

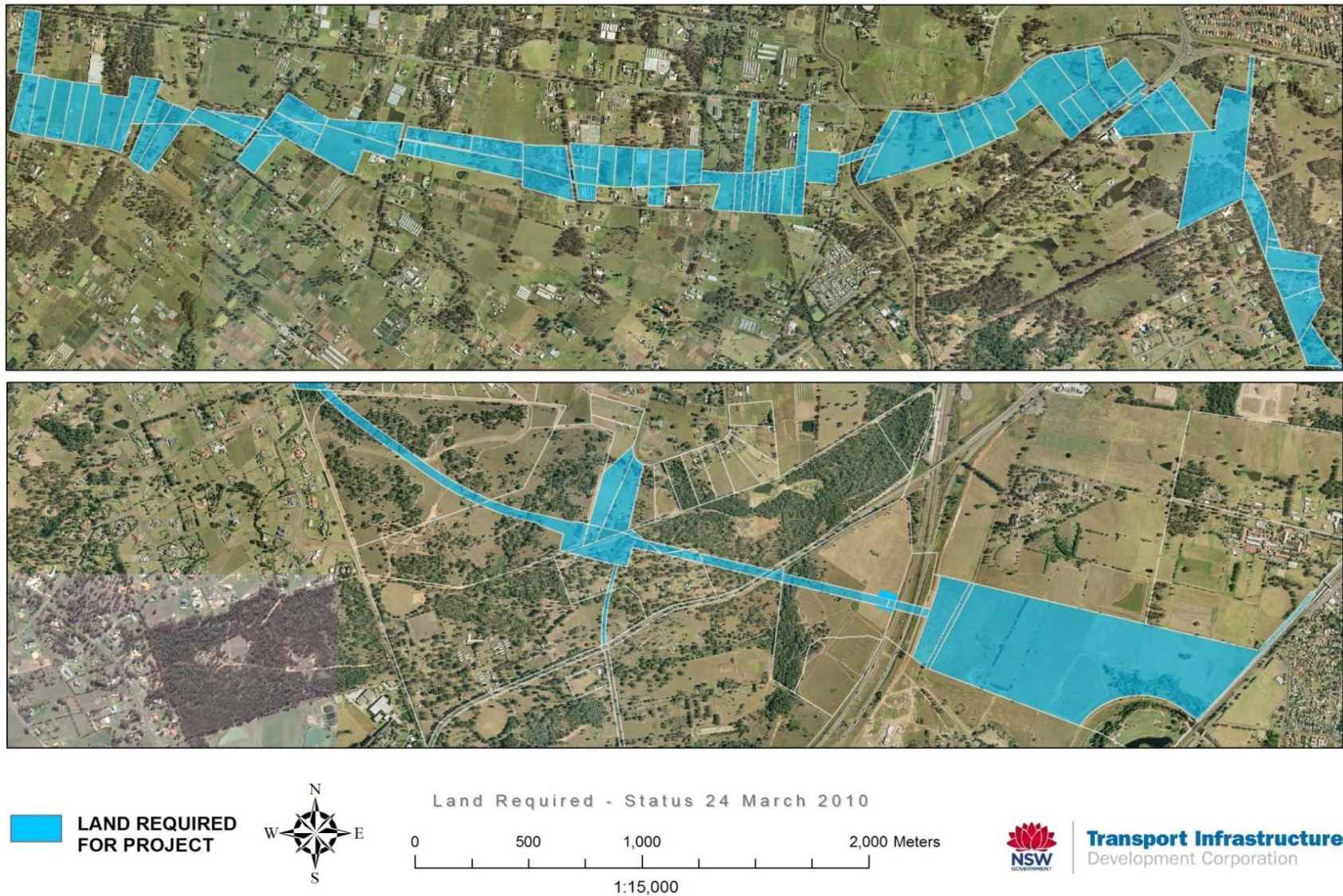


Figure 6-18 Proposed land acquisition for the Glenfield to Leppington Rail Line

Retaining walls

In a number of locations, the project would be elevated above natural ground level (on fill) or below natural ground level (in cut) (refer Figure 6-1a to t). In some of these areas, the extent of additional land required for the project would be minimised through the use of retaining walls. Retaining walls would particularly be required to reduce potential impacts to environmentally sensitive areas.

