3. Description of the proposal

This chapter describes the concept design for the proposal and provides details of existing conditions, the design parameters including major design features, the construction method and associated infrastructure and activities.

3.1 The proposal

3.1.1 Overview

Key features of the proposal include the following:

- upgrade of the existing highway to a four-lane divided carriageway allowing for two lanes of traffic in each direction, either side of a central median with planted trees
- upgrade of the Bellevue Crescent intersection with new turning lanes, U-turn bay and traffic signals
- a new right turn lane providing access to the Hydro Majestic Hotel
- improvements on Railway Parade to formalise parking provisions, U-turns and rail customer parking
- new indented bus bays on both sides of the highway close to Medlow Bath Station
- construction of a new pedestrian bridge, stairs and lifts to provide an accessible path of travel between the bus bays, the Medlow Bath Station platforms and Railway Parade
- new shared path for pedestrians and cyclists on the western side of the highway
- ancillary works such as the replacement of road surfaces, reconstruction works associated with local roads, driveways, footpaths, kerbs, gutters and retaining walls, drainage works and relocation of services.

Key features of the proposal are shown in Figure 1-2. Further detail is provided in the general arrangement plans included in Appendix M.

3.1.2 Proposed alternative intersection at Bellevue Crescent

As part of the design for the proposal, a new alternative signalised intersection is being considered to the Great Western Highway with a new road to connect to the existing Bellevue Crescent and approximately 25 metres south of the United Petrol Station (as shown in Figure 3-1).

Figure 3-1: Aerial view of proposed alternative intersection at Bellevue Crescent

This alternative design being considered for Bellevue Crescent, which has been assessed as part of this REF, includes the following key features:

- closing the existing Bellevue Crescent and Great Western Highway intersection while still maintaining a service road/shared zone for the properties fronting the highway
- installation of a new signalised intersection built along the southern perimeter of the United Petrol Station utilising a corridor about 20 metres wide through vacant lots
- creating new access options from Bellevue Crescent to the petrol station and Hydro Majestic Hotel
- allows left and right turns out of Bellevue Crescent on to the Great Western Highway (enabling west and east bound movement) and left turn into new Bellevue Crescent from Great Western Highway westbound.

3.1.3 Accessibility improvements

The Transport Access Program is a NSW Government initiative to provide a better experience for public transport customers by delivering accessible, modern, secure and integrated transport infrastructure.

As part of this program, an accessibility upgrade to Medlow Bath Station infrastructure is proposed by TfNSW. The following improvements may be included as part of this project at a later stage.

- replacement of the level crossing to provide a new pedestrian bridge
- upgrade of the station entrance on Railway Parade including:
    - formalising the rail customer car park along Railway Parade, and provision of new accessible parking spaces
    - provision of a new accessible kiss and ride space on Railway Parade adjacent to the new station entry

- provision of accessible paths between the footbridge entry, kiss and ride and accessible parking
- modifications to overhead wiring and HV at the station to accommodate the construction of the new pedestrian bridge

- internal station building work including:
  - minor building modifications that may be required to accommodate new or upgraded electrical equipment including a main switchboard, new or upgraded station communications equipment and other station services
  - ancillary work including adjustments to lighting, relocation or replacement of existing customer facilities (platform seating, bins, payphone, Opal card readers, fencing) and improvement to station systems including additional closed circuit television (CCTV) cameras, hearing loops and wayfinding signage.

3.2 Design

The following sections provide a description of the design criteria, major design features and engineering constraints of the proposal. These features are based on the concept design and would be further refined during detailed design.

3.2.1 Design criteria

The concept design for the proposal was prepared in accordance with the following standards:

- *T HR CI 12030 ST Overbridges and Footbridges Design Standard* (TfNSW, 2020a)
- Australian Standards: amended by Roads and Maritime Services Supplement (2012)
- *Austroads Guide to Road Design* (Austroads, 2009a) and Roads and Maritime Services supplements to the Austroads Guide
- *Austroads Road Safety Audit Manual* (Austroads, 2009b)
- *Beyond the Pavement 2020: Urban design approach and procedures for road and maritime infrastructure planning, design and construction* (TfNSW Centre for Urban Design, 2020)
- *NSW Speed Zone Guidelines* (Roads and Traffic Authority, 2011b)
- *Road Safety Audit Manual and Checklist* (Roads and Traffic Authority of NSW, 2011c)
- *Delineation Manual* (Roads and Maritime Services, 2012)
- *Services Road Design Guide* (Roads and Maritime Services, undated)
- *Managing Urban Stormwater: Soils and Construction, Volume 1* (Landcom, 2004) and *Managing Urban Stormwater: Soils and Construction Volume 2D, Main Road Construction* (Department of Environment and Climate Change, 2008).
- *Disability Standards for Accessible Public Transport 2002* (DSAPT).

Key design criteria for the road improvements are summarised in Table 3-1 (subject to detailed design).

Table 3-1: Key design criteria

Design features	Requirement
Number of lanes	Upgraded to a four-lane carriageway with a typical lane arrangement of two lanes in each direction with additional turning lanes for access to roads off Great Western Highway and to key commercial places (ie Hydro Majestic Hotel)
Lane widths	• 3.35 metres for through lanes • 3.30 metres for turning lanes (plus lane widening at curves, as required).
Design vehicle capacity for main road alignment	• 19 metre B-Double (over 50 tonnes)
Design vehicle capacity at intersections	• Bellevue Crescent (including U-turn) –prime mover and semi-trailers (up to 19 metres) • Right hand turn bay into Hydro Majestic Hotel – service vehicles (up to 8.8 metres)
Posted speed limit	• Main road alignment – 60km/h • Side roads – 50km/h
Design speed	• Main road alignment – 70km/h • Intersection (at Bellevue Crescent) – 60 km/h • Turn in to side roads – 60km/h
Median widths	• Southern portion (at Bellevue Crescent intersection) – 5.10 metres at the southern approach and 1.8 metres at the northern approach to allow for right hand turn bay at signals. • Mid portion (at Hydro Majestic Hotel) – typically 5.10 metre raised median and 1.8 metres at right hand turn bay into the hotel. • Northern portion (between Hydro Majestic Hotel and Railway Parade) – 1.8 metres
Pavement type	Pavement structure would consist of asphalt over lean mix concrete and consider acoustic requirements.
Footpaths/cycle paths and shared zones	• Southern portion (at Bellevue Crescent intersection) – includes a 6.7 metre wide shared zone for pedestrians and local traffic only (to access 100 to 104 Great Western Highway) • Mid portion (at Hydro Majestic Hotel) – includes a 2.5 metre shared path on the western side and a pedestrian path connecting the pedestrian bridge to the bus stop on the eastern side • Northern portion (between Hydro Majestic Hotel and Railway Parade) – 2.5 metre shared path on the western side of the road
Pedestrian bridge clearances	Minimum of 5.5 metres over the road and 6.6 metres over the station platform.
Flood considerations	One in 100 Average Recurrence Interval (ARI) Minor and Major Tributary flood under current climatic conditions.

3.2.2 Engineering constraints

A number of constraints and performance objectives influenced the development of the proposal design, including the following.

