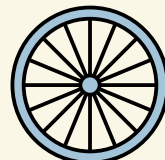
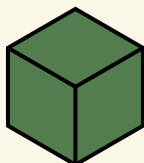
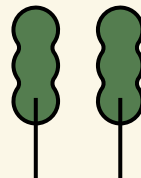
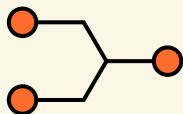
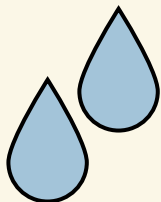




REPOWER LONDON

Infrastructure for
growth



"Blending a local approach to decarbonising our energy system with the major changes at national level will be critical to the success of this vital mission. This report is a great contribution to the debate about how to make this work best."

Nick Winser UK's Electricity Networks
Commissioner



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CONTENTS

| | |
|--|------------|
| Forewords | 04 |
| Executive Summary | 06 |
| 1 Setting the Scene | 08 |
| 2 Types of Infrastructure | 30 |
| 1. Energy | |
| 2. Transport | |
| 3. Digital | |
| 4. Logistics | |
| 5. Water | |
| 6. Green | |
| 3 Delivering a 'Place-Based' Approach | 98 |
| Conclusion | 122 |
| Project Showcase | 124 |
| Endnotes | 176 |
| Further Reading | 179 |
| Acknowledgments | 180 |

Sadie Morgan,
Senior Advisor, NLA &
National Infrastructure
Commissioner



As London continues to grow unprecedentedly, whilst committing itself to a low-carbon future, the city faces the complex task of transforming its outdated and overstrained infrastructure. This task also presents an opportunity to transform the processes and projects by which it is planned and delivered. A new ethos is emerging — infrastructure no longer needs to be a top-down and omnipresent system but a multifunctional tool for affecting positive change in our day-to-day quality of life.

Repower London: Infrastructure for growth does not try to solve the problem of how to shift generations of infrastructural policy, funding models and typical design solutions toward our new ethos. Instead, it lays out an approach that details how to effectively overlap the many players in our built environment industry to coordinate knowledge, creatively collaborate and celebrate their work in a way that is contextually meaningful for the diverse communities of this city.

This place-based approach to infrastructural development centres on site-specific solutions, allowing for more adaptability and thus resilience to an uncertain future. By better recognising the socioeconomic and environmental context of London's differing neighbourhoods, we can layer and co-locate systems to deliver projects that are multifunctional, versatile and long-lasting. From here we can also drive innovative and aesthetic design solutions that foster local interest and pride.

Ultimately, this report calls for more sensitivity in the way that we think about and deliver our infrastructure. The many disciplines that contribute to our built environment hold this knowledge, but rarely do we achieve the coordination needed for this to come to fruition. The creation of local heat networks are a pressing example of this, individual boroughs are currently navigating this highly complex process without any centralised knowledge or pooling of resources despite their critical implication in the city's decarbonisation. Another is data centre placement, which, again, local boroughs are handling alone through traditional planning applications. These facilities place substantial strain on the city's electricity grid and risk vulnerabilities.

Broader collaboration and bottom-up thinking will result in macro strategies with micro solutions. It will also widen the ways in which the success of infrastructure projects are measured. Londoners can expect consideration of not only their commute time or household water usage, but also gains that relate to their health and wellbeing. This report makes practical recommendations to this end, and I look forward to seeing NLA's next steps.

Catherine Staniland,
Director, NLA



As London's political leaders prepare its Growth Plan, it is clear that London's infrastructure has fast become a key limiter of the capital's growth.

Chronic underinvestment and a lack of political alignment (at least until this years' General Election) has seen major transport projects stall, while rapid societal and economic trends have led to vast transformations in our requirements for energy, data and logistics. If we want to deliver the housing and quality of life Londoners so urgently need, improving the city's infrastructure must become a priority for our policy-makers and for our industry.

Aligning all this is the need for London to rapidly decarbonise, which requires careful, coordinated thinking, and which cannot be achieved in siloes.

At the beginning of this year, we launched the New London Agenda — our framework for best practice in city-making. Now, as we stand at the beginning of both a new development cycle and a new political cycle, we have the opportunity to bring the principles of the New London Agenda to life, working together to deliver the infrastructure we need with a place-based lens.

In this report, we call for more holistic and place-based thinking to deliver London's future infrastructure needs. We must work together, across sectors, to recognise the mutual gains to be had from co-locating our infrastructure assets, the role that 'softer'

green infrastructure can play, and the opportunities for infrastructure to positively contribute to our neighbourhoods. All this requires design ingenuity, new funding models, and innovative approaches to planning. No longer can we afford to build infrastructure with a single purpose.

Our definition of critical infrastructure is changing too and in this report we call for affordable housing to be added to this definition, aiding us in taking a longer-term view that transcends political cycles.

To do all this effectively, we believe the layers of local thinking demonstrated throughout this report need to be supported by a coherent place-based infrastructure plan for London, including affordable housing, which is focused on driving growth and productivity in all corners of the city.

Over the following months, and in the lead up to the launch of the Growth Plan and revised London Plan, our Expert Panels and wider community will help to coordinate knowledge and translate this approach spatially across the capital — supporting our mission to deliver a more equitable, sustainable and prosperous city for all Londoners.

EXECUTIVE SUMMARY

London's infrastructure is deteriorating, becoming a major constraint on the capital's growth. As the new Labour government gets to work to 'rebuild Britain', NLA sets out key recommendations to decarbonise and deliver the infrastructure that runs London.

London is kept in motion by complex layers of overlapping infrastructure, both above and below ground. This proximity presents opportunities for a coordinated approach to infrastructure provision, by co-locating infrastructure and designing it in such a way that it serves multiple functions. For this, a focused place-based approach is required, taking into account the optimal scale of delivery and forecasting the community's range of infrastructural needs, all in the context of the energy transition.

The infrastructure we build must be innovative and adaptable to respond to a complex and evolving context, requiring experimentation and interdisciplinary collaboration. To meet this challenge, we must ambitiously rethink the ways we work as a built environment community, forging new collaborative partnerships, training a workforce for the green economy, and taking heed of community leadership.

This holistic approach makes way for a leaner London — driving growth, sustainability, prosperity and equity in the capital. This report captures the following recommendations →

| | | |
|--|---|---|
| <div>1</div> <div>Cultivate cross-boundary coordination</div> <div>Greater collaboration between boroughs and at sub-regional, city-wide and national levels to realise the possibilities of place-based and multi-functionary infrastructure.</div> | <div>2</div> <div>Develop strong partnerships</div> <div>Build new partnerships between the public, private and non-profit sector to drive innovation in infrastructure provision, maintenance and design.</div> | <div>3</div> <div>Break down silos</div> <div>Structure governmental and administrative entities to incentivise collaboration, cross pollination and interdisciplinary thinking to address issues at a system scale.</div> |
| <div>4</div> <div>Choose the right size and scale</div> <div>Find the optimal scale of project and governance for the type of infrastructure you are delivering.</div> | <div>5</div> <div>Train the future workforce</div> <div>Create a workforce that is capable of specifying, building, maintaining and decarbonising critical pieces of London's infrastructure.</div> | <div>6</div> <div>Harness community leadership</div> <div>Build support, trust and understanding through engaging communities at early stages of infrastructure planning processes and by placing them at the heart of design and implementation.</div> |
| <div>7</div> <div>Celebrate infrastructure as civil amenity</div> <div>Design infrastructure to be functional, beautiful, and visible to people so it can be used to educate and build awareness.</div> | <div>8</div> <div>Build in adaptability</div> <div>Do not build for a finished state, but rather build in a way that allows for incremental change and adaptation to respond to changing requirements and contexts.</div> | <div>9</div> <div>Innovate in funding models</div> <div>Provide clarity to infrastructure planners about funding and seek new sources through new innovative funding models.</div> |
| <div>10</div> <div>Test ideas and refine</div> <div>Try new ideas out with quick, cost-effective projects, and then refine incrementally.</div> | <div>11</div> <div>Co-locate infrastructure</div> <div>Understand how spatially adjacent infrastructures can symbiotically support each other.</div> | <div>12</div> <div>City-wide coordination</div> <div>Greater leadership and coordination at a city-wide scale to enable knowledge sharing and a more efficient deployment of resources.</div> |

1

SETTING THE SCENE

INTRODUCTION

From Victorian era sewers and train lines to mediaeval streets and waterways, London's infrastructure is ageing and has suffered from a chronic lack of investment over recent decades. Once a source of national pride, it is fast becoming a key limiter of growth, stymying the capital's ability to meet the compounding challenges of the housing crisis, a changing climate, the cost of living and the economic uncertainty resulting from Brexit. Housing projects have been delayed due to a lack of access to power from the grid, and efforts to decarbonise the heating of buildings through district heat networks and green innovations are slow to implement in current administrative structures. Financing the construction and rehabilitation of infrastructure is also a key issue. The 2013 NLA report "Planes, Trains and Drains" noted the need for London to find new means to fund infrastructure through increased private sector investment and new public-private partnership models, 11 years later, this is perhaps more salient than ever if London's infrastructure is to meet the challenges it faces.






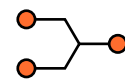
The election of a new Labour government in July 2024 has further pushed the issue of infrastructure to national significance with a key Labour manifesto pledge being to "Make Britain a clean energy superpower".¹ The connection between infrastructure delivery, housing and responding to climate change was further underlined in the King's Speech: "My ministers will get Britain building, including through planning reform, as they seek to accelerate the delivery of

high-quality infrastructure and housing. They will also pursue sustainable growth by encouraging investment in industry, skills and new technologies."²

A new approach to deliver and improve London's infrastructure needs to be developed to meet the challenges of climate change and a rapidly shifting social, political and economic context. This approach may be more focused on a community driven model, allowing London to think innovatively and collectively about what the infrastructure of the future will look like in order to support a more equitable, sustainable and prosperous city.

In the context of the energy transition, the next generation of London's infrastructure may look very different, and must be more 'place-based', with site specific solutions and infrastructure delivered in local contexts where it can serve multiple functions in a symbiotic way. This new approach to infrastructure planning and provision will require new levels of coordination and collaboration, across political boundaries and between built environment disciplines that have previously been siloed.

Forecasting London's Infrastructure needs

| | |
|--|--|
|  20% Increase in energy supply needed by 2050 ³ |  50% Increase in public transport capacity needed by 2050 ³ |
|  26% Increase in water supply needed to meet demand by 2050 ³ |  900M Weekly parcel deliveries by 2050 ⁴ |
|  10% increase in tree cover targeted by the Mayor by 2050 ⁵ |  600k premises across London that don't have gigabit capable services ⁶ |

DEFINING INFRASTRUCTURE

London's infrastructure drives the city in innumerable ways, from allowing us to move throughout the capital, to heating and cooling our homes to allowing us to deliver goods and connect to the internet. Its purpose can be to enable business activity and economic growth, but it also serves a social function in allowing people to be connected with their friends and families, to find community, to interact with nature and just about every aspect of life.

"Infrastructure is the necessary elements which allow a city, a nation, a neighbourhood to function in line with modern expectations"

Peter O'Brien, Director of Regeneration & Growth for the London Borough of Hounslow

While traditionally, it has been conceived of in terms of bridges, pipes, roads and railway tracks, many practitioners now give a broader definition such that infrastructure could encompass other things like social housing, greenery, open space, and social amenities like community and cultural centres. The Centre for London reports that over 300,000 Londoners are on the waiting list for social housing⁷ and that 1.8m new houses will need to be built by 2040 in order to meet the capital's needs. In this context, Peter O'Brien, Director of

Regeneration and Growth for the London Borough of Hounslow argues that social and affordable housing should actually be considered a form of critical infrastructure, for it is necessary for people to maintain a reasonable standard of living, and that in order to allow workers doing essential but low paid work, they must be able to live in proximity to their jobs: "We need to be on an emergency footing for housing, we should consider social housing as a part of a critical infrastructure and take the politics out of it."

There is an increasing recognition that the future of infrastructure demands a holistic approach in both delivery and planning. We must aim to achieve more with fewer resources, ensuring that what we build is not limited to a single function. This holistic perspective extends beyond technical capability and technology; it also necessitates coordination and multidisciplinary collaboration.

No longer can we afford to build transportation infrastructure with a single purpose — for example, a road to move cars. We must think about how this infrastructure impacts on the social lives of citizens, the way it influences travel decisions and their resultant carbon impact, the way it manages stormwater flooding, and the protection for those walking or cycling in extreme heat.

This new approach to the planning, delivery and implementation of infrastructure becomes ever more pressing as London faces multiple challenges:

responding to climate change, an ageing population, an uncertain growth, reduced government spending, skill shortages in new technologies, crumbling Victorian infrastructure, increased extreme weather events, a housing crisis and a need to maintain London's competitiveness in the global market.

Building infrastructure that addresses these multiple needs requires a level of joined-up thinking across scales of governance not seen before. At the hyper local level, solar panels and insulation might be installed in a private residence, at the borough level, the council may deliver a local heat network, a local area energy plans may be delivered at the subregional scale and at the national scale, decisions about sustainable power generation and energy security must be considered.

Bringing together diverse sectors will also be essential, requiring policy and planning to coordinate the intricate interactions and relationships between consumers, private enterprises, and public entities. This all must happen in a policy environment with ambitious national targets to meet for decarbonization, and even more ambitious targets set by the Mayor of London.

THE CONTEXTUAL CHALLENGES FACING LONDON'S INFRASTRUCTURE

The need to imagine new approaches to delivery and maintenance of infrastructure are more prescient than ever with London's infrastructure facing numerous and coalescing challenges. Here we highlight some of the key contextual challenges that London's infrastructure must face.

Climate Change

Climate change is perhaps the clearest challenge facing London, necessitating infrastructural overhaul on three levels. Firstly, to meet the Mayor's 2030 carbon neutrality target, infrastructure must be redesigned to enable low carbon lifestyles, particularly by decarbonising buildings' heating and cooling systems from fossil fuels to electrified systems. This shift will increase electricity consumption and require an upgraded transmission grid. This change must be supported nationally by a shift to renewable energy generation, highlighting the need for a multi-scalar approach.

Infrastructure is also key in creating the necessary adaptations to allow us to live with a changing climate. In many cases, our existing infrastructure exacerbates new

problems that are created by a changing climate — the large areas of tarmac that form most of our street network contribute to the urban heat island effect, as well as cloud burst flooding events.

Already, one in 10 households in the capital are struggling to afford to pay their energy bills and heat their home in the winter months.⁸ Tackling fuel poverty will only become more challenging as warmer summers and colder winters lead to increased power consumption resulting in a greater strain on energy infrastructure. Moreover, extreme weather events such as flooding, and heat waves are set to cause increased damage and disruption to existing infrastructures.

Ageing Infrastructures

Much of London's critical rail infrastructure, including bridges, embankments, and tunnels, were built over 150 years ago and are now falling into disrepair. Population growth has also strained older infrastructures — London's sewer system was originally designed in 1875 to serve a population of 3.7 million compared to



Thames Barrier (Roger Walters, 1982), has been in operation since 1982, but The London Climate Resilience Review suggest that it will need to be replaced by 2070. © John Gilham / Adobe Stock

today's population of around 8.9 million. London's critical infrastructures are reaching a point of no return at which key decisions must be made about whether to make large investments in rebuilding them entirely as new mega projects, whether they are allowed to fall into disrepair entirely or whether to begin upgrading them incrementally. The Thames Tideway Tunnel project is an example of large-scale investment in new infrastructure, but a lack of political will and financing may mean such large-scale initiatives are not feasible in the future. Even newer infrastructure, like the Thames Barrier opened in 1982, may soon become obsolete due to rising sea levels. The London Climate Resilience Review suggests it will need replacement by 2070, highlighting a series of key questions: for what scenario are we building our infrastructure? How can we build flexibility into these types of infrastructures such that they can respond to a changing climate?

Long Term Planning

"London's infrastructure is creaking under the weight of its population. Policymakers have to shake off any assumption that population changes mean questions over the housing shortage and infrastructure will solve themselves. Delays to big infrastructure projects and housing delivery will constrain London's potential." Andrew Carter, Chief Executive of Centre for Cities.⁹

London's 2023 population reached 8.95 million, rebounding after changes related to domestic and international migration due to the COVID-19 pandemic, Brexit, and the war in Ukraine. With increased birth rates and longer life expectancy, it is expected to grow to around 11 million by 2050. In this context, a failure to plan for long term growth projections stymies infrastructure provision in a number of ways.¹⁰

For the public sector, stop-start funding cycles from central government inhibits

local authorities' ability to deliver projects due to uncertainty about when funding will become available. Similarly, Molly Strauss, Head of Infrastructure for the Greater London Authority (GLA), notes that a lack of future planning creates a disincentive for private infrastructure providers to invest in their infrastructure, since they are penalised by regulators for investing unnecessarily.

"If the utility companies knew with 100 per cent certainty about what was going to happen, they would be better able to invest in the infrastructure and be better able to deliver it."

Molly Strauss, Head of Infrastructure for the GLA

In this vein, Deputy Chair of the National Infrastructure Commission, Julia Prescott notes the need for clarity from central government subsidies, specifically in relation to the heat transition: "There needs to be a clear national strategy and clarity on government subsidies for the heat transition, to inform detailed local delivery plans and pipelines of specific projects. This would provide greater certainty for businesses to invest in scaling up their supply and labour chains and provide investors with a more attractive proposition."

Complex Models for Financing and Maintaining Infrastructure

London's infrastructures have been built by a wide variety of models involving both public and private financing throughout its history. Some older infrastructures, like railways, were privately built, while others, such as the sewer system and paved streets, resulted from public investment. Today, infrastructure projects like the Elizabeth line and Thames Tideway use diverse funding mechanisms, including government funds, user charges, and public-private partnerships.

Management and maintenance involve a similarly complex arrangement. For example, the physical rail network is managed by public bodies, Transport for London (TfL) and Network Rail, with a variety of public and private operators running the train services. Electricity is split between various public and private bodies involved in the maintenance of the physical infrastructures and delivery of power to homes and businesses. This complex, fragmented system hinders strategic coordination and realisation of synergistic benefits, with different actors often measuring success with narrow metrics, neglecting broader potential gains like health, biodiversity and broader social outcomes.

Political and Administrative Boundaries

The semi-arbitrary political and administrative boundaries further complicate the planning and management of infrastructure. In many cases, infrastructural boundaries do not align with administrative and political boundaries. For example, District Network Operators and the electricity grid cross multiple boroughs but

the scale at which planning decisions are made about land use comes at a borough level. This can lead to situations where the electricity grid is put under enormous strain by high energy uses (e.g. data centres) but management of the grid happens at a different scale.

In other cases, the actual implementation of infrastructure may happen at too high a scale of governance, leading to top-down solutions that do not necessarily take into account local context and needs of a community. The converse of this, where too much delegation of responsibility to lower levels of governance such that things that would be more efficient to produce at a higher level are having to be worked out individually at a local level. For example, the creation of local area heat networks is a highly complex and long-winded process, but at the moment, many boroughs are individually navigating this process, which could benefit from more centralised coordination of resources and knowledge.

MOVING TOWARDS A NEW PLACE- BASED APPROACH

The recent election of a new Labour government potentially heralds large shifts in national policy around infrastructure with proposals for planning reform⁸ and new national bodies to oversee both power (Great British Energy) and rail (Great British Railways). Labour has also proposed the formation of a new body, the National Infrastructure and Service Transformation Authority (NISTA) that would combine the Infrastructure and Projects Authority and the National Infrastructure Commission. These shifts in national policy and structures will likely have ripple effects in the way that London delivers and manages its infrastructure. The proposed reforms are not however a silver bullet, and finances are still constricted with some infrastructural projects already being cut.¹¹

In this context, there is still an urgent need to move beyond traditional approaches to the delivery, management and maintenance of infrastructure and in order to address the challenges noted earlier in this chapter. This will require a reconceptualization of how we think about not only what constitutes infrastructure but also how we imagine its financing and implementation. Artur Carulla, Partner at Allies and Morrison argues that

we must shift to thinking of infrastructure as “alive, evolving, adaptable and fluid”. In traditional approaches we have imagined infrastructure to be huge single investments at specific moments in time with decades or century long lifespans. In this new conception, it is argued that infrastructure should be built in a way that allows it to be adapted and upgraded in response to shifting contextual factors.

