

A2.1: The combined results table for the holistic analysis of 40 London outline case studies (Section 6.2).

Table of typical physical and property interfaces identified through the holistic London sample scenarios.

Occurrence of interface		Outright - ownership, rights, and responsibilities				Potential divisions of - ownerships, rights, and responsibilities				
ES = External Stakeholder LU = London Underground	These are indicative of findings from the holistic research. What types of physical interface were identified.	Property interfaces are clearly defined, or there is good precedent, based on other scenarios. There should only be deviation where agreed between parties, or where there is documented reasoning (legislation, contract etc.) or practice. For example, a tube tunnel is most likely to be LU ownership. Where UUMI Green, and ES yellow, division of ownership, rights, and responsibilities may/is likely to occur.				There may be differences in Property interfaces within the example, or other similar scenarios. These require further clarification through more in depth (macro) analysis. For example, a bridge may be owned and maintained by LU or by an ES. This could only be determined by reference to source data. Where UUMI Green, and ES yellow, division of ownership, rights, and responsibilities may/is likely to occur.				Use of clarified over defined. Clarified means that any anomalies are with ref to an agreement or legislation. Defined is that the rights responsibilities etc. are clearly spelt out.
Type of Infrastructure	Type of interface	Type of UUMI		Owner/ Manager		Example location	Example location	Clarification		
		Sub-surface	Tube	LU (UUMI)	ES	Sub-surface	Tube	Sub-surface	Tube	
Air space	Above UUMI (where UUMI open to atmosphere)					Gloucester Road Stn.	Down Str. Disused Stn.	Airspace above former District line open cutting owned by LU and leased to ES for over Stn. Development; ownership, rights and responsibilities defined by lease	Airspace above former Piccadilly line Stn. building owned by LU and leased to ES for over Stn. Development; ownership, rights and responsibilities defined by lease	
	Within UUMI					Farringdon LU Stn.	Bank DLR Stn.	The buildings, land, and airspace forming the Metropolitan line Stn. are owned by LU; Network Rail use is enabled by statutory powers; ownership, rights and responsibilities clarified by vesting agreement	The UUMI forming the Central line Stn. is owned by LU; DLR leases the airspace within the Stn. tunnels and passages for its area of the Stn.; DLR passengers have right of access through LU Stn.; ownership, rights and responsibilities defined by lease	
	Under UUMI					North side of Charterhouse Str., south of Farringdon Stn.	Bank DLR Stn.	Air space, under buildings supported by UUMI owned by LU and ES; LU has perpetual easement for passage of trains; ownership, rights and responsibilities clarified by agreements	Utilities subway integral to Central line Stn. UUMI; airspace within subway owned and managed by ES; utilities companies have statutory requirement for use; rights and responsibilities clarified by legislation	
	UUMI within					Smithfield Market Building	Waterloo Network Rail Stn.	LU lease airspace only within ES owned airspace of Smithfield Market basement; lease varied in 1994; ownership, rights and responsibilities defined by lease and other agreements	LU Waterloo & City line UUMI within the Network Rail owned basement airspace of Waterloo Stn.; ownership, rights, and responsibilities defined by agreement	
Bridge	Over UUMI					Bark Place, west of Bayswater Stn.		Highway bridge over Metropolitan line cutting, built with railway; statutorily required to accommodate existing highway; rights and responsibilities clarified by legislation		
	Over UUMI					St Botolph Street Bridge, north of Aldgate		ES built, owned, and managed bridge; constructed over Metropolitan line by agreement with UUMI owner; ownership, rights, and responsibilities defined by agreement; rights and responsibilities clarified by legislation		
	Under UUMI					Ray Str. Bridge, North of Farringdon Stn.		Bridge supporting Metropolitan line over Network Rail land and airspace; vested within London Transport; ownership, rights, and responsibilities clarified by vesting agreement		
Building	UUMI under					Halsey Str. to Moore Str., east of South Kensington Stn.	New Cavendish Str. to Mortimer, north of Oxford Circus Stn.	District line tunnels pass under buildings within the subsoil; variations to extents of ownership of subsoil; ownership, rights, and responsibilities defined by agreement	Victoria line tunnels pass under buildings within the subsoil; variations to extents of ownership of subsoil; rights and responsibilities clarified by legislation	
