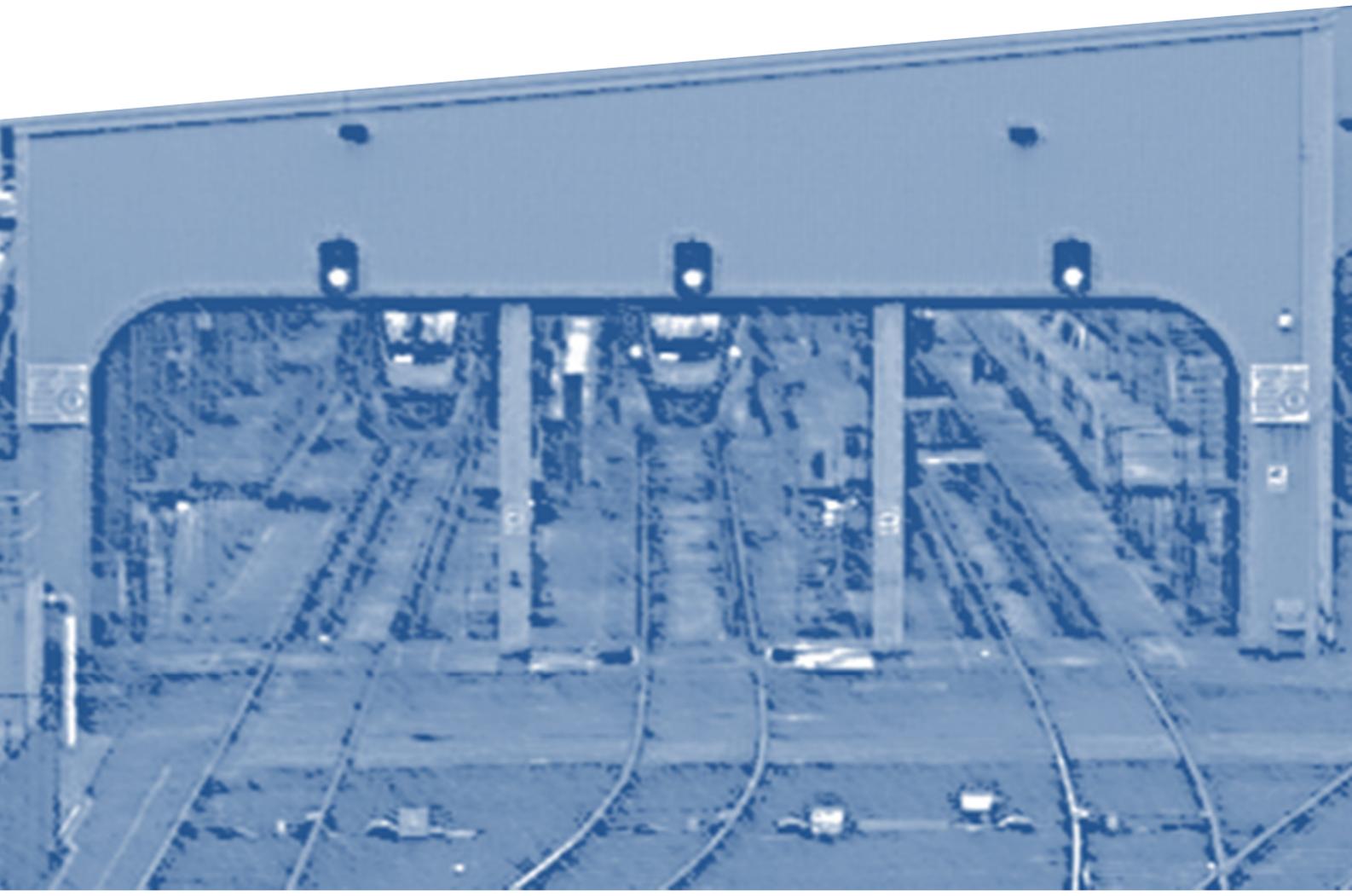




# **Waurn Ponds Stabling & Maintenance Facility**

**Future Land Use Assessment**



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# Waurn Ponds Stabling & Maintenance Facility

## Future Land Use Assessment

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# **Waurn Ponds Stabling & Maintenance Facility**

## **Future Land Use Assessment**

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# Executive Summary

## Background

The Public Transport Victoria (PTV) engaged Opus Rail (OR) to develop the Waurnd Ponds Stabling and Maintenance Future Land Use Assessment. This work includes a concept design and cost estimates for the facility to be constructed on a previously identified site located beyond the level crossing at Reservoir Road and Bogans Lane, Waurnd Ponds (88.678km) and extending in the Down direction parallel to the railway reserve for approximately 1,700 metres to Pettavel Road. OR is also required to provide expert commentaries on the constraints relative to the various issues and their possible relationship with current or planned infrastructure on the site.

Subsequent to “Notice to Proceed” the PTV advised Opus that a Concept of Operations document (COO) would be developed by PTV to be used as the basis for progressing the development, design and implementation of the Train Maintenance facility. Opus studied the COO and determined that in the main, the concept design could be developed in accordance with the requirements and staging of the works. Each stage of the works has attempted to be arranged to allow the following stages to be constructed without interfering with the running of the facility.

A copy of the COO is provided in Appendix 1 and relevant sections are reproduced in this report to facilitate reading and understanding of the design. It will be noted that the COO does not only establish guidelines for development of the site and facility, but also provides context for the Geelong line passenger demand, operations, network and rolling stock considerations.

## Site Suitability

The Waurnd 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 for trains to be efficiently “fleeted” into their starting position for morning trips to Melbourne and with the reverse process applying during late afternoons and evenings. Waurnd 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 Waurnd Ponds were to provide sufficient site length for trains of maximum potential length (up to approximately 250 metres) to 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, in the ultimate layout, trains will need to be directed into as many as 20 (minimum) parallel stabling sidings. The longitudinal separation and required clearance between parallel tracks being the principal driver of desired site length and width. In addition, space is required for a separate maintenance workshop 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, training rooms and dining area will also be required.

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

## Location options

A total of 9 sites in the Waurn Ponds area had been 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 in Figure 1.



**Figure 1: 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 the COO located in Appendix 1.

## Selected site

The selected site for the proposed facility is shown as Site 'G' on the above aerial photograph and is located approximately 4km beyond Waurn Ponds station alongside the main Geelong-Warrnambool rail corridor. It is bounded to the north by the existing rail reserve, to the east by Bogan 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 Bogan 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 west of the Pettavel Road level crossing.

