

A New Heart For Parramatta

With several million people projected to settle west of Parramatta in coming decades, Parramatta is becoming recognised as the logical center of Greater Sydney. Yet, it remains a city **without a station comparable in scope or function to Sydney's Central station.**

Parramatta aspires to be a world class city. Yet, it is a city **physically divided by an elevated rail line.** A similar problem also afflicted Perth until the completion of the highly successful Perth City Link.

The physical scale of Greater Sydney means Parramatta should also aspire to a high speed rail connection to the CBD and to Western Sydney Airport. **FastLink** is a metro style, limited stops commuter service based around High Speed Rail technology. **It will connect Parramatta directly to the CBD or to Western Sydney Airport in 12 minutes.** FastLink also provides the final connection between an East Coast High Speed Rail (HSR) line and the heart of both Parramatta and the CBD. Interchange between HSR and FastLink will occur at both Olympic Park and at a new western Sydney station sited near the M7. This new station will also serve as a transport hub for the Western Sydney Employment Area. (See “A brief introduction to FastLink” on page 13).

FastLink requires a new station to be built in the heart of Parramatta. What follows is a description of this new Parramatta station and how it can be feasibly constructed. This process will:

- **Return the rail corridor to other uses and unify the city physically.**
- **Allow for the existing station to provide a rail service during construction.**
- **Be in large measure self funded through value capture.**
- **Create an integrated station with direct (vertical) interchange between several lines.**
- Be completely underground, apart from some surface portals.
- Allow for an optional additional two platform terminus thus creating eight platforms in total.
- Provide passively for the passage of an East Coast High Speed Rail line.

The main part of the new station has 3 platform levels, each comprising a center island with two platform edges. Vertical transport (escalators and high speed lifts) transfer passengers directly between platforms. The lowest level provides access to FastLink. The next level above provides access to the Western line which runs from the Blue Mountains to Central. The next and uppermost platform level provides access to a “Cumberland” metro rail line which serves stations south to Liverpool and west to Blacktown (or beyond).

Above these platform levels is a lower concourse. At the eastern end of the new station there is also an upper concourse level which occupies the same space as the present station concourse and creates a pedestrian path between Parramatta Town Square and the existing retail link to Westfield. **The only evidence of a new station would be its surface portals** (entrances/exits).

An optional two platform underground terminus occupies the land vacated by the existing station. Its island platform joins the lower concourse thus forming a continuous path at that level. This terminus would suit an inner west metro serving all stations to and through the city circle. **With this new eastern terminus the new station would have a total of eight platforms.**

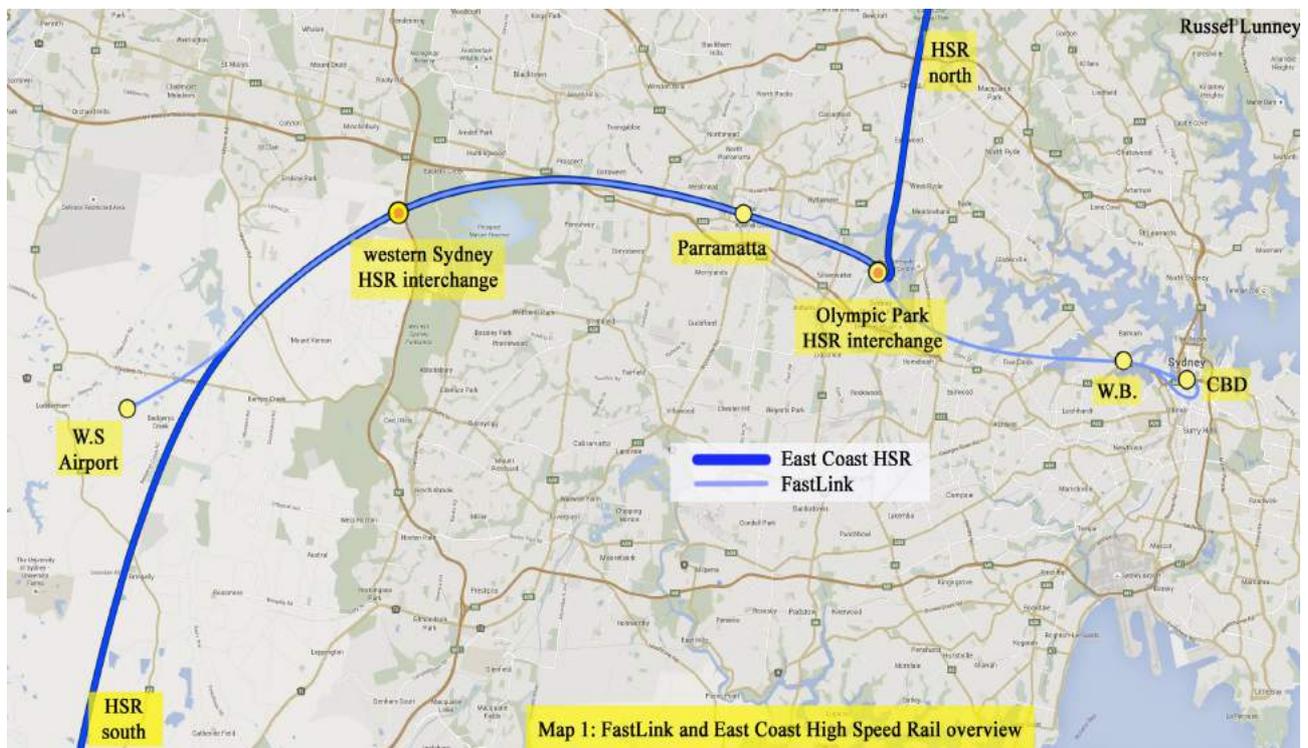
The elevated rail line and **at least seven bridges** would be removed, restoring the rail corridor to its original level. **There would now be space for an expanded civic precinct from Church Street across to Westfield. There would be space for a green corridor that would stretch from Parramatta Park through to Parramatta Road.**

Removing the rail line also affords the opportunity to rationalise the bus interchange. A light rail interchange is more feasible with the added benefit that a light rail line is no longer constrained by the heavy rail line. It can even use some of the former rail corridor.