- **Existing utilities:** the presence of multiple existing underground and above ground public utilities need to be managed. Existing utilities have been identified, and discussions held with the service providers to either relocate utilities within the widened road corridor or protect the assets, while ensuring they can be accessed for scheduled maintenance and emergencies during construction.
- **Operational traffic:** access to the Great Western Highway needs to be maintained during construction as there are no detour options. In addition, access to side streets (Station Street, Railway Parade and Bellevue Crescent) and driveways along Great Western Highway need to be maintained to ensure access for residents and businesses. The traffic management plan should recognise the requirement for maintaining adjacent access, including emergency access and traffic flow during peak periods.
- **Urban amenity and heritage:** the Great Western Highway is one of Australia's most historic roads and the route has largely remained unchanged since its construction in the 1830s. The area has several heritage items within close proximity which notably include the locally listed Hydro Majestic Hotel (located on the western side of the highway) and the State heritage registered Medlow Bath Station Group (located east of the highway). Medlow Bath is the first built-up area east of Katoomba and needs to retain its village feel as part of an upgraded highway.
- **Water quality**: the proposal is within the Sydney Water Catchment area and engineering controls for water quality must be designed to ensure a neutral or beneficial effect to receiving waters.
- **Potential contamination**: the Phase 1 Investigation (Mott MacDonald, 2020) identified potential contamination from the United Petrol Station, the Mazda car dealership, stockpiled ballast and uncontrolled fill material. The presence/absence of these would be identified via a targeted detailed site investigation (Phase 2).

These constraints are considered in Chapter 6 of the REF, which describes measures and safeguards to be implemented to mitigate adverse impacts of the proposal.

3.2.3 Major design features

Upgrade of the Great Western Highway

The upgrade of the Great Western Highway at Medlow Bath would be carried out from 330 metres south of Bellevue Crescent extending to the existing bridge at Railway Parade and include the following features (also refer to Appendix M General Arrangement Plans):

- a four-lane divided carriageway allowing for two lanes of traffic in each direction involving
    - new road surfaces, line markings and raised medians
    - other road adjustment works such as tie ins into the existing highway and reconstruction works associated with the local roads, driveways, footpaths, kerbs and gutters
- three way signalised intersection lanes for entry/exit to Bellevue Crescent, which would include:
    - a right hand turn bay for eastbound traffic to turn from Great Western Highway into Bellevue Crescent
    - a left hand turn bay for westbound traffic to turn from Great Western Highway into Bellevue Crescent
    - U turn bay at 106 Great Western Highway
- right hand turn bay on Great Western Highway for entry into the Hydro Majestic Hotel by eastbound traffic

- a shared path for pedestrians and cyclists on the western side of Great Western Highway with new kerbs and gutters to separate road traffic from the pedestrians and cyclists
- new indented bus bays on both sides of the highway close to Medlow Bath Station
- construction of a new pedestrian bridge, stairs and lifts to provide an accessible path of travel between the bus bays, the Medlow Bath Station platforms and Railway Parade
- a new retaining wall between the railway line and the eastbound lanes of the Great Western Highway
- interchange facilities at Railway Parade adjacent to the station to include:
    - U turn bay
    - raised pedestrian crossings to allow for access to the eastern side from the new pedestrian bridge
    - formalised parking including accessible parking spaces
    - two formalised kiss and ride locations adjacent to the new pedestrian bridge
- retention of access to Station Street from westbound lane of the Great Western Highway.

An indicative cross section of the main alignment of Great Western Highway at Medlow Bath is shown in Figure 3-2 to Figure 3-7 and are subject to detailed design.

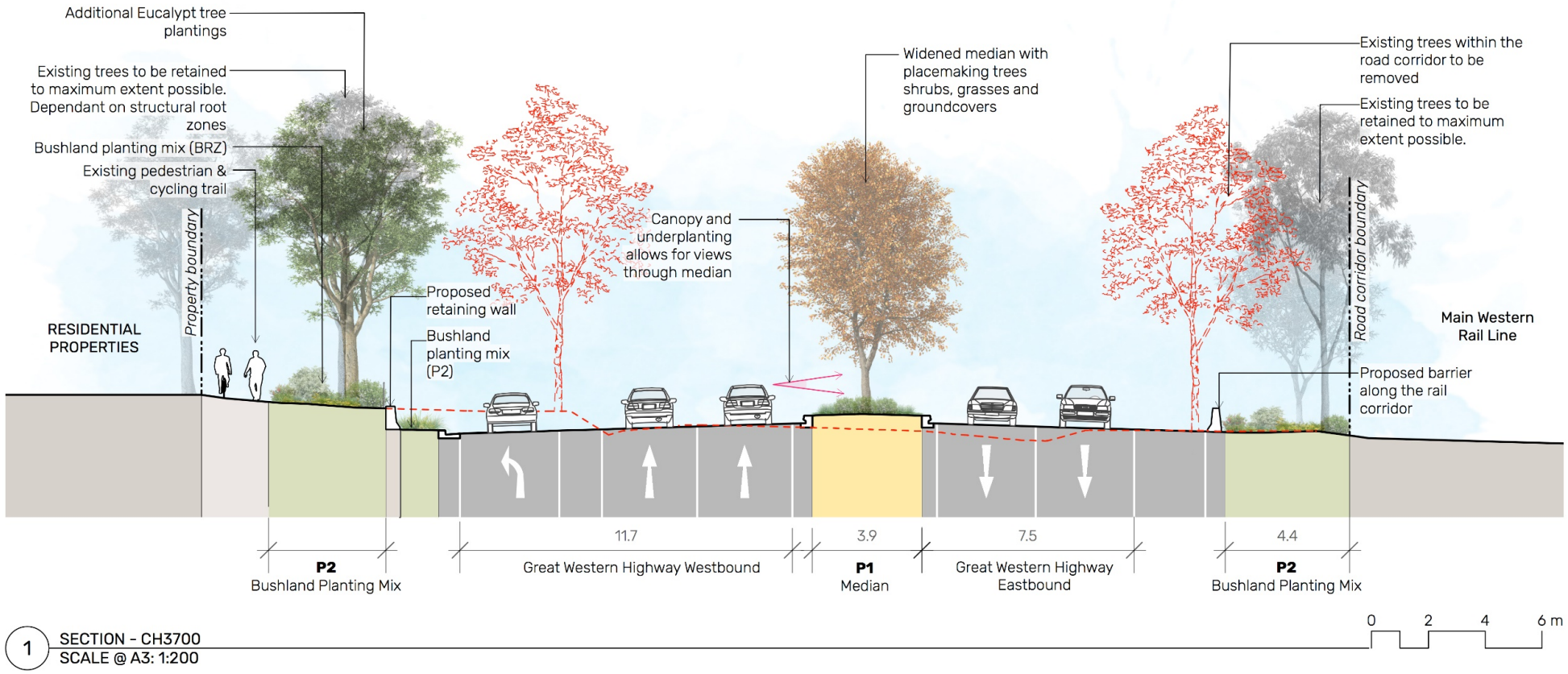

Figure 3-2: Typical cross section within southern section of proposal - south of Bellevue Crescent showing left turn lane (SMM, 2021)

