6 Description of the Proposal

Chapter 6 provides a description of the Proposal based on the concept design. Design refinement will occur during the detailed design phase of the Project and all elements may be subject to change. The alignment, crossings of the corridor, high voltage works, utilities and services, urban and landscape design and noise attenuation measures are described. Property requirements and adjustments expected to result from the Proposal are also summarised.

6.1 Proposed alignment

The principal features of the Proposal are shown on **Figures 6.1a** to **6.1g**. The Proposal comprises one new track typically constructed on each side of the existing tracks. The new lines would be configured as the Up and Down Mains and the existing track would become Up and Down Locals. It would start at the end of the existing four-track section approximately 500 metres to the east of Beverly Hills Station continuing until approximately 450 metres beyond Revesby Station where the new tracks would merge with the existing dual track rail configuration to East Hills.

This configuration would change at the approaches to and across the new Salt Pan Creek Bridge where for construction and environmental reasons, the two new tracks would be added on the Down side of the corridor. In this area, the new outer track would become the Down East Hills Main and the inner track, the Down East Hills Local. The design in this area would require the relocation of all four tracks. Both the re-aligned existing track and the new tracks would be located within the existing rail corridor.

Some changes to the vertical and horizontal alignment would be expected as the detailed design is developed and detailed survey and geotechnical data becomes available. The Proposal shown in the figures and described in the text is indicative only and is subject to detailed design.

6.2 Design requirements

6.2.1 Permanent way

The permanent way includes design and construction of all elements necessary to provide new Up and Down East Hills Main tracks in a parallel configuration to the existing two East Hills tracks within the corridor. The existing East Hills tracks would typically become Local tracks. At Revesby, the existing 2008 Turnback and Down track would become an Up Local and Down Local track respectively.

The Proposal includes the provision of approximately 7.1 kilometres of new track to be known as the Up East Hills Main from chainage 14.00 kilometres to 21.70 kilometres, approximately 7.7 kilometres of new track to be known as the Down East Hills Main from chainage 14.00 kilometres to 20.70 kilometres plus various realigned/slewed track (600 metres), crossovers, tangential turnouts and catch points plus all necessary miscellaneous