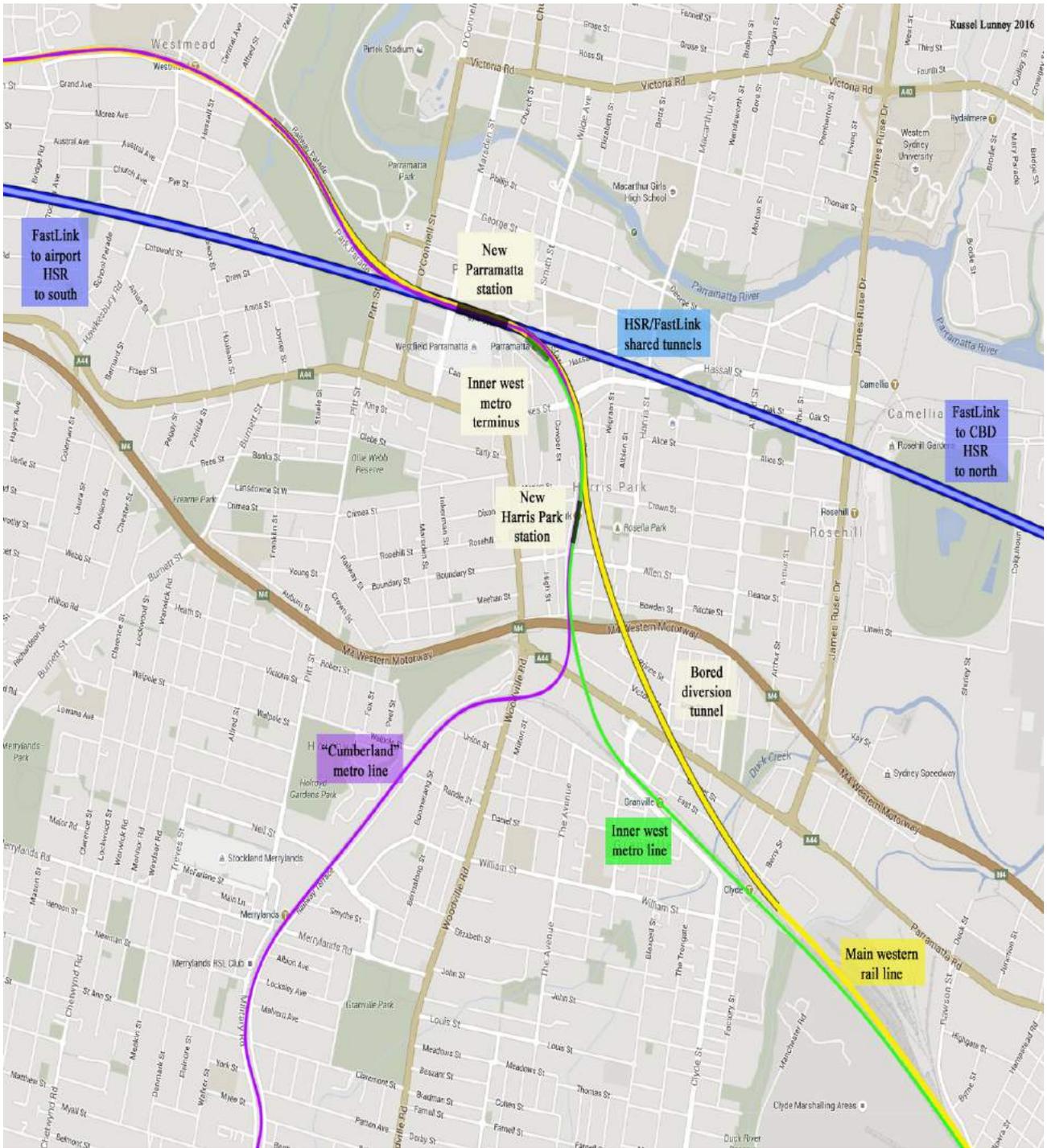
There would be opportunity for value capture in the form of high rise development, especially adjacent to Westfield or over the former station site. Such a development would have to respect the continuity of a green corridor. It would also act to cloak and provide shelter for a bus interchange.

Map 1 (this page) provides an overview of the FastLink route (thinner light blue line) drawn on top of the East Coast HSR route (thicker dark blue line). This shows how the alignment is shared (with independent tracks) between Olympic Park and just before Western Sydney (Badgerys Creek) Airport. These two rail lines also share a tunnel pair between Olympic Park and Prospect. The two interchange stations are marked with an extra orange dot. **The shared tunnel pair is the basis of the new Parramatta station.** It simplifies and cost reduces construction.

Map 2 (next page) provides a closer view showing the location of the new Parramatta station and the arrangement of its rail lines. Note that the Western rail line goes into a tunnel near Clyde and emerges from tunnel at the western end of Parramatta Park. The two metro lines go into cut and cover tunnel near Parramatta Road. The inner west metro line terminates at platforms under where the existing station stands.