The locations of the proposed retaining walls are shown in Figure 6-1 (a to t), and would comprise:

- adjacent to the Glenfield Southern Flyover
- between the combined Upper Canal/Cowpasture Road underbridge and Leppington Station (approximate Chainage 49.75 and 50.40 kilometres).

A number of different types of retaining walls may be used, depending on the nature of the substrate, proximity to the rail boundary/adjacent structures and the height of the cut/fill.

The retaining walls proposed adjacent to the proposed Glenfield Southern Flyover could generally be constructed outside of track possessions (track closedowns) if the work zone is safely isolated from the operating track. For retaining wall construction outside of the existing rail corridor (i.e. in the greenfield section) there would be no requirement for possession works.

Earth mounds

Earth mounds are proposed to be constructed at a number of locations along the rail corridor as a form of noise mitigation for the project. The proposed locations and lengths of earth mounds to be implemented are shown in Figure 6-1 (a to t) and detailed in Table 6-11. These locations and lengths are indicative measures only and are subject to change based on further site investigations during the detailed design phase. Noise mitigation is described further in Chapter 9.

Table 6-11 Summary of proposed earth mound locations

Location (chainage in kilometres)	Approximate height in metres	Up/Down side
Ingleburn Gardens Estate. Exit from Hume Highway cutting between Chainage 44.15 km to 44.30 km.	1.5 m–3.5 m	Up side only
Edmondson Park Town Centre Development. In reserve approaching Denham Court between Chainage 45.75 km to 45.96 km	0.5 m–2.75 m	Up side only
Edmondson Park Town Centre Development. In reserve adjoining Denham Court between Chainage 46.37 km to 46.62 km.	0.25 m–3.5 m	Up side only
Existing and future residential receivers. At grade track Denham Court between Chainage 47.22 km to 47.32 km.	0.25 m–3.25 m	Up and Down sides
Existing and future residential receivers. Shallow cutting Denham Court between Chainages 47.50 km to 47.72 km.	0.25 m–3.5 m	Up and Down sides
Leppington Town Centre. Transition from embankment to cutting approaching Leppington Station between Chainage 50.58 km to 50.76 km	0.25 m–3.75 m	Up and Down sides

Station and stabling works

The construction of the proposed stations and stabling facility would not involve any road closures.

Stations would not become operational until all construction has been completed and they have been assessed by a private certifier or RailCorp, so that relevant requirements and standards have been met and they are safe and ready for operation.

Hume Highway underpass

The Hume Highway underpass would be constructed using tunnelling techniques to minimise disruption to existing road traffic. Adequate access would need to be maintained through the Ingleburn Gardens Subdivision during this time.

Prior to the commencement of tunnel construction, approach and portal cuts would be formed on either side of the road crossing. The portal faces would typically be supported with face nails and reinforced sprayed concrete. Canopy tubes, a form of rock reinforcement, would then be installed around the tunnel perimeter at both tunnel portals.

Tunnel excavation would likely be carried out from one side only using a road header (a mechanical excavator which utilises a rotating milling head to cut through the rock mass). Excavation would typically be undertaken in small stages and would immediately be followed by primary support installation.

Primary tunnel support would typically comprise steel sets, rock bolts and sprayed concrete (either fibre or bar reinforced). Once the underground excavation approaches the end of the first set of canopy tubes a subsequent set would be installed from within the tunnel. The canopy tubes provide overhead protection for the workforce in the tunnel but also minimise ground surface settlements associated with tunnel construction.

Settlement monitoring would be underground on the ground/road surface including convergence monitoring within the tunnel to assess settlement effects progressively during underpass construction. Where field monitoring indicates higher than predicted settlements, mitigating measures would be introduced so that acceptance limits are not exceeded.

The excavation and support installation process is continued until break through at the opposite tunnel portal is achieved.

A temporary ventilation extraction system is likely to be used to ventilate the tunnel during construction. The system would extract air and dust from the tunnel face through suspended duct work into a filter box, which would extract dust particles from the air. The filtered air would flow on through a fan station before being released at an exhaust located near the tunnel portal.

The underpass would be fully drained and, in order to provide a drip free internal environment, a waterproofing membrane and drainage system would be installed. The membrane could be either sprayed on or comprise of thermally welded sheet membranes. Water seeping towards the tunnel would be diverted by the membrane to the drainage system where it would be collected and conveyed to a discharge point.

