

LONDON INFRASTRUCTURE FRAMEWORK

Annex A: LIF Sector
Trends and Service
Challenges



LONDON
GROWTH PLAN

MAYOR OF LONDON



Contents

Transport

3

Energy

6

Water, wastewater & flood risk

10

Waste

14

Digital connectivity & data centres

18

Endnotes and Sources

22

This Annex provides additional context on the London Infrastructure Framework (LIF) and should be read alongside the LIF.

The sector-by-sector trends and service challenges of the five infrastructure sectors presented in the LIF are summarised. Desk-based research and engagement supports the information in this Annex, and the most salient points are summarised to support the LIF's evidence base.

A detailed list of key sources is also provided, noting that additional sources and engagement evidence have been used to assess the LIF Portfolio.

Mott MacDonald was commissioned by the Greater London Authority and London Councils to prepare the London Infrastructure Framework. It was produced in collaboration with GLA, London Councils and their stakeholders.

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Transport



Rolling stock upgrades

Credits: Greater London Authority/Caroline Teo

Transport



Trends & service challenges

Rail trends

01. Sustainable mode share – The Mayor’s Transport Strategy¹ targets an 80% of all trips in London to be made on foot, by cycle or using public transport by 2041 with these modes accounting for 63.4% in 2024. Applying Good Growth principles such as transit-oriented development and densification around stations supports modal shift.
02. Decarbonisation and adaptation – National milestones include a net zero railway by 2050, phaseout of diesel only trains by 2040, and stronger resilience to extreme weather².
03. Industry reform and devolution – A gradual transition to Great British Railways (GBR) is underway, with a call in London to devolve suburban rail services to Transport for London (TfL) to improve integration and reliability.

Rail service challenges

04. Crowding – AM peak demand is forecast to exceed tolerable levels by 2041; without intervention, some stations risk frequent safety related closures.
05. Accessibility – 34% of Tube stations are step free today against the Mayoral target of 50%, for Network Rail stations within the GLA boundary 46% are step free, with 13% partially step free.
06. Outer London connectivity – Due to lower housing density, orbital public transport connections are often less attractive options compared to driving, increasing car dependency and making sustainable, higher density development harder to deliver.

Roads and streets trends

07. Demand – Road demand is projected to grow across all scenarios to 2060 emphasising the focus on interventions that support mode shift and reallocate road space to more efficient users.
08. Decarbonisation – A shift to low-emission pathways is required. The Zero Emission Vehicle mandate, zero-emission HGVs by 2040, with 2,000 zero emission buses in 2025 and TfL’s target is to make its entire bus fleet zero-emission by 2030³.
09. Active travel growth – Cycling journey stages are up 43% since 2019, supported by network expansion and mode shift.
10. Safety – Vision Zero⁴ sets the ambition to eliminate deaths and serious injuries by 2041.

Roads and streets service challenges

11. Bus performance – Average bus speeds remain below the 2030 target by about 1mph, reflecting congestion, roadworks and constrained street space⁵. This affects reliability and undermines mode shift.
12. Road safety – While investment has helped reduce deaths and serious injuries on our roads, TfL and Boroughs still have much further to go to meet Vision Zero targets and eliminate these tragedies.
13. Asset condition – A growing renewals backlog on roads, bridges and tunnels increases the risk to reliability and safety and limits the network's resilience to disruption and extreme weather. Without increased investment in maintenance of existing rail assets, we will not make the most from our investments in trains, tracks, and signalling.

Ports and freight trends

14. Mode shift and connectivity – Policy prioritises shifting freight from road to rail and river, strengthening port links, and leveraging Thames Estuary growth to reduce heavy goods vehicle (HGV) movements and build a low-carbon logistics network.
15. National freight outcomes – A more multimodal National Freight Network is a core aim of the Future of Freight agenda; shifting more goods to rail and other modes could remove approximately 900,000 HGV journeys each year⁶.

Ports and freight service challenges

16. Decarbonisation readiness – Progress depends on Sustainable Aviation Fuel (SAF) supply and investment; technology gaps remain on the path to zero-emission operations.
17. Aviation – Aviation expansion is not directly considered within the LIF, because decisions on aviation expansion are taken at a national level. The GLA is supportive of enhancing public transport connectivity to airports as well as decarbonising aviation. Southern and Western rail access to Heathrow would need to be considered as a part of any expansion at Heathrow.

