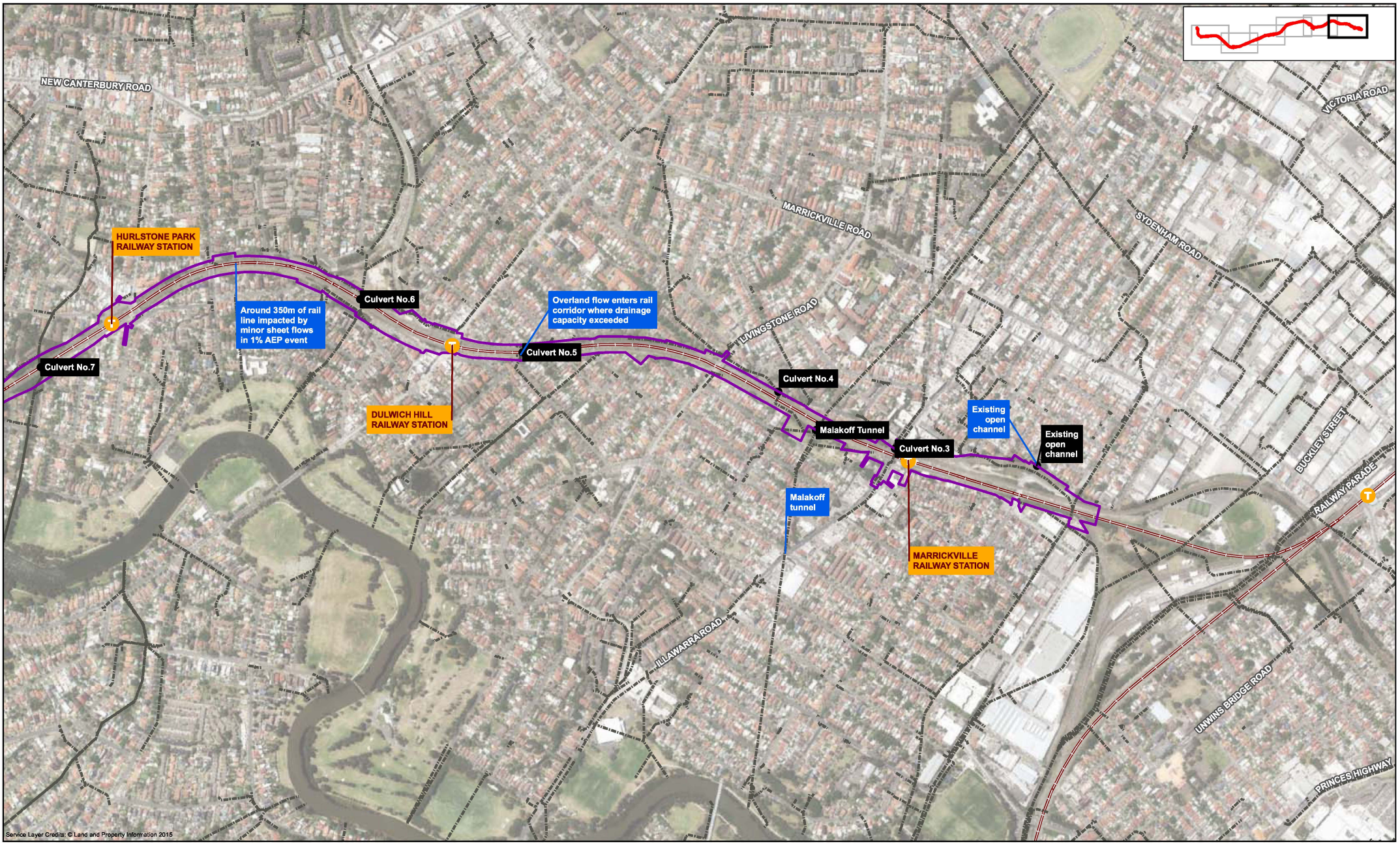
Rest of project area

In the remainder of the project area, between Dulwich Hill and Bankstown stations, existing flooding concerns are considered more minor. High flood risk areas occur within the rail corridor to the west of Campsie Station and east of Canterbury Station but are more localised. Smaller sections of low flood hazard also occur. A summary of existing drainage and flooding concerns in the remainder of the project area is provided in Table 3-3.