Infrastructure should also be imagined as multi-functional — rather than building in a way that it only solves one issue, infrastructure should be designed so that it can serve multiple community needs. For example, rather than building a flood wall, building a park that raises the land height to protect against floods, but also serves as a retention basin, as an amenity for the community and as space for trees that can sequester carbon and provide increased shade to mitigate the urban heat island effect. Building confidence in this approach will require alignment on values and goals, more accurate forecasting of future needs as well as new innovative models for financing and collaboration across sectors and scales. This forms part of a ‘place-based’ approach, which can



At the Olympic Park (LDA Design, 2016), the largest new urban park for more than a century was created, providing green space, alongside flood protection from the nearby river Lea. © Hopkins Architects / Nathaniel Moore

be defined as delivering infrastructure in a way that is tailored to the specific characteristics, needs, and contexts of a particular community, rather than applying uniform solutions across the city in a top-down manner.

"Place-based solutions are about how you scale from a national level, down to a local level. Thinking about how these infrastructure outcomes come together in a local context and the benefits they provide to the community is crucial."

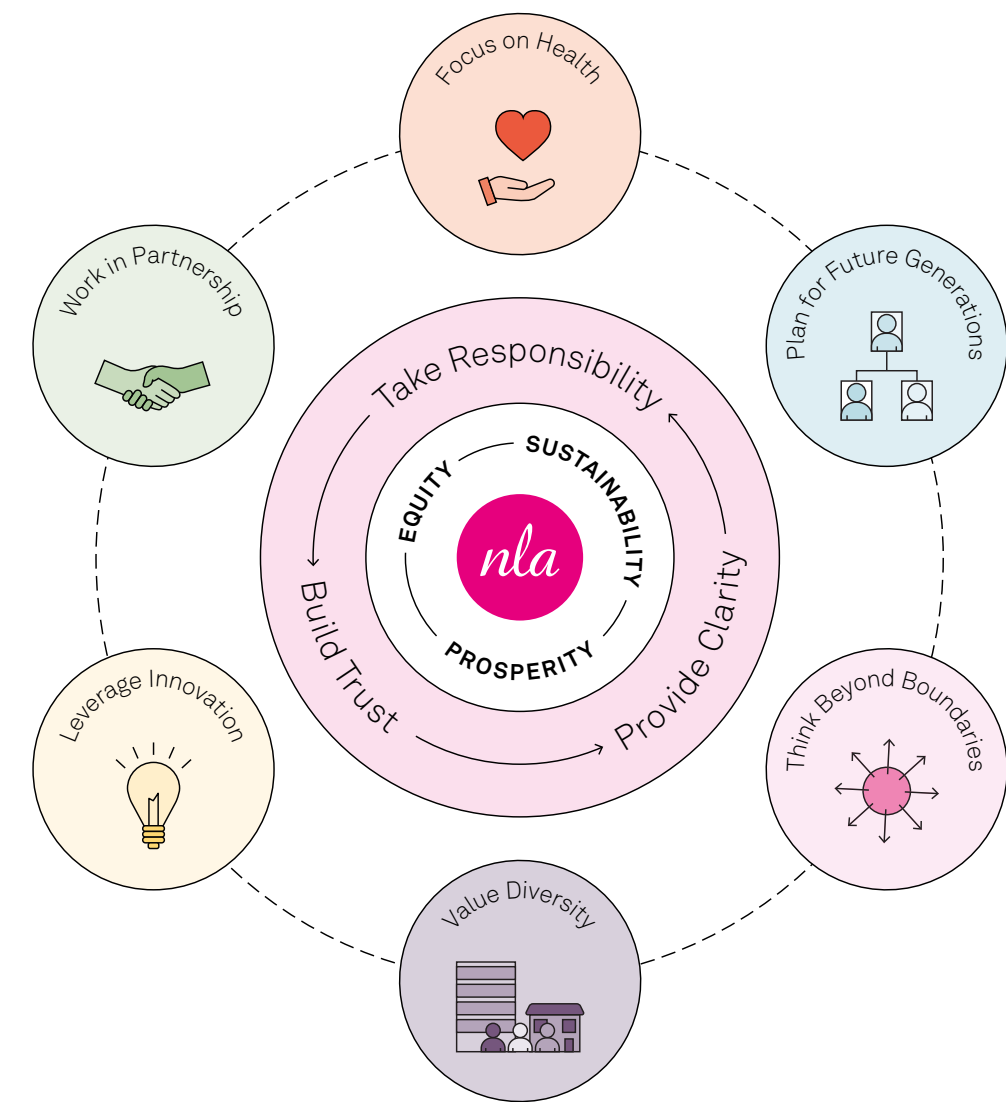
Dr Katherine Ibbotson, Director within the Strategic Advisory Team at WSP

Many practitioners argue for a more people centric approach to thinking about infrastructure — not only in thinking about how it impacts communities but also in public understanding of how infrastructure impacts upon their lives and to help people to understand the cost that their use of infrastructure has on the planet. In this vein, Camilla Siggaard Andersen, Practice Lead at Hassell, cautions against an over-focus on simply “decarbonising” infrastructure without addressing the root causes of the climate crisis:

“The way infrastructure is integrated within communities is as important as its apparent decarbonisation. In today’s world, the critical systems that support our everyday lives are largely invisible to the public. This invisibility often leads to an unconscious consumption of the planet’s resources without a full understanding of the implications. Actions such as streaming a movie, filling a bathtub, or using a dishwasher have impacts on our data, water, and electricity networks, yet

we are largely unaware of these effects. I believe there is a tremendous opportunity to redesign our infrastructure networks as neighbourhood amenities, in a way that encourages behavioural change and empowers communities to take positive action through their daily routines. This, in turn, could also make the goal of decarbonisation more achievable.”

NLA’s New London Agenda sets out 6 pillars, which can be applied for a place-based approach to infrastructure, and are present throughout the cases in this report:



ENERGY AS A UNIFYING THEME

In navigating the complex set of factors relating to delivering the next generation of infrastructure for London, it is evident that energy and electricity supply is a consistent through line that affects all other efforts. In the words of Jason Longhurst, UK Head of Sustainable Investments and Partnerships at Prologis, “the biggest constraint on delivering high and sustainable growth is access to power”.

Delivering decarbonisation is almost entirely reliant on the electrification of many functions of the city from transport to building heating and cooling. Beyond climate goals however, reliable access to clean energy is also essential to delivering the housing and growth London needs to meet its resident’s needs and to maintain competitiveness on a global scale.

“Government, regulators, planners and organisations like National Grid need to look at electricity infrastructure in a very holistic way, thinking of its full importance for society, for the economy and just about everything else. It’s not just about electricity prices — it’s about how we function as a society” Sarah Merrick, Founder & CEO, Ripple Energy.

As such, this report examines how we power our city and our infrastructure, putting forward place-based solutions for decarbonising the infrastructure that London needs to truly support an equitable, sustainable and prosperous city.

Low Carbon Technologies (LCT) connected to the UKPN network in the London Power Networks License Area



Source: UK Power Networks, Low Carbon Technologies (LCT) connected to the UKPN network, 27 September 2024¹²

UPGRADING LONDON'S INFRASTRUCTURE FOR GROWTH, DECARBONISATION AND RESILIENCE

Louise McGough, Infrastructure Principal Policy Officer, and **Molly Strauss**, Head of Infrastructure, Greater London Authority

Aerial view of the city of London – The Mayor's Infrastructure Coordination Service (ICS) works to improve the planning and delivery of London's infrastructure. © Thomas / Adobe Stock



London's infrastructure networks — including energy, water and connectivity — are the backbones of the capital. Their maintenance and improvement are essential to achieve good growth and ensure Londoners' wellbeing. However, the scale of investment needed in the face of climate change — to decarbonise, achieve resilience, and adapt to new weather patterns — is substantial. This infrastructure must also support new homes and respond to new sources of demand, like data centres.

The Mayor has established a Net Zero target of 2030, and identified a preferred pathway: Accelerated Green. To meet this objective, London's energy systems must be rapidly upgraded and new types of infrastructure must be introduced, including installing heat networks and rolling out electric vehicle (EV) charge points. London must also increase its energy efficiency, including retrofitting its buildings, alongside increasing local generation of renewable energy.

The Mayor's Infrastructure Coordination Service (ICS) works to improve the planning and delivery of London's infrastructure. Five years after inception, it is now an award-winning programme that is a relied-upon function by London's infrastructure providers as well as boroughs and regulators.

We are now scaling up existing interventions to cope with the huge amount of new activity across the sector required to decarbonise and achieve resilience, and to mitigate the impacts to Londoners. Our efforts tackle these challenges across timescales — from immediate, on-the-ground activity to long-term planning; and across scales, from site-specific pilots to strategic activities covering large swathes of London.

For example, undertaking critical investments in London's infrastructure will impact London's road network. To avoid disruption to Londoners, these improvements must be delivered as efficiently as possible, by scaling up the 'dig-

once' approach. The ICS is doing just this: working with borough and utility partners to deliver collaborative streetworks. The ICS facilitates pilots across London, and supports utilities and telecoms to apply this best practice across their wider networks. This ensures that essential works can occur while keeping London roads moving for buses, cyclists, pedestrians, and motorists.

Shifting from tactical, more immediate interventions to longer-term strategic work, the Mayor is funding development of four sub-regional Local Area Energy Plans (LAEPs) in order to translate net zero commitments into action. These are being delivered in partnership with London Councils and boroughs. LAEP outputs influence utilities' investment plans—for example, ensuring the utilities have the right information about how much electricity capacity will be needed in particular areas, so that they can make improvements to their networks accordingly. LAEPs also feed into local strategies for investment in energy infrastructure and building retrofit, and provide an evidence base to change London and borough planning policy. By undertaking this work sub regionally with the GLA and London Councils, boroughs benefit from economies of scale, ensure consistency, and can tackle challenges that cross borough boundaries. Boroughs are then encouraged to build on the subregional outputs to complete the LAEP process for their own geography, reflecting local challenges and opportunities. The GLA is also developing a LAEP Datahub which will support these energy planning processes.

THE FOUNDATION OF MAPPING THE UNDERGROUND

Holger Kessler,
Senior Stakeholder Manager, AtkinsRéalis

The National Underground Asset Register is an interactive digital map of underground pipes and cables that standardises, centralises and makes data from hundreds of organisations available for authorised street works users, instantly. © AtkinsRéalis



I often find myself thinking back to an infamous beer advert from the 90s. A man in a high-vis jacket eagerly jumps out of a van and approaches a construction crew, digging a hole in a busy urban street. "I've got an idea, while you've got that open, we can lay our new gas main?" "What a good idea" another man replies, "that would save digging the road up again and causing the public more inconvenience!" Within minutes, their trench is packed with several crews, all working together to install their respective pipes and cables simultaneously.

But, to truly deliver this collaborative, less disruptive utopia, we need to get everyone working together much earlier in the process!

A key barrier has always been that the pipes and cables that transport our electricity, gas, water and data, are owned and operated by a myriad of public and private sector organisations. There are estimated to be around 4 million kilometres of underground pipes and cables across the UK, owned by over 700 different companies! Each of these underground asset owners are legally required to share location data for the purposes of 'safe digging', but there is currently no standardised method to do this, with multiple organisations having to be contacted for every dig, who all provide their information in completely different formats.

As a result, a 2022 consultation found that it takes excavators 6.1 days on average, to receive and process all the data needed to work safely. There are then around 60,000 accidental strikes on these pipes and cables every year, putting workers' lives at risk; disrupting the public and business; and costing the UK economy £2.4 billion every year.

That's why the Geospatial Commission and delivery partner AtkinsRéalis are building the National Underground Asset Register (NUAR), an interactive digital map of underground pipes and cables that standardises, centralises and makes data

from hundreds of organisations available for authorised street works users, instantly.

An initial version of NUAR is already available across England, Wales and Northern Ireland, but the service is on track to be fully operational by the end of 2025, delivering over £400 million of annual economic growth, by increasing efficiency and reducing accidental damage and disruption.

The NUAR team have worked extremely hard to bring the asset owner community on this journey, but ultimately, the project has only come to life because hundreds of major energy and water providers, telecommunication companies, transport organisations and local authorities have voluntarily signed-up to the service and started sharing their data. Nothing could have been achieved without their trust, collaborative spirit and shared vision of a better way.

So, what can we learn from our beer advert, 30 years later?

Well, NUAR is just one example of a much wider point, which is right at the heart of the future of our cities. Reducing waste, disruption, accidents, will only work if we work together; and many of the solutions that we think of as technological, are ultimately about collaboration. "What a good idea"!

DELIVERING A GREENER OLYMPIC LEGACY

Rosanna Lawes,
Executive Director, Development,
London Legacy Development Corporation
(LLDC)

At the Queen Elizabeth Olympic Park, a site with 8km of waterways, a Sustainable Urban Drainage System (SuDS) was implemented to reduce the risk of flooding. © LLDC



LLDC’s 2024 Climate Action Strategy sets out our framework for action across all our activities on Queen Elizabeth Olympic Park.

Many of the initiatives from 2012 have stood the test of time, but we now need to intensify our actions. Some initiatives require remodelling while new Park developments create opportunities to learn and improve.

For example, when the District Heating Network (DHN) was built for the 2012 Games it was greener than the National Grid. But rapid decarbonisation of the Grid, combined with 2025 building regulations, mean the DHN needs new infrastructure to decarbonise.

Working with East London Energy, the DHN’s operator, new air source heat pumps have been installed to support decarbonisation and work to secure a water source heat pump is underway.

Encouraging active travel is a key element of all Park developments. Neighbourhoods are planned to have close public transport access and we have begun to narrow roads around the edge of the Park to improve pedestrian and cycle access. Segregated cycle and pedestrian ways ensure the south, east and west of the Park are all connected while improved access to cycle superhighways has encouraged a modal shift towards active travel.

Post Occupancy Evaluation studies on our first developments at Chobham Manor and East Wick help us to understand how our neighbourhoods work and what lessons we can apply on future developments. These studies gather residents’ views, providing a rich source of data on topics from community and safety through to how utilities are used in the home. The results show homes are outperforming the average UK new build home in terms of electricity, water and heat usage.

With more than 8km of waterways, effective management is vital to ensure

developments on the Park and downstream are resilient to flooding. The north of the Park underwent a dramatic transformation to create a Sustainable Urban Drainage System (SuDS). Natural flood management and drainage features such as swales and reed beds were created to absorb increased water levels and reduce the risk of flood damage to surrounding areas, while improving biodiversity.

A SuDS approach has also been applied to smaller low-lying schemes, such as at Hackney Wick Station, to allow run-off of flood waters from the station to the surrounding area and into the ground to relieve pressure on drainage systems.

Venues like London Stadium must also play their part in achieving Net Zero targets and ambitious plans are in place to reduce demand, increase the use of renewables and offset residual emissions.

A major project is underway to install 6,500 sqm of solar membrane panels at the venue saving 1,400 tonnes of CO2 and generation c.20million kWh over 25 years.


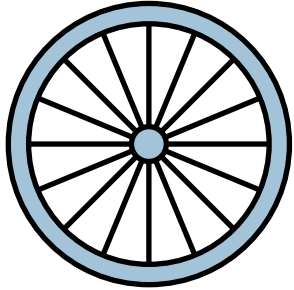
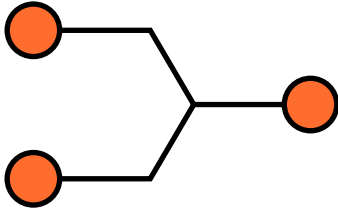
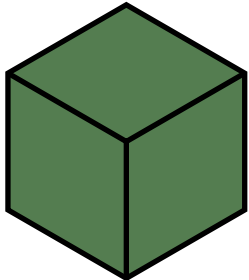
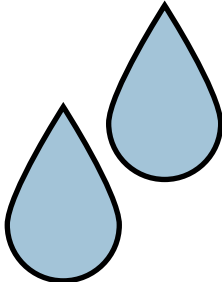
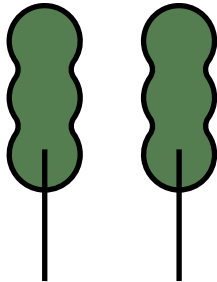
As a whole, the climate emergency has sharpened our focus and our resolve. LLDC’s Climate Action Strategy provides the framework to reinforce a culture change within the organisation, to challenge the status quo and to work with partners to deliver results.

2

TYPES OF INFRA- STRUCTURE

TYPES OF INFRASTRUCTURE

Building on the context established in the previous sections, here we delve into six key forms of infrastructure: Energy, Transport, Digital, Logistics, Water, and Green Infrastructure. We explore each types role in supporting decarbonisation efforts, identify the primary challenges faced, and highlight significant innovations within each sector. While here, we analyse infrastructure by category for clarity. Throughout this study our focus is on the importance of transcending traditional silos. In this chapter, we therefore highlight cases that successfully take a place-based approach exhibiting a joined-up, cross disciplinary and multifunctional strategies to planning and delivery of infrastructure.

| | |
|---|---|
| <div>Energy</div> <div></div> | <div>Transport</div> <div></div> |
| <div>Digital</div> <div></div> | <div>Logistics</div> <div></div> |
| <div>Water</div> <div></div> | <div>Green</div> <div></div> |

ENERGY



Insufficient capacity of critical energy infrastructure is a significant limiter of development in London. Starting in 2022, thousands of homes in the London Boroughs of Ealing, Hillingdon and Hounslow have been stalled due to grid shortages, the result of a high concentration of data centres in West London.

Access to sustainable energy and the infrastructure required to effectively distribute it is one of the most important factors in London's continued success and growth as a city. Energy infrastructure stands out as the pivotal crosscutting element crucial for decarbonising London. The shift towards electrifying heating and cooling systems in buildings, as well as transitioning to electric vehicles and logistics, hinges entirely on an efficient energy grid. Moreover, true decarbonisation through electrification necessitates that the power generated originates from renewable sources. Power generation is generally managed at a national scale but must also be a key consideration in decarbonisation efforts within London.

London's energy network is a highly complex system, which is managed and operated by numerous stakeholders at different scales, including the National Grid, District Network Operators (DNOs), Energy Suppliers, and local authorities. These relationships are overseen by Ofgem, the regulator. The complexity of this model means it is challenging to change the approach to energy infrastructure in London.

| Ownership | |
|---|---|
| <p>4</p> <p>District Network Operators operate London's electricity infrastructure</p> | <p>21</p> <p>private energy suppliers operating in London</p> |
| Policy | Funding |
| <p>2030</p> <p>London's energy to be Zero Carbon</p> | <p>£61bn</p> <p>projected total cost to upgrade London's infrastructure to net zero¹³</p> |

| Infrastructure | |
|--|---|
| <p>69,000</p> <p>new heat pumps installed in 2022¹⁵</p> | <p>60km</p> <p>length of new tunnels bored for London Power Tunnels project</p> |
| <p>1 in 5</p> <p>substations only have 7% spare capacity¹⁶</p> | <p>80</p> <p>terawatt hours a year required by heat pumps by 2050¹⁸</p> |
| <p>600%</p> <p>increase in power demand from data centres in the next 10 years¹⁷</p> | <p>15,000</p> <p>homes delayed by power shortages across the UK¹⁹</p> |
| <p>50%</p> <p>increase in energy demand on its current level by 2035²⁰</p> | <p>+10%</p> <p>of households are in fuel poverty²¹</p> |
| Decarbonisation | |
| <p>80%</p> <p>of greenhouse gas in London is produced from buildings¹⁴</p> | |

Key Challenges

The switch to electrification in transportation and buildings. This is further exacerbated by a warming climate in London that has led to a 5 per cent annual increase in the demand for air conditioning, making it the fastest increase in demand in the world.²² In addition to the progressive electrification of infrastructure, emergent land uses such as data centres are also leading to increased demand for electricity, with John Pettigrew, CEO of National Grid, stating that demand for power from data centres in the UK would increase by 600 per cent in the next 10 years.²³ In this sense, ensuring infrastructure can keep up with rapidly growing demand is a central challenge.

