

# Understanding interfaces within a railway environment.

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as part of the MSc in Transport Engineering and  
Asset Management, Railway Asset Management  
module.

8 February 2018.



## **Considerations for session 1**

- Common infrastructure
- Holistic and asset specific understanding
- 3 case studies of presence and property
- A case study of protection
- Application to a specific railway environment
- Conclusion and Transferability

# Common infrastructure

The environment of a railway is formed of many different types of common infrastructure...





...some are obvious...



Track



Viaducts; Public open space



Bridges; Highway



Tunnels; Earth structures



Retaining & Parapet walls;  
Props



Bridges; Highways;  
Buildings



Tunnel; Track; Signals;



Overhead line equipment;  
Platform; Highway

...others need further consideration.



Railway land & airspace;  
Adjacent land & airspace



Viaduct foundations;  
Airspace under arches



Height of bridge;  
Width of road



Open land over tunnel and  
adjacent to earth structures



Buildings above retaining  
walls; Props supporting the  
retaining walls



Urban environment;  
Props; Cutting; Tunnel;  
Ventilation



Utilities; Girders; Cables;  
Power supply

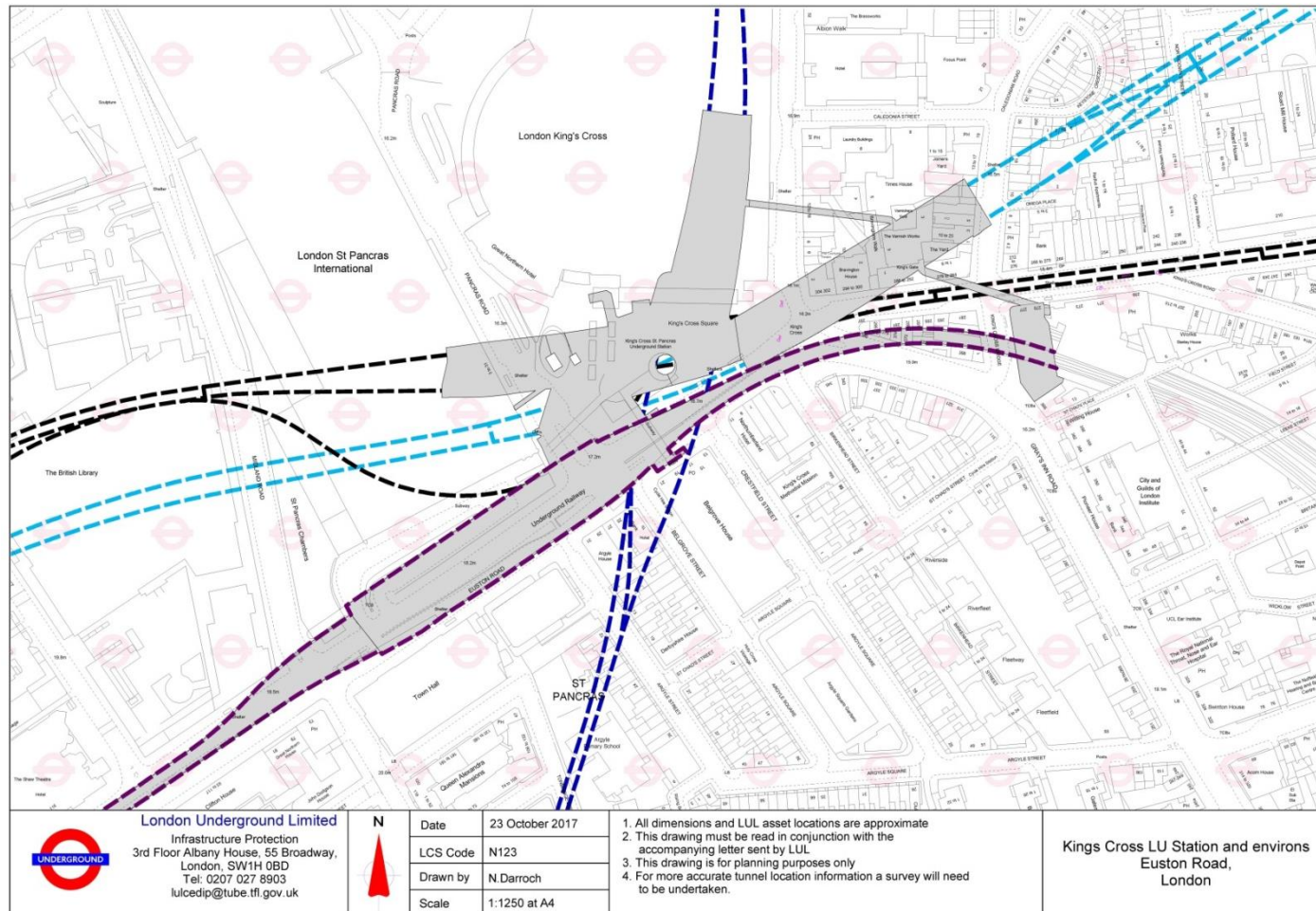


Overhead line equipment;  
Bridge; Lighting;  
Adjacent building

Holistic and asset specific understanding of:  
the railway; its environment;  
and their interfaces