Upon completion of the waterproofing, a secondary and permanent concrete lining would be constructed either comprising a cast in situ or sprayed concrete arch lining. Mechanical and electrical fitout and trackform works would complete the construction of the Hume Highway Underpass.

Bridges over creeks

The construction of bridges over creeks may involve the temporary diversion of the existing waterways using large diameter pipes, in order to protect water quality and facilitate construction. These temporary water management measures would be removed on completion of the bridge works.

Further liaison would be undertaken with relevant water board authorities at detailed design stage, in particular Sydney Catchment Authority (SCA) with regard to the Upper Canal, to develop construction methodologies to be adopted at these sensitive locations.

Track work

The direction of track construction work would be dependent on the construction program and cost and would be determined during the preparation of the detailed Construction Management Plan that would be prepared by the contractor prior to commencement of works. The track would be positioned on a compacted base and comprise ballast layers with sleepers laid in-between.

Overhead wiring (OHW)

Construction of OHW would be undertaken separate to construction of the proposed track. It is anticipated that installation would involve several 'passes' per track (i.e. construction works being phased), with the first pass installing foundations, the second pass placing the mast, portal and support assemblies, and other additional passes to install the catenary and contact wires.

The direction of OHW works would follow the track construction works and, as per the track work, would be determined during the preparation of the detailed Construction Management Plan.

Signalling equipment

The project includes installation of new signalling equipment to be connected to the existing ATRICS control and indications system at Sydenham. The new CSR located along the length of the railway would facilitate this connection.

The final position and location of signals would be developed at detailed design stage, subject to risk assessment by RailCorp.

Testing and commissioning

The testing and commissioning of the project would involve testing the operation of all aspects of the project, including track, signalling and communication systems, train control, the two new stations and the overall interfaces with the existing RailCorp network.

6.4.3 Plant and equipment

The construction equipment outlined in Table 6-12 would be required for the following construction scenarios:

- A: retaining wall construction (piling)
- B: new station construction — Leppington and Edmondson Park Stations
- C: new train facilities – Leppington Train Stabling Facility
- D: bridge construction – see above
- E: culvert construction
- F: excavation and formation
- G: OHW and signalling
- H: track laying.

Table 6-12 Construction equipment required for different construction scenarios

Equipment	Construction scenario							
	A	B	C	D	E	F	G	H
Crane	✓	✓	✓	✓	✓		✓	
Semi-trailer	✓			✓	✓		✓	
Generator		✓	✓	✓				
Concrete saw	✓	✓	✓	✓	✓			
Concrete truck	✓	✓	✓	✓	✓		✓	
Concrete pump	✓	✓	✓	✓	✓		✓	
Excavator	✓	✓	✓	✓	✓	✓	✓	✓
Hammer	✓	✓	✓	✓	✓		✓	
Piling bore rig	✓	✓	✓	✓	✓	✓		
Poker vibrator	✓	✓	✓	✓	✓		✓	
Franna crane	✓	✓	✓	✓	✓		✓	✓
Pettybone crane							✓	✓
Grader			✓			✓		
Rock breaker		✓		✓	✓		✓	
Dump truck	✓	✓	✓		✓	✓		
Hiab truck	✓	✓	✓	✓	✓	✓	✓	✓
Front end loader						✓		
Vibratory roller	✓	✓	✓		✓	✓		
Compactor	✓	✓			✓	✓	✓	
Bull dozer						✓		
Scraper						✓		
Dewatering pump	✓			✓	✓	✓		
Water cart	✓				✓	✓		
Concrete mixer	✓	✓	✓	✓	✓	✓		✓
Elevated work platform	✓	✓	✓	✓			✓	✓
Work train							✓	✓
Track laying machine								✓
Tamper								✓
Ballast regulator								✓
Rail dump cart								✓
Rail grinder								✓

6.4.4 Construction footprint and construction sites

Eleven potential construction sites have been identified for construction works associated with the project, one of which, James Meehan Estate (refer Table 6-10), was approved for use as part of the project approval in August 2007 (refer to Figure 6-17 and the MCoA contained as Appendix A). It is anticipated that the proposed construction compounds would generally be co-located with the stockpile areas (also indicated on Figure 6-17). Any use of additional land for construction purposes would be subject to further environmental impact assessment prior to commencement of construction. In addition, construction site locations, sizes and boundaries as shown and assessed in this EA are indicative. Minor changes to the construction site areas may be made at detailed design stage, and would also be subject to further environmental impact assessment. These would be sited to minimise impacts in relation to biodiversity, heritage, ecology, noise, visual impact and traffic.

