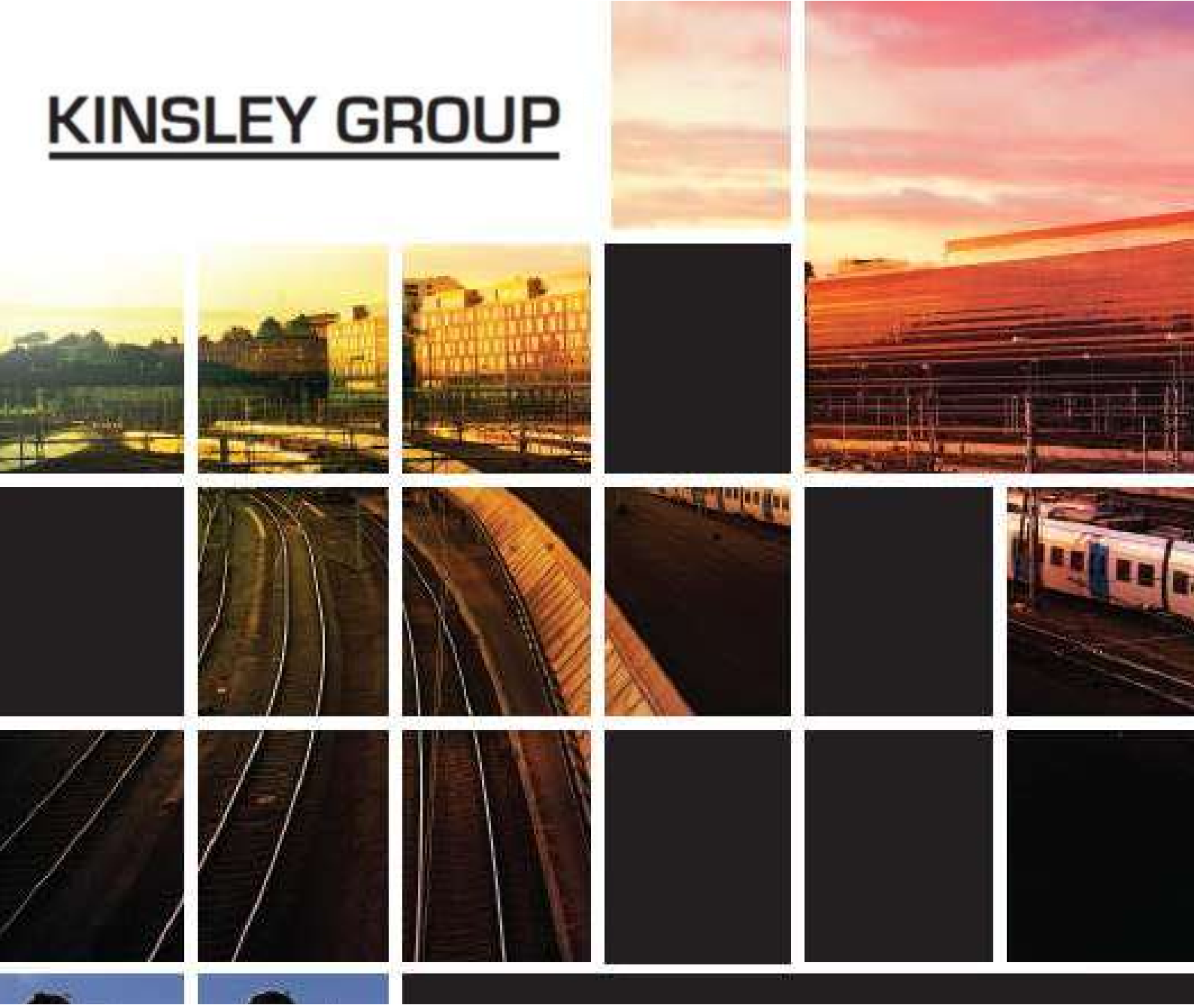
KINSLEY GROUP

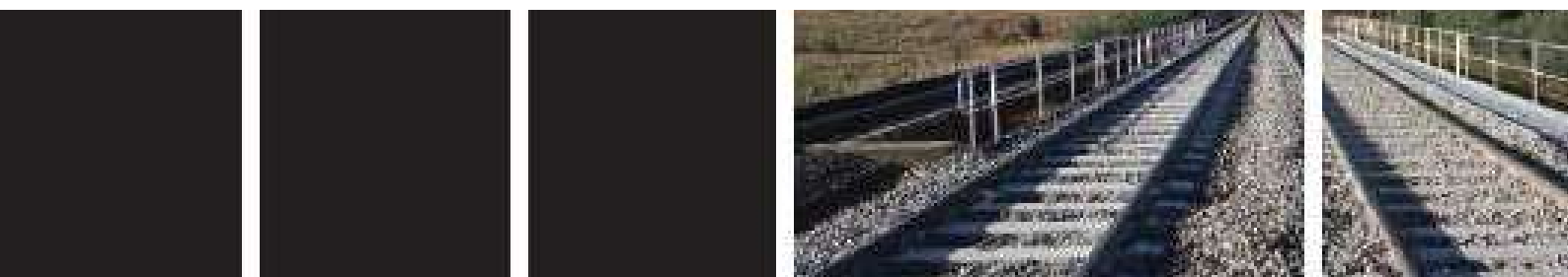


Ballarat Platform 2 Replacement

1891-REP-X0001 - Engineering Design Report

Information Security Classification: OFFICIAL - Sensitive

Revision	Description of Changes	Prepared	Checked	Date
A	Concept Design – Issue for Review	M Johnstone / J Wade	A Sim	17/09/2025
B	Preliminary Design – Issue for Review	N Jarvis / J Wade	T Zhou	07/11/2025



CONTENTS

1 INTRODUCTION

V/Line has engaged Kinsley Group to undertake site investigations and prepare the detailed design documentation to modify the Up End section of Platform 2 at Ballarat Station.

Rolling stock movements through the diverging route of Points 35DW into the Independent Siding Track are currently striking the Up end of Platform 2. This conflict arises from a non-compliant platform offset, which prevents the Independent Siding Track from being operational. To resolve this issue and restore safe functionality of the siding, replacement of the Up end section of Platform 2 is required.

The purpose of this design report is to provide the following information associated with the replacement works for V/Line's review and approval.

- Outline of the design scope of works.
- Provide details of the existing site arrangements.
- Outline the site investigations completed to date.
- Details of the design inputs, design standards, design criteria, deviations from standards and design deliverables.
- Provide an overview of the Safety-In-Design process followed for the project delivery.

2 SCOPE OF DESIGN WORKS

An outline of the design scope of works delivered for the project is provided below:

- Site inspection.
- Feature survey.
- Services investigation.
- Geotechnical investigation.
- Soil contamination investigation.
- Preparation of detailed design documentation.
- Preparation of an engineering design report to support the drawing documentation.
- Preparation of Engineering Change Notification.
- Facilitation of Safety-In-Design (SiD) Risk Workshops with relevant stakeholders.
- Preparation of DMS-compliant as-built drawing documentation.

3 EXISTING SITE CONDITIONS

Ballarat Railway Station is a major regional transport hub in Victoria, located approximately 119km from Southern Cross.

The station comprises two single-face platforms with three broad-gauge tracks running in an east–west orientation, which are Heritage protected. Platform 1, located on the southern side, serves Track 1 (Road 1), while Platform 2, on the northern side, serves Track 3 (Road 3). Both platforms are approximately 250 m in length. At the Up end of the station, crossover points 35UW/DW connect Tracks 2 and 3, to enable trains to arrive into and depart out of Platform 2.