Table 3-3 Summary of existing flooding and drainage conditions – rest of project area

Location	Summary of existing flooding and drainage issues	Figure reference
Dulwich Hill Station to Canterbury Station	• Surface water flows from north to south beneath rail corridor. • Some locations of overland flooding into the rail corridor when the existing cross drainage capacity is exceeded (refer figures). • Substantial overland flooding east of Canterbury Station (high flood hazard area) due to insufficient track and cross drainage. • Minor overland flooding potential west of Canterbury Station (low flood hazard area).	Figure 3-9 Figure 3-10
Campsie Station	• Surface water flows from south to north beneath rail corridor. • Overflows from local drainage enter the rail corridor and flow east towards Campsie Station in events greater than the 10 % AEP . • West of Campsie Station is a high flood hazard area. • Overflows from local drainage enter the rail corridor near Belmore triangle area in events greater than 39 % AEP.	Figure 3-11
Belmore Station	• Surface water flows from south to north beneath rail corridor. • Local drainage capacity constraints outside the rail corridor. • Rail alignment in fill and no predicted overland flow issues within the rail corridor.	Figure 3-12
Lakemba Station	• Surface water flows from south to north beneath rail corridor. • East of station, risk of flooding in rail corridor for 5 % AEP and greater. • West of station, limited cross drainage capacity however rail corridor is in fill.	Figure 3-12
Wiley Park Station	• Surface water flows from south to north beneath rail corridor. • Limited cross drainage capacity however rail corridor is mostly in fill.	Figure 3-13

Location	Summary of existing flooding and drainage issues	Figure reference
Punchbowl Station	• Surface water flows from south to north beneath rail corridor. • East of the station there are a number of culvert crossings present with varying capacities. • Potential for overflows into the rail corridor. • West of the station drainage modelling indicates overflows into the rail corridor at a number of locations for 1 % AEP climate change event.	Figure 3-13
Bankstown Station	• Rail corridor mostly in fill with limited potential for flooding of tracks except in large (infrequent) events. • An area of medium flood risk hazard to the east of the station.	Figure 3-14



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LEGEND

- Project area
- Train station
- Railway
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Figure 3-9

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Data source: Aerial imagery - sixmaps 2016, General topo - NSW LPI DTDB 2012. Created by:afoddy

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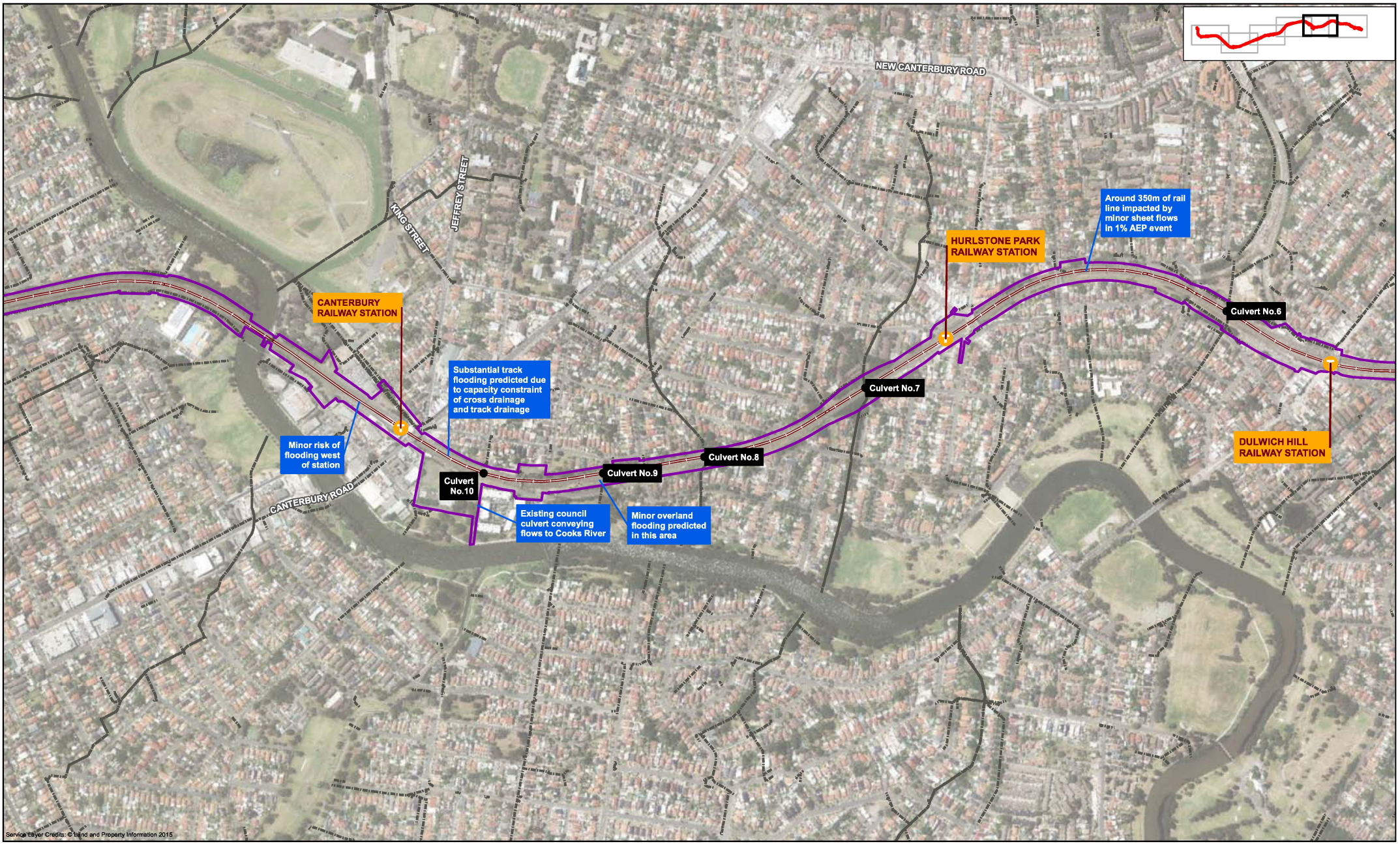