Figure 6.1a **Main features of the proposal**

Indicative and subject to detailed design

Figure 6.1b **Main features of the proposal**

Indicative and subject to detailed design

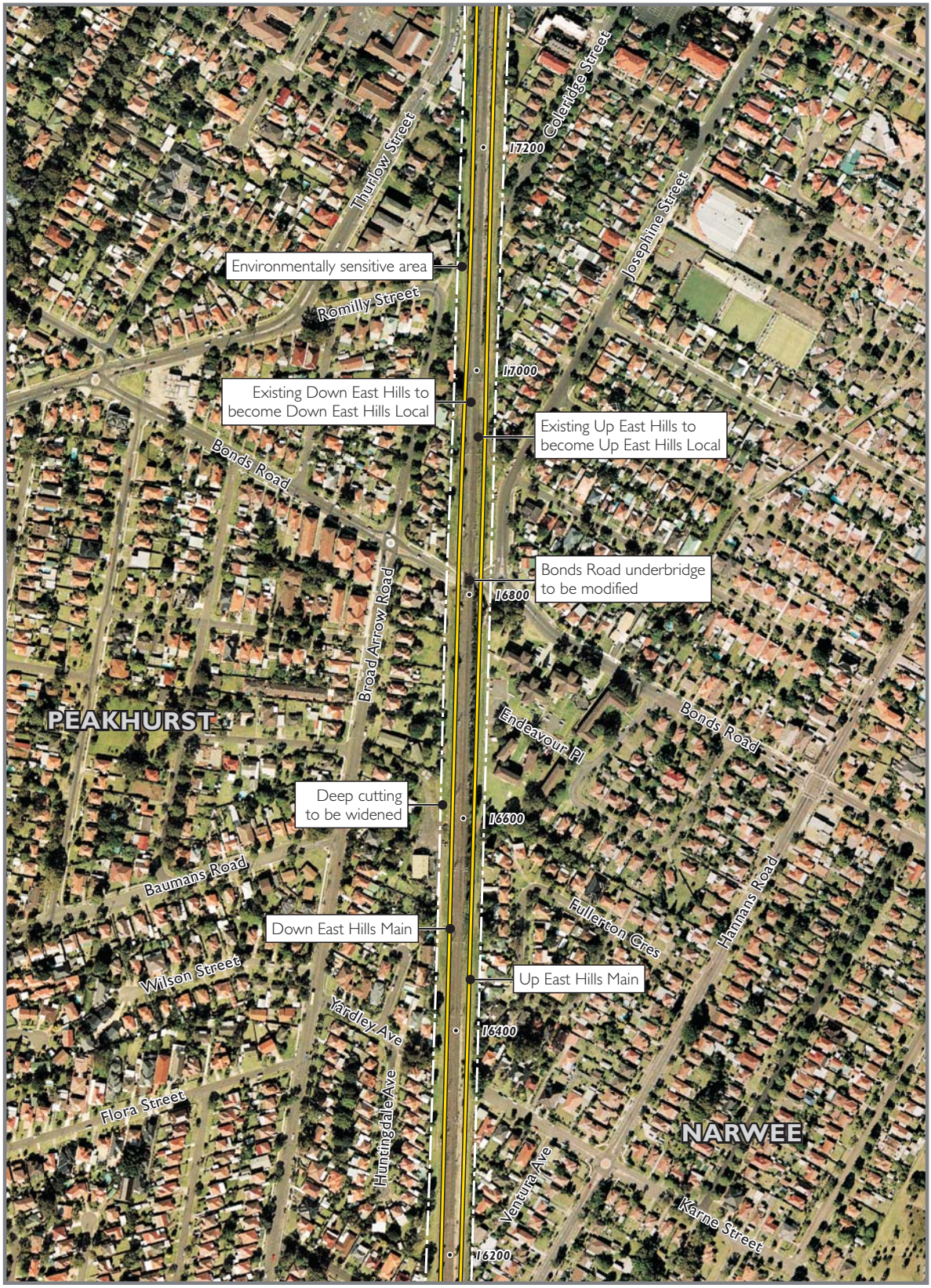


Figure 6.1c **Main features of the proposal**

Indicative and subject to detailed design

Figure 6.1d **Main features of the proposal**

Proposal work

2008 Revesby turnback work

Limit of works

19600 • Metres from Central Station

Indicative and subject to detailed design

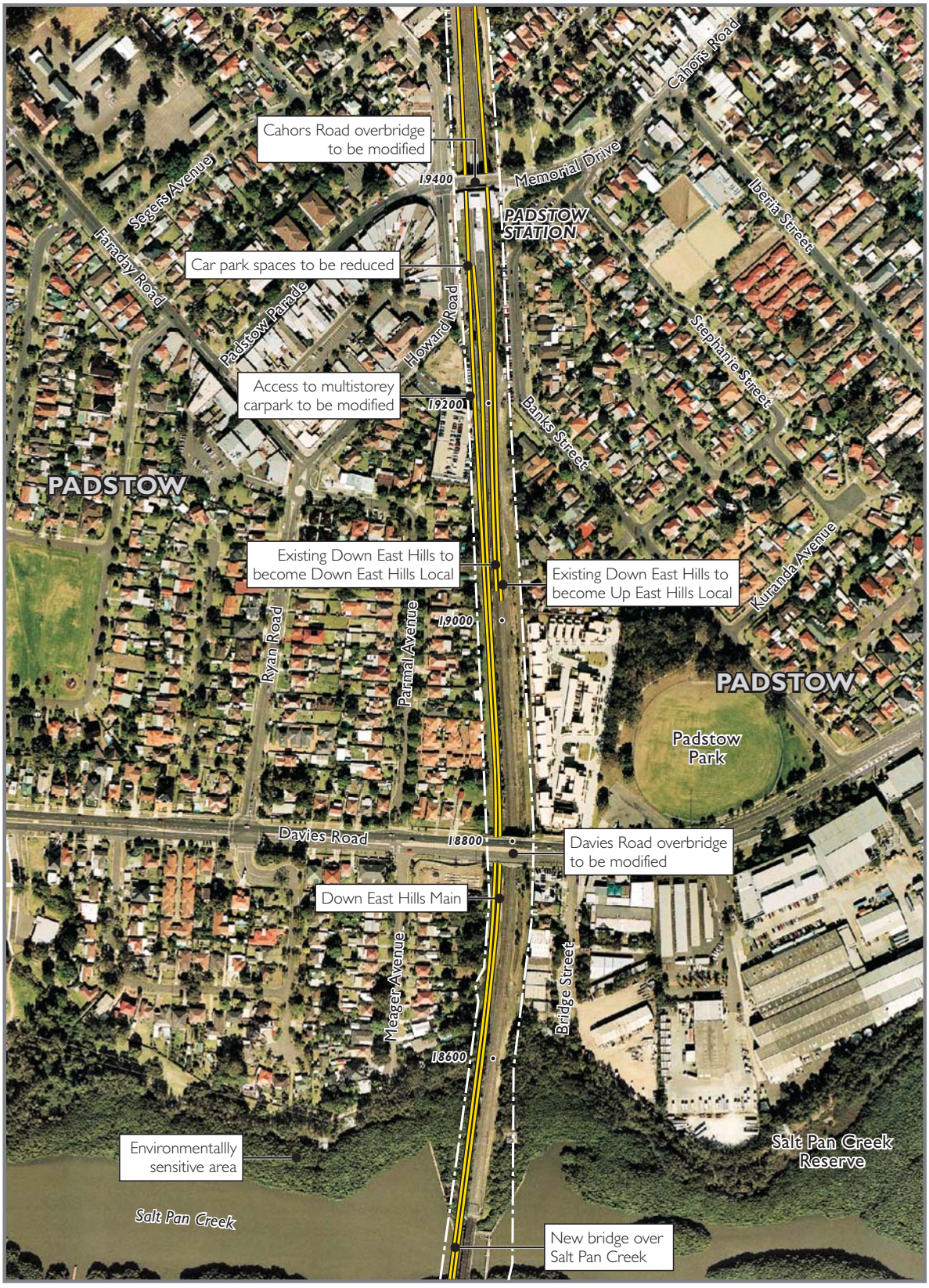


Figure 6.1e **Main features of the proposal**

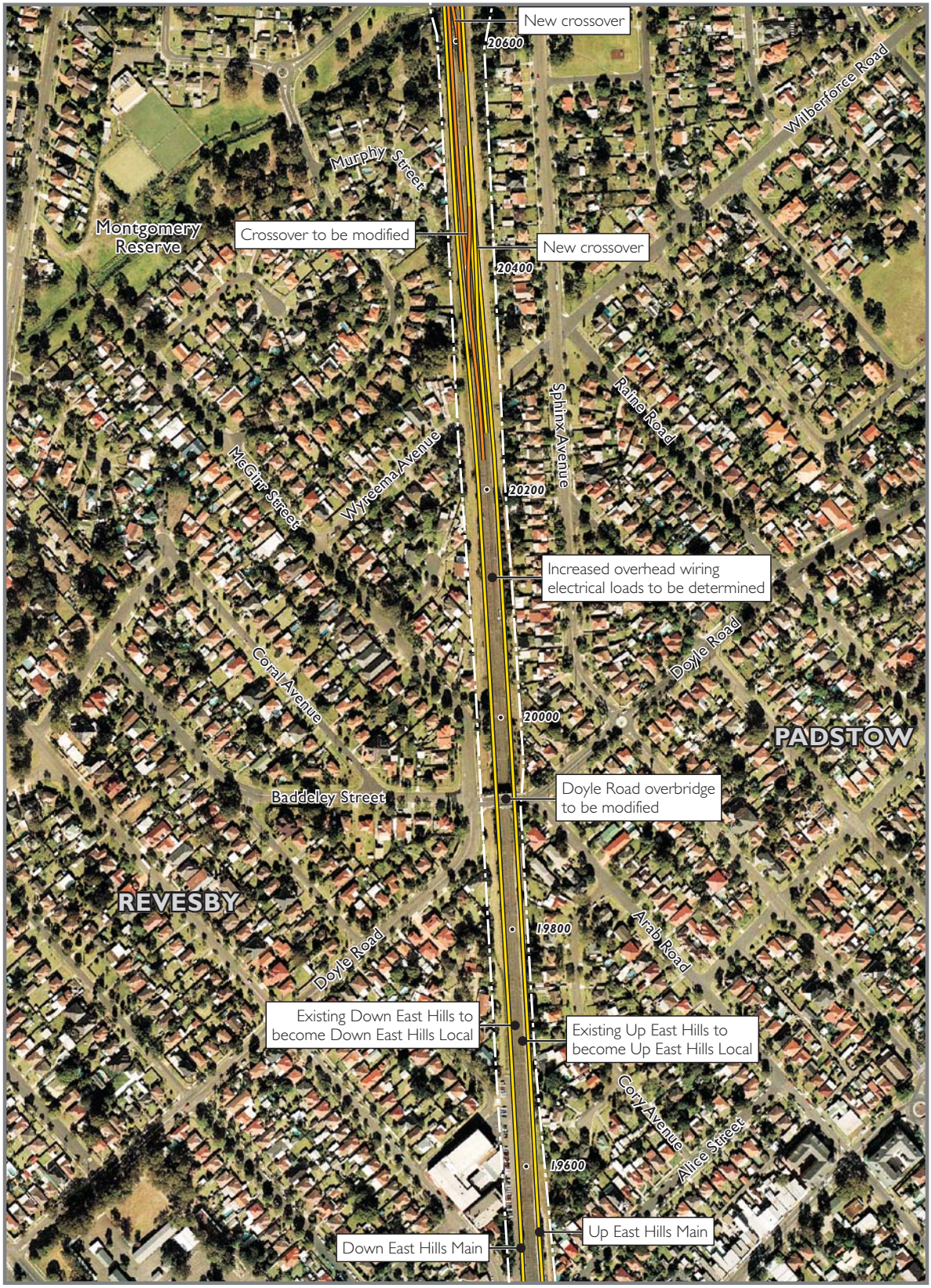


Figure 6.1f **Main features of the proposal**

Indicative and subject to detailed design

Figure 6.1g **Main features of the proposal**

Indicative and subject to detailed design

components. The permanent way would be designed to comply with RailCorp technical standards and optimise the alignment within the constraints of the existing rail corridor.