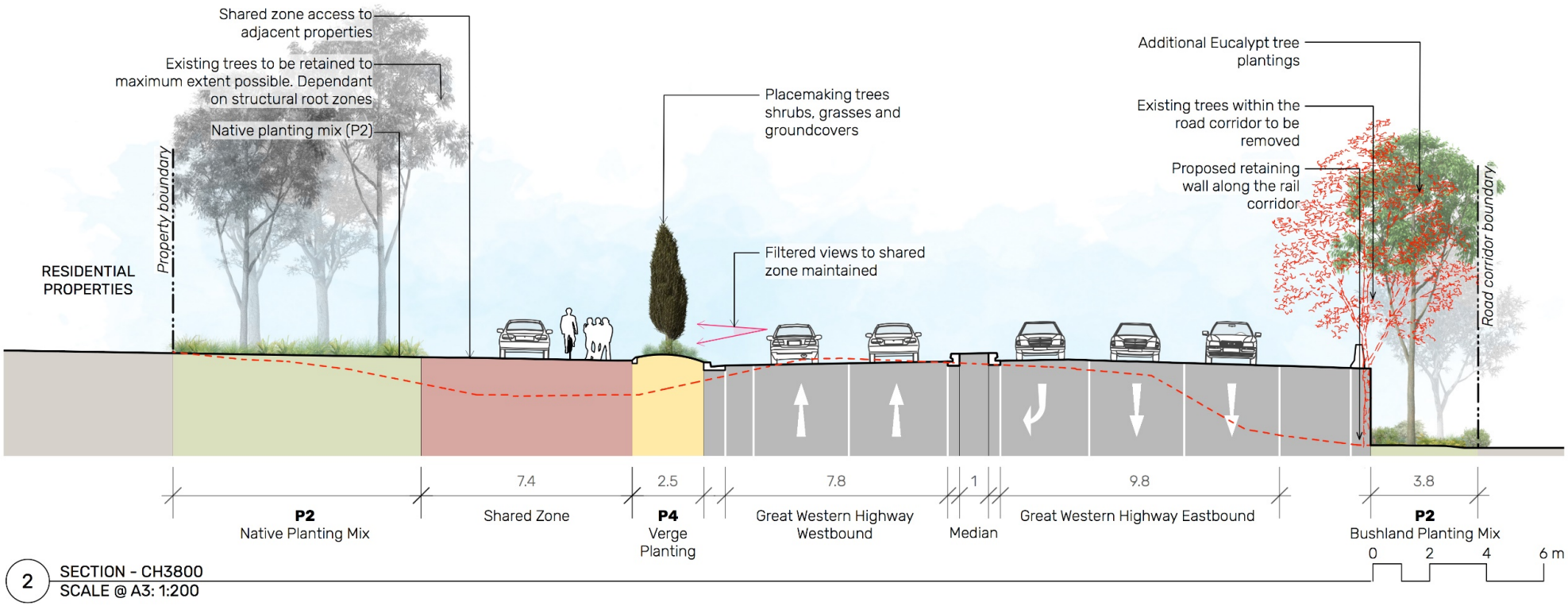

Figure 3-3: Typical cross section within southern portion of proposal – north of Bellevue Crescent showing shared zone and right hand turn lane (SMM, 2021)

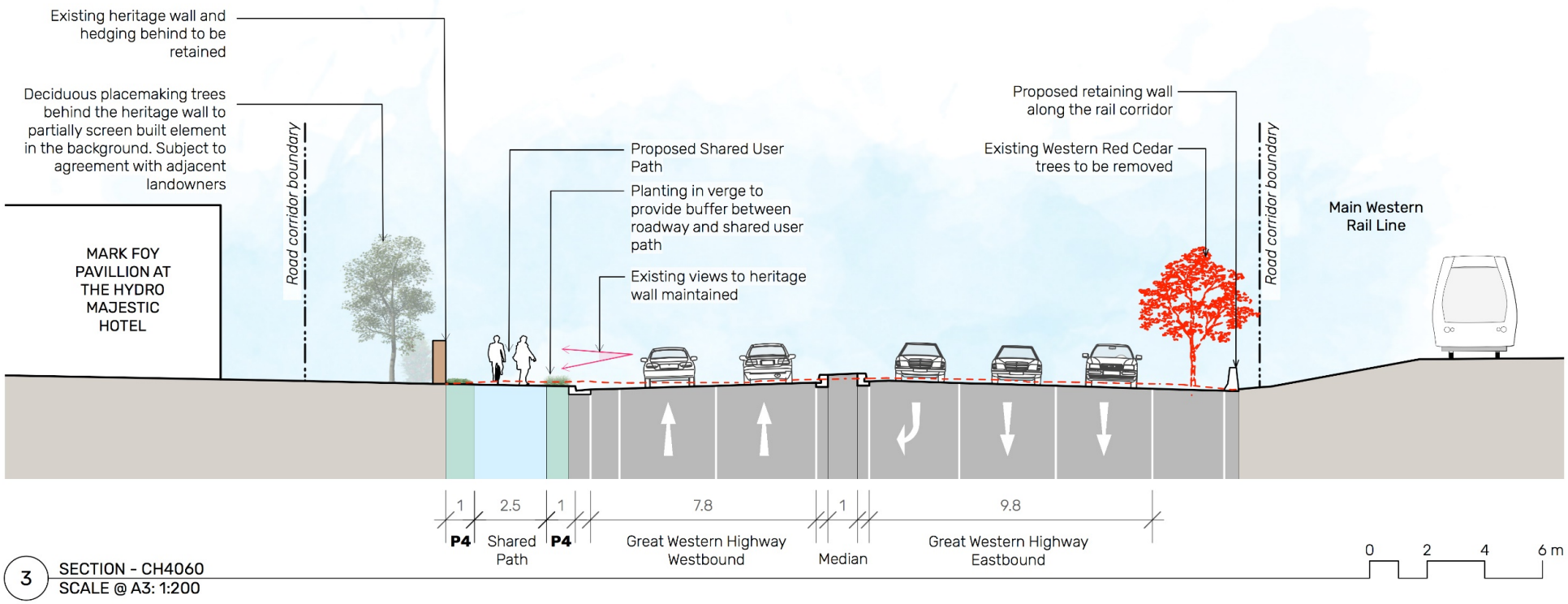

Figure 3-4: Typical cross section within midpoint of the proposal area adjacent to Hydro Majestic Hotel – with right hand turn lane (SMM, 2021)