The site is relatively level on its east-west axis and slopes down from the rail reserve from north to south. Dimensions of the site proposed for acquisition are approximately 1,740 metres east-west and 200 metres north-south or approximately 34.8ha. The site when buffered by an assumed 10 metre wide low earth bund and plantings on its perimeter, provides a useable area of approximately 1,720 metres long by 180 metres wide or approximately 31.0ha. The concept design confirms that the site meets the proposed facility functionality and scope requirements for the short and longer term.

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.

## Cost Estimates

High level cost estimates are included in Appendix 2.

A summary is provided below:

Stage 1a

Stage 1b

Ultimate Development

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## 1 Key Requirements of the PTV Brief and COO

The COO document complements the PTV brief and it was used as a basis for progressing development, design and implementation of a proposed Train Maintenance and Stabling Facility at Waurm Ponds. It was particularly intended to identify 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 – Waurm Ponds area.

Because this project is the first stage of a much more extensive facility, on property which is yet to be acquired, 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 future needs.

Opus has endeavoured to ensure, as far as is reasonably practicable, that the first and second 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.

The decision relevant to the type of rolling stock likely to be required to operate Melbourne – Geelong passenger services into the future is not finalised, therefore it is important that the Stabling and Maintenance facility has flexibility to accommodate various types of rolling stock and servicing requirements; for example, a dedicated Geelong line passenger fleet as an alternative to the present V/Locity trains. The prospects of full Geelong line electrification and locomotive hauled trains utilising the maintenance facility must also be considered.

## 2 Concept Design

The COO has a strong focus on developing a facility with a high level of functionality and efficiency, which includes track and infrastructure layout that facilitates best work practises. Opus adopted the layout concepts provided in the COO and, where practicable, developed the concept design accordingly.

Track lengths and track centres necessarily have been adjusted due to the constraints of the site, rail track geometry and the design standards detailed below. In general, 250m section lengths have not been achieved due to the excessive cumulative lengths required; however, in the main,

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240m was achievable and PTV agreed that 240m section lengths were satisfactory. Other longitudinal length differences are shown below in Table 1.

## **2.1 Design Standards**

Opus has developed a concept design for the Waurm Ponds Train Maintenance Facility and related buildings which complies with applicable local building codes and is compatible with environmental conditions. Building services adhere to international standards and requirements.

The facility design has been developed using as a reference the VRIOGS Metropolitan Electric Train Stabling Design Guidelines, together with the functional requirements provided in the project brief and Concept of Operations document and agreed at the initial project meeting with PTV on Thursday 28 May 2015.

### **2.1.1 General**

The concept design has been developed in consideration of the following standards:

- AS4292 Railway Safety Management;
- Victorian Rail Industry Operators Group Standards, VRIOGS; and
- PTC Heavy Rail Track Design Standards 1997.

In particular, the stabling layout has been designed based on VRIOGS 004.13 – 200X Metropolitan Electric Train Stabling.

### **2.1.2 Track and Civil**

#### **2.1.2.1 Track Centres**

The COO outlines alternate track centres of 4m and 6m. In order to meet the requirements of the above VRIOGS stabling standard the following were adopted:

- Alternate track centres of 6.3m and 4.75 have been adopted;
  - 6.3m track centres have been adopted to provide sufficient clearances to light poles, overhead traction power structures, dewatering equipment and water supply lines and faucets.
  - 4.75m minimum track centres have been adopted, which allows for the use of battery trucks.

#### **2.1.2.2 Trackwork**

The track components comprise:

- 50 kg/m rail on concrete sleepers;
- 1 in 7.52 turnouts in the yard; and

- 1 in 9 turnout(s) on the main line (to be reviewed with V/Line at a later time).

## 2.2 Track Requirements (COO)

The track design has been developed based on the standards referred to above and the COO requirements provided in Table 1 below. Any variance from the COO to the concept design are indicated.

**Table 1: COO Indicative lengths vs achieved Concept Design Lengths**

Track elements	Indicative Length (metres)	Indicative Cumulative Length (m)	Achieved Length (metres)	Achieved Cumulative Length (m)
Entrance track and arrival track fan	200	200	310	310
Handover area	250	450	240	550
Static fuelling facility	250	700	240	790
Wash plant approach	200	900	150	940
Drive through Biowash facility	-	-	50	990
Drive through wash plant facility	50	950	50	1,040
Wash plant overrun, Maintenance Centre trailing connection and start of stabling sidings track fan	200	1,150	240	1,280
Remainder of stabling sidings track fan	150	1,300	150	1,430
Stabling sidings	250	1,550	240	1,670
Stabling sidings buffer stops and overrun	30	1,580	10	1,680

Concept Design drawings for Stages 1a and 1b and the Ultimate Development have been developed and are provided in Appendix 4. A Signalling Scheme Plan that extends the existing signalling system from Waurm Ponds station to the Facility has been developed and is provided in Appendix 3. Cost estimates for Stage 1a, Stage 1b and Ultimate Development are provided in Appendix 4.

## 3 Staging of the Works

### 3.1 Stage 1a

Opus was advised by the PTV Project Manager that the Stage 1a design will be constrained by the current budget allocation. As a greenfield site of substantial size, it is recognised that a significant portion of the initial funding (around 25%) will necessarily be devoted to providing road and rail access, securing the site, mounds and screen planting, and provision of all required services and connections.

As a result, Stage 1a will only need to accommodate an average of 3 x 3-car V/Locity sets at the Workshop on a day by day basis for scheduled maintenance. Stage 1a will not include servicing facilities (fuelling, etc) or overnight stabling sidings; these will be part of Stage 1b when further funding becomes available. This means that 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.

### 3.1.1 Initial site development

The initial site development will include the following works:

- On-site mobilisation;
- Connections to key services (electricity, water, sewerage, drainage, communications);
- Security fencing (approximately 3,800 metres) and entrance/exit gates (2)
- Earthworks to support initial facilities and trackwork;
- Perimeter buffering comprising 3m high earth bund and plant screening;
- Road access from Bogans Lane and provision for exit at Pettavel Road;
- Sundry environmental works;
- Minimum internal roadways;
- Adequate security and safety facilities;

### 3.1.2 Main line/depot interface

The main line / depot interface includes the required track access to the site and the signalling scheme for operation of trains on the single line between Waurn Ponds station and the maintenance facility. The requirements include:

- Extension of two position signalling from Waurn Ponds station to the facility;
- A main line turnout (1 in 9) approximately 50m beyond Reservoir Road level crossing, facing in the Down direction – remote control with auto-normalisation function;
- Future provision for a second main line turnout (1 in 9) facing in the Down direction that allows trains entering or leaving stabling to bypass the normal access points, for use in emergency or when unacceptable train queuing is likely to disrupt services; and
- Future provision for a main line turnout (1 in 9) facing in the Up direction giving access to trains approaching from Warrnambool / Colac. This is a long-term possibility.