6.2.2 Earthworks

Earthworks comprise the widening of existing fill embankments and cuttings at various locations within the rail corridor to accommodate the new tracks on both Up and Down sides.

All existing embankments are approximately five metres or less in height. If embankments are widened using material gained from the excavation works required for the widening of the cuttings, the material can be expected to mainly comprise weathered shale which could be expected to breakdown to a gravely silt/clay and may be suitable for use as compacted fill. It is not expected that major treatments would be required to support the fills which could be expected to be less than five metres in height.

However, some embankments along Salt Pan Creek may require foundation treatment depending on the ground conditions encountered. Replacement of excavated material with engineered fill may also be required where soft soils are encountered. Preloaded or piled foundations may be necessary if the soft soil profile is deep. The extent of foundation treatment cannot be determined until detailed geotechnical investigations are completed as part of the detailed design development.

If it is not possible to construct batter slopes to embankments due to width constraints, retaining walls or additional support would be considered.

Existing cuttings typically stand at between 45 degrees and 60 degrees, predominantly in weathered bedrock and residual soil. Isolated sections have been remediated suggesting that previous stability problems may have been experienced. Typical cross-sections of the rail corridor are shown on **Figures 6.2a** and **6.2b.**

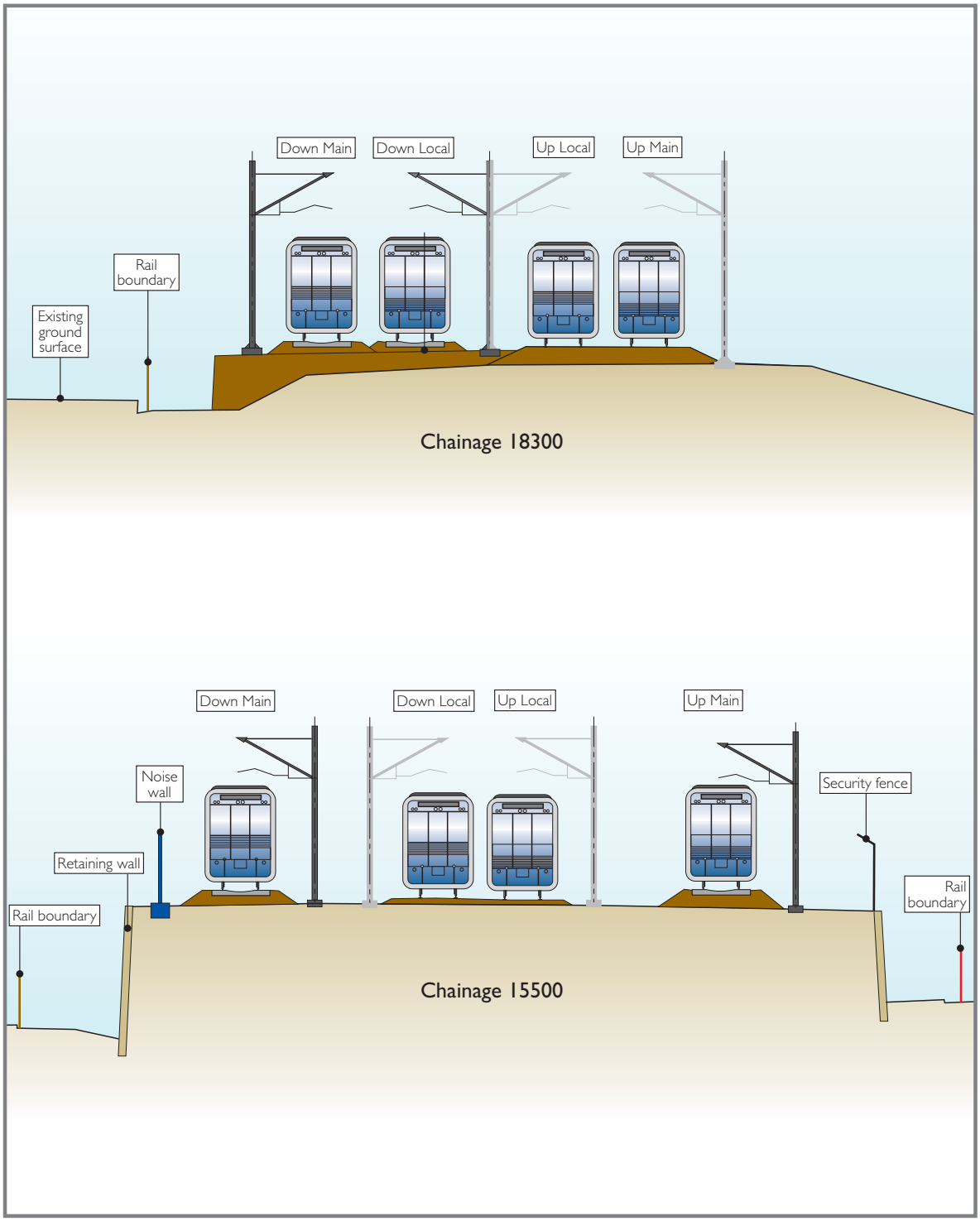
Retaining walls or additional support would be considered where width restrictions limit the use of batter slopes. The majority of cuts are not expected to exceed five metres in depth. Rock breaking equipment may be required in areas where hard rock is encountered. It is expected that the weathered rock derived from the cuts would be suitable for use as compacted fill.

6.2.3 Connections

The proposed alignment of the Proposal does not affect any intervening connections to other lines in the metropolitan network, stabling facilities or sidings. It would connect directly to the existing Up Main and Down Main to the east of Beverly Hills Station and to the present Up East Hills and Down East Hills Lines to the west of Revesby Station.