Lack of access to power has a knock-on effect on other areas of infrastructure development. For example, many housing projects have been delayed across the capital due to lack of grid capacity and available connections. Ajit Bansal, Head of Climate Emergency and Environmental Strategy at the London Borough of Hounslow notes that they have experienced “significant challenges securing a connection for new housing developments to the grid”, further noting that “we can’t wait until 2037 for capacity to increase as we have ambitious housing targets to achieve”. This exemplifies how the challenge of energy infrastructure must be thought of in coordination with other planning and development issues like housing.

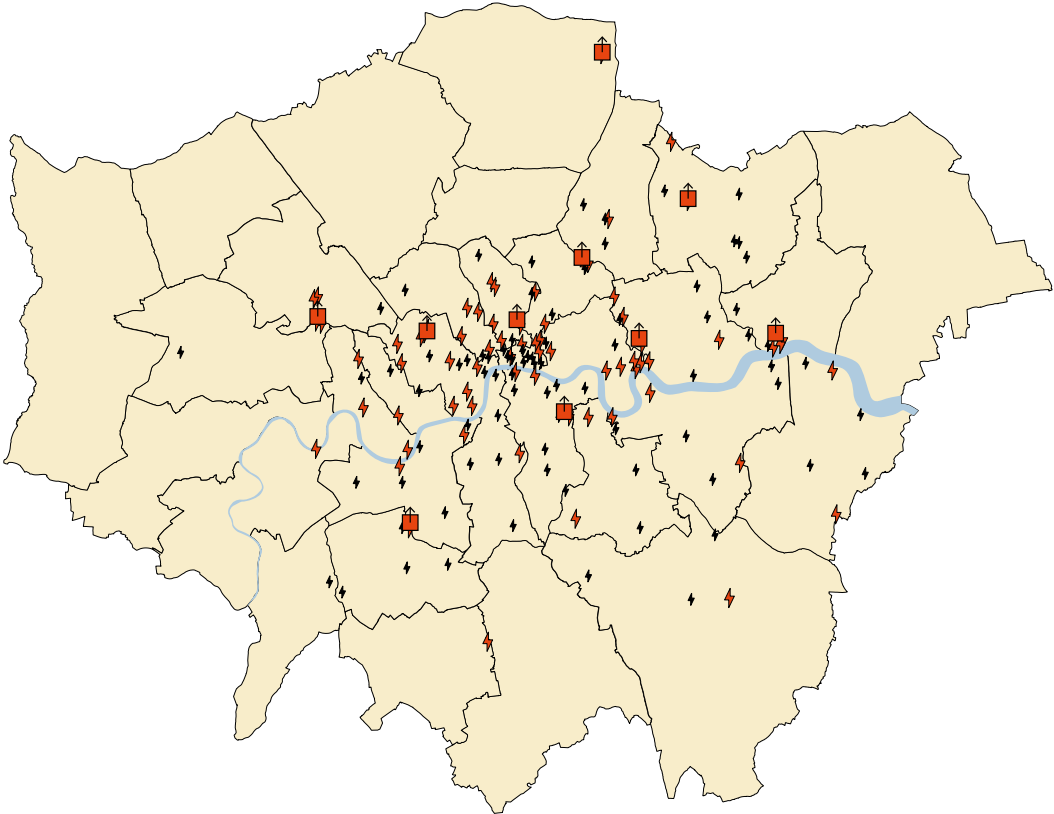
“In parts of London, there are very real constraints on housing growth as a result of a lack of available connections. Clearly, we must avoid a situation where distribution network investment gets behind the curve and then we have to play catch-up, like the situation we’re facing with delays in getting renewable generation sources onto the transmission grid. The debate


is fundamentally about finding the right balance between flexibility first — for example more storage, and demand side response — on one hand, and the need for more network capacity investment ahead of demand.” Julia Prescott, Deputy Chair of the National Infrastructure Commission.

Meeting these challenges in a coordinated way is a challenge in itself. It involves reimagining energy infrastructure beyond merely supplying escalating amounts of electricity but rather understanding how energy consumption is related to land use, climate change and other infrastructural systems to then develop innovative solutions. For example, asking how waste heat from data centres can be utilised to heat nearby housing, or how development can be better coordinated with improvements to energy infrastructure such that they work in cohesion rather than as two separate siloes.


The sheer complexity of London’s energy network is a barrier to achieving this reform. Involving numerous stakeholders responsible for its management and operation, energy infrastructure is divided among various entities: the transmission network is owned and managed by National Grid, while the distribution network is overseen by four District Network Operators (DNOs) within London. Energy is supplied to consumers by a multitude of Energy Suppliers, and local authorities may also hold ownership of certain infrastructure components. Ofgem, the regulator, plays a crucial role in overseeing these relationships. This complexity poses significant challenges in reforming the system and developing new approaches to energy infrastructure.

UK Power Network Grid Supply Points, Grid and Primary Sub stations in the London Power Networks Licence Area



 **Grid Sub stations**

A Grid substation is any substation where the maximum voltage is above 33kV.

 **Primary Sub stations**

A Primary substation is any substation where the maximum voltage is between 22kV and 33kV.

 **Grid supply points**

The entry point for electricity onto the distribution network. Electricity typically leaves here at 132kV to feed some directly connected customers, grid substations or primary substations.

 **The Thames**

 **Borough boundaries**

Source: UK Power Networks, Key characteristics of active Grid and Primary sites, 15 August 2024²⁴

Key Innovations

Large infrastructure projects such as the "London Power Tunnels"²⁵ project have begun to address some of these deficiencies in the grid, with phase 1 laying 32km of tunnels linking substations from Wimbledon to Hackney, at a cost of £1 billion and being completed in 2018. Phase 2 started in 2020 and by 2027 will add 32.5km of tunnels and cables from Wimbledon to Crayford. Other smaller upgrades are being made across the city to substations²⁶ where capacity is being outstripped.

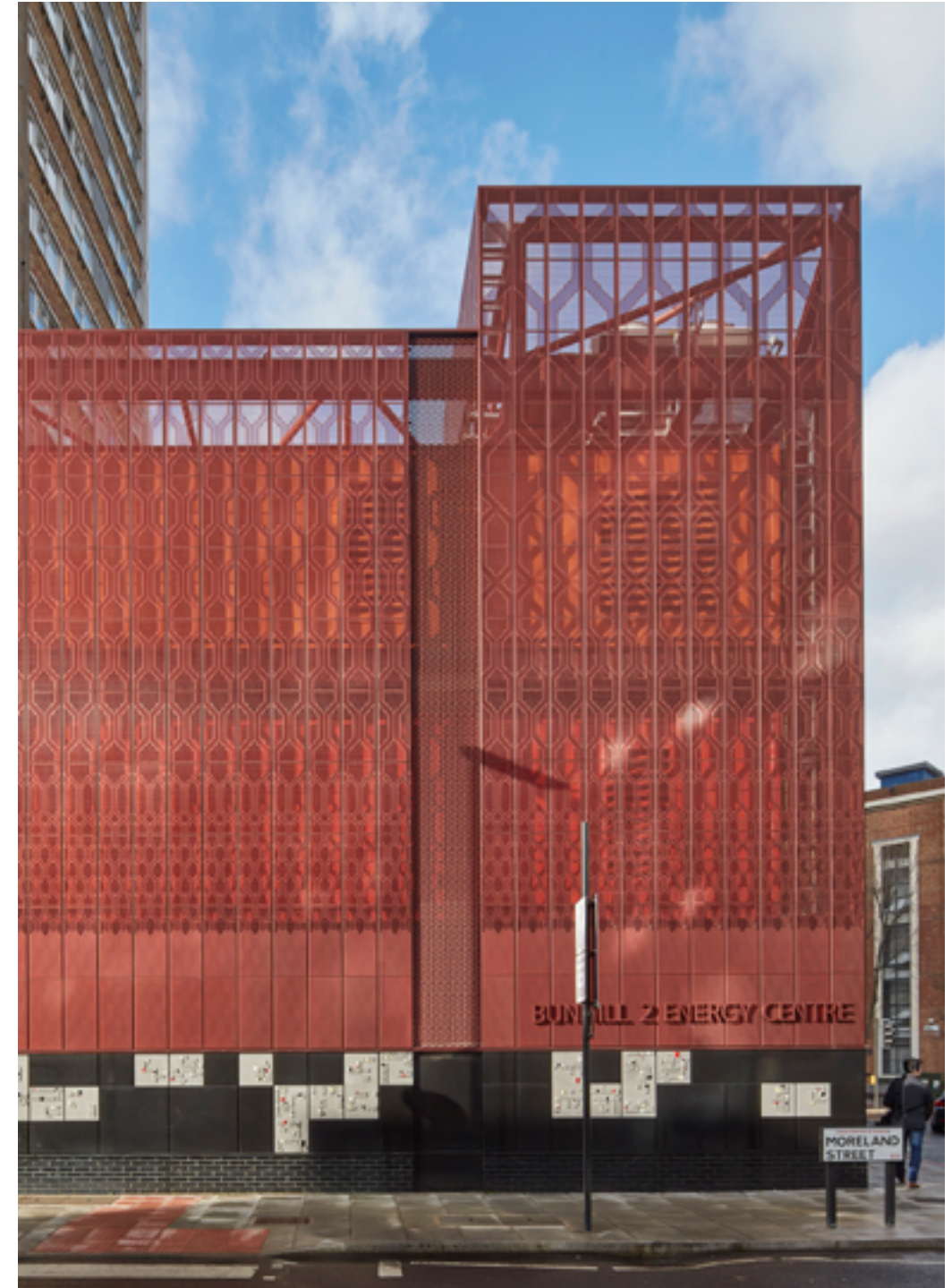
Other planning initiatives such as Local Area Energy Plans (LAEP) seek to achieve greater coordination and in response to growing energy demand tie together many different strands of energy and related infrastructures including heat, transport, energy efficiency, energy demand and renewables into a spatial plan.

For example, The West London Local Area Energy Plan²⁷ explicitly seeks to support housing delivery and growth through the spatialisation of energy demand and encouraging investment in infrastructure to meet the demand. It adopts a cross-borough approach involving seven boroughs in West London, acknowledging that development and energy demand transcend political boundaries and enabling more coordinated planning. The plan also fosters public-private collaboration among electricity network operators, regulators, and developers, allowing for cooperation among traditionally separate groups. While non-binding, Molly Strauss highlights that in the current system "LAEPs are the best way to send signals to utilities and the regulator to make investments".

From a consumer perspective, a key innovation in the financing of energy infrastructure projects comes in the form

of Ripple Energy, a company that enables consumers to become co-owners of renewable energy projects, such as wind farms. Instead of simply buying energy from a supplier, members invest directly in the construction and operation of renewable energy assets. This energy is then supplied to the consumer at a stable rate, as a part of a power purchase agreement protecting members from increasing energy prices. Sarah Merrick, CEO of Ripple Energy states that the key advantage is allowing consumers to benefit from the economies of scale afforded in larger scale projects that in some cases outstrip the benefits that can accrue from installing private local energy generation solutions like PVs. This innovative financing and funding model gives power to consumers to become investors in infrastructure that then powers their homes. This exemplifies how infrastructure development can be structured to effectively bring communities along as active participants.

A groundbreaking example of innovation in energy infrastructure is the Bunhill Heat network.²⁸ Phase 2, which was completed in 2020 and extended the network to now also take excess waste heat from the Tube and utilises it to heat around 1,350 homes within the area. The project was a collaboration between Islington Council, TfL and many other private sector partners exemplifying how forward thinking energy projects can seek innovative place-based solutions that leverage existing assets and simply connect them in smart ways. Moreover, the fact that the site for the energy centre at the heart of the project is located within a disused tube station exemplifies how existing infrastructure can be repurposed for new uses.



Islington Council's Bunhill 2 Energy Centre (Cullinan Studio, 2019) uses waste heat from an underground train network to heat to local homes, schools and leisure centres. © Paul Raftery

HOLISTIC PLANNING FOR A POSITIVE ENERGY FUTURE

Anna Lisa McSweeney, Head of Sustainability and Keith Boxer, Head of International Research, White Arkitekter

Positive Energy Planning Process (PEPP) Vivalla, Örebro (White Arkitekter) © White Arkitekter



A key goal of the The European Commission’s Strategic Energy Technology (SET)–Plan is to establish 100 Positive Energy Districts (PEDs) by 2025, focusing on integrated urban strategies to create climate–neutral cities that are liveable, sustainable and inclusive. PEDs aim to shift the energy focus from individual buildings towards whole neighbourhoods to create areas of net energy ‘prosumption’; optimising the energy balance across a district; energy generation; new trade between stakeholders and engaged communities, allowing people, nature and businesses to thrive.

JPI Urban Europe’s PED–ID project supports the SET/plan goals and identifies stakeholder involvement as the most important element for a successful implementation of PEDs, aiming to develop a process to be tested in three real EU test–projects to accelerate their delivery.

White Arkitekter (White) has devised a Positive Energy Planning Process (PEPP) to co–create holistic roadmaps and action plans with stakeholders, guiding the entire process towards achieving PED status.

Achieving positive energy futures involves more than installing solar panels; it requires creating engaging, liveable places. This holistic approach is the foundation of White’s PEPP. Recognising that stakeholder engagement is crucial for successful urban transformation, PEPP begins with stakeholder mapping to assemble a dedicated group to develop a vision for the area.

The PEPP approach emerged from the Uppsala Business Park research project, part of the PED–ID initiative. A previous energy proposal from a core stakeholder was rejected due to high costs and perceived vested interests, leading to distrust. White stepped in as a trusted intermediary, considering all stakeholder interests and identifying a cost–effective, mutually

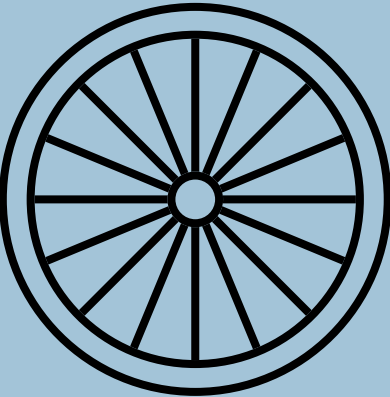
beneficial solution. Acting as facilitators, White led the process to evaluate scenarios and create a shared roadmap.

Initially it was important to gain buy–in from all stakeholders on a retrofit strategy that would reduce energy demand in the existing building stock (resulting in a 40 per cent improvement in energy efficiency). Energy flows were mapped to set up load–matching scenarios, revealing that captured waste energy from local industry could make the district nearly energy self–sufficient.

The challenge in delivering PEDs lies in combining place–making and energy expertise to arrive at holistic, economically, technically, and people–focused solutions. The ‘trusted intermediary role’ is crucial to this process and could be filled by an interdisciplinary consultant, or local authorities. The question remains who funds this early–stage expertise and process leadership while maintaining neutrality. More than half of our work on PEDs is funded through research programs, (PEPP was awarded SEK 12 million by the EU). Scaling this approach will be difficult without a new business model or dedicated funding from national or local authorities over a sufficient period (3–5 years).

While PEDs have not been promoted in the UK post–EU, the Local Area Energy Plan (LAEP) initiative by Energy Systems Catapult, aimed at local governments, shares similar objectives. Analysis by Deloitte’s corroborates that transforming the UK’s energy system at scale requires both infrastructural and behavioural changes, which is most cost–effectively achieved at the local level than top–down initiatives. Engaging people and businesses from an early stage to create a shared vision significantly enhances the chances of success for energy transition projects. PEPP leverages sustainable urban planning methodologies to create low–carbon or energy–positive places, fostering community support and involvement.

TRANSPORT



The traditional definition of transportation infrastructure has focused on moving people or goods by road, rail, sea, or air, often resulting in mono-functional infrastructures like the Westway elevated motorway, which was built with practical considerations rather than a placemaking approach. Recently, there has been a shift towards multi-functional infrastructure, exemplified by the Healthy Streets framework adopted by the Mayor of London, which embeds health and social outcomes

as central in street design. In this sense, transportation as an infrastructure and discipline is relatively advanced in its multi-functionary policy and design approach. The Mayor’s transport strategy aims to reduce car usage, targeting 80 per cent of trips by sustainable modes by 2041, supported by initiatives like the Elizabeth Line, the ULEZ expansion, the electrification of the bus fleet, and vehicle charging infrastructure.

Map of London’s rail, roads and river



- Stations
- Railway lines
- Airports
- Open water

Source: Ordnance Survey 2020, TfL

| Ownership | |
|--|--|
| 360miles of strategic roads managed by TfL carrying around 30% of the city's traffic ²⁹ | 8840miles of streets managed by 32 boroughs ³⁰ |
| 16 Private bus companies operate the TfL bus network ³¹ | 13 Train companies operate national and local rail services in London ³² |
| 620miles of track maintained by TfL as a part of the tube network ³³ | |

| Policy | Funding |
|--|---|
| The Mayor's Transport Strategy sets the target that 80% of trips in London should be made by sustainable modes (walking, cycling, public transport) by 2024 ³⁴ | £250m capital investment for transportation in London in 2024 ³⁵ |

| Infrastructure | |
|--|---|
| 340km of high-quality routes created through TfL's Cycleways scheme, doubling the size of the network since 2018 | 700,000 passengers a day carried by the Elizabeth Line, signifying the biggest expansion of rail and public transport infrastructure in decades |
| 100 Low Traffic Neighbourhoods (LTNs) have been implemented | 500+ school streets are now active in London |
| 10 new superloop bus services introduced to create new radial connections between outer boroughs | ULEZ grew 18x larger (380km² vs the 21km² central zone) after its recent expansion |

| Decarbonisation | |
|--|---|
| 23% of total emissions in London from transportation | 14% of total vehicle fleets in the City of London electrified |

Key Challenges

Transportation accounts for 23 per cent of total emissions in London. In this context, we are seeing a modal shift towards more sustainable transport routes across the city. Transport amenities are key to unlocking land for housing and improved connectivity across London is a key driver of growth. Delivering on demand for regular and reliable transport infrastructure alongside decarbonising existing infrastructure, presents a challenging picture.

Funding is a central challenge for many transportation projects. Some major projects have been paused as a part of the funding agreement between central government and TfL as a part of the COVID 19 bailout. This includes the proposed Crossrail 2 and the Bakerloo line extension to Hayes. The HS2 extension to Euston has also been paused temporarily as works on HS2 have been cut. Still more projects are in planning, including the DLR extension to Thamesmead, and it remains unclear whether or when funding for such big-ticket public transport projects will become available again.

Reallocating street space for sustainable modes is almost always controversial. While some boroughs such as Camden, Hackney and Islington have been highly successful in doing so, others have faced challenges implementing the right solution.³⁶ Other policies, while ultimately executed, have also proven highly controversial such as ULEZ. These reflect the difficulties of effectively bringing communities along with changes to transportation infrastructure.

