15 Social Environment

Chapter 15 provides a summary of the predicted impacts on the social environment and the mitigation measures included in the Proposal to minimise any undesirable effects. The social impacts of the Proposal relate to how it would integrate with the local and regional community. This includes consideration of the likely impacts of the Proposal on amenity, Aboriginal and built heritage, visual character and air quality.

15.1 Local characteristics

15.1.1 Aboriginal heritage

The site is located within the Georges River and Cooks River catchments, which due to their water resources and ecological diversity would have facilitated inter and intra-territory movement for local and visiting Aboriginal groups. The vegetation of the Sydney Basin would once have consisted mainly of Dry Sclerophyll or Open Woodland Forests on the higher sections where the soils are sandy and well drained while the slopes would have supported an open Sydney Turpentine-Ironbark Forest. The vegetation found within these woodlands and forests would have provided a rich and varied food source and supported a variety of animal life associated with Aboriginal diet. The urbanisation of the Sydney Basin has ensured that the landscape and its vegetation has been dramatically altered and no longer resembles the pre-contact landscape.

A search of the DECC Aboriginal Heritage Information System, the State Heritage Register and Inventory, the Register of the National Estate and the National Trust Register did not reveal the presence of any previously recorded Aboriginal sites within or adjacent to the rail corridor.

An archaeological survey was undertaken on 27 October 2006 involving inspections from each railway station and at different locations along the East Hills Line. The inspection revealed that the rail corridor is highly disturbed from previous rail construction activities and was covered with blue metal ballast. Specific attention was paid to areas of archaeological sensitivity such as where the line crosses Little Salt Pan Creek and Salt Pan Creek. No Aboriginal archaeological sites or places of significance were located during the course of the survey. Areas of archaeological sensitivity are also highly disturbed and the construction of the existing bridge over Salt Pan Creek and the piping of Little Salt Pan Creek under the rail corridor would have destroyed any sites which may have existed in these locations.

The area of the Proposal falls within the boundaries of the Metropolitan Local Aboriginal Land Council (MLALC). Consultation was undertaken with MLALC to discuss the Project and enable its representatives to attend the field survey undertaken to identify items of Aboriginal heritage significance within the study area. Two representatives attended the field survey and both indicated that there would not appear to be any restriction placed upon the Proposal in relation to Aboriginal heritage since no sites of Aboriginal heritage significance were located during the surveys.

15.1.2 Built heritage

A heritage assessment was undertaken to determine the impact of the Proposal on any significant item of built heritage within the corridor. Each of the stations within the rail corridor is listed on the RailCorp (formerly State Rail Authority) Section 170 Register as an item of heritage significance. In addition, Beverly Hills Station is listed on the State Heritage Register as an item of State significance and on the National Trust (NSW) Register.

The platform at Beverly Hills Station is unique on the East Hills Line since it is not symmetrical, unlike all the others. The Up side platform of Beverly Hills Station is curved whereas the Down side is straight. The station is listed in the Beverly Hills Railway Station group, with the boundary of this group formed by Tooronga Terrace to the north, Morgan Street to the south, King Georges Road overbridge to the west and a line across the tracks 10 metres to the east of the platform end. The overbridge at King Georges Road is therefore also included in the list as a heritage item on the State Heritage Register.

The significance assessment for the Proposal relates only to Beverly Hills Station and the overbridge at King Georges Road since these are listed on the State Heritage Register. The complete significance assessment undertaken can be found in the **Technical Paper 4** in Volume Two. The assessment concluded that the construction of Beverly Hills station provided the impetus for the residential development of the area and is historically important because its booking office was one of the last to use the Edmondson cardboard tickets. The station was associated with the Oatley family, who were early settlers in the district. The station is used by many local residents everyday as a means of accessing the City's rail transportation system, making it an important piece of local infrastructure.

The Beverly Hills Station buildings and platform were assessed to be of local significance. The King Georges Road overbridge is only of significance due to its association with the railway station. It does not contain any historical, aesthetic, social or rarity of representative significance. The overbridge was therefore assessed as having no local, regional or state significance.

The Proposal would have no impacts on the station facilities themselves.

Narwee Station is listed on the RailCorp Section 170 Register as an item of heritage significance. It is not listed on the State Heritage Register. The assessment of the potential impacts of the Proposal on items of heritage significance has been considered at Narwee Station. It should be noted that the Director-General's Requirements for the Environmental Assessment requested assessment of the heritage significance of the pedestrian underpass at Narwee Station although a review of available information indicates that the underpass is not of heritage significance.

The listing on the Section 170 Register relates only to the station buildings and the platform but not to the pedestrian underpass. The heritage theme associated with the listing is transport and economy. The works associated with the Proposal would not have any impact on the station buildings nor the platform and, as such, no impacts on items of identified heritage significance can be expected to occur at the station.

A heritage panel was placed adjacent to Narwee Station by Canterbury City Council in April 2001. This aims to inform the public about significant events in the development of the

city; in this case, the East Hills Railway Line. There would be no impact to this heritage panel as a result of the construction of the Proposal.

15.1.3 Visual character

The rail corridor between Kingsgrove and Revesby has a typical suburban character with a mix of land uses and natural features. The railway line has existed since the 1930s and is an established and accepted feature in the landscape. Certain aspects of the railway, such as the bridges, have become local landmarks. The land use is predominately low density residential along the corridor with some medium density residential and commercial uses near the railway stations. There are also some schools and open spaces along the corridor.

The visual character of the corridor and its adjacent area is undistinguished with few notable features. It passes through predominantly flat land mainly at a level below the adjacent area in relatively shallow cuttings. In a limited number of areas it rises above its surroundings on embankments providing a visual barrier between the areas on either side which are only linked intermittently at the limited number of crossing points.