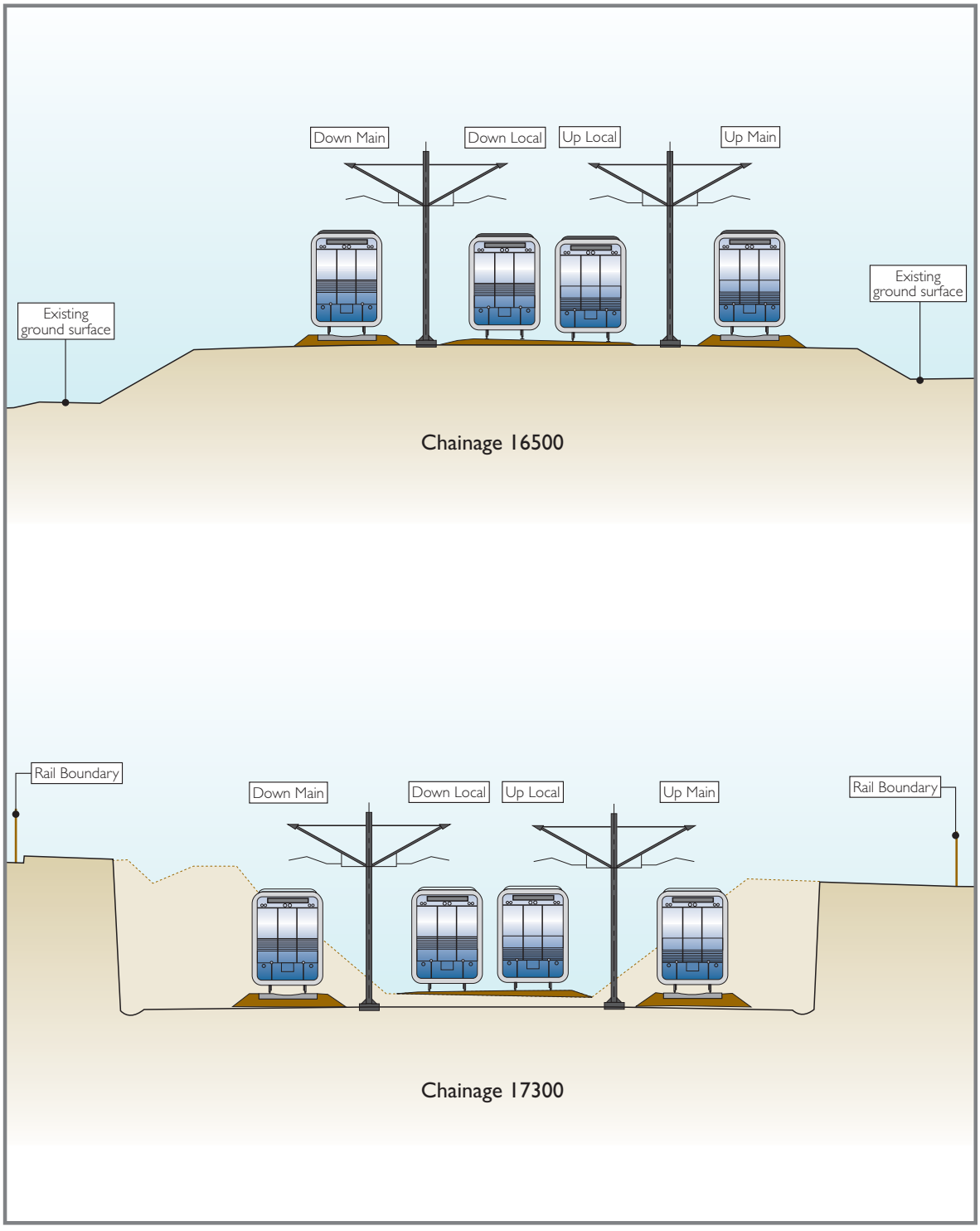
6.2.4 Drainage and culvert structures

The concept design was prepared considering issues of track drainage, local catchments and larger catchments. The design has been developed on the basis the Proposal would not increase the risk of flooding.



Indicative and subject to detailed design

Figure 6.2a **Typical rail corridor cross sections**



Indicative and subject to detailed design

Figure 6.2b **Typical rail corridor cross sections**

Track drainage would be in accordance with RailCorp standards, *Australian Rainfall and Runoff* (The Institution of Engineers, Australia 2001) and be sized for the 50 year average recurrence interval storm (ARI) event. The corridor surface drainage system for the new works would consist of various drains behind retaining walls, catch drains on top of cuttings and toes of embankment, connecting into the existing Council and Sydney Water systems as necessary. Inter-track subsoil drainage would be required in some areas, particularly along and close to station platforms between the existing and new tracks. Platform surface and roof drainage would discharge to the new drainage system and eventually connect into the relevant Council drains.

Existing cross drainage culverts have been identified along the rail corridor. As a minimum, existing culverts require extension and modification of inlets. However, some culverts which have inadequate capacity may also require upgrading. The design flows for these would be assessed prior to detailed design. Elevation of the track would take account of minimum cover requirements at locations where existing culverts cross the corridor.

Following consultation with Hurstville, Canterbury and Bankstown Councils in October 2006 several areas of local flooding were identified including:

- Morgan Street, Beverly Hills;
- Melvin Street (Beverly Hills Girls High School);
- Narwee Avenue, Narwee;
- Narwee Substation;
- Webb Street, Hurstville;
- Banks Street, Padstow; and
- Crusade Avenue, Padstow.

These areas would be further assessed as part of the development of the detailed design and, where relevant to the Project, would be sized to accommodate design flows and minimise downstream flooding.

Two large stormwater drainage canals on the city side of Beverly Hills Station cross beneath the existing tracks at chainages 14.20 kilometres and 14.30 kilometres and would require two new bridges for each canal for the Up and Down East Hills Main tracks. These single span underbridges would replicate the existing vertical clearances. Each bridge would accommodate a ballast top single track and maintenance walkway on the Down side.

6.3 Crossings of the corridor

6.3.1 Pedestrian footbridges and underpasses

There are two crossing points of the rail corridor available to pedestrians independent of public roads. Both the pedestrian underpass at Narwee Station and the pedestrian bridge at Revesby Station would be affected by the works.

The underpass at Narwee provides access to the station and would require lengthening to allow the new track to pass over. Pedestrian access would be restricted during construction of the lengthened underpass and may require one side to be closed at some time during the works. Both sides of the underpass will not be closed at the same time. Broad Arrow Road underbridge provides a short (less than 100 metres) diversion for pedestrians.

The existing footbridge at Revesby will be removed as part of the current Revesby turnback works and replaced with a new covered footbridge, stairs and easy access lifts. The footbridge would be extended as part of the Proposal by the addition of an overhead concourse with additional stairs and a lift to street level. Pedestrian access would be maintained throughout the works.

6.3.2 Road bridges

There are five locations where modifications or reconstruction works would be required to existing road bridges as a result of the construction of the Proposal. The works are required to achieve the necessary clearances to accommodate the two additional tracks. The Proposal is to reinstate these bridges to existing road, pedestrian and median configurations.

King Georges Road overbridge

The existing structure at King Georges Road consists of two bridges abutting each other, accommodating three lanes of traffic in each direction, a right turning lane, a wide median and pedestrian footpaths on each side.

Modifications would be required to each of these structures to accommodate the new Up and Down East Hills Main tracks and comply with current RailCorp engineering standards and the loading requirements of the *Australian Bridge Design Code AS5100-2004*, where applicable. The existing older, original bridge (southbound) would need to be demolished and replaced and the existing newer bridge (northbound) strengthened and modified. During construction the existing northbound bridge would remain open at all times reconfigured to two lanes of traffic in each direction.

Southbound bridge

The existing southbound bridge is a two-span concrete jack arch structure supported on brick abutments with a central brick pier.

The proposed new overbridge would comprise two concrete deck spans finished with an asphaltic concrete wearing course. The superstructure would be supported on contiguous bored piles at the abutments.

Alternative structural forms would be considered during detailed design.

Northbound bridge

The northbound structure is a four-span prestressed concrete plank bridge supported on reinforced concrete piers and abutments with some allowance made for the Proposal.

The strengthening works required for the existing northbound four-span overbridge would comprise pier and abutment modifications. The existing abutment columns would be

encased in concrete to form a blade wall and the existing foundations lowered. The blade wall would be tied into the supporting embankment.