Energy



Electricity infrastructure works
Credit: SSEN

Energy



Trends & service challenges

Network transmission & distribution trends

01. System build-out – National Grid’s RIIO (Revenue = Incentives + Innovation + Outputs) – T3 plans⁷ prioritise major reinforcements and new capacity to connect offshore wind, storage and large demand users (e.g., data centres and industrial processes). Electricity and gas network investments of this kind are funded through established regulatory price-control mechanisms, providing the long-term certainty needed for networks to plan, finance and deliver major upgrades.
02. Decarbonised supply mix – Clean Power 2030 sets a clear mandate for growth in offshore wind, nuclear, solar and low-carbon flexibility, while gas networks continue to play an important transitional role, supporting system reliability, enabling heat network development and providing flexibility as low-carbon heat sources and electrification scale up. Renewable and low-carbon capacity is forecast to make up the electricity mix over the next decade.
03. Regional coordination – Ofgem’s Regional Energy Strategic Planning (RESP) introduces regional plans to better coordinate investment and sequencing. The Transitional RESP (tRESP) was published in January 2026, with full RESP plans due by late 2028. These regional plans will sit underneath and help deliver key national frameworks, including the Clean Power 2030 ambition and the Strategic Spatial Energy Plan (SSEP).

Network transmission & distribution challenges

04. Capacity lag – If demand from electrified transport, heat, storage and distributed generation outpaces the network’s investment plans, it could potentially widen the gap between London’s needs and deliverable capacity and reliability of supply. The impact on small and medium enterprises can be significant as they are often unable to fund work to mitigate network constraints. DNOs encourage early engagement on connection applications to enable long-term capacity where it is needed.
05. Peak pressures – Demand Side Response (DSR) measures can reduce peak electricity demand. Positively, DSR has grown in recent years with 23% of DSR capacity now coming from domestic households, however more is required to unlock this opportunity. Increased levels of flexibility in London’s energy system can reduce the required capital investment to reinforce electricity infrastructure⁸.
06. Spatial constraints – Limited headroom at key substations, particularly in parts of the SSEN network (located within West London) creates a growing risk that housing, commercial development, and the electrification of bus garages and other large transport depots could advance faster than networks can deliver new capacity, causing delays to connection and rollout. Similar risks should be monitored in other high-growth areas such as the Isle of Dogs, where a new substation is required by 2030. Accordingly, DNOs are actively engaged in spatial planning processes at both the pan-London and borough scales.

Heat network trends

- 07. Waste-heat first – Increasing focus on recovering heat from Energy-from-Waste plants, sewage treatment works, data centres, transformers and industrial processes, as these sources improve project economics and make use of London’s unusually large and diverse waste-heat resources, positioning the city well for expanding low-carbon heat networks.
- 08. Heat Network Zoning – Zoning, supported by Advanced Zoning Pilots, Green Heat Network Fund (GHNF) funding, and borough- and sub-regional Local Area Energy Plan (LAEP)-led heat network planning, is enabling the shift from isolated schemes to coordinate, multi-borough networks. Seven Strategic Areas with substantial waste-heat resources have been identified across London, with potential to deliver approximately 40 million tonnes of carbon savings over 40 years⁹. London Councils and the GLA are also developing a zone coordination framework to guide consistent, London-wide implementation of zoning, actively shaping how heat network infrastructure is planned and delivered across the city. These strategic enablers are accelerating borough development pipelines and creating clear delivery pathways for larger, more commercially viable networks.
- 09. Delivery pathway – Under the Mayor’s Accelerated Green 2030 Net Zero pathway, heat networks would need to reach around 460,000 domestic connections by 2030 (alongside approximately 2.2 million heat pumps¹⁰ with borough activity scaling rapidly through new zoning work, updated masterplans and strengthened programme capacity.