The corridor itself, while dividing the area through which it passes has only limited visual influence on its surroundings. The rail related infrastructure is utilitarian and functional with little visual quality with the exception of some of the original station buildings. The larger items, mainly focusing on the stations where the bridges are generally located, have little intrinsic visual quality and are, in most cases only visible from the stations themselves. The undersides of the relatively new concourses built at some of the stations seem not to have been considered from a visual perspective although they are the most conspicuous parts of these structures visible to the passengers waiting for their train. Changes in such areas are generally piecemeal becoming cluttered over time especially if redundant equipment and services are left in place or only partially removed when improvements are made.

Visual connectivity across the corridor is limited except where the public has access to crossing points or where roads or footpaths run parallel to the railway. Elsewhere, views are only available to residents whose properties share a boundary with the rail corridor. In many cases even these views are obscured by vegetation on the batter slopes or the limited vegetated spaces within the corridor.

15.1.4 Air quality

Prevailing climatic and air quality conditions along the rail corridor are similar to many areas in greater metropolitan Sydney. Data on existing climatic conditions are available at Bankstown Airport, which is located to the north of Revesby. January is the hottest month with a mean maximum temperature of 28 degrees Celsius, while July has the lowest mean maximum temperature at 17.2 degrees Celsius. March is the wettest month with a mean rainfall of 117.9 millimetres, while September is the driest month with a mean rainfall of 41.7 millimetres. The average annual rainfall received at Bankstown Airport is nearly 900 millimetres.

Prevailing winds in the Sydney Basin follow a pattern of light morning breezes, predominately from the south and west, and moderate to fresh afternoon breezes, primarily from the south, east and north-east. According to the weather station at Bankstown Airport, the annual average wind speed in the morning (09.00 hours) is 7.9

kilometres per hour, primarily in a north west, west and south west direction. The afternoon (15.00 hours) readings indicate an average annual wind speed of 17.9 kilometres per hour, predominantly from the southeast and east (Bureau of Meteorology, 2007). An increase in distance from the coast reduces the influence of the coastal sea breezes. As a result, and in conjunction with the barrier effect of the mountains encircling the Sydney Basin, the south west of Sydney experiences higher concentrations of airborne pollutants than the coastal regions.

Air quality data from Chullora and Earlwood from July 2005 to June 2006 have been examined and summarised in **Table 15.1**. Chullora is located to the north of Riverwood while Earlwood is located to the north-east of Kingsgrove. The recorded air quality in these regions exceeded the National Environment Protection Measure (NEPM) for ozone and particulate matter on two and five days respectively. All exceedances of the particulate matter standard within the year from July 2005 to June 2006 occurred at Earlwood. The averages for each of the air quality measurements did not exceed the NEPM standard level, although the average for particulate matter was less than 2 micrograms per cubic metre away from the NEPM standard level.

Table 15.1 Air quality data for Chullora and Earlwood from July 2005 to June 2006

	Pollutant				
	Ozone (pphm)	**Nitrogen Dioxide (pphm)**	**Particulates PM_{10} ($\mu g/m^3$)**	**Sulphur Dioxide (pphm)**	**Carbon Monoxide (ppm)**
NEPM[1] Standard Level	10	12	50	20	9
Measured Concentration	Maximum 1-hour average	Maximum 1-hour average	24-hour average	Maximum 1-hour average	Maximum 8-hour average
Chullora	11.7	6.6	49	0.5	2.3
Earlwood	11.1	6.5	61	N/A	N/A
Mean of monthly averages with sites combined	3.125	2.57	48.08	0.33[2]	0.88[2]
Number of days over the NEPM Standard	2	0	5	0	0

Note 1 NEPM stands for National Environment Protection Measure
Note 2 These means are only for the monthly averages of Chullora as no data was available for Earlwood.
Source: Department of Environment and Climate Change - Quarterly Air Quality Monitoring Reports

Air quality in the region over the monitoring period was mixed: poor for certain pollutants (ozone and particulates) but good for others (sulphur dioxide and carbon monoxide).

15.1.5 Social

Hurstville LGA

Hurstville is located 15 kilometres to the south west of the Sydney central business district and is one of eight regional centres within greater Sydney. Hurstville is one of the fastest growing areas of metropolitan Sydney with approximately 28,700 dwellings, housing a population of 73,700 (Australian Bureau of Statistics Census, 2007). According to the 2006 Census, the median age of the total population in Hurstville was 38 years with one-quarter of the population aged over 55. Approximately 35 percent of the population in Hurstville was born overseas. About 30 percent spoke a language other than English at home, with Cantonese, Mandarin and Greek the most commonly spoken. The population of Hurstville is expected to reach 87,000 by 2021 (Department of Planning 2006).

Approximately 55 percent of the total resident population is employed, with nearly 40 percent working full time. The three largest sources of employment for Hurstville residents are retail and trade, manufacturing and business and property services, each employing roughly 13 percent of the population. Over two-thirds of the population travel by private vehicle to and from work, with slightly more than eight percent of the Hurstville workforce travelling by train. The median weekly household income for the population of Hurstville in 2006 was $1,060, similar to the median weekly household income for the Sydney Statistical Division.

Canterbury LGA

Canterbury LGA is located 17 kilometres south west of the central business district of Sydney, with a total population of approximately of 130,000 people at the 2006 Census. Nearly half of the total population was born overseas (48 percent), primarily in China, Lebanon and Greece. Correspondingly, the main languages spoken at home, other than English, are Arabic (including Lebanese), Greek and Chinese. About one-quarter of the population fall within the 40 to 59 years age group, with 17 percent of the total population older than 60 years. The median age of the Canterbury population was 36 years in 2006. Over half of the population are members of two-parent families with children. The population of Canterbury is expected to reach 148,000 by 2021 (Department of Planning 2006).

Nearly half the total population of Canterbury is employed, with more than 30 percent working full time. The two industries employing the largest number are manufacturing and retail and trade, both employing approximately 15 percent of the total workforce. More than two-thirds of the workforce travel to and from work by private vehicle, with nearly 20 percent travelling by train. The median weekly household income for the population of Canterbury was $839 in 2006, lower than the median weekly household income of $1,154 for the Sydney Statistical Division.