The Ballarat Station Pit, Points and Siding Yard Renewal Project, completed in 2023, included the renewal of all tracks within the Ballarat Station Pit and Up end yard. As part of these works, life-expired secant turnouts were replaced with tangential turnouts on concrete bearers to improve the long-term performance of the yard. This scope involved removing an existing 1 in 8.7 secant turnout at the Up end of Platform 2, with its toe located approximately 4 m into the platform extent. To enable a minimum operating speed of 40 km/h, 1 in 9 tangential turnouts were proposed. To accommodate the larger tangential turnouts, the toe of Points 35DW was positioned approximately 9 m into the Platform 2 extent. While the through route of Points 35DW achieves the required platform offset clearance, the diverging route does not comply with the minimum offset requirement due to increased centre-throw effects of rolling stock operating through Points 35DW and into the Independent Siding Track. As a result, this has led to rolling stock striking the Up end of Platform 2, when utilising the Independent Siding Track.

An aerial view of the station is provided below in Figure 1.

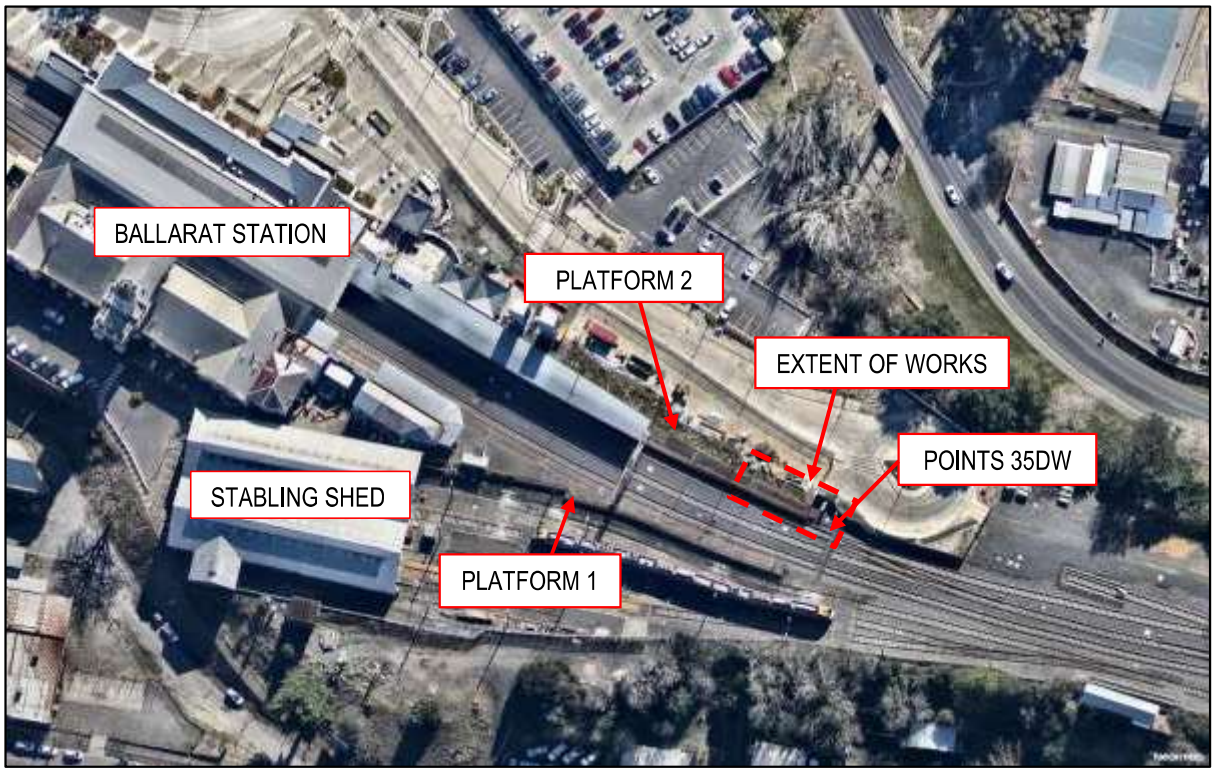


Figure 1 – Aerial view of Ballarat Station.

3.1 Existing Track

A summary of the existing track and operational details for Ballarat is provided below for interface with Platform 2.

Line Speed:

- Track 1, 2 and 3 - 40km/h throughout the station (Class 2 Track).
- Independent Siding Track - 15 km/h (Siding Class).

Track Structure:

- Track 3 - 60kg/m rail, Independent Siding - 47kg/m rail.
- Track 3 - Full-depth concrete sleepers, Independent Siding – low-profile concrete sleepers
- Track 3 - 200mm ballast depth, Independent Siding Track - 150mm ballast depth

Turnouts/Crossovers:

A summary of the existing turnout arrangement is shown in the table below.

Table 1 – *Existing turnout summary*

Turnout No.	*Location*	*Details*	*Operation*
Points 35UW	Toe of points located 50m Up end of Platform 2 Track 2 diverges onto Track 3	1 in 9 tangential turnout, R250, 60kg/m HH, concrete bearers	Automatic
Points 35DW	Toe of points located 9m into Platform 2 Track 3 diverges onto Independent Siding Track Track 3 through move connects into Track 2	1 in 9 tangential turnout, R250, 60kg/m HH, concrete bearers	Automatic

Track Geometry:

At the immediate Up end of Platform 2, Track 3 follows the geometry of Points 35DW, comprising tangent track for the through route and a 250 m radius for the diverging route. Beyond the toes of Points 35DW, Track 3 transitions into a horizontal curve of 700 m radius, aligning with the curvature of the platform. There is no applied cant on Track 3 through Platform 2.

3.2 Rolling Stock Operations

The rolling stock utilising the diverge route of Points 35DW at the Up end of Platform (i.e. Track 3 into Independent Siding Track are the following heritage trains operated by Steam Rail Victoria:

- BW Car – Plate B as per SAFO-111
- Overland/Vinelander JS Car – Plate A as per SAFO-111

Plate A has been adopted for the rolling stock operating through Track 3 and into Track 2 (through move of Points 35DW), based on VLocity train envelope.

Following engagement with Steam Rail Victoria, it has been confirmed the following:

- All Steam Rail Victoria rolling stock fit within Plate A and B envelopes

- Steam trains more than 300m (weekend operation to Wycheproof) stop at Ballarat Station Platform 2.
- Steam trains typically arrive and depart via the Independent Track, stabling upon arrival. Under this operating scenario, therefore, the full platform length—including the direct Up end of the platform is utilised for passenger disembarkation and boarding. However, any doors near gaps or curves in the platform are always managed by the Train Officers assigned to each car per our normal processes. Refer to Appendix H for email correspondence from Steam Rail Victoria.

