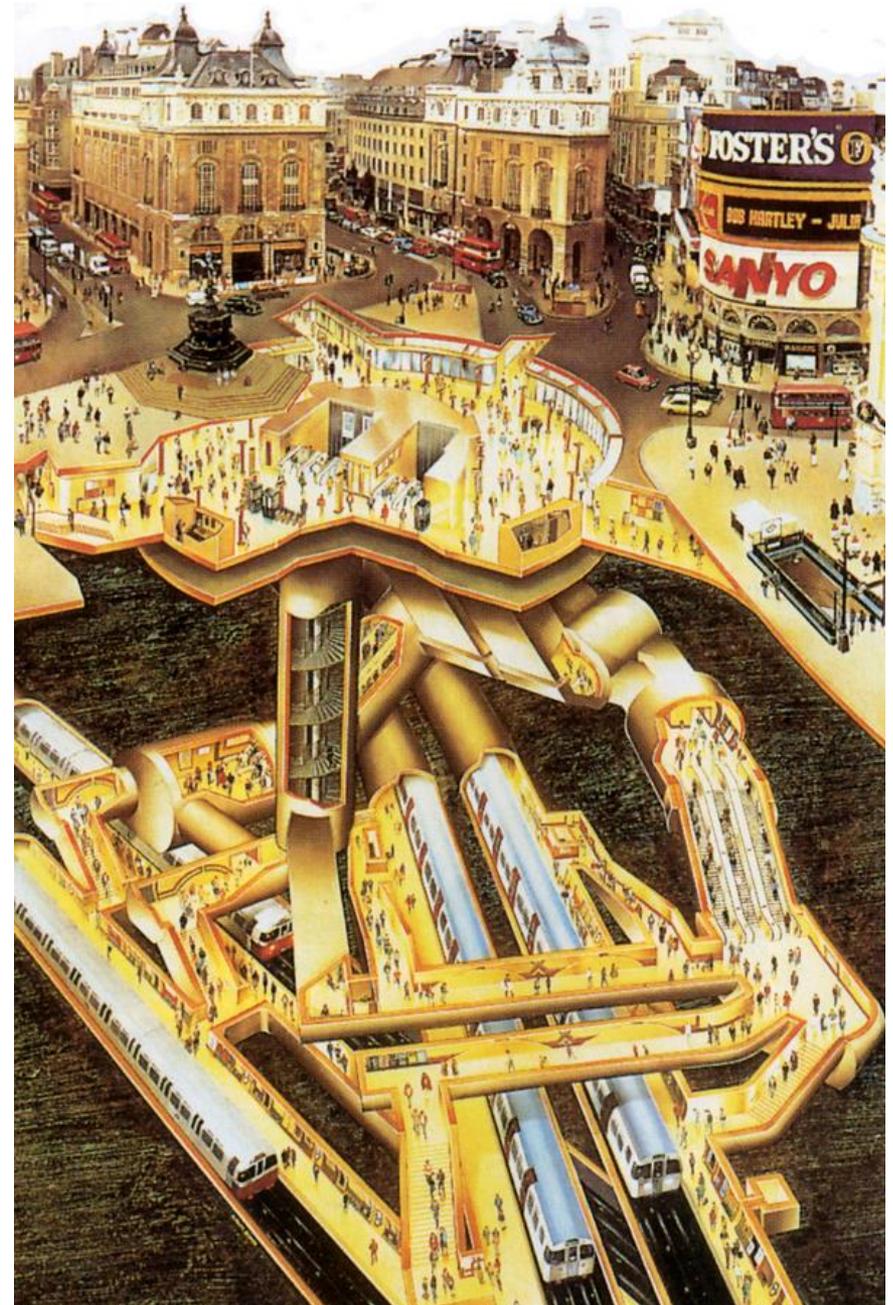


Understanding London's underground railway infrastructure: how the past explains the present

Presented by: Nathan Darroch MA, MIAM

At the Institute of Historical Research as part
of the Transport and History Series,
11 January 2018.



Source: London Transport Museum, undated. *Piccadilly Circus - Gavin Dunn* (1989). [online] London Transport Museum. Available at: <http://www.ltmuseumshop.co.uk/posters/london-transport-poster-archive/gallery/gallery-product/poster/piccadilly-circus-gavin-dunn-1989/posterid/32/1062-32.html> [Accessed: 28 January 2016].

Why is historical geography important to the understanding of an urban railway system?

“if you’re going underground,...why bother with geography?”

Henry (Harry) Beck, quoted in Ackroyd, P., 2012. pp.131-132.

“Historical geography is a sub-discipline of human geography concerned with the geographies of the past and with the influence of the past in shaping the geographies of the present and the future”.

Heffernan, M., 2008.

*“if historical geography is about understanding how the ‘past shapes the geographies of the present and the future’, it must be used to advise and guide those managing and planning the urban environment, **and** its transport infrastructure, now and in the future”.*

Darroch, N., 2018.

Why is historical geography important to the understanding of an urban railway system?

Here is why...

Populations are urbanizing and cities are densifying, globally.



Sau Paulo, Brazil



New York, US



Paris, France



London, UK

Underground metro systems are a beneficial means of mass transportation within such environments.

“Metros are the backbone of public transportation systems in cities of different sizes around the world. 148 cities have a metro system and there are close to 540 lines in total. Together, they carry over 150 million passengers per day.

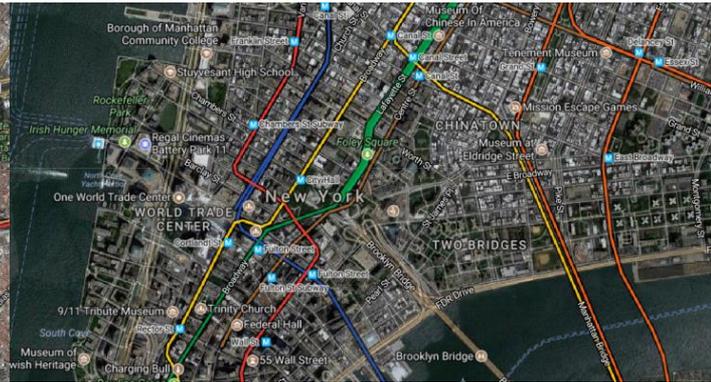
Two-thirds of the world’s metro systems are located in Asia and Europe (50 and 45 respectively). There are 16 systems in Eurasia, 16 in Latin America, 15 in North America and 6 in the Middle East and North Africa (MENA) region.”

Source: Union Internationale des Transports Publics (UITP), 2014.