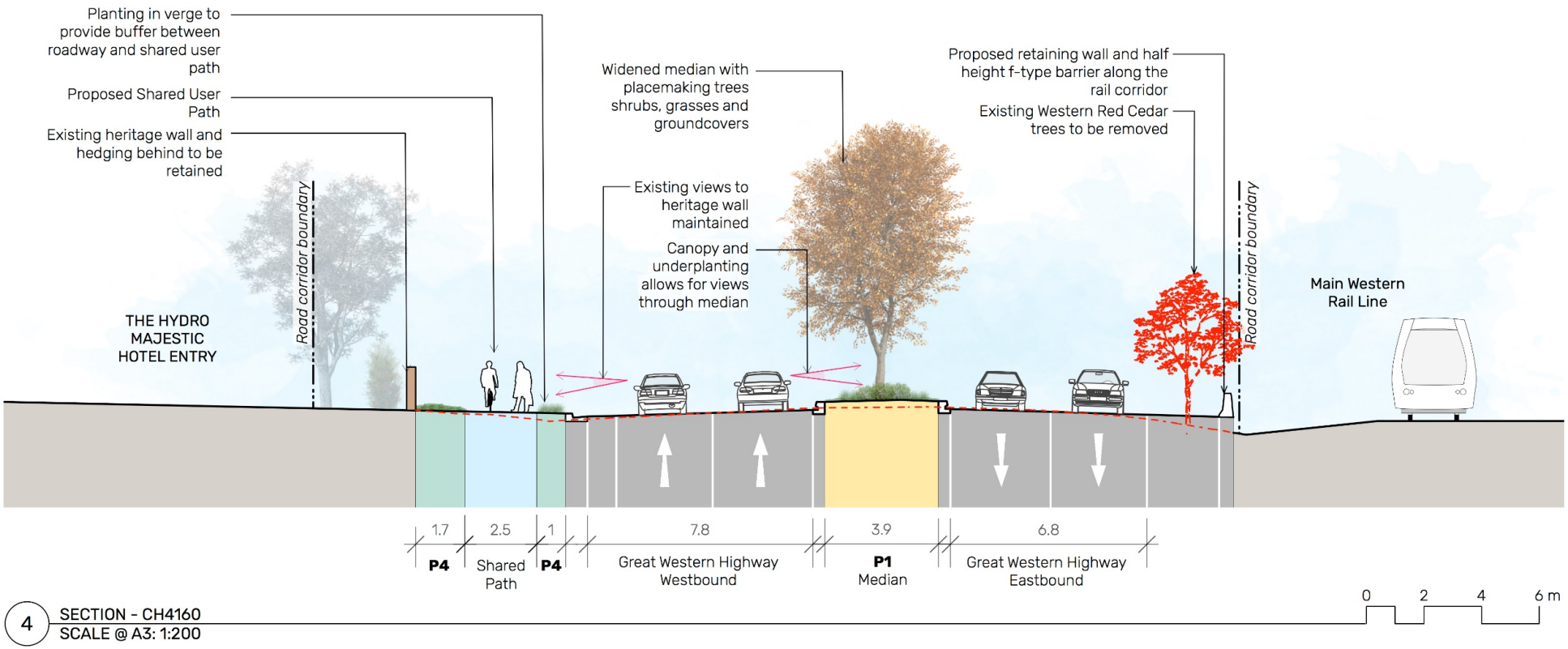

Figure 3-5: Typical cross section within midpoint of the proposal area adjacent to Hydro Majestic Hotel – with wider median and no right hand turn lane (SMM, 2021)

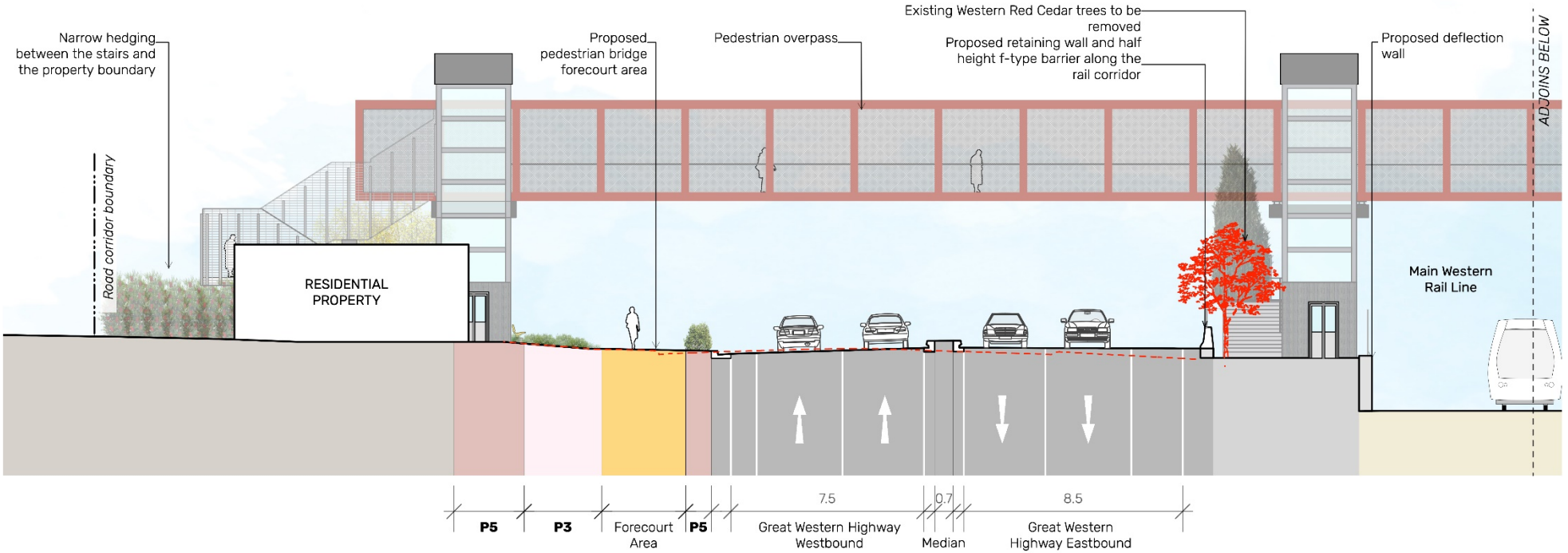

Figure 3-6: Typical cross section of proposal area adjacent to the station – showing pedestrian bridge (SMM, 2021)

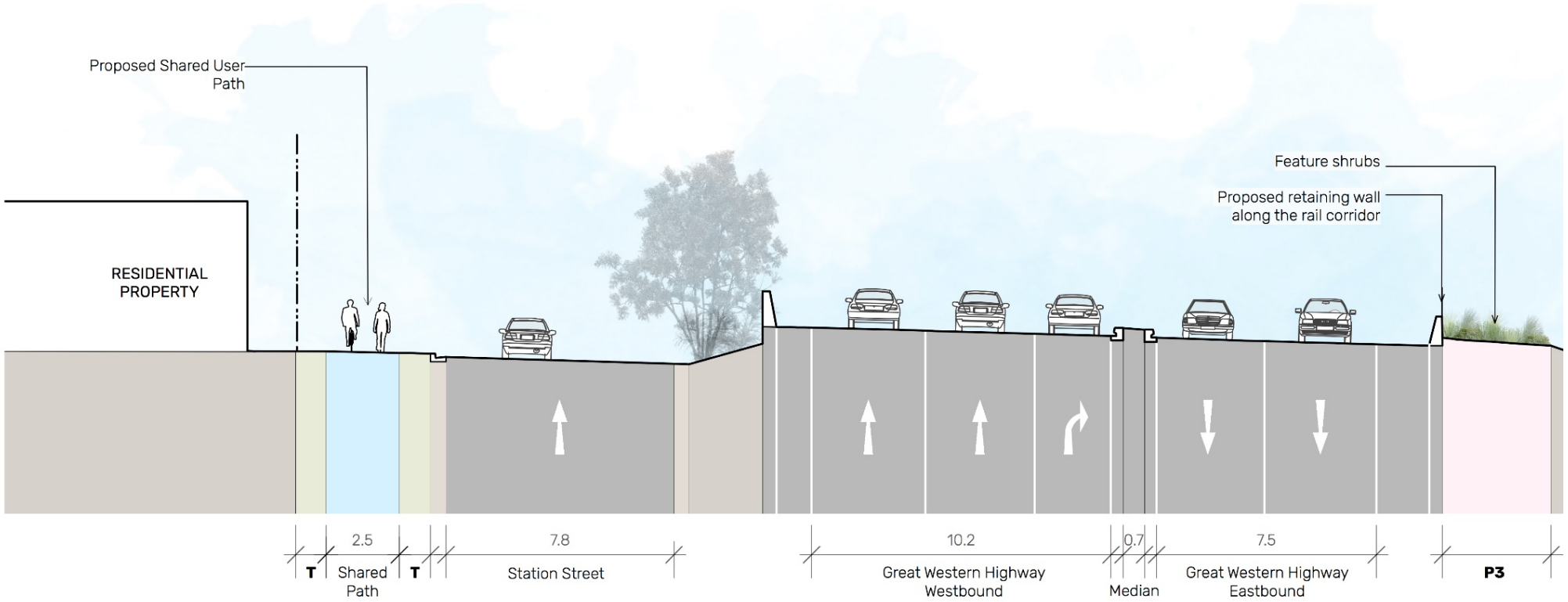

Figure 3-7: Typical cross section within northern portion of the proposal area near Station Street (SMM, 2021)

Bus bays

The proposal would include bays for local bus services to connect with the area and station. This would include one bus bay with bus shelter on the westbound carriageway and one bus bay with bus shelter on the eastbound carriageway of the highway adjacent to the new pedestrian bridge and lifts. The bus bay on the eastbound carriageway would have the design capacity for two buses. The bus bay on the westbound carriageway would have the design capacity for at least one bus. The school bus stop in Railway Parade would be removed and now use the upgraded highway bus stops.