Map 1: An overview of the FastLink and East Coast High Speed Rail routes



Map 2: Closer view of new Parramatta station and its rail lines

How a new Parramatta station could be constructed

Note: In what follows, it is assumed that freight has been bypassed as part of a separate project. This may involve a new freight link through Yenora and on to Prospect. That project would also enable a new intermodal terminal. It isn't further discussed here.

The process of construction can be simplified to the following three points.

1. Use the existing station as a temporary station operating with two platforms during construction.
2. Build a new station just to the west of the existing station using a temporary bridge over the construction site to support the operational rail line.
3. Commission the new station in stages and in the process remove the old station and elevated rail line.

On the following pages there are six drawings that represent snapshots of the construction process.

Drawing 1 (page 6) shows the location of the FastLink tunnels. These tunnels are drawn in blue at nearly exact scale. They run at depth to avoid building foundations to the east of Station Street. Each tunnel would carry two tracks side by side and be approximately 10.5 metres in internal diameter. The inner tracks (facing the new platform) would carry FastLink. The outer tracks allow for a separate east coast HSR line to pass through the station at speed. This design avoids having an infeasibly large station. See the A brief introduction to FastLink on page 13.

The FastLink tunnels would be completed either before or during station box construction. So although this is presented as the first drawing, there would be overlap between the construction of these tunnels and the construction of the bridge (shown in drawing 2). The reason for drawing 1 is primarily to show the FastLink tunnels, the FastLink platform and the station box relative to other local features and without the clutter of upper levels.

Before the snapshot in drawing 2, platforms 2 and 3 of Parramatta station are closed leaving a service operating on platforms 1 and 4. Then the tracks west of Parramatta station serving platforms 2 and 3 are removed.

Drawing 2 (page 7) shows a new 300m long temporary bridge (probably a steel truss structure) occupying the space where the center two tracks (from platforms 2 and 3) once ran. Intermediate supports for this bridge are needed, but not drawn. Once the bridge has been assembled, its support jacks are removed and it is allowed to become free-standing. The bridge spans between the western end of the existing platforms and just west of the Marsden Street bridge.

Parramatta station now reverts to using platforms 2 and 3. These trains now operate over the new temporary bridge. Platforms 1 and 4 are now permanently closed and these tracks are removed along with the Church Street and Marsden Street bridges. The construction of the new station box can begin. Drawings 1 and 3 highlight the outline of the new station box.

The new station box is structurally independent from the FastLink/HSR tunnels running below it and the FastLink platform. Once the shell of the new station box is complete, the tunnel boring machines for the new Western line tunnels can enter.

Drawing 3 (page 8) shows the next phase of construction with the new Western line tunnels (yellow) completed. After this, work can continue to complete the upper levels of the new station, with parts of the upper (metro) platform level remaining a construction zone. During this time, the FastLink platform cavern is mined from beneath the station box and the FastLink tunnel linings are partially removed on the platform sides. The mining of the FastLink platform cavern continues up until it reaches the floor of the station box above – which is already self supporting. See the Further details section on page 12.

Drawing 4 (page 9) shows the new Parramatta station partly operational with the Western line now in service.. Customer access is functional but not yet fully complete. FastLink can also commence operation once its platform level is fully fitted out.

At this stage the temporary bridge is disassembled. The existing Parramatta and Harris Park stations are demolished. The former elevated rail line is now fully removed from the city. Access to Parramatta from the south is temporarily via interchange at Auburn.

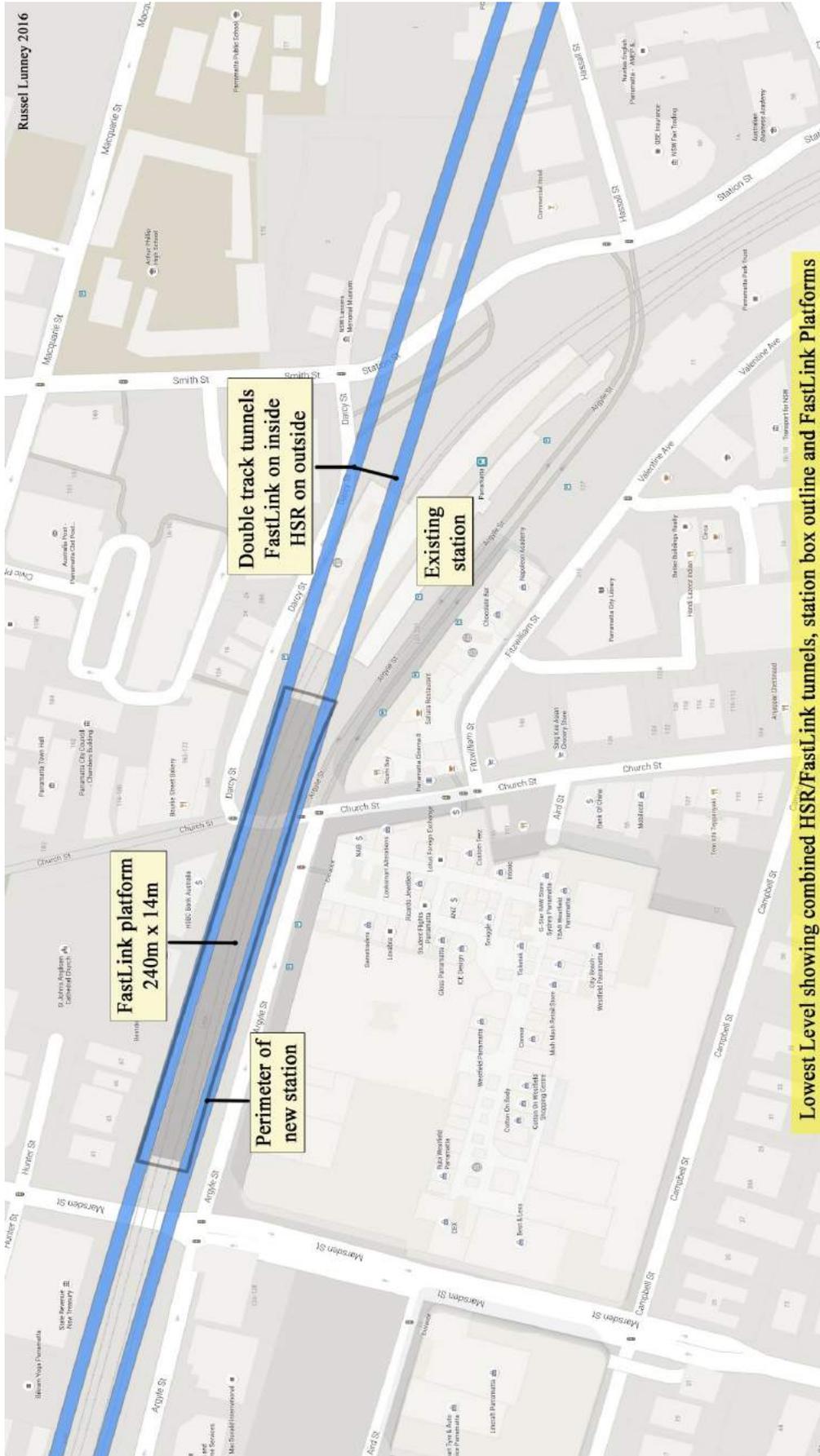
The rail line from Liverpool and over the Woodville Road bridge is re-graded into a cut and cover tunnel (purple) that passes through a new Harris Park station (not drawn). Granville reverts to a two platform, two track station. These tracks are now re-graded into a cut and cover tunnel (green) which passes through the new Harris Park station. If the optional terminal platforms are constructed on the eastern end of the new Parramatta station then these tracks will terminate there.