3.3 Existing Station Platform and Clearances

Platform 2 at Ballarat comprises of a bluestone coping, with brick and bluestone blocks for the platform face. These platforms are heritage listed, and any modifications will require Heritage Victoria approval. Details of the two platforms include the following:

Table 2 – *Existing station platform details*

Platform / Track No.	*Platform Length (m)*	*Coping Type*	*Wall type*
Platform 2 (Points 35DW / Track 3)	242	Bluestone	Masonry brick and bluestone blocks

Key details of the platform at the Up end of Platform 2 include:

- The Up end of the platform is not used by regular V/Line services with the 6-car VL train stop mark located approximately 60m from the start of the platform. SteamRail Victoria, however, does run trains up to 300m and do have passengers board the train from the direct Up end of the platform. However, as described in Section 3.2, the steam trains typical operate via Independent Siding Track (diverge route of Points 35DW)
- Trackside platform consists of bluestone coping (depth ~170mm), two courses of brick (depth ~150mm), and three large bluestone blocks (depth ~350mm). Refer to Appendix C for the dimensions of the platform face.
- There is no coping overhang for the first 4-5m of the platform. Further into the platform coping overhang is present with approximately 40-90mm present directly Dn end of toe of Points 35DW.
- The width of the platform at the immediate start of the platform is approximately 2500mm from the coping edge to the rear platform fenceline. The width of the platform tapers out to ~2700mm about 5m into the platform extent.
- The rear platform consists of bluestone coping with a brick wall. The depth of the rear wall extends down ~1400mm from the top of the coping.
- The end of the platform consists of an in-situ concrete wall, with steel rail/bollards embedded into the concrete where the end of the platform fence is located

The existing horizontal offsets for the first 6 m of Platform 2 are summarised in Table 3 below.

Table 3 – *Existing platform 2 clearances*

	Through Track Pts 35DW			*Diverge Track Pts 35DW / Track 3*			*Vertical Offset (m)*
Platform Chainage (m)	*Horizontal Offset*			*Horizontal Offset*			
	Perpendicular offset (m)	*Curve effects (m)*	*True offset (m)*	*Perpendicular offset (m)*	*Curve effects (m)*	*True offset (m)*	
0	1.678	0.001	1.679	1.446	0.1304	1.316	0.956
1	1.679	0.001	1.680	1.474	0.1304	1.344	1.022
2	1.681	0.001	1.682	1.503	0.1290	1.373	1.052
3	1.695	0.001	1.696	1.544	0.1260	1.417	1.060
4	1.698	0.001	1.699	1.575	0.1210	1.453	1.069
5	1.692	0.001	1.693	1.596	0.1140	1.481	1.075
6	1.669	0.001	1.670	1.600	0.1050	1.494	1.074

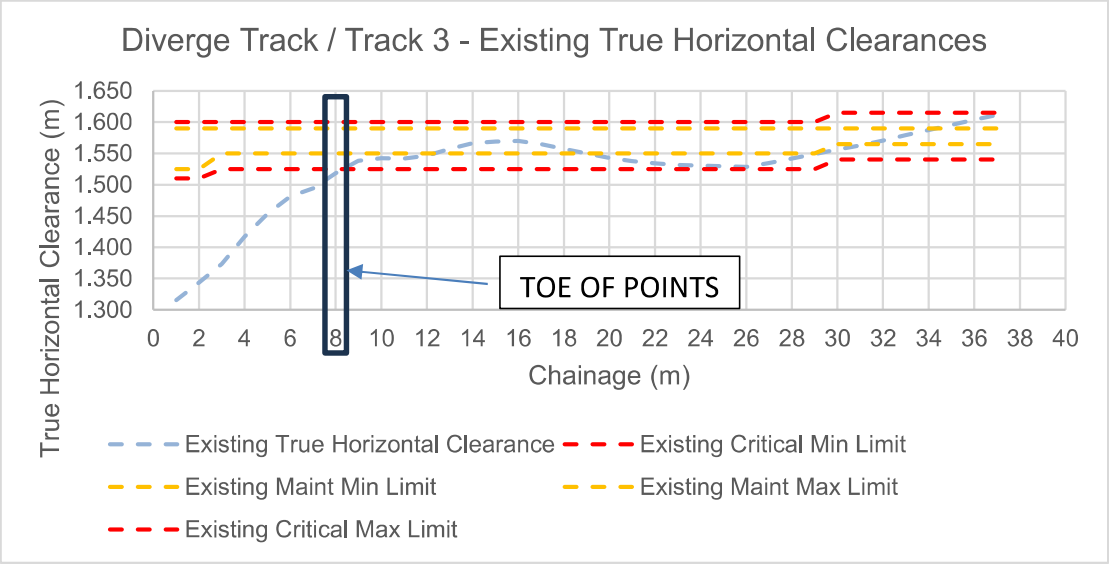


Figure 2 – *Existing Horizontal Platform 2 Offsets Measured from Diverge Track Points 35DW / Track 3*

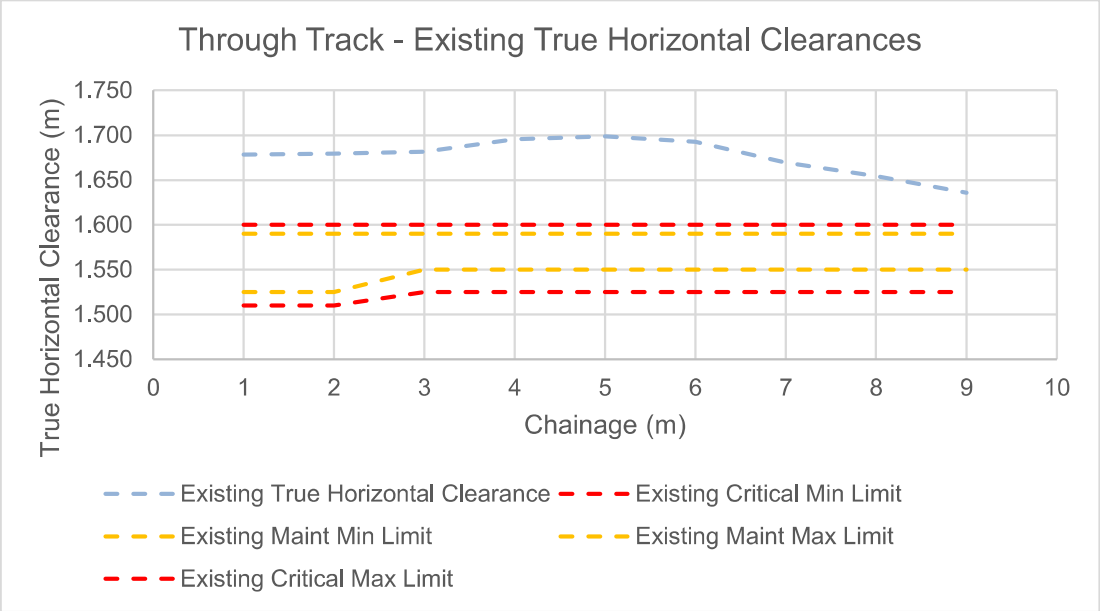


Figure 3 – *Existing Horizontal Platform 2 Offsets Measured from Through Track Points 35DW*