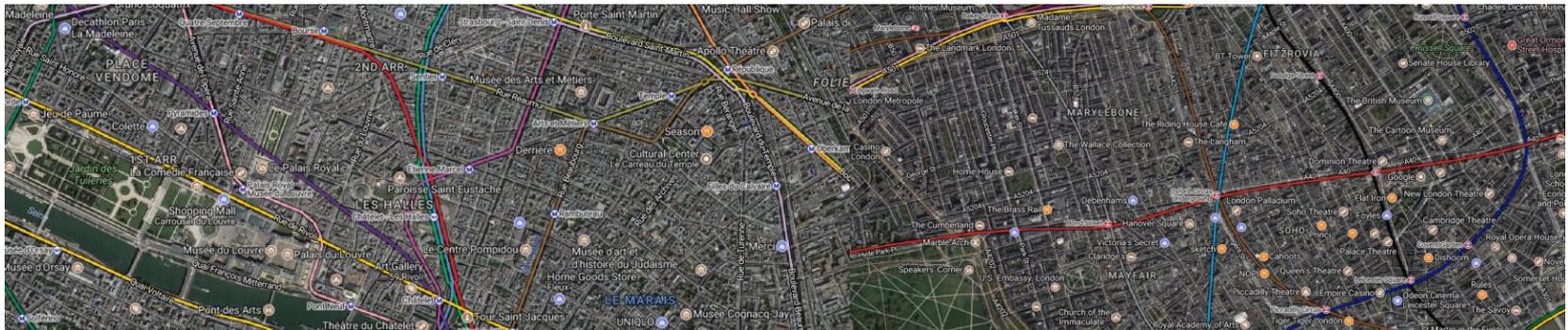
The construction and presence of urban metro systems creates hundreds of thousands of interfaces...



Sao Paulo, Brazil



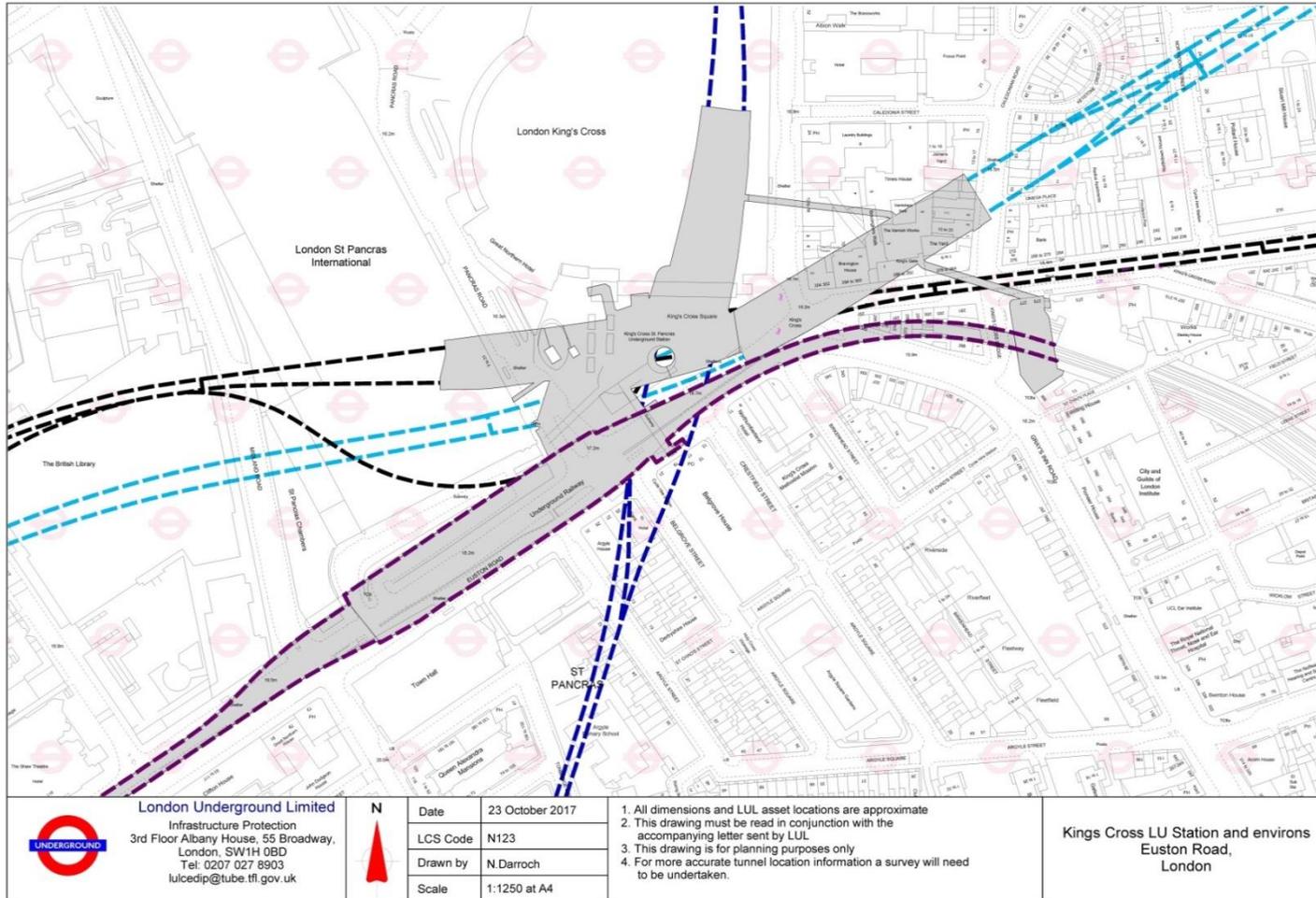
New York, US



Paris, France

London, UK

...over many years; decades; and even centuries...



© Crown copyright and database rights 2017 Ordnance Survey 100035971

...within changing urban environments.



Junction of Gray's Inn Road and Kings Cross Bridge, London



Summertown Road and environs, Glasgow

These interfaces can be obvious...



Metropolitan and Thameslink lines north of Farringdon Stn.



Elephant & Castle LU Bakerloo line stn.



Canary Wharf LU Jubilee line stn.

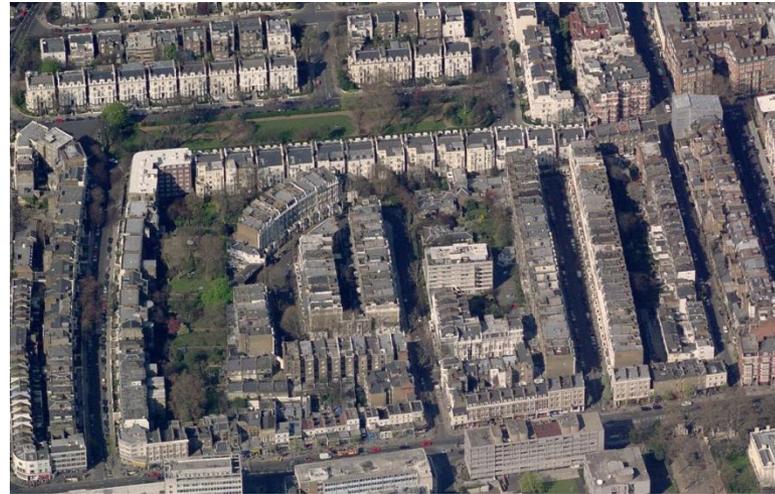


Piccadilly Circus LU Piccadilly and Bakerloo lines stn.

...and less so.



River passing through tunnel crown of a sub-surface tunnel.