Heat network challenges

- 10. Scaling to multi-borough delivery – Moving from borough schemes to strategic, cross-borough networks can be challenging. While zoning, Advanced Zoning Pilots, and the emerging London Councils - GLA zone coordination framework address part of the challenge, larger networks will require long-term stewardship, including in many cases through an infrastructure promoter.
- 11. Commercial viability – Business cases remain sensitive to the electricity-gas price differential, electricity network connection charges and the availability of capital support to de-risk anchor loads¹¹.
- 12. Planning and delivery environment – Strategic networks face consenting and coordination hurdles including securing sites for energy centres and thermal storage, routing trunk mains through constrained corridors, and synchronising works with other utilities and highways to programme, permit and deliver at pace.

Net zero infrastructure trends

- 13. Transport electrification – For London to meet the 2030 net-zero carbon city ambition, rapid growth in EV infrastructure is required. TfL forecast requirement of between 43,000 and 51,000 public charge points by 2030¹², and a major acceleration in bus garage electrification will also be required.

- 14.** Distributed renewables – Solar PV deployment is accelerating; national ambitions under the Clean Power 2030 Action Plan target 45–47 GW solar by 2030¹³ and the Mayor’s Accelerated Green Pathway indicates that 1.5 GW rooftop solar would be needed by 2030. Borough-level schemes demonstrate a growing pipeline of borough-led solar projects, complementing strong growth in small-scale PV paired with batteries observed in DNO data.
- 15.** Flexibility and storage expansion – Flexibility solutions and battery storage are becoming increasingly important to manage rising electrification and variable renewable output. Local flexibility markets, demand-side response and distributed storage identified through LAEPs are essential to reducing peak loads, enabling more cost-effective network reinforcement and supporting system resilience.
- 18.** Capacity constraints – Electricity capacity is constrained in several growth locations, limiting the pace of electrification.
- 19.** Skills and delivery capacity – LAEPs highlight a shortage of trained labour across design, construction, reinforcement and operation and maintenance for future energy assets.
- 20.** Investment-ready projects – Although policy direction is strong, many net zero schemes lack the commercial structuring to reach investment readiness. National reviews highlight the need for a stable, prioritised pipeline and clearer risk allocation to attract private finance at scale.
- 21.** Economic and financial context – The high electricity-to-gas price ratio (the ‘spark gap’) constrains the affordability of electrification, particularly for heat pumps.

Net zero infrastructure challenges

- 16.** Under-used rooftops – viable rooftop solar capacity remains undeveloped due to grid constraints, upfront capital costs and planning requirements.
- 17.** Network readiness – Electricity capacity is constrained in several growth locations, notably West London. Nationally, connections queues now exceed 700 GW, outpacing even ambitious forecasts and limiting networks’ ability to connect the electrification and clean-power projects needed to meet decarbonisation targets. This has knock-on impacts, for example, on zero emissions buses, which require certainty of electricity supply for charging.
- 22.** Storage and flexibility – Limited of storage and local flexibility reduces London’s ability to optimise renewable generation and manage peak demand.

Water, wastewater & flood risk



Proposed Reservoir in Oxfordshire

Credit: Thames Water

Water, wastewater & flood risk



Trends & service challenges

Water resource: source, supply, and demand sector trends

- 01.** Demand reduction and efficiency – UK targets a reduction in consumption from 137 litres to 110 litres per person per day by 2050, enabled by widespread smart metering and leakage reduction. The requirement for future water resource projects depends on the level of reduction through adaptive pathways.
- 02.** Supply requirement – Moving to 1-in-500-year drought resilience by 2040 to ensure a secure supply under more extreme conditions, but this increases water supply requirements.
- 03.** Strategic diversification – Environmental Destination scenarios are developed by the Environment Agency; these include future abstraction licence reductions as some abstraction licences that were issued at rates that did not protect the environment. The licence changes results in the largest additional water need in the Southeast, impacting both Affinity and Thames Water. Reducing abstraction requires new water resource options to be developed with emerging plans for new reservoirs, water recycling and regional transfers.