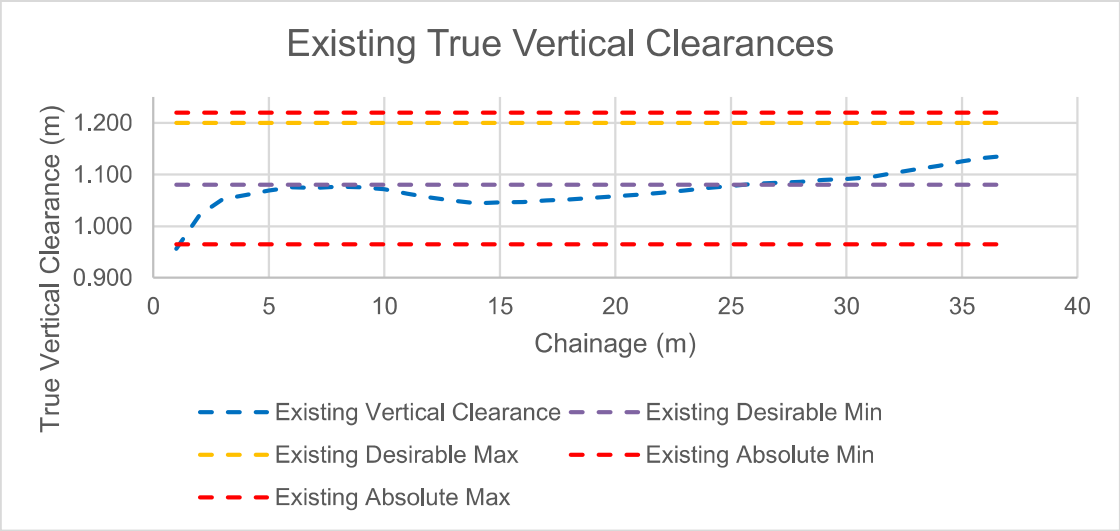


Figure 4 – *Existing Vertical Platform 2 Offsets*

3.4 Existing Platform Fencing

The existing platform fencing located at the Up end of Platform 2 consists of the following:

- A 2400 mm high ARC Garrison fence is installed along the rear of the platform. The fence posts are founded on concrete footings positioned close to the bluestone coping at the rear edge. At the Up end of the platform, where the platform width tapers and available space is limited, the end fence post is welded to the Up end platform fence and to a rail bollard embedded within the platform. Refer to Photo 5 for details.
- A 1200 mm high ARC Garrison fence is installed at the Up end of the platform. The fence is welded to two rail bollards embedded into the platform. Refer to Photo 5 for details.

3.5 Site Photos

Photographs of the site are provided below for further clarity of the existing site conditions.

Photo 1

View of Platform 2 and Track 3, looking towards the Up end.

Photo 2

Close-up view of the Up end of Platform 2.

Photo 3

View of rolling stock striking the face of Platform 2.

Photo 4

View of the end of platform 2 maintenance stairs and service area

Photo 5

View of the end of platform 2 maintenance stairs and platform fencing connection

Photo 6

View of the fencing connection at the Up end of the platform (rear of platform)

Photo 7

View of the Up end of the platform /rear of platform (looking in Up direction)

Photo 8

View of the rear brick platform wall, noting 1400mm depth to wall footing.

Photo 9

View of the rear brick platform wall

Photo 10

View of the Up end of Platform 2 (looking in Up direction)

Photo 11

View of the end of Platform 2 fencing and (looking in Up direction)

4 SITE INVESTIGATIONS

A series of site investigation works was conducted during the design development process. A summary of the investigations is provided below:

4.1 General Site Inspection

A general site inspection was carried out by the V/Line Project Manager on 24 October 2025 to verify the results of the feature survey and identify any site constraints or issues that could affect the design and construction phases of the project. Relevant dimensions and observations were recorded, including coping measurements, fence types and details, and retaining wall types and dimensions, to support the development of the design drawings.

4.2 Feature Survey

Kinsley Group engaged the services of Track Link Surveys to undertake a full feature survey of the platform structure and the surrounding topography of the site. The survey works are set to MGA and AHD datums in MicroStation format in accordance with PTV infrastructure drawing standards.

The following information was obtained by the feature survey:

- All track infrastructure and formation, including running edge of rails, top and toe of ballast, turn out and special work details.
- Sufficient existing surface levels through the area to capture the existing topography of the site and general features.
- All visible signalling equipment.
- All platform structural information.
- All service authorities' furniture with appropriate details/comments (pits, poles, etc)
- All structures including buildings, fences, lighting poles and platform furniture.
- All line marking and tactile ground surface indicators.

4.3 Services Investigation

As part of the design development process, a Dial Before You Dig (DBYD) enquiry was undertaken, along with a review of the VicTrack Rail Map database, to identify and locate existing underground services within the project area.

In addition, Kinsley Group engaged HR Utilities Subsurface Mapping to conduct subsurface utility scanning and surveying to validate DBYD findings and confirm the presence of any services that may influence the design. The verified service information has been incorporated into the design drawings for reference.

The key findings from the services investigation are summarised below:

- An existing 1x100 LV electrical conduit for signalling is located within the platform footprint (QL-B survey). The conduit alignment runs along the platform to the signalling pit at the Up end of the platform (adjacent to the location case). This service will be impacted by the platform works and will require reinstatement as part of the project scope.
- An existing north–south deep drainage underpass from the Yarrowee River intersects the Up end platform and rail corridor and is classified as QL-D (picked up from VicTrack Railmap). The culvert drain is significantly below the proposed works and will not be impacted. Historical

drawings (Appendix I) indicate approximately a 10 m level difference between the drain invert and top of rail.

Refer to Appendix B for service investigation information

4.4 Geotechnical and Soil Contamination Investigation

Kinsley Group engaged the services of Geotesta to undertake the geotechnical and soil contamination investigations at the Up end of Platform 2 at Ballarat Station to determine the subsurface conditions and parameters to inform the platform design. The geotechnical and soil investigations on site were completed on 13 October 2025.

4.4.1 Geotechnical Investigation

The scope of the investigation included the following activities:

Fieldwork:

- Drilling one (1) borehole to a maximum depth of 3m or refusal using a TEC 15 mini drill rig on the platform where the platform is proposed to be reconstructed.
- Drilling one (1) borehole to a maximum depth of 2m or refusal using a post hole digger on the track, adjacent to the proposed reconstructed platform.
- Dynamic Cone Penetrometer Test (DCP) test was undertaken next to each borehole to 2m depth or refusal to assess the consistency/ soil shear strength.
- Recovered soil samples bagged and returned to Geotesta's laboratory for storage and testing.

Figure 5 – *Site Plan with test locations*

Laboratory Testing Results

Table 4 – *Summary of Laboratory Test Results*

BH No.	*Depth (m)*	*Soil Type*	*W_n %*	*LL %*	*PI %*	*LS %*	*Fines %*
BH1	2.0	Silty CLAY	19.4	-	-	-	-
	2.5-3.0	Silty CLAY		46	28	12	45
BH2	0.9-1.0	Silty CLAY	24.4	-	-	-	-
	1.5	Silty CLAY		57	37	14.5	-

Note: Wn = Moisture content; LL = Liquid Limit; PI = Plasticity Index; LS = Linear Shrinkage

Footing Design

The estimated geotechnical design parameters of the soil material encountered based on the geotechnical investigation are presented below.

Table 5 – *Summary of Geotechnical Design Parameters* based on Investigation

Soil Type	*γ (kN/m³)*	*S_u (kPa)*	*C' (kPa)*	*φ' (deg)*
Silty/Sandy CLAY - Stiff	18	50	3	25
Silty/ Sandy CLAY– Very Stiff	19	100	5	28

Note: c' = Effective cohesion; φ = Effective friction angle; γ = Unit weight; Su = Undrained Shear Strength

The geotechnical investigation determined the allowable bearing capacities of the subsurface soils for the designed pad and strip footings. These values are summarised in the table below and apply to footings founded at least 200 mm into natural, very stiff clay or better, extending through any fill, topsoil, or tree roots.