Linden Gardens, Notting Hill
Source: Bing Maps, 2017



Cheapside/St Paul's, London
Source: Bing Maps, 2017

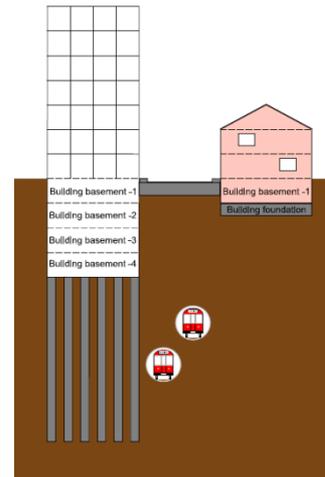
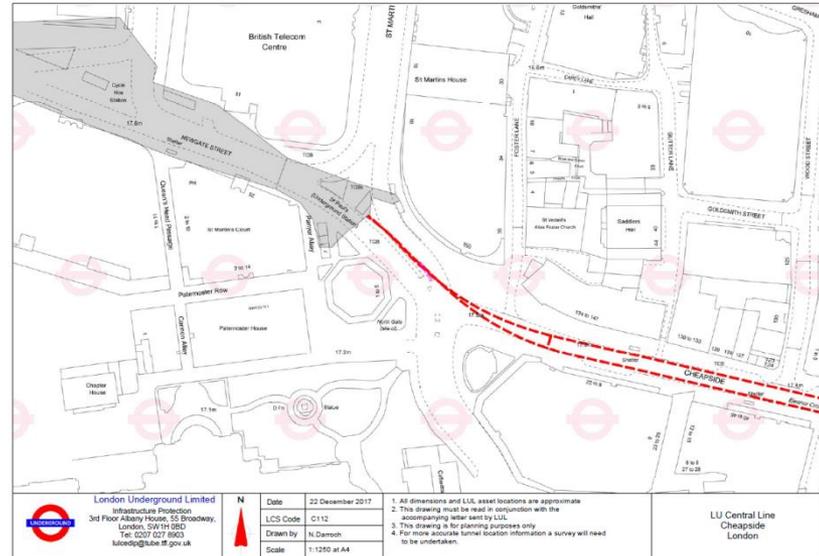


Diagram showing the generic relationship of tube tunnels with building foundations

Either way, these interfaces are affected by and affect their environment...



Circle line, Porchester Terrace, Bayswater



Plan showing the Central line under Cheapside
Source: London Underground

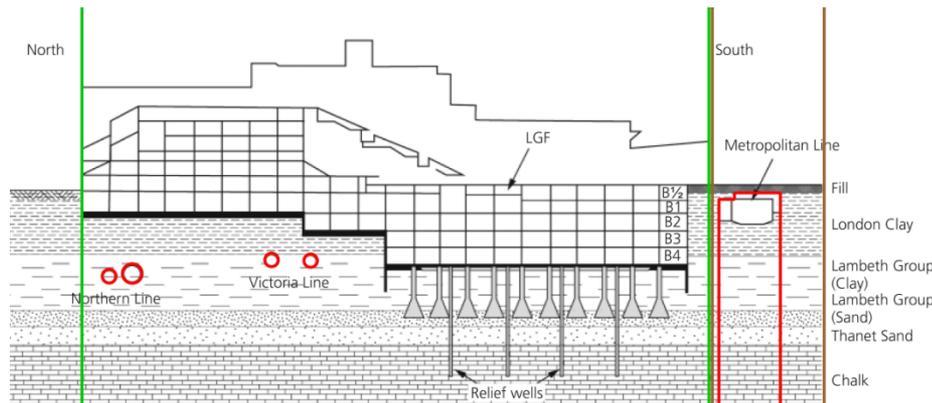
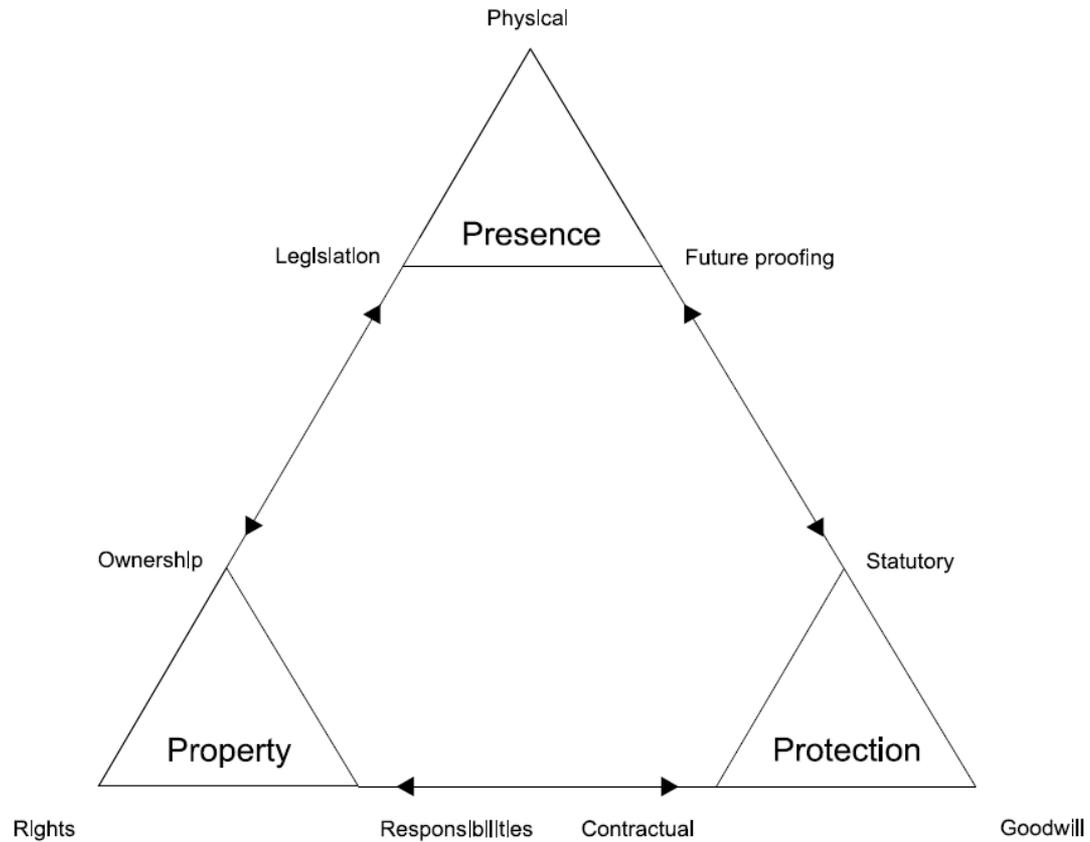


Diagram showing the design of the British Library.
Source: Simpson, B., and Vardanega, P., 2014.