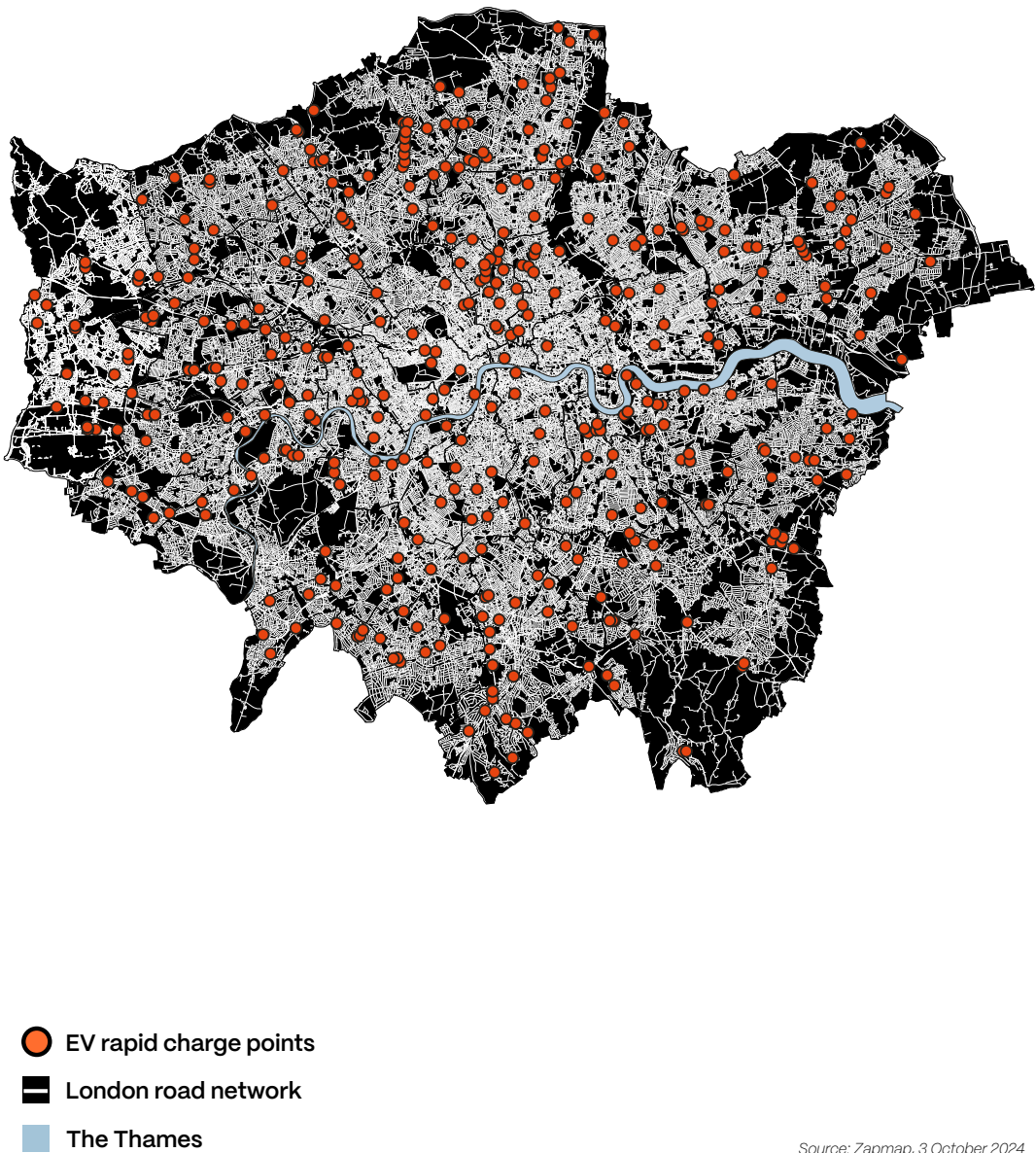
Keeping up with demand for electric vehicle charging infrastructure is also a key challenge of meeting decarbonisation targets. TfL has set out its electric vehicle charging strategy³⁷ which states a need for

60,000 electric vehicle charging points by 2030, on top of the existing 8,600 charging points which require a 600 per cent increase.

"The transition to electric vehicles is still in its early adopter phase, primarily driven by those with access to home chargers and company cars. For mainstream adoption, abundant and conveniently located public charging facilities will be crucial. Charging infrastructure must ensure a fair and accessible experience for all citizens, otherwise we risk creating a 'two-speed' Britain".

Paul Ford, Chief Development Officer, Zest

Map of 400 EV rapid charge points across London



Source: Zapmap, 3 October 2024

Key Innovations

Many key innovations in the provision of transportation infrastructure focus around integrating transportation infrastructure better in the fabric of the city and serving other functions, including decarbonisation. For instance, Network Rail has started re-evaluating the role of the stations it manages in the London region as potential components of the city’s energy networks. They envision stations being used to generate power by installing solar panels on roofs. Network Rail oversees 1.4 million sqm of canopy across the UK, which, if equipped with photovoltaics (PVs), could generate sufficient energy to power a city of 35,000 people. In a pilot project, both Denmark Hill station and Streatham Hill depot were outfitted with PVs and successfully generated enough power to operate the station entirely self-sufficiently. In addition, Network Rail are also imagining how stations can become integrated with other transportation modes through the incorporation of mobility hubs at stations to enable sustainable last mile trips as well as imagining how they can become community spaces.

Paul Ford, Chief Development Officer, Zest notes that “for landowners looking to develop charging facilities, planning hurdles and grid capacity significantly impede the rollout, exacerbated by the absence of clear frameworks and guidance. Obtaining planning permissions is often complex and time-consuming, resulting in delays and excessive costs for community charging projects”. In response to these challenges, TfL has been pioneering new approaches and designs for implementing electric vehicle (EV) charging infrastructure by collaborating with local boroughs to facilitate the installation of new EV charging stations on council-owned land and other sites. This partnership enables councils

to achieve decarbonisation targets while generating revenue from underutilised sites. Moreover, these charging hubs are envisioned not just as infrastructure for charging vehicles, but as mobility hubs that support various mobility options. Alex Gilbert, Head of Energy & Electrification; Commercial Development at Places for London highlights that these hubs are also designed with future flexibility in mind, ensuring they can adapt and evolve alongside advancing technologies and changing needs.

Also in this vein, the Mayor’s bus action plan³⁸ states that all buses should be electrified by 2030. This requires the upgrading of not only the bus fleet but also the creation of charging facilities in bus depots and the other infrastructural upgrades to the electricity grid required to enable this. TfL is collaborating with bus operating companies to electrify their garages as well as exploring innovative models where electrified depots not only serve as traditional bus facilities but also integrate housing and other uses above them. Additionally, electrified depots are imagined to potentially serve as charging points for other fleet operators during hours in which most buses are on the road, and the depot sits largely empty. Supplying enough energy to these sites will require significant upgrades to the existing grid — electrifying the Sutton bus garage required 1.5 kilometres of new high-voltage cables.³⁹ As such, TfL is also exploring how energy could be supplied directly from alternative sources such as the London Underground.



POWER STATIONS: USING STATIONS AS PART OF A DISTRICT ENERGY NETWORK

Frank Anatole,
Principal Architect, Network Rail

Network Rail HubStation Standard Station Design with integral upgradable PV panels. © Network Rail/7N Architects/Pillar Visuals



Network Rail owns, operates and develops Britain's railway infrastructure. Keeping the country moving makes it one of the largest consumers of electricity in the UK.

Network Rail's Solar Railways, or 'Running Sunbeams' initiative represents a significant step towards integrating renewable energy into the UK's rail infrastructure, aligning with broader national and global sustainability goals. The initiative focuses on harnessing solar energy to power the railways, which involves installing solar panels along railway lines, on station rooftops, and in adjacent land areas. This approach aims to reduce the carbon footprint of the rail network, lower energy costs, and contribute to the UK's target of achieving net-zero emissions by 2050. One of the critical aspects of the Solar Railways initiative is its potential to decarbonise a traditionally high-energy-consuming sector by substituting conventional energy sources with cleaner alternatives, thus playing a pivotal role in transforming the environmental impact of rail transport.

London already has several solar farm initiatives currently being trialled, focusing on maximising the use of unused urban spaces to generate renewable energy. The Solar Railways project is particularly innovative because it directly supplies energy to the rail network, by-passing the grid and using the railway's own infrastructure to transfer and store energy. This decentralisation means that solar energy generated can be used more efficiently and directly where it is needed most, such as for powering signalling systems, station operations, and even electric trains. This initiative is not just a green solution but also enhances the resilience of the rail network by providing a more secure and stable energy supply. By reducing dependency on the national grid, the railways can operate more reliably, particularly during energy shortages or price fluctuations.

Nationally, Network Rail has 1.4 million m² of canopies across Britain. If all were covered in PV with an average efficiency of 15 per cent and receiving an average of 5 kWh/m²/day of sunlight they could produce approximately 43.75 megawatts (MW) of power on average, equating to about 383.25 million kilowatt-hours (kWh) of electricity annually. This would power a town with 35,000 to 50,000 residents for an entire year. Or it could cover a significant portion of the energy needs of a small city.

In London, in addition to its 11 major London stations, Network Rail has over 340 medium to small stations across the capital — many with canopies and roofs. Installing panels across various stations using the significant potential roof space available therefore presents a significant opportunity to develop localised power networks in a city like London.

Given the large number of London stations and the variability in roof sizes, it's reasonable to estimate that the combined roof area could easily span to thousands of square meters. A total of 1 million square meters of PV panels in London, operating at 15 per cent efficiency and receiving an average of 2.8 kWh/m²/day of sunlight, could conceivably generate 153.3 million kWh per annum.

This would make a meaningful impact on the city's renewable energy portfolio, contributing to reduced carbon emissions and enhanced energy sustainability.

This potential is exemplified by a recently completed project in South London. In 2022 newly installed photovoltaic (PV) arrays at Denmark Hill Station generated 236,387kWh of energy, which is equivalent to boiling a kettle to make 7.5 million cups of tea. This was more than the station needed to power its passenger facilities. Network Rail currently sell the power to GTR at a substantially discounted rate through a Power Purchase Agreement. The

energy generated through the panels saved approximately 46 tonnes (45,713kg) of CO2 per year.

Network Rail’s HubStation project complements the Solar Railways initiative by reimagining station spaces as multifunctional hubs that integrate sustainable technologies. HubStations are envisioned as next-generation railway stations that combine transportation, commerce, community services, and sustainability features under one roof. This project focuses on transforming stations into self-sustaining ecosystems that can generate, store, and utilise renewable energy locally. By incorporating solar panels in canopies as standard, advanced battery storage systems, and energy-efficient designs, HubStations can serve as local power generators, significantly contributing to the energy needs of the station and surrounding rail network.

The synergy between the ‘Solar Railways’ and HubStation projects lies in their shared goal of embedding sustainability into the core of the railway system. HubStations effectively act as anchor points by providing large surfaces for solar panel installations and integrating energy management systems that optimise the use of locally generated solar power. For instance, a HubStation equipped with extensive solar panels can supply energy to trains while docked at the station, power the station’s operations, or even contribute excess energy back to the rail network or local grid. This model not only supports NR’s decarbonisation goals but also offers a cost-effective way of managing energy consumption at high-traffic stations.

In addition HubStations can leverage smart technologies to monitor and optimise energy use, creating a feedback loop that informs broader sustainability strategies across the railway network. By gathering data on energy generation, consumption, and storage, Network Rail can refine

its approach to solar energy utilisation, ensuring maximum efficiency and minimal waste. In dense urban locations like London stations could be linked to provide locally networked power reservoirs. This integration of smart energy management into HubStations could also pave the way for future innovations, such as using solar energy to charge electric buses, bikes, and other green transport options directly linked to the stations.

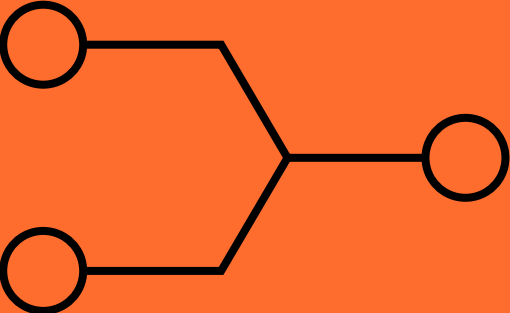
Additionally, HubStations could serve as visible symbols of the railway’s commitment to sustainability, enhancing public perception and encouraging wider community engagement. By showcasing renewable energy technology in action, these stations can educate and inspire passengers about the importance of transitioning to a low-carbon future.

In conclusion, the combination of Network Rail’s Solar Railways initiative and the HubStation project represents a forward-thinking approach to sustainable transport. By integrating renewable energy generation directly into the rail infrastructure and reimagining station design, Network Rail is not only reducing its carbon footprint but looking to set a precedent for how transport networks can contribute to broader environmental goals. This holistic approach ensures that the railways of the future will not just be a means of travel but are active participants in the fight against climate change. The practical challenges are, of course, vast.



Denmark Hill Station (Network Rail, 2022) with PV covered canopies. © Network Rail

DIGITAL



Digital infrastructures, including fibre optic cables, data centres, 5G transmitters, and smart meters, are critical for London's data-driven economy, yet Building Digital UK estimates that 600,000 properties still lack adequate Gigabit broadband, highlighting the gap in digital infrastructure provision. The ramifications of not having access to reliable high-speed broadband can be deleterious for social and economic outcomes of residents. In the words of Councillor Anthony Okereke of Greenwich: "Digital inclusion is a universal need".⁴⁰

Olly Freedman, Consultant at Proptivity, notes that "82 per cent of London's economy is underpinned by data". In this sense the physical infrastructures that enable the data economy can be considered as critical infrastructures for the capital's continued operation. Theo Blackwell, the Mayor's Chief Digital Officer, further emphasises this importance of digital infrastructure in decarbonisation: "Better digital connectivity, collaboration and joined-up city data are essential to addressing the challenges faced by the city, such as achieving Net Zero".⁴¹ In this regard, The Mayor's "Smart Energy" strategy aims to contribute to decarbonising London's energy by optimising energy use, reducing consumer costs, and increasing distributed energy resources, all of which are reliant on effective digital infrastructure.

| Ownership | |
|--|---|
| <p>5</p> <p>main private companies maintain and operate London's fibre optic network</p> | <p>200</p> <p>Internet Service Providers operate in London</p> |
| Policy | Funding |
| <p>100%</p> <p>of local authority owned social housing to have access to full fibre by March 2025 ⁴²</p> | <p>£10m</p> <p>investment from the Mayor to boost fibre optic cable roll out across London ⁴³</p> |

| Decarbonisation & Infrastructure | |
|---|--|
| <p>3%</p> <p>of the UK's demand for heating and hot water could be met by data centres alone ⁴⁴</p> | <p>1 gigawatt</p> <p>A smart and flexible energy system could reduce London's peak demand by one gigawatt ⁴⁶</p> |
| <p>43%</p> <p>of homes in London have smart meters ⁴⁵</p> | <p>170+</p> <p>data centres in London currently ⁴⁷</p> |
| <p>6x</p> <p>increase in data centre power use in next 10 years ⁴⁸</p> | |

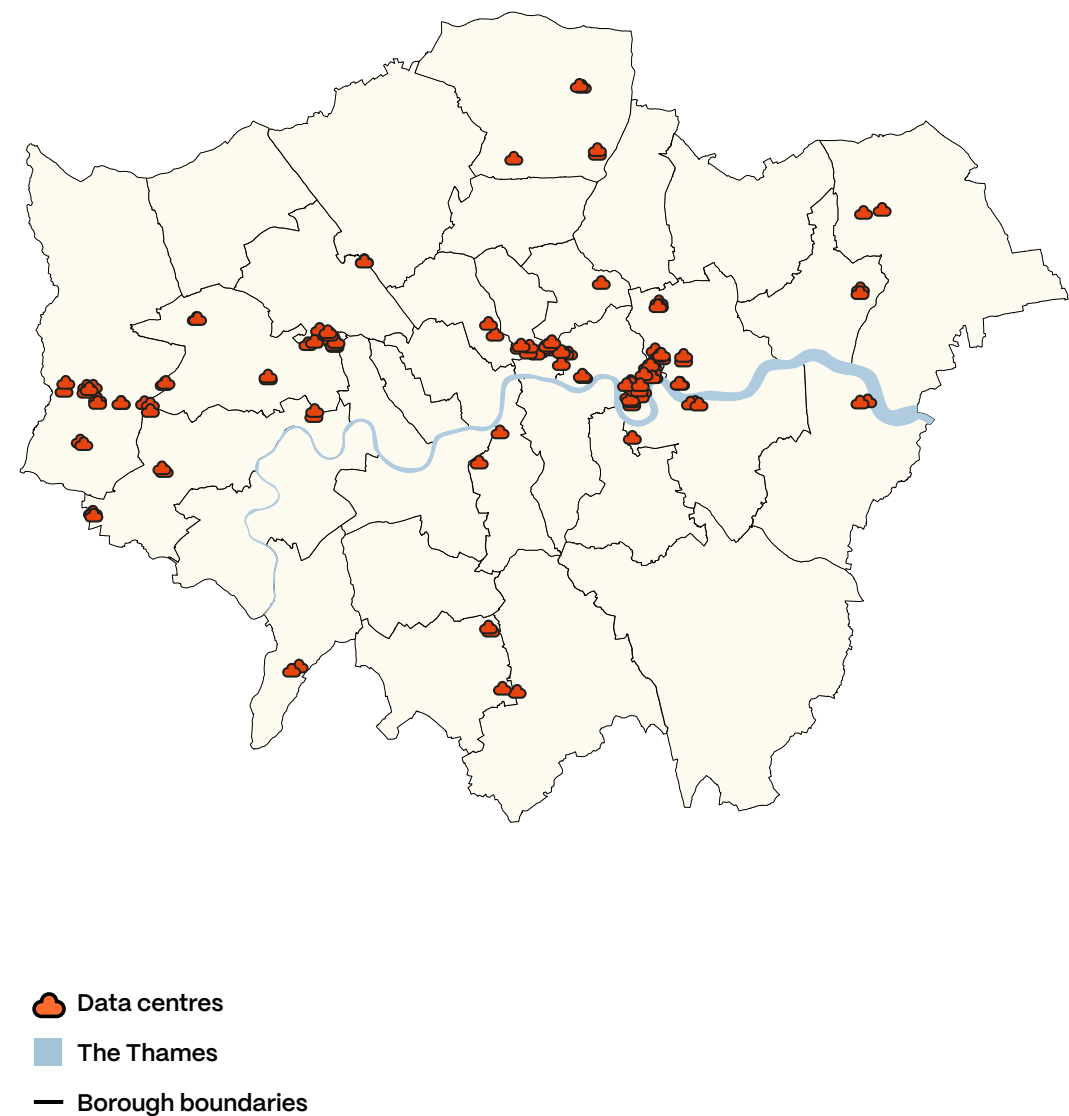
Key Challenges

The rapid growth of data centres has led to huge increases in demand for electricity. This will be exacerbated by the growth of AI usage, increasing power demand by a further 500 per cent.⁴⁹ A key challenge is imagining how this increase in demand for electricity can be managed. Currently, there is no Mayoral spatial strategy for data centre placement, leaving boroughs to handle planning applications like any other use, despite their substantial grid impact. West London, in particular, faces acute energy supply issues partly resulting from the proliferation of data centres, delaying housing development. Addressing this requires better planning to integrate data centres without overburdening other infrastructures.

Other digital infrastructures such as fibre optic cables, are managed by diverse stakeholders, with ownership fragmented across boroughs and involving a range of private entities like BT, Virgin Media, and Openreach. These private operators typically invest based on market demand, with public funding supplementing this where necessary. This complex ownership and market driven investment model leads to uneven outcomes, notably in South London, which suffers from reduced access to high-speed internet resulting in poorer economic and social outcomes.⁵⁰

The rollout of 5G in London has been slower than in comparable European cities, with London ranking 10th in 5G availability and experience. London's average download speeds are 143 Mbps, significantly lower than Lisbon's 528 Mbps, highlighting the need for accelerated digital infrastructure development to enhance connectivity and support the growing demands of the digital economy.⁵¹

Map of Data Centres in London*



*Reportedly, there 170+ data centres in London, 90 of which are mapped here.⁴⁷

Source London Data Centres, Accessed 27 September 2024⁵²

Key Innovations

Key innovations seek to better integrate digital infrastructure into other systems in a place-based manner. One example of this is the Bidder Street Data Centre, a proposed project in East London that will include a heat transfer plant that takes excess heat produced at the data centre and uses it to heat up to 13,000 homes.⁵³ Moreover, the planned data centre is situated on the site of a former heavy recycling centre, showing how infrastructures can change to new cleaner industries in the same location. The centre is set to be run entirely using renewable energy. This case exemplifies how digital infrastructure can be both neutral in its carbon impact, and multi-functional and place-based in the co-benefits it provides to local communities.