Work sites would be required for the stations, the train stabling facility, bridges, the structure at the Hume Highway, and the extensive works proposed at Glenfield Junction. The establishment and use of construction work sites and access tracks (refer to Section 6.4.5), are required to construct all stages of the project.

Contractor compound areas would be fenced from the rest of the site. Site compounds are each expected to contain an office building, a lunch room, showers/toilets, change rooms and medical facilities, where required.

The main compound is proposed at the south-western intersection of Camden Valley Way and Bringelly Road.

Small site compounds would also be established at all structures, including new bridges and culverts.

A number of key procedures would be included in the construction compounds so that their operation would be both safe and efficient. These features include:

- 24 hour, 7 day a week security
- a data and communication system
- an area suitable for the storage and segregation of hazardous materials
- a fire alarm system connected to the main security system
- a wheel wash unit at the exit point of each construction site.

Parking and access

Contractor car parking spaces and reserved car parking for emergency vehicles would be provided within the proposed construction compounds. A fence of 1.8 metres (minimum) in height would be erected around new boundary lines with gates that would provide wide bell-mouth type access and egress points.

A Construction Environmental Management Plan (CEMP) and associated Traffic Management Plan would be prepared to provide further details on car parking arrangements and minimise impacts on the surrounding network during construction of the project.

6.4.5 Heavy vehicle haulage routes and work site access

Coupled with a number of local roadways, the regional road network (including Campbelltown Road, Glenfield Road, Camden Valley Way, Bringelly Road and Cowpasture Road), would provide access for haulage vehicles to worksites along the project alignment. These regional roads connect to the Hume Freeway (F5), Westlink (M7) and the Hume Highway, which would provide access to the remainder of the metropolitan area. A summary of these haulage routes is shown in Figure 6-19.

The majority of haulage truck trips would be to transfer earth material between the temporary stockpiles and worksites.

Stockpile sites proposed for the construction of the SWRL are shown in Figure 6-17 and would comprise the following:

- Stockpiles A and B — located next to the SWRL alignment within the site of the proposed James Meehan Estate. These stockpiles would be accessed via Macquarie Links Drive and Glenfield Road.
- Stockpile C — located south of the SWRL alignment next to at the site of the proposed Edmondson Park Railway Station. This site would be accessed via Blaxland Road and Campbelltown Road.
- Stockpiles D and E — located north of the SWRL alignment close to Cabramatta Creek. These sites would be accessed via Jardine Drive, Rynan Avenue and Bringelly Road.
- Stockpile F — located on the south side of the SWRL alignment close to the Sydney Water Supply Channel. This site would be accessed from Camden Valley Way and Bringelly Road.
- Stockpile G — located on the south side of the SWRL alignment next to the proposed site of the proposed Leppington Station. This site would be accessed from Rickard Road.
- Stockpile H — located on the south side of the SWRL alignment between Eastwood Road and Dickson Road. This site would be accessed from Eastwood Road.

Major compounds proposed for construction of the project are shown in Figure 6-17 and would comprise the following:

- Compound 2 — a 10,000 square metre area located near Stockpiles A and B and within the proposed James Meehan Estate. This worksite would be accessed via Quarter Sessions Road.
- Compound 6 — a 10,000 square metre area located to the north of the SWRL and adjacent to Camden Valley Way. This worksite would be accessed from Camden Valley Way.
- Compound 11 — a 10,000 square metre area located at the site of the proposed Leppington Train Stabling Facility. This worksite would be accessed via McCann Road, Eastwood Road and Bringelly Road.

In addition to the main worksites described above, a number of smaller (2,500 square metre) worksites would be established in the following locations:

- west of Campbelltown Road (compound 3)
- north of the proposed Edmondson Park Station (compound 4)
- west of Cabramatta Creek (compound 5)
- west of the Upper Canal (compound 7)
- north of the proposed Leppington Station (compound 8)

- east of Dickson Road (compound 9)
- east of Eastwood Road (compound 10).

The locations of the above worksites are shown in Figure 6-17.

Haulage roads would be established along the project corridor early in the construction phase to reduce the need for heavy vehicles and construction plant to travel on local roads. Other haul routes would be restricted to main roads suitable for taking construction traffic. Where possible, this would not include streets in residential areas. Access for emergency vehicles would be maintained at all times during operations, including access to the rail corridor. The final haul routes would be described further in the Construction Traffic Management Plan.