Proposals for the reconstruction and modification of King Georges Road overbridges are shown on **Figure 6.3.**

Belmore Road overbridge
The bridge would comprise a two-span concrete deck supported on abutments. The central pier on the station platform and the adjacent concourse piles would be strengthened. Configuration and structure of the bridge is similar to that of the proposed southbound bridge on King Georges Road.

Road works at the bridge approaches would be required to tie the existing pavement to the new bridge. The full extent of the road works would be determined at the detailed design stage.

Davies Road overbridge
The proposed new overbridge would accommodate the current four traffic lanes, a bus stop and two pedestrian walkways.

The existing southbound bridge would remain and will be extended southwards with a second span to cross the two new rail lines.

The northbound deck would be demolished and replaced.

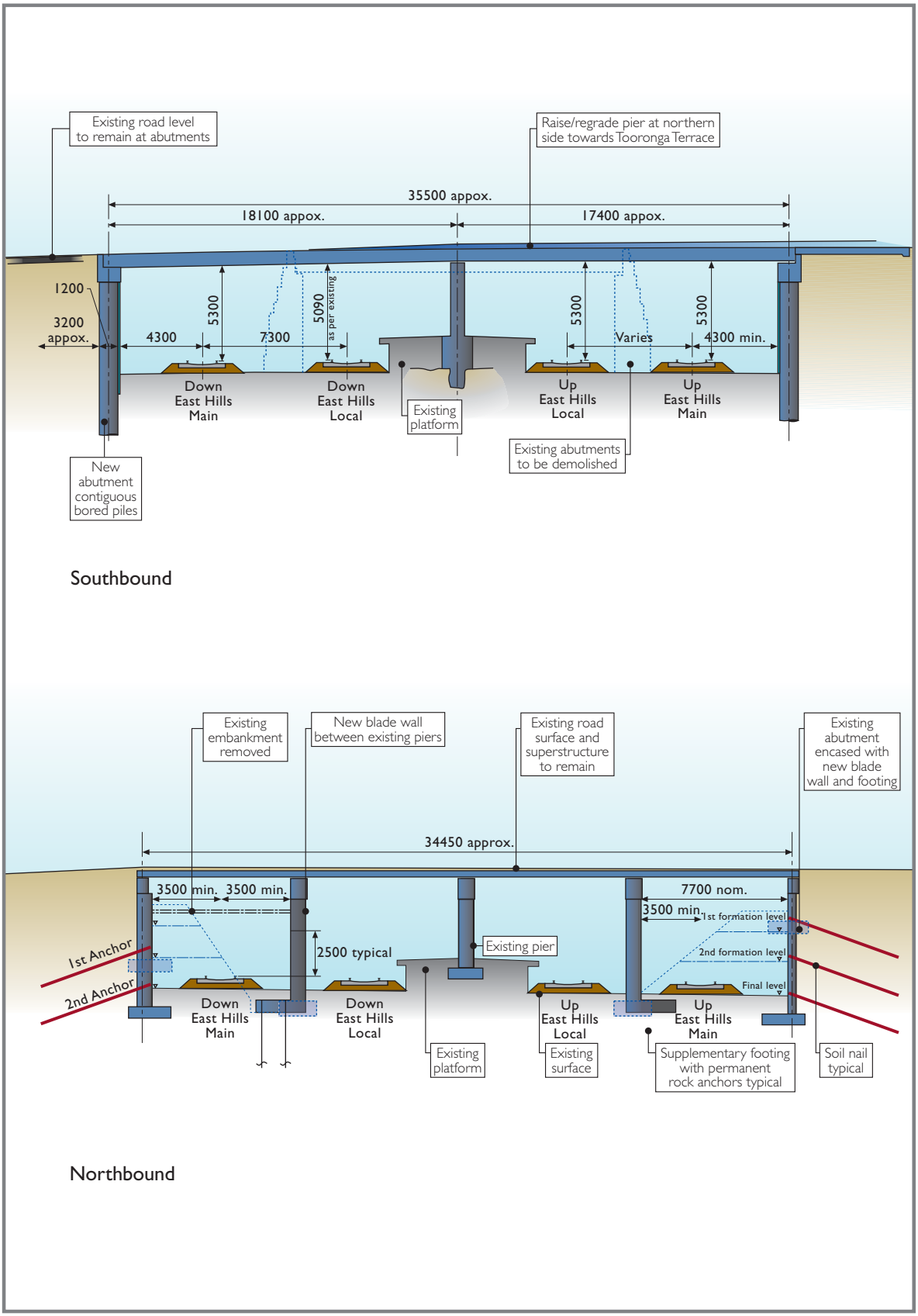
Each bridge would be supported by contiguous bored piles at the new abutments faced with shotcrete. The new northbound central pier would comprise a precast concrete headstock supported on a reinforced concrete pier fixed to pad footings. The proposals for the reconstruction and modification of Davies Road overbridge are shown on **Figure 6.4.**

Memorial Drive/Cahors Road overbridge
The proposed overbridge would accommodate the existing two traffic lanes and two pedestrian footpaths.

The bridge would consist of a concrete deck of two equal spans. It would be supported by contiguous bored piles at the abutments faced with shotcrete. The central pier may comprise a precast concrete headstock supported on a reinforced concrete pier on pad footings. However, it may be possible to reinforce the existing brick pier as an alternative to replacement.