Bankstown LGA

Bankstown City is located in Sydney's south western suburbs and is between 13 and 23 kilometres south west of the Sydney central business district. The total population of the Bankstown LGA was just over 170,000 at the 2006 Census. Around 60 percent of the total population was between the ages of 18 and 64 with some 35 percent of the total born overseas, representing a slightly higher proportion than that in the Sydney Statistical Division (31.2 percent). Nearly half of the total population was from non-English speaking

backgrounds, with Arabic (19.3 percent) and Vietnamese (8.3 percent) the most common languages spoken at home. The most common household type within the Bankstown area comprised couples with children less than 15 years of age. The population of Bankstown is expected to reach 192,000 by 2021 (Department of Planning 2006).

About half the total population was employed, with approximately 35 percent working full time in 2001. The wholesale and retail trade industry was the largest employer of the Bankstown population at 21.5 percent, followed by manufacturing (16.8 percent) and finance insurance and business services (15.4 percent). More than half of the workforce population used private vehicles to travel to and from work. The train is the second most common method of transport to and from work at 13.7 percent. Over 30 percent of the workforce of Bankstown work locally in Bankstown, followed by nearly 15 percent working in the Sydney LGA. The median weekly household income for the population of Bankstown was $926 in 2006, lower than the median weekly household income of $1,154 for the Sydney Statistical Division.

15.2 Changes to the social environment

15.2.1 Aboriginal heritage

Since no Aboriginal sites, places or objects were identified during the course of the archaeological survey, it is unlikely that the Proposal would affect Aboriginal heritage. There are therefore no constraints on the Proposal as a result of Aboriginal archaeological and cultural heritage issues.

15.2.2 Built heritage

A visual inspection of the entire railway corridor between Kingsgrove and Revesby was undertaken and concluded that apart from Beverly Hills Station, there would be no impact on any significant item of heritage within the railway corridor. The Proposal would not adversely affect the railway stations as there would be no structural alterations. Consideration would be given to the conservation of the heritage elements of the pedestrian underpass at Narwee Station including the facia which would need to be relocated. The overbridges at Belmore Road, Davies Road, Cahors Road and Doyle Road would be affected by the Proposal but none of these are listed on the RailCorp Section 170 Register, the State Heritage Register or in local environmental plans.

The proposed works would include the demolition and reconstruction of the southbound King Georges Road overbridge and the strengthening of the existing northbound overbridge, which would affect the original fabric of the Beverly Hills Station group, as listed on the State Heritage Register. Alternatives to the demolition of the central pier of the King Georges Road southbound overbridge have been considered but none are considered to be feasible.

The demolition of the central pier would have an impact on the original design. However, the original structure has undergone many changes, including cementing over the original jack arch construction, and as such, the assessment indicates that the overbridge is no longer of heritage significance. The works on the King Georges Road overbridge would not adversely affect the significance of Beverly Hills Station and its buildings, as the new

overbridge would retain a similar form to the existing northbound bridge and the station buildings themselves would not be changed.

One element at Narwee Station would be affected by the Proposal. This is the pedestrian underpass which provides access to the station and would need to be extended to allow the additional rail tracks to pass over. Levels within the underpass would also need to be adjusted to maintain necessary clearances for pedestrian movement. Heritage values would be assessed during the detailed design stage and representative features, particularly those relating to the existing fascias, would be relocated and preserved as part of the new design, if this is practicable.

15.2.3 Visual character

Visual change would be brought about by the widening of cuttings and embankments within the corridor with the removal of most of the established vegetation within it and some alongside, the widening of the permanent way with an increase in the spans of the overbridges and the lengthening of the underbridges including major new structures spanning Salt Pan Creek. The introduction of noise barriers along a substantial part of both sides of the corridor would have a significant impact on the visual character of the corridor for those living adjacent to it, using the trains or passing across it. There would also be some changes in the proximity of the stations, mainly relating to reconfiguration of existing car parking. Visual impact issues are discussed in more detail in **Technical Paper 3** in Volume Two.

Visual impacts as a result of the Proposal would be caused by loss of vegetation, installation of new noise and retaining walls, loss of commuter parking and the lengthening of the new overbridges to accommodate the two new railway tracks.

The Proposal would result in the loss of vegetation along the corridor with the removal of well established street trees at:

- Morgan Street, east of Beverly Hills Station;
- Bryant Street, east of Narwee Station; and
- William Road, at Riverwood Station.

The location of these areas is shown on **Figures 14.1a to 14.1g**. In most cases, the existing trees would be replaced by retaining walls and/or noise barriers. The greatest visual impact due to the loss of vegetation is in the vicinity of the railway stations as there are small pockets of landscaped areas within the rail corridor in these locations. The loss of vegetation in these areas would have an impact when viewed from the public domain or adjoining property. Where space is available, these areas would be replanted with suitable species in consultation with the relevant council.

There are numerous locations along the railway corridor where noise barriers are required, especially where the rail alignment is close to existing residential development. **Technical Paper 1** in Volume Two indicates the locations and heights of the proposed noise barriers, with heights generally between 1.5 and 4 metres. Some noise barriers would be less than two metres high, which would be approximately the same height as the existing backyard fences and would therefore have little impact. There would generally be two types of

noise barriers; solid and partially transparent. Transparent sections would be restricted to the top part of the noise barrier and would be used only where overshadowing would be a problem and in locations where public access would be restricted.

The number of retaining walls required along the railway corridor would be significant, with the types used dependent on the ground condition, height of cut/fill and the proximity to the rail boundary. Most of the retaining walls would be facing inward towards the railway tracks with no visual impacts on the surrounding environment. The major outward-facing retaining walls with a significant impact on the immediate environment are:

- along Bryant Street, between chainages 15.305 kilometres and 15.580 kilometres, west of Broad Arrow Road;
- near Narwee Station on both sides of the corridor between chainages 15.605 kilometres and 16.400 kilometres;
- adjacent to Bonds Road on the Up side of the corridor between chainages 16.545 kilometres and 16.885 kilometres; and
- along Blamey Street on the Down side of the corridor between chainages 20.760 kilometres and 20.950 kilometres.