	UUMI Adjacent to (includes diagonally subjacent)					Rear of Victoria Str., west of St James's Park Stn.	Haymarket, between Charring Cross and Piccadilly Circus Stns.	District line cutting to rear of buildings on Victoria Street; freehold ownership of land and airspace; some variation to ownership; ownership, rights and responsibilities clarified by agreements	Bakerloo line tunnels under public highway with buildings either side; ownership, rights and responsibilities clarified by legislation	
	UUMI within					Westminster Stn.	Westminster Stn.	LU ticket hall, District line platforms, track, and supporting structures within basement levels of building; ownership, rights and responsibilities defined by lease	LU ticket hall, and Jubilee line escalators and access to Stn. tunnels, within and through basement of building; ownership, rights and responsibilities defined by lease	
Bus Stn.	Bus Stn. located over UUMI					Aldgate Bus Stn., south of Aldgate Stn.		Bus Stn. located on raft over Metropolitan line; foundations located within UUMI environment; ownership, rights and responsibilities defined by agreement		

Covenants	Legal restrictions or requirements imposed on land, buildings, airspace					Porchester Terrace, east of Bayswater Stn.	Brompton Road disused Stn.	Requirements for external stakeholder to gain permission for works from UUMI owner; rights and responsibilities defined by agreements	Requirements for external stakeholder to gain permission for works from UUMI owner; rights and responsibilities defined by agreements
Easement	Right for the presence of UUMI within the land of an ES					North side of Charterhouse Str.	East of South Kensington Stn.	LU has perpetual right to use surface of land for operation of Metropolitan line; ownership, rights and responsibilities defined by agreements	Easements within private land for presence of Piccadilly line tunnels; rights and responsibilities clarified by legislation
Freehold	Freehold ownership of buildings land and airspace forming UUMI and its environment					St James's Park, Stn. to east of Palace street (west of stn.)	Kings Cross St Pancras (Northern, Piccadilly, Victoria), Network Rail Stn. forecourt	LU owns the land and airspace above District line UUMI in former cutting and tunnel; from west side of vent, east of Palace Str. ownership of land is ES with UUMI LU; ownership, rights and responsibilities defined by agreements	LU owns land, UUMI, and airspace at ground level and below ground at various depths and locations; Network Rail owns surrounding land and subsoil; ownership, rights, and responsibilities clarified by vesting agreements and other agreements
Girders	UUMI supporting highway above					Palmer Str., west of St James's Park Stn.	Oxford Circus Stn.	Girders forming District line UUMI supports highway above; highway authority and LU rights and responsibilities clarified by legislation	Girders forming Central and Victoria line ticket hall roof supports highway above; highway authority and LU rights and responsibilities clarified by legislation
	UUMI supporting building above					Terminal House, Buckingham Palace Road, west of Victoria Stn.	Westminster Stn.	Girders and foundations supporting building over District line; ownership, rights and responsibilities defined by agreements	Structures supporting building over, located within Stn. 'box' of District and Jubilee lines; ownership, rights and responsibilities defined by Lease
Leased	Buildings/land/airspace owned by LU but leased to an ES					Barbican, between Moorgate and Barbican Stns.	Elephant & Castle Stn.	Airspace over realigned Metropolitan line UUMI leased to ES for over railway development; realignment rights and responsibilities clarified by legislation; ownership, rights and responsibilities defined by Leases	Air space over Bakerloo line vent shaft leased to ES for over sailing development; ownership, rights and responsibilities defined by Lease
	Buildings/land/airspace owned by ES but leased to LU					Westminster Stn.	Westminster Stn.	LU leases the airspace within the building basement for its District and Jubilee line ticket hall, and District line platforms (within basement); LU owns UUMI; ownership, rights and responsibilities defined by Leases	LU leases the airspace within the building basement for its District and Jubilee line ticket hall and access to tube (located under public highway); LU owns UUMI; ownership, rights and responsibilities defined by Leases
Pipe Crossing	Pipe Crossing over UUMI					Sloane Square Stn.	Notting Hill Gate Stn.	Piped river passing over District line Stn.; accommodated under statutory requirements; rights and responsibilities clarified by legislation	Water mains passing over Central line Stn. ticket hall; accommodated under statutory requirements; rights and responsibilities clarified by legislation
