.</li> <li>Deleted - Confidential to compact and rehabilitate.</li> </ul>
F	Between Bogans Lane and Pettavel Road (North side)	4,000 metres	Mainline entry reasonably level.  Site slopes upwards towards Reservoir Road.	Roughly 1,600 metres long.  Triangular shape of land.	<ul style="list-style-type: none"> <li>Land slopes up towards Reservoir Road and would require extensive land excavation.</li> <li>Residence located on the land.</li> <li>Would need to cross the VicTrack optic fibre cable.</li> </ul>	<p>Could be used, but would have to cover the cost of extensive excavation given the slope on the land.</p> <p>Residence located on the site.</p>
G	Between Bogans Lane and Pettavel Road (South side)	4,000 metres	Mainline entry reasonably level.  Site is relatively level, although there is a hump in the centre.	Roughly 1,600 metres long.  Can acquire a 200 metre wide strip over the full distance.	<ul style="list-style-type: none"> <li>Telstra cable between running line and site.</li> <li>The selected site will cut a farm into two parts.</li> <li>The selected site will also abolish an occupational crossing used by the owner of the property.</li> </ul>	<p>This site is the best of the options available in that it is relatively flat and can accommodate all of V/Line's requirements for the next 50 years.</p> <p>It is also the closest site to Waurm Ponds that meets V/Line's requirements, i.e. it minimises dead running.</p>
H 1 / H 2	West of Pettavel Road	5,800 metres	Mainline entry reasonably level.  Site is uneven and dips down to a creek.	Roughly 1,600 metres long.  Can acquire a 200 metre wide strip over the full distance.	<ul style="list-style-type: none"> <li>The site is not even over the distance required.</li> <li>The distance from Waurm Ponds is roughly 1.8 km further from the station than the preferred location.</li> </ul>	<p>The topography of the site does not suit a stabling yard and maintenance facility.</p> <p>Pushing the facility any further west will substantially increase the amount of dead running.</p>

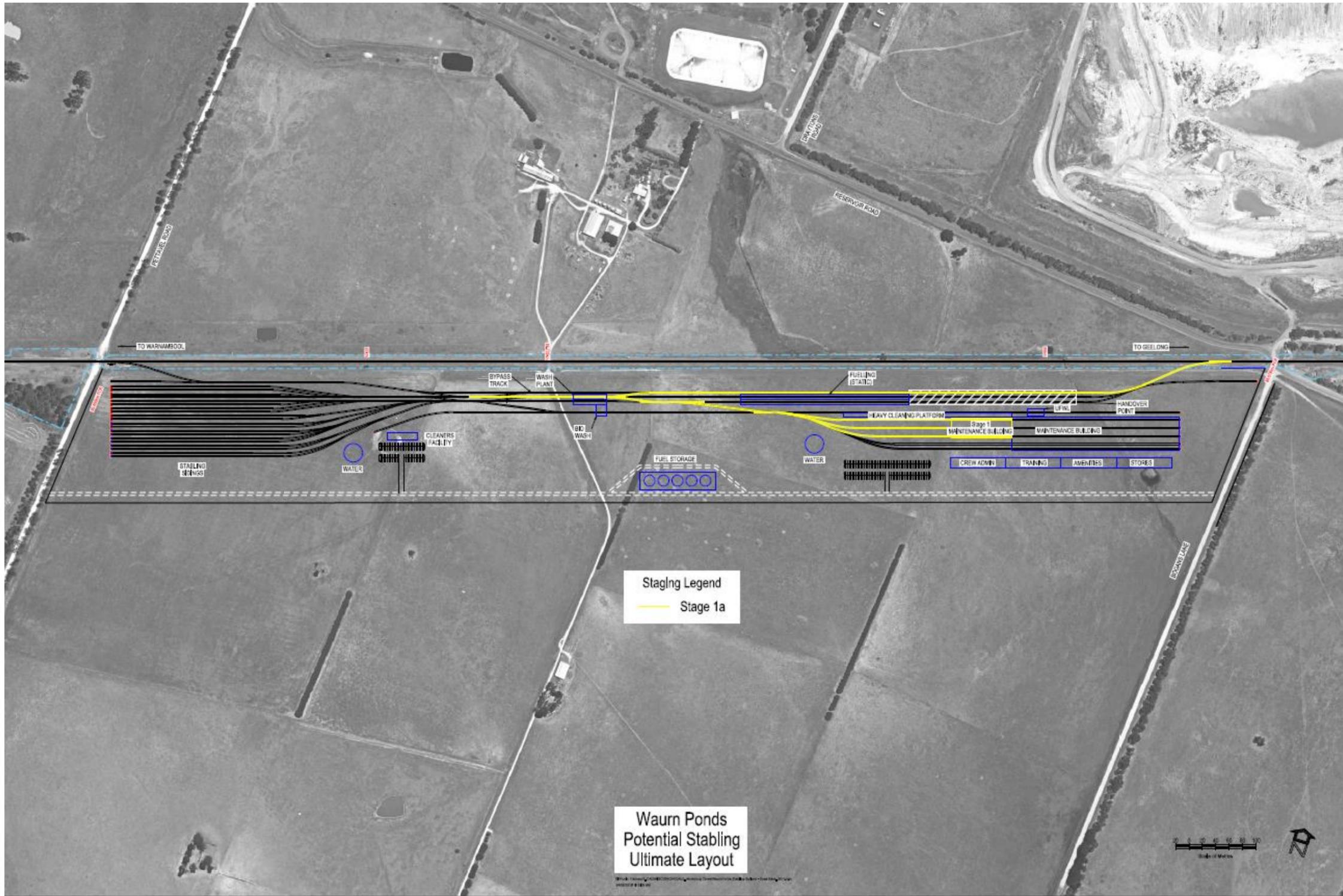
Appendix 'B'