#### **Train Control and Signalling – Main line and Depot**

The existing arrangements for train control of the line from Geelong to Waurn Ponds station will be extended to include control of the main line turnout to the Waurn Ponds Maintenance Facility.

With the exception of train departures from the Handover Point in the depot toward the main running line, Depot management will be responsible for the coordination and control of train movements within the Depot precinct, including the granting of signal release to the Train Controller for all entry movements into the depot.

To facilitate the above, a Depot Control Room will be required and the Controller provided with suitable communication facilities for liaison with depot staff who will be involved in train movements within the depot precinct and appropriate CCTV or other like technology to ensure visibility of all train movements.

In the initial stages at least, it is intended that depot yard points will be manually operated; however, the design will provide for remote control in the future.

#### **Signalling to include:**

- Two position signalling between Waurm Ponds station and the Stabling and Maintenance facility (to be reviewed by V/Line at a later time);
- Remote control of Up end of Cement Siding (Separable option only for pricing as an alternative to retaining the present un-signalled arrangement) – assume Down end of the siding is disconnected;
- A main line Down Arrival Home signal protecting the level crossing and Calling-on indication for entry to the depot arrival track as far as a Handover Point Stop Board (with provision for future entry selection to three arrival tracks) if two-position signalling is retained (or 3-position equivalent). This replaces the present Down Automatic signal at 88.658km;
- Interlocked entry gate;
- A depot Up Departure Home signal from the 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 is retained (or 3-position equivalent);
- Roll-out protection from Depot;
- Arrival/departure track to be track circuited to Handover Point Stop Board;
- A main line Up Home signal to protect the Depot turnout with a separate Calling-on indication to replace the present Up Distant WPD 28 at 88.720km;
- A main line Up Distant signal beyond Pettavel Road level crossing if two-position signalling is retained (or 3-position equivalent);
- Block Section - Depot to Waurm 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, the depot entry to be subject to release granted by the Waurm Ponds Depot Controller; and
- Track occupancy indication within the Depot Handover Point to be provided to the main line Signaller.

**A Signalling Scheme Plan is provided in Appendix 3**

### 3.1.3 Initial track layout

- Consistent with later Stages 1b and the ultimate proposed configuration to avoid unnecessary re-work;
- Access into the facility via a 1 in 9 mainline turnout. This type of turnout may need to be reviewed pending an assessment of the mainline speed and the allowable running speeds for a 1 in 9 turnout;
- Arrival/departure track No. 1 (to become future bypass track in the Ultimate Development), approximately 900 metres in length;
- Head-shunt approximately 200 metres in length with buffer stop, to allow access to the Maintenance Centre;
- Three tracks within the Maintenance Workshop, each with approximately 200 metres standing room clear of Maintenance Workshop building derailleurs or other protection; and
- Depot yard turnouts hand operated with WSA levers.

### 3.1.4 Handover Point

- A clearly delineated Handover Point area 240 metres in length located on No.1 arrival track clear of future fouling point;
- 3 x 10 metre (future island) platforms at V/Locity cab positions for 6-car consist and Stop signage for arrival and departure movements, located between No.1 track and future No.2 track.

### 3.1.5 Train stabling

Not included in Stage 1a

### 3.1.6 Servicing facilities

Not included in Stage 1a

### 3.1.7 Maintenance Workshop

The Maintenance Workshop building footprint allows for expansion to accommodate 5 x 240 metre trains in parallel, together with a warehouse (store) facility and an administration area with all staff facilities and amenities. The Concept design does not include building services, plant and equipment.

The concept design to meet the requirements of Stage 1a includes:

- Consideration of future traction technologies and likely expansion to handle foreseeable train configurations and length not exceeding around 240 metres;
- Main Workshop building approximately 3,000m<sup>2</sup>, approximate dimensions 30m x 100m;
- The initial main workshop building 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;
- Provision for building systems (e.g. heating, power and other supplies) as specified by PTV and V/Line;
- Warning devices, derailleurs and other protection systems to meet current standards and OH&S requirements; and
- Generally six-car trains will need to be split into three-car sets for workshop maintenance in the first stage.

The COO clearly expects the Maintenance Workshop from Stage 1a to undertake all required running maintenance on the allocated portion of the V/Locity fleet including scheduled examinations, component change-out, unscheduled repairs and/or minor modification as determined by fleet management.

The Workshop will require:

- Jacks;

- Platforms;
- Cranes;
- Bogie turntable/s
- Work benches, tools, and equipment layout;
- Air, grease, water, power, etc.

To ensure the Workshop can meet the above requirements in an efficient and timely way, the internal elements need to be defined, constructed and installed as a separate project.

### 3.1.8 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 Workshop;
- Local radio communication for use within the depot precinct;
- Fire services to meet current standards; and
- CCTV as specified by PTV and V/Line.

**The concept design drawing for Stage 1a - Initial development is included in Appendix 4.**

## 3.2 Stage 1b

Stage 1b is an extension of Stage 1a design requirements and is expected to provide for initial overnight stabling and servicing of around four train consists likely to be 1 x 5 Sprinters and 3 x 6 car V/Locity trains, as well as accommodating the maintenance pool of V/Locity sets allocated to Waurin Ponds, which should average 3 x 3-car sets.

Therefore, this stage would include the construction of a second (track 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, a Biowash facility, and at least six stabling sidings, including provision for toilet extraction and water replenishment.

### 3.2.1 Further site development

No further work is required at this Stage.

### 3.2.2 Main line/depot interface

Additional signalling requirements are:

- A second motorised turnout leading to the second (Road No.2) arrival/departure track;
- Second arrival/departure (Track No.2), track circuited to Handover Point Stop Board;
- An additional Depot Up Departure Home signal leading from No.2 arrival/departure track; and

- Track occupancy indication on the second arrival/departure track within the Depot Handover Point to be provided to the main line Signaller.

### 3.2.3 Additional track

- A second arrival/departure track approximately 500 metres in length (required to avoid queueing on main line) to provide No.2 arrival track;
- Previous 1a head-shunt is 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);
- Back-shunt towards Maintenance Workshop to have independent head shunt 200 metres in length to allow movements within the Maintenance Workshop 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; and
- Additional external track 500 metres in length on north side of Maintenance Workshop building with an underfloor wheel lathe, and 160m long heavy cleaning platform with full length awning.

