



Silvertown Tunnel

A TfL-Riverlinx Public-Private Partnership

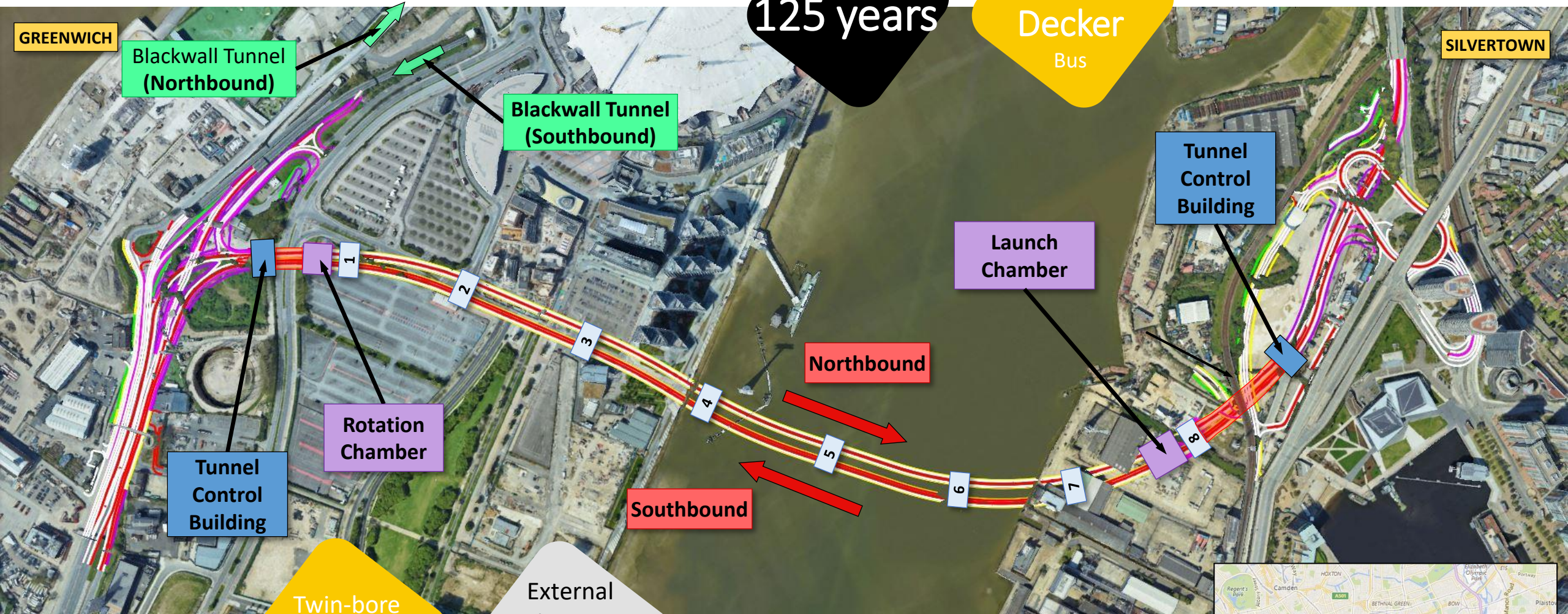
Javier Angulo
COO / Tunnel Manager

Ana Méndez
Operations Manager

cintra

 RIVERLINX

Tunnel layout



Blackwall
125 years

Double
Decker
Bus

GREENWICH

SILVERTOWN

Tunnel
Control
Building

Rotation
Chamber

Launch
Chamber

Tunnel
Control
Building

Northbound

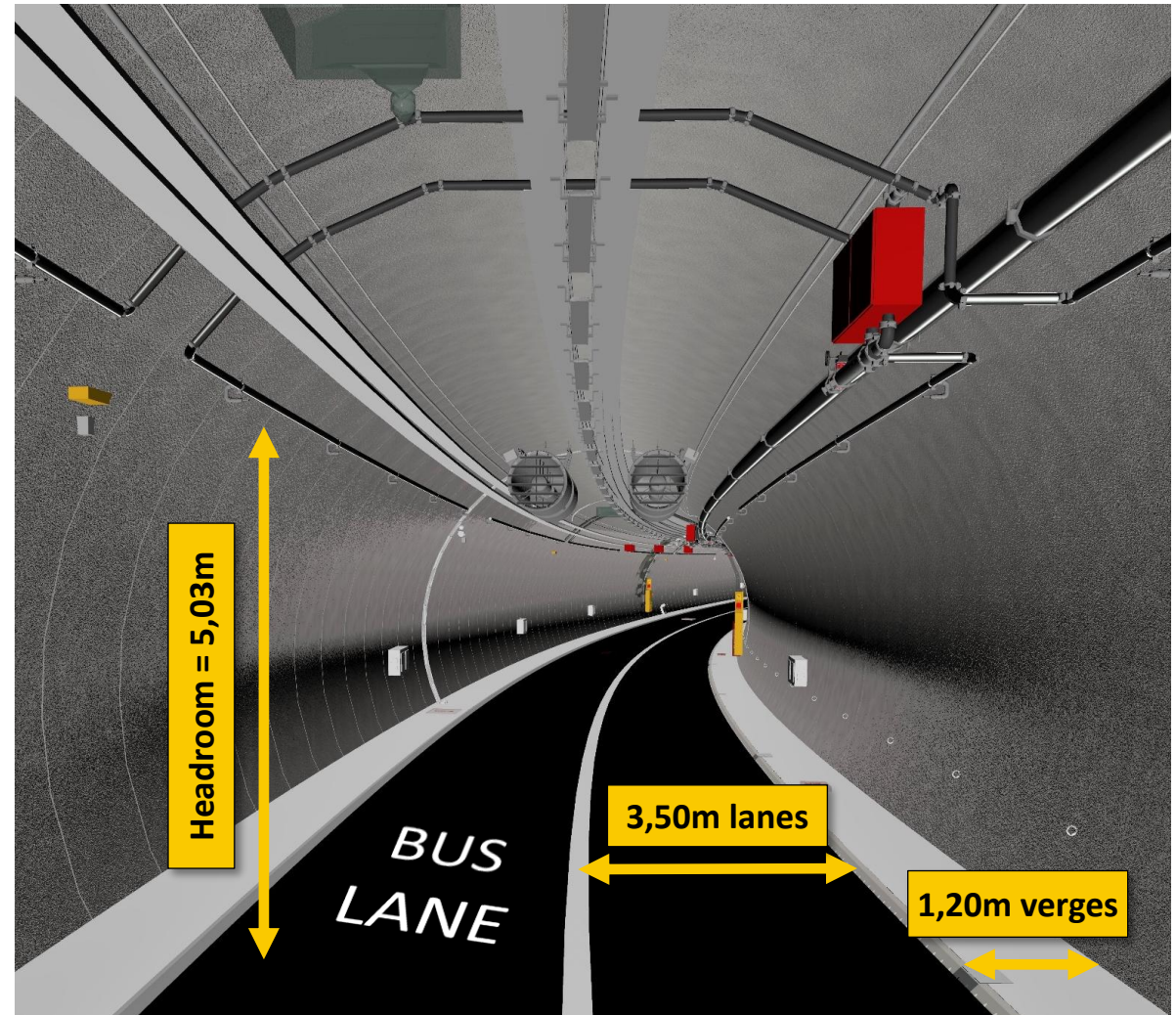
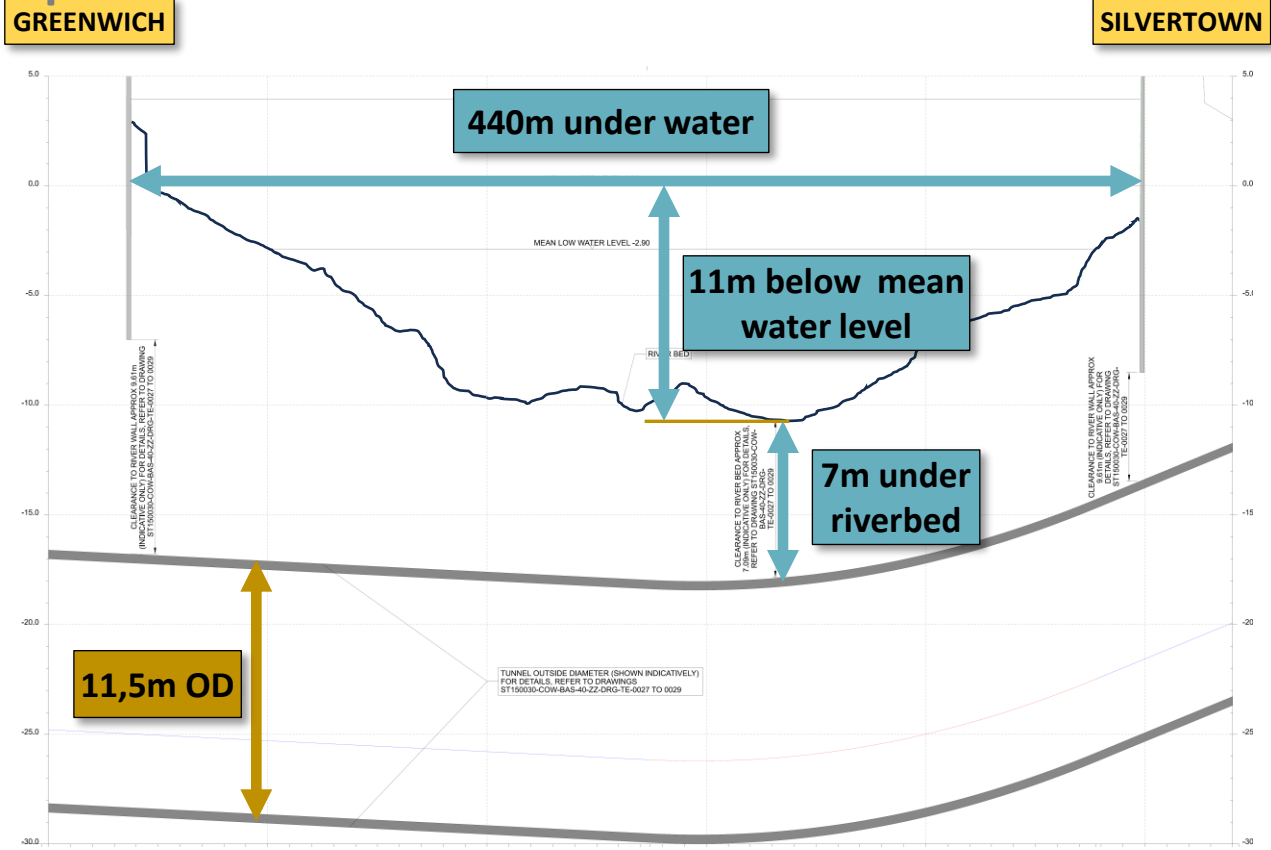
Southbound