Pedestrian bridge

The pedestrian bridge would comprise a three-span steel truss bridge extending across the full width of the widened Great Western Highway (about 60 metres), with abutments on the western side of the highway and on Railway Parade. Piers providing structural support would be located on the eastern side of the highway and on the station platform. The piers and abutments would be constructed from reinforced concrete. An indicative design of the new pedestrian bridge is shown in Figure 3-8.

To provide access for pedestrians and cyclists, new lifts and stairs would be located on both sides of the highway, the station platform and Railway Parade. The stairs would be constructed from concrete, while the 17-person lifts would comprise steel structure with glazing, and canopies at the lift lobbies to provide weather protection. The existing level crossing would be removed.

The incorporation of these lifts and stairs would significantly improve connectivity of the area for rail customers, pedestrians and tourists in line with Transport Access Program objectives. The proposal would provide an accessible path of travel across the highway and to the public transport services including the Medlow Bath Station and bus services on the Great Western Highway and Railway Parade.

The design of the bridge would be sympathetic to cultural and aesthetic characteristics of the area. For more information on design initiatives refer to Section 6.9.3.

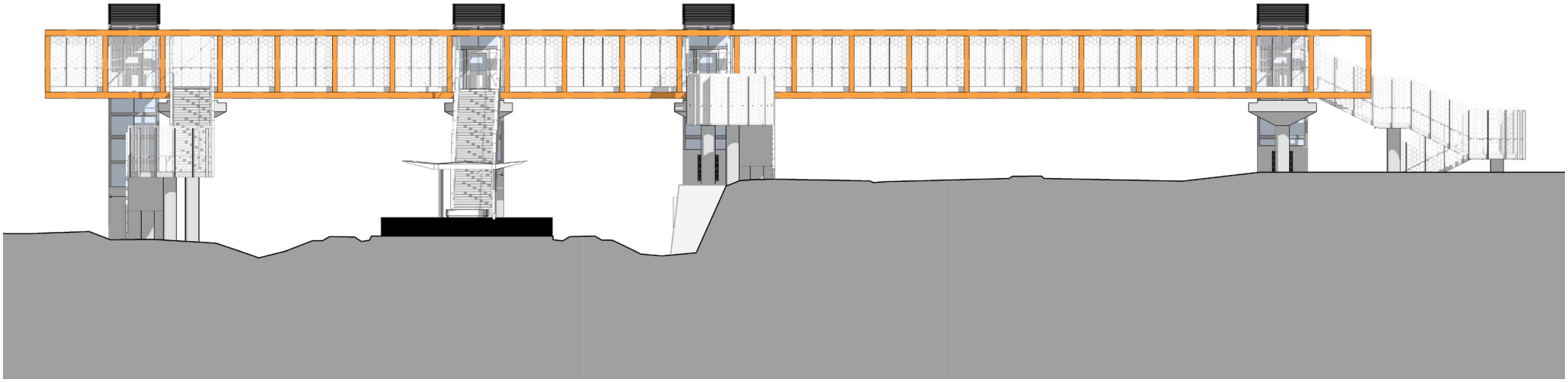

Figure 3-8: Indicative view of the new pedestrian bridge looking south (subject to detailed design) (MRB, 2021)

Urban design and landscaping features

Key urban design and landscaping features of the proposal are detailed below.

- Retaining walls to utilise materials appropriate to the Blue Mountains by having natural finishes such as sandstone (ie applied finishes like painting to be avoided).
- Where earthwork cuttings are needed, the design preference is that the embankments would be stabilised by vegetation and seek to avoid the use of shotcrete.
- Roadside furniture would be installed to support safety in operation. This would include safety screens, seating for pedestrians at bus stops and additional lighting.
- Shared user path for the entire length of the upgrade along the western side of the Great Western Highway. In combination with the new pedestrian bridge this would provide better east/west connectivity for residents, visitors and recreation users.
- Planting and revegetation of areas have been integrated into the design to mitigate potential visual and environmental impacts of the proposal. Additional opportunities for plantings have been incorporated into the design by providing a widened median. Specific examples are:
    - use of mature tree plantings along key points of the proposal for placemaking, marker moments for proposed bus stops and station entries. Deciduous tree plantings would aim to provide colour and foliage in the summer months and allow for light to permeate during the winter months. Accent tree species include Crimson Sentry, Chinese Redbud, Swanes Golden, Himalayan Cypress, Green Beech, Golden Ash, Tulip Tree and Golden Elm
    - plantings within medians aim to evoke historical aesthetic treatments (reminiscent of Medlow Bath in the 1900s). This would consist of massed colourful exotic shrubs and groundcovers, contrasting colour and texture to the existing bushland. Accent plantings of Pride of Madeira and Lavender will provide splashes of intense seasonal colour and year round textural contrast to layers of Blue Flax Lily and Shore Juniper where sight lines are needed.

The landscaping design is in accordance with the *Street Tree Masterplan* (Blue Mountains City Council, 2012).

Drainage design

Water quality management infrastructure for the proposal would include water quality controls such as detention basins and downstream biofiltration rain gardens. The proposed design of the pit and pipe network is shown in Appendix M General Arrangement Plans and includes:

- **at the southern tie in of the proposal on the Great Western Highway (south of Bellevue Crescent):** installation of a new cross drainage culvert urban runoff divert into biofiltration basins and grassed swales for primary and secondary treatment prior to discharge. The final position and shape of the basin is subject to the batter design of the upgrade works
- **at the midpoint of proposal:** installation of a new storm water pipe from west to east beneath the rail corridor (in addition and parallel to existing). This would drain into a new detention basin that incorporates bioretention. It is proposed that the basin would be located at 16 – 18 Railway Parade. The final position and shape of the basin is subject to detailed design but would be greater than 160 square metres to achieve the required Natural or Beneficial Effect (NorBE) objectives.

Other drainage features are listed below.

- Under existing conditions, the discharge of the drainage system downstream of CX3770 is to the rail culvert RD3770. A new 450 millimetre diameter connection to the existing rail drainage swale upstream of RD3770 is proposed as part of the concept design. Flows in excess of the 450 millimetre diameter connection would bypass this rail drainage outlet and continue downstream to subsequent discharge locations.

- Under existing conditions, the discharge of the drainage system downstream of CX3960 is to the rail culvert RD3960. A new 450 millimetre diameter connection to the existing rail drainage swale upstream of RD3960 is proposed as part of the concept design. Flows in excess of the 450 millimetre diameter connection would bypass this rail drainage outlet and continue downstream to subsequent discharge locations.

