5. Additional investigations undertaken after exhibition of the Environmental Assessment

5.1 Introduction

Additional investigations were undertaken to address a number of the key issues raised in the submissions received and as a result of additional design information becoming available. The investigations were focused on addressing particular community concerns in relation to potential impacts of the proposal. The additional investigations undertaken to address these concerns were the following:

- Refining the proposed concept design for the Glenfield flyover at Leacock Regional Park and Throsby Park and undertaking further land use and property, social and visual assessments, and
- Refining the proposed concept design for locations where retaining structures and noise barriers are combined and undertaking a further visual assessment at a locality where the potential visual impact would be at its greatest.

5.2 Glenfield flyover at Leacock Regional Park and Throsby Park

5.2.1 Current proposal

The Glenfield flyover is needed to take the SSFL from the western side of the RailCorp tracks south of Glenfield (where the existing freight passing loop is already located on the western side of the corridor) to the eastern side of the RailCorp tracks. Being on the eastern side of the corridor avoids an underpass or flyover at Cabramatta Junction and minimises the underpass at Sefton Park Junction for the SSFL connection with the existing Metropolitan Goods Line. A grade separated crossing at Glenfield is also required to ensure the operational independence of the SSFL from the RailCorp network and to provide access in the future to the proposed Moorebank terminal.

The position of the flyover at Glenfield is controlled by a number of criteria for the track alignment. These include:

- to allow for the construction of a future RailCorp underpass for the East Hills Line (not part of the SSFL proposal) – this limits how far south any option with the RailCorp tracks over the SSFL could be sited
- to locate the necessary ramp for a flyover clear of the Glenfield substation (located north of Glenfield Road bridge) on the western side of the rail corridor
- to allow for a possible future connection from the SSFL to a possible future intermodal terminal at Moorebank – this limits how far north the flyover could be located.

- to allow for a feasible flyover structure to be built the SSFL and crossing angle can not be reduced – this defines how far the approach ramps and embankments extend into adjoining land.

As described in Section 3.5.2 of Volume 1 of the Environmental Assessment, two alternatives were assessed using a multi-criteria analysis for the proposed grade separated crossing of the RailCorp tracks at Glenfield.

The preferred concept design for the proposed Glenfield flyover involves a crossing of the SSFL (combined with the proposed passing loop) over the RailCorp's Up and Down Main South Lines (two electrified tracks), and a potential future Down relief freight track on the eastern side (not part of the SSFL proposal). With the proposed passing loop on the flyover, the SSFL alignment would need 1/100 gradients on the approach ramps to the flyover to allow the operation of the passing loop. The current proposal is shown on *Figure 5.1*.

The current concept design for the Glenfield flyover comprises two approach ramps with batters or retaining structures for the embankments and prefabricated bridge deck units for the crossing of the rail corridor. A retaining wall was proposed on part of the western side of the southern approach ramp to avoid the embankment extending into ponds (un-named) in Leacock Regional Park and Throsby Park.

The southern approach ramp of the current proposal requires the acquisition of approximately 1.3 hectares of public land, including 0.13 hectares from Leacock Regional Park (State of New South Wales) and 1.19 hectares from Throsby Park (Liverpool City Council). The northern approach ramp requires acquisition of private land from the Glenfield Waste Facility. The ramps would extend approximately 50 metres in width at the widest point. The acquisition of the land within Leacock Regional Park would require an additional process (to that outlined in the *Land Acquisition (Just Terms Compensation) Act 1991*) involving an Act of Parliament to de-gazette the land from the National Park Estate.

The proposed southern approach ramp would overlay an existing gully that is located adjacent to the rail corridor. It is proposed to realign the section of gully for a distance of approximately 900 metres, from the Cambridge Avenue road bridge through Throsby and Leacock Regional Parks. It also includes moving the gully from the eastern side of a power substation to the western side. Through Throsby and Leacock Regional Parks, the gully would be realigned within the available land between the southern approach ramp and the rail corridor. Principles for the detailed design of this realigned gully are outlined in *Section 12.2.3* of Volume 1 of the Environmental Assessment.

As discussed in *Section 12.2.4* of Volume 1 of the Environmental Assessment the proposal would directly affect approximately 0.4 hectares of Cumberland Plain Woodland (an endangered ecological community under the *Threatened Species Conservation Act 1995* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*) at Leacock Regional Park and Throsby Park.

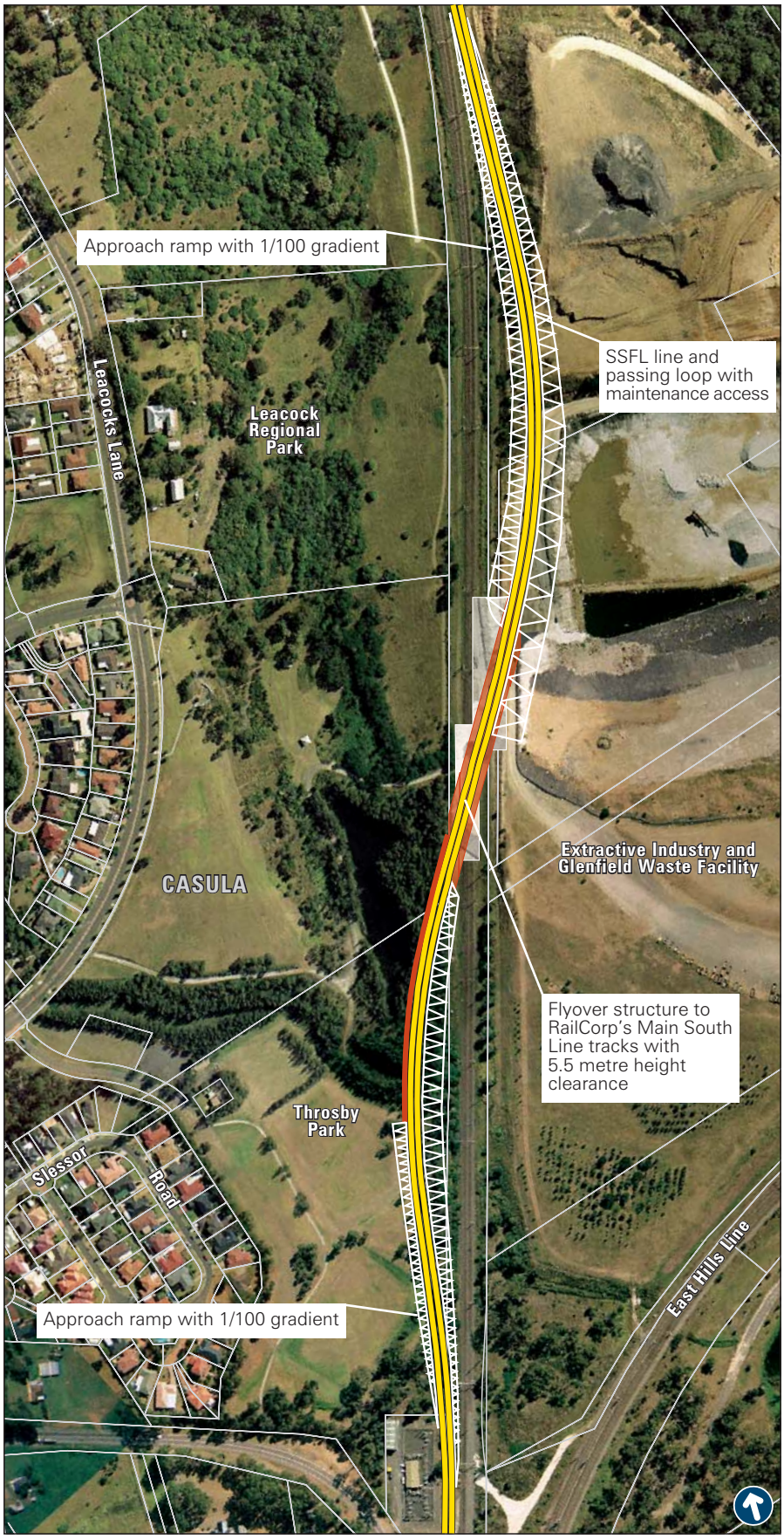

Figure 5.1 Glenfield flyover: current proposal

5.2.2 Refined proposal

As part of undertaking these further investigations at Leacock Regional Park and Throsby Park, the proposed concept design for the Glenfield flyover has been refined in the following ways (see also *Figure 5.2*):