Twin-bore
1,4 km

External
Diameter
11,5m



Cross section and longitudinal profile



The Riverlinx Consortium

Administrative & Highway Authority



Special Purpose Vehicle (SPV)

- Cintra Global Ltd
- Aberdeen European Infrastructure GP II Limited
- Invesis
- SK Ecoplant

cintra

Aberdeen
Asset management

INVESIS

SK ecoplant



Managed
Investment

1,200
M€

Construction Joint Venture (CJV)

- Ferrovial Construction (UK) Ltd
- Bam Nuttall Limited
- SK Ecoplant

ferrovial
construction

bam
nuttall

SK ecoplant

Financial
Close

2019

Concession
Period

2025-
2050

1,000
People

cintra

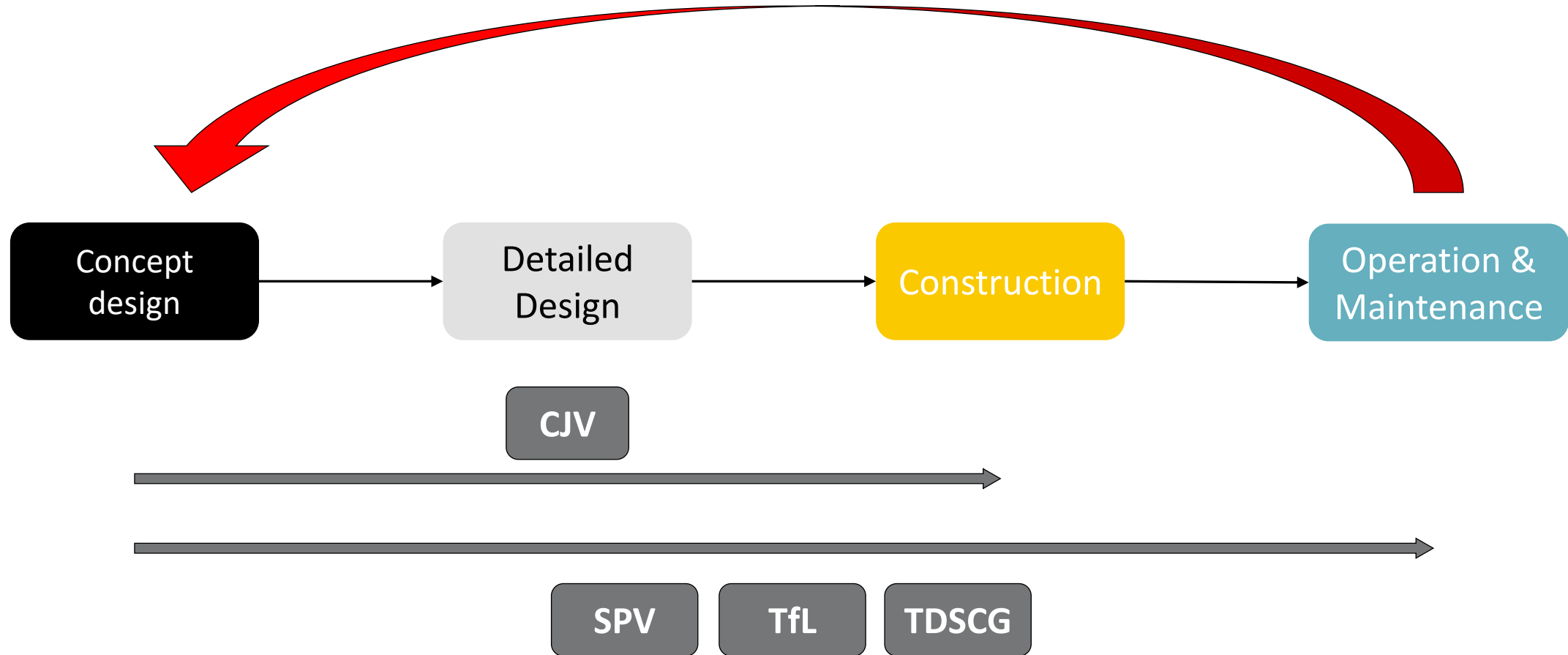


The Contract

- D → Design (CJV, TfL, SPV, TSO, TDSCG*)
- B → Build (CJV, 5 years, fixed price)
- F → Finance (Shareholders + Lenders)
- O → Operate (SPV, TfL, TSO, TDSCG*, 25 years)
- M → Maintain (SPV, 25 years)

**TDSCG = Tunnel Design and Safety Consultation Group (London Fire Brigade, London Ambulance Service, Metropolitan Police, Environment Agency, Port of London Authority and Greenwich and Silvertown boroughs)*