6.4.6 Construction workforce

At peak times, a construction workforce of approximately 300 staff would be working on-site. For the purposes of the traffic impact assessment for the construction period, it has been assumed that the workers would report to one of three site offices located in up to three of the proposed construction compounds. The workers would report to this office before and after each shift. The location of the main site office would most likely be closer to the area where most of the construction activity would be occurring at that point in time. Further details on the traffic-related impacts derived from the construction workforce are presented in Chapter 9.

The main compound would be provided at the south-western intersection of Camden Valley Way and Bringelly Road.

6.4.7 Sediment basins

A number of sediment basins would be established adjacent to the project alignment to manage potential water quality impacts during construction. Initial investigation into potential basin locations was undertaken as part of Technical Paper 3 (refer Volume 2b); however, these locations have since been reviewed and updated, with the latest information on sediment basin location presented below. Indicative locations of the sediment basins are shown in Figure 6-17, while indicative basin sizing and rationale for inclusion in the design is outlined in Table 6-13. The location and sizing of sedimentation basins would be finalised by the construction contractor prior to construction.

The location of the sediment basins were determined based on a review of topographic data, and is in accordance with Landcom's (2004) *Managing Urban stormwater: Soils and Construction, Volume 1* and the Institute of Engineers Australia's (1987) *Australian Rainfall and Runoff – A Guide to Flood Estimation, Volume 2*.

Table 6-13 Indicative sediment basin sizing and requirements

Name ¹	Size (m ³) [#]	Requirement for sediment basin
N1	168	Drainage of the cutting between approximate Chainage 443.55 and the Hume Highway Underpass (northern side of project corridor).
S1	161	Drainage of the cutting between approximate Chainage 443.55 and the Hume Highway Underpass (southern side of project corridor).
L1	208	Protection of the tributary from fill area beginning at Ingleburn Gardens Road.
L2	51	Protection of tributary from fill area extending to Campbelltown Road.
N2	248	Protection of tributary from sediment generated from large cut and fill extents. Flow would be drained to the north.

Name ¹	Size (m ³) [#]	Requirement for sediment basin
N3	73	Protection of tributary from cut and fill batters extending to Edmondson Park Station.
S2	68	Protection of tributary from cut and fill batters extending to Edmondson Park Station.
CP1	189	Sediment basin for the large disturbed area associated with the proposed car park on the southern side of Edmondson Park Station.
CP2	378	Sediment basin for the large disturbed area associated with the proposed car park on the northern side of Edmondson Park Station.
N4	172	Protection of tributary from the cut located to the west of Edmondson Park Station. Flow would be directed to the north.
N5	190	Tributary protection from catchment extending to Chainage 46.100 km.
S3	188	Tributary protection from catchment extending to Chainage 46.100 km.
N6	280	Large cut extending from Chainage 46.250 km. Flow would be drained to the northern side of the works to minimise vegetation clearing.
L3	220	Protection of Cabramatta Creek from large fill extent.
S4	90	Protection of Cabramatta Creek from fill on western edge.
N7	83	Protection of Cabramatta Cree from fill on western edge.
S5	99	Protection of local dams and water course from cut.
N8	92	Protection of local dams and water course from cut.
N9	188	Sediment basin would be located on a proposed noise mound until cut works are completed. Basin would be required to protect local water course (minor drainage depression located at Chainage 47.500; refer Section 10.6.4).
S6	94	Protection of tributary from large fill area.
N10	149	Protection of tributary from large fill area.
S7	84	Protection of tributary from large fill area.
N11	108	Protection of tributary from large fill area.
S8	63	Protection of tributary at Chainage 48.200 km.
N12	25	Protection of tributary at Chainage 48.200 km.
S9	92	Protection of tributary at Chainage 48.200 km.
N13	99	Protection of tributary at Chainage 48.200 km.
L4	439	Protection of drainage line running parallel to Camden Valley Way. Existing dam could be used until construction works reach the northern extent of this location.
S10	191	Sediment basin placed on noise mound to capture large cut drainage. This basin would be removed during the construction of the noise mound.
N14	169	Protection of tributary from the cut area extending between Chainage 49.250 km to 49.400 km. Flow would be directed to the northern basin.
S11	62	Protection of tributary from the fill area extending between Chainage 49.450 to 49.600 km.
N15	51	Protection of tributary from the fill area extending between Chainage 49.450 and 49.600 km.
L5	69	Protection of the Upper Canal during piling works and the fill area. Heritage issues would need to be considered during determining the exact location of the basin.