- The third track that was catered for in the current proposal (the potential future Down relief freight track on the eastern side of the rail corridor) has been deleted (with the agreement of RailCorp) and therefore the flyover does not need to allow for its future provision. This means the size of the bridge deck units is reduced by half (given that the span only needs to cross the existing two RailCorp tracks) and the retaining wall for the northern approach ramp has moved closer to the rail corridor.
- The retaining wall located adjacent to the pond (un-named) in Throsby Park, is proposed to be refined with a retaining wall and landscape treatment to address the pond edge. The maintenance access track adjacent to the SSFL track would be on a deck supported by columns at five metre centres allowing for planting beds underneath. The north westerly orientation and height clearance to the deck above would allow for sun exposure. This new planting area would extend approximately 190 metres.
- The embankment for the northern approach ramp has been widened due to the lower then anticipated excavated ground level on the Glenfield Waste Facility land.
- The retaining wall located in Leacock Regional Park near the southern approach ramp has been refined with a revegetated batter that would contribute to visual screening of the flyover.

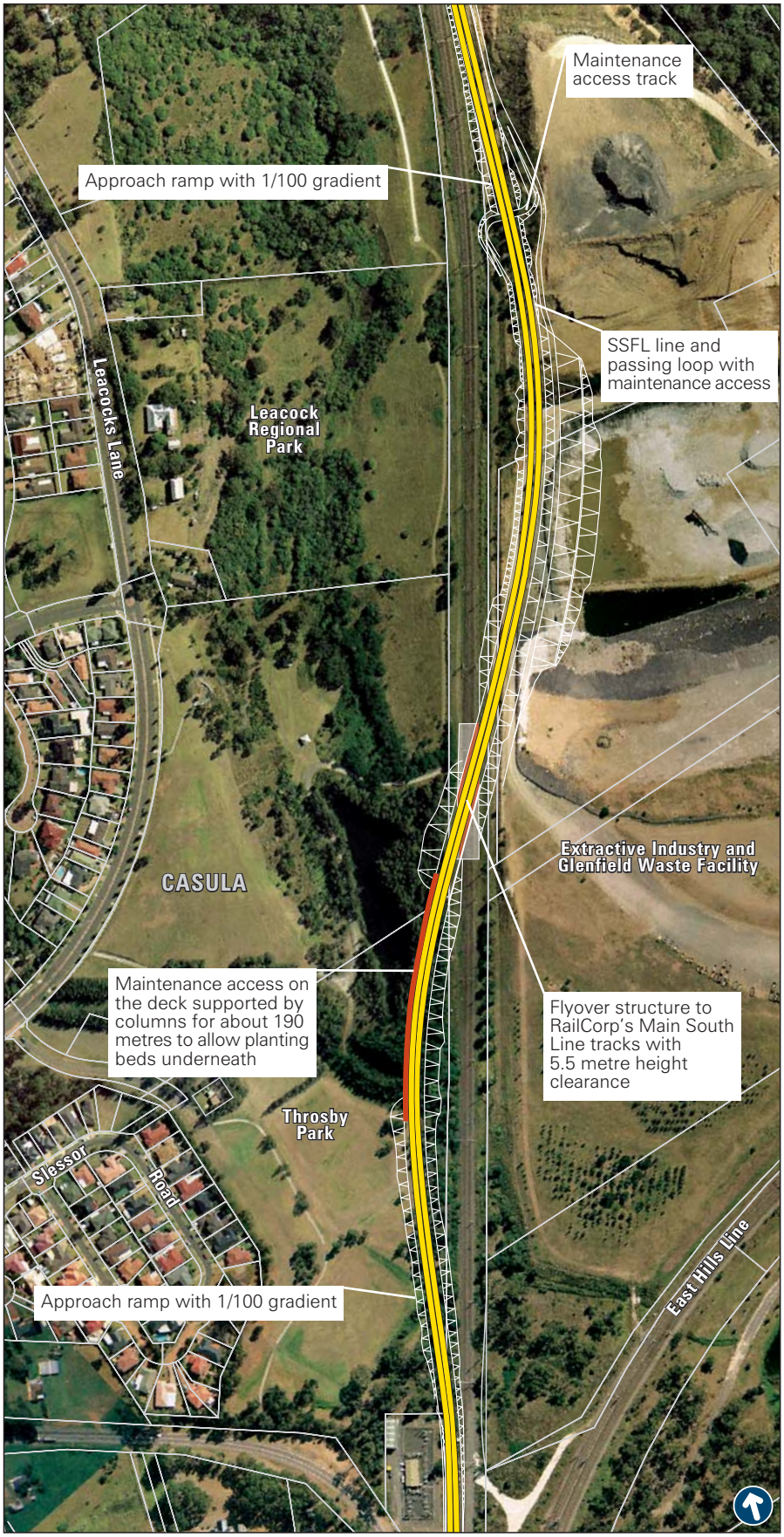

Figure 5.2 Glenfield flyover: refined proposal

5.2.3 Land use and property assessment

Under *Liverpool Local Environmental Plan 1997*, the railway corridor in this area is zoned *5(b) Special Uses – Railways*, and the open space areas associated with Leacock Regional Park and Throsby Park are zoned *6(a) Recreation Public (Leacock Regional Reserve)*.

Leacock Regional Park comprises an area of approximately 35 hectares of parkland and remnant Cumberland Plain Woodland, located five kilometres south of Liverpool. It was acquired by the NSW National Parks and Wildlife Service and gazetted in 1997 (National Parks and Wildlife Service 2006). The park is situated on the upper western banks of the Georges River. The railway corridor forms the current eastern boundary of the park. The undulating landform falls gradually down to the river with Glenfield Creek traversing the park in a northerly direction and draining into the Georges River. The Glenfield Waste Facility occupies a triangular area opposite the southern half of the park.

Glenfield Farm, a nationally listed heritage property, is included within Leacock Regional Park. The facilities within Leacock Regional Park include picnic and barbecue facilities, and a walking/cycle trail, which leads to the Casula Regional Arts Centre.

Throsby Park is situated at the southern end of Leacock Regional Park. It has road access from Leacocks Lane, formalised car parking and includes two low lying playing fields. The park also contains a stormwater retention basin and other infrastructure (including a sewage pumping station).

Glenfield Waste Facility extracts sand and takes non-putrescible (building) waste. The deed of agreement for the waste facility requires that the land become part of Leacock Regional Park at the end of life. The SSFL will not significantly reduce the area of land available for waste disposal or future recreation.

Property

The batters required at Glenfield Waste Facility are wider than originally anticipated, refer above, but would not necessarily increase the land take (approximately 1.3 hectares) as the filling of the tip would eventually incorporate the two lower tiers of the batters below finished ground level.

The refined concept design for the southern approach ramp requires the acquisition of approximately 1.3 hectares of public land, including 0.15 hectares from Leacock Regional Park (owned by the State Government) compared to previously 0.13 hectares and 1.1 hectares from Throsby Park (owned by Liverpool City Council), compared to previously 1.19 hectares (see *Table 6.1)*. The ramp would extend into Throsby Park less than 50 metres in width at the widest point.

Table 6.1 Comparison of Park land acquisition for the refined design

	Now - land take (ha)	Previous – land take (ha)
Leacock Park	0.15	0.13
Throsby Park	1.10	1.19
Total	1.25	1.32

The proposed Glenfield flyover would have a direct property impact and result in public land acquisition of a small part of Leacock Regional Park and of Throsby Park. The portion of land to be acquired from Leacock Regional Park would also require an Act of Parliament to de-gazette the land from the National Park Estate. The direct property impact would result in a land use change for the land to be acquired (from open space to railway corridor); however the proposal would not contribute to broader land use change in the locality.