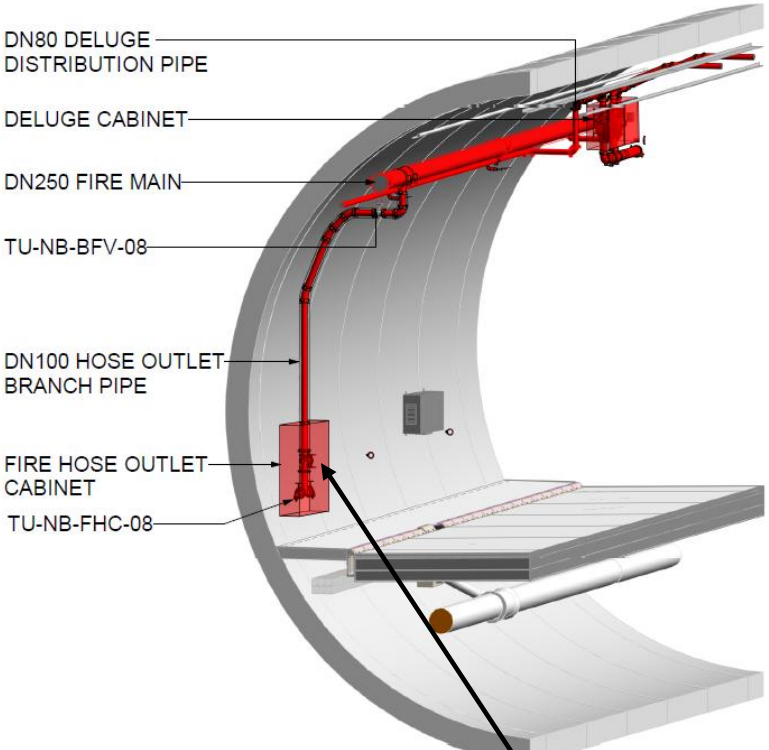
Advantages of the DBFOM PPP contract



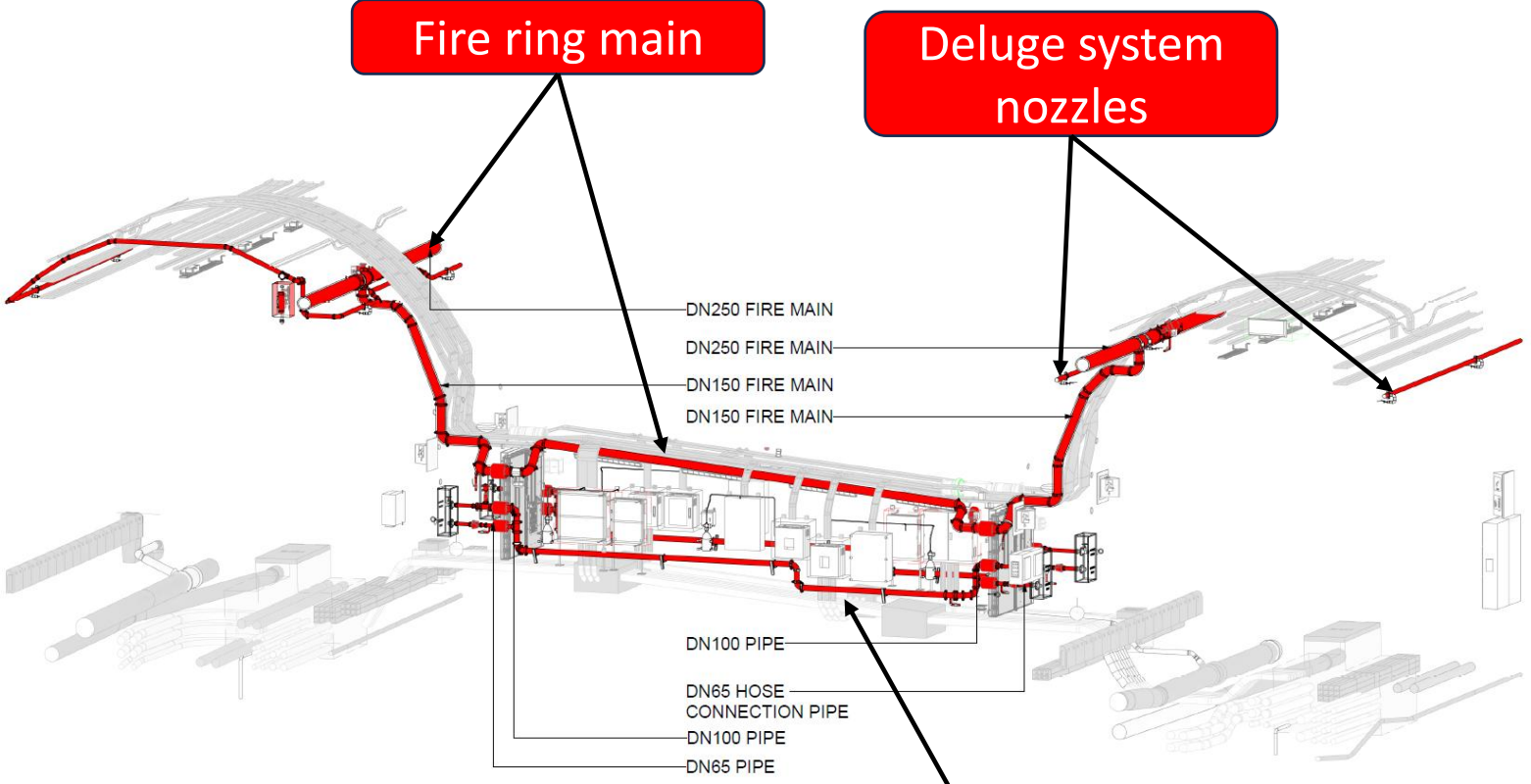
- Long-term approach in D&C (operability and maintainability)
- Continuous engagement with the key stakeholders
- Planification of the O&M since the beginning of the project
- Smooth transition between D&C and O&M

Tunnel Design Innovations

Fixed Fire-Fighting System (FFFS)