Water resource: source, supply, and demand challenges

- 04.** Severe water stress – The Southeast Region including Greater London and the supply areas of Affinity and Thames Water are classified by the Environment Agency as seriously water stressed, raising the risk of supply shortfalls.
- 05.** Delivery pace and affordability – The speed of delivering new infrastructure is limited by the need to keep bills affordable and by the realities of delivering major works in a dense city with congestion, complex permitting and co-located critical utilities.
- 06.** Asset deficit – The age of the network, with much of the network nearing end of life increases failure risk and reinforces the case for renewal; Thames Water's cast-iron mains alone are associated with an asset health deficit of approximately £19.3 billion.

Drainage and wastewater trends

07. Wastewater pollutants – Environmental targets and legislation are driving improvement in Wastewater capacity and treatment discharge. The Environment Act 2021 contains binding duties for storm overflow discharges and strengthened phosphorus-reduction standards that support improved river health, which create opportunities for recreation in London waterways.
08. Sewer-flood resilience – Protection targeted for more than 187,000 properties to a 1:50 standard, meaning protection against storms with a 2% annual chance of occurring, backed by London’s aim for 95% of homes to be free from sewer-flood risk.
09. Nature-based management – Sustained shift toward sustainable drainage systems (SuDS) to control the flow and volume of surface water, and nature-based solutions, to intercept and attenuate surface water before it enters combined sewers.

Drainage and wastewater challenges

10. Rising hydraulic load – Population growth results in urban creep¹⁴ and more impermeable surfaces, increasing rainfall intensity and runoff, pushing networks beyond design capacity.
11. Water-quality pressures – 94% of Thames basin water bodies are classified as less than good, with a significant share of reasons (32%) attributed to water company activities¹⁵.
12. Delivery barriers for SuDS – Scaling sustainable drainage is hindered by fragmented delivery models, market maturity and coordination needs, underscoring the role of city-wide standards and surface water catchment partnerships.
13. Ageing drainage and misconnections – Victorian combined sewers and outdated drainage create capacity shortfalls, misconnections, and risks of sewer flooding in high rainfall.

Flood risk trends

14. Resilience and adaptive pathways – The National Flood and Coastal Erosion Risk Management Strategy shifts emphasis from protection to resilience, embedding adaptive pathways, nature-based solutions and SuDS.
15. Climate pressures – Sea levels could rise by up to 1.15 m by 2100, with wetter winters and drier summers; the number of properties in floodplains is expected to nearly double over the next 50 years, increasing pressure on London’s defences.
16. Surface-water focus – London’s Surface Water Strategy drives proactive action before and after flood events, advancing capture, control and adaptation through catchment-based partnerships.

Flood risk challenges

17. Tidal system strain – Rising sea levels have increased Thames Barrier closures and place long-term pressure on tidal flood defences.
18. Space and discharge constraints – Dense urban form limits options for new defences, while tidelocking increasingly restricts discharge to the tidal Thames at high tide.
19. High surface-water exposure – Around 320,000 properties face high surface-water risk; 13% of homes are in high or medium risk categories, and over 40% of London’s 300,000 commercial properties are exposed.

Waste



Waste depot

Credit: ReLondon

Waste



Trends & service challenges

Residual (non-recyclable) waste trends

01. Energy from Waste (EfW) capacity and policy restraint – EfW has expanded significantly over the past decade, but policy now limits new capacity to avoid over-provision. With the potential expansion the UK Emissions Trading Scheme (ETS) to include emissions from waste incineration facilities, future facilities are required to demonstrate carbon-capture readiness to align with London's decarbonisation objectives.
02. Waste Quantity – The amount of waste arisings will depend on many factors, including population growth, implementation of national reforms, behaviour change and the adoption of circular practices. Future shifts in residual waste levels will depend on further policy development and implementation and the availability of recycling infrastructure.

Residual (non-recyclable) waste service challenges

03. Capacity gaps – In West London, transfer stations are already at or near capacity, with a residual waste gap forecast to exceed 600,000 tonnes per annum by 2031¹⁶.
04. Landfill closures – South London has seen the closure of Beddington landfill and faces closure at Redhill landfill by 2027, increasing reliance on more distant facilities¹⁷.