Noise

As discussed in Technical Paper 2 of Volume 2 of the Environmental Assessment, at 40 metres from the existing track, maximum existing noise levels in this area during the pass-by of a freight train would be approximately 87dBA. With the proposed SSFL, including the new flyover at this location, maximum noise levels at the same position would increase by approximately 5dBA to approximately 92dBA. This change would be small but noticeable and would result in a small loss of amenity. However, given the character of the park his shaped by the rail corridor and that proposed operations of the SSFL are consistent with the operations of the rail corridor (although the frequency of trains are expected to increase over time), the amenity impact would diminish the use or enjoyment of the park for open space purposes or result in a change of land use.

Leacock Regional Park Plan of Management

The Leacock Regional Park Plan of Management was prepared in October 1996 by Clouston consultants for Liverpool Council and the former Department of Urban Affairs and Planning (now Department of Planning). The Leacock Regional Park Plan of Management applies to a 90 hectare area of land comprising Leacock Regional Park managed by the National Parks and Wildlife Service, the Glenfield Farm heritage estate, the Glenfield Waste Facility and open space areas under the ownership of Liverpool City Council (Throsby Park).

The Leacock Regional Park Plan of Management was prepared to facilitate future planning of the site with guidelines for community involvement and the approaches to be adopted in developing detailed designs for recommended projects within the study area identified under the plan. The proposal is broadly consistent with the objectives and values identified in the plan, including:

- Aligning the SSFL with the existing rail corridor, although the flyover would require public and private land acquisition, and therefore access or links with the open space areas in the locality would not be affected.
- The cultural heritage values of Glenfield Farm would not be affected either directly or indirectly.
- The two playing fields in Throsby Park would be avoided by using a steeper landscaped batter in this location, which is less visually intrusive and a softer edge than a retaining structure.
- Undertaking additional planting along the rail corridor boundary (particularly to the north in Leacock Regional Park) where there is currently an intermittent tree line. The new planting would create a visual screen to the rail corridor, soften the edge of the park and improve the visual amenity for users of the pathway.
- Undertaking revegetation of land affected by the proposed flyover construction using indigenous species in planted areas, re-using the topsoil layer from cleared areas and where possible, use planting propagated from the collection of seeds in the locality.

- Providing a visual screen to the Glenfield Waste Facility by means of the landscaped embankments to the northern and southern approach ramps from the pathway in Leacock Regional Park.
- The Glenfield flyover does not affect the pathway within Leacock Regional Park or Throsby Park, does not create the opportunity for concealment or other safety issues due to the flyover being located within a widened fence corridor, and the flyover does not affect existing park access, parking areas or circulation. Although the pathway in Leacock Regional Park would need to be relocated a short distance to the west due to proposed plantings along the rail corridor.

As discussed in *Section 14.2.2* of Volume 1 of the Environmental Assessment the proposal would result in a reduction in the land area of the park with the amount of land to be acquired representing less than four per cent of the total combined area of Leacock Regional Park and Throsby Park. Following the planned extension of the park when operations cease at the Glenfield Waste Facility in accordance with a Deed of Agreement, the total overall extent of the park to be acquired reduce by less than two per cent of the planned 90 hectare size of parkland. Therefore, the proposal would have a minor impact to park viability and is unlikely to significantly increase maintenance costs per hectare.

5.2.4 Social assessment

The proposed construction of the Glenfield Flyover would result in temporary amenity impacts to the park, including construction traffic, visual, noise and dust for up to nine months. These impacts would occur mostly on weekdays when use of the park is lower and work can be managed to minimise the construction footprint so that use of the park is not significantly affected.

The proposed SSFL is aligned with the existing rail corridor, although the Glenfield flyover does result in a widening of the corridor. Severance impacts would be minor and would be mainly limited to increased visual separation of the park from the planned future park on the eastern side of corridor. The planned area to the east is already physically severed by the rail corridor. The SSFL would widen the rail corridor and introduce the flyover structure thereby contributing to some additional visual separation.

The proposed of the Glenfield flyover includes fencing to the widened rail corridor to isolate park users from the RailCorp and ARTC tracks. The proposed planting beds adjacent to the pond would also be inaccessible due to the height of the planting beds above a vertical retaining wall to the pond bank. Accordingly, there is no potential for increased criminal or unsociable activity associated with the proposal.

The Glenfield flyover does not create a major social impact in its own right. However, the amenity related construction impacts would have a temporary effect and the operation of the flyover would result in a minor noise impact and visual severance impact to the planned future park extension to the east of the corridor.

5.2.5 Visual assessment

Caldis Cook Group undertook an additional visual assessment of the refined concept design for the Glenfield flyover. The complete visual assessment is provided in *Appendix B* of this report and a summary is provided as follows.

Assessing visual impact

The Visual Assessment (see Technical Paper No. 5 of Volume 2 of the Environmental Assessment) concluded that for the Liverpool locality, the combination of a high visual effect and a moderate level of visual sensitivity along the rail corridor would result in a high visual impact at some points in this locality. One of these areas where high visual impacts would be expected is at Leacock Regional Park and Throsby Park.

In undertaking this further visual assessment, visual character is defined, visual effect is assessed and then visual impact is determined.

The visual character of Leacock Regional Park and Throsby Park and their settings are defined by the following main elements:

- Leacock Regional Park which has passive recreation values, an undulating topography, cultural heritage value associated with Glenfield Farm, grassed parkland on top of the ridge at Leacocks Lane (with picnic and barbecue facilities), open grassland and bushland through most of the park, Glenfield Creek and the un-named ponds, and the walking/cycle trail which leads north to the Casula Regional Arts Centre.
- The two playing fields and open grassed parkland define the visual character of Throsby Park which has active recreational value. Formalised car parking and access is provided form Leacocks Lane. The character of the park also includes the remnant riparian bushland along a tributary of Glenfield Creek, an intermittent treeline screening the rail corridor, and the adjacent residential land to the west. The park also contains a stormwater retention facility and other infrastructure, including a sewage pump station.
- The Glenfield Waste Facility covers an area of similar size to the combined Throsby and Leacock Regional Parks; however its character is very different due mostly to the current activities of sand extraction and waste management. The main area of the facility is mainly bare of any vegetation except for remnant stands of trees around the boundaries. Distant views of the Holsworthy bushland can be seen from the public viewing outlook at the top of the ridge at Leacock Regional Park.
- The Main South Line rail corridor that is aligned north-south and separates Leacock Regional Park and Throsby Park from the Glenfield Waste Facility and the Georges River.

'Visual effect' is the expression of the level of visual contrast between a proposed development and the visual setting within which it is placed.

The proposed flyover includes a deck (approximately 70 metres in length) supported by columns, which would allow the SSFL to cross-over the existing RailCorp tracks. The two approach ramps would be earth embankments, with a combination of reinforced soil walls, retaining walls and landscaped batters. At close range, the visual affect of the proposed flyover would be high, due to the effective height and length of its side walls; and its strong contrast to the surrounding parkland environment, particularly near the large pond in the northern part of Throsby Park. For this reason, the southern approach ramp would have a higher visual effect than the northern approach ramp, which has its formation between the existing rail corridor and the Glenfield Waste Facility (see *Figure 5.3*).

The northern approach ramp, by comparison, would have a moderate visual effect due to the nature of the adjacent waste facility. Currently, the area has very little vegetation. Future plans may involve it being restored to parkland, which would be visually connected to Leacock Regional Park and Throsby Park.

Distant views of the proposed flyover would be possible from higher ground including the viewing outlook from the ridge within Leacock Regional Park (see *Figure 5.4*).

Glenfield flyover – before view

Glenfield flyover – after view

Figure 5.3 Glenfield flyover: near view photomontage

Glenfield flyover – before view

Glenfield flyover – after view

Figure 5.4 Glenfield flyover: distant view photomontage

Therefore, the proposed southern half of the Glenfield Flyover would have a high visual effect, in relation to Leacock Regional Park and Throsby Park.