The rail corridor has been divided into 11 sections for the purposes of the urban design and visual impact assessment, comprising the railway station precincts and the spaces between them. The extent of each section is listed in **Table 15.2** and is shown diagrammatically on **Figure 15.1.**

Table 15.2 Sections for visual and urban design assessment

Section	Chainage[1] (km)	Location
1	14.000–14.500	Start of works to Beverly Hills Station
2	14.500–14.800	Beverly Hills Station
3	14.800–15.600	Between Beverly Hills and Narwee Stations
4	15.600–15.900	Narwee Station
5	15.900–17.400	Between Narwee and Riverwood Stations
6	17.400–17.600	Riverwood Station
7	17.600–19.200	Between Riverwood and Padstow Stations
8	19.200–19.500	Padstow Station
9	19.500–20.800	Between Padstow and Revesby Stations
10	20.800–21.100	Revesby Station
11	21.100–21.700	Revesby Station to end of the Proposal

Note 1: Distance in kilometres from Central Station.

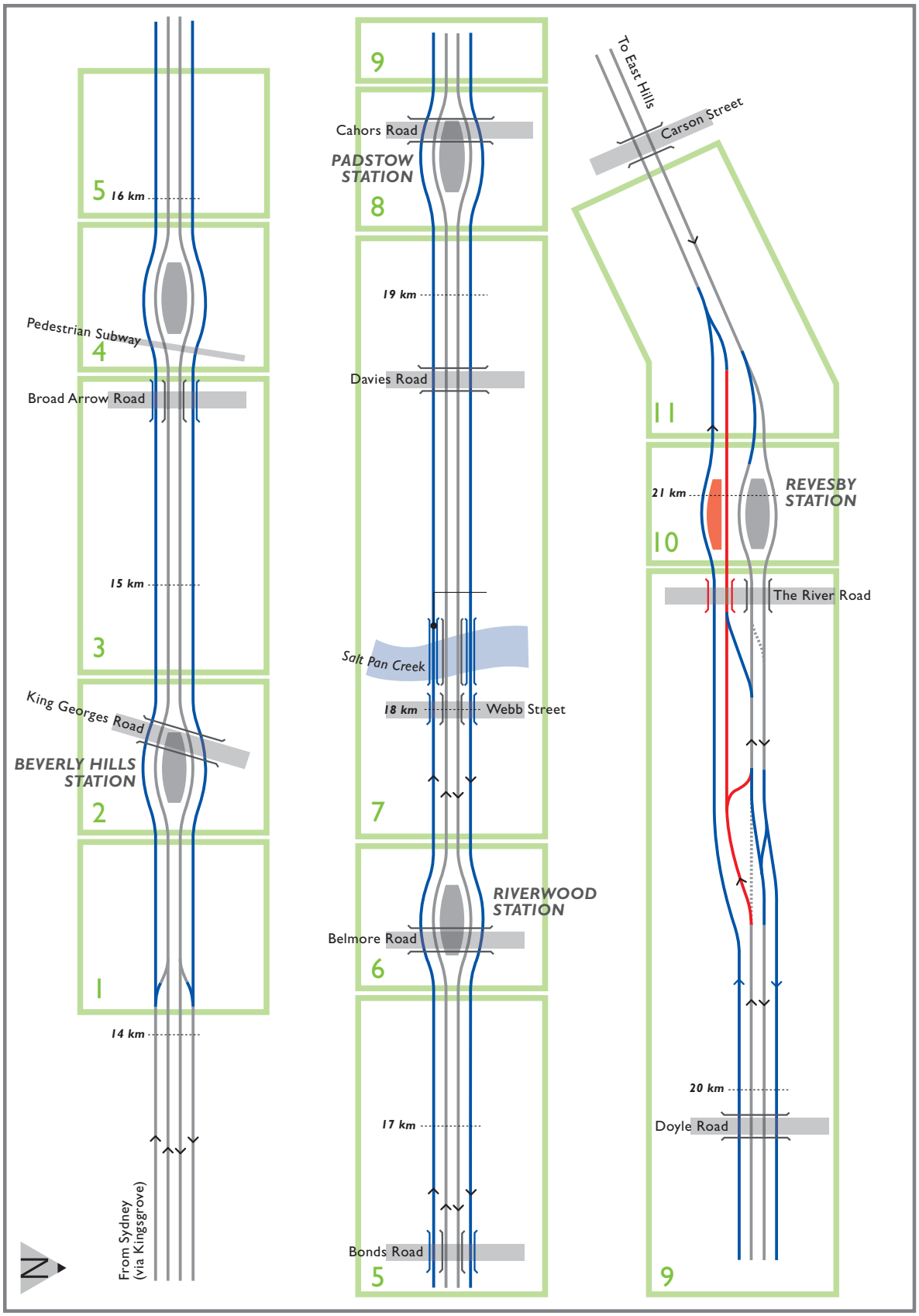

Figure 15.1 **Areas for visual assessment**

2008 turnback works
2010 Proposal works
Existing track

Note: The works shown are Quadruplication Option 1a (see Figure 5.1)
The Proposal is shown on Figures 6.1a to 6.1g.

Section 1

Tooronga Terrace and Morgan Street run parallel to the rail corridor with a group of mature trees along both these streets providing shade and important visual character. The trees along Morgan Street on the Down side of the corridor would be removed as part of the Proposal works. The railway tracks cross two stormwater drainage canals requiring new bridges on both sides of the corridor. The existing bridges are reinforced concrete of little visual significance. Towards the western end of the section, the railway is in cutting allowing visual connection between Tooronga Terrace and Morgan Street. This provides a sense of openness to the streets and is visually important. However, a 2.5 metre high noise barrier is proposed along Morgan Street reducing this connectivity and representing a change to street character. Visual impacts are assessed as low to moderate.