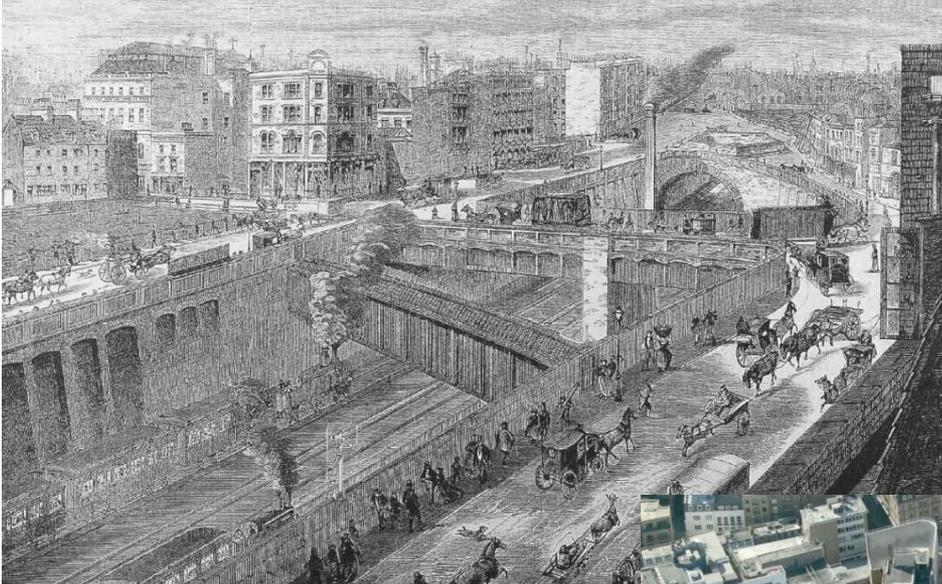


Building over District & Circle lines, St James's Park

...and must therefore be clearly understood...



...*within* the *context* of those changing urban environments.



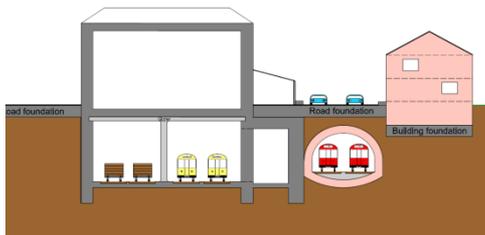
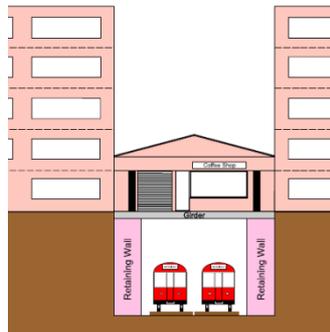
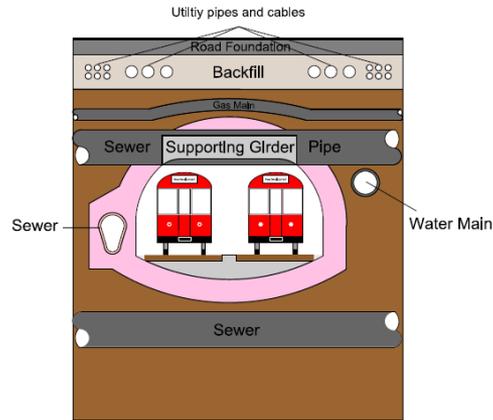
1868

2017

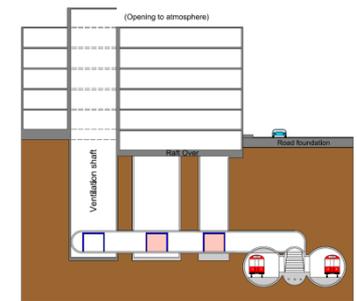
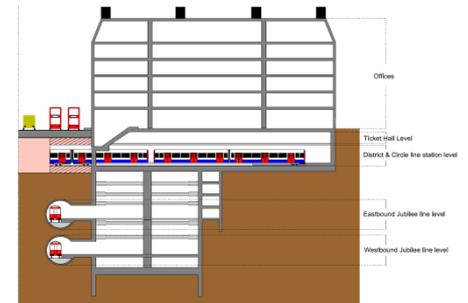
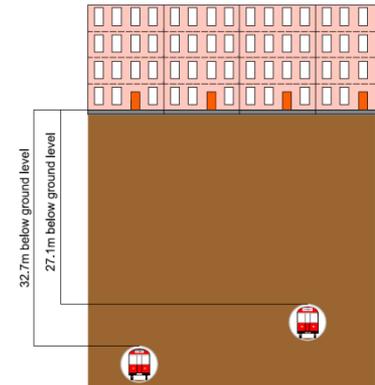


Drawing: British History Online, 2017. *Farringdon Road*. [online] Available at: <<http://www.britishhistory.ac.uk/survey-london/vol46/pp358-384>> [Accessed 20 October 2017]; **Satellite image source:** Bing Maps, 2017.

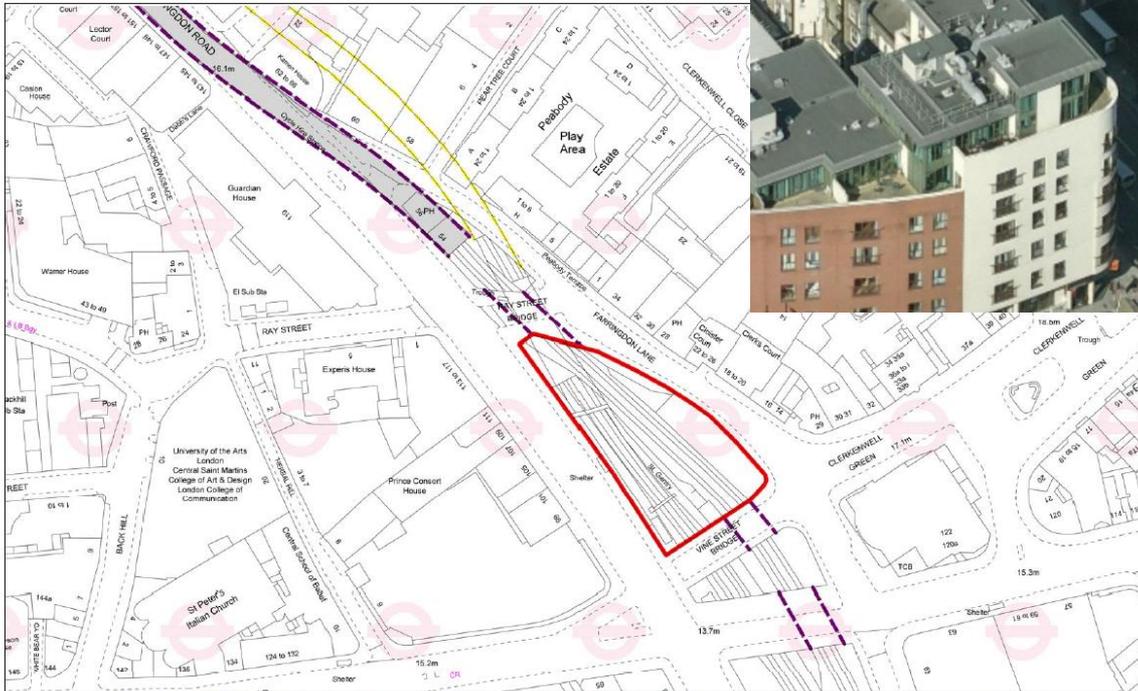
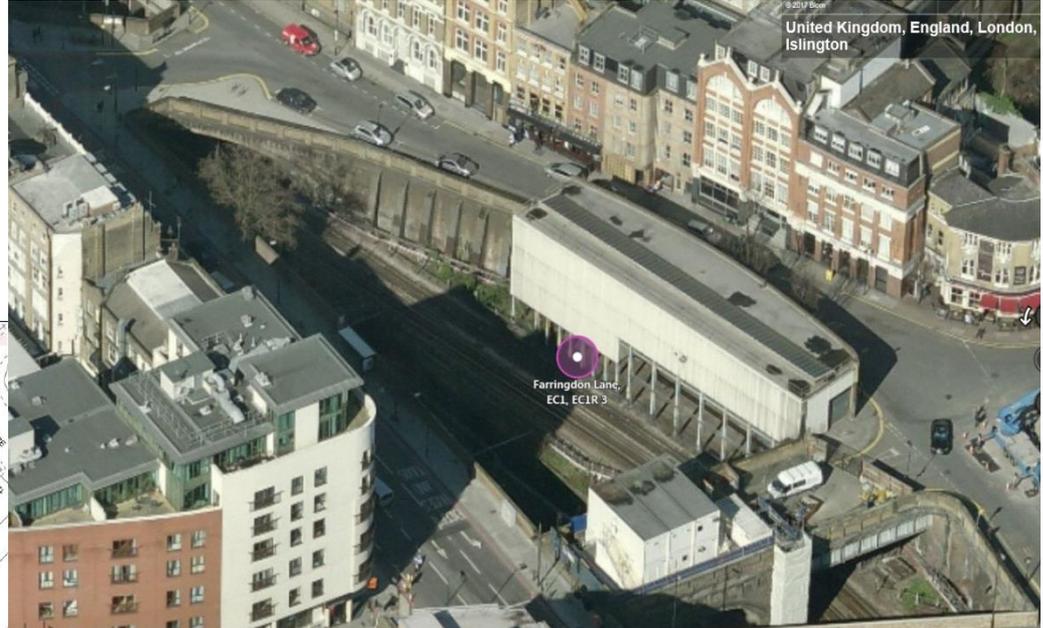
My current research has identified 40 different physical interfaces within TfL Fare Zone 1 alone.