West of the new Parramatta station, a cut and cover tunnel carries the new “Cumberland” metro line (purple) through to a portal in Parramatta Park. During this time the new Parramatta station is operational but with parts of the upper platform level remaining a construction zone.

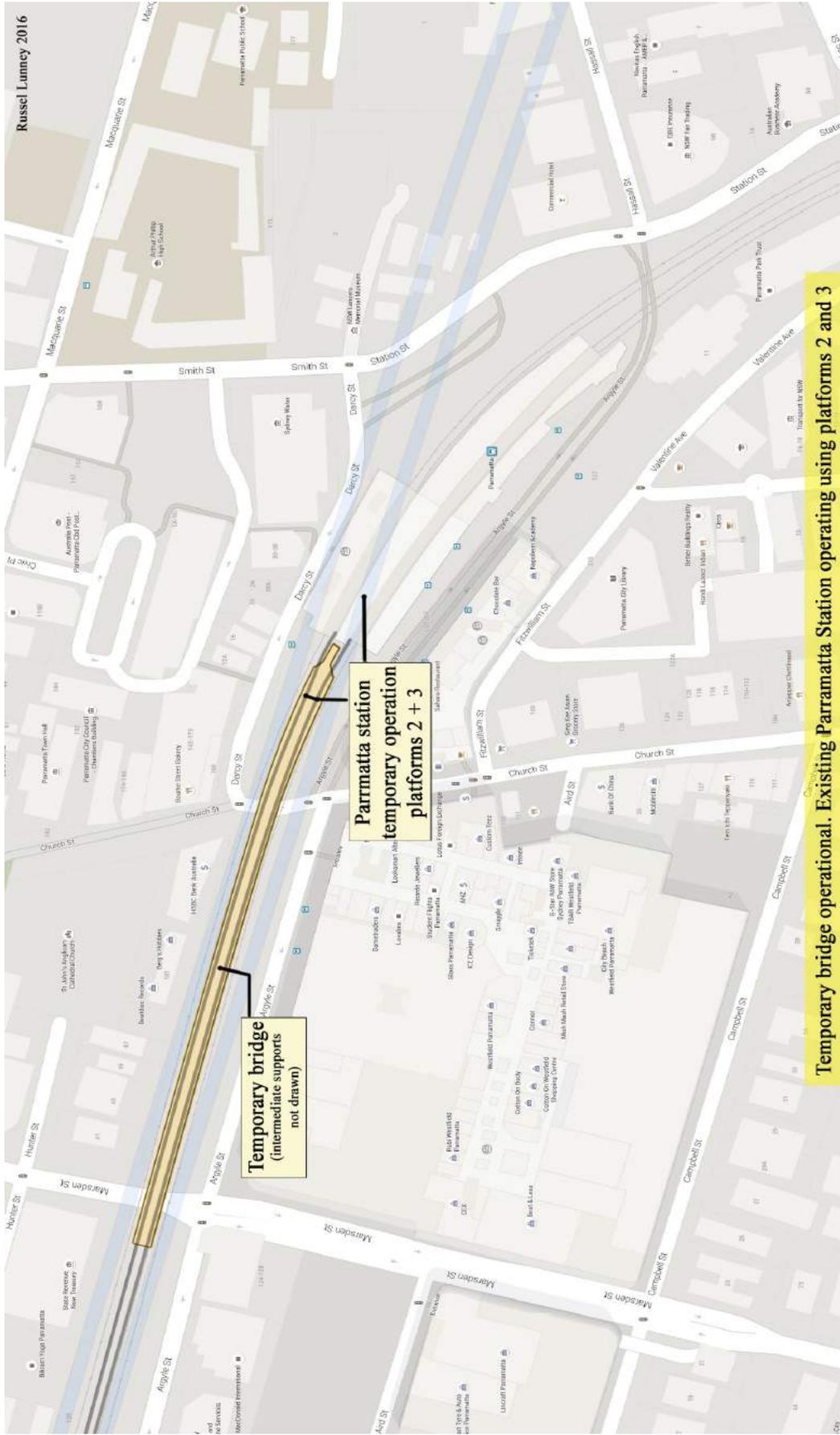
Drawing 5 (page 10) shows the new Parramatta station with both the Western line and the “Cumberland” metro line operational. FastLink may also be operational at this stage. Harris Park (not shown) is now rebuilt and operational. The optional eastern terminus and the upper concourse is now the last stage of construction.