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Figure 3-10

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Figure 3-11

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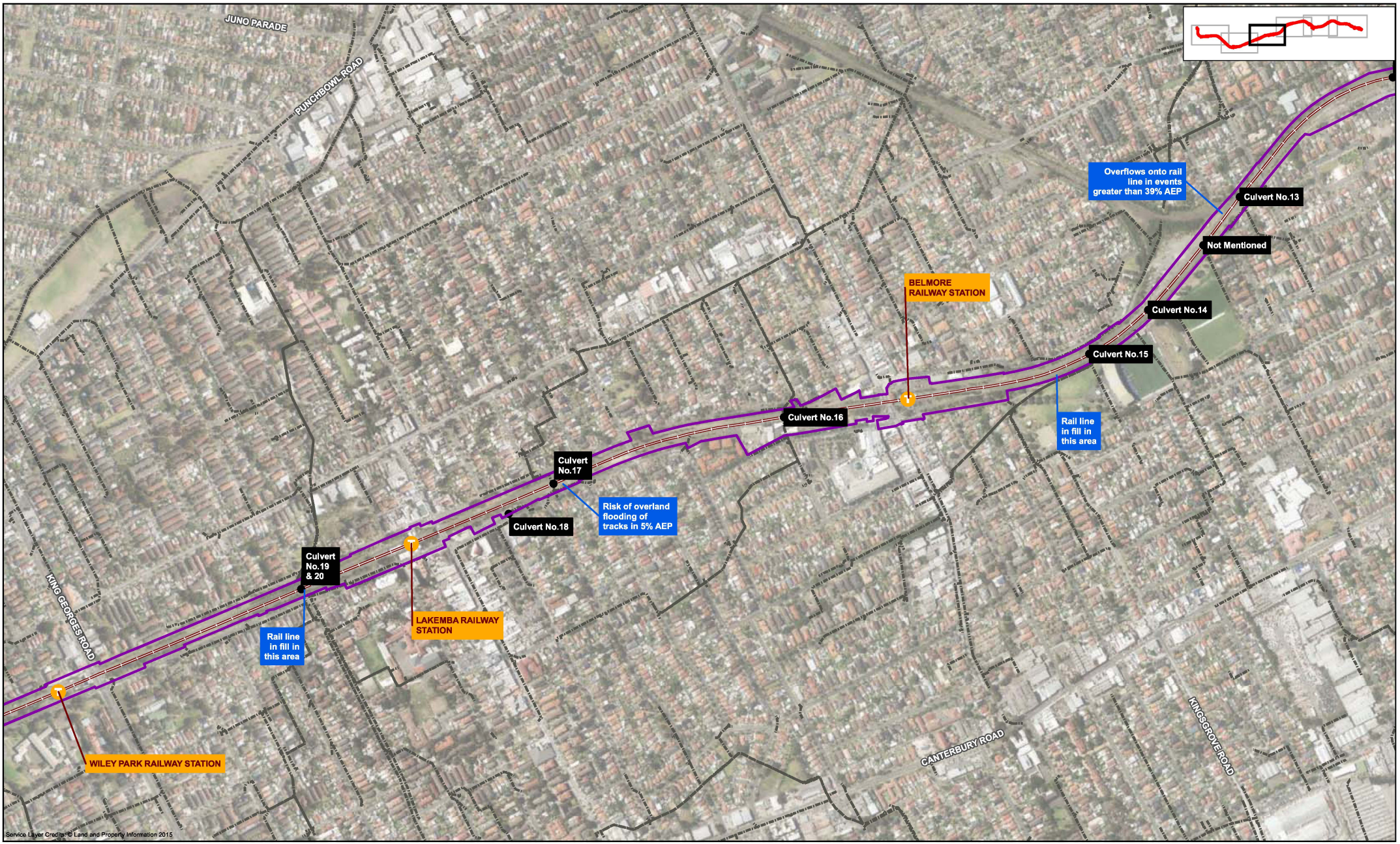