	Pipe Crossing under UUMI					Baker Str. to Edgware Road Stn.		Pipe for drainage located under Metropolitan line track; accommodated under statutory requirements; rights and responsibilities clarified by legislation	
	Pipe Crossing penetrating UUMI (<i>Tunnel Crown</i>)					West of Baker Str.		Sewer passing through Metropolitan line tunnel crown; accommodated under statutory requirements; rights and responsibilities clarified by legislation	
Retaining walls	Enabling LU cutting					Edgware Road Stn.		Retaining wall - LU statutory responsibility to support surrounding land; potential variations to depth of subsoil ownership; ownership, rights and responsibilities defined by agreements; clarified by legislation	
	Under land of ES					South of Notting Hill Gate Stn.		Retaining wall for Circle line - LU statutory responsibility to support surrounding land; potential variations to depth of subsoil ownership; ownership, rights and responsibilities defined by agreements; clarified by legislation	
	Enabling other railway infrastructure					Rear Granville Str., between Kings Cross and Farringdon		To enable presence of vent shaft for Network Rail Thameslink Route; re-vested from London Transport (predecessor LU) to British Rail (predecessor Network Rail); clarified by legislation; ownership, rights, and responsibilities clarified by vesting agreement	
Subway (includes public pedestrian and utilities)	Private pedestrian subway over UUMI					Nurse Maids Subway, Crescent Gardens, west of Great Portland Str. Stn.		Private subway from Crescent Gardens to Regents Park; passes through Metropolitan line tunnel crown; accommodated under statutory requirements; rights and responsibilities clarified by legislation	

	LU owned pedestrian subway under public highway				Exhibition Road Subway. South Kensington Stn.		Owned and maintained by LU with private entrances at museums; connecting to District line station; accommodated under statutory requirements; rights and responsibilities clarified by legislation; ownership, rights, and responsibilities clarified by agreement	
	Public subway within UUMI					Piccadilly Circus stn.		LU owned and maintained public subway within Piccadilly line ticket hall; outside paid area; accommodated under statutory requirements; ownership, rights, and responsibilities clarified by agreement
	Public subway connecting to UUMI				Monument Stn.	Charring Cross (Bakerloo)	Local authority subways connecting both sides of Cannon Str. to Stn.; ownership, rights, and responsibilities clarified by agreement	Local authority subways under junction of Whitehall and Trafalgar Square connecting to stn.; ownership, rights, and responsibilities clarified by agreement
	Utilities subway					Bank Stn.		Utilities subway integral to UUMI forming Central line ticket hall and subways; ownership and responsibilities defined by statutory powers
Stn. entrance	Within purpose built building				Bayswater	Leicester Square	Stn. building erected for Metropolitan line, containing stairs to platform level	Multiple Stn. buildings erected for entrance to Northern and Piccadilly lines; subsequent re-modelling saw ticket hall located beneath public highway
	Within ES building				Paddington (H&C), within main line Stn..	Hippodrome Building, Leicester Square. Stn.	Entrance created for improved passenger flows; within and adjacent to Network Rail building and on Network Rail land; LU has right of access for passengers; ownership, rights, and responsibilities clarified by vesting agreements and other agreements	Entrance to Northern and Piccadilly lines ticket hall; created for improved passenger flows and for entry to new under highway ticket hall; ownership, rights, and responsibilities defined by agreement
	Within public highway (pavement)				Bressneden Place, Victoria Stn.	Tottenham Court Road	New entrance created for Victoria and District lines improved passenger flows and new under highway ticket hall; rights and responsibilities clarified by legislation	New entrance created for Northern, Central, and Elizabeth lines improved passenger flows and access to existing under highway ticket hall; rights and responsibilities clarified by legislation
Stn. ticket hall	Within purpose built building				Gloucester Road Stn.	Russel Square Stn.	Shared District and Piccadilly line ticket hall within building; formerly two separate ticket halls in separate buildings, one containing lift shafts; ownership, rights, and responsibilities defined by agreement	Piccadilly line purpose built single storey building; with possibility of over station development; contains lifts; ownership, rights, and responsibilities defined by agreement