Drawing 6 (page 11) shows the fully completed station including the eastern terminus.

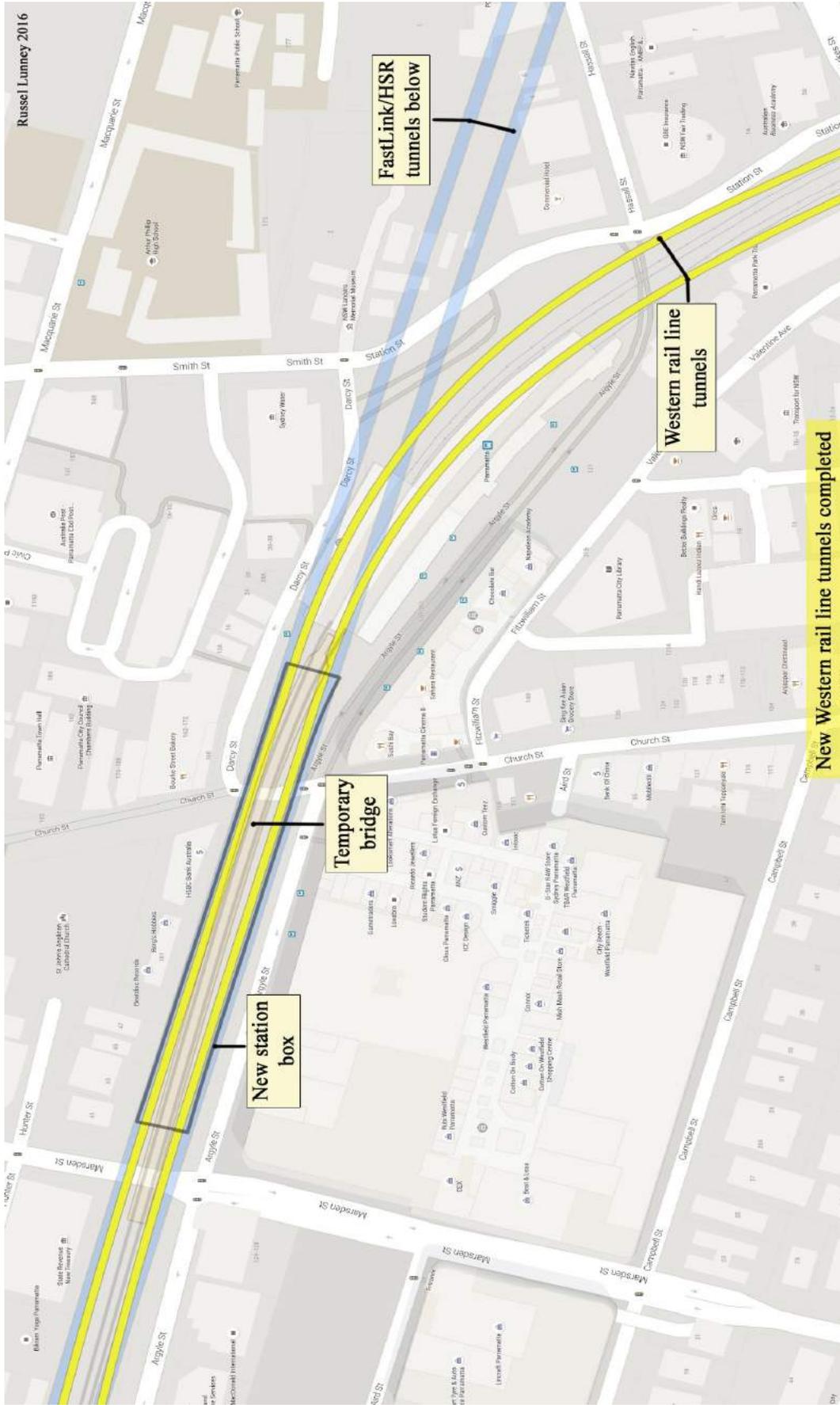
The former rail corridor can now be returned to other uses. Much of it would be a green corridor and an expanded civic space. Some of the air space above the corridor, particularly adjacent to Westfield or over the former station site could be developed as part of the funding for the new station.