Table 6 – *Allowable Bearing Capacity for Pad/Strip Footings*

Soil Type	*Allowable End Bearing (kPa) – Pad Footing*	*Allowable End Bearing (kPa) – Strip Footing*
Silty CLAY - Stiff	140	115
Silty CLAY – Very Stiff	220	180

Further details of the Geotechnical Investigation can be viewed in Appendix E.

4.4.2 Soil Contamination Investigation

The soil contamination assessment for waste classification/disposal was conducted as part of the geotechnical drilling program. The objective of the assessment was to classify potential soil for disposal in accordance with EPA Industrial Waste Resource Guideline Publications. Analytical results were compared to the new EPA Publication "Waste Disposal Categories, Characteristics and Thresholds Publication 1828.2 March 2021".

The field investigation work was completed on 13 October 2025 as part of Geotesta's Geotechnical Investigation "GE17559" and consisted of 4No. samples from 2No. locations.

The sampling and analysis program conducted indicates that soils on site can be classified as "**Category D**" in accordance with VIC EPA Publication 1828.3, September 2024, "Waste Disposal Categories, Characteristics and Thresholds Guideline". The material can be sent to a landfill that accepts Category D Priority Waste.

Further information and detailed analysis results can be viewed in Appendix F.

4.5 Planning Property Assessment

A desktop review of the property report for Ballarat Station has been conducted, revealing that the station and yard are listed on the Victorian Heritage Register. The project works are located within the heritage zone HO59, which is detailed as "Ballarat Railway Complex" VHR Number H0902.

V/Line has submitted a permit application to Heritage Victoria for construction works at the Up end of Platform 2 at Ballarat Station. The application is still being reviewed; however, based on similar projects (i.e. rebuilding platform with heritage façade) has typically been approved by Heritage Victoria. Confirmation of the permit will be detailed prior to IFC.

Refer to Appendix J for details of the planning property report.

5 DESIGN DEVELOPMENT

Details of the design inputs, standards, criteria, considerations, and deliverables associated with the design development are provided below for clarity on the design process and adherence to relevant design standards.

5.1 Design Inputs

The civil structural design has been developed utilising the following design inputs:

- V/Line's RFQ document.
- General site inspection (V/Line).
- VicTrack Railmap.
- DMS Drawings (Ballarat Station Pit, Points and Siding Yard Renewal Project and historical station plan).
- Feature Survey Data.
- Services Investigation.
- Geotechnical Investigation.
- Soil Contamination Investigation.
- Discussions with V/Line.
- SAFO-111 - Network Rolling Stock Approval Form.
- Existing platform measurements (Refer to Appendix C).
- Optioneering assessment for modification of Platform 2 (Up end).

5.2 Design Assumptions and Constraints

The design presented in this report is based on the assumptions listed below:

- Heritage Victoria will accept the proposed design (TBC).

The design presented in this report is based on the constraints listed below:

- Platform is heritage listed.
- Existing geometry for Tracks 2 and 3 is fixed and cannot be altered without a reduction in operating speed (<40km/h) or acceptance of non-compliant geometry.
- Existing track geometry and Points 37W / 35DW.
- Width of the platform.

5.3 Design Standards and Design Criteria

The detailed design drawings will be developed in accordance with the following design criteria:

- NIST-0001 Structural Gauge Envelopes.
- NIST-002.1 Railway Station Design Standard and Guidelines.
- NIST-012.2.1 Construction of Cable Route and Signalling Civil Works.
- NIST-2616 Railway Structures Design Requirements.
- NIST-2617 Transit Space.
- NIST-2618 Track Design.
- NIST-2659 Earthworks and Drainage.
- NIST-2705 Inspection and Assessment of Clearances
- NIPR-2695 Design Management Procedure.
- PTV-NTS-012 Network Technical Standard – Infrastructure Drawing Standards v6.0
- OPMG-18 Station Design Principles.
- AS1170 Structural Design Actions.
- AS2159 Piling – Design and Installation.
- AS2870 Residential Slabs and Footings.
- AS3600 Concrete Structures.
- AS4100 Steel Structures.
- AS5100 Bridge Structures.
- AS7636 Railway Structures.
- Disability Standards for Accessible Public Transport 2002 (DSAPT Standards).
- AS1428 – Design for Access and Mobility.
- CVL-EGN-2024-002 Platform Width and Slope
- TC-ENG-N-22002 Structural Gauge Envelopes for Specific Railway Infrastructure Intended to be Immediately Adjacent to the Railway.

5.4 Design Considerations

- **Platform Reconstruction Works –** The final 5.40 m section at the Up end of Platform 2 will be demolished and rebuilt to achieve compliant clearance between the platform coping edge the centreline of the nearest track (diverge route of Points 35DW).
- **Platform Coping Realignment –** A 7 m section of platform coping at the Down end of the newly reconstructed platform is to be realigned. The coping stones will be repositioned up to 15 mm further from the track to achieve horizontal platform clearances within the maintenance tolerances specified in NIST-2705. This will involve removing the existing asphalt and TGSI units behind the coping and reinstating them with new asphalt and TGSIs at the compliant offset.
- **Track Alignment Regression –** A regressed track alignment for (i) Track 2, (ii) Track 3 / Independent Siding Track and (iii) Points 35DW has been completed with horizontal regression within +-15mm and vertical regression within +10mm/-5mm.

  Refer to drawings BAT_C0772, BAT_C0773 and BAT_C0774 for horizontal and vertical geometry details.
- **Vertical Platform Clearance –** The design improves on the existing platform height, with the vertical clearance between the top of rail and the platform coping increased to 1080 mm at the end of the platform and tying into the existing ~platform height of 1050mm ~ 5.4m into the platform.