Where the market is failing to provide sufficient digital infrastructure, new public-private joint ventures between local boroughs and private operators are being formed to close gaps in the network. An example of this is in Greenwich where a new public company, Digital Greenwich Connect Ltd. has been created to design, build and maintain a new 21 km full-fibre, gigabit-capable network infrastructure project called Digital Greenwich Connect. The funding was split 50:50 between the borough and a private investor. The advantage of this model is that the public retains some ownership of the infrastructure, while encouraging private capital to invest in expanding infrastructure in areas that may not attract investment of their own accord.⁵⁴

The rollout of 4G/5G connectivity on the London Underground network also exemplifies effective public-private partnerships. TfL formed a partnership with G.Network and Boldyn Networks to roll out mobile connectivity to underground sections of the Tube and Elizabeth line. This infrastructure not only allows for greater connectivity

and productivity for travellers, but also is designed such that it will also host the new Emergency Services Network (ESN) which will give first responders immediate access to life-saving data, images and information in live situations and emergencies on the frontline.⁵⁵ This exemplifies how improved digital infrastructure can support not only increased economic productivity, but also better services across many sectors.

In terms of governance, the establishment of the London Office of Innovation and Technology (LOTI) has allowed for greater cross boundary collaboration across the city on delivering key digital infrastructures. One outcome of LOTI has been the creation of the "Sub-regional digital infrastructure strategy for Local London and South London Partnership".⁵⁶ This document is used to identify the gaps in current digital infrastructure and allow councils to make joint decisions about how to address these shortfalls across administrative boundaries and encourage strategic investment from partners in existing infrastructure.

A final example of how digital infrastructure can relate to physical infrastructure of buildings is 'Building Atlas', founded by Stephen Lorimer as a means of using AI and Data systems to help building owners prioritise energy efficiency upgrades to their portfolio. The system only requires the address of the building for the model to assess the property and make cost effective investment suggestions. Lorimer states that the biggest advantage is that it gives companies the confidence to make investments without having to go through lengthy study processes that often end up being outdated before recommendations are even implemented. This example demonstrates how digital infrastructure can lead to more informed decisions about decarbonisation.



RETHINKING DEPLOYMENT OF DIGITAL CONNECTIVITY IN THE CITY

Rhod Morgan,
Chief Operations Officer, Vorboss

The Vorboss Light Maintenance Vehicle (LMV) is a zero-emissions e-cargo bike that can be used for deployment of digital infrastructure across London. © Vorboss



On the difficult but vital mission to decarbonise London's infrastructure, the Internet is a vital companion — and one you need to be able to rely on.

Internet connectivity powers the smart buildings in our city, helping them make better use of energy, space and resources. It enables real-time monitoring of traffic, air quality, footfall, water levels, and countless other data points. It helps ensure the security and safety of our buildings, roads, railways and open spaces.

The task for us at Vorboss — as we build a future-proofed fibre network connecting London's businesses — is to decarbonise our own work, so that deploying this powerful technology doesn't exacerbate the problem it has the power to fix.

There are three fundamental steps we've taken to achieve this: how we build our network, who is building our network, and the capability we're building. Everything we do is engineered around building it once, and building it right.

The way London's fibre networks are built needed a rethink. Two men, one van. Multiple vans for each job. Clogging up London's streets, and air. A burden on the capital.

Something had to change.

At Vorboss, we've introduced a whole new way of deploying our high-capacity fibre network for London's most demanding businesses.

We've designed and manufactured the Vorboss Light Maintenance Vehicle (LMV), a zero-emissions e-cargo bike that a fibre splicing technician can easily ride to any part of our network to connect a customer, upgrade a connection, or fix a fault.

Zero emissions. Minimal additional traffic. A game changer.

Where more equipment is required than can be carried on the Vorboss LMV, one of our traditional fleet of vehicles will travel to the site before 5am to deliver everything required in a unique, Vorboss-designed 'drop box', ready for the engineer to access on their arrival. And the engineer can get there using London's incredible public transport system, using the pre-paid TfL travel cards we supply to our team.

The other fundamental thing we've changed is the accepted norm that it will be men doing this work. More than a third of our technicians are women, and we have pledged to increase this to 1 in 2 by 2027, reaching gender parity.

And all our technicians are London based, and trained at our in-house academy.

Our team's work produces no landfill waste. We have zero electrical waste, getting back all materials at the end of their lifecycle. And we have a no single use plastics policy. We don't use third party contractors when we connect customers to our network, so we're accountable for every aspect of our work and the impact we have.

As part of our £250 million investment in London, we've engineered our network to support demand way into the future — build it once, build it right. With London's future in mind, we provide businesses direct access to critical fibre infrastructure, offering between 10Gbps and 100Gbps connections. It's highly reliable, resilient digital infrastructure that's built in a way that's good for our city.

We love London, and we're passionate about doing our bit for its future.

LOGISTICS



Logistics is one of the most important elements in keeping London's economy moving and London as an attractive place to locate a company. Logistics as a sector is fairly unique in its impact on the public, in that when it is done well, it is almost unnoticed, but when challenges arise, it can have a noticeable effect on residents' quality of life.

Logistics infrastructure includes streets, ports, distribution centres, freight railways, and airports, along with the vehicles and personnel needed for goods movement. The Mayor's *London Freight and Servicing Action Plan*⁵⁷ aims to improve efficiency and reduce delivery vehicles through freight consolidation hubs, enhancing vehicle safety, and promoting sustainable modes like cargo bikes and barges.

The NLA report *Industrial & Logistics: Can London Deliver 2023*⁵⁸ provides a detailed overview of the challenges and opportunities London is grappling with in relation to logistics.

| Policy | |
|---|--|
| 1,300 hectares of London's land are designated as Strategic Industrial Locations (SILs), vital for logistics and industry | 33% of boroughs have adopted or intend to adopt Co-Location policies ⁶⁰ |
| 69% of boroughs have either adopted or published draft site allocations for Co-Location ⁵⁷ | |
| Ownership | |
| 30,000 private logistics companies operate in London ⁵⁹ | 6 international airports in London are all owned by different private entities |
| Port of London Authority governs freight on the Thames east of Teddington Lock | |

| Decarbonisation & Infrastructure | |
|---|---|
| 23% of road-related carbon dioxide emissions in London came from freight vehicles ⁶¹ | 10% is the Mayor's target to cut the number of lorries and vans entering central London in the morning by 2026 |
| 1.36m square foot of warehouse space is required | 4.8% of London's employees work in the logistics sector ⁶² |
| 30% (almost) of London's industrial land isn't protected by designation ⁶³ | 29,668 new homes coming forward across all Co-Location schemes in the capital (schemes currently at Stage 1/Stage 2 & approved) ⁶³ |

Key Challenges

With online purchases rising from 18.3 per cent of retail sales in 2019 to 34.6 per cent in 2021³⁰ in the UK along with growth in UK manufacturing, logistics is a growing sector which relies on well-planned physical infrastructure to deliver goods to consumers.

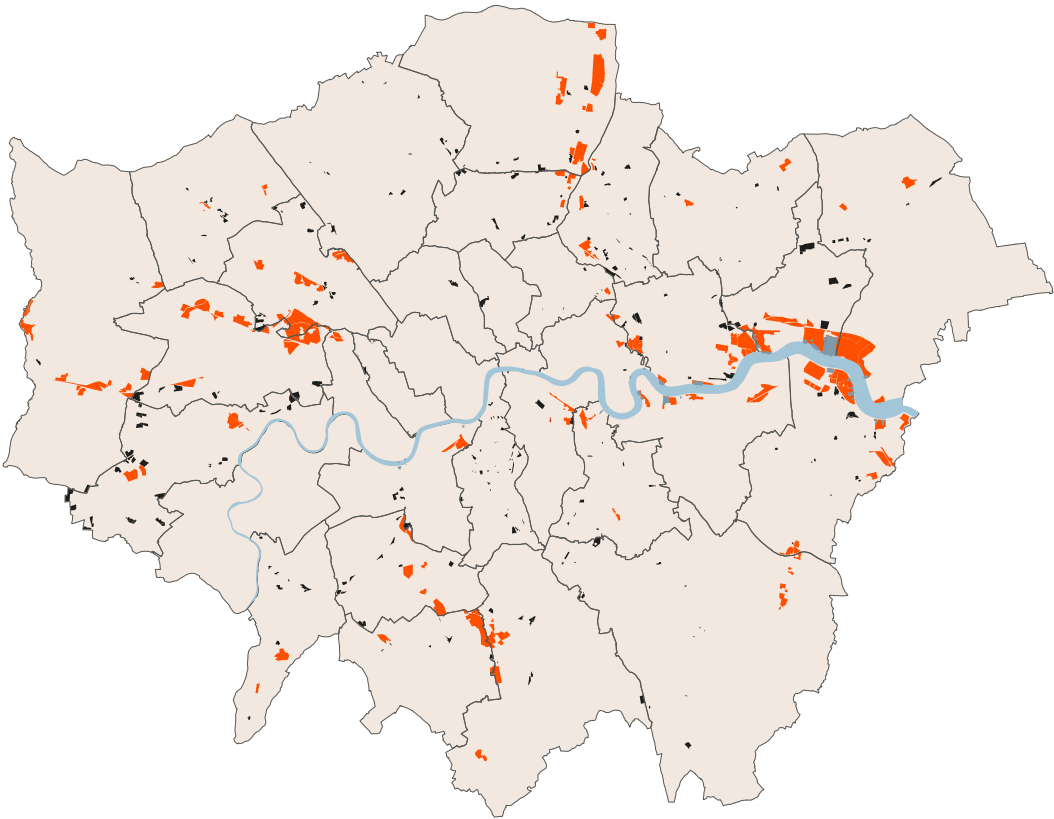
Yet, London has lost 24 per cent of its industrial floor space to other uses over the last 20 years with remaining sites seeing large increases in rent. This has the effect of constricting space available for logistics purposes, and in some cases pushing it further outside of the city, reducing the possibility of last mile deliveries being made by sustainable modes.

Another challenge is transitioning towards logistics trips that use sustainable low impact modes such as cargo bikes and electric vehicles. This will require creation of new distribution hubs closer to customers as well as the provision of electric vehicle charging facilities which in turn require potential grid connection upgrades.⁶⁴ Furthermore, rethinking logistics networks requires effective collaboration between multiple private logistic operators and public entities overseeing infrastructure and land use.⁶⁵

Contemplating how logistics infrastructures can be better integrated into the fabric of the city and provide greater community benefit is another key consideration. There are disparities in the quality of logistics services across London, bearing consequences for businesses' competitiveness and resident satisfaction. Logistics facilities are often seen as contributing to concerns such as road safety, noise and air quality, and a lack of perceived community benefits in facility design. Developing new approaches to the design and integration of logistic facilities

within dense urban environments is a key challenge, one which surely requires a strategic London-wide view on where distribution hubs are positioned.

Map of Strategic Industrial Land (SILs), Locally Strategic Land (LSIS) and Safeguarded Docks in London



- Borough boundaries
- Strategic Industrial Land (SILs)
- Locally Strategic Land (LSIS)
- Safeguarded Docks

Source: GLA Planning Datamap, 2024

Key Innovations

Increasingly, logistics operators are considering sustainable measures to both reduce carbon emissions and generate energy. Research by Prologis and the MIT Real Estate Innovation Lab reveals that consolidating deliveries on a 'circular route' reduces transportation-related emissions by almost 90 per cent, with a full standard van replacing more than 100 individual car trips.⁶⁶ Moreover, the UK Warehousing Association (UKWA) has identified opportunities to capitalise on roof space using photovoltaics (PV), with data showing that the industrial and logistics sector alone could meet the UK's 2025 carbon reduction targets if all available roof space was fitted with PV. Some programmes, including Prologis Solar Solutions, are leading on PV integration, though currently, fewer than 5 per cent of warehouses have PV according to the UKWA.

Consolidation of Pick-Up-Drop-Off (PUDO) points within buildings (and sometimes neighbourhoods) is a key way in which logistics trips are being reduced across the city.

"Buildings should always be designed with a single point of delivery, both residential and commercial. If you want to maximise deliveries and minimise movements, you should have collection points in every building and sometimes even at the centre of neighbourhoods. To push this further it could be combined with additional charges for door delivery, which some parts of the delivery sector are already proposing. Yet use of PUDO would be the free option or described as the sustainable option." Jason Longhurst, UK Head of Sustainable Investments and Partnerships, Prologis.

Artur Carulla, Partner at Allies and Morrison, takes this a step further, arguing that "Given

the potential importance of neighbourhood-wide PUDOs, the ground floor of buildings could be considered as a semi-public infrastructure". In this sense, we see how new innovations in infrastructure may sometimes require what is traditionally considered infrastructure to be expanded. An initiative of the GLA has been to begin mapping PUDOs available for public use on an online portal called 'clickcollect.london'.

New organisational structures can be key in providing greater coordination where neighbourhood wide PUDOs can be created, Shravan Joshi notes PUDOs don't have to be based only in individual buildings, but that "Business Improvement Districts (BIDs) are a key player in working to find areas where logistics and deliveries can be consolidated", again demonstrating how collaboration between many individual stakeholders can be achieved with cross cutting organisations like BIDs.

The creation of new logistics hubs for last mile distribution of goods is also seeing innovation, with new proposals emerging for consolidated distribution centres that integrate various modes. One key example is the proposed redevelopment of Bow Goods Yard by Network Rail into a 30 acre logistics hub. This example is ground breaking in that it is integrated into the existing rail network, creating the possibility for rail freight to be offloaded onto sustainable low impact modes for final delivery to addresses within the city, potentially reducing the need to have over 90,000 HGV trips a year.⁶⁷ British Land is also developing multiple proposals for various logistics hubs across London, currently holding permission for 2.3m sq ft of new logistics hubs across the city. These hubs will act as last mile hubs, allowing deliveries to be made by cargo bike and other sustainable modes.⁶⁸

Making better use of other existing assets for logistics is also a key focus: various attempts have been made to effectively use water as a means for conveying goods. In 2020, DHL launched their first river-based delivery service, whereby "deliveries bound for central London are moved from trucks to vessels in Wandsworth. They travel on the Thames until Bankside pier where they are dispatched on cargo bikes."⁶⁹ The Thames Estuary Growth Board's "Riverside Urban Logistics Environment" (RULE) project seeks to harness the Thames as a key corridor for freight distribution, through the implementation of a series of measures. It includes the creation of new floating piers at strategic locations that can

function as both public space amenities and as last mile freight distribution hubs where freight can be transferred from boat to cargo bike for delivery. The project seeks to holistically address the barriers that prevent the Thames from being better used as a logistics corridor, and demonstrates well the concept of better making better use of existing infrastructures.



Bow Goods Yard (Maccreeanor Lavington) will unlock space to deliver light industrial, workspace, logistics, and leisure at the the last heavy industrial site in the London Legacy development Corporation Area. © Maccreeanor Lavington

REPOWER INDUSTRIOUS LONDON

Francis Moss,
Principal Regeneration Officer,
London Borough of Ealing & Founder,
Industrious London Officer Network

Park Royal (We Made That) in west London employs more than 40,000 people. It is London's largest industrial estate with 450ha of industrial land, contributing £2.1billion in Gross Value Added to the UK economy. © London Borough of Ealing



Local industrial space is a vital yet often overlooked infrastructure essential for repowering a more sustainable and industrious London. Historically, such spaces have been integral to sustaining the city's economy and its people. However, with evolving industrial uses and town planning approaches, industrial spaces have become increasingly segregated from everyday urban life. Modern-day Londoners rely more than ever on these hidden industrial hubs, as evidenced by the surge in logistics operations during the COVID-19 pandemic to meet the growing demand for deliveries.

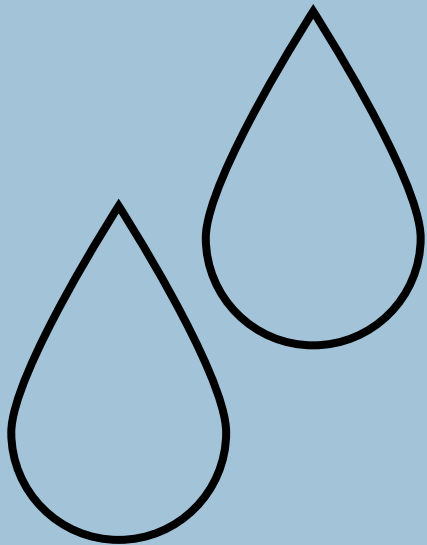
A closer examination of local industrial spaces reveals a fascinating diversity of businesses, many driven by industrious entrepreneurs and employing local residents. Unfortunately, in many parts of London, there is insufficient local industrial space to meet the needs of new or expanding businesses. This shortage can stifle economic growth and limit local job opportunities. For instance, a small Ealing-based organic skincare manufacturer has been forced to relocate part of its operations outside of London, increasing transport distances and operational inefficiencies.

In the face of economic, environmental, and political shifts, the needs for industrial space are evolving. Retrofitting existing industrial buildings, integrating them into 20-minute neighbourhoods, and supporting circular business ecosystems will be crucial to meeting the diverse needs of increasingly green businesses. Local industrial areas will provide the infrastructure necessary to repower a sustainable economy and city. For example, waste heat from data centres can heat homes, repair businesses can extend the lifespan of consumer goods, waste from one business can serve as raw material for another, and solar panels and wind turbines on industrial roofs can power local communities.

This transformation requires collaboration among business, education, and research, with the public sector playing a key convening role. It is essential to create a shared understanding of how industrial space demands are changing, how these spaces can support a sustainable city, and where additional industrial areas should be located to reduce transport needs and support a greener economy. Positive changes are already underway across London. In Ealing, the council is hosting a circular economy hub within industrial space and has convened the Greenford Innovation Partnership with key stakeholders to explore and test these opportunities. The NLA and GLA are facilitating cross-sector groups to examine city-wide changes, and the Industrious London Officer Group is bringing together council officers to champion industrial space and share knowledge and experiences to support this transformation.

Repowering an industrious London will require a collaborative effort, but the benefits for the city's economy, environment, and residents will be substantial.