The overall visual sensitivity from Glenfield to Casula was found to be moderate to high, due to the open space and residential areas along the proposed SSFL alignment, particularly Leacock Regional Park and Throsby Park. The southern approach ramp of the proposed flyover would be located west of the rail corridor, and within the visually sensitive area of playing fields and parkland; whereas, the northern approach ramp would pass east of the existing corridor, through the Glenfield Waste Facility, which is not a visually sensitive area.

Therefore the combination of a high visual effect (due to the proposed alignment of the approach ramps and the height of the flyover) and moderate to high levels of visual sensitivity would result in a high visual impact at some locations in the area concerned.

There are some features of the landscape which would naturally assist in minimising the visual impact of the southern half of the proposed flyover. These include the following:

- the flyover would be situated within the low point of Leacock Regional Park and its impact would be less for park visitors up on the higher ground due to the increased viewing distance, and sight lines over the flyover; and
- existing vegetation within the park and vegetation near the boundary of the rail corridor provides some visual screening. This would be augmented by additional planting as outlined in the next section.

The proposed Glenfield flyover also shields views of the Glenfield Waste Facility from Leacock Regional Park which could be seen as a positive to the visual amenity the park.

Design treatments

The proposed concept design for the Glenfield flyover includes a number of treatment strategies to minimise the visual impact. The Visual Assessment (see Technical Paper No. 5 of Volume 2 of the Environmental Assessment), identified a design objective for Locality C (Casula to Warwick Farm, Liverpool) as follows: "…to reinstate/restore the affected areas of natural bushland and river bank ecology along the rail corridor and to reduce impacts on affected residential areas."

Leacock Regional Park contains an endangered ecological community (Cumberland Plain Woodland), and the flyover alignment would affect regrowth and remnant patches of this community. For the southern approach ramp, vegetation near the ponds would need to be cleared. The affected areas would be replanted in accordance with appropriate ecological guidelines and in consultation with the Department of Environment and Conservation. The proposed landscape concept plan is shown in *Figure 5.5* and the main elements include:

- Embankments: where space allows batters would be constructed to a gradient of 2:3, which is compatible for revegetation. Steeper batters may be needed adjacent to the playing fields in Throsby Park.
- Topsoil: any clearing in the vicinity of the Cumberland Plain Woodland would include the retention of the topsoil layer, with its latent seed bank, for re-use in the area
- Planting species: species would be selected to revegetate the proposed batters based on their compatibility with the Cumberland Plain Woodland (e.g. *Casuarina glauca*, *Melaleuca linarrifolia*).

- Terraces: the eastern side of the northern approach ramp is adjacent to the Glenfield Waste Facility and requires more extensive battered slopes, which would take form as two to three temporary battered terraces. The two lower tiers would be stabalised with grasses before being submerged below the tips finished ground layer.
- Railway corridor edge: the western side of the railway corridor has an intermittent line of trees at its park edge. This visual screen would be augmented by additional trees, for example, *Casuarina glauca* or *Casuarina cunninghamiana.*
- Pond edge: the southern approach ramp of the flyover would incorporate a design to address the pond edges, which would be adjacent to the structure. The maintenance access track adjacent to the SSFL and passing loop tracks would be on a deck supported by columns at five metre centres, allowing for planting beds underneath (refer Section A in *Figure 5.5).* The north western aspect of the colonnaded planting bed would allow for sun exposure. Rainwater from the flyover would be channelled to the planting beds below.
- Re-aligned drainage gully: the existing drainage gully would be re-aligned to cross the SSFL and lie between it and the RailCorp corridor. The drainage gully will be terraced with rocks and regulated to encourage a water flow resembling the principles of a natural creek, avoiding concrete elements and the rail corridor.

Where widened embankments for the SSFL would need to be retained by a structure, a keystone wall system has been proposed. A keystone wall is made up of units, which are designed to interlock with adjacent units to form a high strength wall. The keystone units are durable, with a highly textured rough-cast face, which discourages graffiti. The keystones are available in a limited range of colours.

The proposed visual strategy for keystone walls would be to use a light “Limestone” block for the main wall and capping, with a subtle pattern of contrasting strips along the wall at irregular intervals. These contrast panels would be made up of a dark “Bluestone” block. The proposed concept for keystone walls is shown in *Section 3.3* of Appendix B of this report and is outlined below:

- Where viewing points are estimated to be distant, for example, at Leacock Regional Park under the flyover bridge, the contrast panel would be approximately 2.7 metres long by 0.4 metres high (using standard height blocks), placed at irregular heights every 6 to 8 metres.
- Where viewing distances are estimated to be close and more detail can be seen; for example, nearer the ponds, the contrast panel would be approximately 2.7 metres long by 0.2 metres high placed at irregular heights every 3 metres.

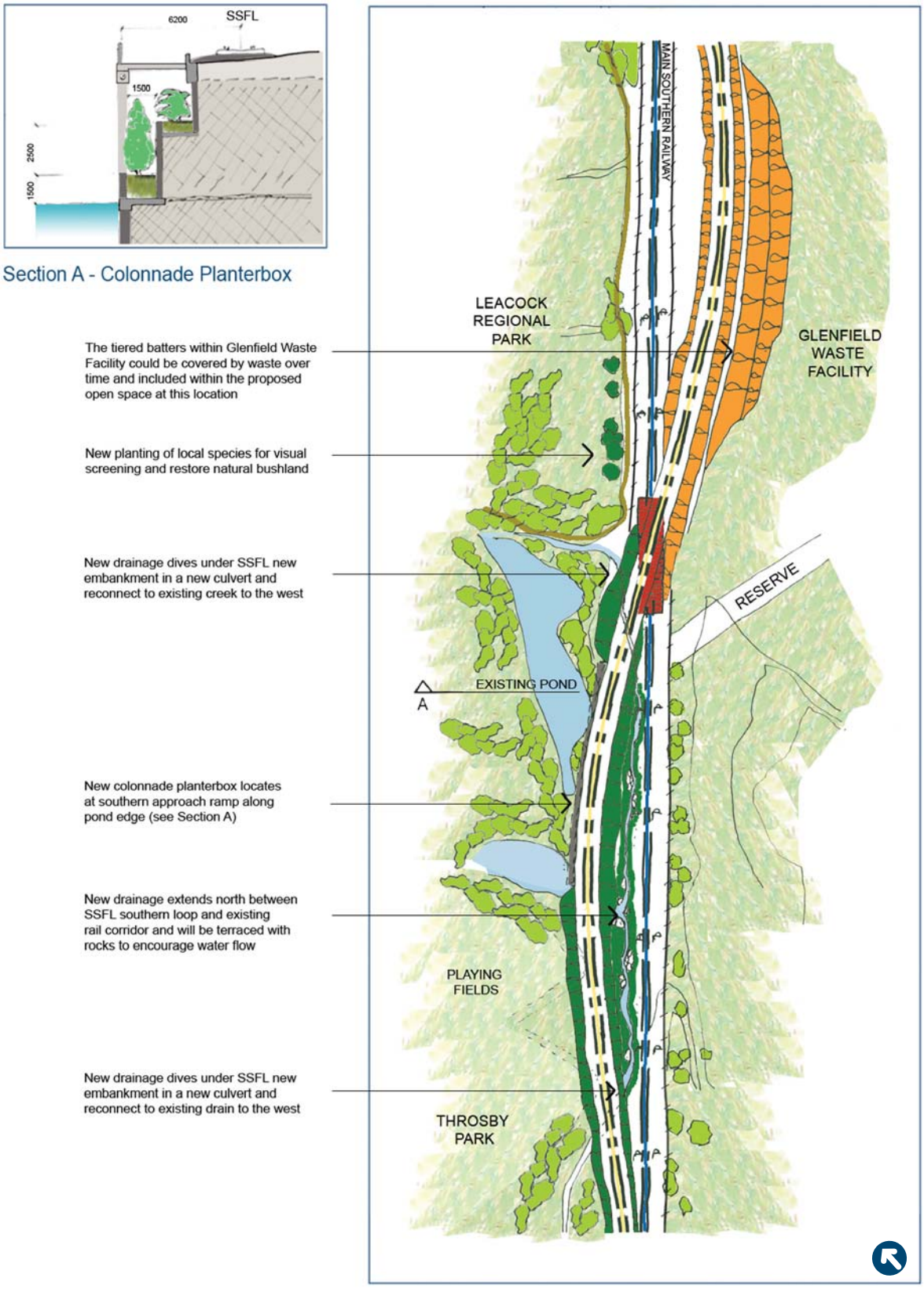

Figure 5.5 Glenfield flyover: proposed landscape concept plan

- Existing pathway
- Existing fence line
- Existing RailCorp line
- Proposed Southern Sydney Freight Line (SSFL)
- Indigenous shrubs/grasses
- Proposed indigenous vegetation
- Existing vegetation communities
- Proposed SSFL flyover deck
- Proposed colonnade planterbox