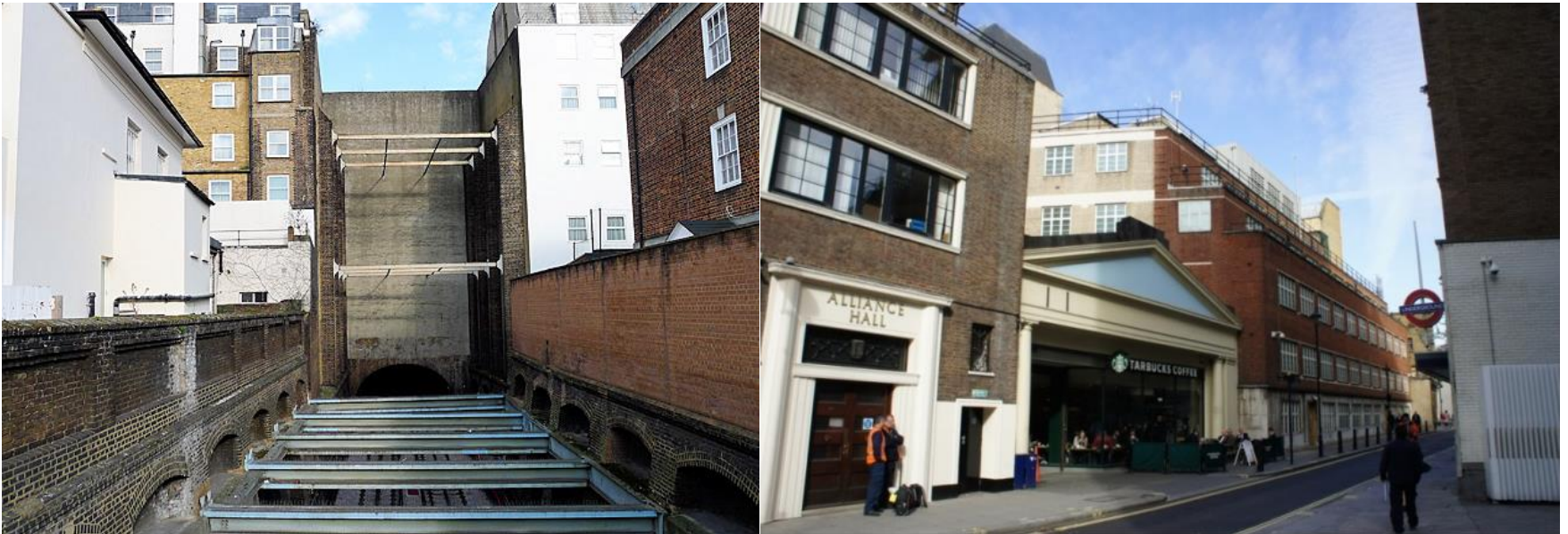
As a railway asset manager, you *must* have a good understanding of the railway; its environment; *and* how these relate to one another, at a macro level...



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...and a micro level...



...as well as ***within*** the track environment.



**Source:** Smug Mug, 2018. *A life spent chasing trains*. [online] Available at: <https://nick86235.smugmug.com/keyword/165%3Blondon%20underground> [Accessed 8 January 2018].



Failure to do so increases risk of adverse effects on the railway and its more general environment, as well as service provision.