Indicative (pre-design) cost estimate for Stage 1a

Waurm Ponds Stabling_Stage 1a		Date of Rates : 01 Jun 2015					
Code	Element	Quantity	Unit	Rate	Total	Contingency	Total
	<b>Construction Costs</b>						
	<b>Prelims</b>						
	General						
	Mobilisation		item				
	<b>Sub-total - Prelims</b>						
	<b>Services</b>						
	<b>Existing</b>						
	Nominal sum for unspecified alteration/relocation		item				
	<b>New Connections</b>						
	Electricity - nominal sum		item				
	Water - nominal sum		item				
	Sewerage - nominal sum		item				
	Stormwater drainage		item				
	<b>Sub-total - Services</b>						
	<b>Earthworks</b>						
	Clear site of vegetation; cart away		sqm				
	Cut to fill		cum				
	FCR capping layer 150mm		sqm				
	<b>Sub-total - Earthworks</b>						
	<b>Trackwork</b>						
	Supply & install 9.0 turnouts		no				
	Supply & install 15.0 turnouts		no				
	Stabling tracks		m				
	Track drainage		m				
	Steel buffer stop		no				
	<b>Sub-total - Trackwork</b>				Deleted - Confidential		Deleted - Confidential
	<b>Facilities</b>						
	Fuel point/fuel storage - nominal sum		no				
	Fuel tanker facilities - nominal allowance for unspecified concrete slab, spillage protection etc.		item				
	Wash Plant - not included						
	Dewatering facilities		item				
	Yard lighting		sqm				
	Fire services		item				
	CCTV		no				
	<b>Sub-total - Facilities</b>						
	<b>Maintenance Facility</b>						
	Nominal sum for unspecified maintenance building and facilities. Based on Ballarat East.		item				
	Nominal sum for unspecified staff accommodation		sqm				
	Nominal sum for unspecified storage building		sqm				
	<b>Sub-total - Maintenance Facility</b>						
	<b>Civil Works</b>						
	Security fence with Tiger tape; gates		m				
	Footpath 40mm asphalt		sqm				
	Site roads		m				
	Waterway - nominal sum to place pipes/culvert		item				
	Earth Bund - 3m high surrounding site		cubm				
	Nominal sum for unspecified alterations to adjoining roads		item				
	Car parking		spaces				
	<b>Sub-total - Civil Works</b>						
	<b>Signalling (Marshall - Waurm Ponds)</b>						
	<b>Main Line</b>						
	Nominal sum to provide 6 ML signals, motorised points, interlocked train gate, upgrades to train control, trenching, cabling, etc.		no		Deleted - Confidential		Deleted - Confidential
	<b>Stabling Yard</b>						
	Assume no signalling required						
	<b>Sub-total - Signalling (Marshall - Waurm Ponds)</b>						Deleted - Confidential
	<b>Miscellaneous</b>						
	Decontamination - nominal sum		no				
	Environmental works - nominal sum		no		Deleted - Confidential		
	Traffic mitigation works - nominal sum		no				
	<b>Sub-total - Miscellaneous</b>						
	<b>Total Construction Cost</b>						
	<b>Contractors O/Heads &amp; Margin</b>						
	Allowance for Contractors Preliminaries O/Heads & Margin				Deleted - Confidential		
	<b>Sub-total - Contractors O/Heads &amp; Margin</b>						
	<b>Total Construction Cost Including Prelims &amp; O/Heads</b>						
	<b>Land Acquisition</b>						
	Land Acquisition		item				
	<b>Sub-total - Land Acquisition</b>						
	<b>Total Construction Cost Including Prelims, O/Heads &amp; Land Ac</b>						
	<b>Design</b>						
	Allowance for Design		%				
	<b>Sub-total - Design</b>						
	<b>Insurance</b>						
	Principal supplied Project Insurance				Deleted - Confidential		
	<b>Sub-total - Insurance</b>						
	<b>Project Management</b>						
	Project Management (major role)		%		Deleted - Confidential		
	Lessee/Operator P/M (minor role)		%				
	Other Authority/Agency Consultee charges		%				
	<b>Total - Project Management</b>						
	<b>Risk</b>						
	Risk allowance		item				
	<b>Sub-total - Risk</b>						
	<b>Total - Direct Costs</b>						
	Corporate Levies		%				
	<b>Total - PTV Levees</b>						
	<b>Total - Project Costs (\$Real)</b>						
	<b>Escalation</b>						
	Escalation						
	<b>Sub-total - Escalation</b>						
	<b>Total Estimated Investment</b>						