Summary of visual assessment

The proposed SSFL requires a grade-separated crossing over the existing RailCorp tracks north of Glenfield Junction. The concept design for the proposed Glenfield flyover has been refined based on more design information becoming available.

The visual impacts of the proposed southern half of the Glenfield flyover would be high with consideration to Leacock Regional Park and Throsby Park and appropriate visual and landscape strategies would be applied to soften the impacts. These would include general landscape treatments for non-visually sensitive areas, such as near the Glenfield Waste Facility, and more specific and detailed treatments for visually sensitive areas, such as near the ponds. One of the main strategies would be to revegetate affected areas with compatible indigenous species, which would form an appropriate visual screen once established and to visually integrate flyover batter slopes with the Park setting. Detailed landscape plans would also be prepared during the detailed design of the proposed Glenfield flyover in consultation with the Department of Environment and Conservation and Liverpool City Council.

5.2.6 Conclusion

The proposed Glenfield flyover has been assessed in terms of potential land use and property, social and visual impacts. The assessment has concluded that the proposal (including the refinements to the concept design outlined in *Section 5.2.2*) would not have a greater environmental impact than that outlined in the Environmental Assessment.

Therefore, the proposed Glenfield flyover would not result in any adverse environmental impact not already anticipated and/or managed in the Environmental Assessment.

5.3 Combined retaining structures and noise barriers

Caldis Cook Group undertook an additional visual assessment of the refined concept design where proposed retaining structures and noise barriers are combined. The complete visual assessment is provided in *Appendix C* of this report and a summary is provided below.

We have examined more closely one of the locations at the southern end of Broomfield Street, Cabramatta where the combined height of the retaining structures and noise walls is greatest (i.e. 7.5 metres) and the residential context creates significant potential for visual impacts.

Elsewhere in the northern part of the proposed SSFL route (between Glenfield to Sefton) the combined height would be equal to or less than this height.

5.3.1 Affected area

Investigations carried out for the Environmental Assessment determined that residential areas along Broomfield Street would require noise barriers to mitigate increased noise levels from freight trains.

The existing RailCorp track alignment, leading north from the Broomfield Street (Sussex Street) underbridge is on an embankment, approximately four metres above street level. Between the underbridge and Cabramatta Railway Station, the natural ground level rises and the level of the embankment decreases (see Photograph 5.1).

Photograph 5.1 View of western side of Broomfield Street, near the underbridge

The proposed SSFL would lie on the eastern side of the rail corridor on a widened embankment next to the RailCorp tracks. The widened embankment would require a retaining structure on the corridor boundary and a noise barrier, (See Figure 5.6). At the southern end of Broomfield Street, the retaining structure would be approximately 4 metres high below a 3.5 metre noise barrier. Closer to Cabramatta Railway Station, the height of the retaining structure would be greatly reduced due to the topography, and the noise barriers would need to increase to four metres to be effective.

Design strategies and mitigation measures were proposed in the Visual Assessment (see Technical Paper No. 5 of Volume 2 of the Environmental Assessment), and these are investigated further in the following section.

5.3.2 Design treatments

The proposed design treatments for the retaining structures and noise barriers were incorporated into the refined concept design, based on the following:

- Achieving the design objective and the relevant urban and landscape design guidelines/principles, as outlined in *Section 3.1* of Appendix C to this report. (The complete list of urban design and landscape guidelines/principles for the proposal is listed in Section 3.4.6 of Volume 1 of the Environmental Assessment).
- Using the examples provided in *Section 3.2* of Appendix C to this report which demonstrate the general principles of good design.

Retaining structure

The widened embankments for the proposed SSFL at Broomfield Street would be retained by a keystone wall system. The keystone units are durable, with a highly textured rough-cast face, which discourages graffiti. The keystones are available in a limited range of colours.

The visual strategy for the proposed keystone wall would be to use a light coloured “Limestone” block for the main wall and capping course, with a subtle pattern of contrasting strips along the wall at irregular intervals. These contrast panels would be made up of a slightly darker coloured “Bluestone” block. The contrast panel would be approximately 2.7 metres long by 0.2 metres high (using half- height blocks), placed at irregular heights, at approximately every 3 metres (refer to Figure 5.6). As the viewing distance to the wall could be relatively close from the adjacent footpath, more detail would be visible.

Figure 5.6 Refined concept design of retaining structure and noise barrier at Broomfield Street

Noise barrier

The noise barrier would be designed to meet the urban design and landscape guidelines above, and the proposed design would:

- discourage graffiti, by incorporating a texture and relief on the surface, or anti-graffiti finish
- include the use of colour to create a visually pleasing effect
- use horizontal and vertical joints in the panels for visual effect.

Landscaping

Landscaping would also be incorporated into the proposed concept design as an element to enhance the streetscape and soften the proposed wall, including:

- A planting strip at the top of the retaining wall would allow for small shrubs, ornamental grasses or creepers to partially cover the wall in time.
- At the base of the retaining wall (street level), small planting areas at regular intervals would allow for an avenue of small trees to grow.

5.3.3 Conclusion

Along Broomfield Street, Cabramatta, the SSFL would be on a widened embankment, at the same level as the existing rail alignment and this would necessitate the construction of a retaining structure combined with a noise barrier, which would address both engineering functions and the residential acoustic amenity. Careful detailing of the proposed keystone wall and noise barrier, in combination with a landscaping strategy along its length would minimise the visual impact of the combined retaining structure and noise barrier and provide improved street planting.

In other parts of the proposed SSFL route where a combined retaining structure and noise barrier would have a visual impact, the refined concept design as outlined above would be applied during detailed design to provide a similar outcome. As outlined in clause Cl46(b) and Cl89 of the Statement of Commitments in Appendix D to this report, ARTC has committed to consulting with directly affected residences regarding the proposed design of noise barriers and landscape treatments.

The proposed design treatment for combined retaining structures and noise barriers has been assessed in terms of potential visual impacts. The assessment has concluded that the proposal (including the refinements to the concept design) would not have a greater environmental impact than that outlined in the Environmental Assessment.

Therefore, the proposed combined retaining structures and noise barriers would not result in any adverse environmental impact not already anticipated and/or managed in the Environmental Assessment.

6. Modifications to the proposal

6.1 Introduction

Subsequent to the consideration of the submissions received and additional design information becoming available, the ARTC proposes a number of minor modifications to the concept design presented in the Environmental Assessment. The following sections summarise the proposed modifications to the proposal.

6.2 Connection to the RailCorp network at Glenfield and Casula

The proposed interface between the SSFL and RailCorp network is described in *Section 7.1* and *Table 7.1* of the Environmental Assessment.

Two of the proposed connections are to be deleted from the concept design. These connections are at the following locations:

- north of Glenfield Railway Station, that would enable freight services travelling in the Up direction (into Sydney) to leave the SSFL and travel via the Old South Line and Granville to access western Sydney
- south of Casula Railway Station, that would enable freight services travelling in the Down direction (out of Sydney) via the Old South Line and Granville to join the SSFL.