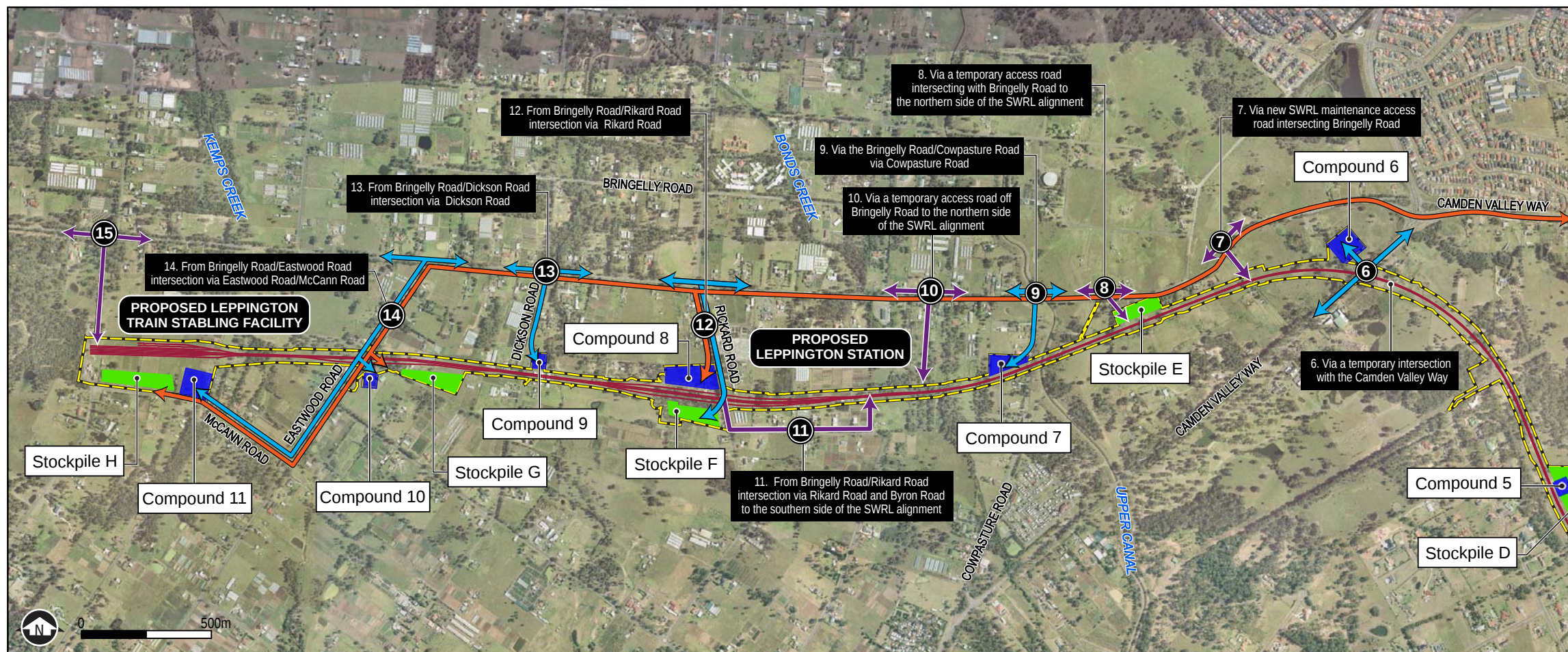
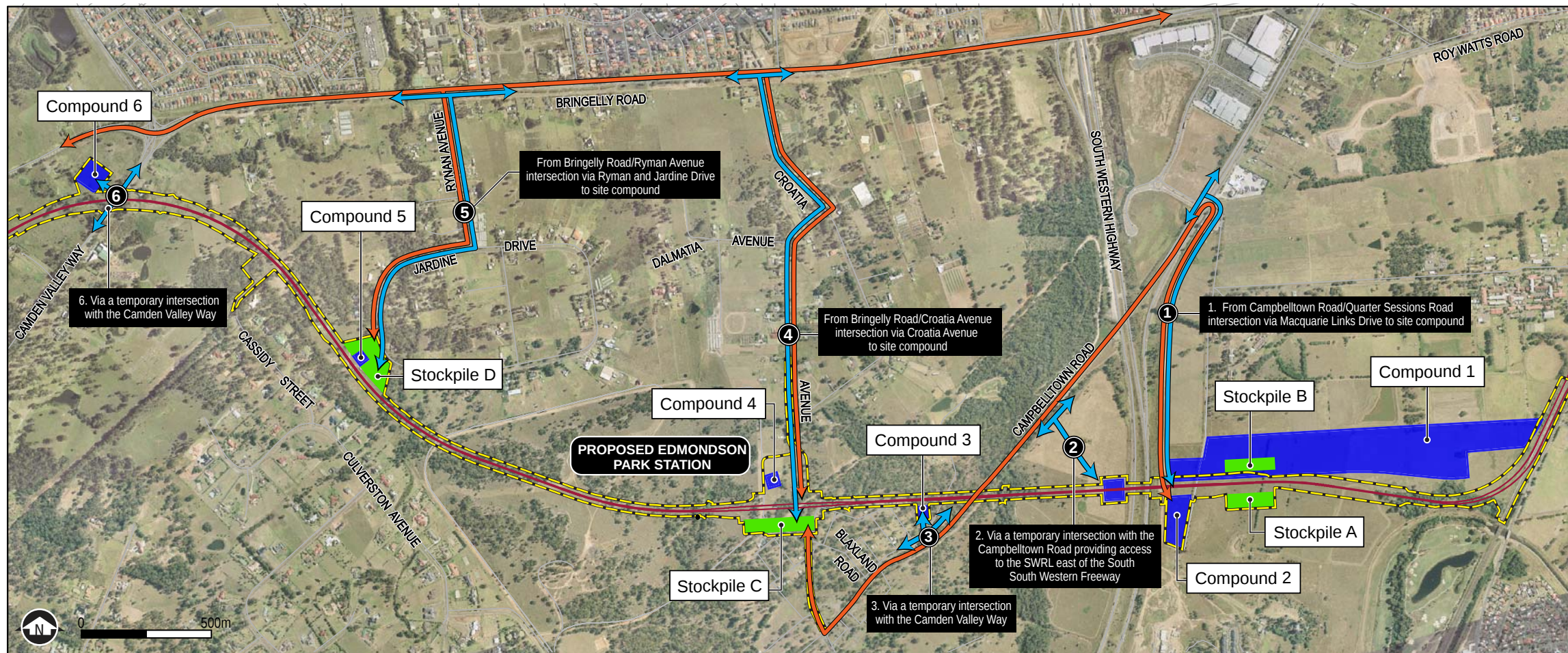
Name ¹	Size (m ³) [#]	Requirement for sediment basin
L6	33	Protection of Upper Canal during piling works. Heritage issues would need to be considered during determining the exact location of the basin.
S12	38	Protection of Bonds Creek during piling and dewatering works. The retaining wall leading to either side of Bonds Creek would also be utilised for drainage containment.
S13 *	102	Use of existing large farm dam to capture run off from large fill area, progressively fill in dam as the project footprint extends. The basin is located outside of the project corridor that was assessed for the EA.
N16	79	Fill area between Chainage 50.450 km and 50.600 km directed to basin.
CP3	210	Required for the large disturbed area associated with the car park proposed on the southern side of Leppington Station.
CP4	546	Required for the large disturbed area associated with the car park proposed on the northern side of Leppington Station.
S14 *	133	Large fill area associated with Leppington Station. This basin utilises an existing farm dam and is located outside of the project corridor that was assessed for the EA.
N17	193	Large fill area associated with Leppington Station. Flow cannot be continued to Scalabrini Creek.
L7	124	Protection of Scalabrini Creek from the large fill area.
L8	84	Protection of Scalabrini Creek from the large fill area.
S15 *	33	Sediment basin for the large fill area associated with the Dickson Road overbridge. The basin is located outside of the project corridor that was assessed for the EA.
N18 *	36	Sediment basin for the large fill area associated with the Dickson Road overbridge. The basin is located outside of the project corridor that was assessed for the EA.
S16 *	33	Sediment basin for the large fill area associated with the Dickson Road overbridge. The basin is located outside of the project corridor that was assessed for the EA.
N19 *	36	Sediment basin for the large fill area associated with the Dickson Road overbridge. The basin is located outside of the project corridor that was assessed for the EA.
S17	33	Sediment basin for the large fill area associated with the Eastwood Road overbridge.
N20 *	36	Sediment basin for the large fill area associated with the Eastwood Road overbridge. The basin is located outside of the project corridor that was assessed for the EA.
S18 *	33	Sediment basin for the large fill area associated with the Eastwood Road overbridge. The basin is located outside of the project corridor that was assessed for the EA.
N21 *	36	Sediment basin for the large fill area associated with the Eastwood Road overbridge. The basin is located outside of the project corridor that was assessed for the EA.
N22	143	Large cut area extending west from Eastwood Road to Chainage 52.600 km. The basin is located outside of the project corridor that was assessed for the EA.
L9	118	Protection of Kemps Creek from the fill area extending west from Chainage 52.600 km and piling associated with the construction of the Kemps Creek Underbridge.