WATER

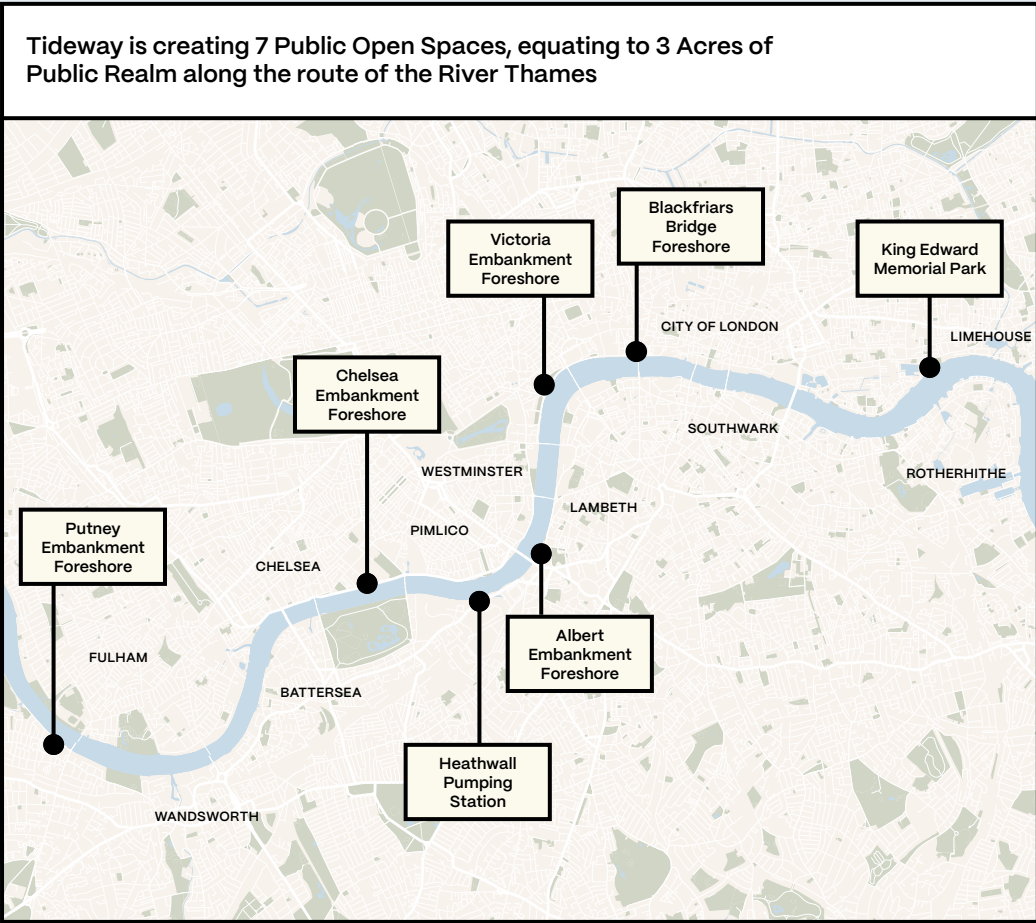


Water infrastructure is critical from many perspectives — for sanitation, public health, environmental quality, and residents' quality of life. London's 19th-century sewer system, designed for around 2 million inhabitants, now serves over 8 million, while the sprawling water distribution pipe network is in a state of disrepair after decades of disinvestment. Thames Water, the primary operator, has faced criticism for high leakage rates, customer complaints, and sewage overflows into the River Thames, allegedly due to consistent failure to invest in infrastructure upgrades. While traditionally, water infrastructure was considered only in terms of large scale means of moving, distributing, holding back and storing water in the form of the sewer networks, tidal barrages and flood walls. In the context of a changing climate, evolving definitions seek to think about water infrastructure not only ask how we 'control' water, but also how we can live with it more effectively and the potential benefits this can bring. For example, increasing permeable ground space in streets through sustainable urban drainage systems (SUDs) and the creation of 'blue' infrastructure like parks or open spaces that are actively designed to flood.

| Ownership | |
|---|---|
| <p>15_m</p> <p>people in London and the Thames Valley (about 25% of the UK population) are served by Thames Water</p> | <p>200_{km}</p> <p>of tunnels are used as a sewer system operated by Thames Water</p> |
| <p>The non-tidal section of the River Thames is managed by The Environment Agency with the Port of London Authority managing the tidal section.</p> | <p>Canals are managed by the Canal and River Trust in partnership with various public and private bodies.</p> |

| Policy | Funding |
|---|---|
| <p>50,000_{sqm}</p> <p>of catchment draining through SuDS every year – The Mayor’s target on London’s roads⁷⁰</p> | <p>£600_m</p> <p>total investment spent in upgrading pipe network by Thames water 2020–2025⁷¹</p> |

| Decarbonisation & Infrastructure | |
|--|--|
| <p>40%</p> <p>of London’s surface is impermeable⁷²</p> | <p>1/4</p> <p>of London’s rail stations, 1 in 5 schools, nearly half of London’s hospitals and hundreds of thousands of homes and workplaces will be at risk of flooding in the future⁷³</p> |



Key Challenges

Many of the key challenges around water infrastructure relate to the failure to maintain and upgrade existing infrastructure sufficiently. Analysis from the Angling Trust estimates that Thames Water replaces about 0.05 per cent of its pipe network annually and thus it would take around 2000 years at the current rate for the entire system to be upgraded.⁷⁴ The problem is compounded particularly in London where 89 per cent of pipes are cast iron which is more susceptible to corrosion, and there are 2.5x the average number of properties for each kilometer of pipe. This all results in London experiencing significantly higher rates of leakage, with 24 per cent of all water supplied to consumers in the capital being lost through leaks.⁷⁵ This issue compounds in the longer term, combined with population growth and declining groundwater supplies, it is estimated that by 2050, there will be a 26 per cent gap in water supply.⁷⁶ Similarly, the sewerage system is failing to cope, with up to 40 million tonnes of raw, untreated sewage currently discharged into the Thames every year during storm events to prevent waste water backing up into people's homes.⁷⁷

Surface water flooding presents as another key challenge, whereby large rain events cannot be dispersed quickly enough by drains and results in surface flooding. In 2021, two storm events resulted in 30 London underground stations being unusable, and multiple schools and hospitals being forced to be evacuated. Climate change is only exacerbating the rate of these extreme rain events, and they will be twice as likely by the 2030s.⁷⁸ Flooding from the Thames is also an issue throughout much of the city. Channelisation of the river through embankments and flood walls protects this to some extent, but these hard measures when designed without thought

to local context can create barriers within the city and reduce access to the water. The Thames Barrier is also a key element in this protection, but the London Climate Resilience Review estimates that by 2070 it will need to be entirely replaced.⁷⁹

Map of London's Waterways



- Thames Tideway Tunnel
- Open surface water (rivers, reservoirs, canals, lakes)
- Borough boundaries

Source: Ordnance Survey, tideway.london

Key Innovations

The Thames Tideway tunnel represents a landmark investment in water infrastructure. Costing £4.2bn, the 25km long tunnel crosses London from east to west providing an additional capacity for 39 million tonnes of water and preventing around 18m tonnes of untreated sewage from being dispersed into the Thames each year.

One of the biggest innovations of the project is its use of the Regulated Asset Base (RAB) financing model whereby investment is attracted by providing regulated guaranteed stable long-term returns for investors through user charges, with each consumer in London paying no more than an additional £25 per year. The other innovation is the creation of 8 new public spaces above the infrastructure adjacent the River Thames. In this way, what would otherwise be a hidden piece of infrastructure is generating community and place-based benefit through its design⁸⁰, providing health benefits for residents both in terms of a cleaner river, but also in the creation of new spaces that offer the potential for mental health and active recreation benefits.

New development in London adjacent to the river is also finding innovative solutions to integrating water management as a core part of the design. In the Barking Riverside development, the whole masterplan is based around the need to work to attenuate and slow surface water run off, with bioswales present throughout. Half of the site also drains directly into the Thames, and the outfall area is being landscaped as intertidal habitat, serving to create new coastal grassland areas, returning the site to its pre-industrial habitat. To protect against flooding from the river, the river frontage was entirely raised by 1m, but rather than being designed as just a flood

wall, this new flood defence is deliberately designed to be a community amenity area.

"We wanted to design infrastructure that also serves as a social amenity in open spaces. A key component of this was capturing community views through co-design sessions, aimed at shaping the play areas along the riverfront. We relied on good flood resilience engineering solutions whilst also ensuring river access for the community — a key factor that influenced the whole process, from design and planning to delivery", says Qiao Zhang, Head of Infrastructure for Barking Riverside Development. This exemplifies how water infrastructure can be multifunctional in its outcomes, serving both a flood resilience need and also bringing multiple place-based benefits.

For developments away from the river, Anthony Peter, Development Director at Related Argent, describes how different developments are taking different approaches to water infrastructure: "We take a site-by-site approach, depending on the density and the context. At Kings Cross, the decision was to have underground attenuation tanks, because of its dense urban nature, whereas at Brent Cross, with more green open space, we were able to incorporate some surface level attenuation ponds in the park space." However, he goes on to say that "an individual developer is unlikely to be able to solve issues of surface water flooding alone, as flooding is usually a catchment-wide problem, we need local authorities to take more of a strategic view on blue infrastructure".

In this vein, the London Surface Water Strategic Group was established in 2021. The group is comprised of representatives from various public and private bodies with the intention of



providing more strategic direction and cross boundary approach to addressing surface water flooding across the city.

In its interim report, analysis suggests that water catchment areas do not align with borough boundaries across the city, highlighting the need for a cross-boundary approach to infrastructural responses to flooding issues.⁸¹ Additionally, the report reinforces the need for a community led approach as solutions are implemented across the city.

"There is great work in flood mitigation happening in many boroughs but the gaps are when water may fall in one borough, but then pool in another. We need to take a more strategic vision of how this is implemented across the whole city"

Elizabeth Rapaport, Chair, London Surface Water Strategic Group

"Finding committed local actors and properly engaging them when working to understand and address surface water flooding is essential. While modelling is an essential tool, Surface water flooding is such a locally specific issue that when we are developing solutions, we need to ask residents for their input as they know their areas better than anyone. This engagement can be the difference between a solution that is successful or not", says Elizabeth Rapaport, Chair of the London Surface Water Strategic Group. The group and its interim report encapsulate well the principles of improved cross collaboration and taking a truly place-based approach to the planning and implementation of infrastructure.

Map showing London waterways, draft surface water catchment areas and flood risk areas



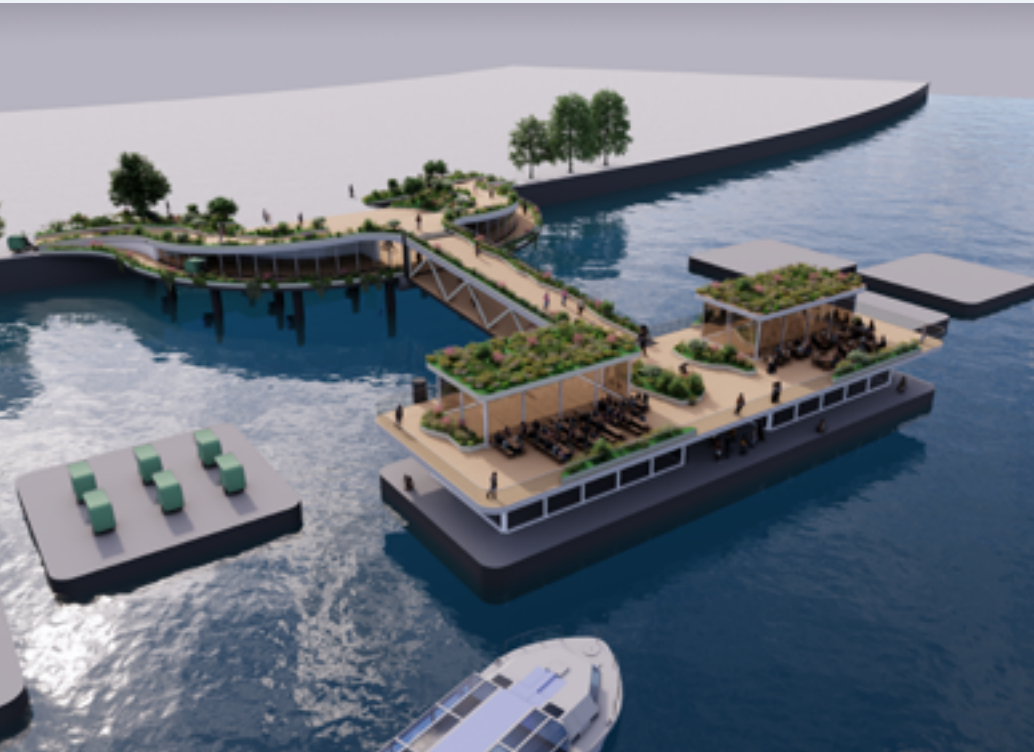
- Thames Barrier
- Draft surface water catchments
- Flood risk areas
- Open surface water

Source: Ordnance Survey 2020, GLA PanningHub, London Surface Water Strategy

FAIR GROWTH: TRANSFORMING LONDON'S WATER INFRASTRUCTURE FOR A SUSTAINABLE FUTURE

Kate Willard OBE,
Thames Estuary Envoy and Chair of the
Thames Estuary Growth Board

Conceptual designs for micro consolidation centres on the river Thames. © Aukett Swanke



London faces a significant challenge: balancing economic expansion with environmental sustainability. Fair Growth offers a tantalising and ambitious solution by focusing on development that benefits all Londoners. At the heart of this vision is the transformation of the city’s water infrastructure — with the majestic river Thames at its core. Our Riverside Urban Logistics Environment (RULE) project exemplifies this approach, aiming to reduce pollution, alleviate congestion, and enhance urban logistics through innovative use of the river Thames.

Water Infrastructure’s role in thriving cities

Cities worldwide increasingly recognise the role that water infrastructure plays in transport, commerce, quality of life, and urban growth.

New York’s Pier 57 has been transformed into a mixed-use development revitalising the waterfront with office spaces, public parks, and recreational spaces. Hamburg’s HafenCity project leverages its historic port area to create a vibrant, sustainable and flood resilient district, while Copenhagen’s Harbour Baths offer environmentally friendly urban swimming areas.

In London, the Floating Pocket Park in Paddington provides a green oasis on the water, offering seating areas and lawns, while Thames Tideway is improving water quality and supporting marine biodiversity. Thames Clipper Logistics have already used electric vessels to reduce emissions and road congestion.

The RULE Project: A Catalyst for Change

The Thames Estuary Growth Board is taking this approach a step further, with an innovative solution which will reduce congestion and pollution by shifting large volumes of light freight from road to river.

We have partnered with the Thames Freeport and the Port of London Authority to deliver this groundbreaking project. Our initial ambition is to transport 20million parcels annually on the water, easing the burden on London’s roads and fully integrating blue infrastructure into supply chains.

Enthusiasm for this approach spans a fantastic array of partners, including boat operators, pier owners, policymakers, logistics service providers, last-mile delivery companies, and potential investors.

Environmental Benefits

The project promises substantial environmental benefits, reducing CO2 emissions by 2,284 tonnes and NOx by 3.6 tonnes annually, aligning beautifully with London’s commitment to achieving Net Zero, prioritising ecological health alongside economic development.

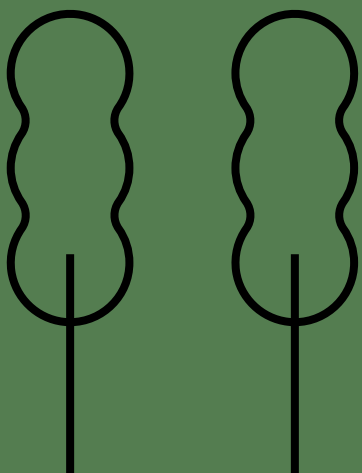
Economic and Social Impact

The project will stimulate economic activity, creating over 800 new jobs and generating £54 million in Gross Value Added (GVA) and establishing efficient and sustainable logistics networks, raising quality of life for Londoners by reducing congestion and pollution.

A Vision for the Future

As London continues to evolve, the city must champion the principles of fair growth and use them consciously to guide its development. London can lead the way in creating a more sustainable and equitable future for residents and businesses globally. Our ambitious, transformative RULE project exemplifies how innovative water infrastructure can drive sustainable growth, enhance urban resilience, and improve quality of life.

GREEN



Awareness of the critical importance of nature-based infrastructure has gained currency in recent years, with greenery offering manifold benefits including carbon sequestration, improved air quality, reduced urban heat island effect, physical and mental health benefits, and decreased stormwater runoff. It is also recognised how these benefits precipitate downstream benefits too, for example, tree shade can reduce cooling demand in buildings and thus reduce electricity demand, decreasing strain on grid infrastructure and overall carbon emissions. Additionally, work has been done to quantify the health benefits of green infrastructure, with it being estimated that they provide around £111 million in savings for the NHS annually.⁸² In this context, policy has come to reflect green infrastructure's importance, with the London Plan 2021 setting the goal for half of London to be "green" by 2050 and addressing geographic inequalities in green space access. Other infrastructure bodies have also developed policies, such as TfL's Green Infrastructure and Biodiversity Plan⁸³ which prioritises increasing tree canopy, sustainable drainage systems, and wildflower verges across its portfolio of streets and land.

| Ownership | |
|--|--|
| <p>18%</p> <p>of Greater London is designated Public Open Space – this includes parks, open spaces and green infrastructure on streets largely overseen by local authorities or TfL ⁸⁴</p> | <p>14%</p> <p>of Greater London is privately owned and operated gardens ⁸²</p> |

| Policy | |
|---|--|
| <p>10min</p> <p>walk or less to access green space from every Londoner's home – The Mayor's Target ⁸⁵</p> | <p>10%</p> <p>increase in tree cover by 2050 – The Mayor's Target ⁸⁶</p> |
| <p>50%</p> <p>of London households are still further than 400m from their nearest park</p> | <p>260,000 sqm</p> <p>of wildflower verges by TfL by end of 2024 ⁸⁷</p> |

| Decarbonisation & Infrastructure | |
|--|--|
| <p>47%</p> <p>of London is classified as green space</p> | <p>2°C</p> <p>London's parks and green spaces help reduce urban temperatures by up to 2°C during heat waves</p> |
| <p>£133m</p> <p>worth of benefits provided by London's trees every year ⁸⁸</p> | <p>2,367,000 tonnes</p> <p>of carbon stored in London's trees ⁸⁶</p> |
| <p>700</p> <p>green roofs totalling</p> <p>175,000 sqm</p> <p>are in operation in London currently ⁸⁹</p> | |

Key Challenges

Although London has relatively high levels of existing green infrastructure, the London environmental strategy notes that up to the year 2018, there had been successive years of lost green space at around 10–15 acres per year.⁹⁰ Reversing this decline while also meeting needs for new housing and other infrastructure is a challenge. This is combined with the fact that green spaces in poorer areas are more likely to be built upon than those in wealthier areas according to The Countryside Charity.⁹¹

Given the lack of land available for large scale green space projects, Judith Sykes, Senior Director & CEO at Useful Simple Trust notes the need for the retrofitting of green infrastructure across the city in a series of smaller projects.

"We're lucky we're a really green city with a good starting point but a lot more to be done in upstream system retrofit targeted in the right places. Historically the problem has been identifying who should adopt nature-based solutions? 25 years later we are still here having the same conversations. We need a more systematic and strategic approach".

Judith Sykes, Senior Director & CEO,
Useful Simple Trust

The recent London Climate Resilience Review (LCRR) underlined this need, stating that "Blue Green Infrastructure (BGI) can

often be siloed into dedicated teams, which misses opportunities to embed BGI throughout related programmes across built environment and community work".

The LCRR goes on to state that lack of overall investment is significant barrier to achieving greater green infrastructure:

"[In the ten years to 2019] spending on public green space has fallen by over 30 per cent to just £159m while London's population has grown by around 900,000 people (11.2 per cent)".⁹²

This trend highlights the need to find new and innovative ways to fund green infrastructure, from non-traditional sources. A key part of this is ensuring that private sector stakeholders are aware of the multiplicity of benefits it can bring and avoid the common perception that green infrastructure is only the remit of the public sector. While greater investment is needed, Tom Weighton, Sustainability Officer at London Borough of Redbridge notes that "the way in which green infrastructure is delivered is essential to ensure a just transition. For example, we have to have joined-up thinking about access to green space and where housing is being built."

Map of Green Spaces in London



- Green Belt
- Open green land
- Open water (rivers, reservoirs, canals, lakes)

Source: Ordnance Survey and
GLA planning hub 2024

Key Innovations

Tackling the issue of investment requires the private sector to understand the benefits of green infrastructure. At King's Cross, green infrastructure has been a central element of the masterplan with 40 per cent of the 67-acres designated as open space as well as over 400 new trees being planted.⁹³ Anthony Peter notes how this was precipitated through a changing mindset about value:

"We see green infrastructure as a key driver which adds genuine value to our developments — in terms of amenity, mental health and many other aspects, with all these ultimately working towards creating an attractive environment for occupiers and residents. Maintenance can be expensive, but the value it adds to the site makes this more than worth it."

As noted, finding available space for new green infrastructure is a challenge. As such, innovation is coming in the form of repurposing historic and underutilised infrastructures. The Camden Highline seeks to transform a disused railway viaduct into an elevated linear park, serving as a new local green space for 20,000 residents living within 500m of the project. The project demonstrates that infrastructure we build should be considered fluid over its lifetime, from serving as transportation infrastructure, to serving as green infrastructure and provides a model for us to reimagine all types of infrastructure as they reach the end of their original use. The funding model also relies on a mix of public donations, private sector support and public grants, demonstrating how new large scale green infrastructure projects can be funded through multiple sources.

In terms of delivering smaller scale projects, the successful Greening the Business

Improvement Districts program provides an example of how public private partnerships can leverage private capital to deliver many smaller scale greening projects across the capital.⁹⁴ The GLA program worked to conduct audits of 16 BIDs to identify potential sites for greening, and then provided partial funding for demonstration projects. The programme delivered 16 green infrastructure demonstration projects and a further 101 additional installations, leveraging a total of £4.3 million in private funding. This demonstrates an effective model for both financing local green improvements, but also for allowing them to be delivered in a bottom-up manner, with local stakeholders playing a leading role in the development of each project, allowing them to be delivered in a more place-based approach.