	Under highway				Notting Hill Gate Stn.	Charring Cross (Bakerloo)	Shared ticket hall for District and Central lines; formerly two separate ticket halls in separate buildings; supports highway above; highway authority and LU rights and responsibilities clarified by legislation	Bakerloo line ticket hall under highway jct. of Whitehall and Trafalgar Square connecting to Stn.; supports highway above; highway authority and LU rights and responsibilities clarified by legislation
	Within land of ES				Kings Cross St. Pancras (Metropolitan Stn.)	Kings Cross St Pancras (Northern, Piccadilly, Victoria)	Metropolitan line ticket hall within Network Rail land and buildings; ownership, rights, and responsibilities clarified by vesting agreements and other agreements	Ticket hall within Network Rail land and buildings; ownership, rights, and responsibilities clarified by vesting agreements and other agreements
	Within building of ES				Cannon Str. Stn.	Marylebone	District line ticket hall within Network Rail land and buildings; ownership, rights, and responsibilities clarified by vesting agreements and other agreements	Bakerloo line ticket hall within Network Rail land and buildings; ownership, rights, and responsibilities clarified by vesting agreements and other agreements
Shafts	Ventilation shaft within LU building					Palace Street, north of Victoria Stn.		Victoria line vent shaft contained within LU operational multi-storey building; clarification of connecting UUMI required; ownership, rights, and responsibilities defined by agreement
	Ventilation shaft within ES building					Building west of Marylebone Stn.		Bakerloo line vent shaft located within ES building; building owned by LU but leased to ES for 250 years; ownership, rights, and responsibilities defined by agreement
	Ventilation shaft above UUMI				Off Palace Street, east side, west of St James's Park Stn.	Elephant & Castle Shopping Centre	District line vent shaft located over former cutting now girdered; ownership, rights, and responsibilities defined by agreement	Bakerloo line vent shaft located within subsoil, venting to surface; shopping centre over sails vent shaft; ownership, rights, and responsibilities defined by agreement
	Escalator shaft within highway					Piccadilly Circus Stn.		Multiple escalator shafts within under highway UUMI forming Piccadilly Circus Stn.; rights and responsibilities clarified by legislation

	Escalator shaft within land of ES					Angel Stn.		Single escalator shaft passing under multiple properties within land of multiple owners; rights and responsibilities clarified by legislation; ownership, rights, and responsibilities defined by agreement
Tunnels (including covered way)	Under public highway				Marylebone/Euston Roads, between Edgware Road and Kings Cross	Liverpool Street Stn. To Shepherds Bush Stn.	Metropolitan line sub-surface tunnels also forming Stns.; rights and responsibilities clarified by legislation; ownership, rights, and responsibilities defined by agreement	Central line tube tunnels also forming Stns.; rights and responsibilities clarified by legislation; ownership, rights, and responsibilities defined by agreement
	Under park land					St James's and Green Parks, Green Park Stn. to Westminster Stn.		Jubilee line tunnels within Crown lands (exempt from legislation); ownership, rights, and responsibilities defined by agreement
	Within private property				Moscow Road, UUMI located directly under private buildings within private land	Hanover Street to Conduit Street, south of Oxford Circus Stn.	Metropolitan line UUMI owned and responsibility of LU; surrounding buildings and lands to UUMI privately owned; ownership, rights, and responsibilities defined by agreement	Freehold of Victoria line tunnels within subsoil of ES; rights and responsibilities clarified by legislation
	Within land of other railway organisation				Blackfriars Stn.	Euston Stn.	District line tunnels within Network Rail land; presence of UUMI enabled by statutory powers; ownership, rights, and responsibilities clarified by vesting agreement	Northern line tunnels within Network Rail land; presence of UUMI enabled by statutory powers; ownership, rights, and responsibilities clarified by vesting agreement
Vesting	Re-allocation of UUMI				Network Rail alignment between Kings Cross and Farringdon	Moorgate Stn.	Metropolitan line UUMI including: land, air space, tunnels, cuttings, re-vested from London Transport (predecessor to LU) to British Rail (predecessor to Network Rail); ownership, rights, and responsibilities clarified by vesting agreement	Network Rail UUMI forming Northern City Stn. within LU Stn., within privately owned land; all UUMI enabled by statutory powers; Network Rail UUMI re-vested from London Transport (predecessor to LU) to British Rail (predecessor to Network Rail); ownership, rights, and responsibilities clarified by vesting agreement