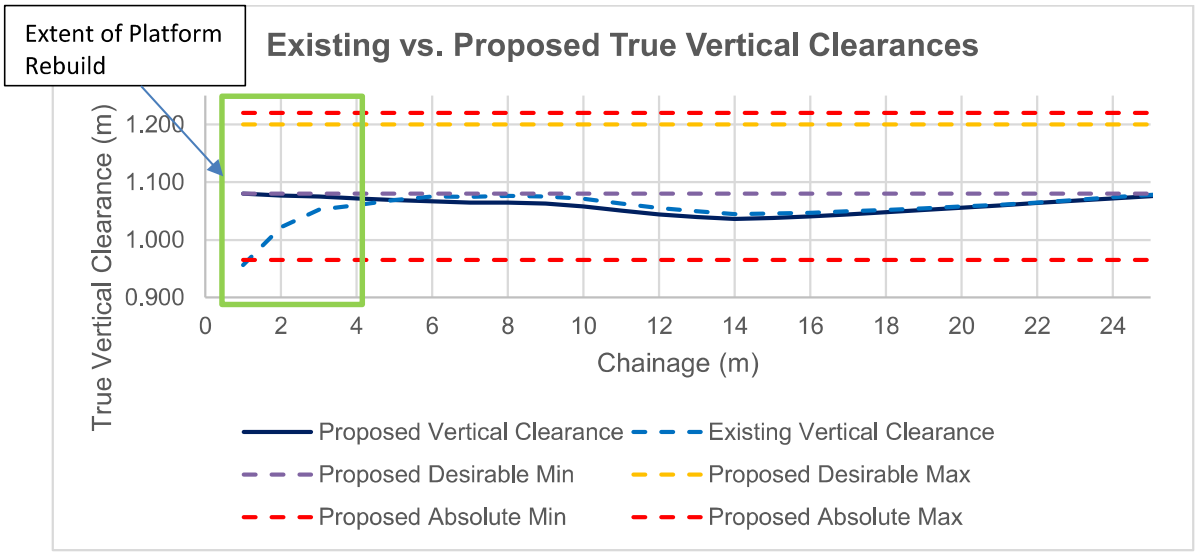


Figure 6 – *Existing vs Proposed Vertical Clearance – Up end of Platform*

- **Horizontal Platform Clearance -** As part of the platform reconstruction works, the design proposes to increase the horizontal clearance to the platform to mitigate platform striking for trains operating through the diverge route of points 35DW (Independent Siding Track). As a result, the first 5.4m of the platform alignment will be reconstructed to achieve compliant clearance. An additional 7.0m of the platform coping is proposed to be reset a maximum of 15mm away from the track to allow for curve effects and meet maintenance tolerances. The graphs below show the revised horizontal platform clearance for the through and diverge track of Points 35DW at the Up end of the platform. Note the extent of the reconstructed platform and coping reset length achieves compliant horizontal clearance (considering curve effects) within maintenance tolerances of 1550-1590mm for platform height between 1025-1090mm as per NIST-2705.

  The horizontal platform offset from the through track of Points 35DW, as shown in Figure 7 below, shows the offset exceeding 1800mm at the Up end of the platform. This would present a stepping distance risk for passengers stepping on and off the platform. However, as noted in Section 3.3. of this report, regular V/Line services do not utilise this part of the platform and only steam trains use this part of the platform (infrequent services). As agreed in Preliminary Design

SiD workshop, an administrative control shall be implemented by V/Line (i.e. update to Book of Rules or NSP) to ensure stream rail trains stopping at Platform 2 arrive and depart via the independent siding track (diverge track of Points 35DW) to mitigate stepping distance risk for passengers. Platform offset from the through track of Points 35DW to coping edge to exceed 1800mm at the Up end of platform 2.

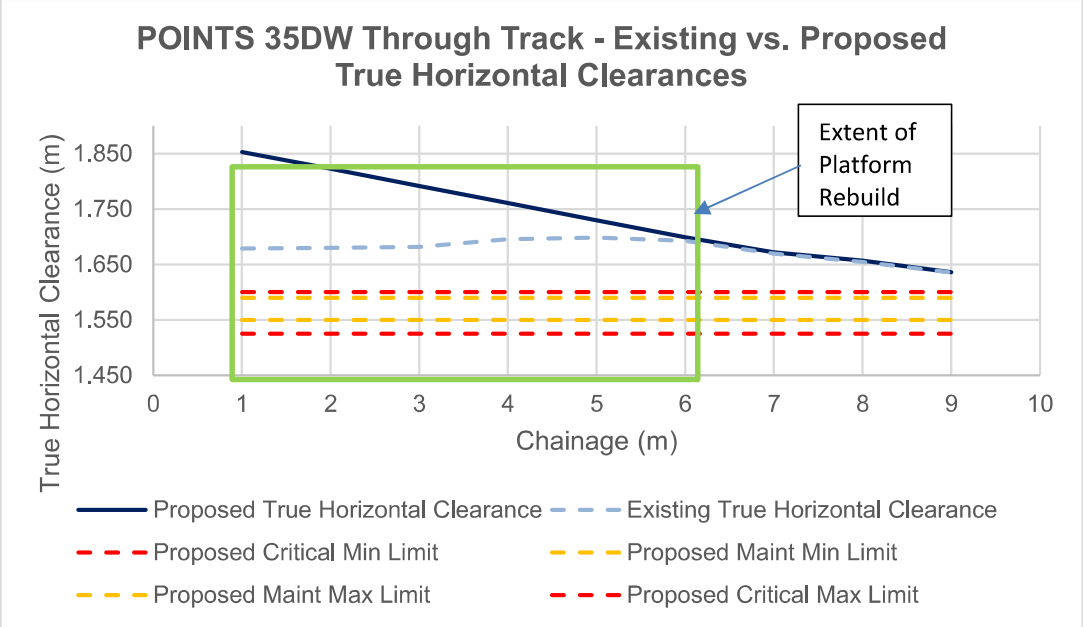


Figure 7 – *Existing vs Proposed Horizontal Clearance – Points 35DW Through Track*

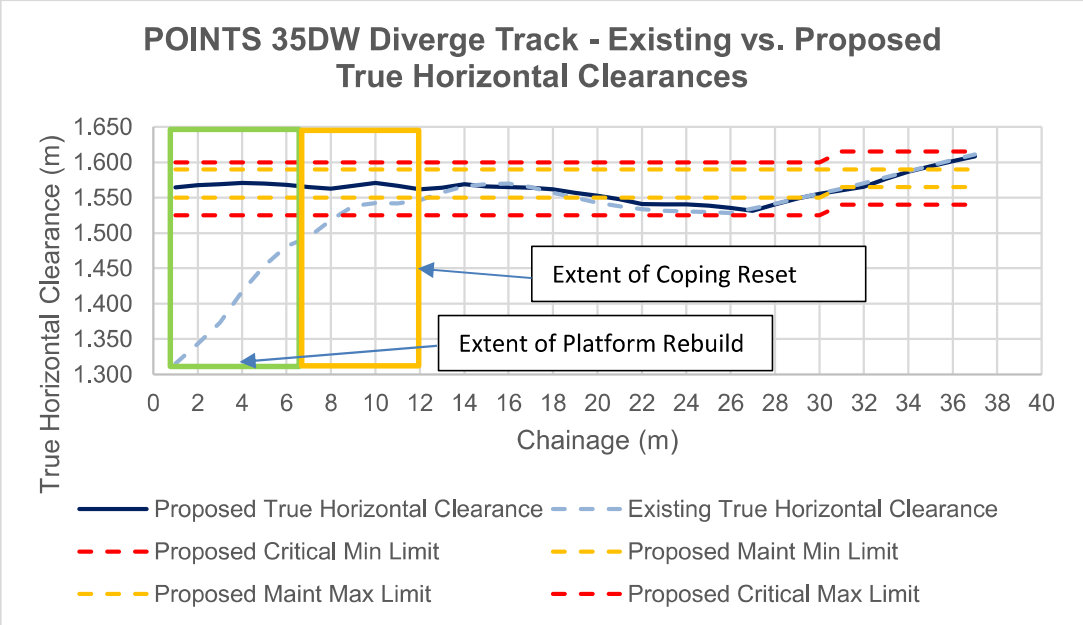


Figure 8 – *Existing vs Proposed Horizontal Clearance – Points 35DW Diverge Track*

A Swept path assessment has been undertaken for the diverge track of Points 35DW at the Up end of Platform 2, utilising rolling stock Plate A, with a bogie length of 16150mm as per SAFO-111 (see figure 10). As a result, the new platform coping alignment has been tapered such that the end of the platform meets minimum horizontal platform clearance with consideration of the curve effect of Points 35DW diverge track.

The resultant centre throw effects for rolling stock Plate A have been assessed for the diverge track of Points 35DW / Independent Siding / Track 3. Centre throw effects have been manually calculated at 1m intervals by running an outline of Plate A with 16.15m bogie length and

measuring the centre throw relative to the centre line of track. See below as an example. It should be noted that due to the variation of the horizontal curvature (i.e. 250m radius through turnout and 702m Dn end of toe of points), the calculation of centre throw using the general centre throw equation outlined in NIST-0001 Section 11.0 cannot be used. See an example of centre throw check below.