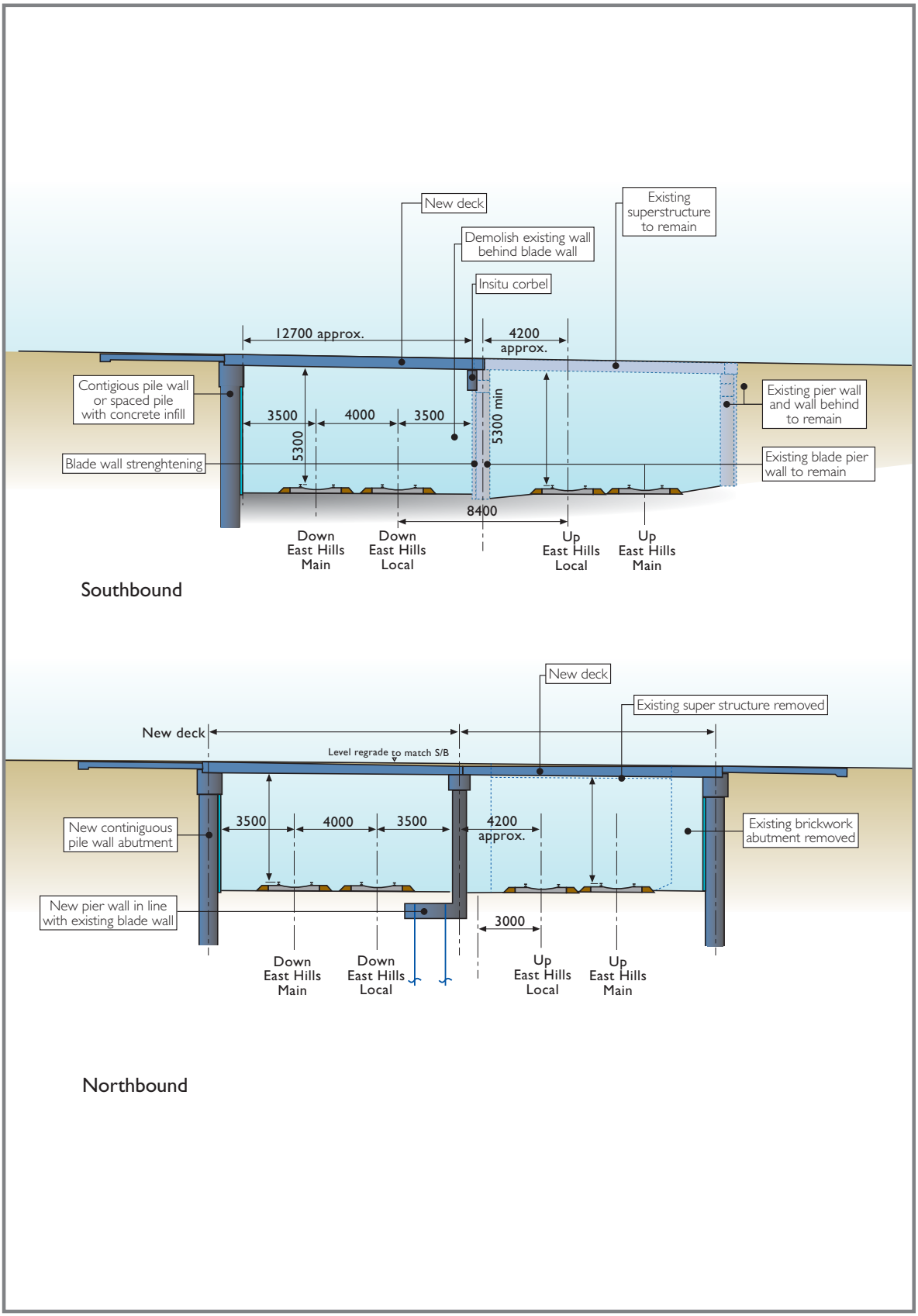
Doyle Road overbridge
The new bridge would accommodate the existing two traffic lanes and two pedestrian footpaths.

The bridge would consist of a three span concrete deck. It would be supported by contiguous bored piles at the abutment faced with shotcrete. The central piers would comprise a concrete headstock supported on a reinforced concrete pier fixed to a pad footing.



Indicative and subject to detailed design

Figure 6.3 **King Georges Road overbridge**



Indicative and subject to detailed design

Figure 6.4 **Davies Road overbridge**

6.3.3 Rail bridges over roads and waterways

All new rail bridges would be concrete decks supporting ballasted tracks. With the exception of Bonds Road, the existing rail bridge crossings along the route would be retained with new structures constructed outside the existing ones to support the new track work. At Bonds Road, the existing two track structure would also be replaced as part of the works.

Broad Arrow Road underbridges
Each bridge would comprise two concrete girders and deck with a single span of approximately 23 metres. They would be supported by concrete abutment headstocks each founded on concrete bored piles. The bridges would maintain the existing minimum road clearance. The proposal for the underbridges is shown on **Figure 6.5.**

Bonds Road underbridges
The works at Bonds Road initially involve the replacement of the bridge structure under the existing twin tracks with a new ballasted concrete deck supported off the existing brick abutments. The deck replacement and track reinstatement would be undertaken during a weekend track possession. Two new ballasted concrete deck bridge structures would be supported on bored piles constructed behind modifications to the existing abutments and wing walls.

Webb Street underbridge
The bridge would comprise pre-cast concrete deck girders over a single span. The deck would be supported by concrete abutment headstocks each founded on concrete bored piles.

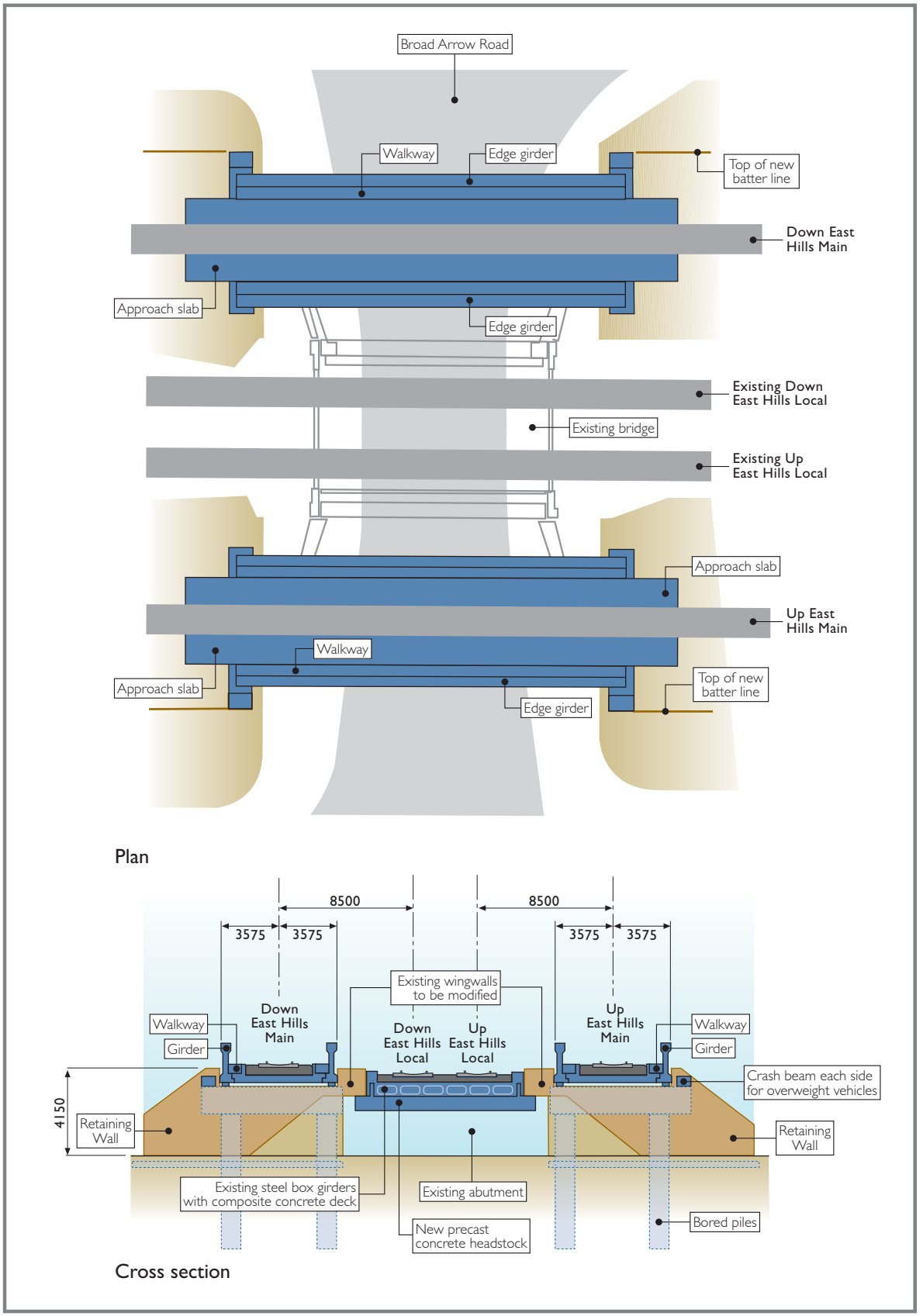
Salt Pan Creek underbridge
The proposed new two track underbridge over Salt Pan Creek would be constructed on the southern side of the existing bridge. The new structure would accommodate ballasted top dual tracks with a maintenance walkway on one side.