Section 2

Beverly Hills Station is in a cutting partially below King Georges Road. This allows a visual connection to be made between Tooronga Terrace, Morgan Street and the station platform, providing a sense of openness in the street and improving security on the platform by increasing its visibility. The overbridge at King Georges Road has brick abutments visible from the platform but is not of any wider visual significance. The noise barrier proposed along Morgan Street would not extend to King Georges Road maintaining some connectivity between Morgan Street and the station platform.

The new overbridge would replace the existing structure with a considerably larger concrete bridge introducing additional visual impacts especially for those using the station or travelling by train. This presents an opportunity to improve a poor visual environment. Visual impacts are assessed as low.

Section 3

There are rear fences along the rail corridor for more than half of Section 3 with a view corridor across it at the end of Melvin Street, providing a sense of openness. There are mature trees along Bryant Street between the road and the rail corridor that provide visual separation and a particular visual character to the street. These trees would be removed as part of the Proposal. There are seven lengths of noise barriers proposed along the tracks on both sides of the corridor, four of which would have a negligible impact because they are low in height and located some distance from existing residential buildings. The 2.5 metre high noise barrier proposed at the end of Melvin Street would remove the existing visual connection.

The tracks are currently on a 2.5 to 4 metre high embankment, which would be replaced by concrete retaining walls on both sides of the corridor. The retaining walls would be approximately four metres high and face the roadway for the majority of their length. Noise barriers would be placed on top of two of the retaining walls, increasing the total height of the visual barrier to between 4.5 and 6 metres. These modifications would have an impact on the character of Bryant Street. Noise barriers are discussed in more detail in **Section 15.3.3.**

There is an underbridge on Broad Arrow Road, comprising a steel structure with brick wing walls, which would be modified to accommodate two new bridges. The new bridges would comprise pre-cast concrete girders and would have limited visual impacts on their surroundings. Visual impacts are assessed as moderate to high.

Section 4

A pedestrian underpass at the end of Penshurst Street provides access to Narwee Station and across the railway corridor. The underpass has brick wing walls but these are of limited visual significance. Although located on an embankment, Narwee Station is enclosed by groups of trees and shrubs and by shops on Hannans Road. The appearance of the shop building from the station platform is poor but the trees provide a sense of enclosure to the platform and are an important part of the visual character of the station area. A group of mature trees provides visual separation between the railway tracks and the commuter car park located along Hannans Road on the upside of the corridor. The trees also provide shade to the car park. Some of these trees would be removed and the shop building demolished to accommodate the new works. This would result in a significant change in the character of the station, making it more open and visible. Although the removal of the shops would improve the view from the platform, removal of the trees would have an adverse impact.

The pedestrian underpass would be lengthened and new entrances provided. The retaining walls would be similar to the existing structures. A 3.5 metre high noise wall would replace the existing school fence and due to its position on the top of a cut would form a strong vertical face along with the retaining wall. Visual impacts are assessed as generally moderate but high on the elevated sections of the corridor.

Section 5

The rail corridor in Section 5 is lined with rear fences along almost its entire length. The existing underbridge on Bonds Road has a steel structure and brick wing walls of limited visual significance. The proposed bridges would comprise pre-cast concrete girders with little additional visual impact. A group of trees on the Up side of the corridor acts as a natural screen for the apartment buildings next to the embankment and are an important component of the outlook from the apartments. These trees would be removed and replaced by a three metre high retaining wall surmounted by a two metre noise barrier. The combined effects would result in a significant visual change for residents of the adjacent apartment buildings.

There is a total of eight noise walls proposed for Section 5, with two likely to have an impact on the surrounding environment as they would be four metres high, causing overshadowing at nearby residential buildings unless partially transparent. The other proposed noise walls are either, at a distance from any building or on the southern side of the residential development and therefore would have less impact. Visual impacts are assessed as moderate.

Section 6

Riverwood Station has been recently upgraded with a new entrance and a retail area over the tracks along Belmore Road. The overbridge has brick abutments which are of limited visual significance. It would be lengthened as part of the Proposal, requiring demolition of the existing bridge and construction of a new structure. This would not have a significant visual impact on the surrounding area as it would be only visible from the station platforms although clearly visible at close range to rail passengers.

A row of trees screens the commuter car park along William Road from the platform and enhances the outlook. As such, these trees are an important component of the visual character of the area. A two metre high noise barrier would be built west of Belmore Road on the Up side of the corridor. The barrier would eliminate the current visual connection between the platform and the car park along William Road. In addition, a group of shrubs and trees along Thurlow Street would be removed, creating a change to the visual character along the street. Visual impacts are assessed as moderate.

Section 7

Rear fences provide the visual boundary of the rail corridor along most parts of Section 7. Noise barriers, generally two metres in height but with two sections of four metres, would be located on both sides of the corridor, replacing backyard fences of the apartment buildings. The noise wall on the Down side of the corridor would overshadow adjacent houses because of its height and position on the northern side of these houses. The noise wall on the Up side of the corridor would be on the southern side of the building and would not overshadow, but would reduce light levels in the ground floor units. A group of trees act as a screen between the Southside Montessori School and the railway tracks and are important for the outlook from the school. These trees would be removed and a two metre high noise barrier wall placed adjacent to the school. These changes would have some impacts on the visual environment of the area.

There are two under bridges in Section 7, one over Webb Street and the second over Salt Pan Creek. The Webb Street underbridge has a steel structure and brick wing walls that are not visually intrusive and the widening of the bridge would not have a significant impact on the surrounding environment. The existing underbridge over Salt Pan Creek has a steel superstructure with brick blade piers as supports. It borders extensive areas of mangroves, which are of conservation significance due to their habitat. The underbridge is highly visible from the boardwalk and is visually significant in the area. The visual quality of Salt Pan Creek is influenced to a considerable extent by the presence of the existing bridge and service infrastructure such as a major power line and the sewer crossing further downstream.