The remaining connections between the SSFL and RailCorp network as described in the Environmental Assessment have not changed and are included in the concept design.

The noise and vibration, hazard and risk and air quality assessments undertaken for the Environmental Assessment assumed that all of the predicted freight services would travel the entire length of the SSFL (refer *Section 7.1.8*). As a result of the modification to delete these two connections, freight services cannot leave the SSFL at Glenfield or join the SSFL at Casula. Therefore, these services that could have only travelled on part of the SSFL route have already been modelled in the noise and vibration assessment and included in the hazard and risk and air quality assessment along the entire route. This means that the conclusions of the noise and vibration, hazard and risk and air quality assessments remain unchanged.

ARTC considers that the proposed modifications to delete the two connections to the RailCorp network will not result in any change to environmental impacts not already anticipated and/or mitigated in the Environmental Assessment.

6.3 Leightonfield yard

This section describes the current proposal, the modified proposal, the additional noise, land use and property and traffic and transport assessments, and the conclusion from these assessments.

6.3.1 Current proposal

The proposed SSFL is aligned on the southern side of the rail corridor between Cabramatta to Sefton Park Junction. The proposed alignment through Leightonfield is shown on *Figure 4.1g* of the Environmental Assessment, with an enlarged extract shown below in *Figure 6.1*.

As a consequence of the proposed alignment, existing connections to the sidings and Road Sea Rail freight terminal at Leightonfield would be cut off, and so replacement connections (at both ends) to the SSFL were proposed (see *Section 4.2.2* of the Environmental Assessment). A small portion of the Llewellyn Avenue road reserve was proposed to be acquired, near the Marple Avenue intersection, to accommodate the western connection into the yard. A strip of land less than eight metres in width would be required.

The proposal would affect an existing perway siding (which is a short maintenance siding used to park on-rail maintenance plant, e.g. a tamper or ballast regulator) on the eastern side of Liverpool Railway Station as it would be cut off by the SSFL. The replacement perway siding is proposed as part of the SSFL project and located at Leightonfield on the Up (northern) side of the corridor.

A 900 metre crossing loop between the SSFL and RailCorp's network is also required at Leightonfield, to accommodate freight trains that would need to leave the SSFL and join the RailCorp's Main South tracks. A crossing loop is created by placing a long length of track within the crossover, between the tracks. Therefore, between the RailCorp tracks and the Leightonfield sidings, two tracks were proposed to be constructed as part of the SSFL past the Leightonfield Railway Station. The location of the proposed crossing loop is shown on *Figure 6.1*.

The proposed alignment to the west of Leightonfield passes underneath the Woodville Road bridge. This bridge has sufficient clearance (vertically and horizontally) to allow for the SSFL to be constructed (see *Section 4.3.3* of the Environmental Assessment).

To the east however, the Miller Road Bridge requires major works in order to create an additional span on the southern side the bridge over the SSFL. It is proposed to transform the existing abutment into a pier, construct a new abutment structure contiguous with a retaining wall to the new cutting on each side of the bridge, and construct a new span over the SSFL.

6.3.2 Modified proposal

The proposed modified SSFL alignment through Leightonfield and the proposed 1,600 metre long passing loop (with standing room to accommodate a 1,500 metre freight train) are shown on *Figure 6.2* and described further below.