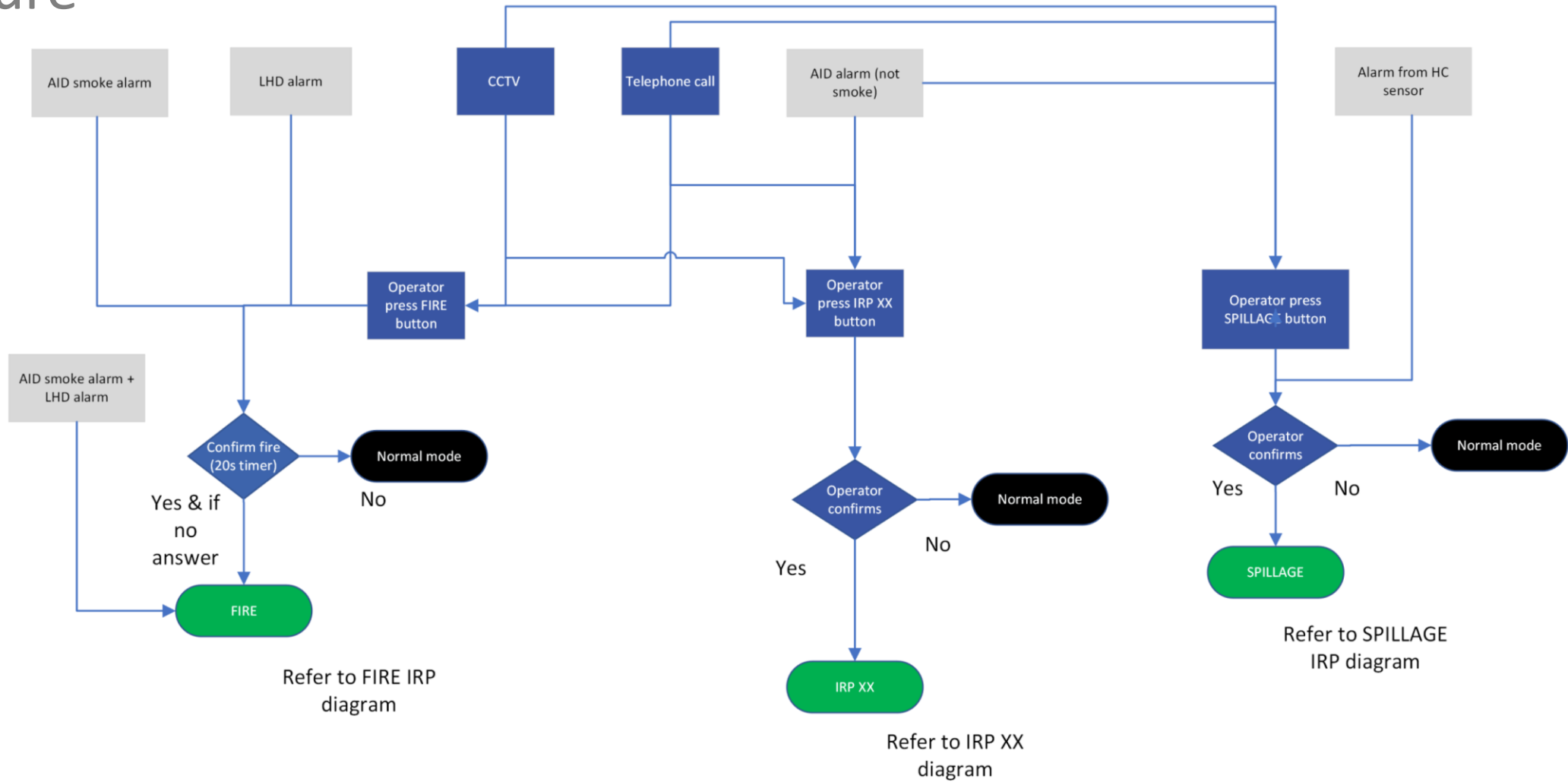


Fire hose outlet



Dry Cross Connector

Automatic Incident Detection and Tunnel Closure



Tunnel Construction

Our Tunnel Boring Machine (TBM) - Jill

Weight

2,300 t

Diameter

12 m

Biggest in UK

Length

82 m

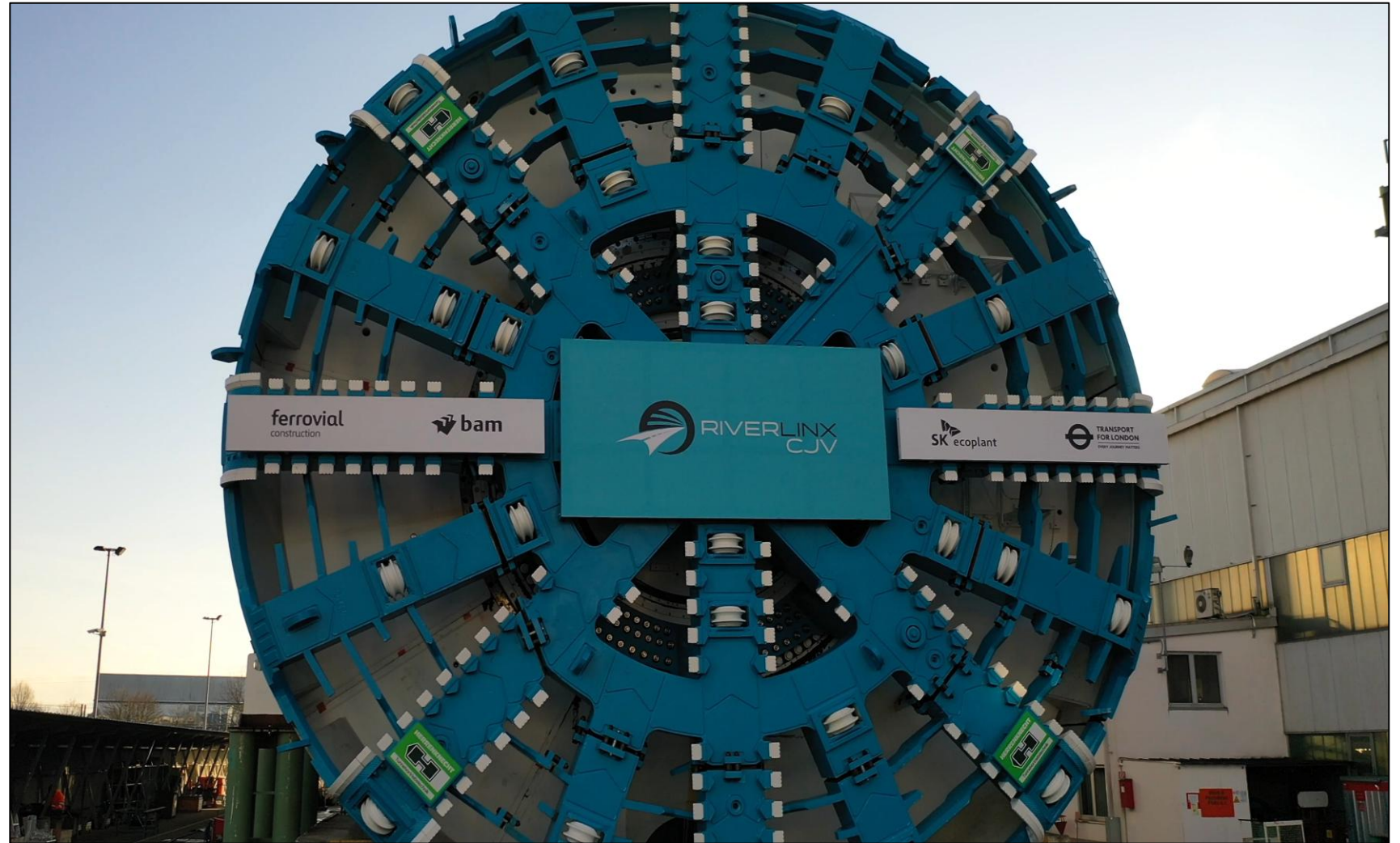
Advance
Speed

55 mm/
min

Record

32 m

(1 day)



A moving



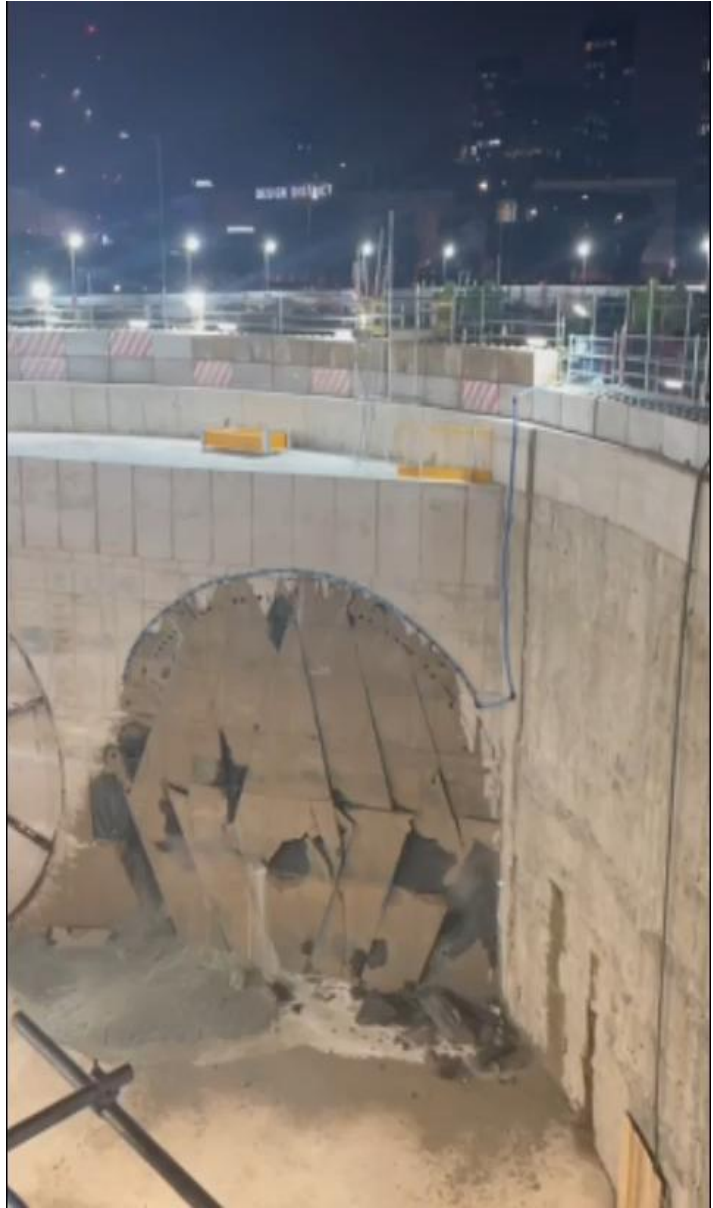
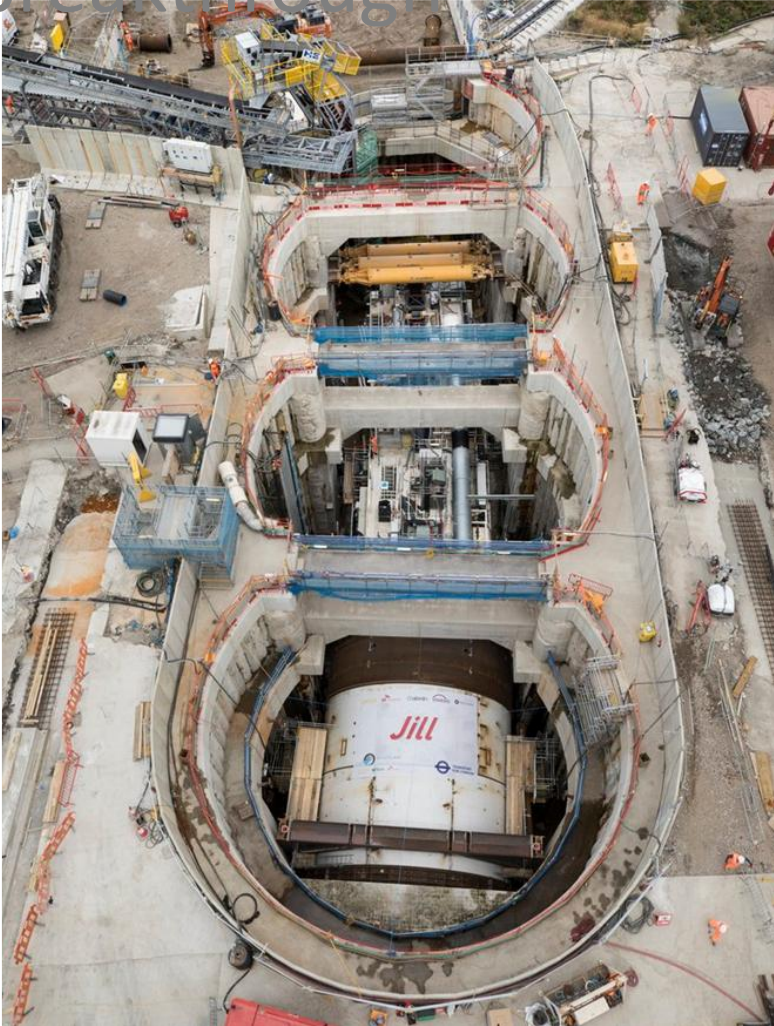
Rings
550
(Per tunnel)

Deliveries
1,650
(Per tunnel)

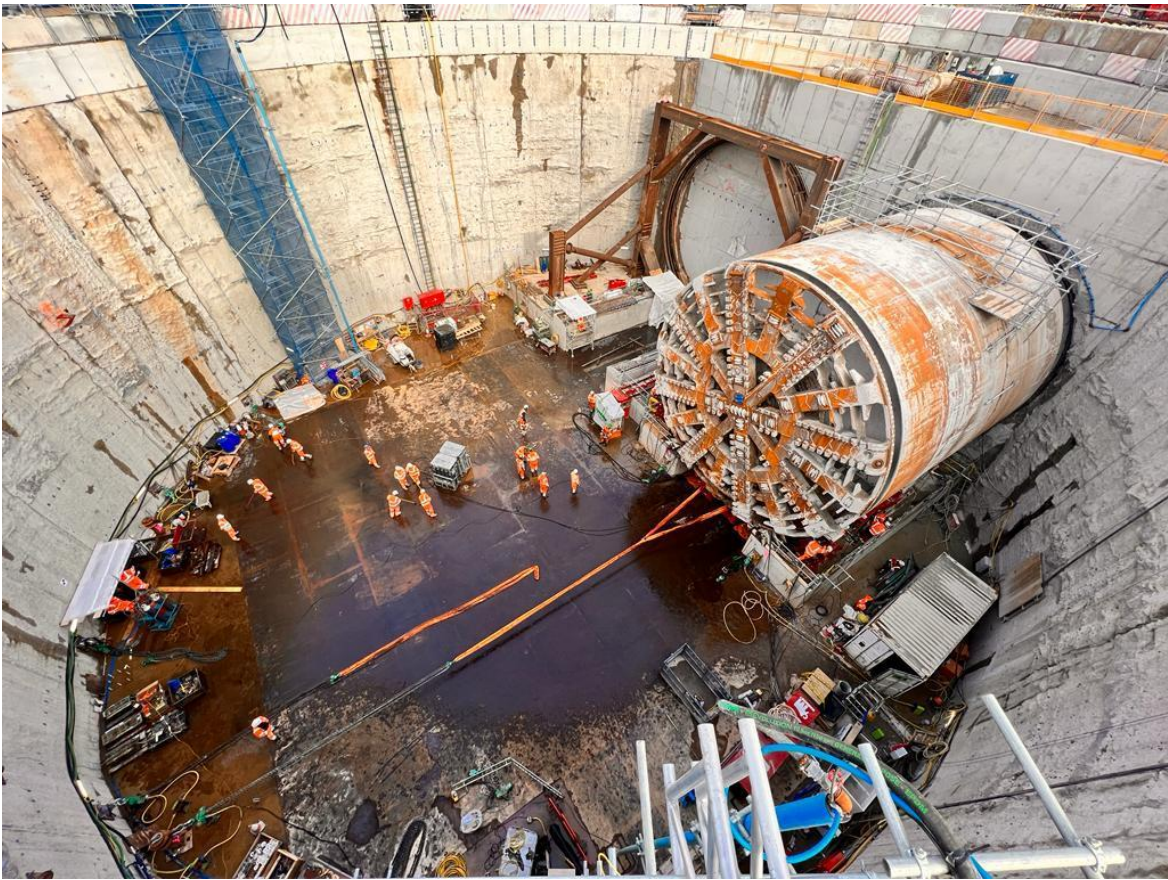


Barges
+160
(Per tunnel)