Drawing 1: Station location and FastLink tunnel alignment

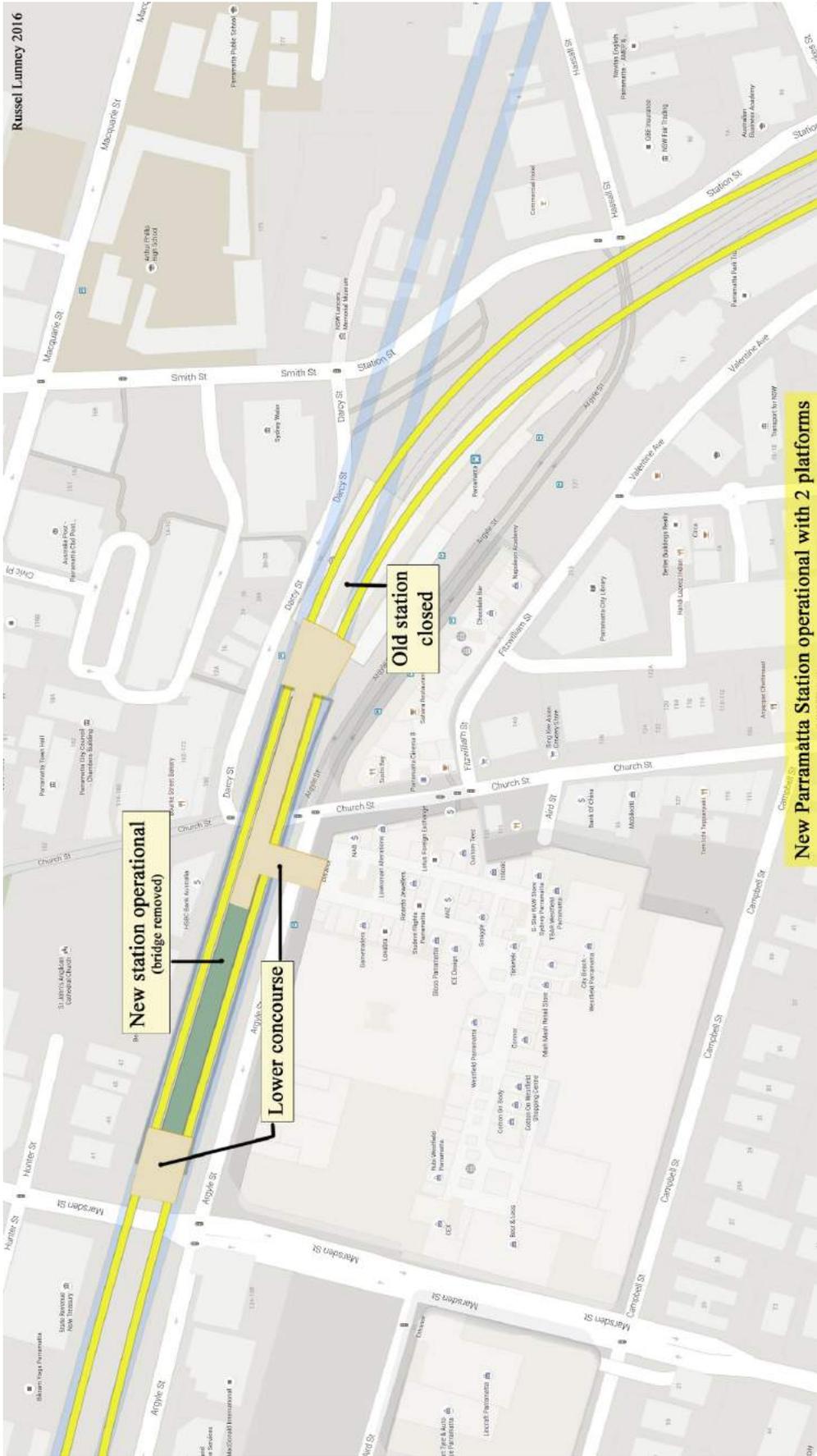


Drawing 2: Temporary bridge



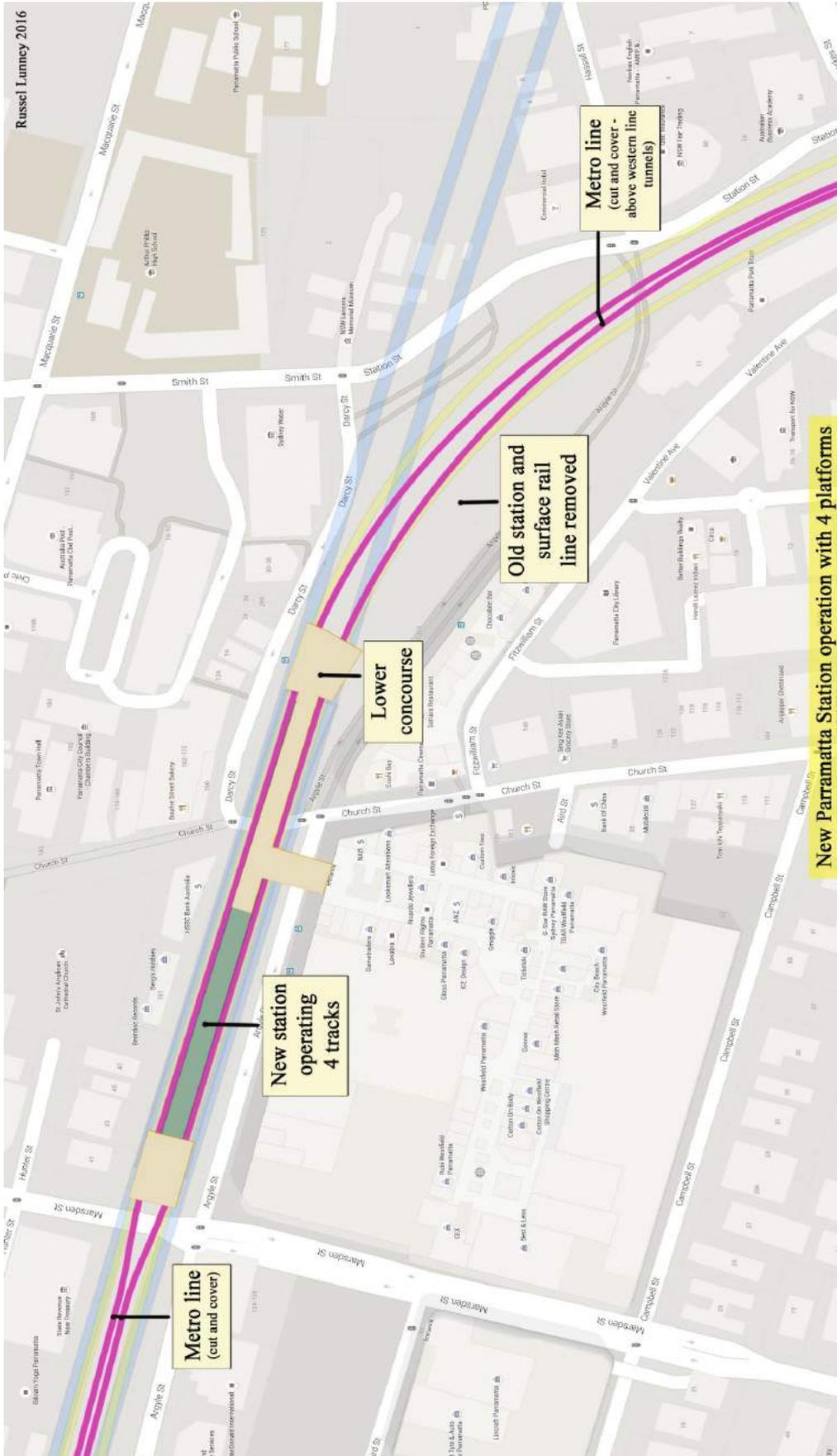
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Drawing 3: Western line tunnels complete