In their 2050 Vision, the Thames Estuary Growth Commission too embraces a 'natural capital' approach, which considers the value of the natural environment for people and the economy. With a focus on 'connecting to and enhancing natural assets and green infrastructure', five distinct, but interconnected 'productive places' were identified along the estuary with a clear vision for each area and people-led projects, delivered in part through the Thames Estuary Fund.⁹⁵



The Camden Highline (vPPR Architects) will transform the disused railway viaduct between Camden Town and King's Cross into a new green park, linking people to amenities and joining existing green spaces. © Hayes Davidson, JCFO, vPPR

SINGLE SYSTEM THINKING

Stephen O'Malley,
CEO and Founding Director,
Civic Engineers

At Gascoigne Estate Phase 2 (White Arkitekter, 2022) Sustainable Drainage Systems (SuDS) measures have been integrated into the landscape and play features so that all stormwater on the site infiltrates naturally into the ground. © Civic Engineers



The realities of climate change are no longer contestable. Our precious ecosystems are being overwhelmed by energy-hungry lifestyle choices and carbon-intensive industrial methods. Engineers have played a huge role in creating these systems. Fortunately, by applying these long-established technical skills with greater emotional intelligence, we also possess the reframed ability to adapt them to provide sustainable and regenerative options.

We need a new way to live. The spatial arrangement, and the mix of uses, of our neighbourhoods has a profound impact on how they function, how we move around them and how they work with the lie of the land. The best examples are those that work in harmony with the landscape, heritage and local distinctiveness.

The recent suite of societal changes we've experienced have caused us to rethink our built environment. We can now seamlessly glide from a medical appointment to a university lecture, renew our car insurance, arrange grocery home delivery, check-up on our elderly aunt via Teams from the convenience of our kitchen table.

Reducing our need to physically travel provides the freedom to achieve more by travelling less. This sea change in lifestyle patterns brings the concept of proximity into sharp focus. It's about placing the services of our everyday in a way that shortens the distances we journey and therefore making it more likely that these trips will be undertaken by active travel means.

How these neighbourhoods and their uses are clustered, and their functionality in concert becomes ever more important: especially when we recognise the enduring value rooted in the geography and architectural character of these evolved districts. Creating infrastructure and places that work in harmony with the natural landscape increases their climatic resilience and attractiveness,

and ensures sustainable futures for the communities that occupy them.

Getting the public onboard is about hearts and minds. It does require regulation and 'sticks' like the Mayor of London's Ultra Low Emission Zone. Introduced in 2019, mandatory policies like this are necessary to shepherd us all towards behaviours that will, in time, be depoliticised.

Shifting from car oriented movement in these increasingly dense neighbourhoods is not just a practical recognition that more of us living in closer proximity leads to a gridlocked highway network. We can tighten the street geometry to liberate space for other uses. These other uses include safer pavements for pedestrians. Also social squares, parks and public realm, complete with integrated cycling routes and, critically, space for Nature-based Solutions. The positive benefits of these measures is evidenced through the LTN programme rolled out across the capital. The performance data highlights improved sociability and public health, amongst other metrics.

For new forms of infrastructure to be sustainable, we also need to think about the new financial models. Climate resilient urban infrastructure, if designed well, reduces the risk of flooding, protects properties, businesses and people. At Civic, we have developed the idea of EcoBIDS which would see local stakeholders, the value beneficiaries of these choices, put money in a collective pot, which could be redistributed to fund these micro-interventions as part of a borough wide and local watercourse catchment system, to keep them thriving. After all, we all have something to gain from cities that are nurturing, attractive to live in and synchronised with our natural environment.

3

**DELIVERING
A 'PLACE-
BASED
APPROACH'
TO INFRA-
STRUCTURE**

WHAT IS A "PLACE-BASED APPROACH"?

A common misconception is that a 'place-based approach' is merely about creating a sense of place through urban design and well-planned communities, but also, as Jason Longhurst, UK Head of Sustainable Investments and Partnerships at Prologis puts it, "place making isn't just soft visual side, but also delivering the infrastructure in a coordinated way". It should encompass delivering infrastructure in a way that is responsive to the local context, both adjusting to meet the needs of the community, and also benefiting from the local specific advantages that may be present. Finally, it is an approach that looks to break existing siloes in how it is delivered at a local level — rather than building monofunctional infrastructures that only serve one purpose, it requires us to imagine how infrastructure can respond to large challenges we are facing, but ensure it lands in a community in a contextually sensitive way.

From these various infrastructure types outlined in the previous section, here we present a set of learnings extracted from the range of inputs, voices and case studies that are key for London to move towards an approach described above, to

meet the infrastructure needs moving into the future and to achieve targets around decarbonisation. While greater policy direction from central government is necessary, these learnings identify what next steps our community can take immediately to start delivering the next generation of infrastructure in London.

"A place-based approach is about how you apply a big concept at the small scale. In general, communities don't tend to care so much about these big scale challenges, they are more concerned about how the infrastructure lands in their community and impacts upon their quality of life."

Dr Katherine Ibbotson, Director, WSP



1.

Cultivate cross-boundary coordination

We need greater collaboration between boroughs, at the subregional scale, at the city scale under the Mayor and at the national level if we are to realise the possibilities of place-based and multi-functionary infrastructure.

Infrastructure does not adhere to administrative nor political boundaries. However, our governance structure within London in many cases devolves responsibilities to lower levels of governance. While in many cases, this is positive in that it allows a greater connection between local residents and planners, providing greater on the ground knowledge to make decisions, in some cases it can become a hindrance, especially at the semi-arbitrary boundaries. Linear infrastructure especially does not recognise these boundaries, and the decisions in adjacent domains can have significant impacts on adjacent areas but without the structure to allow for coordination.

In Artur Carulla's words: "Subsidiarity should stop when delegating responsibilities to lower levels of government becomes inefficient or ineffective". However, in some cases this principle is not followed due to a lack of power within the GLA, Carulla continues: "The GLA is a small organisation with a limited budget dealing with a somewhat restricted scope of policy". As such, many infrastructures (for example: Heat

Networks) that may be best coordinated at a city-wide scale, are being delegated to local boroughs.

The GLA is working to enable more cross boundary collaboration with bodies such as the GLA Infrastructure Team that brings together multiple stakeholders, both public and private that cross borough boundaries to find creative solutions to infrastructural challenges, for example the "Dig Once" initiative seeks to align multiple infrastructure operators and utility companies who may have need to dig up the street in order to lay new cables or conduct maintenance such that they can work at the same time.⁹⁶ Molly Strauss, notes that it has "saved over 1000 days of disruption so far equating to over £10m of public benefit".

In other cases, boroughs are forming cross boundary partnerships to meet challenges, such as the Shoreditch Heat Network. In this case, a new partnership is being formed between the City of London and the London Borough of Hackney to seek to connect a heat network that will use excess heat from data centres and offices in the City to heat residential properties in adjacent Hackney, a partnership facilitated and funded by the GLA.



The North London Heat and Power Project (Grimshaw, 2024) transforms Edmonton EcoPark into a hub for waste, recycling, and energy, supporting two million residents in seven London boroughs. © Hufton + Crow

2.

Develop strong partnerships

We must build new partnerships between the public, private and non-profit sector in order to deliver innovation in infrastructure provision, maintenance and design.

Given the current multiplicity of owners, operators and managers of infrastructure across London, forging new effective and co-beneficial partnerships is essential for the effective delivery of infrastructure and its effective management. Harnessing the private sector to accelerate innovation is also key to making best use of new and emerging technologies.

The TfL Electric Vehicle Charging Infrastructure Hubs mentioned under the Transport section perfectly demonstrate this idea of creating new partnerships to deliver critical and innovative infrastructure. The model works with TfL identifying potential land, then forming a joint venture with local boroughs to engage private developers and operators to develop and run the sites. In this sense, it brings the best assets from each sector — TfL being able to take a strategic view of charging needs and demand, the borough being able to capitalise on underutilised land within its existing portfolio, and private operators who can deliver the best technology and management practices for the finished asset. Rather than putting each actor in competition, goals and metrics of success are aligned such that positive outcomes for all parties can be achieved.

The Brent Cross Town development marks a key case of how partnerships can forge effective infrastructure delivery in new developments. The development will deliver a total of 6,700 homes, 50 retail/food locations and around 25,000 office worker spaces across a 180-acre site. To power this, the site includes one of the largest all electric heat and cooling solutions in Europe. This is a highly complex infrastructural investment with extremely long time horizons for payback. In this regard, Anthony Peter, Development Director at Related Argent, noted that the most important thing was having a strong and effective partnership with its private energy partner, Vattenfall. Peter notes that “the key thing in the partnership is to have a shared long term commitment with aligned goals, coupled with a mechanism that allows the partnership (as well as the physical infrastructure) to dynamically adapt and change in response to contextual conditions.”



Brent Cross Town's low carbon heat and cooling network (Allies and Morrison, 2035) uses heat pumps, electrical boilers, chillers, and thermal stores, forming one of the largest such facilities in Europe. © Cityscape Digital

Break down silos

Structure governmental and administrative entities in ways that allow for the necessary collaboration, cross pollination and interdisciplinary thinking to address issues at a system scale.

"As built environment professionals, thinking beyond boundaries requires us all to lead and to be creative, courageous and truly collaborative about the solutions. We have to work together, not in silos. We've got to create positive momentum that will fortify the plan and capture hearts and minds. We need to bring people on the journey with us to a much brighter, more sustainable future for everyone." Stephen O'Malley, Civic Engineers.

Governmental, administrative and other organisations have been traditionally set up in a way that silos different infrastructure types. While there is a great deal of literacy about the techniques for upgrading individual buildings to meet carbon neutrality standards, in the opinion of Artur Carulla, Partner at Allies and Morrison, there is a disciplinary failure in that "the main share of a city's environmental impact is not in the buildings, but the land, energy and water footprint of infrastructure and that systems thinking at this scale is lacking". He further attests that while getting a building wrong may result in non-optimal outcomes for 60 years, getting the structures of the city wrong — the masterplan, the transportation network, the division of public and private land — can very rarely be altered and thus has a

larger and longer-term impact on a city's sustainability.

In this sense, creating greater inter and intra-disciplinary understanding of the systems at play and finding cross cutting solutions is key. Restructuring organisations can be a key first step in this process. For example, Islington Council's Net Zero Carbon programme seeks to bring together various departments to work on delivering change through "eight multi-disciplinary work streams involving teams from across the council".⁹⁷

In other cases, such as TfL, it may require an expansion of scope of the organisation. Rather than just being responsible for the management and running of transportation infrastructure in the city, TfL have identified their position including the land they hold and the potential collaborations they can forge to impact other aspects of the city, meaning that they must expand their mandate to work on a wider set of things. The formation of "Places for London", TfL's property development arm allows the organisation to deliver housing on much of its underutilised land, with the aim of delivering housing for 40,000 people by 2030.⁹⁸



Bank Junction (City of London Corporation, 2023) – the All Change at Bank project reprioritises space for people walking, wheeling and cycling alongside an enhanced public realm, including seating and greening. © City of London Corporation

4.

Choose the right size and scale

Find the right scale of project and governance to deliver the type of infrastructure you are trying to deliver.

“Different infrastructures require different governance and implementation models, and the ideal scale will be unique for every kind of system.” Camilla Siggard Andersen, Practice Lead, Hassell.

A key issue identified throughout this insight study was finding the right scale of governance at which to deliver different types of infrastructure. Some infrastructure is still delivered at too high a level resulting in a feeling of top-down imposition without consideration for localities due to their complexity. In other cases, some infrastructure that may be better delivered at a citywide scale, like heat networks, are being implemented at a hyper local level requiring much doubling up and failed experiments in different localities and would benefit from more standardisation and centralisation. Regardless of the scale of delivery, as different infrastructures require different levels, maintaining a place-based approach must be consistent throughout, keeping the focus about communicating and ensuring the infrastructure lands in a contextually sensitive manner.

Moreover, the size of projects can affect how quickly they can be implemented and how quickly we can course correct if mistakes are made. Megaprojects make large assumptions and may result in

solutions that quickly become outdated, whereas smaller projects can trial new ideas more quickly and get them implemented. This approach is sometimes called “Massive Small” in that it relies on a large number of smaller projects. However, when facing the scale of change required to meet decarbonisation targets, one may question whether smaller projects will add up to enough change quickly enough.

An example of rethinking scale is the approach to water management. Traditionally flooding events have been managed through large scale infrastructure projects such as the Thames Barrier, the channelisation of the river and flood walls. Increasingly, rather than focussing on these large hard projects, there is a recognition that rainfall should be managed locally through sustainable urban drainage systems as much as possible. The Mayor’s London Sustainable Drainage Action Plan⁹⁹ sets out the broad principles for how boroughs and agencies can respond, but focuses on locally small scale projects to be implemented across the city at a more local level.



5.

Train the future workforce

We must create a workforce that is capable of specifying, building, and maintaining the critical pieces of infrastructure that will drive the decarbonisation of London's Infrastructure.

Beyond planning for new ways of delivering innovative infrastructure, London also has a critical need to ensure we have the right skills to deliver and maintain the new infrastructures. For example, Jeremy Martin, London Borough of Hackney, notes that one of the biggest challenges in the installation of heat pumps is actually having a workforce that is capable of specifying, installing and maintaining them. At the moment, a lack of available skills leads to much higher prices for all of these stages, slowing their roll out and leading to issues with reliability.

Building these skills also creates a virtuous cycle within communities that are receiving new infrastructures. As investments in infrastructure projects in local areas proliferate, they generate new employment opportunities. The development of this skilled workforce further drives innovation and efficiency in local infrastructures, which supports more robust and resilient communities, reinforcing the demand for and success of new infrastructure initiatives at a local level.

As a measure to target this shortfall, the Mayor has launched the Mayor's Skills Academies programme, of which one

key focus is the development of skills for green jobs including decarbonisation of buildings, low carbon transport and the circular economy.¹⁰⁰ This involves four different educational institutions offering programmes to retrain adults in these fields. At a subregional scale, the West London Alliance has also developed its first Local Skills Improvement Plan (LSIP) that sets out priorities for the area to develop the skills necessary in a local manner to meet their requirements, with research forecasting that jobs in the green workforce will double across the decade between 2020 and 2030. The research projects that by 2030, Power Infrastructure will represent 36 per cent of total green jobs in West London, while Low Carbon Transport will represent 19 per cent.¹⁰¹

6.

Harness community leadership

Build support, trust and understanding through engaging communities at early stages of infrastructure planning processes and by placing them at the heart of design and implementation.

A key failure of historic infrastructural investments is that they were often imposed upon communities rather than being designed and built in collaboration with them. This has resulted in a well-founded historic mistrust of infrastructure projects from many localities. Building truly resilient infrastructure that is integrated into place, requires a new approach to the community's involvement in the planning and implementation of infrastructure.

Judith Sykes sets out that for all infrastructure projects "the community must be involved in setting the brief. The community must be a key part of setting the agenda and we must do more to clearly articulate the benefit of the infrastructure to communities." This is enshrined at a national level in the National Infrastructure Commission's Design Principles that states that infrastructure projects should be "informed by the people affected, including residents, community groups, infrastructure users, interest groups, and local employers".

"The Great Grid Upgrade" offers a good example of how nationally significant infrastructure can be delivered with a strong community focus. The programme is set to make vast upgrades to the

national grid transmission network necessary to enable the connection of new renewable power sources (e.g. wind farms) into the grid. This will involve the large-scale construction and upgrading of existing power lines across the country, touching many communities. In order to bring communities along, the approach is twofold — firstly, to communicate the importance of the infrastructure through effective communications and secondly, to ensure that community benefits are consistently delivered across their projects.¹⁰² This includes things such as committing to biodiversity net gain in all projects and investing in local skills, education and employment in communities touched by the projects.

At a local level for smaller scale infrastructure projects developments such as the Barking Riverside where key flood defence infrastructure was designed in collaboration with residents demonstrates the principle.

These two examples show how at various scales of infrastructure and significance, community leadership must be incorporated.

Celebrate infrastructure as civil amenity

Design infrastructure to be functional, beautiful, and visible to people so it can be used to educate and build awareness.

"If you look at Victorian infrastructure, it conveys a strong civic ambition. It wasn't just the ornament and decoration, infrastructure was built to transcend its functional purpose and deliver a sense of delight and urban pride, something that was to be used but also enjoyed" Artur Carulla, Partner at Allies and Morrison.

Celebrating infrastructure is something that the Victorians were adept at doing. Building public understanding, pride and engagement with infrastructure can be a key component of trust and engagement. In the past decades, infrastructure has been considered something to be hidden away, buried underground or elevated out of sight. It is no wonder that there is poor public consciousness of the cost our lifestyles have on resources and the planet.

It can be argued that new infrastructure should be made visible to people, to be celebrated and to serve as an educational opportunity to help people understand both its importance but also its cost economically and environmentally. As Artur Carulla, further states: "there is a natural desire in people to understand how things work. If you can make a spectacle of infrastructure, if you can build into people's lives, you can better bring communities along with change".

In Brent Cross Town, a new substation was built to power more than 6,700 homes and over 1 million sqft. Instead of trying to hide the infrastructure as is common with substations, the decision was taken to celebrate it by wrapping it in a huge sculptural piece of art. Not only does this make an otherwise uninteresting infrastructure beautiful, but it also serves to actually draw attention to it and help people understand how this infrastructure is critical to the development's sustainability.

"It would have been easy to take the more traditional route of enclosing the substation in a nondescript box and to miss the opportunity that is now so evident. Instead, we have demonstrated that even the most functional pieces of infrastructure can play an important role in defining place and lifting the spirits" Nick Searl, Partner at Related Argent.¹⁰³

In a similar vein, Elephant Park features a heat and energy plant that actually becomes a focal point within the development, sharing the same building as a cafe and nursery. A glass window that exposes the inner pipes of the centre, allows passers by to look into the inner functioning.¹⁰⁴ In the words of the architect Joe Morris, "we are hoping that the articulation of the form through material and windows encourages people to engage with it".¹⁰⁵ It also features a continuous architectural style that blurs the line between the energy infrastructures and social infrastructures that are contained within.



8.

Build in adaptability

Do not build for a finished state, but rather build in a way that allows for incremental change and adaptation to respond to changing requirements and contexts.

"Whatever part of infrastructure we are talking about, we need to ask: are we designing for a capacity we have predicted, or are we accepting that we don't know the future and instead focussing on designing a system that can feedback to us and tell us what it needs so we can work out how to adapt it. This would be a real paradigm shift in how we think." Simon Joe Portal, Head of Engineering & Sustainability, UK, Drees & Sommer.

Artur Carulla, states that "we should stop thinking in terms of infrastructure being a finite completed piece of work", but rather as something that can be incrementally improved and adapted based on changing contexts and demands. An example of this would be a large-scale investment in a fixed piece of infrastructure that places all bets on one thing and assumes that the requirements won't change. For example, an elevated motorway junction assumes firstly that travel patterns will remain car centric, is a large investment and cannot easily be adapted for other uses. Furthermore, it actually locks in a specific type of transportation by excluding all other modes through its design.

Queen Elizabeth Olympic Park represents a good example of development of infrastructure as a part of a masterplan that

was designed with adaptability in mind. For example, many of the venues were not only designed to be used beyond the games, but they were also designed to be reduced in capacity once the Olympics were over and less spectators would be attending. Similarly, bridges over the Lea River were designed to be partially deconstructed after the Games, when they wouldn't have as high volumes of pedestrians using them. Talking of the Olympics site, Artur Carulla, notes that "we're bad at forecasting our future as a species, so we need to think about how infrastructure can be both incrementally upgraded as demand grows and reduced as demand lessens".

At King's Cross, a similar approach was taken in regards to both infrastructure and building uses and forms. Rather than the masterplan setting out precisely what was to be built in each plot of land, it rather set out the key infrastructural pieces that would form the public realm, and then over time uses and buildings were designed in harmony with this. Thus, the masterplan effectively provided a vision but allowed for changing contexts and economic conditions to not break the project by being overly definitive in what the outcome was supposed to be. This was also reflected in the infrastructure, with a route through the site that was originally intended to be for bus access, was eventually converted into pedestrian only space as bus routes changed.