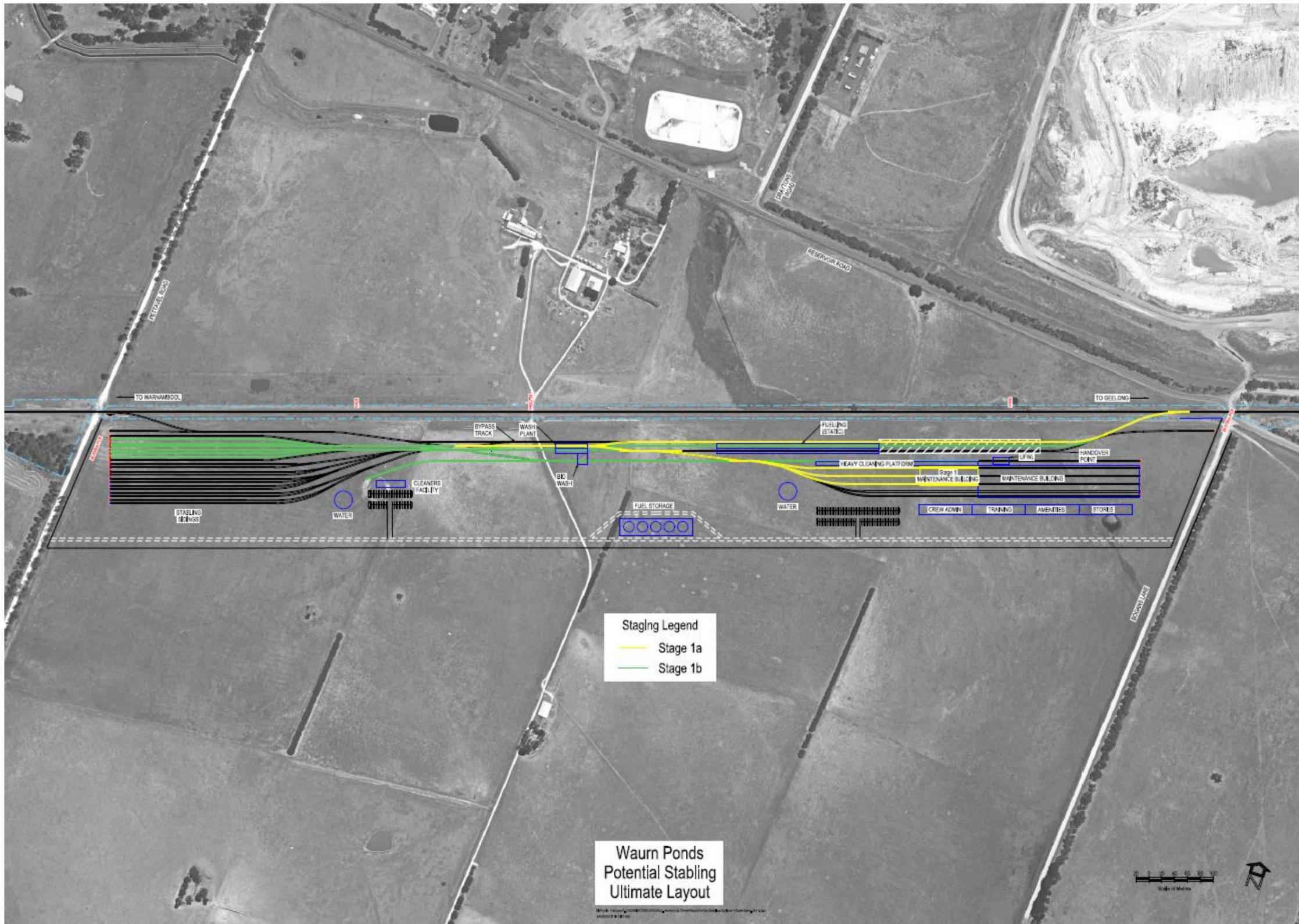
# Appendix 'C'

## Stage 1a proposed track layout and site configuration



# Appendix 'D'

## Stages 1A and 1b proposed track layout and site configuration



# Appendix 'E'

## Proposed ultimate track layout and site configuration