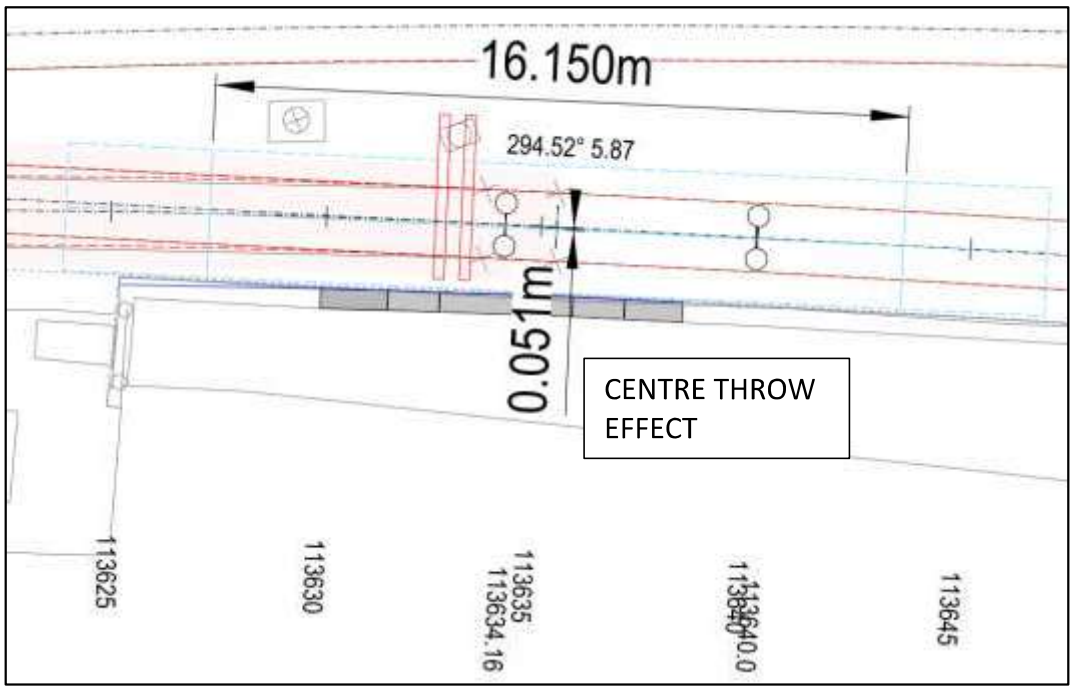


Figure 9 – *Curve Effect Check Example*

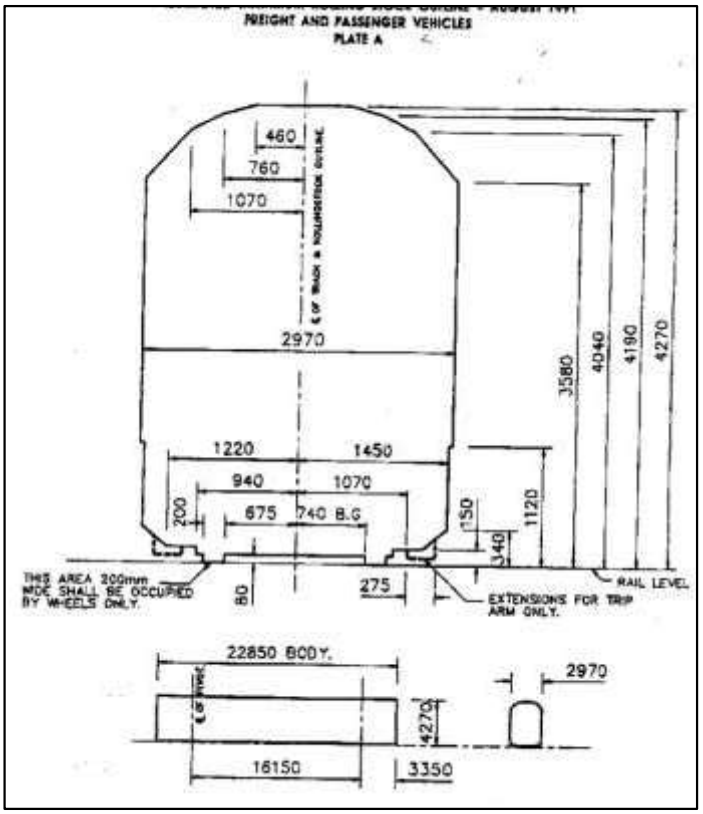


Figure 10 – *Plate A rolling stock vehicle (extract from SAFO-111)*

Refer to Appendix G for the platform clearance analysis spreadsheets.

- **Platform Type –** The platform will be earth-filled to match existing conditions. This type of construction helps prevent a complete collapse in the event of a train impact due to its ability to resist impact loads. In addition to this, an earth-filled platform reduces the effort required for maintenance in comparison to a suspended platform.
- **Platform Width –** The platform width will be reduced by a maximum of 167mm to mitigate the risk of the rolling stock striking the platform whilst maintaining safe platform offsets for passengers to board and egress the carriage. The existing platform width tapers to a minimum of ~2500mm from the coping face to the rear platform fence at the direct Up end of the platform. As a result of realigning, the platform is reduced by ~ 167mm. Note this is less than the exceptional limit of 2700mm for platforms, and a derogation has been submitted for review and endorsement.
- **Pre-cast Concrete Panel *Design* –** The design has proposed two different types of platform panels for the platform reconstruction, including:
    - Type 1 – T-Shape Platform Panel.
    - Type 2 – Two sided L-Shape Platform Panel.

  The proposed panels are an adaptation of the standard L-shaped precast concrete panel detailed in the Standard Platform Extension Design Drawings (SND_C0060). The extension from an L to a T shape allows for the placement of bluestone blocks and a masonry layer, enabling the new facing to match the existing platform's appearance. The two-sided L shape allows for a vertical wall at the platform end, where no bluestone blocks are present. The panel heights have been reduced to suit the current platform height of approximately 1.080 m above rail, compared to the original 1.2 m design. The base of the new panels will align with the top of the existing foundation, ensuring the bluestone and brick facing is flush with the existing structure. To maintain proper drainage, the weepholes detailed in SND_C0060 will only be incorporated in the end platform panel (type 2), where no bluestone blocks are present. To maintain proper drainage, the weepholes detailed in SND_C0060 will only be incorporated in the platform panel type 1, as the end panel (type 2) will be partially buried due to the existing surface levels. Where weep holes are present in the type 1 panels, the bluestone blocks are proposed to be un-grouted to allow for water to discharge into the existing track drainage.
- **Platform Footing** – The proposed footing width is designed to be flush with the T-shape precast concrete panel at the track side for ease of constructability and to avoid disturbing the track formation.
- **Platform Coping –** The existing bluestone coping is to be reused, adjusted and reset. A 50mm coping overhang is proposed on the 5.4m reconstructed section to match the existing conditions and enable any future track-platform gauge modifications. Due to the existing dimensions of the coping and bluestone block wall, the coping block is supported by the masonry brick layer and not the precast concrete panel, meaning that the bluestone coping is not capable of supporting collision loading. An RFI was submitted to V/Line Network Engineering and was endorsed as part of the preliminary design.
- **Platform Surface –** The proposed platform surface is type 10N asphalt, as the platform is expected to be a lightly to moderately trafficked pavement and is slip-resistant in accordance with NIST-002.1.
- **Brick Retaining Wall at Rear of Platform–** The brick retaining wall at the back of the platform is in ok condition based on visual inspection photos. The platform wall is proposed to be retained and temporarily supported if deemed necessary by the contractor. The wall is approximately. 1.4m high, with the base of the existing wall outside the 1:1 zone of influence from excavation for the new track-side platform wall. The fill in front of the existing brick wall is proposed to be removed during construction to reduce the passive force on the existing wall, while the excavation works on the platform are being undertaken (see figure 11)