**Retaining wall collapse, Liverpool 2016.**  
Source: RAIB, 2017b.



**Tube tunnel penetration, London, 2013.**  
Source: RAIB, 2014.



**Sewer collapse, Forest Hill, 2016.**  
Source: BBC, 2016.



**Partial bridge collapse, Barrow Upon Soar.**  
Source: RAIB, 2017a.



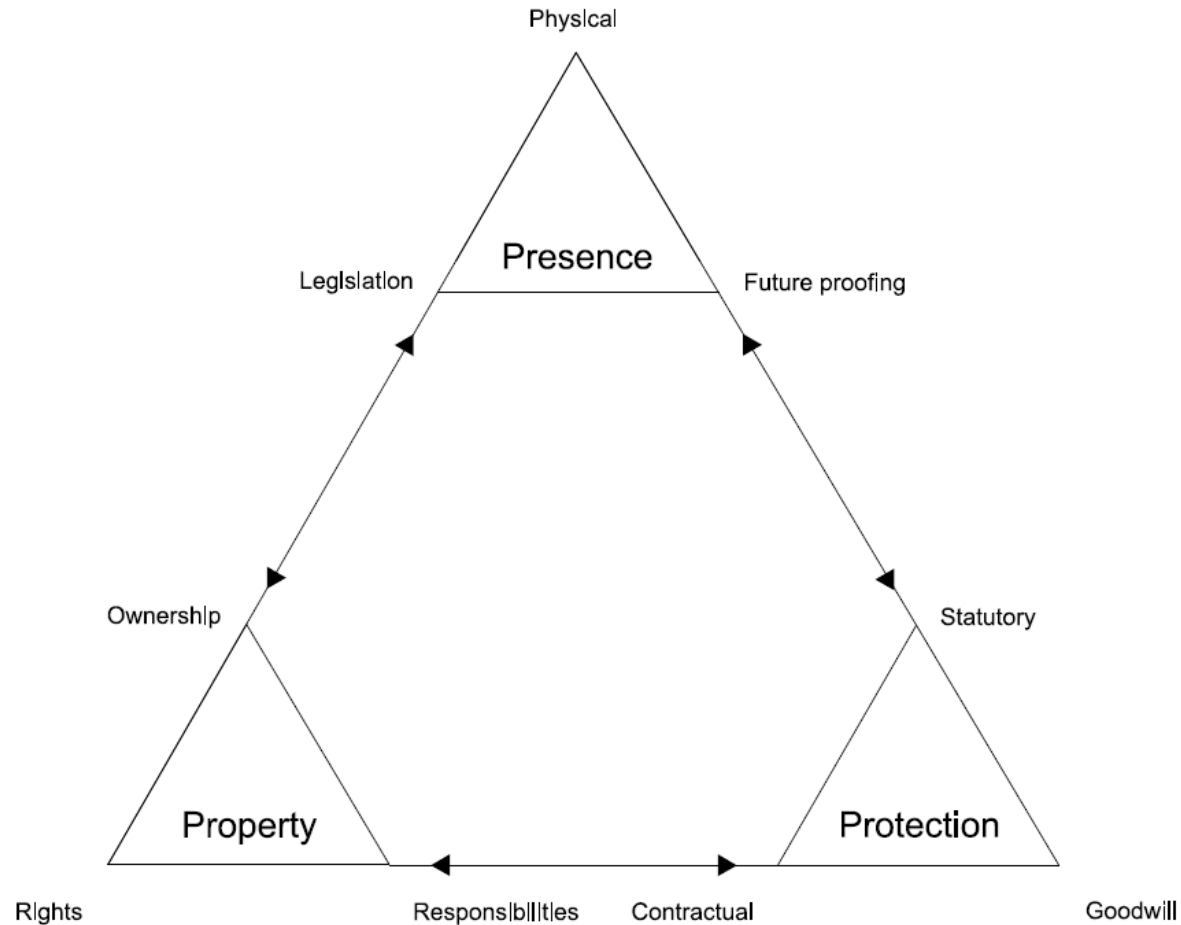
**Fallen bridge parapet at Froxfield, 2015.**  
Source: RAIB, 2016



**Collapsed signal post at Newbury.**  
Source: RAIB, 2015.



To understand the railway; its environment; and how these relate to one another, we therefore need to understand the interfaces involved.



**Source:** Darroch, N., Beecroft, M., & Nelson, J., 2016.

Every example here consists of interfaces between the railway and its environment. All are different, but all have the same principles of *presence*, *property*, and *protection*.



## But what do these interfaces and their sub-interfaces/enablers mean?

- Presence:
  - What is there? (Physical)
  - What allows it to be there? (Legislation)
  - What enables its continued presence? (Standards, Contracts)