The provision for the capture of surface runoff represents a major upgrade to the existing conditions where minimal piped infrastructure exists. It is noted that the existing cross drainage discharge locations across the rail corridor are to be maintained to continue the connectivity of flow paths to the downstream receiving watercourses and these discharge locations are typically open drains leading to the rail corridor or existing overland flow paths in Medlow Bath Park. The general process of water quality management for the proposal is shown in Figure 3-9.

Uplift in rainfall intensities as a result of temperature increases under the latest climate projections in the Australian Rainfall and Runoff 2019 (ARR 2019) have also been incorporated into design infrastructure. The cross drainage capacity for the proposal would be upgraded to 1 per cent AEP inclusive of climate change uplift for the RCP 8.5 in line with the ARR 2019. (The RCP refers to the 'Representative Concentration Pathway that takes into account emissions of greenhouse gases, aerosols and other chemically active gases, and land use and cover. An RCP of 8.5 represents a scenario at the higher end of likely temperature increases.)

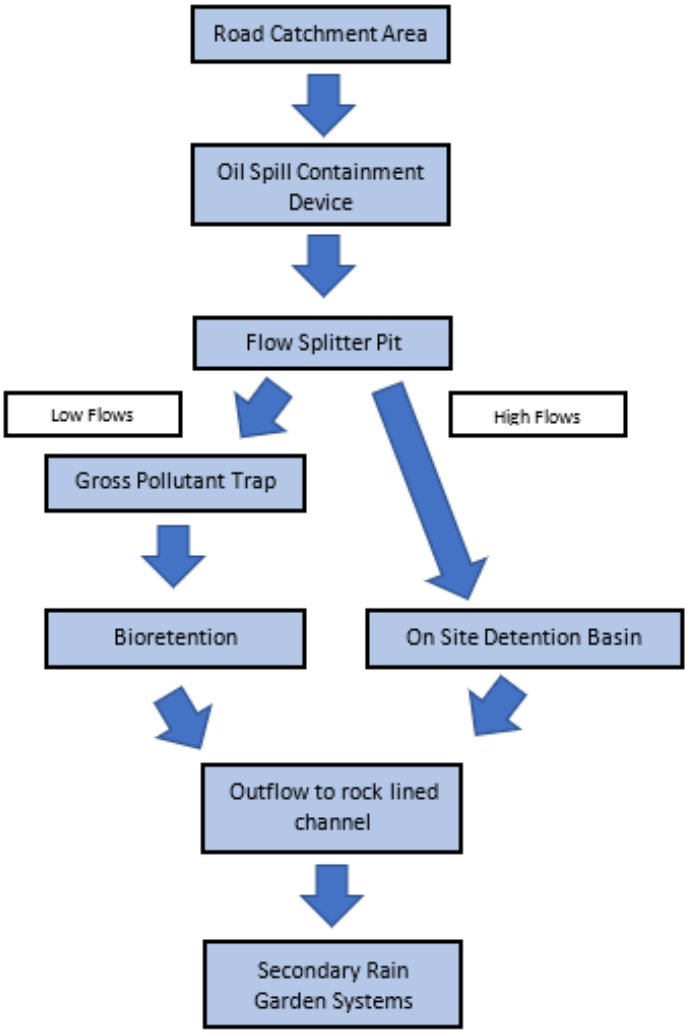

Figure 3-9: Water quality management process for the proposal

Work methodology

The next sections provide a summary of the likely construction methodology, staging, work hours, plant and equipment and associated activities that would be used to construct the proposal based on the concept design. Detailed construction staging plans and methodology would be determined by the construction contractor(s) after completion of the detailed design. The actual construction method may vary from the description in this section as a result of factors such as identification of on-site conditions during pre-construction activities, ongoing refinement of the design, consultation with property owners and availability of funding.

The environmental management framework to manage and mitigate impacts is presented in Chapter 7 (Environmental Management). Construction activities would be guided by a Construction environmental management plan (CEMP) to ensure work is carried out to TfNSW specifications (published by the former Roads and Maritime) within the specified work area. The final construction plan and methods chosen by the contractor would also be required to be consistent with this framework.

In the event that construction activities result in environmental impacts additional to those assessed in this REF, further environmental assessment would be required to be undertaken and approved by TfNSW.

3.2.4 Construction activities and staging

Construction would be staged to manage and minimise community impacts and in particular to minimise traffic impacts. Investigation and early work activities would be undertaken to facilitate efficient construction work progress. These early work activities may include activities such as:

- environmental and engineering investigations and marking of sensitive areas
- utility investigation and adjustments
- installation of temporary environmental and traffic controls such as sediment controls, basins, line marking and signposting
- property adjustment work
- establishment of ancillary facilities.

Key construction planning activities that would minimise impacts during construction are summarised below.

- Staging of works to minimise disruption by:
    - maximising large uniform areas
    - having clarity about the type of construction for an area, especially the groundworks
    - reduce access disruption
    - avoiding unnecessary excavation
    - optimising design solutions to reduce construction duration.
- Staging traffic switches and utilities works with the objective of ensuring the highway remains open in both directions during construction.
- Staging of the pedestrian bridge to fit in with planned Sydney Trains track possessions is also critical.

Impacts during the construction phase would be further minimised by the following.

- Utilising construction methods that allow the pavement to be trafficked soon after laying, such as full depth asphalt rather than lean mix concrete base.
- Construction staging and traffic switching including temporary stages to be fully modelled in Building Information Modelling (BIM) in 4D and to always allow a lane in each direction to be operational.

- Constructing the permanent sediment basin at an early stage of the proposal to capture water during construction and then be used during operation.

The indicative construction activities for the proposal are identified in Table 3-2.

Table 3-2: Indicative construction staging and activities

Stage	Activities	Duration (weeks)	Maximum daily deliveries (trucks)	Maximum daily workforce
Site preparation	• Pre-construction identification and marking of sensitive areas as identified in this REF and the CEMP • Utility investigations • Potential removal of redundant utilities and relocation of existing ones	8	3	8
Site establishment	• Topsoil stripping • Installation of erosion and sedimentation controls • Hardstand construction • Utilities services • Material storage areas • Temporary security fencing • Temporary pedestrian fencing • Temporary access road to the compound • Temporary traffic control barriers, signage and lighting along the full length of the existing roadway in order to separate the construction site from passing traffic • Property adjustment work	6	15	35
Vegetation clearing	• Clearing trees, grubbing, mulching	2	3	5
Roadworks	Road works would be required along the entire road alignment. The works would be split into constructing the northbound lanes first and then constructing the southbound lanes. Road construction would include: • Removal and demolition of existing pavements, kerbs and gutters • Embankment foundation treatments • Construction of the new embankment • Excavation of cuttings • Construction of the larger transverse drainage structurers (box culverts) • Installation of drainage pit and pipe systems • Construction of the open drainage channels and permanent controls • Utility works typically including communications, power, gas, water and sewer (where necessary) along with Intelligent Transport System (ITS) and Traffic Control System (TCS) networks • Construction of the pavement layers including the select fill, subbase and the asphalt • Kerb and gutter construction	70	20	75

Stage	Activities	Duration (weeks)	Maximum daily deliveries (trucks)	Maximum daily workforce
	• Major and minor sign structures including piling, concrete works and installation of overhead steel structures • Tie-ins to existing pavement at the southern and northern limits			
Pedestrian bridge	• Construction of bridge footings, piers and deflection wall • Construction of lift foundations • Installation of lift shafts, upper lift landings, lift shaft services, lift cars and fit out lift cars • Installation of lighting/CCTV/PA services to lift landings • Construction of lift landing canopies • Installation of line marking and signposting	72	20	60
Station upgrade	• Site compound establishment (erect fencing, tree protection zones, site offices, amenities, plant and material storage areas, removal of platform garden beds) • Relocation of overhead wiring portal • Undergrounding of 11 kV • Platform work including, resurfacing, new tactiles, relocation of platform furniture • Upgrade of station power supply • Upgrade of station services • Removal of level crossing • Site demobilisation	72	10	25
Finishing works	• Installation of road furniture (ie lighting, safety barriers and guideposts) • Pavement marking • Installation of urban design treatments and features • Landscaping works • Removal of all remaining temporary works such as traffic control barriers and lighting	10	15	25

3.2.5 Construction hours and duration

Subject to approval, the proposal would progress to the detailed design stage. Construction of the proposal is anticipated take around 20 months to complete, weather permitting.