The new bridge over Salt Pan Creek, on the southern side of the present bridge would be aligned with the existing structure but would be supported on bored piles with a headstock carrying the concrete girders. The boardwalk and pedestrian bridge over Salt Pan Creek are part of a popular recreation area and the new bridge structures would have a significant visual impact.

The abutments of the existing overbridge at Davies Road are only visible from the train and are not visually significant. Visual impacts along this section of the corridor are assessed as high.

Section 8

Padstow Station has recently been upgraded with a new concourse and retail facilities constructed over the tracks. Memorial Drive which passes over the platform is not visually significant. The new overbridge at Memorial Drive would not have a major visual impact on its surroundings except for users of the station. A group of trees provides a pleasant outlook for the houses on Banks Street and screens the tracks and station from the commuter car park on Banks Street. These trees are an important part of the street character that would be removed and partly replaced by a two metre high noise barrier.

This represents a change in the character of Banks Street. A three metre high noise barrier would be installed west of Memorial Drive, reducing light levels at adjacent building. Visual impacts are assessed as low.

Section 9

The abutments of Doyle Road underbridge are just visible from the street and have little visual significance. The construction of the new underbridge at Doyle Road would result in little additional visual intrusion. The backyard fences located along the whole length of Section 9 would be replaced by noise barriers on both sides of the corridor. The noise barriers located to the east of Doyle Road would be four metres high and cause some overshadowing, as some of the buildings are located close to their back fences. Two noise barriers would be located between Doyle Road and The River Road, both 1.5 metres high. Visual impacts are assessed as moderate to high.

Section 10

Access to Revesby Station is by pedestrian footbridge from Blamey Street on the south and through the commuter car park along Marco Avenue on the north of the corridor. The foot bridge is a large steel open structure with significant visual impacts. This will be removed as part of the Revesby Turnback Project and replaced by a new enclosed overhead concourse. The Proposal would only include an addition to the concourse providing new station facilities and an extension of the pedestrian footbridge to provide access to Platform 4 and Blamey Street.

A 5.5 metre high retaining wall would be built along Blamey Street to accommodate the new line along the southern side of the corridor. This would have a significant visual impact on the southern side of the station but is included in the Project currently under construction. The visual impacts of the works included in the Proposal are assessed as moderate.

Section 11

These are backyard fences along the entire length of Section 11, with no other visually significant features. There are no noise walls, retaining walls or bridges proposed for this section of the corridor. Visual impacts are assessed as low.

15.2.4 Air quality

Air quality is not considered to be a key issue in the operation of the Proposal of the East Hills Line. Electric rail operations are minor emitters of airborne pollutants, and improved rail services resulting from the Proposal would encourage some mode shift away from road-based transport, reducing the air pollutants being emitted locally.

The primary impacts on air quality from the Proposal would result from the construction phase of the development, especially during earthworks. Dust generation would have the potential to affect the amenity of local residents. The volume of dust generated during the construction phase of the Proposal would be dependent on the silt and moisture content of the soil and the types of construction activities to be carried out. Dust and other particles would be generated during the construction phase by the following activities during construction and operation:

- cut and fill earthworks;
- construction of retaining walls;
- demolition of existing bridges;
- piling of bridge abutments;
- excavation of spoil;
- ballast laying;
- some intermittent use by diesel powered trains and on the few occasions when other lines are closed for various maintenance works; and
- additional electricity generation at power stations.

Table 15.1 provides an outline of the air quality data for the region, highlighting that the level of particulate matter was close to exceeding the National Environment Protection Measure standard level and therefore the generation of dust and other particulates during the construction of the Proposal would need to be monitored closely and the proposed construction activities subjected to all relevant safeguards. The potential dust load generated over a typical construction day would be dependent on a number of factors including the activity being undertaken and wind speed and direction. The Proposal is not expected to result in a reduction of the local air quality with the implementation of proposed mitigation measures and safeguards outlined in **Section 15.3.4.**

15.2.5 Social

Social impacts are defined as those with the potential to affect the way members of the local and regional community go about their normal lives. The primary social impact of the works would result from impacts in relation to movement of both pedestrians and vehicles. The construction of the Proposal would result in temporary impacts on the ease of access to established locations, but overall the movement patterns of the community would be improved by the operation of the Proposal on completion of the works.

Amenity impacts are discussed in the context of changes to noise, air quality and visual effects generated by the construction and operation of the Proposal. These are assessed in **Chapters 13** and **15**.

Severance effects

Severance effects relate to impacts associated with separating communities or individual properties as a result of constructing the works. The Proposal would not exacerbate existing severance effects during its operation as it would be located within the existing railway corridor. All existing public crossings would remain open for vehicle and pedestrian access during the operation of the Proposal and it would not sever any communities along the corridor.

However, it is likely that there would be some temporary disruption during the construction phase, particularly during the works required to upgrade the pedestrian footbridge at Revesby Station and the overbridges. During times of closure of the existing public

crossings, alternative routes would be provided. These could possibly result in marginally longer pedestrian routes to gain access to the station and cross the corridor.

Pedestrian and cyclist access and movement

Pedestrian and cyclist access and movement would be temporarily affected as a result of the construction activities required for the Proposal. Pedestrian access ways would be affected during the demolition and reconstruction of the overbridges at Beverly Hills, Riverwood and Padstow Stations. Pedestrian access structures would be constructed for use during these periods. Pedestrian access from Blamey Street to Revesby Station would be affected by the construction of the overhead concourse building. The existing pedestrian underpass at Narwee Station would need to be extended to accommodate the Proposal, affecting pedestrian access and movement. However, the design of the underpass extensions would maintain its heritage character.

Access ways, with appropriate barriers to separate the construction site from the public thoroughfare, would be erected to manage pedestrian movements safely and allow continued accessibility. A construction method would be selected to ensure that access and movement of pedestrians and cyclists is maintained, and where affected, temporary access would be a priority in the construction sequence.