Name ¹	Size (m ³) [#]	Requirement for sediment basin
L10	477	Protection of Kemps Creek from fill area associated with the Leppington Train Stabling Facility, Leppington Substation, and piling associated with the construction of the Kemps Creek Underbridge.
L11 *	811	Disturbance of large area associated with Leppington Train Stabling Facility. Basin comprises an existing farm dam. The basin is located outside of the project corridor that was assessed for the EA; however, it is located on land proposed to be acquired for the project (refer Figure 6-17).
S20	548	Basin comprises an existing farm dam. Required for the carpark and other facilities proposed at the Leppington Train Stabling Facility.

Notes: #: Location and sizing of sediment basins are indicative only, subject to detailed design, and would be finalised by the construction contractor prior to construction.

1: Refer to Figure 6-17 for the indicative location of the sediment basins

*: Sediment basin located outside the project footprint that was assessed for this EA. The need for the basin would be confirmed during detailed construction planning. If required, an impact assessment would be undertaken for the basin prior to the construction.



- Proposed rail line
- Proposed project footprint
- Potential site compounds for the project
- Potential stockpile for the project
- Potential on-road earthwork haulage route
- ↔ Potential site compound access route
- ↔ Potential site access route (to be confirmed during detailed construction planning and, if required, subject to additional assessment)

Figure 6-19 Summary of haulage trips that would require access via the public road network

6.4.8 Construction environmental management plan (CEMP)

A CEMP would be prepared for the construction phase of the project. The CEMP would provide a centralised mechanism through which all potential environmental impacts relevant to the project would be managed. It would also outline a framework of procedures and controls for managing environmental impacts during construction.

The CEMP would also outline how environmental mitigation measures identified in this EA would be incorporated into the construction stage of the project and would document mechanisms for demonstrating compliance with the MCoA, other relevant project approvals and the Statement of Commitments (SoC).

The CEMP would be prepared by the selected Managing Contractor and endorsed by an independent Environmental Management Representative (EMR) to be appointed by TIDC. Monitoring would be undertaken by the EMR and the Managing Contractor. Regular audits by the EMR and TIDC would be undertaken against the CEMP, MCoA and SoC. The plan would include, but not be limited to, measures to address the following issues:

- construction traffic management
- construction noise and vibration management
- water and soil management
- vegetation management
- weed management
- historic and Aboriginal heritage management
- dust management
- landscape and rehabilitation (for worksites)
- community liaison
- occupational health and safety
- hazards and risk management
- spoil management
- waste management
- energy management (including fuel)
- carbon/greenhouse gasses.

The CEMP would outline the mitigation and monitoring measures to be implemented to minimise environmental impacts, and establish the environmental performance objectives and targets for each issue.

The CEMP would also outline objectives and targets for environmental performance, in the form of measurable key performance indicators (KPIs) and would take into consideration TIDC's sustainability targets (TIDC 2009). The KPIs for environmental management would be audited on an annual basis.

In addition to the CEMP, environmental work procedures and environmental control maps, containing site specific details, would be prepared (and implemented) during construction.

The ongoing management of environmental issues associated with the operation and maintenance of the project would be undertaken through RailCorp's Environmental Management System and standard operation procedures.

6.5 Sustainability

A Sustainability Framework for the project has been prepared by ARUP, detailing the key sustainability initiatives that may be incorporated into the proposed SWRL. A summary of the key initiatives is outlined in Section 5.3.4.