Construction work for the proposal would generally be carried out during standard working hours, as follows:

- Monday to Friday, 7am to 6pm
- Saturday, 8am to 1pm
- Sunday and Public Holidays, no work with the exception of during rail closures.

Out of hours work would be required to minimise disruptions to railway operations, motorists and nearby sensitive receivers. Where possible, works in or near the rail corridor would utilise already scheduled rail shutdowns.

Out of hours work would be subject to permitted road occupancy licences and construction staging. Out of hours work would be carried out in line with the procedures contained within the Environmental Protection Authority (EPA) *Interim Construction Noise Guideline* (ICNG) (Department of Environment and Climate Change, 2009) and the *Environmental Noise Management Manual* (Roads and Traffic Authority, 2001). This would be undertaken in accordance with the conditions of the environment protection licence (EPL) for the proposal.

During scheduled night work, potentially impacted sensitive receivers would be consulted and kept informed of construction progress to minimise any impacts. In addition, management and mitigation measured detailed within the CEMP would be implemented as required to further mitigate any construction impacts. This includes the development of an out-of-hours work protocol which would govern the management of work outside standard work hours. Prior advice would be given to the community regarding work hours, and any planned construction work that is proposed to be carried out outside standard work hours.

3.2.6 Plant and equipment

A range of plant and equipment would be used during construction. An indicative list is provided below. The final equipment and plant requirements would be determined by the construction contractor.

- Bulldozers
- Backhoes
- Dump trucks
- Road trucks
- Excavators
- Backhoes
- Piling rigs
- Water trucks
- Water pumps
- Concrete saws
- Cranes
- Concrete pumps/vibrators
- Road sweepers
- Asphalt pavers
- Roller/compacters/compressors
- Line marking vehicles
- Graders
- Scrapers
- Concrete trucks
- Generators
- Chainsaws
- Jackhammers
- Mulchers

3.2.7 Earthworks

Earthworks would be required for the road upgrade works and typically involve regrading of the existing road.

However, it is anticipated that deeper excavations would be required for the following:

- abutments and piers for pedestrian bridge footings
- retaining wall adjacent to the station
- lift shaft foundations.

Any unsuitable materials would need to be removed to ensure foundation materials can provide sufficient support for the overlying work. Unsuitable materials typically include:

- highly organic material
- clay and silt of very soft, soft and firm consistency
- silt and sand of very loose relative density
- uncompacted or poorly compacted fill

- fill material containing foreign material such as waste or putrescible material
- contaminated material.

Estimated quantities of materials associated with earthwork are provided in Table 3-3. Earthwork requirements would be confirmed during detailed design.

Table 3-3: Indicative earthwork volumes

Material	Estimated volume
Excavation (cut) volume	13,250 m^3
Earthwork materials (soil)	Topsoil 1,200 m^3
Fill volume	1,600 m^3

3.2.8 Source and quantity of materials

The following materials would be required for construction:

- earthwork materials (eg sand, gravel, topsoil, general fill material) and selected material for road formation
- bitumen and aggregates (eg stone, sand, gravel) for pavement production
- binders to stabilise and treat the road formation and culvert bases
- cement and aggregates for concrete used in drainage construction, pavement construction, and miscellaneous work such as kerbs and gutters
- precast concrete elements for bridge and drainage construction and miscellaneous work.

Materials for road construction would likely need to be imported from off-site facilities (eg quarries). Sources of materials for construction would be determined during further development of the design. The indicative quantities of the main materials are listed in Table 3-4.

Table 3-4: Indicative resource volumes

Material	Estimated volume
Pavement materials (aggregate and asphalt)	Milling of asphalt surface 5,900 m^2 Select material 4,200 m^3 Lean mix concrete subbase 2,800 m^3 Base and sub-base: 890 m^3 7mm seal on subgrade: 18,800 m^2 Primer 18,800 m^2 Asphalt: 4,500 m^3
Concrete for shared paths, medians, and bridge structures	600 m^3
Steel for pedestrian bridge	63 tonnes

Surplus materials

The excavated material from the proposal would be reused onsite where possible. These materials would be stockpiled and further tested to determine suitability for reuse, however it is likely that there would be a surplus of material requiring disposal offsite.

Surplus or unsuitable material that cannot be used on-site would be classified in accordance with the *Waste Classification Guidelines* (EPA, 2014) and disposed of at an approved materials recycling or waste disposal facility if not possible to be stockpiled for the adjacent eastern stage of the Great Western Highway upgrade.

Water

The amount of water that would be required during construction is unknown at this stage. The amount would depend on material sources and methodologies applied by the contractor. It is proposed that water would be obtained from the local water supply network.

3.2.9 Traffic management and access

Construction would generate heavy vehicle movements associated with:

- delivery of construction materials
- spoil and waste removal
- delivery and removal of construction equipment and machinery
- movement of materials, resources and construction staff between the construction areas and compounds.

Based on the traffic assessment, truck movements during construction would be distributed throughout the day equating to less than 30 trucks per day.

Construction activities would also generate light vehicle movements associated with staff movements to and from and within the site. During normal working days it is estimated the number of truck movements to the work sites would be less than 30 per day, based on similar projects. Also refer to Table 3-2 for information on truck volumes.

Access to the construction site for trucks would be via the Great Western Highway as there are no alternative routes from local streets. Where possible, vehicles would be parked within the construction compound to minimise impact to local residents.

A temporary one hour road closure would be required to allow for the operation of a crane to lift in and install the new pedestrian bridge. Other temporary partial road or lane closures would be required at times to allow for road works (such as new pavement, kerb and gutter works) however it is proposed that alternating one-way traffic flow would be able to be maintained.

There are a number of properties with direct access to the road network within the proposal area. Access to affected properties would be maintained throughout by providing temporary property access where required.

Bus stops on Great Western Highway servicing the local bus network would be temporarily relocated during construction. Proposed relocations would be confirmed during construction planning.

Section 6.5 provides a more detailed assessment of traffic and transport impacts.

3.3 Ancillary facilities

Ancillary facilities would be required to support construction of the proposal including the following:

- site compounds
- laydown areas
- stockpile sites
- hardstands for the construction plant (including cranes)
- temporary sediment basins.

Table 3-5 summarises the potential locations of each ancillary facility, and how they would generally be used subject to arrangement with property owners. These are shown in Figure 3-10.