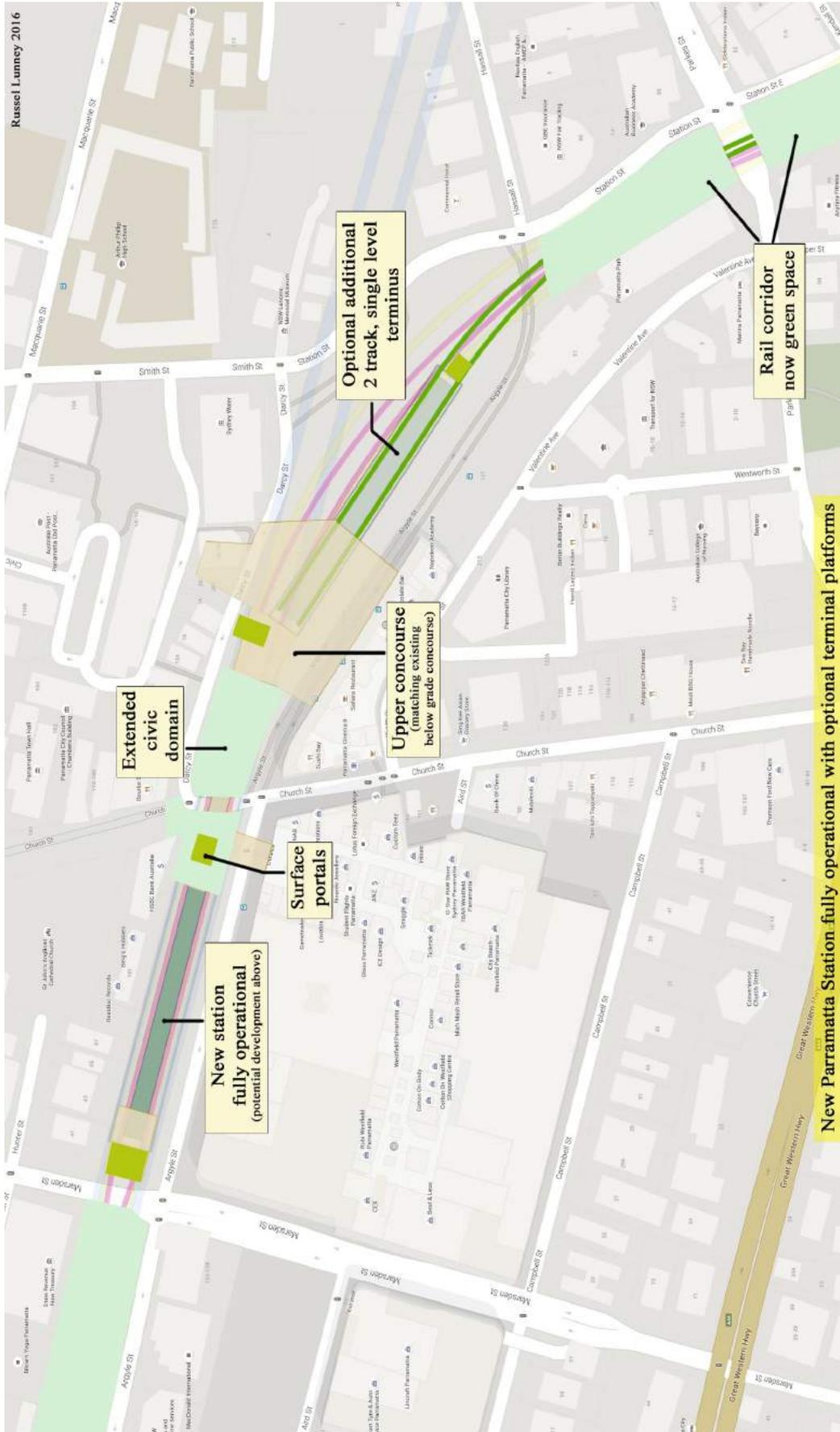


New Paramatta Station operational with 2 platforms

Drawing 4: Western line operational



Drawing 5: Normal service restored



Drawing 6: Complete

New Parramatta Station fully operational with optional terminal platforms

Further detail

The Western rail line referred to above is the “mains” or “express” track pair from Central through Strathfield and Parramatta and then out to the Blue Mountains. This is the track pair that would carry limited stops intercity services. These trains would naturally terminate at Central. The Western line would be diverted permanently through new tunnels (yellow) starting near Clyde and returning to the surface near the western end of Parramatta Park. As a consequence, some of the land occupied by the rail line would be returned to Parramatta Park.