Physical Interface	Location	Physical Interface	Location
Sub-surface railway		Tube Railway & stations	
Tunnel under highway (highway pre-existing)	Craven Road, Bayswater	Tunnel under highway (highway pre-existing)	Charring Cross Road
Tunnel under highway (contemporary)	Charterhouse Street, Smithfield	Tunnels staggered under highway (different depths) (pre-existing; post)	Cheapside, City of London
Utilities interfaces with metro infrastructure (pre-existing; contemporary; post)	Aldgate East	Tunnels under building affecting building design (post)	British Library
Tunnel under building (contemporary)	Pembridge Square/Moscow Road, Bayswater	Station building with development over; and redevelopment of site (post)	Brompton Road Disused station
Railway within basement of building (contemporary)	Smithfield Meat Market, Farringdon	Escalator shaft from remote station building under building to platforms (pre-existing; post)	Angel, Islington
Railway within basement of building (post)	Westminster Station	Utilities subway within station infrastructure (contemporary)	Bank Station
Railway in cutting (buildings adjacent: pre-railway; post)	Campden Street, Kensington	Key to terms: <i>Pre-existing</i> - The urban asset was present before the railway. <i>Contemporary</i> - the urban asset was provided with or about the same time as the railway. <i>Post</i> - the urban asset was provided/changed post railway construction.	
Railway in cutting: bridge over (contemporary)	Campden Street, Kensington		
Railway in cutting with bridge over (contemporary; separate span owners)	Leeke Street, Islington		
Railway in cutting with bridge over (post)	St Botolph Street, Aldgate		
Railway in cutting with building over (post)	Palmer Street, Westminster		
LU railway in cutting adjacent to Network Rail in tunnel (contemporary)	Swinton Street, Islington		
Road, over railway, over railway (contemporary)	Ray Street, Farringdon		
Bus station over railway (post)	Aldgate Bus Station		



Scenario 1: Ray Street Bridge - a highway over a void over a fly under.



 <p>London Underground Limited Infrastructure Protection 3rd Floor Albany House, 55 Broadway, London, SW1H 0BD Tel: 0207 027 8903 lulcedip@tube.ltf.gov.uk</p>		Date	5 Jan 2018	<ol style="list-style-type: none"> All dimensions and LUL asset locations are approximate This drawing must be read in conjunction with the accompanying letter sent by LUL This drawing is for planning purposes only For more accurate tunnel location information a survey will need to be undertaken. 	LU Metropolitan and NR Thameslink lines Ray Street bridge Area London
		LCS Code	M122		
		Drawn by	N.Darroch		
		Scale	1:1250 at A4		

Scenario 1: Presence.



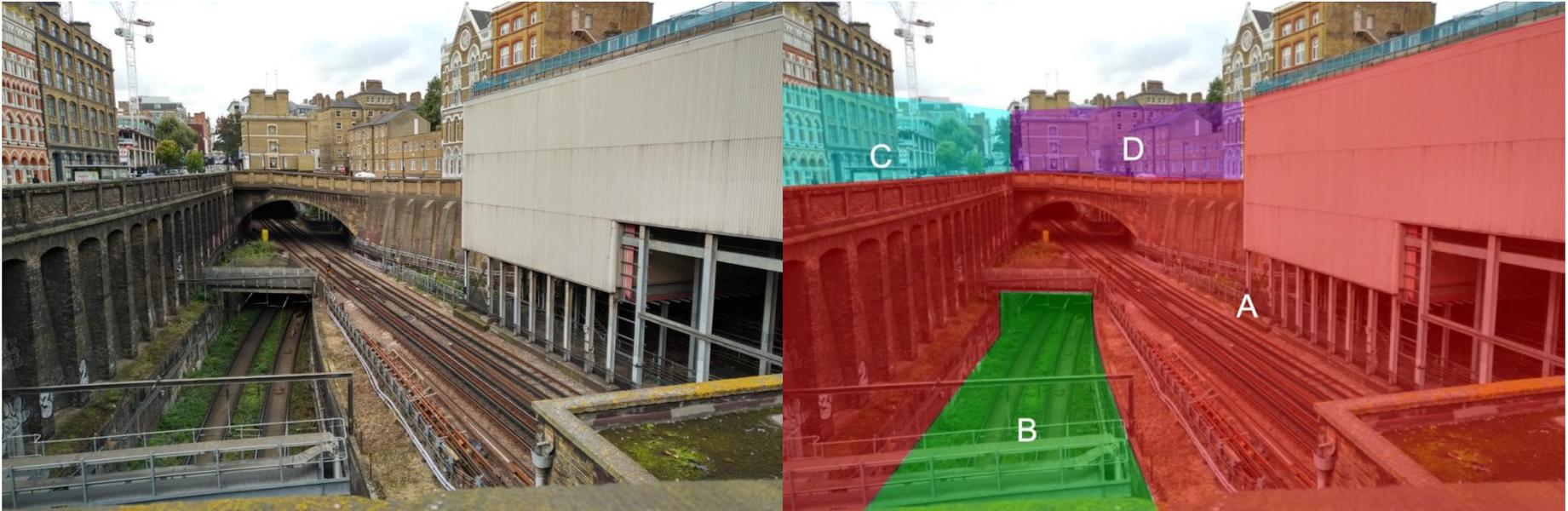
Ray Street pre-existed the railways.

The Metropolitan railway opened in 1863.