05. Hazardous waste capacity shortages – East London faces a projected hazardous waste capacity deficit of 18,400 tonnes per annum by 2041¹⁸, while North London has no local landfill capacity and a hazardous waste gap approaching 49,000 tonnes per annum¹⁹. Declining landfill capacity across the wider South East Region compounds these risks²⁰.
06. Extended Producer Responsibility for packaging – Local authorities do not have sufficient powers or influence to significantly reduce the amount of fossil plastic in residual waste. Even with the Simpler Recycling reforms and Packaging EPR, there will remain a large amount of fossil-based waste not covered by producer responsibility regimes. The ETS will therefore represent additional costs to local authorities that they will not be able to mitigate. The LGA has estimated that local authorities could collectively face costs of nearly £750m in the first year of the ETS, rising to £1.1bn by 2036.
07. Carbon pricing – From 2028, EfW is expected to enter the UK Emissions Trading Scheme, creating strong incentives to remove plastics and other fossil-based materials from residual waste streams. Whilst this has an important decarbonisation objective, scheme design must recognise and address how incentive structures would operate in a system where local authorities are legally obliged to collect and dispose of residual waste and are in long-term contracts for disposal, there is no route for the financial price point to impact on consumer behaviour, and where the market for flexible plastic recycling is limited.

Recyclable and organic waste trends

08. Anaerobic digestion (AD) – AD remains critical for unavoidable food waste that is inedible and cannot be prevented at source, supported by borough site safeguarding policies and strengthened by post-2028 biomethane policy supporting renewable gas production. Demand for AD capacity is expected to rise as Simpler Recycling requires weekly household food waste collections for all properties by April 2026, significantly increasing the volume of separately collected food waste entering the system.
09. Data and transparency – Mandatory digital waste tracking from 2026 will enhance oversight of commercial and municipal waste flows, supporting better planning and compliance.
10. Growth in recyclable streams – National forecasts indicate significant growth in recyclable materials by 2035, particularly plastics (+52%) and food waste (+100%), reflecting both changes in consumption patterns and the expansion of consistent household food waste collections under Simpler Recycling, increasing pressure on collection and processing systems²¹.

Recyclable and organic waste service challenges

11. Collection, contamination and capture challenges – London continues to face persistent challenges in capturing high-quality recyclable materials. Municipal recycling rates remain at 32.7%, driven by high contamination in dense housing and flatted developments, where shared communal systems and limited bin storage reduce individual accountability and material quality. Data gaps compound these issues; despite forthcoming digital waste tracking, boroughs and the GLA still lack reliable, granular information on commercial waste composition and flows across London, limiting the effectiveness of forecasting, infrastructure planning and regulatory oversight.
12. Land and infrastructure capacity constraints – Strong competition for industrial land continues to restrict opportunities for developing new recycling, reuse, repair and treatment facilities. Safeguarding and intensification under London Plan Policy SI9 therefore remain essential. Beyond site availability, circular propositions such as reusable packaging systems, furniture reuse or electronics refurbishment require additional enabling infrastructure, including reverse logistics, consolidation hubs, cleaning facilities and specialist storage. These elements are currently fragmented or absent, slowing the development of scalable circular economy business models.

13. Reuse, repair & circular business model viability – Reuse and repair activity remains constrained by a lack of enabling infrastructure, from collection and sorting through to refurbishment and redistribution, preventing operators from achieving the economies of scale needed for commercial viability. Although demand for essential items is increasing, particularly among lower-income households, current reuse and repair markets generate limited financial returns and deliver value primarily in the form of social benefits. High handling costs, limited standardisation and volatile secondary markets further restrict investment, meaning market forces alone are unlikely to deliver the scale of infrastructure required to support London’s circular economy ambitions.
14. System incentives, governance and performance – Extended Producer Responsibility (EPR) will progressively shift cost and accountability upstream, improving data quality and material outcomes. However, the existing system places significant burdens on consumers and borough services, slowing the transition towards higher-value circular solutions such as reuse and high-quality recycling. At the same time, London lacks consistent, sector-wide monitoring and evaluation frameworks for circular economy interventions. This absence of robust M&E limits the city’s ability to demonstrate performance, assess scalability, or attract sustained investment into reuse, repair and recycling models.