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Figure 3-12

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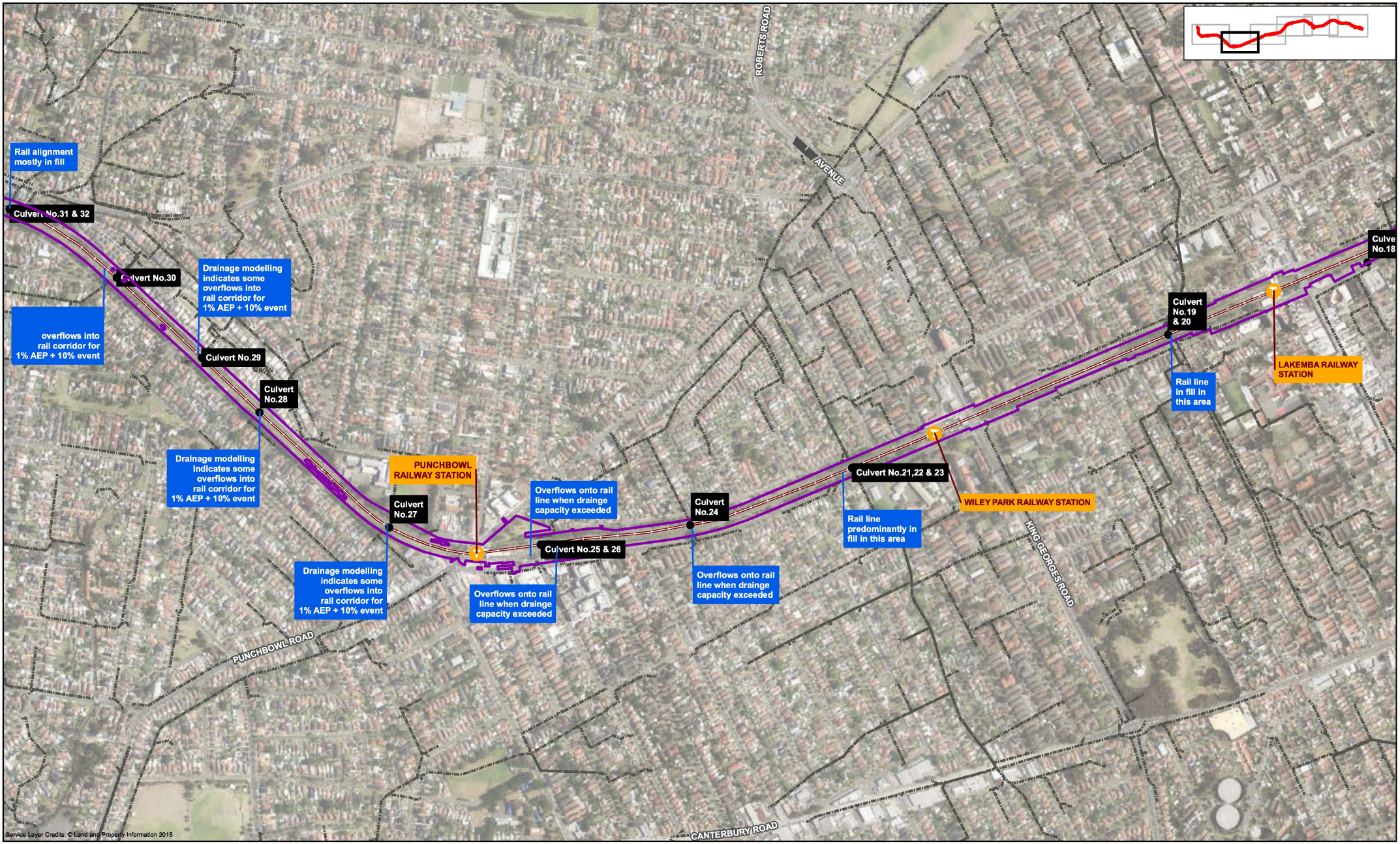