The widened line was completed in 1867.

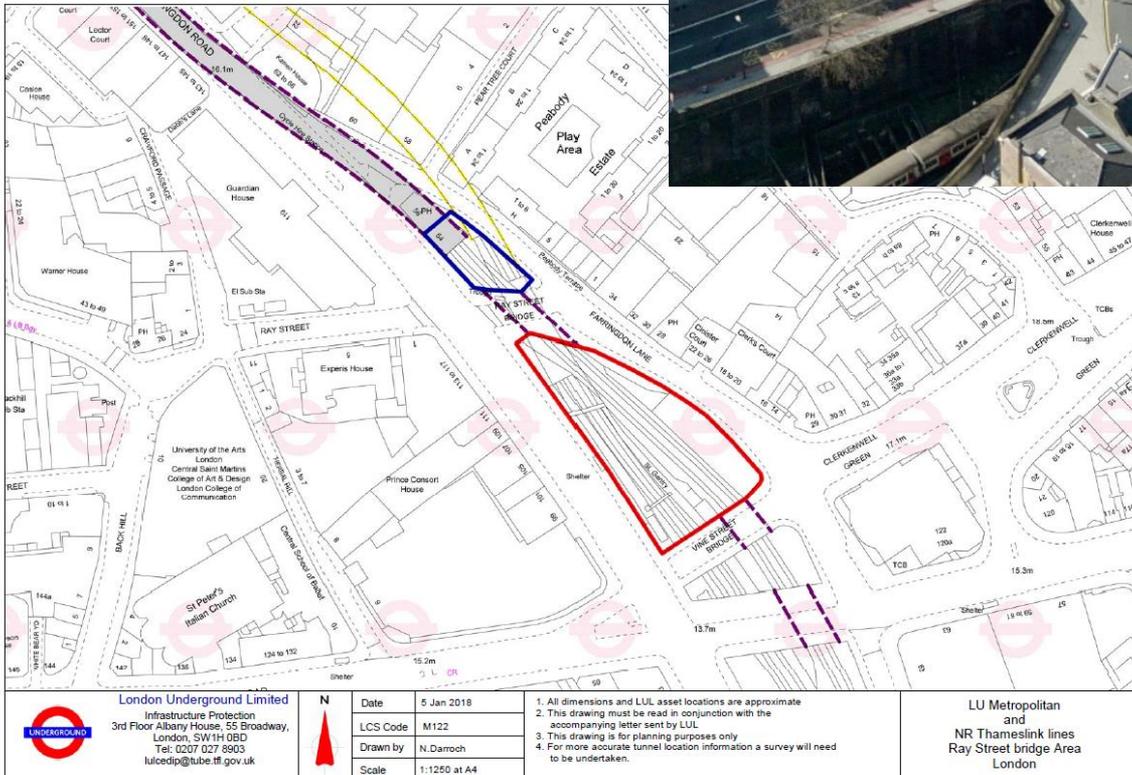
All are still in use today.

Scenario 1: Property.



- A = London Underground land and airspace
- B = Network Rail land and airspace
- C = TfL Streets highway
- D = Local authority highway

Scenario 2: No.54 - a building located over a tunnel adjacent to a void over a fly under.



Scenario 2: Presence.



The Metropolitan railway opened in 1863.

The widened line was completed in 1867.

The building was erected c.mid 1870s, post railway construction.

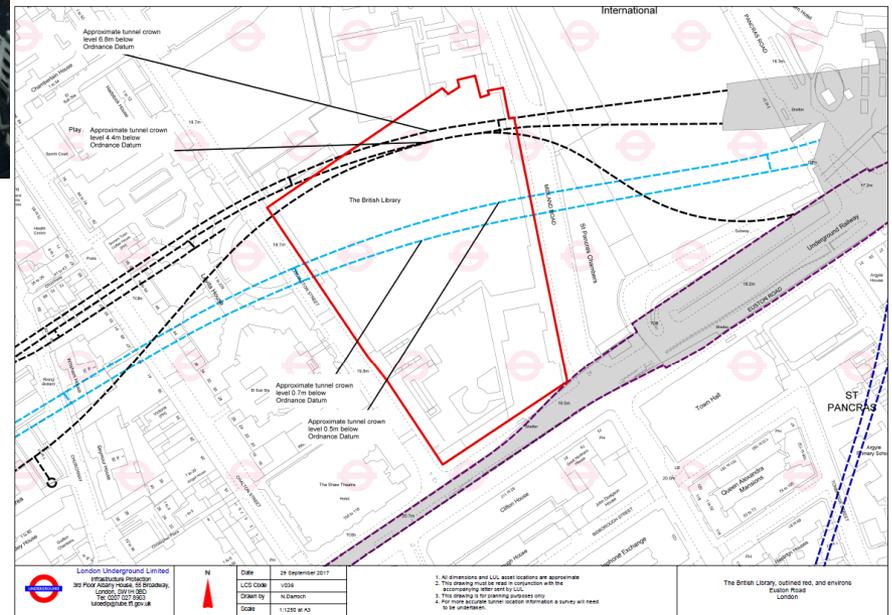
All are still in use today.

Scenario 2: Property.



- A = London Underground land and airspace
- B = Network Rail land and airspace (below)
- C = TfL Streets highway
- D = Local authority highway
- E = Building owner

Scenario 3: The British Library – a building over tube tunnels and adjacent to a sub-surface tunnel.



Map source: London Underground
Satellite image source: Bing Maps, 2017

Scenario 3: Presence – a.



The current British Library was built in the 1990s.

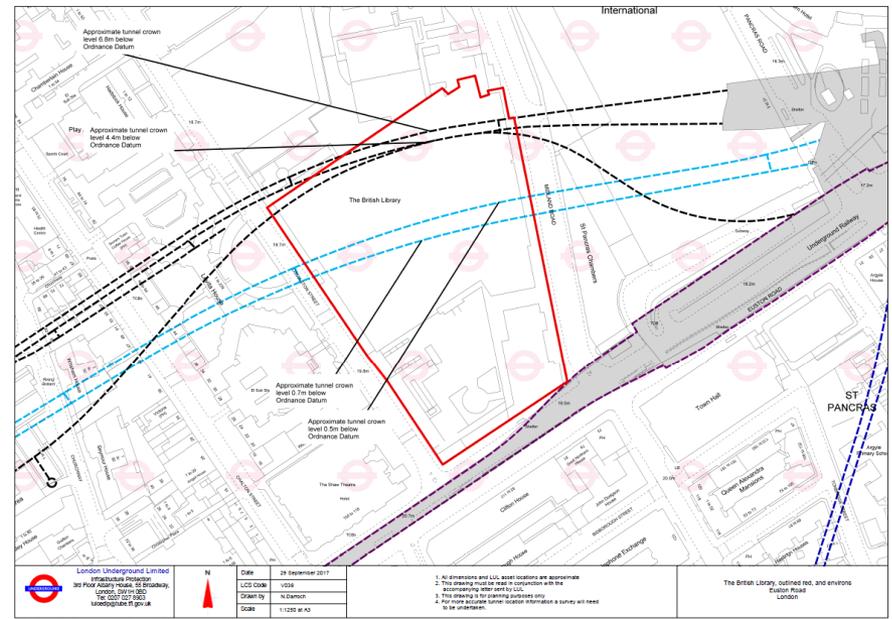
Scenario 3: Presence – b.