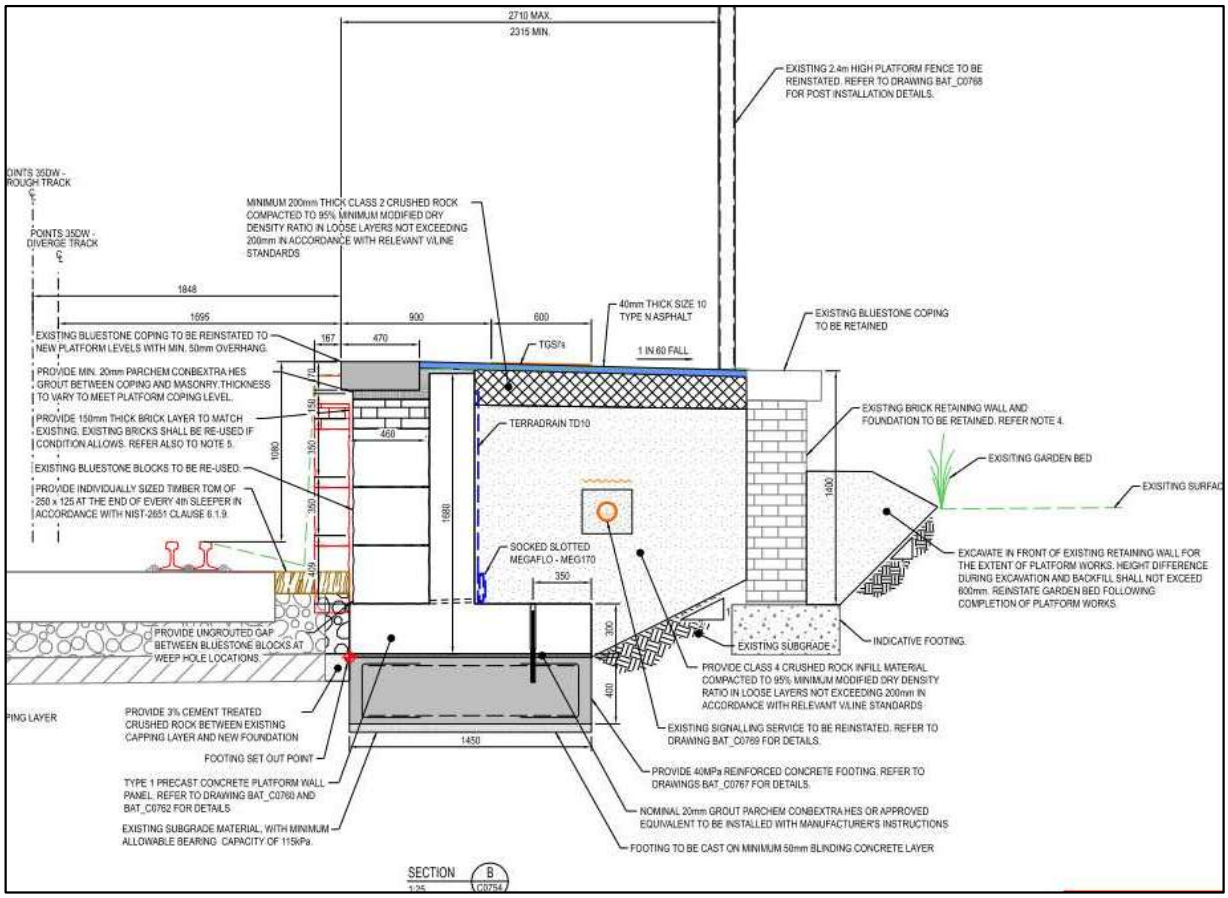


Figure 11 – *Section of Proposed Platform Wall Adjacent to Existing Brick Wall*

- **Fencing and Gate Design –** The 2.4m high fencing along the back of the platform is to be reinstated following the reconstruction of the platform. The footing of the reinstated fence will be a 25MPa mass concrete footing. At the platform end, a 1.2 m-high fence with a gate is proposed, connecting to the reinstated 2.4 m fence via a post sleeve at the fence corner and 1.2m fence end. The existing intermediate fence posts are currently direct fixed to the platform and will be reinstated in a similar manner. The reduced height of the 1.2 m fence is intended to maintain the train driver's visibility of the platform and nearby signals, in accordance with NIST-002.1, while also matching existing conditions. The gate will provide access to the new end-of-platform stairway, similar to the existing arrangement.
- **Stairway Design –** The design proposes to reinstate the existing maintenance stairway at the Up end of the platform, based on the good condition and compliance of the current stairs. The re-use of the stairs is supported by V/Line Network Engineering and stakeholders in the Concept Design SiD workshop. As the platform end height is proposed to be raised, the stairs will be reinstated on a new cast in-situ concrete footing.
- **Existing Signalling Service** – The existing LV signalling conduit detailed in Section 4.3 is proposed to be reinstated as part of the platform reconstruction works. Approximately 11m of conduit will be replaced, with the service transitioning from the platform to the existing surface level on the up end through the proposed platform footing. Once transitioned, the conduit will achieve the required vertical cover as detailed in NIST-012.2.1.

5.5 Design Analysis

The design calculations were undertaken in accordance with the design standards and design criteria listed in Section 5.3 to establish the adequacy of the structure and founding material to support the following loads:

Table 7 – *Design Loads*

Dead Loads			
Item	***Material Density (kN/m³)***	***Load Factor***	***Design Standard Reference***
Culvert Crown Units	24	1.2	AS3600
Steel	77	1.2	AS5100.2
Natural Soil	22	1.2	-
Live Loads			
Item	***Loading (kPa)***	**Load Factor**	***Design Standard Reference***
Platform Live Load	10	1.5	AS5100.2

The following design actions were assessed for each element during the design analysis:

Table 2 – *Design Analysis* ***PASS*** ***FAIL***

Platform Panels			
Design Check	Acting Loads (kN)/Moments (kNm)	Resisting Loads (kN)/Moments (kNm)	Pass/Fail
Sliding	17.27	28.00	***PASS***
Overturning	20.34	59.9	***PASS***
Bending	20.34	86.0	***PASS***

5.6 Deviations from Standards

The deviations from the design standards listed in Section 5.2 of this report are summarised in Table 7 below.

Table 7 – *Derogation and RFI summary*

Reference No.	*Standard Non-Compliance & Description*	*Status*
BAT-DER-01	**Platform width less than 2700mm** **CVL-EGN-2024-002 Clause 18.4 – Exceptional Limit** • The reconstructed platform width will be less than 2700mm • The existing platform width is 2500mm at the direct Up end of Platform 2 • The design proposes to realign the coping to improve gauge to track, however reduces the platform width to approximately 2335mm, this is without reconstructing the back of the platform wall.	Open