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Figure 3-13

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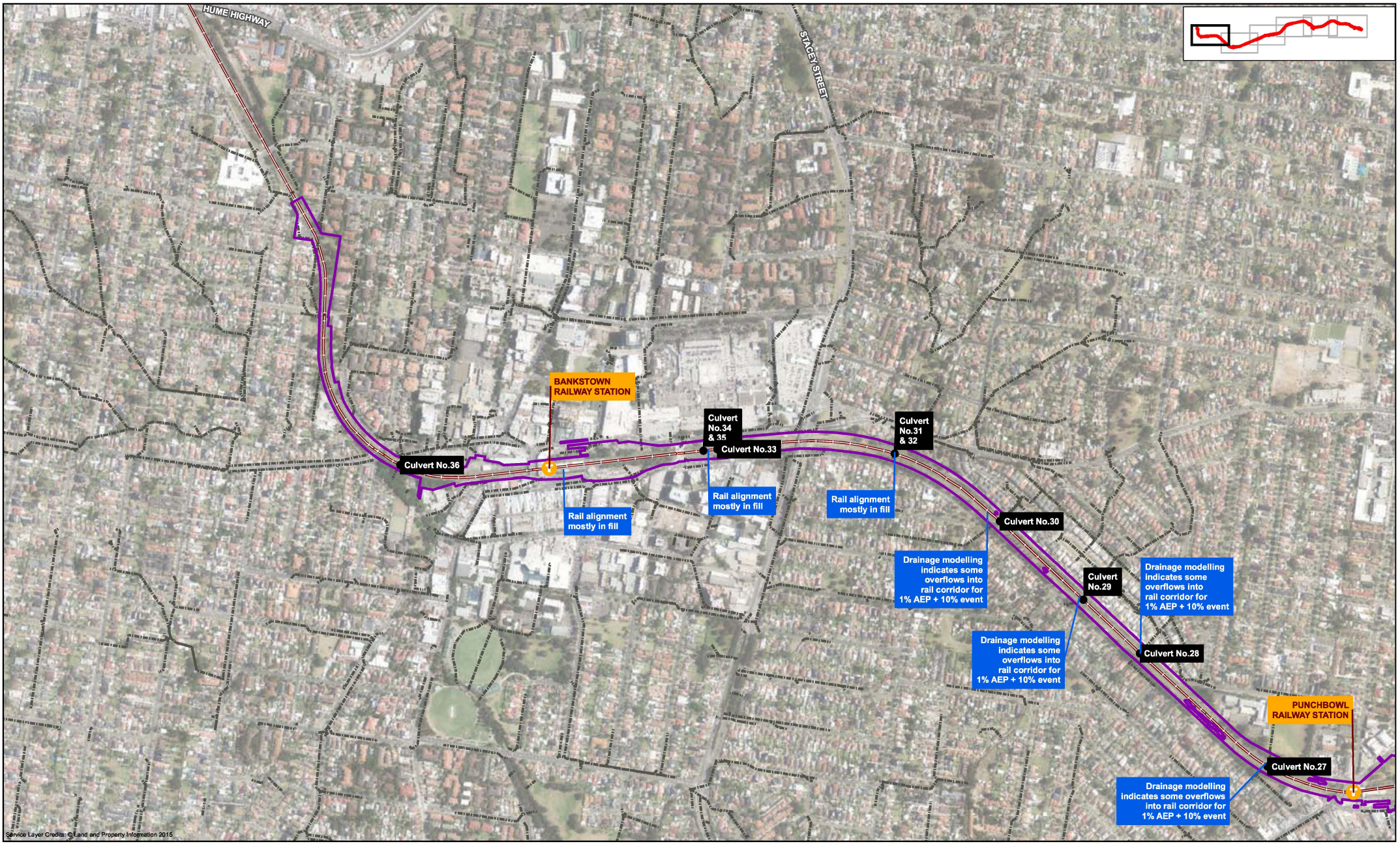

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Figure 3-14

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3.6.5 Flood risk management

Cooks River catchment

The Cooks River Flood Study investigated the flood behaviour within the catchment for a range of events. *The Cooks River Floodplain Risk Management Study and Plan* discussed a number of potential floodplain management measures. However, no specific measures were recommended or incorporated within the project area from either of the above studies.