Launch and breakthrough



Rotation



2023
bcia british construction industry awards

British Construction Industry Award for best Temporary Works Initiative 2023



Ground freezing

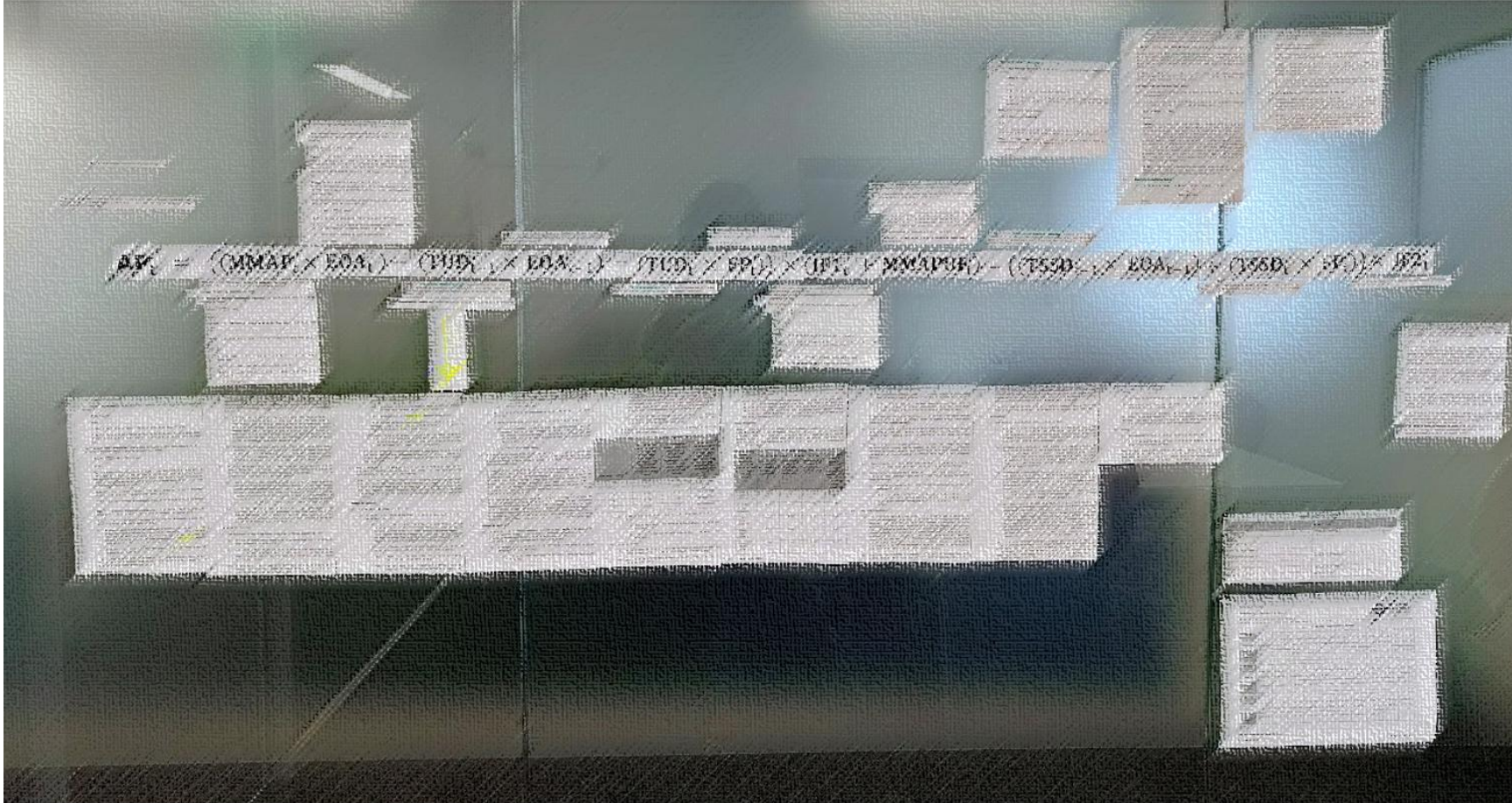


New Civil Engineer Tunnelling Awards for
best Tunnelling Project of the Year 2023

Tunnel Operation

Availability Payment and Safety Requirements

Unique Payment Mechanism



Unavailability
of the tunnel

Non
compliance
with other
KPIs

Operations Performance Indicators

OBJECTIVE

AUTOMATIC

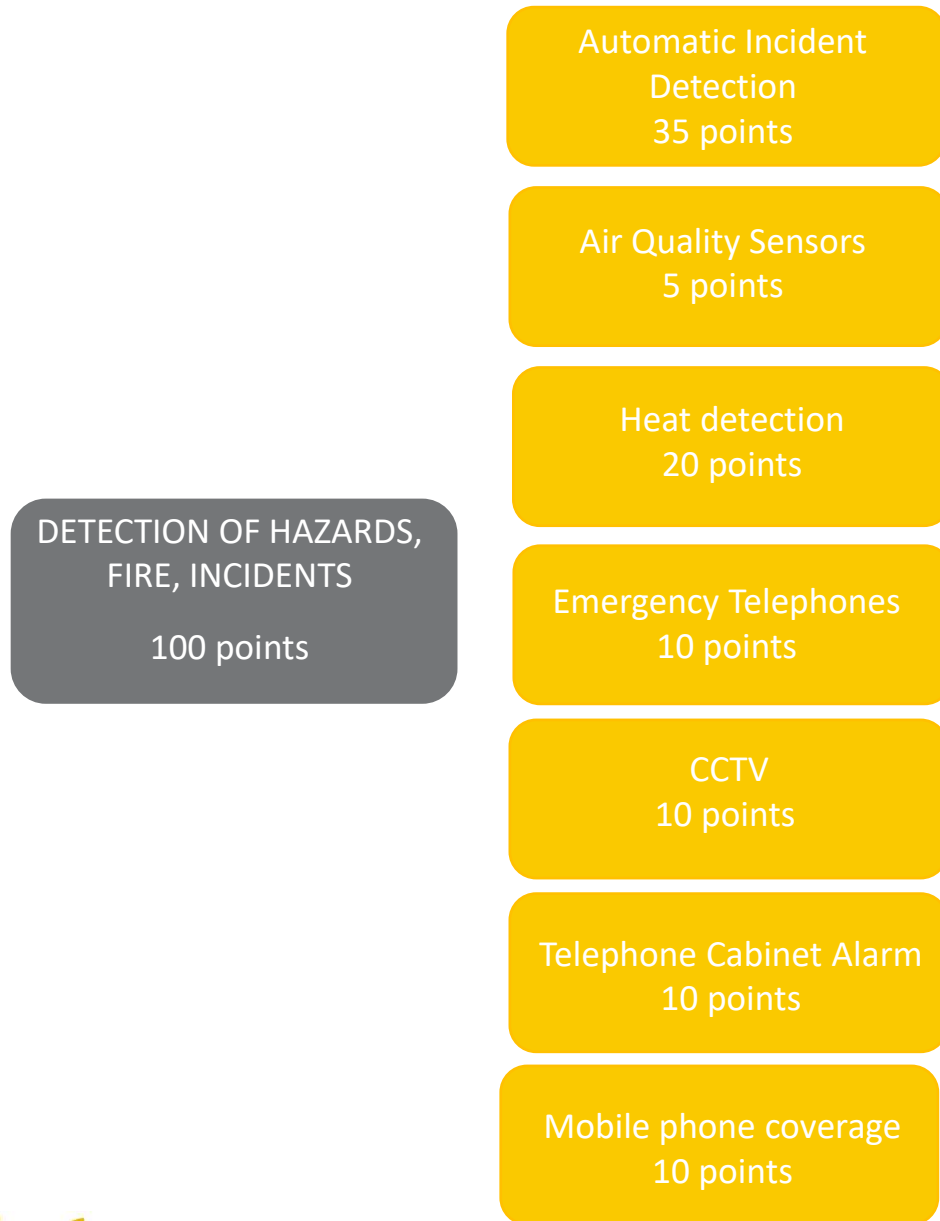
- TfL currently manages 13 Tunnels from NMCC
- TfL Will have Access in real time to monitor Silvertown via Tunnel Control System
- TfL Will be able to take control in certain scenarios
- Bi-directional communication