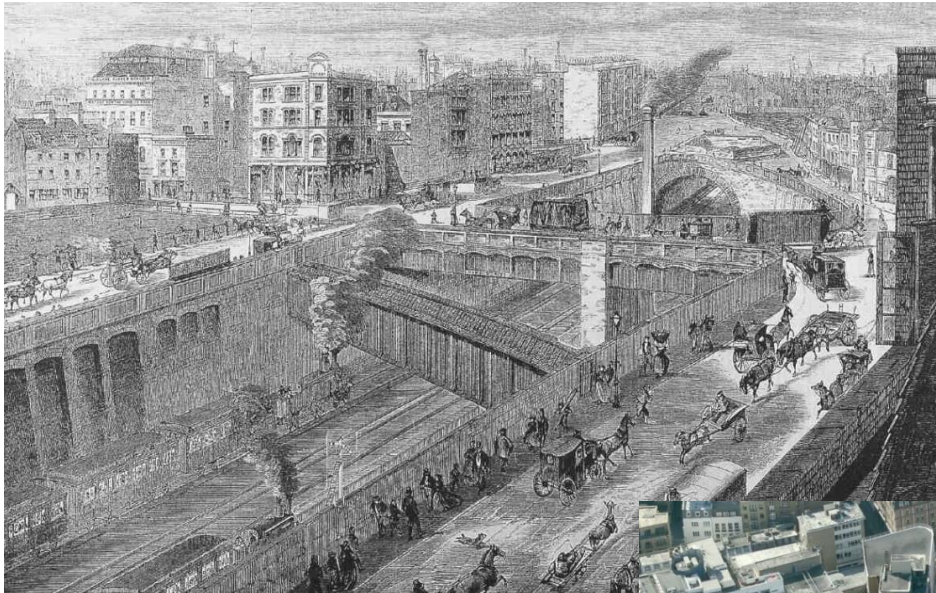
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  - What rights do you and others have? (Rights)

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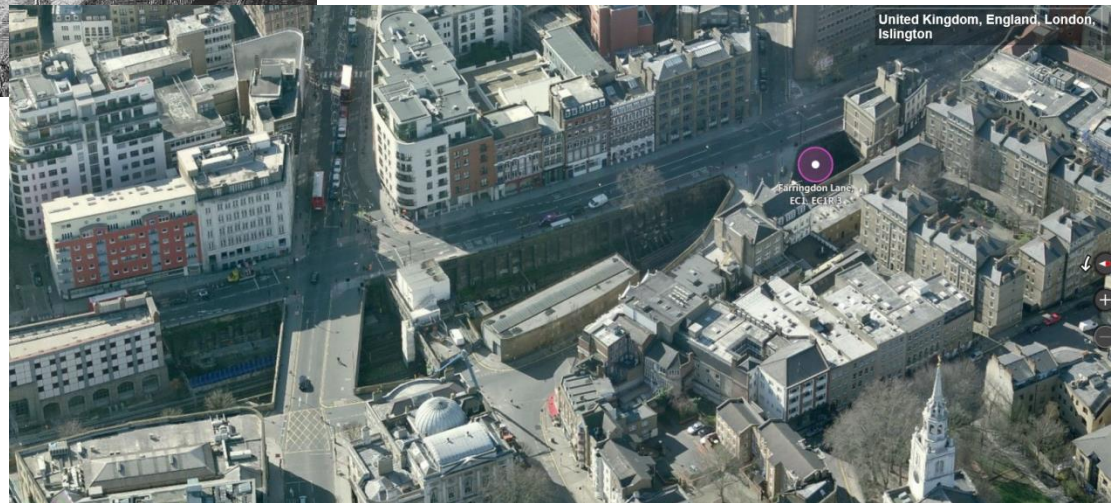
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  - What rights do you and others have? (Rights)
- Protection:
  - What are the proposed works? (Demolition; Excavation; Removal)
  - How will they affect the physical and legal infrastructure present?
  - How can protection be assured? (Contractual; Statutory; Goodwill)

We must also remember that the railway; its collective assets; *and* its environment change over time.