Digital connectivity & data centres



Installation of underground cabling

Credit: Transport for London

Digital connectivity & data centres



Trends & service challenges

Wired infrastructure trends

- 01.** Gigabit capable infrastructure – Delivery of gigabit infrastructure is accelerating, aligned with the national target for 99% of premises to have gigabit-capable connectivity by 2032. This will offer Londoners faster broadband speeds, improved reliability of connection, and consistent performance regardless of distance from the street cabinet. Without timely delivery, some homes risk losing service altogether as the copper network is phased out.
- 02.** Dark Fibre Backbone – Dark Fibre Backbone future-proofs areas for digital growth, enabling connectivity to keep pace with rapid housing and population growth, as well as connections for commercial development, internet service providers, mobile operators, public services and data centres.
- 03.** Public-sector grant investment – Alongside commercial activity, targeted grant-funded programmes are helping to accelerate digital connectivity in areas where the market alone cannot deliver. Initiatives such as the Mayor of London-supported fibre projects alongside borough leveraging contracts to anchor commercial investment, have enabled upgrades to key public-service sites to leverage commercial investment in boroughs that would otherwise not have benefited from these investments.

Wired infrastructure challenges

- 04.** Uneven rollout and take-up – Persistent disparities remain in fibre rollout with 390,000 premises across London remain unserved.
- 05.** Commercial viability – The remaining locations without gigabit infrastructure are likely to be commercially unviable due to the cost of delivery or a low expected return due to slow customer adoption, unwillingness, or inability to upgrade. These factors mean that a grant or subsidy would be required to deliver new broadband services, slowing infill.
- 06.** Fragmented delivery – Multiple planning, permitting and highways processes across 32 boroughs raise time and cost, with limited pan-London funding tools compared with other regions.

Wireless infrastructure trends

07. Rising demand – Mobile data demand in London is set to rise sharply, with usage forecast to increase fourteen-fold by 2035²², while current investment plans will only increase by six-fold. This, combined with the removal of Huawei 5G equipment, indicates there is a significant gap in upgrade requirements across mobile networks.
08. Delivery models – The TfL–Boldyn long-term partnership to offer connectivity across the tube network also represents an emerging delivery model supporting innovative public-private partnerships.
09. Assistive and Monitoring Technology – Technology requires a reliable digital connection to improve quality of life, decrease the requirement on public services, lower carbon emissions, and improve outcomes.

Wireless infrastructure challenges

10. User experience gap – A large share of Londoners report poor user experience indoors and in busy places, and independent benchmarking shows 5G performance lagging other major European and UK cities²³.
11. Planning friction – Approval rates for mobile infrastructure remain low, with refusals frequently citing visual impact and heritage/design concerns.
12. Site loss – Notice to Quit²⁴ on rooftop phone masts linked to redevelopment, and subsequent difficulties in identifying and agreeing replacement locations with site providers, is eroding capacity and creating localised coverage gaps.
13. Slow take up of small cell sites – While neutral host operators have secured agreements to deploy small cells (mini masts) on street furniture in busy places with poor network capacity, take up of these locations by operators has been slow.