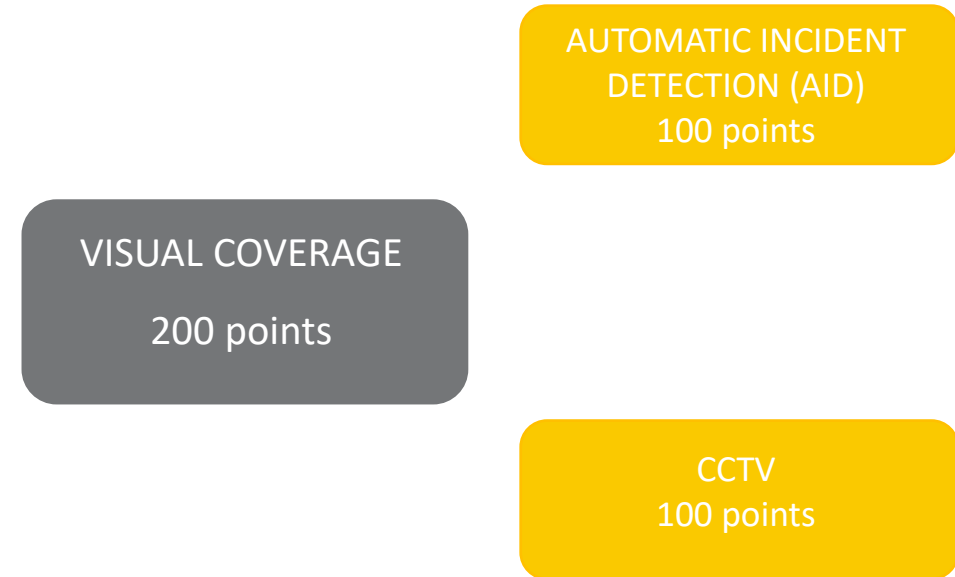
27 Safety Sub-Function
Minimum Operation
Requirements



SAFETY SCORE = 100



SAFETY SCORE > 100



Tunnel Safety Management System

TSMS 04/02/2025 17:37:55 399 859

BOTH BORES

Power (Máx. LoSS = 140)

HV Supplies	40	■
UPS	60	■
Generator	40	■ <input type="button" value="Disable"/>

Pollution Related Visibility (Máx. LoSS = 103)

Emission Control Ventilation	50	■
CCTV	1	■
AID	1	■
Air Quality Sensors	50	■
Anemometers	1	■

Alert to All Tunnel Users (Máx. LoSS = 160)

Radio Break-in	60	■
Tunnel VMS	10	■
PAVA System	90	■

Mitigation Actions Available (máx. +35)

Speed Reduction	25	<input type="button" value="Off"/>
Lane Closure	30	<input type="button" value="Off"/>

Lighting for Evacuation from Fire (Máx. LoSS = 140)

Carriageway Lighting (N&D) and Emergency	60	■
Evacuation Lighting	80	■

Mitigation Actions Available (Máx. +30)

Speed Reduction	20	<input type="button" value="Off"/>
Lane Closure	25	<input type="button" value="Off"/>

Tunnel Control System (Máx. LoSS = 300)

Project Co Tunnel Control System	100	■
Secondary Tunnel Control System	100	■
TFL Tunnel Control System	100	<input type="button" value="Ena. NB"/>

Lighting Related Visibility (Máx. LoSS = 100)

Carriageway Lighting (N&D) and Emergency	100	■
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Mitigation Actions Available (Máx. +30)

Speed Reduction	20	<input type="button" value="Off"/>
Lane Closure	25	<input type="button" value="Off"/>

Warning All Approaching Vehicles (Máx. LoSS = 282)

Radio Break-in	1	■
Portal LCS	90	■
Tunnel LCS	1	■
Approach VMS (TFL)	90	<input type="button" value="Ena. NB"/> <input type="button" value="Ena. SB"/>
Tunnel Entry Control Barrier/Signals	10	■
Portal VMS	90	■

Mitigation Actions Available (máx. +35)

Speed Reduction	25	<input type="button" value="Off"/>
Lane Closure	30	<input type="button" value="Off"/>

Comms. for Evacuation from Fire (Máx. LoSS = 100)

PAVA System	100	■
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Mitigation Actions Available (Máx. +100)

Speed Reduction	90	<input type="button" value="Off"/>
Lane Closure	90	<input type="button" value="Off"/>

Visual Coverage (Máx. LoSS = 200)

CCTV	100	■
AID	100	■

Carriageway Condition (Máx. LoSS = 100)

Carriageway (Structural)	50	<input type="button" value="Ena. NB"/> <input type="button" value="Ena. SB"/>
Carriageway (Surface)	50	<input type="button" value="Ena. NB"/> <input type="button" value="Ena. SB"/>

Mitigation Actions Available (Máx. +50)

Speed Reduction	50	<input type="button" value="Off"/>
Lane Closure	50	<input type="button" value="Off"/>

Roadway Drainage (Máx. LoSS = 100)

Pumped Drainage	100	■
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Comms. In-Tunnel and Approaching (Máx. LoSS = 140)

Radio Break-in	20	■
Portal LCS and VMS	40	■
Tunnel LCS	40	■
Tunnel VMS	40	■

Mitigation Actions Available (Máx. +40)

Speed Reduction	40	<input type="button" value="Off"/>
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Instigate Immediate Closure (Máx. LoSS = 226)

Portal LCS	50	■
Tunnel LCS	1	■
Approach VMS (TFL)	25	<input type="button" value="Ena. NB"/> <input type="button" value="Ena. SB"/>
Portal VMS	50	■
Tunnel Entry Control Barrier/Signals	100	■

Fire & Smoke Ctrl from Potential Fire (Máx. LoSS = 102)

Emergency Ventilation	30	■
FFFS3	70	■
Fire Extinguishers	1	■

Facilities for Evacuation from Fire (Máx. LoSS = 110)

Carriageway Lighting (N&D)	25	■
Evacuation Sign (Running Man)	25	■
Walkways	40	<input type="button" value="Ena. NB"/> <input type="button" value="Ena. SB"/>
Cross Passages	20	<input type="button" value="Ena. NB"/> <input type="button" value="Ena. SB"/>

Mitigation Actions Available (Máx. +50)

Speed Reduction	20	<input type="button" value="Off"/>
Lane Closure	40	<input type="button" value="Off"/>

Stop Traffic Getting Stuck in the Tunnel (Máx. LoSS = 110)

Green Wave	10	<input type="button" value="Ena. NB"/> <input type="button" value="Ena. SB"/>
Tunnel Entry Control Barrier/Signals	100	■

High Priority Alarms

Contributing System	NB	SB	Contributing System	NB	SB	Contributing System	NB	SB	Contributing System	NB	SB
HV Supplies	■	■	Anemometers	■	■	HDT	■	■	Fire Extinguishers	■	■
UPS	■	■	Pamped Drainage	■	■	Emer. Telephones	■	■	Sump Detection	■	■
Emission Ctrl Vent.	■	■	Radio Breakin	■	■	Mobil Phone Fac.	■	■	Radio (Emer. Serv.)	■	■
CCTV	■	■	Portal LCS & VMS	■	■	PA/VA	■	■	Hydrant System	■	■
AID	■	■	Tunel LCS	■	■	Emer. Ventilation	■	■	Evacuation Lighting	■	■
Air Quality Sensors	■	■	Tunel VMS	■	■	FFFS	■	■	Evacuation Signs	■	■

Evacuation from Potential Sump Fire (Máx. LoSS = 100)

Sump Suppression Systems	50	■
Sump Detection Systems	50	■

Mitigation Actions Available (Máx. +50)

Speed Reduction	40	<input type="button" value="Off"/>
Lane Closure	45	<input type="button" value="Off"/>

Comms. for Emergency (Máx. LoSS = 250)

Radio (Emergency Services)	100	■
Emergency Telephones	100	■
Mobil Phone Facilities	50	■

Mitigation Actions Available (Máx. +100)

Speed Reduction	100	<input type="button" value="Off"/>
Lane Closure	100	<input type="button" value="Off"/>

Facilities for Emergency (Máx. LoSS = 100)

Hydrant System	50	■
Cross Passages	50	<input type="button" value="Ena. NB"/> <input type="button" value="Ena. SB"/>

Mitigation Actions Available (Máx. +100)

Speed Reduction	50	<input type="button" value="Off"/>
Lane Closure	50	<input type="button" value="Off"/>

How do we comply with very strict KPIs?