The western “locals” track pair would ideally form a new all stops metro line from the city circle to Parramatta, terminating at the new eastern terminus. This track pair would continue to service Clyde and Granville and could service Harris Park. This metro line is coloured green on the drawings to reflect its origin as the T2 line.

The track pair from Liverpool, through Merrylands and over the Woodville Road bridge would form a new “Cumberland” metro that would run from Liverpool, through Parramatta and at least to Blacktown. This metro could in theory be an extension of Sydney Metro, were Sydney Metro extended to Liverpool. These tracks are coloured purple on the drawings in homage to the Cumberland line.

A rebuilt Harris Park station would serve one or both of the metro lines now passing through it. One of those metro lines is from Liverpool and the other from the CBD.

The most interesting feature of this proposal (from the point of view of the bystander) will be a 300m long temporary bridge which will continue to carry the operational rail line whilst the new station box is being constructed below the bridge. Whilst a major cost item, it is still believed the most cost effective way to keep the rail line operational whilst the new station is being built.

The main station box platforms will be 240m long in order to cater to 12 car trains. This is to provide space for longer Western line trains as well as future proofing for FastLink. As such the new lower concourse could run from Marsden Street to opposite the mid point of Parramatta Town Square (in the drawing it is shown as an eastern and western portion in order to reveal the platforms below). The eastern end of the lower concourse flows onto the island platform for the eastern terminus. Above the eastern end of the lower concourse is the upper concourse which serves as the pedestrian path between Parramatta Town Square and the existing Westfield retail link.

It is expected that the lower concourse could have further connections both to existing structures and to a new development in the space above.

One other detail not drawn but worth explaining. The new station box does not contain the FastLink platform. This is done primarily to avoid a deep excavation for the station box. But it also allows the station to become operational sooner and thus cause less disruption. The station box floor is supported on columns that project through the center line of the FastLink platform. In this way, when the FastLink platform space is mined, the columns are revealed and they remain a permanent part of the FastLink platform. It also means less complex support for the FastLink cavern, because the “ceiling” is actually the floor of the station box above and the station box is already self supporting. As a consequence of this, the FastLink platform will be quite spacious (high ceiling) – more so than the platform levels above it.

A brief introduction to FastLink

FastLink is HSR technology **adapted for efficient and cost effective city access.**

The first adaptation is that the FastLink rolling stock is configured in metro style. That means longitudinal seating and three wide doors per carriage. This creates short dwell times and **allows FastLink to operate with only two platforms per station.** Conventional HSR uses airline style seating and can have dwell times of several minutes at major stations, which then requires more platforms. This is why previous HSR studies baulked at true CBD access and instead stopped at Central.

The second adaptation is that FastLink trains are limited to 240m (12 car) in length, whereas conventional HSR intercity services can require 300m platforms or longer. **This also constrains cost and further contributes to FastLink's ability to have underground stations.**

The third adaptation is that FastLink typically operates below 250Km/hr. This factors into tunnel sizing. **It also means high frequencies are possible.** This is important because the route between Parramatta and the CBD will eventually demand very high capacity – over 40,000 people per hour in one direction.

Having said this, FastLink is still HSR technology. Its trains would share a common design, common vendor and common maintenance with the East Coast HSR line. The main delineation is that FastLink runs on a quite separate track pair, physically separate from the East Coast HSR line. **The reason that FastLink and HSR share a tunnel (from Olympic Park through Prospect) is to save on overall cost.**

There are two HSR interchange stations in Sydney. One is at Olympic Park. The other is in western Sydney near the M7. These sites are chosen in part for having sufficient space to build a full HSR interchange at a reasonable cost. Although an inter-capital journey would require interchange at one of these stations, this interchange can be made seamless through both a well designed station and a high frequency connecting service (which is FastLink). Moreover, **FastLink can deliver people to underground platforms in the center of the CBD or the center of Parramatta. This isn't possible for a conventional HSR line.** A conventional HSR design simply forces interchange at Central instead. The FastLink CBD station would offer direct interchange with Town Hall station and Sydney Metro Pitt Street station as well as easy access to the CBD light rail line.

In order to keep to a 12 minute schedule from Parramatta to the CBD, only two intermediate stops can be supported. One of those is at Olympic Park, which also **interchanges with the Parramatta to Strathfield light rail line.** The other stop would be at White Bay, creating a **90 second transfer from White Bay to the CBD** and also **interchanging with an extended inner west light rail line** and Victoria Road buses.

The western end of FastLink would terminate at Western Sydney (Badgerys Creek) airport. That would create an interchange with the conventional rail line from the south and southwest, thus **allowing faster journeys from the south and southwest to Parramatta in particular.** The western Sydney FastLink/HSR station would **become a satellite of the airport and attract airport related commerce, being only a few minutes from the terminal via FastLink.** This station would also serve as a transport hub for the Western Sydney Employment Area.

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Author: Russel Lunney
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