1868

2017

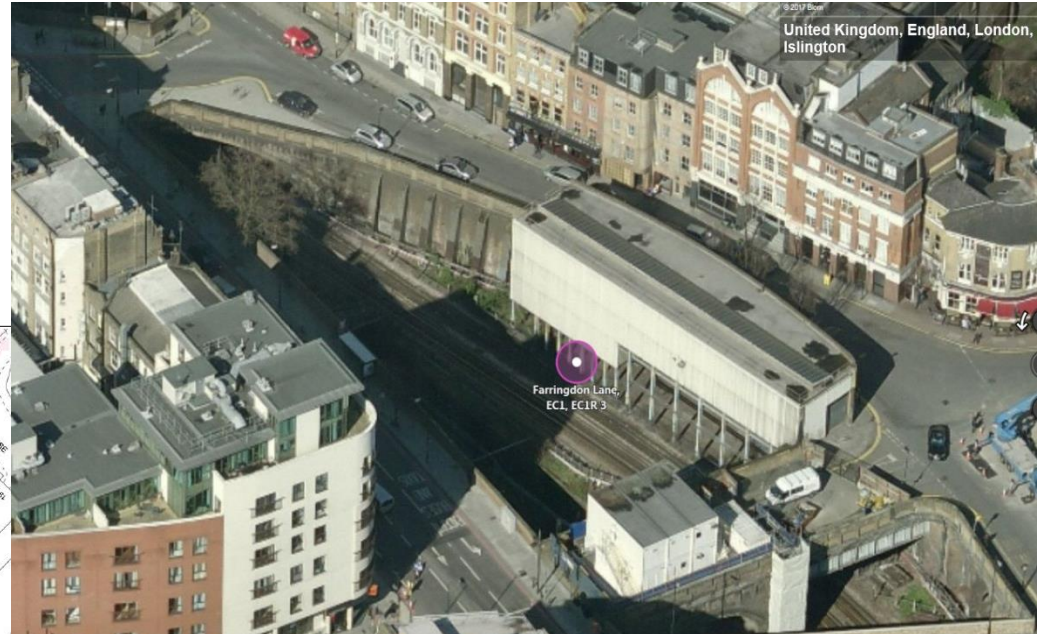
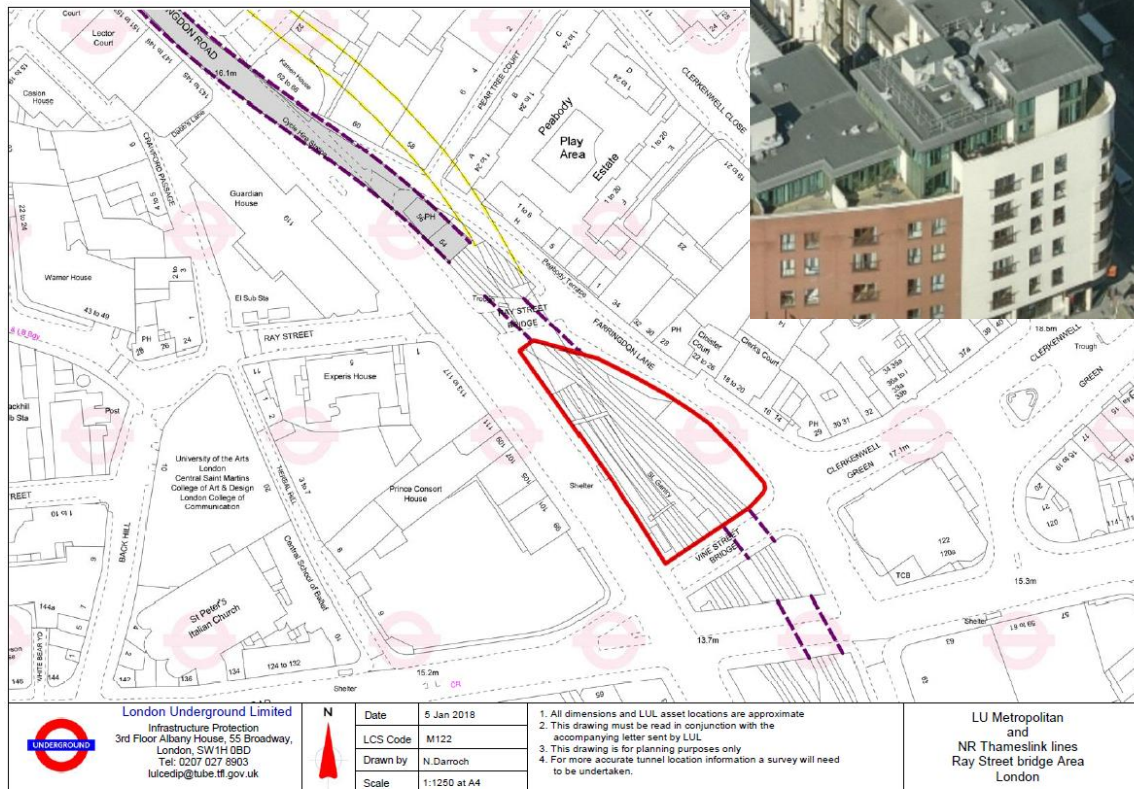


**Drawing:** British History Online, 2017. *Farringdon Road*.  
[online] Available at: <<http://www.britishhistory.ac.uk/survey-london/vol46/pp358-384>> [Accessed 20 October 2017]; **Satellite image source:** Bing Maps, 2017.



# 3 case studies of presence and property

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



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

## Scenario 1: Presence



Ray Street pre-existed the railways.