The Metropolitan line opened in 1863.

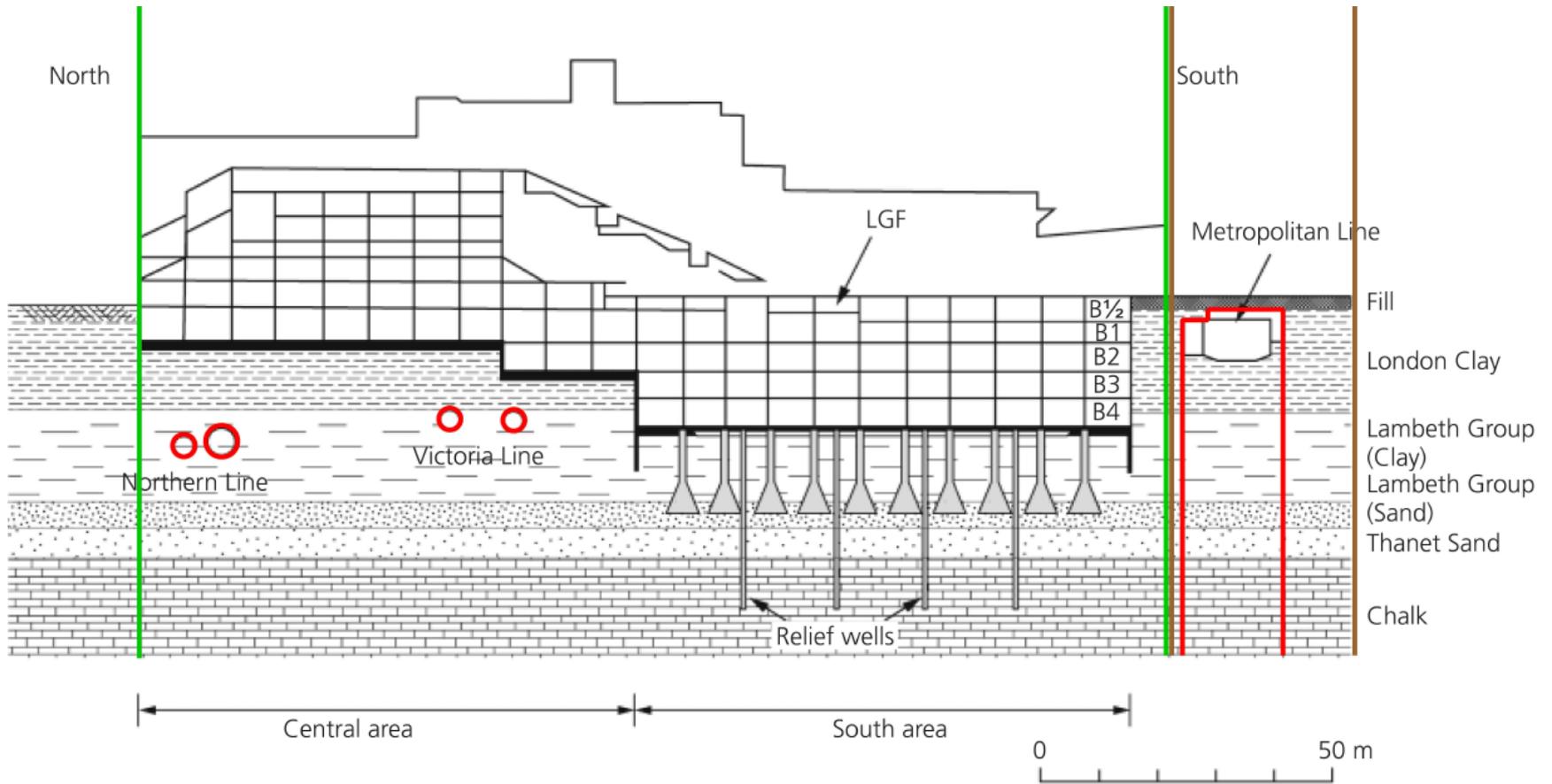
The Northern line opened in 1907.

Kings Cross Metropolitan line station opened in 1941.

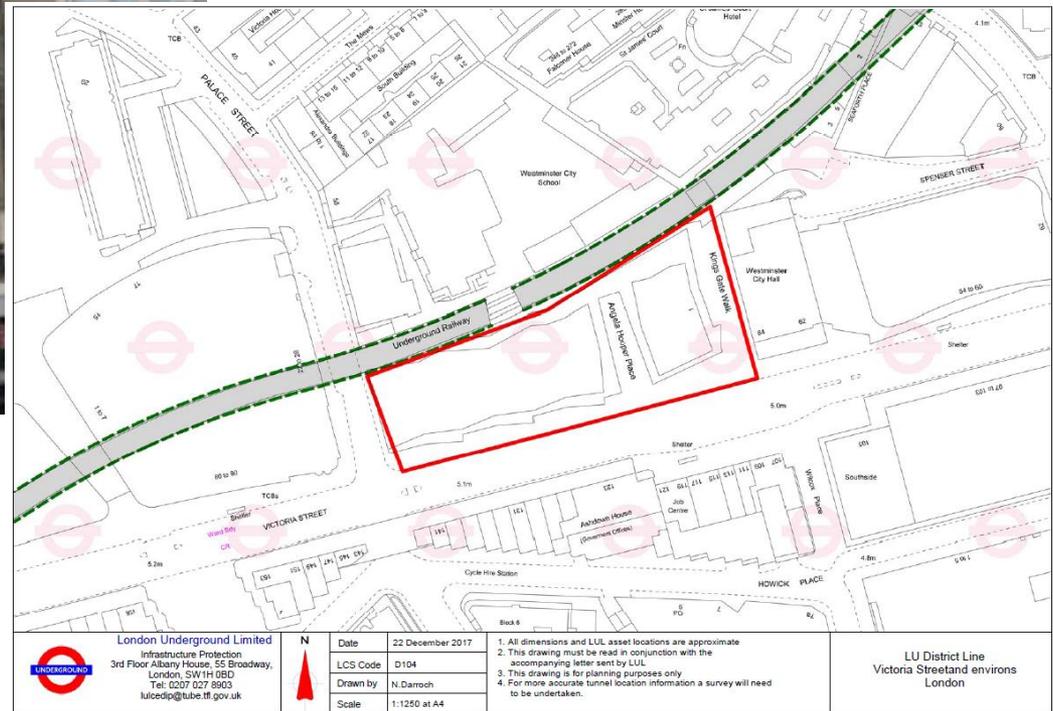
The Victoria line opened in 1968.



Scenario 3: The effect of Presence, Property, and Protection interfaces.