Salt Pan Creek Catchment

The Salt Pan Creek Catchments Floodplain Risk Management Study and Plan (Bewsher Consulting, 2013) provides floodplain management options to address known flooding issues in the catchment.

The plan identified the need for mitigation works associated with the Wattle Street railway culvert at Bankstown. These were mainly aimed at reducing flood risk to the properties upstream of the rail corridor. The works include culvert upgrade or flow diversion and formalisation of the flow path to upstream of the rail corridor. The status of these works is unknown.

The plan also identified drainage issues in the Bankstown CBD and noted that works have previously been undertaken at the rail corridor to amplify the box culvert crossing near the rail corridor and to formalise an overland flow path downstream of the rail corridor underpass (West Terrace). Recommendations for further works were made as part of the plan and include improvement of the overland flow path near the rail corridor underpass.

3.6.6 Emergency management

The applicable emergency management plan for the study area is the *South West Metropolitan Emergency Management District Disaster Plan* (NSW Government, 2012). Local Flood Plans (LFP) are subordinate plans of the Local Disaster Plan. LFPs outline the roles and responsibilities for the NSW State Emergency Service (SES) and other agencies during flood events in relation to flood preparation, management and recovery. No currently published flood plans for the area are available on the NSW SES Floodsafe webpage. The floodplain risk management studies in the area indicate that a LFP was available for Marrickville but that it considered flooding from the Cooks River only.

Flood emergency management is incorporated into design criteria for Sydney Metro station infrastructure. Flood emergency management procedures would be incorporated in Sydney Metro operational emergency management plans.

The project team has held preliminary discussions with the NSW SES who identified Unwins Bridge Road in the Marrickville area as being a key evacuation route in advance of a flood event, although it was noted that in recent flood history, the flood events that have occurred have been of the order of a maximum of the 20 per cent AEP event.

3.7 Water quality

Typical surface pollutants from the existing project area, including the rail corridor, stations, car parks and ancillary facilities could include:

- Oils and hydrocarbons
- Heavy metals
- Chemicals from spills or inappropriate waste disposal
- Sediments

- Gross pollutants including litter and debris
- Nitrogen
- Phosphorous

No existing water quality treatment measures within the project area were identified in the desktop research or site visit.

3.7.1 Cooks River catchment

Historically poor water quality in the Cooks River means that it has been considered unfit for contact by humans (Cooks River Alliance, 2014). Sewage overflow, illegal dumping and litter by both the public and businesses have been quoted as the main sources of pollution in the catchment.

An ongoing plan of management for the Cooks River is in place. The plan targets, amongst other objectives, the improvement of water quality.

Further downstream in the Cooks River Estuary at Botany Bay, water quality is monitored as part of the NSW Government's State of the Beaches programme. The *State of the Beaches 2015-2016 Sydney Region* (NSW OEH, 2016) report graded the beach at Kyeemagh Baths, the beach most relevant to the study area, as good, indicating that water quality was suitable for swimming most of the time. The report noted that swimming suitability was affected from time to time by upstream sources, including from the Cooks River.

The Cooks River Water Quality and River Flow Objectives (DECCW, 2006a) states that tidal patterns in the estuary at Botany Bay significantly influence water quality, flow regimes in the Cooks River are already significantly altered, and that a return to pristine aquatic ecosystems is unlikely. However it notes that improvements in water quality should still be targeted.

3.7.2 Salt Pan Creek catchment

Heavy development in the Salt Pan Creek catchment, including construction effects and litter, as well as other influences such as sewer overflows and a landfill operation, have resulted in historically poor water quality in the creek. The water quality was designated D- ("poor") in 2009-2010. However water quality has improved in the ensuing years through the efforts of local councils and others. The most recently available report, the *2015-2016 River Health Report Card for the Georges River (GRCCC, 2016)*, identified the overall water quality health of Salt Pan Creek as "good" (A-). It is understood that water quality treatment devices in the form of trash racks and GPTs have been installed in the catchment together with the implementation of a public education program, amongst other controls.

The *State of the Beaches 2015-2016 Sydney Region* (NSW OEH, 2016) report graded the majority of the beaches of the Lower Georges River as being good, meaning that water was appropriate for swimming most of the time.