The bridge would consist of precast concrete deck units simply supported over four equal spans. The deck would be supported on concrete headstocks each founded on concrete bored piles. The new bridge would provide a vertical clearance matching that of the existing bridges.

The proposed underbridge arrangement at Salt Pan Creek is shown on **Figure 6.6**.

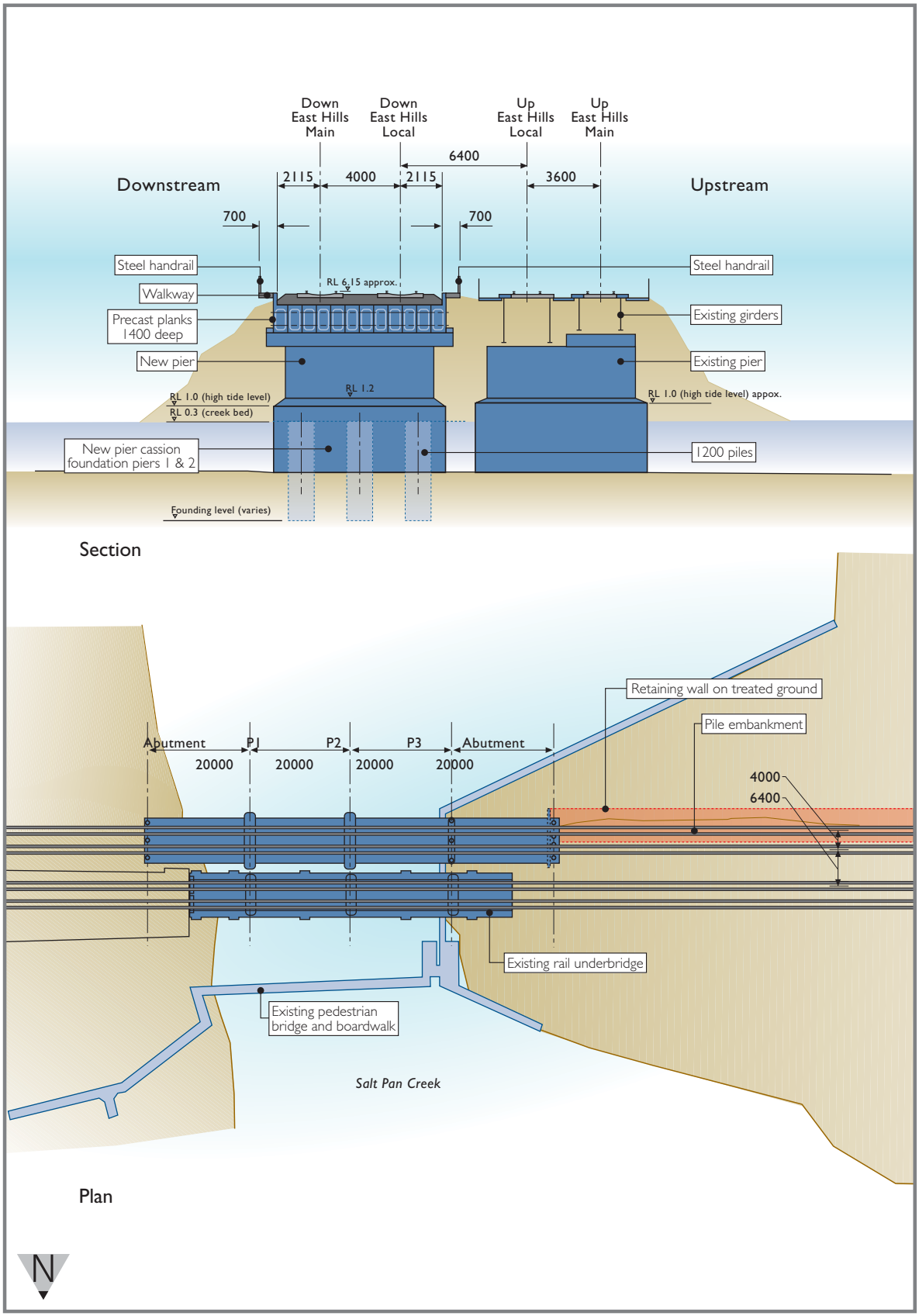
6.4 Rail electrical works

Principal features of the Proposal include a new traction substation at Revesby, a new 11kV distribution system and the relocation of existing overhead high voltage power lines along the route between Kingsgrove and Revesby.



Indicative and subject to detailed design

Figure 6.5 **Broad Arrow Road underbridges**



Indicative and subject to detailed design

Figure 6.6 **Salt Pan Creek underbridge**

The new substation at Revesby would be required to provide sufficient power for the trains to meet anticipated movements available on the new infrastructure. It would also allow the removal of the existing outdoor switchyard providing additional space for extension beyond Revesby. The site for the new substation is adjacent to the existing switchyard on land owned by RailCorp. This power supply upgrade is critical to the Proposal and must be completed prior to its commissioning. The transfer of the existing 33kV feeders from the outdoor switchyard to the new substation would be of particular importance. This would be carried out during an extended possession. The location for the new substation is shown on **Figure 6.7.**

Similarly, the relocation of the existing 33kV overhead power lines would enhance system reliability and security of supply. New underground 11kV cabling and associated works would also be provided along the rail corridor with new station supply substations at the stations.

Traction power is to be provided to the new track utilising RailCorp standard overhead wiring configurations. Relocation of a number of existing overhead wire structures is also anticipated.

6.5 Utilities

Many RailCorp and public utility services are located along or cross the rail corridor. A number of these would be affected by the proposed works. These services and utilities include:

- RailCorp services, electrical, signalling and communications infrastructure;
- Electrical - power and lighting (EnergyAustralia; Transgrid);
- telecommunications (Telstra, Optus, AAPT, PowerTel);
- ethane gas (Gorodok);
- gas (Agility);
- water and sewer(Sydney Water); and
- Hurstville, Bankstown and Canterbury Council drainage services.

Electricity

- Underground and overhead crossings of the rail corridor are located along the works. A number of crossings are in service ducts within existing overbridges. These would have to be temporarily supported and reinstated into new structures. A number of overhead crossings are unlikely to be affected by the works.
- Underground under-track crossings may have to be adjusted and/or protected.
- Street lights would be adjusted as required.

Figure 6.7 **Location of substation**

Indicative and subject to detailed design

Telecommunications

- The PowerTel optic fibre cable is located along the corridor and would be affected by the works. Investigations during detailed design would establish the extent of these works.

- Telstra cables cross the corridor generally at bridges and these would be managed as required.

- Optus telecommunications cables would not be expected to affect works along the corridor.