### 3.2.4 Handover Point

- Clearly delineated Handover Point area 240 metres in length provided on No.2 arrival track clear of fouling point (noting future provision for one additional parallel arrival track No.3);
- 3 x 10 metre platforms located between No.1 and No.2 tracks 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.

### 3.2.5 Train stabling

- 6 x 160m stabling sidings provided with provision for future extension to 240 metres, if and when needed.

### 3.2.6 Servicing facilities

- Static fuelling facility 240m in length provided on No.2 arrival/departure track configured for up to a 9-car V/Locity consist and designed as an island facility with provision to also service a future No.3 arrival/departure track;
- Biowash facility provided on No.3 track 150m down of the static fuelling facility;
- One track of a future two track drive-through automated train wash facility provided on No.3 arrival/departure track. The Biowash facility is located prior to entering the train wash; and
- Toilet extraction and water replenishment equipment provided on Nos. 2 to 7 stabling sidings.

### 3.2.7 Maintenance facilities

The Maintenance Workshop requirements defined for Stage 1a (see 3.1.7 and 3.1.8 above) are adequate for work expected in Stage 1b.

### 3.2.8 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>; and
- Additional CCTV to cover stabling sidings area, as specified by PTV and V/Line.

**The concept design drawing for Stage 1a and 1b is included in Appendix 4.**

## 3.3 Ultimate Development

The Ultimate facility design and any development stages leading up to the ultimate design 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 with minimal need for re-working of the initial works previously undertaken under Stages 1a and 1b. The actual scope of the Ultimate Development 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; and
- Motive power technology.

At a high level, the Ultimate Development 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 platform 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 up to 20 longer consists and related servicing equipment;
- Possible extension of signalling to control internal movements to and from stabling sidings;
- Extension of the Train Maintenance Workshop building to accommodate longer consists;
- Expansion of the Train Maintenance Workshop building to provide additional parallel tracks;
- Adaptation of the Train Maintenance Workshop facilities to maintain locomotives (if applicable);
- Adaptation of a Train Maintenance Workshop track for commissioning new trains or special projects;
- Extension of the heavy cleaning platform and awning to accommodate longer consists;

- Extension of the Train Maintenance Workshop external track for an underfloor wheel turning lathe;
- Expansion of the Train Maintenance Workshop stores building;
- Expansion of staff amenities and training facilities;
- Provision of contract train cleaners store and amenities building;
- Provision of train crew administration facilities; and
- Expansion of staff car parking.

The concept design drawing for the Ultimate Development is included in Appendix 4.

## 4 Summary of Key Ancillary Facilities

In addition to the principal facilities and structures generally referred to in the report, the concept design also facilitates provision of various other important facilities and equipment, including:

### 4.1 Communications

Communications facilities include:

- CCTV;
- Security and access control;
- Public address in specific areas;
- WiFi access
- Phones and computer systems; and
- Alarms.

### 4.2 Lighting

Flood lighting is intended throughout the facility to provide both security of the asset and safety of personnel. The lighting should be designed with suitable cut-offs, screening and glare suppression to minimise impact on adjacent land use and be arranged in such a way that it can be sectionalised and controlled for most effective and efficient use.

### 4.3 Mechanical Services

Mechanical services facilities include:

- General lighting and power;
- Water and fire services;
- Sewerage and train toilet system; and
- Diesel fuel service pumps.

## 4.4 Road Vehicle Movements within the Depot

The main access gate to the site is provided at the east end of the facility and all entries and exits, including staff access and all deliveries by service vehicles, should be routed through this entrance gate. An emergency access / exit gate is provided at the western end of the site for use by emergency vehicles, if required.

The road layout is designed to limit the need to cross tracks.

Appropriate access is provided for emergency vehicles to the workshop, stabling tracks and main parts of the facility.

Adequate parking space for cars and two-wheeled vehicles is provided for both maintenance and operations staff and visitors. Parking has been located in order to minimise walking time to and from work points.

Visitors and administration office personnel should be directed to the relevant area and dedicated car park after checking, identification and registration at the main access gate.

## 4.5 Pedestrian Movements within the Depot

At a later stage of design, adequate access and pedestrian footpaths should be provided to minimise the amount of walking required, and to provide for personnel safety.

# 5 Safety and Security Arrangements

Safety and security should be given the highest reasonable level of attention to protect maintenance and operating staff from any hazards that may exist throughout the facility. Reasonable security measures should be provided to protect the physical asset from fire, theft and intrusion. A safety plan should be developed later to identify and mitigate identified hazards, in line with the Operator's Safety Management and Security Plan.

## 5.1 Safety Aspects

Adequate, safe personnel access routes are provided to enable safe and efficient movement within the facility for normal operations and for emergency evacuation. Such access routes include routes between stabled trains, routes adjacent to tracks and cross-track walkways and rail/road crossing protection.

After due risk assessment, areas where there is potential danger to personnel should be fenced off, or guardrails and warning signs erected as necessary in accordance with applicable safety standards.

A Fire Alarm System should be installed, and fire-fighting and emergency equipment provided at appropriate locations throughout the depot.

## 5.2 Security Measures

The entire facility compound is completely fenced. Road access is provided by a single entrance only. All entries and exits, including pedestrians and deliveries by service vehicles, should proceed through this entrance gate, controlled by security personnel.

- Flood lighting is proposed within the compound for the following areas:
- Remote controlled entrance gate on the arrival tracks, interlocked with the signalling system;
- Perimeter fencing;
- Stabling tracks;
- Servicing tracks;
- Fuel storage area;
- Outdoor storage areas;

Road and rail apron areas at workshop entrances;

Workshop store;

- Level crossings; and
- Security checkpoints.

Intrusion alarms for key areas are recommended; CCTV is proposed with surveillance covering the perimeter fencing, gates, fuel storage area, stabling sidings, and the entrances to the workshop facility, amenities buildings, equipment storage sheds and service facilities.

It is suggested that the perimeter security arrangements referred to above be reviewed at a later stage of development to determine if a more intensive plan is required.

## 6 Stakeholder Consultation

Stakeholder consultation was facilitated by Opus Rail providing PTV with a draft layout drawing of the ultimate facility, which was then made available to V/Line. A meeting was held on 21 July 2015 at PTV attended by V/Line representatives. V/Line had many comments, but mainly relating to the fit-out of the Workshop building, which was not part of the SOW for this project.

The V/Line representatives advised that they and their vehicle maintenance contractors (Bombardier) had reviewed the concept design and accepted the logic proposed for train processing including, stabling, servicing and maintenance. The only concern expressed related to the proposed positioning of the Biowash being on the same track where heavy internal train cleaning is proposed. It was stated that on the Melbourne – Geelong railway line “track kill” of animals such as kangaroos and sheep is a frequent occurrence (even daily), and the Biowash should be part of the series progression for arrival trains. It was agreed that the Biowash would be placed immediately before the external train wash and the design was revised accordingly.