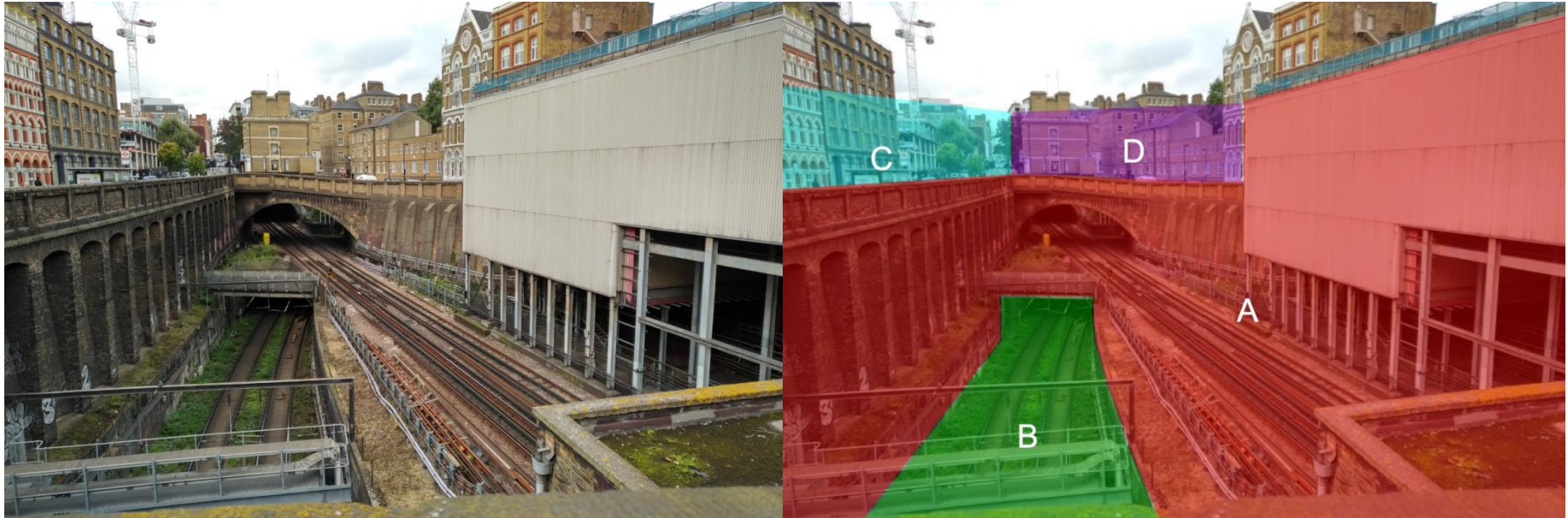
The Metropolitan railway opened in 1863.

The widened line was completed in 1867.

All are still in use today.



## Scenario 1: Property



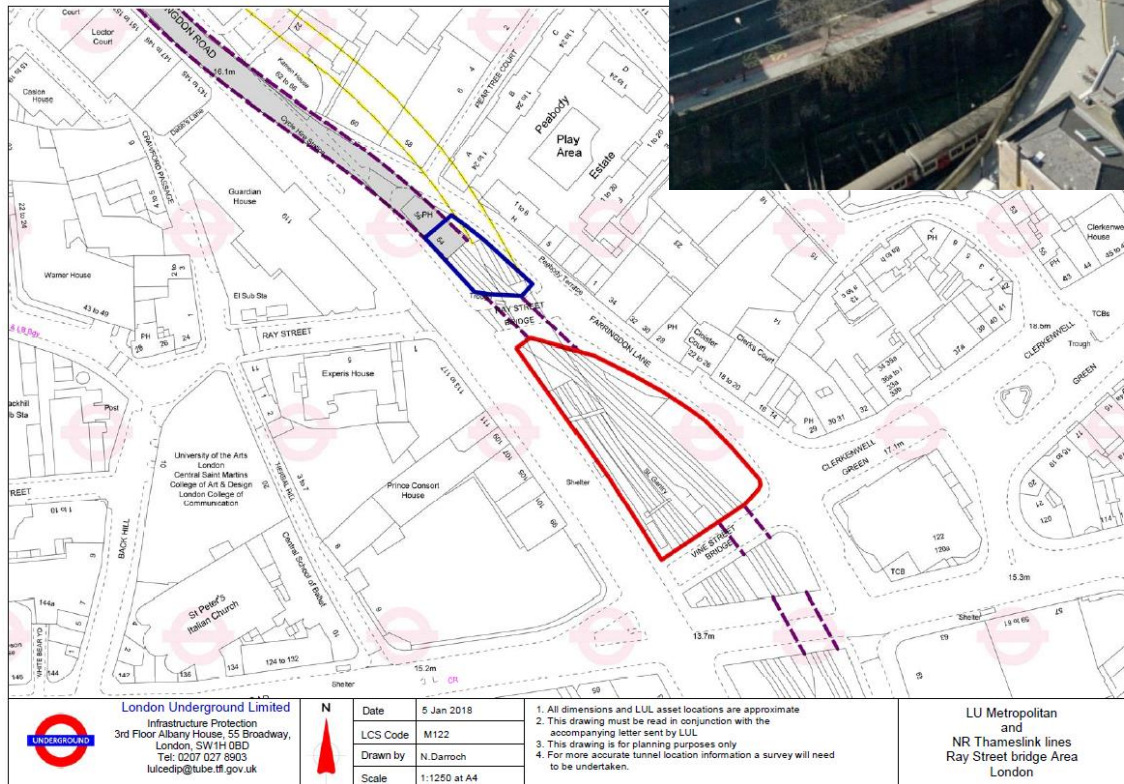
- A = London Underground land and airspace
- B = Network Rail land and airspace
- C = TfL Streets highway
- D = Local authority highway