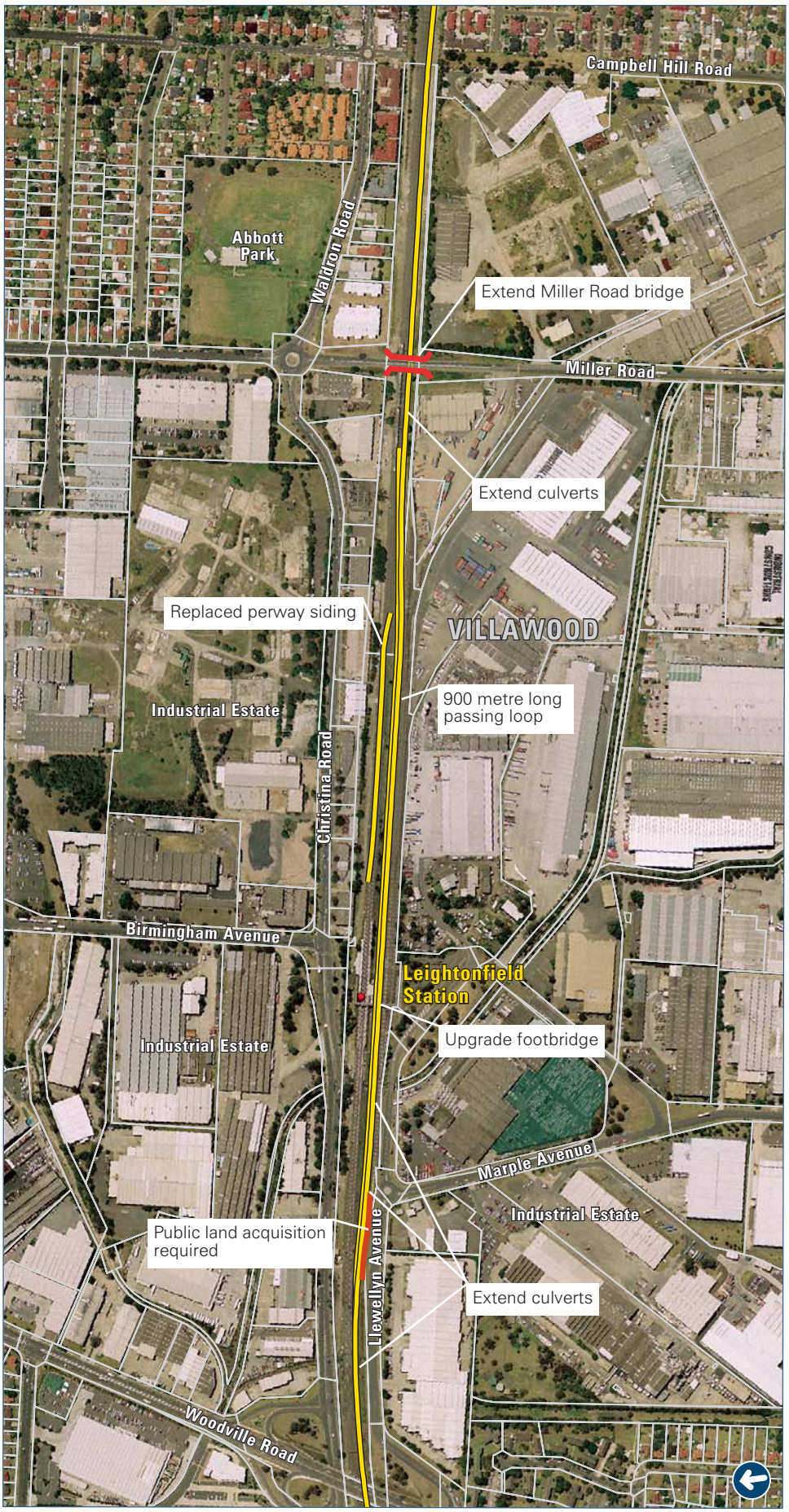

Figure 6.1 Leightonfield Yard: current proposal

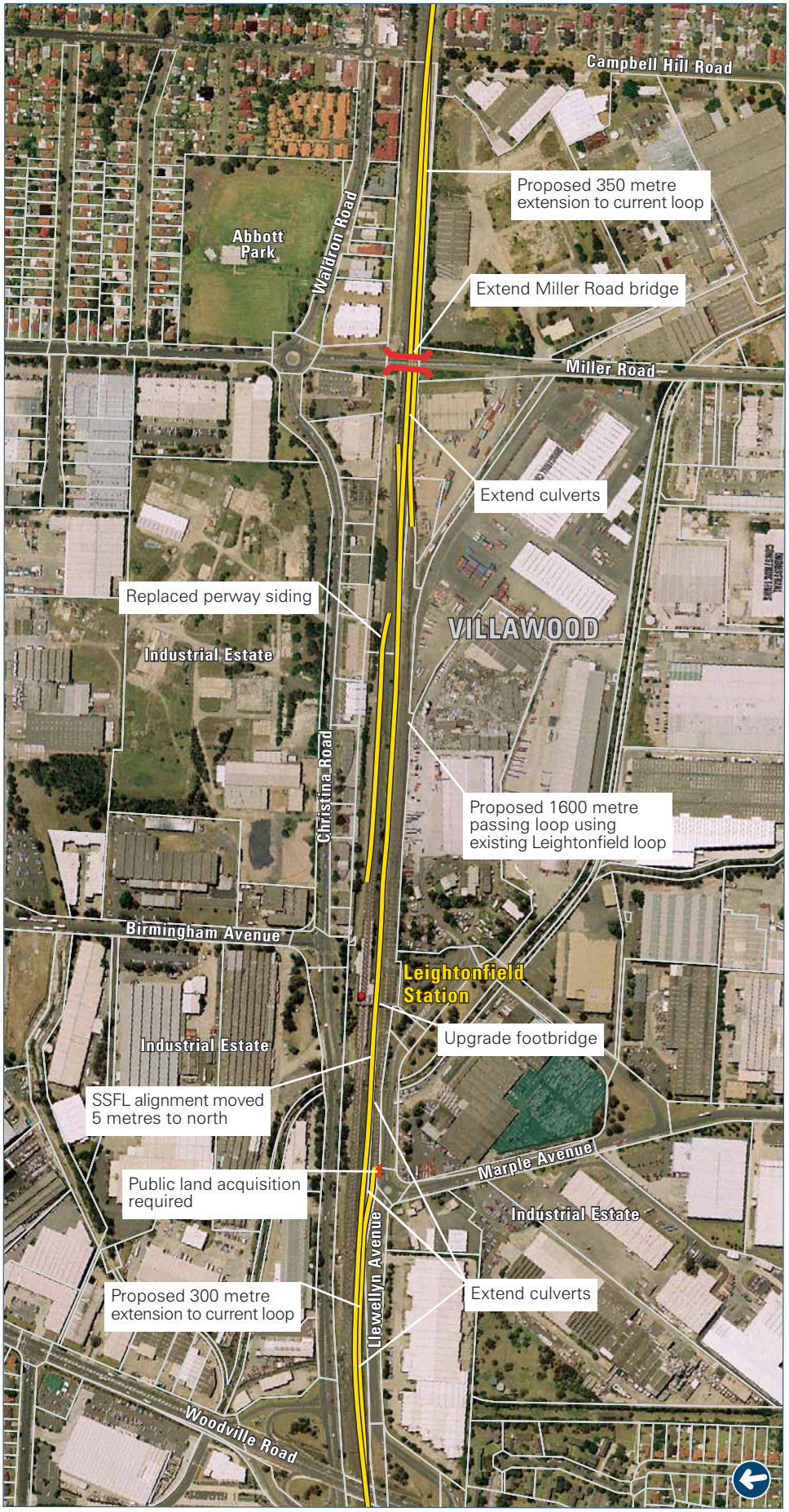

Figure 6.2 Leightonfield Yard: modified proposal

The provision of replacement connections to the sidings and Road Sea Rail freight terminal (at both ends) are still proposed. The replacement perway siding is still proposed and is not affected by the proposed modifications.

The previously proposed 900 metre crossing loop is to be deleted from the concept design. As a consequence, the alignment of the SSFL is modified and located approximately five metres further to the north within the rail corridor, but still within the space available between the RailCorp tracks and the Leightonfield sidings.

The former crossing loop is to be replaced by a proposed 1,600 metre long passing loop with standing room to accommodate a 1,500 metre freight train. The proposed passing loop would be created by connecting and extending the existing Leightonfield Yard loop. The additional loop length is created by approximately 300 metres of new track to the west and approximately 350 metres of new track to the east. The location of the proposed passing loop is shown on *Figure 6.2*. The proposed acquisition of the Llewellyn Avenue road reserve would reduce to about four metres in width (at the widest point due to an irregular boundary) at the Marple Avenue intersection.

The proposed operations of the passing would be different to the Glenfield passing loop, as it is not located in the centre of the SSFL route and couldn't accommodate freight trains longer than 1,500 metres. It would be expected that the proposed passing loop at Leightonfield would be used up to three times daily by 2018 and mostly by shorter trains up to about 1,200 metres in length awaiting a path into Chullura during periods of high freight traffic volumes from the Main Northern Line.

The proposed modifications to Leightonfield would not affect the alignment of the SSFL underneath the Woodville Road Bridge. As noted above, this bridge has sufficient clearance (vertically and horizontally) to allow for the SSFL to be constructed and the turnout to the proposed passing loop is located to the west of the bridge.

To the east however, the Miller Road Bridge requires a lengthened additional span on the southern side the bridge to cater for the SSFL and proposed passing loop alignments. The original proposal included lengthening the bridge span for two tracks and the extended loop would occupy the extra space. A similar construction method as outlined in Section 5.1.3 of the Environmental Assessment would apply for this new lengthened span. The turnout from the proposed passing loop to the SSFL is located beyond the bridge approximately 140 metres from Chester Hill Railway Station.

6.3.3 Noise assessment

Wilkinson Murray was commissioned to assess the potential noise impact at Leightonfield arising from the proposed modifications.

Due to the limited number of movements on the proposed passing loop, and the fact that noise levels from these movements will be lower than from through trains on either the SSFL or the existing lines, changes to the location and type of operations on the loop would have negligible impact on the assessed noise level at any residence as already documented in the Environmental Assessment. The only changes requiring consideration from the point of view of noise impact are those affecting operations on the SSFL, including the modified location of the SSFL track, proposed passing loop track location and the location of proposed new turnouts.

Western loop extension

The nearest residence to the western end of the proposed passing loop is located in River Avenue (represented by catchment VIL3, see Technical Paper 2, Volume 2 of the Environmental Assessment). This residence is located approximately 120 metres from any proposed section of track, and approximately 140 metres from the proposed turnout. The proposed track modifications would have negligible impact on noise at these residences.

Eastern loop extension

The nearest residences to the proposed eastern extension to the passing loop are located on the southern side of the rail corridor along Wellington Road (and further to the east of the proposed loop), and directly opposite the proposed passing loop on the northern side of the rail corridor along Waldron Road.

For residences in Wellington Road (represented by catchment CHE1, see Technical Paper 2, Volume 2 of the Environmental Assessment), a 4 metre high barrier is already recommended. This barrier (possibly with a slight extension to the west) would serve to mitigate any additional noise impact from the new turnout at these residences. The SSFL track itself is proposed to move slightly further from these residences, resulting in a slight overall reduction in noise from this source.

To the north of the proposed rail line, the nearest residences in Waldron Road to the proposed modified track section are in catchment CHE2 (see Technical Paper 2, Volume 2 of the Environmental Assessment). L_{Aeq} noise levels in this catchment were predicted to decrease as a result of the project, by 1dB immediately on opening and by 0.3dB in comparing levels in 2018 with and without the project. These levels would not change as a result of the proposed modification.

However, the introduction of a new turnout approximately 30 metres from one block of units on Waldron Road could potentially add additional noise, to the level where mitigation measures would be indicated. The extent of this additional exposure would depend on the type of points used and other factors, and cannot be predicted at this stage. It is therefore recommended that noise exposure at units in Waldron Road, particularly those opposite the proposed junction of the SSFL and passing loop lines, be investigated in detail during the detailed design stage of the project, and barriers or other reasonable and feasible mitigation be provided for these units where a significant difference is predicted between the 2018 noise level with the SSFL and the “no build” case.