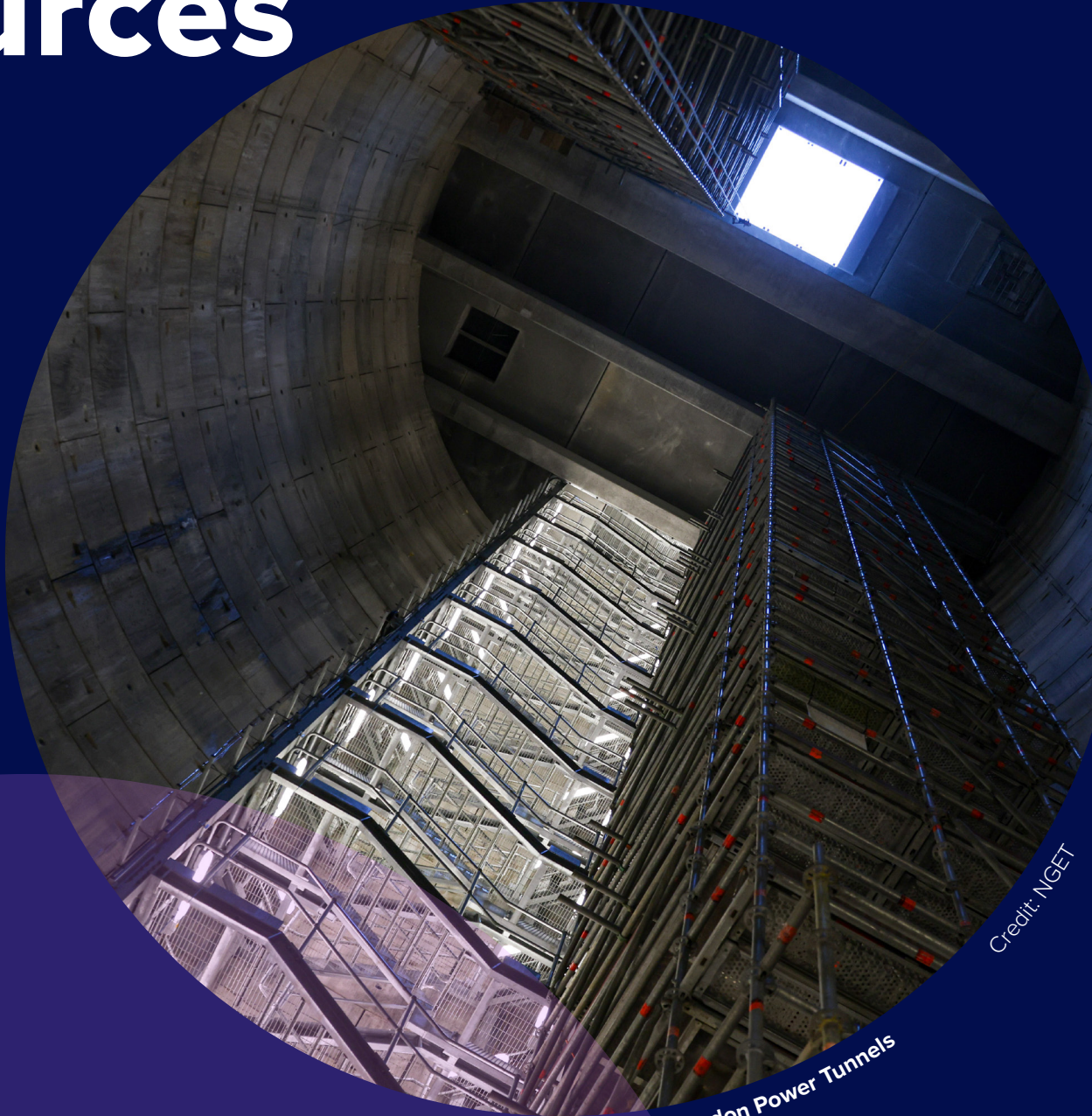
Data centres trends

14. Global market strength – London ranks among the top data centre markets and anchors the UK Compute Roadmap²⁵, to triple national capacity to around 6 GW by 2030. London was estimated to have 1,000 MW of data centre capacity in Autumn 2024²⁶, with 180MW delivered in 2025²⁷, with Manchester the next largest cluster with 24GW²⁸.
15. Rising demand – Data centre connections have already led to grid capacity constraints, as growth continues to be concentrated in accessible areas with strong digital connections such as Slough. The growth of these clusters has created grid capacity constraints, particularly in West London underscoring the need for high-capacity, resilient power, robust cooling and dense connectivity.

Data centres challenges

16. Location and power constraints – West London cluster saturation, limited land and constrained grid capacity are driving long connection queues and intensifying energy demand tensions with housing and commercial development.
17. Water and evidence gaps – There is limited tracking of water consumption by data centres, and uncertainty about the type of cooling systems use creates uncertainty regarding water requirement, especially as water-cooled data centres are using potable water for cooling. Having more accurate information would enable AI-driven water demand to be integrated into water resource planning effectively.
18. Growth Coordination – The pace of the delivery for data centres brings challenge to coordinate delivery with other infrastructure such as heat networks and energy infrastructure, reducing the value to the local area.

Endnotes and Sources



London Power Tunnels

Credit: NGET

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