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



United Kingdom, England, London, Islington



## 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.

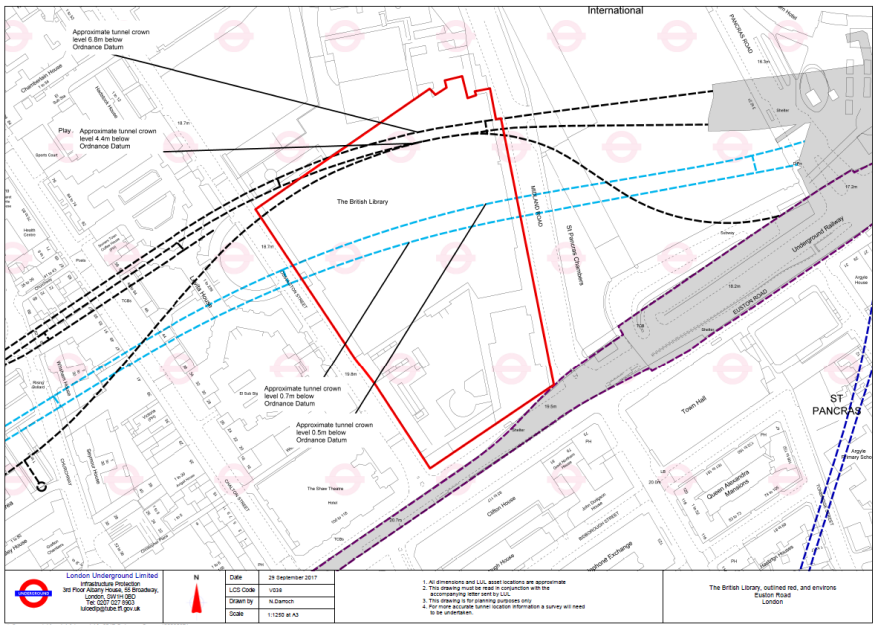
All are still in use today.

## 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





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## Scenario 3: Presence - a



The current British Library was built in the 1990s.

## Scenario 3: Presence - b

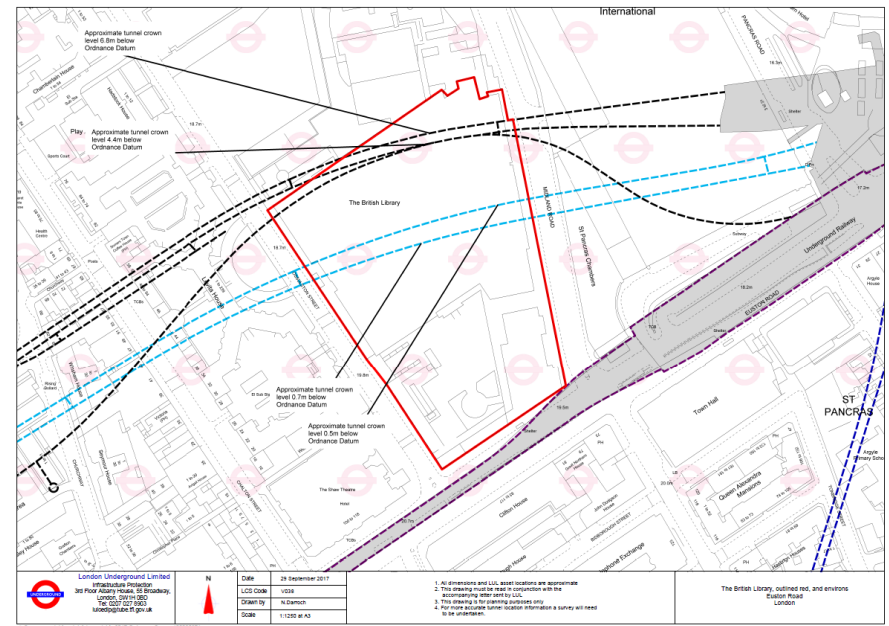
The Metropolitan line opened in 1863.

The Northern line opened in 1907.

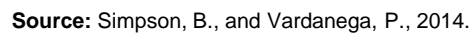
Kings Cross Metropolitan line station opened in 1941.

The Victoria line opened in 1968.