The local community and affected commuters would be advised before the commencement of the works, providing advice on their nature and duration and the arrangements to be put in place during construction.

The construction of the Proposal would result in the temporary relocation of bus stops at the relevant railway stations and modification of some local bus routes for short periods during construction.

Pedestrian and cyclist access and movement would not be substantially altered as a result of the operation of the Proposal, with no public crossings closed. The existing public crossings over the railway line would be retained and upgraded to provide continued and safe public access.

Passenger station amenity and usage

Passenger amenity at the five railway stations would be affected during the construction of the Proposal, especially at Beverly Hills, Kingsgrove and Padstow where the construction of the footings for the overbridges would take place on the station platforms. Impacts would primarily relate to construction noise and air quality. These are discussed in **Sections 13.2** and **15.2**, respectively.

The extent of any adjustment to the patronage of stations on the East Hills Line as a consequence of the Proposal is unpredictable as many influences can be expected to affect passenger choice. Improved services on the line beginning with the Revesby Turnback Project due for completion in 2008 can be expected to attract more passengers to each of the stations. Population growth in the south west can also be expected to increase demand for rail travel on the line.

Any changes between the attractiveness of various stations will be influenced by ease of connection with the surrounding catchment area, availability of commuter car parking

close to the station, travel time differences between local and express services and the relative quality and convenience of the services provided. Community response to these, and other factors, is personal and will vary depending on circumstances. It is therefore not possible to predict changes which might occur as passenger usage changes in response to the improvements resulting from the Proposal.

Ancillary structures

A number of ancillary structures, mainly for existing RailCorp billboard advertising signs are located at sites within the rail corridor. These are a source of income for RailCorp but also have implications for visual quality. It is expected that the Proposal would require the removal of 20 existing billboard structures and a number of painted signs on bridge abutments. An assessment would be undertaken in consultation with RailCorp of existing signage along the rail corridor and the potential for new and replacement locations along the corridor and at the stations.

Track possessions

Track possessions relate to periods where railway tracks would be closed to allow work to be carried out. The construction of the Proposal would take advantage of regular weekend track possessions and a timetable for the construction of the Proposal is outlined in **Section 7.1**. During track possessions, buses would be provided to ensure that community access to public transport services is maintained.

It may be possible that works which can be completed quickly may also be undertaken during weekend/weekday nights when trains are not running.

Vehicular access and traffic circulation

Temporary traffic delays and disruptions are likely to occur during the construction or modification of the existing overbridges and vehicular access to public and private land may be interrupted during the construction phase of the Project. During such times, diversions and temporary access arrangements would be put in place to maintain vehicular access. Access would be maintained to all commercial properties although minor delays and/or additional travel distances could be experienced during the construction phase. Consultation would be undertaken with land owners and businesses before the start of construction works to develop suitable access arrangements for the local businesses and residents close to or adjacent to the works.

Temporary traffic delays and disruptions are likely to occur during the construction and modification of bridges. The description and duration of the proposed bridge closures are shown in **Table 7.1**.

Two of the proposed overbridges, at King Georges Road and Davies Road, are on major north–south traffic arteries carrying substantial volumes of traffic. The demolition and construction of the southbound bridge on King Georges Road would require closure for up to six months. The traffic impacts resulting from the Proposal are discussed in **Chapter 12.**

The operation of the Proposal would not affect vehicular access and traffic circulation. All crossings would be appropriately upgraded to ensure that circulation of local and regional traffic would not be affected. Existing road bridges would be upgraded to ensure that vehicles would continue to cross the railway corridor safely.

Environmental amenity

The environmental amenity of the areas adjacent to the railway corridor is already influenced by the existing East Hills Line. Local environmental amenity would generally be improved for residents adjoining the corridor as the proposed noise barriers would improve the existing acoustic environment. The visual impacts of these barriers and other changes to the visual character of the corridor and its surroundings are discussed in **Section 15.3.2**.

15.3 Management measures

15.3.1 Aboriginal heritage

The archaeological survey did not locate any items, objects or places of Aboriginal heritage significance. However, if a previously unrecorded item or site of Aboriginal heritage significance was uncovered during the construction of the Proposal, work would immediately cease in the vicinity of that site. The uncovered site would be reported immediately to the Cultural Heritage Branch of the DECC and advice sought concerning the appropriate course of action. The MLALC would also be informed. The pre-construction induction would advise all employee and/or contractors engaged in the quadruplication works that it is an offence under the *National Parks and Wildlife Act 1974* to knowingly disturb or destroy Aboriginal relics.

15.3.2 Built heritage

The significance assessment undertaken within the study area concluded that Beverly Hills Station and the King Georges Road overbridge (included in the definition of the Beverly Hills Station group) are listed on the State Heritage Register, but neither is of state significance. However, Beverly Hills Station is of local significance and would be affected by the works to be carried out on the King Georges Road overbridge. An archival recording of the overbridge and its relationship to the Beverly Hills Station would be undertaken prior to any works commencing on the overbridge. All railway stations within the study area are listed on the RailCorp Section 170 Heritage Register, but it is not anticipated that the Proposal would adversely affect any of these.

The Proposal includes the extension of the pedestrian underpass at Narwee Station. While the station buildings and platform are listed on the Section 170 Heritage Register, the underpass is not included.

If any item of potential European heritage significance is discovered during the works, work would cease in the vicinity and the find immediately reported to the Heritage Office and advice sought concerning the most appropriate course of action. The Heritage Officer at the relevant council would also be informed.

15.3.3 Visual character

There is a wide range of responses to the issue of visual quality in relation to urban infrastructure. These should focus on the achievement of a high level of design quality in the new structures, the effective integration of their many elements, implementation of a coherent and consistent design strategy and the management of undesirable visual effects to minimise their impacts. Typical urban design and landscape treatments to

mitigate impacts on the visual environment are summarised in the following section. A more detailed discussion of urban design issues is set out in **Technical Paper 3** in Volume Two.