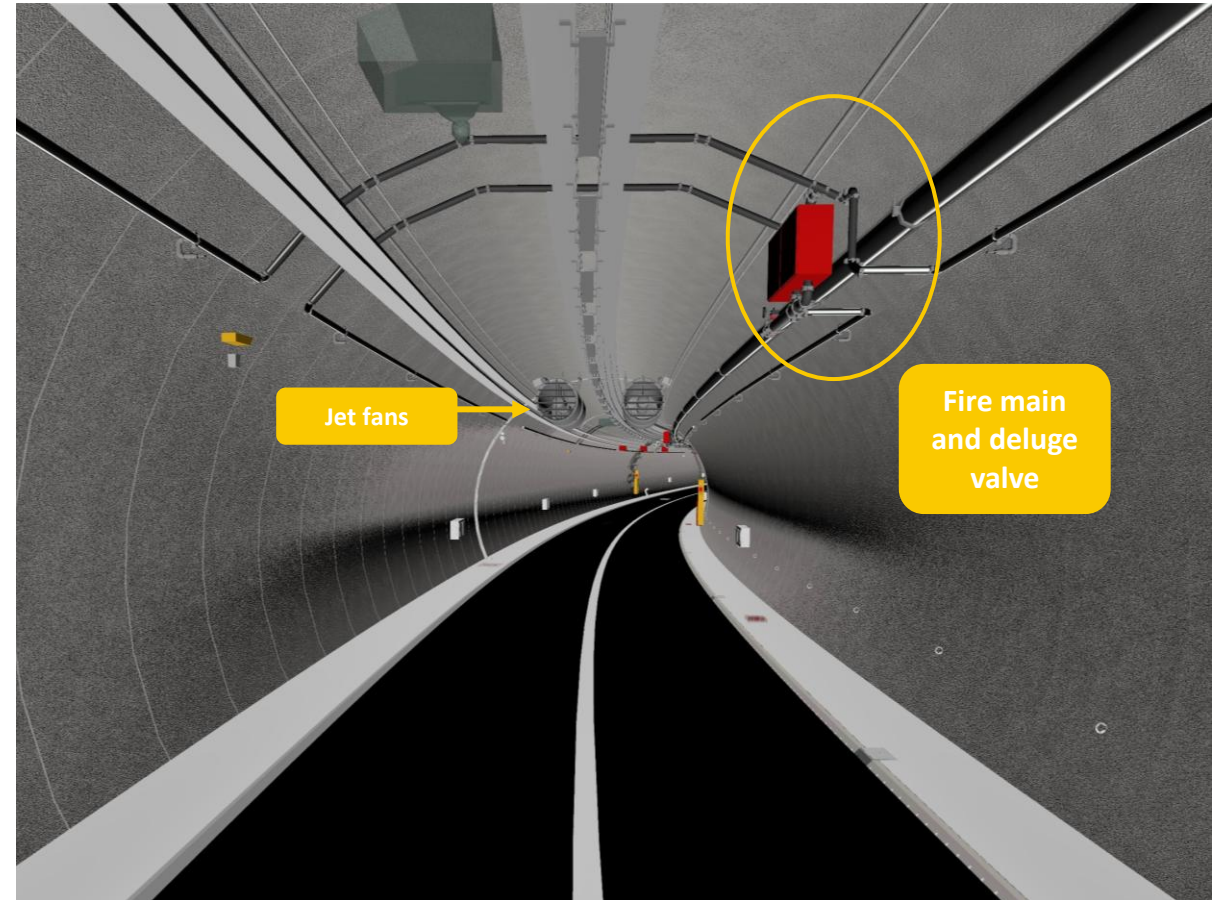
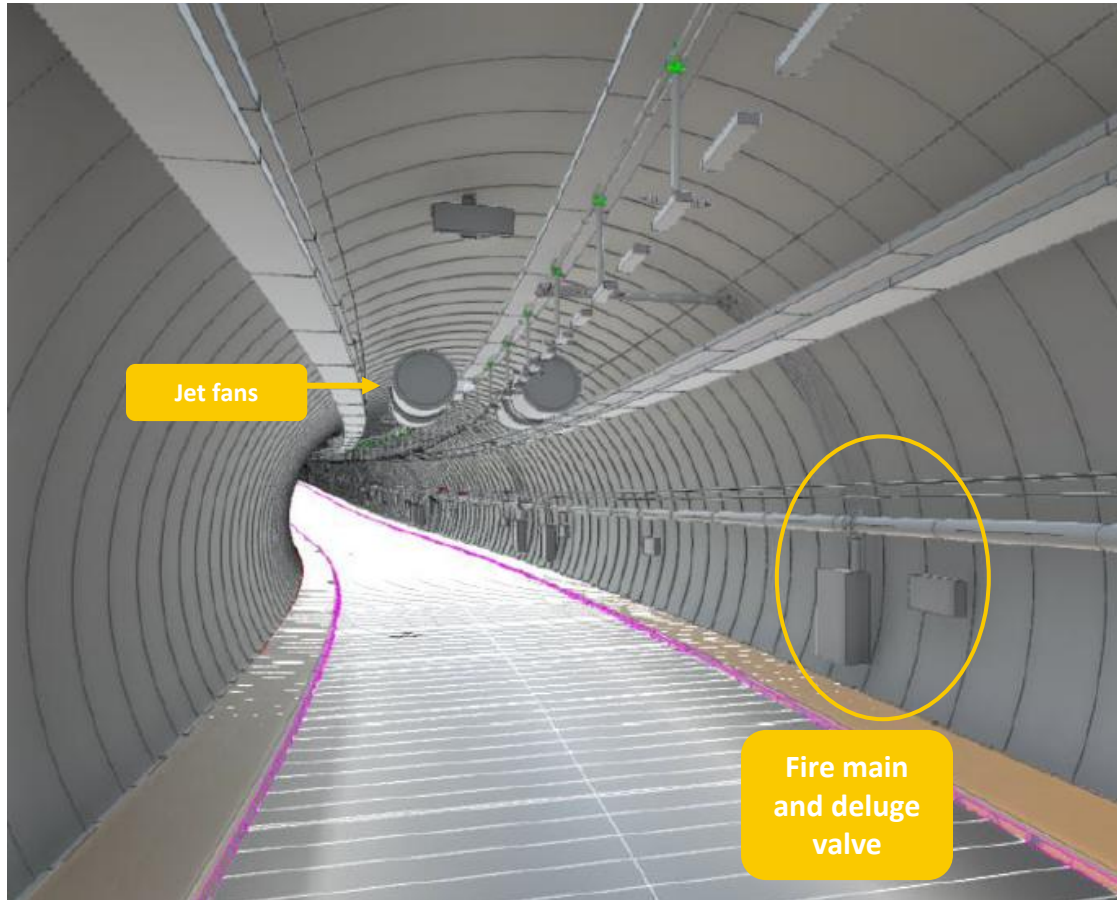
**Resilient
and
redundant
systems**

**Comprehensive
Operations
Strategy**

Resilient and redundant systems

Fixed Fire Fighting System

First tunnel in the UK with an automatic FFFS



Protection of safety critical systems

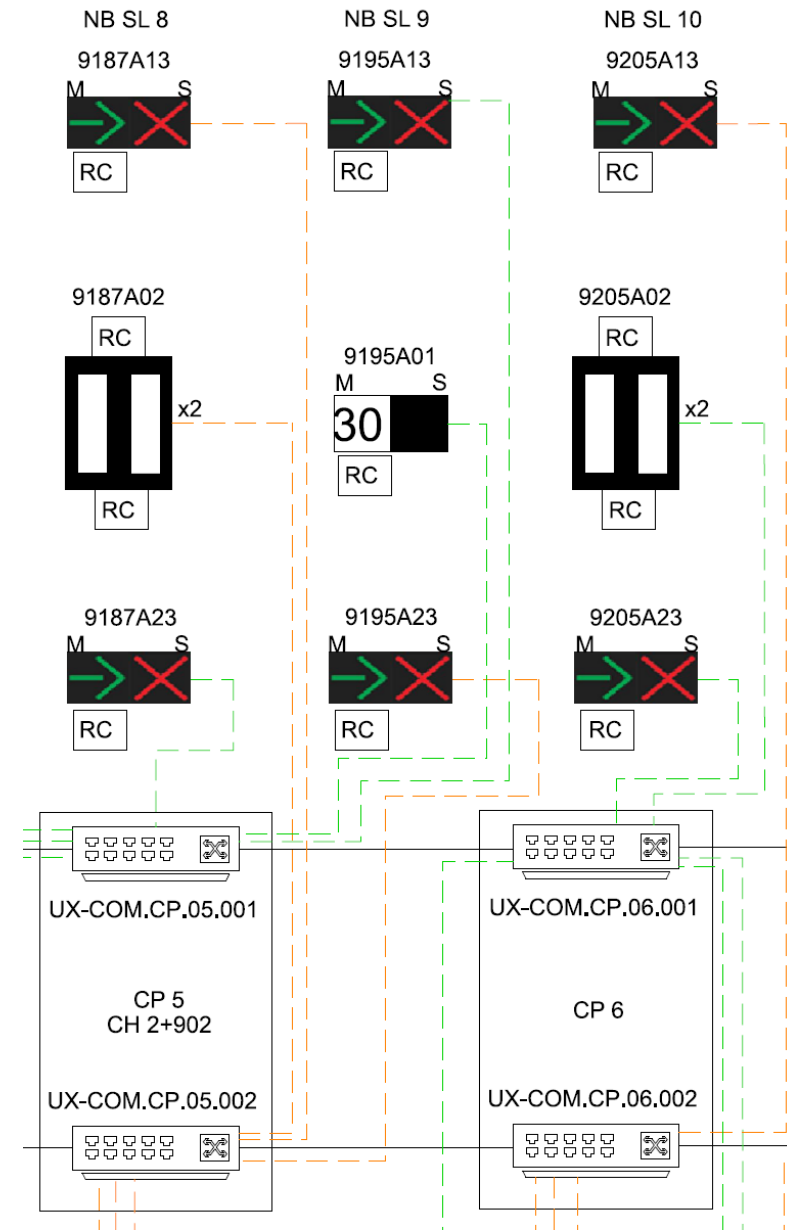
Tunnel systems are fed from the cross passages (except from jet fans)