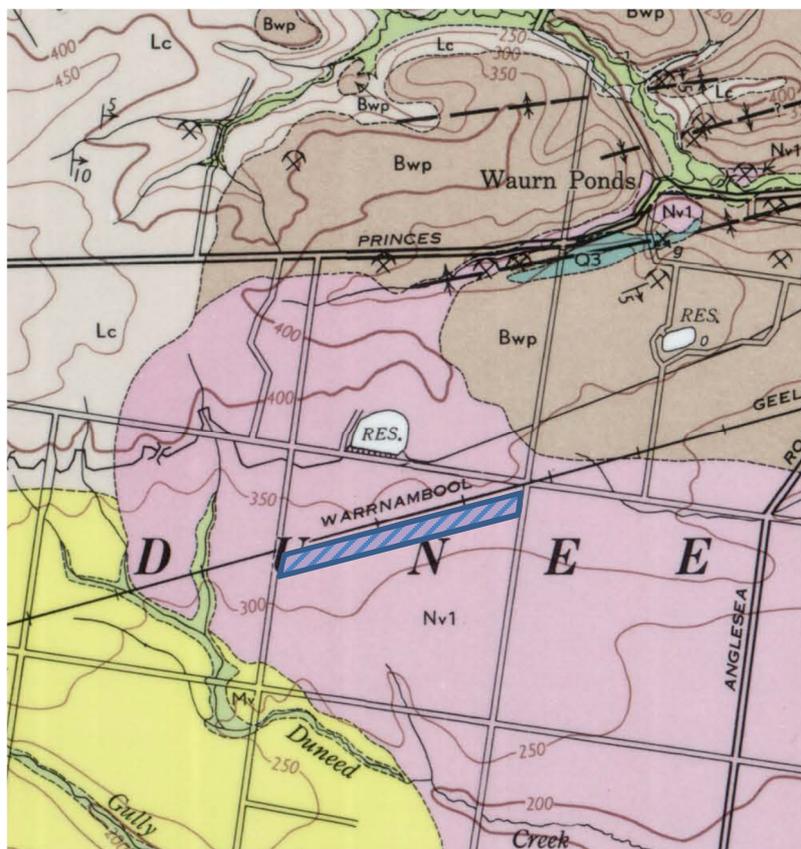
## 7 Geotechnical and Environmental

The site is reasonably flat and open. Clear separation from future developments on the south and north side is recommended. The objective is to minimise any noise and lighting impact on adjoining developments. Mounding and tree planting around the facility boundary is proposed and included in the cost estimate for both Stage 1 and the ultimate layouts.

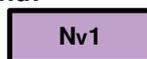
A desk-top analysis of Geotechnical, Flora and Fauna and Heritage was undertaken to identify any obvious constraints or issues associated with the proposed site and near-by areas.

### 7.1 Geology and Engineering Properties

The proposed location for the Maintenance and Stabling Facility between Pettavel Road and Bogans Lane is shown below on the extract from the Geelong geological map.



Legend:



Nv1

Nv1

**Newer volcanic.** *Iddingsite labradorite basalt, Olivine labradorite basalt, Olivine basalt (Ballan type)*



Mv

Mv

**Moorabool Viaduct Sands.** *Calcareous sand, clayey sand, quartzite, ferruginous sand and gravel (pelecypods, gasteropods, leaf impressions)*



Bwp

Bwp

**Waurm Ponds Limestone.** *Limestone, marl – richly fossiliferous pelecypods, gasteropods, polyzoa, foraminifera*



Lc

Lc

**Arkose, coarse felspathic, sandstone, shale, mudstone – containing plant fossils**



**Proposed location of V/Line Waurm Ponds Maintenance and Stabling Facility.**

The area is covered by a newer volcanic basalt flow, which is characterised by basaltic clay soil overlying variably weathered basalt and fresh basalt rock. The upper soil layers could also contain some sedimentary deposits from the erosion of the Barrabool Hills. These deposits are likely to be intermixed with upper level basaltic clays and humus after years of farming.

Basalt boulders may be encountered in the soil, although farming of the area is likely to have removed the shallow boulders. The variously weathered basalt rock can range from highly decomposed basalt to slightly decomposed and fresh basalt. The surface of the basalt rock is likely to be irregular.

### 7.1.1 Building foundations and track subgrade

The basaltic clay that is expected to overlie the rock for a depth of one to two metres is likely to be reactive, i.e. moisture sensitive and prone to swelling and shrinkage as a result of seasonal changes in moisture content. The soil is likely to transition from completely decomposed basalt to moderately decomposed and fresh basalt at varying depths. Deep beam and slab foundations may be suitable to resist the swelling and shrinkage of the clay; alternatively, if the basalt rock surface is shallow, the rock surface can be regulated with blinding concrete for construction of slab foundations on rock. Reinforced concrete piers can be used if the rock profile is deeper.

It might be economical to lime-stabilise the basaltic clay to a suitable depth on some parts of the site, e.g. below the replenishment service tracks and stabling sidings, in order to minimise moisture sensitivity of the clay, or the basaltic clay can be removed. Excavated clay can be used to form mounds along the site boundaries for noise and visual screening. Untreated basaltic clay is not a suitable formation or subgrade material.

The basalt flow that covers the site overlies Tertiary Moorabool Sands, which are evident to the south and west of Mount Duneed Road. The basalt flow that covers the area of the proposed Maintenance and Stabling Facility is expected to be of the order of fifteen to 20+ metres thick in that area, similar to the basalt flow overlying Moorabool Sands at South Geelong Tunnel. The flow is likely to consist of solid rock at depths of one to two metres from the ground surface.

### 7.1.2 Recommended geotechnical investigations

The variety of optional treatments to suit possible site conditions and varying structural requirements highlight the need for a preliminary geotechnical investigation to confirm the soil properties, depth to rock, degree of weathering and profile of the rock surface for preliminary design. A detailed geotechnical investigation should then be conducted for detailed design of building foundations and specifying a suitable subgrade for the track formation.

### 7.1.3 Other local geology and resulting planning restrictions

The area to the north-east of the proposed site has been considered for possible alternative locations to the preferred site for the Maintenance and Stabling Facility. The geology of that area, on both sides of the Geelong – Warrnabool main line, consists of Tertiary Barwon Group Waurm Ponds Limestone and the area is zoned Special Use Zone – Schedule 7 (SUZ7) under the Greater Geelong Planning Scheme.