Earthworks

As far as possible fill embankments and cuttings within the corridor should be considered as elements that are consistent with adjacent natural landforms and not as an imposition on the landscape. The main consideration is to provide potential for screen planting at the base and top of the cut faces where space permits. Abrupt or steep vertical transitions should be avoided. The use of shotcrete should be avoided as far as possible on earthworks.

Bridge elements

The bridges are major defining structures which have a significant impact on the visual quality of the rail corridor and its surroundings. All elements of a bridge should be fully integrated into the overall design including street lighting, handrails, and throw screens and the junctions between the bridges and adjacent retaining walls and street furniture need to be carefully considered. The bridge girder or portal beam is the defining element in the visual composition of the structure, especially when seen from below. This should be as simple as possible to reduce its apparent bulk and any additions such as cantilevered footpaths should be part of an integrated design.

While each bridge must adapt to its particular context, a common design theme should be adopted to reflect the overall character of the rail corridor.

Retaining structures

Retaining walls would only be used where there is no alternative. Cut and fill batter slopes that can be vegetated would be preferred.

Retaining wall locations should be coordinated with other project elements, particularly noise barriers and drainage structures and should be used to maximise the effective width of the corridor for landscape treatments.

Retaining walls should match the construction and appearance of associated noise barriers to form a coordinated design system along the rail corridor. Outward facing retaining walls adjacent to the public domain should be detailed appropriately to minimise staining, with a textured surface and proper joints. Shuttering should include ribbing or v-joints to break up the linearity of the walls. A coping would be provided at the top of the wall sloping away from the surface to reduce staining. The use of shotcrete on retaining walls would be minimised.

Vegetation

Mature trees would be protected and retained where possible. Areas where trees must be removed and there is a resultant loss of visual amenity would be planted with new trees, shrubs and groundcover suitable for the location to improve the existing environment where this is practicable. Plant material would also be chosen to provide adequate screening to all areas likely to be prone to graffiti both within and outside the rail corridor. This would include dense groundcover where space is available and self-clinging vines.

Planting design would be simple and capable of fulfilling its purpose with a minimum of maintenance. A Landscape Concept and Maintenance Strategy would be developed to outline all landscape works proposed for the corridor and adjacent land where appropriate. This would be prepared in consultation with RailCorp.

Noise barriers

There would be varying heights of noise barriers along the rail corridor. Urban design and landscape treatment for typical noise barrier conditions would relate to the following:

- As far as possible, noise barriers would be located on the boundary of the rail corridor.
- Noise barriers would follow generally linear alignments with large subtle curves. As far as possible the barriers would be located in parallel with the rail tracks. The top line would be continuous, free of steps and joint lines perpendicular to the adjacent ground plane. Particular attention would be give to points of transition between structures, such as retaining walls and the adjacent ground level. Where abrupt changes cannot be avoided, new sections of wall would overlap and steps avoided. No support structures would be visible from the rail corridor.
- Houses are generally located at a sufficient distance from the noise barrier to minimise overshadowing, even if the wall is higher than two metres. There could however be a loss of view and overshadowing if the houses are less than five metres from the barrier. In such situations, consideration would be given to the use of transparent sections in specific locations.
- A simple repetitive pattern, related to its structure, would be used to enliven the surface of noise barriers in those locations where they face roads. Any space between noise walls and the footpaths would be landscaped to minimise impacts and reduce the likelihood of graffiti. Walls would be finished with an anti-graffiti treatment or painted.
- Consultation on the colour and finish (surface pattern) as well as associated landscape species would be undertaken throughout the detailed design and construction stages of the Project with property owners located adjacent to the proposed noise wall locations.
- A targeted consultation program for property owners affected by overshadowing would be undertaken during the detailed design phase of the Proposal. Where technical constraints allow adoptions of materials (such as transparent sections of wall), positioning and height of the noise barrier would be discussed and feedback sought. The consultation program would include one on one briefings, distribution of information flyers and information sessions.

A typical example of a noise barrier with a retaining wall is shown in **Figure 15.2**. Urban design principles relating to noise barriers are discussed in more detail in **Technical Paper 3** in Volume Two. These principles would be confirmed during the detailed design stage and would form the basis of the Urban Design Strategy. Community feedback on these principles will be sought during the Environmental Assessment exhibition period.

Before

After

Figure 15.2 **Artists impression of retaining wall along Bryant Street (noise barrier above)**

15.3.4 Air quality

The primary impacts on air quality would result from dust generation during the construction phase of the Project. Dust would be controlled by readily available, proven mitigation measures and techniques to ensure that no decline in local or regional air quality results. Mitigation measures to manage air quality during construction would include:

- minimising the area of exposed soil during earthworks;
- stabilisation of disturbed areas as soon as practicable following the completion of earth works;
- the use of water carts and sprays to keep earthwork areas damp to reduce dust generation;
- imposing a 15 kilometres per hour speed limit on vehicles on construction sites, especially those with unsealed access tracks. Where possible, access tracks would be surfaced with gravel to minimise the transmission of dirt;
- covering soil and material stockpiles and loaded trucks;
- ensuring that all plant and equipment used during construction is fitted with emission controls and that the equipment is appropriately maintained and serviced; and
- avoiding dust-generating activities during high wind periods.

15.3.5 Social

Amenity concerns such as noise, visual character and air quality impacts during the construction and operation of the proposal would be mitigated through environmental management measures and safeguards, as described in **Chapters 12** to **15.** The impacts on the local and regional community would be minimised through suitable construction sequencing as outlined in **Section 7.1**.

The traffic management arrangements detailed in **Section 12.4** would ensure that appropriate diversions and access arrangements are in place, without compromising the safety of the pedestrian, cyclist and vehicular movements. Community consultation would be an integral part of minimising the social impacts of the construction and operation phases of the Proposal. Information would be provided regularly and effectively to the community to ensure the community has an opportunity to prepare themselves by making the necessary arrangements during the periods of temporary impacts.