Ethane gas pipeline

A major high pressure ethane gas pipeline runs along the rail corridor between Kingsgrove and Revesby, crossing the tracks at several locations. This pipeline, which extends from Moomba in South Australia to Botany, was commissioned in 1996.

- The pipeline comprises a 200 millimetre steel conduit coated with plastic. In places the plastic is covered by a 50 millimetre thick concrete layer spun onto the pipe. A one metre easement surrounds the pipeline which is typically between one and two metres below ground level when located in a trench. The top of the pipeline is protected by a 500 millimetre wide concrete slab placed approximately 600 millimetres above it. A 60 millimetre plastic conduit containing electrical cables runs along the top of the slab to protect the pipeline from railway induced currents.

- Protection and avoidance is critical as relocation is not feasible due to excessive cost and the impacts associated with closure.

- Construction equipment loads must be limited where depth over the pipeline is limited. Substantial fill loading over the pipeline may be acceptable subject to owner's approval, although additional protection may be required.

- The works would be designed to avoid impacts on the pipeline.

Gas mains

- Gas mains cross the rail corridor at road bridges. The mains would be adjusted and/ or protected as required.

Water and Sewer

- Water and sewer mains cross the rail corridor at a number of locations. Relocation and/or protection works would be undertaken as required.

RailCorp services

A large number of services are located within the rail corridor. These include overhead and underground electricity lines, communications and signal cables. The location and depth of these services would need to be determined by a full services search for consideration during the detail design phase.

Two existing RailCorp facilities would need to be relocated as part of the works. The development of a new substation at Revesby is described in **Section 6.4**. The signalling depot currently located at Riverwood would need to be moved to another site to accommodate the works associated with the Proposal.

Much of the signal maintenance effort following completion of the Proposal would be centred on the major interlocking at Revesby. It is therefore proposed to relocate this facility to a suitable site adjacent to the Revesby area.

The depot would normally operate with a morning and evening shift and RailCorp requires access on a 24 hour, seven days a week basis. The depot would provide facilities for management and staff and materials laydown and storage together with parking facilities for staff.

Three sites, owned by RailCorp, have been identified adjacent to the East Hills Line; two at East Hills and the other at Holsworthy. These would be investigated in more detail and subject to RailCorp approval, one would be selected to accommodate the new signal maintenance depot. The proposed locations are shown on **Figures 6.8** to **6.10**.

6.6 Urban and landscape design

6.6.1 Key elements

The key elements of the Proposal relating to design issues which need to be addressed if a visually acceptable outcome is to be achieved, are:

- widening of the permanent way and loss of trees;
- retaining walls and embankments;
- noise barriers; and
- modification of overbridges and the addition of new structures.

Several urban design principles have been developed as outlined in **Technical Paper 3** in Volume Two. These principles would be confirmed during the detailed design stage and form the basis for the Urban Design Strategy. Community feedback on these principles will be sought during the exhibition of the Environmental Assessment.

6.6.2 Loss of trees

The widening of the active corridor to the boundary would result in the removal of street trees and the substitution of noise barriers at a number of locations. These are often close to the stations providing screening and contributing to the visual character of the surroundings. Trees would be retained where possible and new trees planted in front of new structures such as retaining walls and noise barriers where space is available. The location of street trees expected to require removal is listed in **Section 15.2.3** and shown on **Figures 14.1a** to **14.1g.**

N 0 100 metres

Figure 6.8 **Potential site for relocated RailCorp signalling depot - East Hills 1**

N 0 200 metres

Figure 6.9 **Potential site for relocated RailCorp signalling depot - East Hills 2**

Figure 6.10 **Potential site for relocated RailCorp signalling depot - Holsworthy**

Landscape options would be developed within the context of the urban design principles and community feedback sought.

6.6.3 Retaining walls and embankments

The majority of the retaining walls required for the Proposal would be inward-facing with little visual impact on the surrounding area. However, there are several areas where outward–facing retaining walls would have a significant visual impact. Where space is available, trees and scrubs would be planted in front of the retaining walls to reduce the level of visual intrusion and integrate them into their surroundings.

6.6.4 Noise barriers

Noise barriers of varying heights would be required along considerable lengths of both sides of the rail corridor. Where these are less than two metres in height, their visual impact is similar to standard backyard fences. As height increases and/or the separation distance to adjacent buildings decreases, their impact becomes greater. Issues relating to overshadowing and graffiti would be considered during the detailed design when finalising the extent and type of noise walls to be constructed. Where possible, planting of trees and shrubs would be undertaken along the length of the walls to provide some protection.

6.6.8 Modifications to overbridges and addition of new structures

The visual impacts of the proposed modifications to some of the existing structures often requiring demolition of substantial parts and the addition of new structures with increased overall spans would be significant, particularly as a number would be viewed at close quarters by passengers waiting for their train. The scale of these structures would generally be compatible with that of the cuttings and embankments along the corridor and consideration would be given during the detailed design to achieving structures of good visual quality and an appropriate standard of finish.

6.7 Noise attenuation

Noise attenuation would be provided along the corridor where it is considered to be reasonable and feasible in accordance with the approach described in **Section 13.2.2**. Approximately 7.5 kilometres of noise barriers are proposed with heights ranging from 1.5 metres to 4 metres. The approximate location and height of permanent noise barriers along the corridor are shown on **Figures 13.2a** to **13.2g**.

More detailed calculations of barrier length and height would be undertaken as part of the detailed design. Refinement would be expected during this period following detailed survey and consultation with the neighbouring residents. Consideration of adverse amenity and visual impacts and the increasing costs of tall structures would be undertaken as part of the refinement process. In some cases however, it may be preferable to increase the height over short distances if this is both cost effective and acceptable to local residents.

Barriers would be located at appropriate distances from the nearest track depending on local conditions. As far as possible, barriers would replace existing rear fences to properties or would be located at the top of a cutting or on a retaining wall where the track is in cut. Public access to the rear of the barriers would be minimised and where this is not possible,

materials and finishes designed to reduce graffiti would be used. Where the corridor width allows, or in locations such as at the end of culs de sac, landscaping would be used in front of the barriers to minimise the opportunity for graffiti. The exact type and combination of barrier and treatments would be determined at the detailed design stage in consultation with local residents, RailCorp and local Councils.

More details of the acoustic assessment and potential treatments available are provided in **Chapter 13** and **Technical Paper 1** in Volume Two.

6.8 Property acquisition

The Proposal would be constructed mostly within the existing rail corridor on land owned by RailCorp. There may however be some locations where private land would need to be acquired and some property adjustments would be necessary to leases held by various individuals and organisations over RailCorp land within the corridor. Any necessary acquisition would be undertaken under the terms of the *Land Acquisition (Just Terms Compensation) Act 1991.* Surveys would be undertaken to accurately determine the boundaries of the rail corridor and RailCorp-owned land adjacent to it, in order to define any areas required for acquisition.

More details of the potential impacts of the Proposal on land and property and land acquisition are included in **Chapter 15.**

Areas identified for construction compounds are generally located as close as possible to the rail corridor. However, several preferred work areas would be located on Council land. Negotiations and lease agreements would be in place for these parcels of land (refer to **Section 7.6** for further details on construction compounds/work areas). Use of this land would be temporary and all sites would be returned to at least their previous condition on completion of construction.