Table 3-5: Indicative location of ancillary facilities

Location	Size (m^2)	Indicative site use
181 – 183 Great Western Highway, Medlow Bath	2,053	Potential site compound, site office location and construction parking
90-98 Great Western Highway, Medlow Bath	2,750	Site compound and equipment laydown site
52-88 Great Western Highway, Medlow Bath (area behind Petrol Station)	6,902	Potential site compound, site office location and construction parking

Figure 3-10: Indicative locations of anciliary facilities site

Potential impacts of these proposed site compounds and ancillary facilities have been assessed in this REF. Impacts have been minimised by selecting sites with consideration to the following criteria:

- proximity to the proposal
- vacant site with exiting hardstand area, with existing vehicle access and egress
- relatively flat ground that does not require substantial reshaping
- in plain view of the public to deter theft and illegal dumping.

Stockpile locations would be refined during the detailed design phase using the criteria set out in the *Stockpile Management Guideline* (Roads and Maritime Services, 2015b). Where possible, the stockpile areas would be located on sites:

- not prone to flash flooding
- more than 40 metres from a watercourse
- more than 50 metres from the nearest dwelling
- in previously disturbed areas that do not require the clearing of native vegetation
- in plain view of the public to deter theft and illegal dumping
- outside the drip line of trees and on level ground wherever possible.

Bridge laydown areas for large precast structures would need to be in proximity to the bridge construction area.

Ancillary sites would be securely fenced with temporary fencing. Signage would be erected advising the general public of access restrictions. Upon completion of construction, the temporary site compound, work areas and stockpiles would be removed, the site cleared of all rubbish and materials and rehabilitated.

Where amendments or additional ancillary facilities are identified during construction, the contractor would consult with TfNSW to confirm the suitability of the proposed amendment or additional facility, and whether any additional environmental assessment is required.

3.3.1 Ancillary facilities for Transport Access Program works

Potential locations of site compounds and laydown areas for the management of the Transport Access Upgrade works at Medlow Bath Station are identified below. It is anticipated that the compounds would be required for the duration of construction.

The proposed location of the site compound (adjacent to the rural fire service land on Railway Parade) is indicated in Figure 3-11. The proposed location of laydown area within the rail corridor is indicated in Figure 3-12.

Figure 3-11: Proposed site compound for Transport Access Program works

Figure 3-12: Proposed laydown area for Transport Access Program works

3.3.2 Construction sedimentation basins

Construction works have the potential to affect water quality through erosion of exposed or disturbed areas and subsequent sedimentation of watercourses. To mitigate these effects, sediment basins would be installed within the proposal area to trap sediments and other pollutants from disturbed areas.

Sediment basins shown in the general arrangement plans included in Appendix M would collect a high proportion of sediment-laden runoff from disturbed areas. The ideal location for the sediment basins is on the downstream side of the proposal area. These proposed locations for sediment basins also consider site constraints such as heritage, environmental, accessibility for maintenance or other constraints such as utilities.

The design criteria for the sediment basins are defined in *Managing Urban Stormwater: Soils and Construction, Volume 1* (Landcom, 2004) and *Volume 2D Main Road Construction* (Department of Environment and Climate Change, 2008) and the former Roads and Maritime General Specifications G36 and G38. The sediment basins would need to provide sufficient volume for settling and storage of sediments. The settling zone volume are estimated using the appropriate design rainfall depth and catchment areas. The storage zone is estimated using the Revised Universal Soil Loss Equation.

The final size and location of the basins would be confirmed during detailed design. Additional soil and water management measures would also be developed during detailed design and included in the CEMP.

3.4 Public utility adjustment

TfNSW has consulted with public utility authorities during the design process to identify and locate existing utilities and incorporate utility authority requirements for relocations and/or adjustments.

Preliminary investigations indicate that the following existing utilities are within the proposal area:

- overhead (majority of local network) and underground electricity – Endeavour Energy and RailCorp
- water reticulation – Sydney Water Corporation
- sewer reticulation – Sydney Water Corporation
- natural gas – Jemena Gas
- telecommunications – Telstra, Optus, NBN Co, etc.

Most of the affected utilities are located on the western side of the Great Western Highway. Some utilities located on the western verge cross the rail corridor to Railway Parade, the Endeavour Energy 11 kilovolt supply via overhead infrastructure and Jemena Gas via a conduit.

As part of the proposal these services would be relocated to a new configuration outside the new road pavement but still on the western side of the highway, with the final location of any relocated utilities subject to consultation with the relevant utility providers. The eastern side of the highway has little opportunity to accommodate services due to the widening of the road and inclusion of a retaining wall on the rail corridor boundary.

As part of the proposal an upgrade to the station power supply would be required to provide adequate power for the new pedestrian bridge and lifts. This would include a new kiosk substation to be located east of the Medlow Bath station platform adjacent to Railway Parade within the railway corridor.

Utilities that would be impacted by the proposal are identified in Table 3-6. Generally, utilities that would require relocation as part of the proposal would be relocated underground within the new road alignment.

Table 3-6: Utility impact assessment

Service	Location	Requirement	Service type	Service provider
Power (Great Western Highway side)	Distribution Overhead / Underground on western verge of the Great Western Highway between Bellevue Crescent and Hydro Majestic Hotel. Streetlighting and Low Voltage Overhead on western and eastern verges of the Great Western Highway. 11kV overhead supply crosses the rail corridor near the middle of the project boundary.	Relocation required	11 kV high voltage, 415 V and street lighting	Endeavour Energy
Power (Railway Parade side)	11 kV overhead between the rail corridor and Railway Parade	Section requires relocating underground at the pedestrian bridge	11kV high voltage	RailCorp

Service	Location	Requirement	Service type	Service provider
Gas	Mainly present on the western verge of the Great Western Highway. Crosses to Railway Parade on the eastern side of the rail corridor	Relocation required	300 kPa 160 mm diameter pipe, 300 kPA 32 mm diameter pipe	Jemena Gas
Tele-communications (including NBN)	Telstra network present on the western and eastern verges of the Great Western Highway and at Railway Parade. Optus fibre within the rail corridor.	Relocation and/or protection required	Fibre optic and copper. DA and CC network. Underground network mainly within Telstra network. Optus Inter Office Fibre.	Telstra Optus NBN
Water – potable and sewer	Mainly present on the western verge of the Great Western Highway and section at Railway Parade turning bay	Relocation and/or protection required	150 mm potable main and 110 mm sewer main on westbound verge of the Great Western Highway. 100 mm potable main and 450 mm sewer main on Railway Parade.	Sydney Water Corporation

3.5 Property acquisition

The proposal is mainly located within the existing road corridor, however, some property acquisition may be necessary. Based on the concept design, the property acquisitions outlined in Table 3-7 would be required however details of property acquisition would be determined during the detailed design phase. Table 3-7 identifies potentially affected lots to provide an indication of the acquisition that may be necessary.

Table 3-7: Proposed property acquisitions

Address	Current use	Purpose
Part of 46 Great Western Highway, Medlow Bath (Lot C/DP413431)	Car park	Western footing of pedestrian bridge
16 - 18 Railway Parade, Medlow Bath (Lot 1/1/DP2590)	Vacant	Permanent drainage basin
106 Great Western Highway Medlow Bath (Lot 9/DP701200)	Residential	Space for U-turn bay on Bellevue Crescent
128W Great Western Highway Medlow Bath (Lots 219 and 220/DP1211208)	Vacant	Provide additional space for road corridor
Part of 52-88 Great Western Highway, Medlow Bath (Lot 20/DP25570) – at rear of petrol station	Temporary car park	Alternative Bellevue Crescent alignment option
90-98 Great Western Highway, Medlow Bath (Lots 3 and 4/DP25570 and Part of 5/DP25570)	Vacant	Alternative Bellevue Crescent alignment option