Map source: London Underground

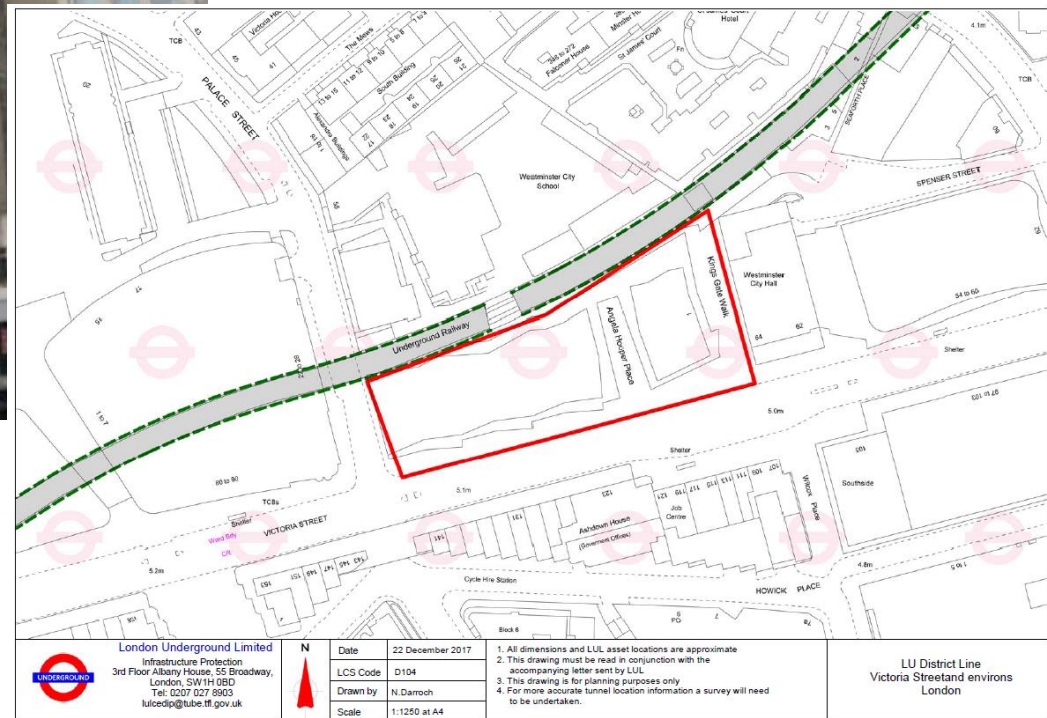






# A case study of protection

## Scenario 4: Kingsgate House - demolition & reconstruction

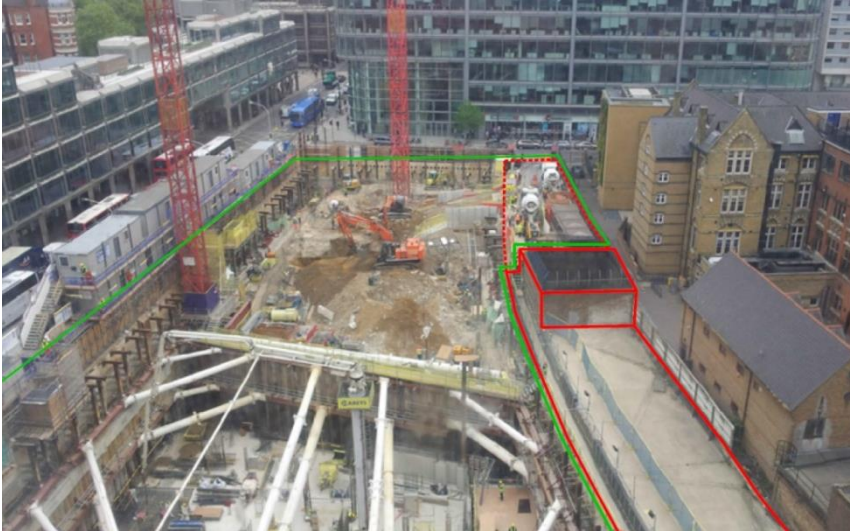


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**Map source:** London Underground  
**Satellite image source:** Bing Maps, 2017



## 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.



Source: London Underground

## 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 interfaces of *presence*, *property*, and *protection* at macro and micro levels enables efficient management of existing assets and infrastructure to be undertaken.

This understanding also helps the planning and development of future infrastructure and its environment, and how these shape and are shaped by each other.

This understanding is essential to ensure the continued safe presence and operation of the railway; its environment; and the national economy.

Not just in the UK but globally; and not just for railway infrastructure...



...understanding the interfaces of presence, property and protection can also be applied to other transport and environmental infrastructure...



In Osaka, Japan, there is a highway that goes *through* a building.

Are the interfaces any different?

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