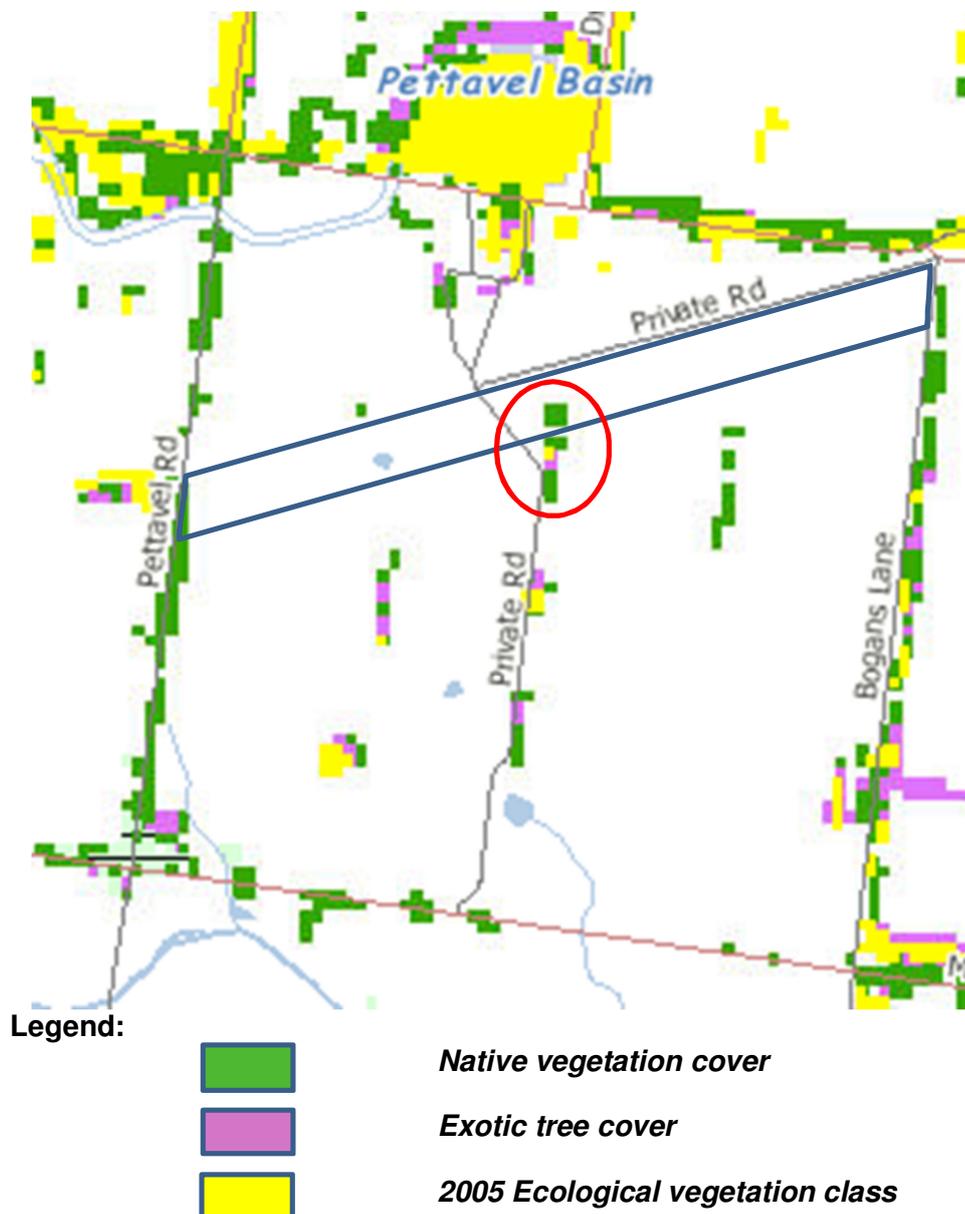
The Planning Ordinance for Schedule 7 to the Special Use Zone relates to Earth and Energy Resources Industry, in this case, Earth Resources, operated by Blue Circle Southern Cement (Boral). Whilst a railway is a permitted use on the land zoned SUZ7, e.g. loading sidings for cement trains, a transport terminal is a prohibited use. The value of the limestone resource and the current zoning makes these sites unrealistic alternatives to the currently preferred site.

A rezoning of unmined SUZ7 land to PUZ4 for railway usage is likely to be opposed by Blue Circle Southern Cement, as other options exist. The City of Greater Geelong could be approached for an authoritative view on this interpretation, if necessary.

## 7.2 Environmental and Heritage Considerations

### 7.2.1 Vegetation

The vegetation map below has been compiled and copied from the former DSE website.



Pettavel Road at the western extremity of the proposed site has a Vegetation Protection Overlay-Schedule 1 (VPO1) on the Greater Geelong Planning Scheme and is deemed a Significant Roadside and Linear Reserve to protect remnant species and flora and fauna habitat that may be found on the road reserve. Care should be taken to avoid interference with the vegetation on the reserve during the development and operation of the Maintenance and Stabling Facility.

A study of data on the former DSE website and examination of aerial photographs show that the natural vegetation has been almost totally cleared from the farmed area on and near the proposed Maintenance and Stabling Facility site, with the exception of a small clump of native trees and plains grassland that is incorporated in a line of cypress trees that form a windbreak on the affected property. The clump of native trees is indicated in yellow on the map above.

The nearest edge of the ecological vegetation is fortuitously 5m outside the proposed Maintenance and Stabling Facility site to the south of the proposed boundary fence; however, care will be required in design and construction of the Facility to avoid any changes on the construction site that might affect the native vegetation, e.g. changes in water flow, including subsurface water and damage to tree roots. It is also noted that native vegetation cover is indicated in green within the site for the proposed Maintenance and Stabling Facility; however the area is not directly impacted by the first stage track layout or amenities.

The *Melaleuka Armilaris* is a remnant native shrub found to the north of Reservoir Road and east of Bogans Lane. Such remnant species could be affected if other locations for the Maintenance Facility were adopted

The above aspects should be pursued with the Department of Environment, Land, Water and Planning during preliminary design to ensure that the design satisfies the Department's requirements.