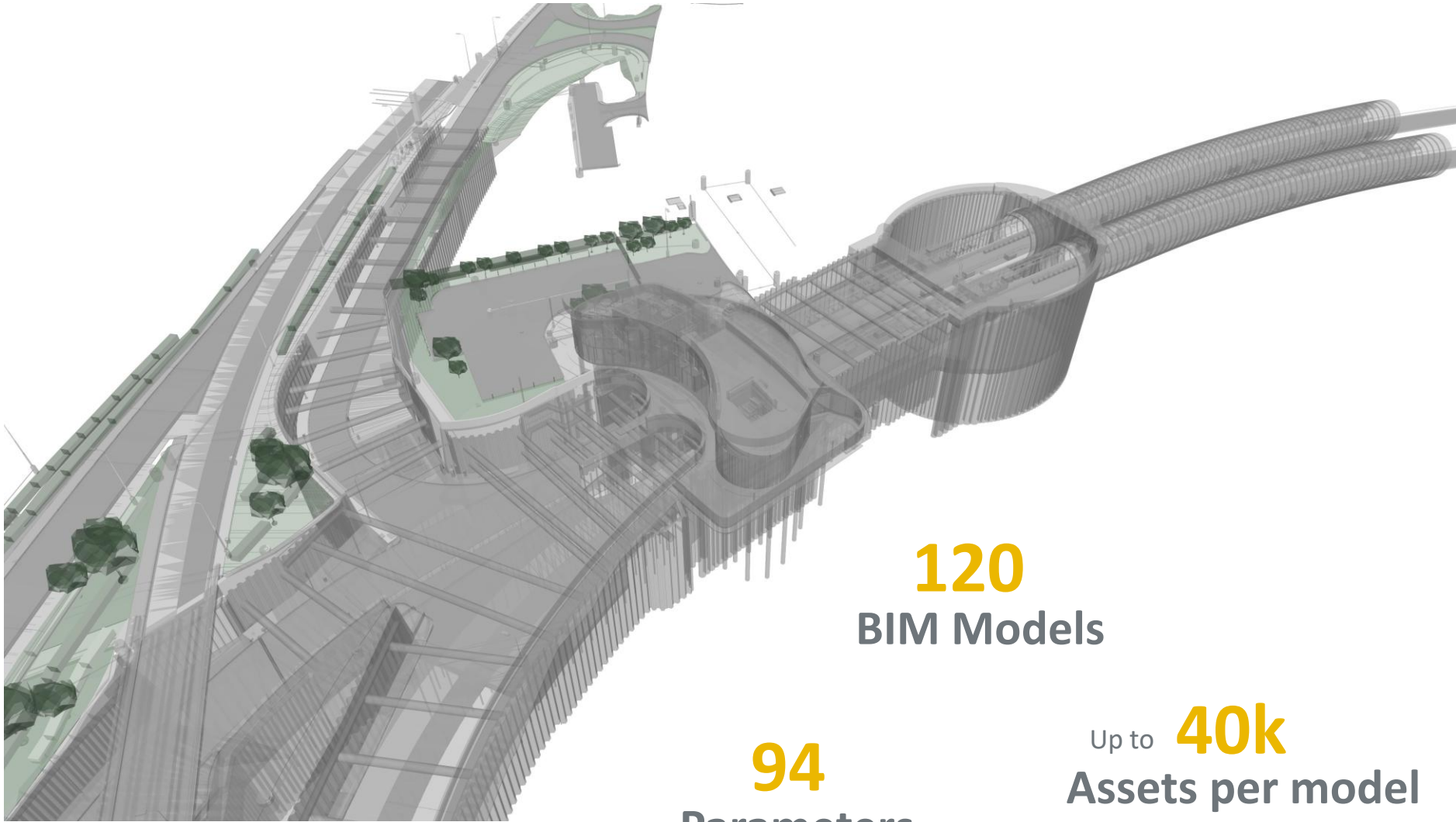
Resilience and redundancy

“No fewer than 47 out of 52 lane control signals in each bore are operating continuously, provided that no 2 adjacent tunnel lane control signals are not operating continuously at the same time”

- **Communications and power supply cabling interleaving (resilience)**
- **Independent power supplies (redundancy)**



Asset Management System



Integrated with BIM model

Integrated with Tunnel Control System

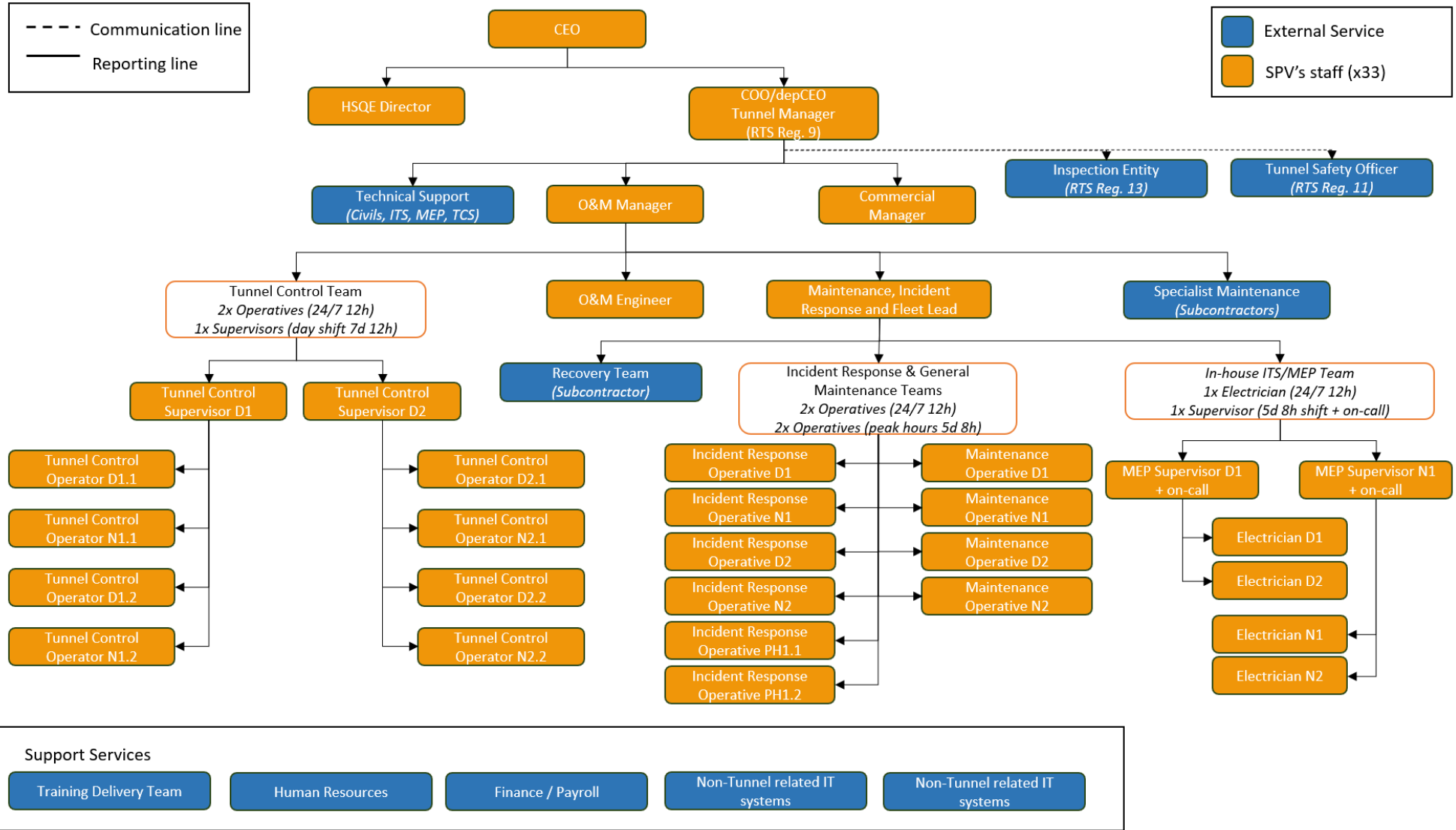
120
BIM Models

94
Parameters
per asset

Up to **40k**
Assets per model

Comprehensive operation strategy

Riverlinx Team



Tailored Incident Response Plans

Tabletop exercises to test Incident Response Plans including all participating agencies

- 15 scenarios tested including a wide range of incidents
- Observers from the industry
- Riverlinx team and ES undertaking their role
- 63 improvements / lessons learned gathered



Silvertown Live Exercise

Participation of 30 actors, 25 observers and 70 Emergency Responders (8 ambulances, 4 fire trucks and 4 police units)



Silvertown Live Exercise



Silvertown Live Exercise



Silvertown Live Exercise





Q&A
Silvertown Tunnel Project