6.3.4 Land use and property assessment

The existing land use within the vicinity of Leightonfield Railway Station is dominated by large scale industrial land uses on both sides of the rail corridor (see *Figure 6.2*). The Road Sea Rail terminal is also located at Leightonfield, on the southern side of the rail corridor. However, to the east of Miller Road on the northern side of the corridor the land use changes to low-medium density residential dwellings. Residences are also located on the southern side of the corridor beyond Campbell Hill Road.

The Villawood town centre is located to the west of the Woodville Road bridge on the southern side of the corridor. Current land uses at Villawood are retail (an Aldi supermarket and convenience / small scale retail), warehousing and former Department of Housing land where pre-existing stock has been demolished awaiting a new master plan for re-establishment. The provisions of the draft Fairfield Development Control Plan No 25 – Villawood Town Centre (1998) and the draft Department of Housing/Fairfield City Council Kamira Court Masterplan have been considered. However, it is understood that the draft Kamira Court Masterplan has yet to have been finalised, and neither the DCP or master plan have been adopted by resolution of Council.

The town centre of Chester Hill is located further to the east and contains local business, retailing and community land uses that service the surrounding community.

The construction and operation of the proposed passing loop would not affect the industrial land use at Leightonfield. During construction, residential land use impacts would relate to amenity impacts, including noise, traffic and transport and visual impacts. During operation, and as already noted above, potential noise impacts could occur to the residences opposite the proposed passing loop in Waldron Road, particularly those opposite the proposed junction of the SSFL and passing loop lines.

The only property impact would relate to a small intrusion at the boundary of the existing rail corridor at the intersection of Llewellyn Avenue and Marple Avenue intersection. The roundabout configuration and operation would not be affected by this acquisition.

6.3.5 Traffic and transport assessment

As already described in Section 10.2 of Volume 1 of the Environmental Assessment, the construction of the additional bridge span at Miller Road would require the bridge to be reduced to one lane over a period of three to four months. The work would also require the complete closure of the bridge for two weekends. The construction of the proposed lengthened span (to accommodate the proposed passing loop, i.e. a second track) to Miller Road would not change the impact to the transport network. Likewise the construction traffic required for this work would not change.

In addition, the proposed upgrade of Miller Road would have a neutral impact on traffic operation (see Section 10.3.1 of Volume 1 of the Environmental Assessment) and this would not change as a result of the proposed modification.

Potential impact to pedestrian access to the Leightonfield Railway Station during construction would not change to what has already been assessed in Section 10.2.7 of Volume 1 of the Environmental Assessment. Access to the station from the southern side of the station would remain open at all times during construction, with only temporary diversions being required.

6.3.6 Conclusions

The proposed modified SSFL alignment through Leightonfield and the proposed 1,600 metre long passing loop have been assessed in terms of potential noise, land use and property and traffic and transport impacts. The assessment has concluded that the proposed modifications to the proposal are unlikely to have a greater environmental impact than that outlined in the Environmental Assessment.

It is proposed, that noise exposure at units in Waldron Road, opposite the proposed eastern junction of the SSFL and passing loop lines, be investigated in detail during the detailed design stage of the project, and barriers or other reasonable and feasible mitigation be provided for these units where a significant difference is predicted between the 2018 noise level with the SSFL and the "no build" case. (see Cl46(a) in the Statement of Commitments in Appendix D of this report)

Therefore, the proposed modification at Leightonfield would not result in any adverse environmental impact not already anticipated and/or managed in the Environmental Assessment.

6.4 Conclusions

Subsequent to the exhibition of the Environmental Assessment, a number of minor modifications have been made as a result of the consideration of public submissions and further design information becoming available.

The ARTC is seeking approval for the Southern Sydney Freight Line proposal, comprised of:

- the Environmental Assessment that describes the project in detail, its method of construction, and the associated environmental impacts and management
- the refinement to the proposed Glenfield flyover concept design described in *Chapter 5* of this report based on the additional investigations conducted following exhibition of the Environmental Assessment
- the proposed modifications to the proposal and a justification for each that is described in *Chapter 6* of this report.

The assessments undertaken in *Chapters 5* and *6* conclude that the proposed modifications to the proposal are unlikely to have a greater environmental impact than that outlined in the Environmental Assessment. Therefore, the proposed modifications would not result in any adverse environmental impact not already anticipated and/or managed in the Environmental Assessment.

Part 3A of the *Environmental Planning and Assessment Act 1979* requires the proponent to provide a Statement of Commitments which demonstrates its commitment to the implementation of the proposed environmental management measures. A draft Statement of Commitments was provided in *Appendix C* of the Environmental Assessment. A final Statement of Commitments, which has been amended as a result of the submissions received and the assessments undertaken of the proposed modifications, is provided in Appendix D of this report.

7. Conclusion

This Submissions Report has addressed the outcomes of the consultative process conducted during the public exhibition of the Environmental Assessment for the proposed Southern Sydney Freight Line.

In addressing both compliance with legislative requirements and the requirements of the consultative process, this Submissions Report demonstrates that:

- All statutory obligations have been met (*Chapters 2* and *3*).
- ARTC has considered all issues arising from the submissions and provided a written response to the issues (*Chapter 4*).
- In responding to the issues relating to the proposed Glenfield flyover, additional investigations and design work has been undertaken to adequately respond to these issues (Chapter 5).
- Modifications to the concept design have been proposed and a justification that each modification is minor in nature (*Chapter 6*).
- The environmental impacts of the proposed modifications have been assessed and it has been concluded that there are no greater impacts as a consequence of these modifications (*Chapters 5* and *6*).
- A final Statement of Commitments, which has been amended as a result of the submissions received and the assessments undertaken of the proposed modifications, demonstrates ARTC's commitment to a comprehensive management approach to minimise environmental impacts (Appendix D).

In consideration of the above, it is concluded that the SSFL proposal as described in the Environmental Assessment and amended by this Submissions Report should proceed for the approval of the Minister for Planning and subsequently to the Commonwealth Minister for the Environment and Heritage.

8. References

Bankstown City Council (2001) Bankstown Local Environmental Plan 2001

Clouston, 1996, Leacock Regional Park Plan of Management, Final Report

Department of Housing/Fairfield City Council (2006) Draft Kamira Court Masterplan.

Department of Infrastructure, Planning and Natural Resources, (2005).*Floodplain Development Manual*

Department of Planning (2006a). www.planning.nsw.gov.au/harbour/pdf/e03-431-18-p07.pdf accessed 4 August 2006

Department of Planning 2006b www.planning.nsw.gov.au/harbour/pdf/syd_harbour_brochure.pdf u. accessed 4 August 2006

Fairfield City Council (1994) Fairfield Local Environmental Plan 1994.

Fairfield City Council (1998) draft Fairfield Development Control Plan No 25 – Villawood Town Centre

Liverpool City Council (2002) *Georges River Corridor: Plan of Management and Master Plan*

Maunsell, (2000) *Sydney Dedicated Freight Track Study*

National Parks and Wildlife Service (2002b), Guidelines for the conservation significance assessment of the native vegetation of the Cumberland Plain, Western Sydney, NSW National Parks and Wildlife Service, Hurstville

National Parks and Wildlife Service 2006 (www.nationalparks.nsw.gov.au) Accessesed August 2006

National Parks and Wildlife Service, (2002a) Final native vegetation mapping of the Cumberland Plain, western Sydney, NSW National Parks and Wildlife Service, Hurstville

Parsons Brinkerhoff (2006) Southern Sydney Freight Line Environmental Assessment Volume 1 Main Volume

Parsons Brinkerhoff (2006) Southern Sydney Freight Line Environmental Assessment Volume 2 Technical Papers

Roads and Traffic Authority (2000) Sharing the Main Street – A Practitioner's Guide to Managing the Road Environment and Traffic Routes Through Commercial Centres

Roads and Traffic Authority, (2002) Traffic Volume Data for Sydney Region 2002

Wilkinson Murray (2005).Hornsby Station Platform 5 and Stabling Project: Technical Paper 2 – Noise and Vibration Assessment. Report 04291, August 2005