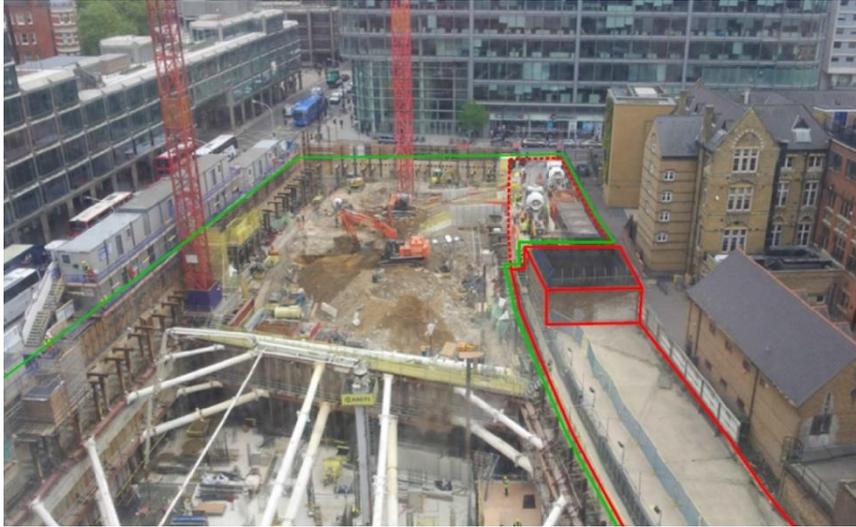
Scenario 4: Kingsgate House - demolition & reconstruction.



© Crown copyright and database rights 2017 Ordnance Survey 100035971

Map source: London Underground
Satellite image source: Bing Maps, 2017

Scenario 4: Protection.



Located on Victoria Street,
Westminster...

...directly adjacent to the District
and Circle lines...

...the original building was demolished and
excavation undertaken to create basement
levels.

Once this was completed, new buildings
were erected.



Scenario 4: Protection.



The new development is:

- 8 storeys below ground level, at its lowest point;
- up to 14 storeys above ground level;
- 22 storeys in total;
- directly adjacent to an underground railway.

Conclusion

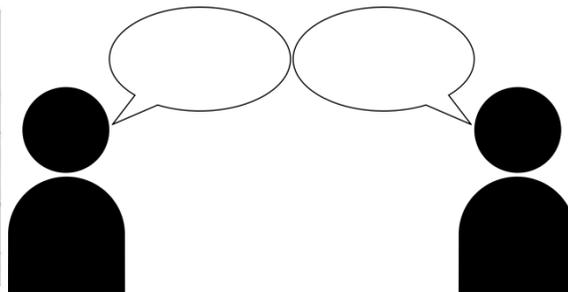
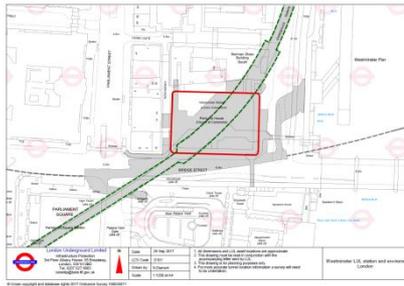
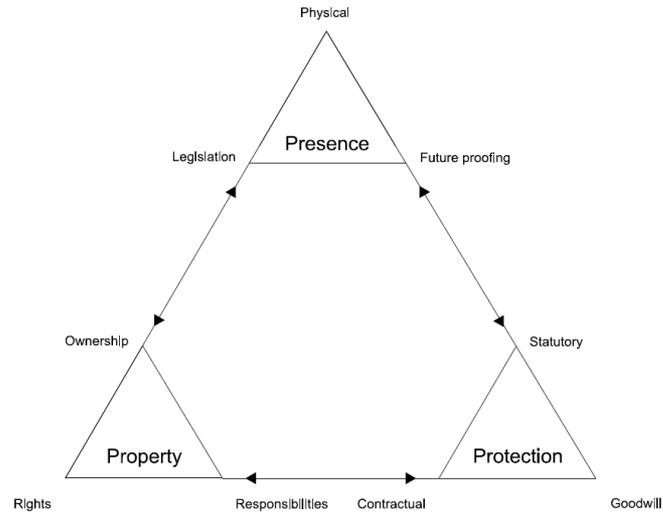
Understanding the historical development of and changes to the infrastructure of a city (roads, railways, buildings etc.) and its urban underground metro infrastructure can assist understanding of the interfaces of *presence*, *property*, and *protection* between them.

This understanding can also potentially help the planning and development of future changes to urban environments, and how these shape and are shaped by transport infrastructure.

This understanding is essential to ensure the continued safe presence and operation of the city and its urban infrastructure.

Not just in the UK, but globally...

Transferability and sharing: from London, UK, to Sao Paulo, Brazil.



But it may not just be limited to urban underground metro infrastructure.
In Osaka, Japan there is a highway that goes through a building.

Are the interfaces any different?



Thank you for listening.

What are your thoughts on the underground now?

Will you view it differently?

Any questions?

Contact details:

Email: r01nd14@abdn.ac.uk

Web site: www.nathandarroch.co.uk

LinkedIn: Nathan Darroch

References and Bibliography:

- Ackroyd, P., 2012. *London Under*. London: Vintage Books.
- British History Online, 2017. Farringdon Road. [online] Available at: <<http://www.british-history.ac.uk/survey-london/vol46/pp358-384>> [Accessed 20 October 2017].
- Darroch, N., 2012. *London's deep tube railways: visibly invisible*. MA. University of York. [online] Available at: <<http://etheses.whiterose.ac.uk/id/eprint/3905>> [Accessed 20 October 2017].
- Darroch, N., 2014. *A brief introduction to London's underground railways and land use*. [online] Journal of Transport and Land Use. Available at: <<http://dx.doi.org/10.5198/jtlu.v7i1.411>> [Accessed 20 October 2017].
- Darroch, N., Beecroft, M., & Nelson, J., 2016. *A conceptual framework for land use and metro infrastructure*. [online] Journal of Infrastructure Asset Management. Available at: <<https://doi.org/10.1680/jinam.16.00008>> [Accessed 20 October 2017].
- Heffernan, M., 2008. Historical geography. [online] (2008) Available at: <http://www.history.ac.uk/makinghistory/resources/articles/historical_geography.html> [Accessed 11 January 2018].

References and Bibliography:

- Morrison, G., undated. *In Osaka, Japan There's A Highway That Goes Through A Building*. [online] Available at: <<https://www.forbes.com/sites/geoffreymorrison/2016/10/31/in-osaka-japan-theres-a-highway-that-goes-through-a-building/#1c1885ed541f>> [Accessed 4 January 2018].
- Simpson, B., and Vardanega, P., 2014. *Results of monitoring at the British Library excavation*. [online] Proceedings of the Institution of Civil Engineers - Geotechnical Engineering. Available at: <<https://doi.org/10.1680/geng.13.00037>> [Accessed 20 October 2017].
- The Illustrated London News , 1861. *Construction of the Metropolitan Railway close to King's Cross station in 1861*. [photograph] Available at: <https://upload.wikimedia.org/wikipedia/commons/c/c8/Constructing_the_Metropolitan_Railway.png> [accessed: 2 February 2016].
- Union Internationale des Transports Publics (UITP) (International Association of Public Transport), October 2014. *Statistics Brief World Metro Figures*. [.pdf] Brussels: UITP. Available at: <http://www.uitp.org/sites/default/files/cck-focus-papers-files/Metro%20report%20Stat%20brief-web_oct2014.pdf> [Accessed: 18 February 2016].