### 7.2.2 Fauna

There are several threatened species of fauna *that* have been sighted within about five kilometres of the proposed Facility. The threatened species include:

- Yarra Pygmy Perch - *Microperca yarrae*, *Nannoperca obscura*, *Edelia obscura*, *Paradules obscura* – small freshwater fish inhabits Waurm Ponds Creek within 3km to the north and east of the Facility site.
- Blue-Billed Duck – *Oxyura australis* – vulnerable aquatic, seldom seen on land, sighted on Pettavel Basin wetlands to the north of the Reservoir Road.
- Musk Duck – *Biziura lobata* – only living member of the genus Biziura, Pettavel Basin wetland.
- Grey Goshawk – *Accipter novae hollandiae porzana pusilla palustris* – sighted in the region.
- Eastern Grey Egret – *Ardea modesta* – sighted in the region and near Duneed Creek to the south of the site.

The presence of the species needs to be respected, but the species should not be directly impacted by the proposed works provided dust and site water runoff is suitably controlled and water quality requirements are addressed before discharge to water courses.

### 7.2.3 Heritage

There are no items of heritage significance shown on the Greater Geelong Planning Scheme near the proposed Maintenance and Stabling Facility site. The area is zoned Farming Zone and appears to have been used for that purpose since the land was settled by Europeans in the early 1800s.

Land clearing and the intensive farming and cropping has disturbed the soil to an extent that remnant heritage articles are unlikely to be found on the site. Aboriginal heritage items are more likely to be found nearer to Armstrongs Creek.

## 8 High Level Cost Estimate Assumptions

### 8.1 General

#### 8.1.1 Earthworks and Drainage

**Assumptions:** The earthworks and drainage costs allow for the conditions that are likely to be encountered in the area. It is assumed that the selected area will be naturally well-drained and not swampy. The existing ground condition is suitable for construction of the proposed facility.

**Earthworks:** The basaltic clay that is expected to overlie the rock for a depth of one to two metres is likely to be reactive and either require removal or treatment. It might be economical to lime-stabilise the basaltic clay to a suitable depth on some parts of the site. Excavated clay can be used to form mounds along the site boundaries for noise and visual screening. Untreated basaltic clay is not a suitable formation or subgrade material. It is estimated that some fill material will be required to be brought in to balance the earthworks on site.

**Drainage:** The basis for the estimate is to provide:

- Open catch drains at top of batters;
- Open table drains at the toe of batters;
- Track subsurface drainage every second track;
- Kerb and channel on access roads and car parks if the fall requires. At this stage we have assumed kerb and channel on the edge of road and car park pavements; and
- An underground, piped, storm water drainage system.

All drainage, other than from roofs, will be fed into storm water drainage system. Allowance has been made for underground pipes along both long sides of the depot, a retention basin and sullage separation pit. Runoff from roofs is proposed to be collected in rainwater tanks for use in toilets and nearby gardens.

Excavation for storm water drainage pipes could encounter basalt rock material and the unit rate per metre of pipe has been raised in consideration of such conditions occurring below the nominal cut surface for the general yard.

### 8.1.2 Trackwork

Trackwork costs have been based on the use of new materials for ballast, sleepers, rail and turnouts. Some cost savings could be made if serviceable materials are available for use, instead of new.

The track estimates should be reasonably accurate and the 30% contingency should be a generous allowance for possible changes in the track layout, track lengths and turnout requirements.

### 8.1.3 Maintenance Facilities and Amenities

The maintenance facilities and amenities costs have been based on costs of previous similar facilities, including Ballarat East Depot, Geelong Loco Depot and South Dynon Carwash Facility.

### 8.1.4 Fuel Storage

It is noted that the storage at South Dynon comprises two 550,000 litre tanks; however the tanks are huge and would be difficult to screen or set below ground level, with maintenance vehicle access.

The concept layout and estimated cost of the fuel storage facility are based on ten 100,000 litre tanks, each say 6.5 m diameter and 3.5 m high (height to diameter ratio yet to be optimised). Consideration could be given to setting the fuel storage partially below ground level on solid rock for safety and aesthetic reasons.

A suitable configuration needs to be resolved.

## 8.2 Estimated Costs

The high level cost estimates are included in Appendix 2.

Total estimated cost for development of Stage 1a (including PTV standard on-costs) is Deleted - Confidential

Deleted - Confidential

Total estimated cost for development of Stage 1b (including PTV standard on-costs) is Deleted - Confidential

Deleted - Confidential

Total estimated cost for the Ultimate extension (including PTV standard on-costs) is Deleted - Confidential

Deleted - Confidential

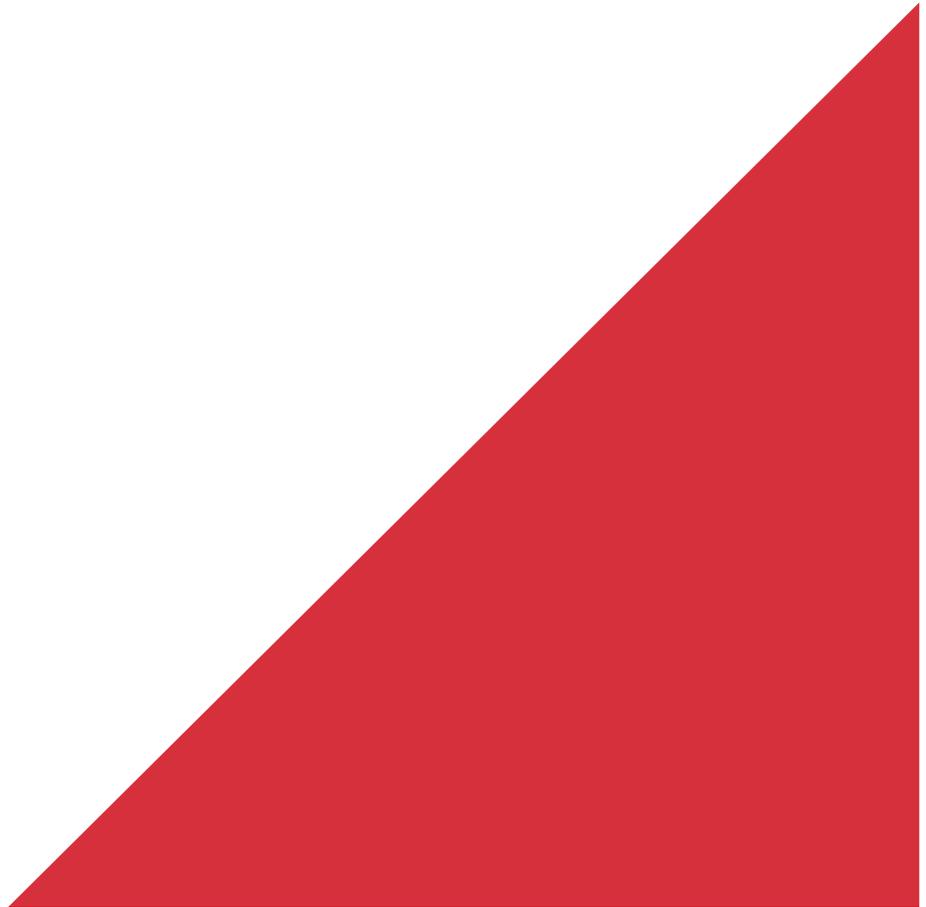
The cost estimate does not include land acquisition.

## 9 CAD & GIS Data Requirements

- CAD plans and data are provided to PTV to be used in accordance with the Project Brief.
- PDF copies are similarly provided.
- CAD plans and data are in Microstation format.
- Master units are provided in metres.
- All drawing content is provided in default view.
- All data in the default view is provided in accordance with the Project Brief.

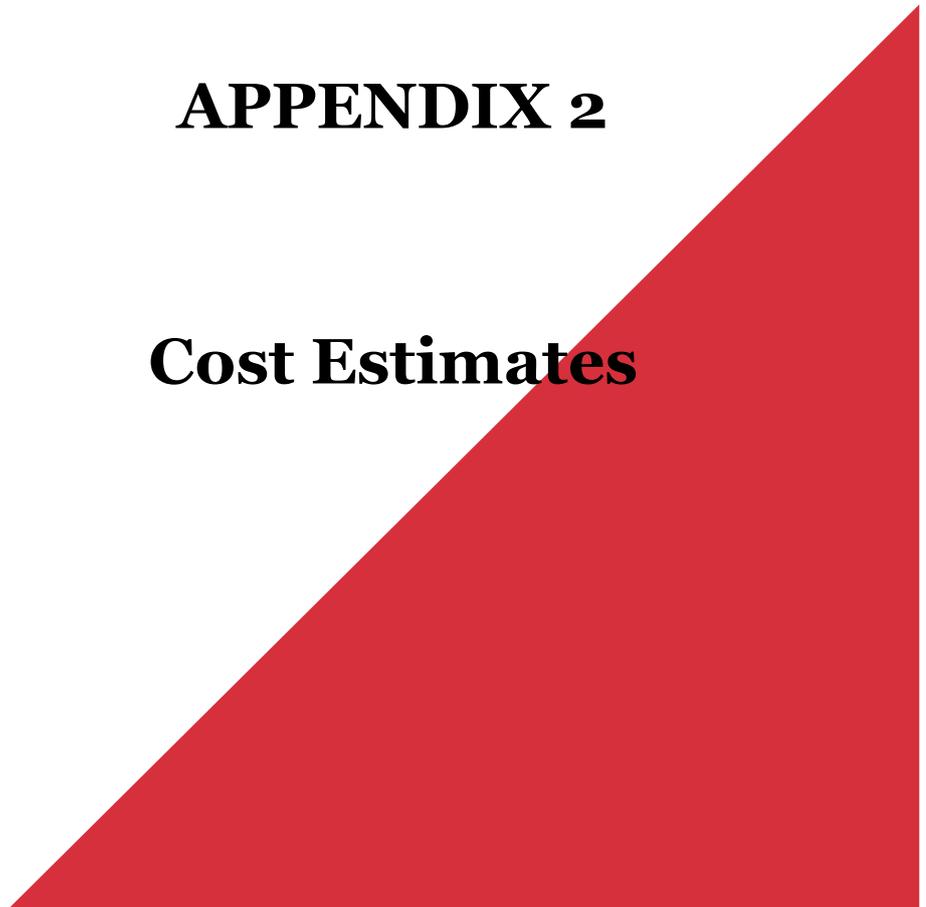
# **APPENDIX 1**

## **Concept of Operations (COO)**



# **APPENDIX 2**

## **Cost Estimates**



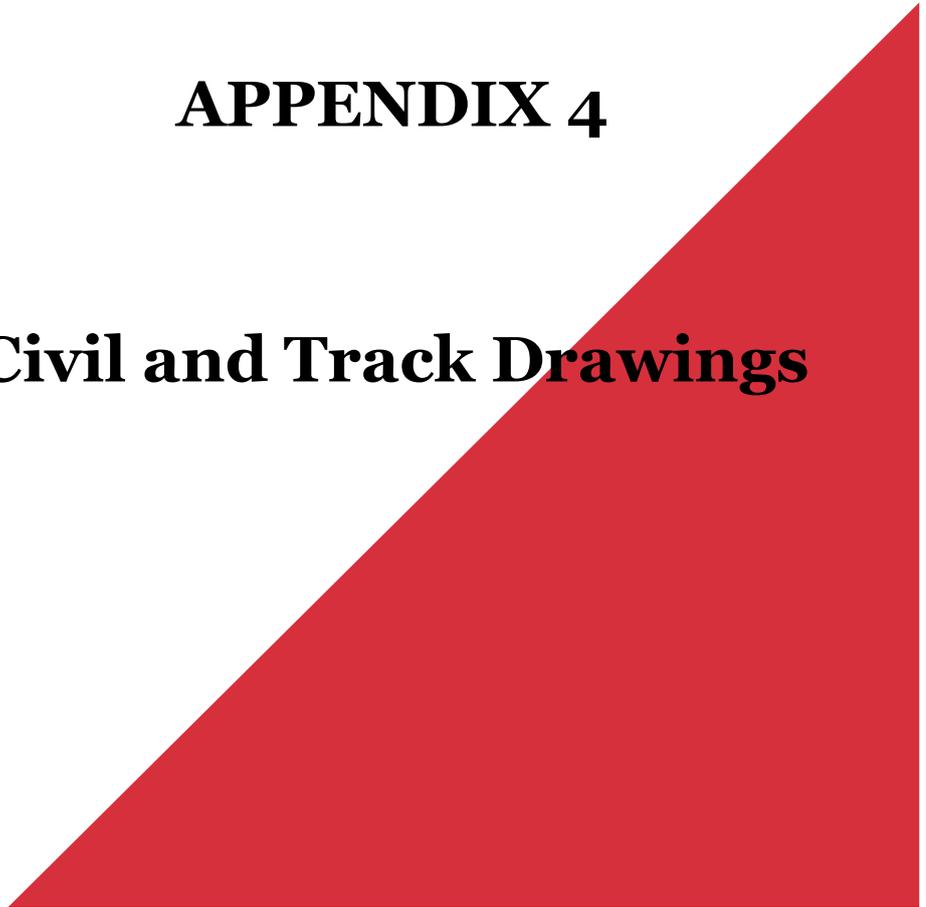
# **APPENDIX 3**

## **Signalling Scheme Plan**

### **Stages 1a and 1b**

# **APPENDIX 4**

## **Civil and Track Drawings**







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