King's Cross Canal Corridor (Townshend Landscape Architects, 2018) breaks through a boundary wall to connect the canal with the King's Cross Development through a series of active public spaces. © John Sturrock

9.

Innovate in funding models

Provide clarity to infrastructure planners about funding and seek new sources through new innovative funding models.

While adaptability is essential, it is also necessary to provide clarity and confidence such that bodies can make investments in infrastructure. Unpredictable funding cycles and changing regulation oftentimes make it difficult for infrastructure providers to commit. Peter O'Brien, Director of Regeneration and Change, at the London Borough of Hounslow notes that the constantly changing nature of regulation proves a huge impediment to getting projects to fruition. He suggests that periodic regulatory pauses could be beneficial in order to actually get projects implemented.

In this context, many innovations in funding models are being developed to both fund infrastructure consistently, but also ensure that it meets the needs of local residents by funding in a more locally powered manner. One example is the co-ownership of energy production facilities such as Ripple Energy's model. This model not only achieves a new model of funding and ownership, but also serves to increase a sense of community buy-in to energy infrastructure.

Joint public private partnerships will also play a role, for example the previously mentioned Digital Greenwich Connect, which harnesses private capital in combination with public funding to deliver digital infrastructure where

market forces alone are not creating it. The Green BIDs program harnesses private capital at a local level to deliver green infrastructure with GLA support.

Innovative models like 3Ci's "Net Zero Neighbourhoods" seek to package multiple smaller decarbonisation infrastructure projects together into attractive investment propositions by creating scale and longer-term certainty for investors. While coordinating multiple homeowners to invest at the same time into retrofit, by joining multiple projects together and funding them through investment, the upgrades can be provided at no cost to homeowners.¹⁰⁶

The EcoBID concept is similarly innovative, seeking to ape the Business Improvement District model, but as a means to funding climate mitigation efforts. It is proposed that ECOBids could be funded and driven through a City Climate Bond social enterprise that receives funds from government, land owners, landlords, property developers, businesses and institutions and then spend these monies on local climate resilience projects.¹⁰⁷



10.

Test ideas and refine

Try new ideas out with quick, cost-effective projects, and then refine incrementally.

"If you look at the whole system and try to change everything on day one, it will take years to change anything, and potentially will never be implemented. If however you look at one small part, test a new idea and see if it works and then repeat it, you're much more likely to affect long term change"
Dr Katherine Ibbotson, Director, WSP

As new approaches to delivering infrastructure and new technologies emerge and to deal with constrained budgets, the concept of quickly testing new ideas and designs, refining and adapting is an important approach. This helps to avoid over investing in specific technologies that may quickly become redundant and can also be an effective way of demonstrating to communities about what changed infrastructure may look like or function.

This as an approach has perhaps best been applied in transportation, where "quick build" projects seek to rapidly reallocate road space using temporary materials that can cheaply be implemented and refined based on analysis of the outcomes. The rapid roll out of COVID cycle lanes and Low Traffic Neighbourhoods supported a 13 per cent increase in cycling between 2019 and 2022.¹⁰⁸

In some cases, these were criticised for being implemented too quickly without

proper community engagement, but in general, studies show that they are effective at demonstrating the benefits of new ways of designing streets and public opinion is generally favourable after a bedding in period.¹⁰⁹

11.

Co-locate infrastructure

Understand how spatially adjacent infrastructures can symbiotically support each other.

Addressing infrastructure in a more joined-up way not only requires greater partnerships and collaboration between entities, but it also requires a greater attention to the spatiality and adjacencies of infrastructural systems. Too often, each infrastructure is considered as a closed system, in separation to others. However, it is evident from cases in this report that the best multi-functional outcomes happen when infrastructures' physical spatiality becomes the basis for finding new synergies between infrastructural types. This can result in new and innovative combinations and mutually supportive infrastructures.

The Bunhill Local Area Heat network (see Energy section) demonstrates this concept effectively. Our transportation infrastructure system and our heating infrastructures sit as two infrastructural networks often overlapping each other, but almost always functioning as separate entities. The innovation to simply connect the two together in this project shows how adjacency can provide the opportunity for new symbiotic functions. Other key examples of co-location include the Bow Goods Yard (see Logistics section) proposal that seeks to integrate the rail transportation network into the logistics network, the Camden High Line (see Green section) that integrates redundant

transport infrastructure into the city's green infrastructure network and the proposed Bidder Street Data Centre that links the city's digital infrastructure into the heating system, with excess heat from the data centre being used to heat up to 13,000 nearby homes.

City-wide co-ordination

Greater leadership and co-ordination at a city-wide scale, including a visual spatial strategy, to enable knowledge sharing and a more efficient deployment of resources.

Our definition of critical infrastructure must evolve to include affordable housing, to ensure that this is treated as a priority in the long-term. Whilst this report highlights the integral work taking place at a local-level, it also builds a case for a coherent London-wide infrastructure strategy, encompassing affordable housing and driving prosperity across the capital.

This research calls for a coordinated place-based plan for infrastructure, contemplating the interconnected and complex layers of infrastructure—Energy, Transport, Digital, Logistics, Water and Green—in a holistic way.

The development of Local Area Energy Plans (LAEPs) led by the GLA exemplify the benefits of a coordinated strategy led from City Hall. This approach offers key advantages in terms of economies of scale and transcending borough boundaries.

There is also a crucial role for the GLA to play in bringing together various data sets from different infrastructure providers to see where the spatial crossover and adjacencies are and developing a London-wide strategy. The GLA's Planning Data Map offers a fantastic visual resource to consider proximity of infrastructures, but there is still work to be done. Notably, there isn't currently a Mayoral

spatial strategy for data centre placement, despite their significant impact on the grid.

Crucially, a strategy encouraging co-location of infrastructures could empower local authorities to drive a more linked up approach to infrastructure delivery.

In anticipation of the launch of the Growth Plan and revised London Plan, NLA's Expert Panels and wider community will come together to share knowledge and translate this approach spatially across the capital—supporting our mission to deliver a more equitable, sustainable and prosperous city for all Londoners.



A view of Canary Wharf – RePower London calls for a coordinated place-based plan for infrastructure, contemplating the complex layers of infrastructure – Energy, Transport, Digital, Logistics, Water and Green – in a holistic way. © 24K-Production / Adobe Stock

CONCLUSION

Taking a historic perspective, the days in which mono-functional infrastructures were planned in a top-down manner and imposed on communities without recourse are long over. We now, however, find ourselves at another transition point, where the more recent mass privatisation of many infrastructures in the 1980s is being questioned more than ever. With the first Labour government in over a decade, we may be beginning to see a new more mixed approach to public and private involvement in infrastructure management and planning. It is in this complex and shifting context that London's infrastructure must rise to meet a multitude of compounding challenges, from climate change, to a rapidly changing social and economic context.

Regardless of the macro forces at play, the message coming from the built environment industry is that a new approach to planning, delivering and implementing infrastructure is needed. This new approach must be focused around meeting communities' multiple needs in a joined up way. This must be delivered in a truly place-based manner, that delivers real benefits in people's daily lives and builds the resilience required to meet climate change among other challenges.

We must also build infrastructure with humility. The idea that we can accurately forecast and predict what our and the planet's needs will be in 10 years, let alone 100, is a fiction, and so the next generation of infrastructure must be built with flexibility and adaptability as central, such that future generations can weave and blend what we build to suit their needs and requirements.



Situated at the gateway to the Greenwich Peninsula, the Energy Centre (C.F. Møller Architects, 2017) features a striking 49-metre artwork, The Optic Cloak by Conrad Shawcross that combines creativity with functionality. © Knight Dragon

PROJECT SHOWCASE

LONDON—WIDE

The RePower London Project Showcase highlights a selection of exemplar schemes that have been delivered or are coming forward, which model place-based approaches to infrastructure provision in the capital. From neighbourhood, community-driven infrastructure projects to sub-regional networks and London-wide frameworks, the showcase includes diverse typologies and scales of delivery.

AVA Footbridge and Lift System

Craft Marsh Trading Estate, 3 Gas Rd,
Sittingbourne ME10 2QB, UK

Status: Under Construction

Completion: June 2024

Railway infrastructure provider: Network Rail
Architect: Hawkins\Brown Ltd
Structural Engineer: Expedition
Contractor: Walker Construction
Steel fabricator: McNealy Brown
Modular lift manufacturer: ARX

"The challenge for the AVA Consortium was to design a footbridge that could be installed anywhere – from dense inner-London sites to rural towns, and villages in conservation areas. Our vision was for a simple, low impact, timeless and most important, modular system that could adapt to any environment. Built to last and capable of being mass-produced.

As lead architect, my role was to ensure the design put people and accessibility first. Its configurable layout allows for various bridge and lift arrangements to be simply installed in sites that were unsuitable for more conventional bridges, connecting communities and helping to make them stronger and more vibrant. It's integrated lighting system and clear sight lines make everyone feel safe and comfortable.

AVA is a game-changer, fully adaptable, quicker, cheaper, longer lasting, and with a better carbon performance, it will enable far more access-for-all schemes to be realised than ever before."

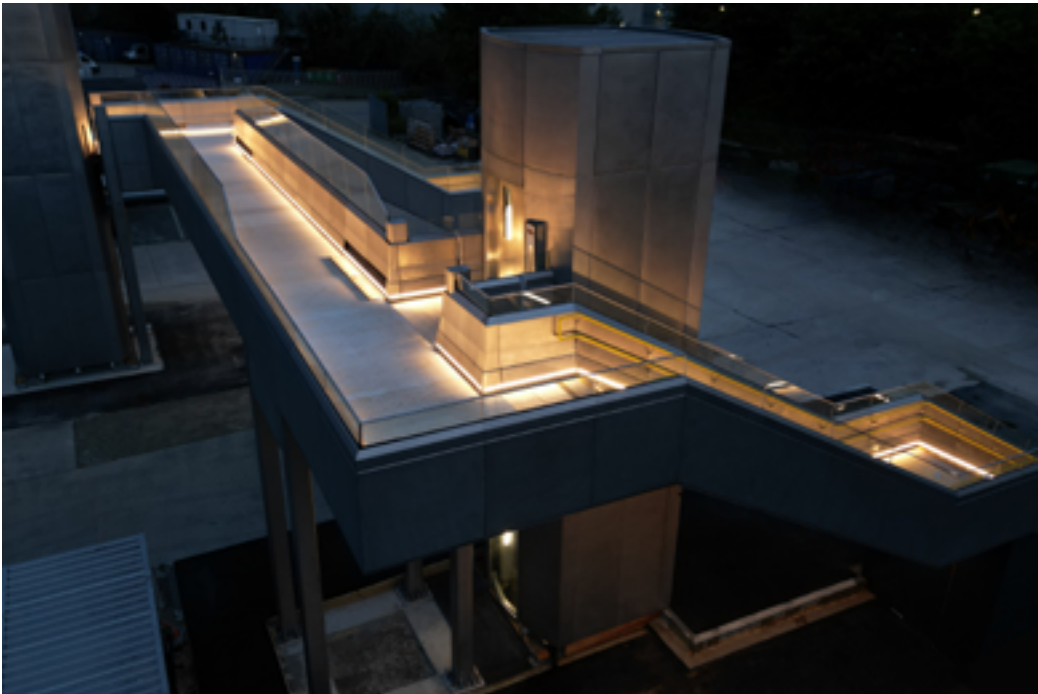
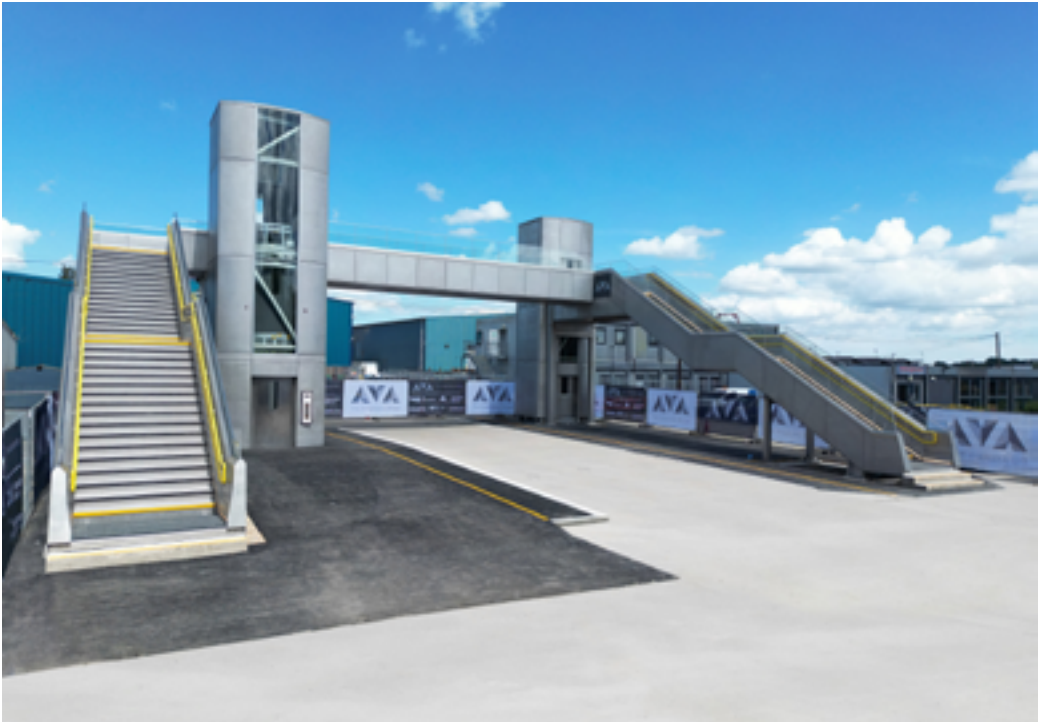
Andrew Davies, Partner and Infrastructure lead,
Hawkins\Brown

The AVA Footbridge and Lift System prototype heralds a new era of railway footbridge design and construction, revolutionising the procurement, manufacture, and installation of railway bridges. This groundbreaking project is the result of a collaboration between Hawkins\Brown, Expedition Engineering, Walker Construction, Network Rail, McNealy Brown, and ARX. As an assured Network Rail design, it can be installed at any London railway station. Transport for London has also visited the demonstrator and the AVA lifts are now being installed at Seven Sisters station.

AVA's development was driven by a clear need to enhance productivity in delivering footbridges across the network. Traditional footbridges often fell short of Network Rail's goals to reduce capital expenditure, installation time, and carbon footprint, posing challenges to the 'Access for All' programme.

Designed with a focus on modern manufacturing methods and construction, AVA moves towards the principles of 'Industry 4.0' digital technology. Its full potential will be realised through batch production and economies of scale as production ramps up.

Featuring a distinctive modular design, an integrated lighting system, and an exposed bead-blasted stainless-steel finish, AVA is a high-quality architectural piece suitable for any station environment. Its layout is configurable, allowing for various bridge and lift arrangements to meet specific site requirements, and its span and height are flexible, with customisation options including the addition of a roof. The use of stainless steel for both structure and cladding extends the design life of the footbridge to 120 years, requiring only minor maintenance. This significantly reduces early-stage degradation, minimises disruption to passengers, lowers whole-life carbon footprint, and cuts down overall lifecycle costs.



MetaLoop

John Ruskin St, London, UK

Status: Proposed

Completion: December 2030

Proposed by: ASYNISIS

The Station Comes To You with the fastest, most seamless Express A to B Renewables-powered AV-EV & Active Personal Rapid Transit network, to help us de-carbonise & de-congest our Cities most easily and quickly, while sparking a Housing, Productivity & Revenue boom due to the Doughnut Economy PPP Operating Model.

As CleanTech mobility infrastructure, MetaLoop also seeds a new Great British Renewables Superpower manufacturing NetZero export industrial base.



The National Underground Asset Register

Trafalgar Sq, London, UK

Status: Under Construction

Completion: 2050

Client: Geospatial Commission
Other: AtkinsRéalis, Ordnance Survey, 1Spatial, GeoPlace, The Greater London Authority

Every 7 seconds, a hole is dug somewhere in the UK. To ensure safe digging, owners of the UK's 4 million km of underground pipes and cables must share location data — but currently, excavators must spend valuable time contacting different asset owners and analysing this data before they can dig. To solve this, the Geospatial Commission is building a National Underground Asset Register, a digital map of underground pipes and cables that provides instant data access for planners and excavators.



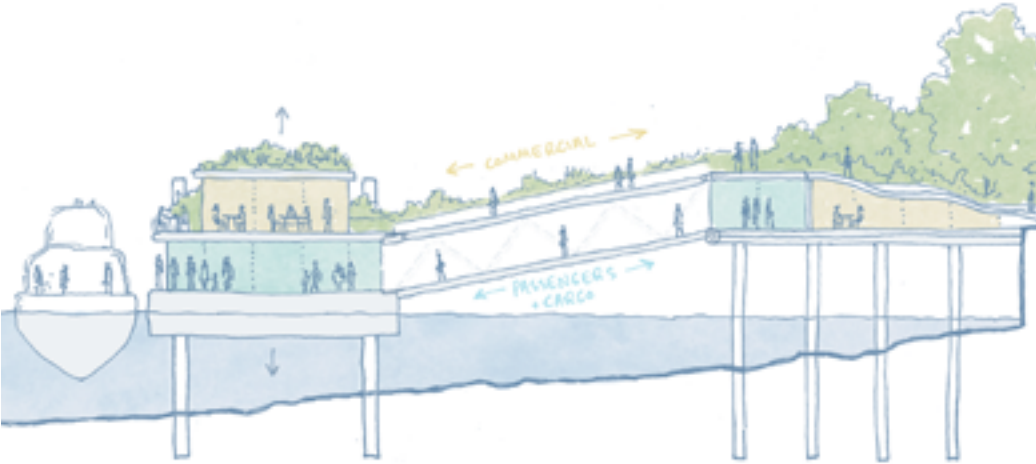
Riverside Urban Logistics Environment

London
Status: Proposed
Completion: 2027

Strategy: Thames Estuary Growth Board
Architect: Aukett Swanke
Transport Consultant: Arup

RULE will transform logistics in London, using boats and cargo bikes to take light freight off roads and onto the river. It will reduce congestion and emissions, delivering a sustainable end-to-end supply chain, turning the River Thames into a logistics highway.

Purpose-built floating platforms will create vibrant new destinations with lush green spaces along the river, multi-functional public realm, marine habitats, restaurants and retail.



SUB-REGIONAL/ CROSS-BOROUGH

King Edward Memorial Park Foreshore

The Hwy, London, UK

Status: Under Construction

Completion: 2025

Client: Tideway
Architect: Weston Williamson+Partners
Engineer: Mott MacDonald
Contractor: Costain Vinci Bachy JV
Soft Landscape: Mott MacDonald
Borough: London Borough of Tower Hamlets
Client-side Design Assurance: Fereday Pollard

“The Tideway project is vital to the health of the Thames — addressing the most significant source of pollution in the river. Our design for King Edward Memorial Park Foreshore, one of five sites we’re developing in East London, capitalises fully on the opportunity presented to enhance this important community asset. Our approach seamlessly integrates the project’s technical constraints and gives careful consideration on how it might be used, to deliver a design that is a genuine asset and complement to the existing park.”

Steve Bell, Director, WW+P

Tideway’s work to upgrade London’s 19th century sewer infrastructure presents an extraordinary opportunity to radically improve both the quality of the Thames river environment, and the quality and accessibility of the riverside open spaces for the enjoyment of the capital’s residents, workers and visitors.

King Edward Memorial Park is the location of one of the most polluting sewer overflows into the river in London, which currently overflows the equivalent of more than 300 Olympic-sized swimming pools each year.

The starting point for the design is the arrangement of massive below-ground structures necessary to meet the project technical requirements. But the site is also at the sensitive river edge of a hugely important green space in East London: a vital amenity for multiple communities.

Alongside extending the park, WW+P’s design provides a series of complementary experiences that encourage visitors to reconnect with the river, meeting Tideway’s vision of ‘Reconnecting London with the River Thames’. A sequence of riverside terraces will descend towards the water, alongside a new public square and areas of planting to encourage new habitats and increase biodiversity.

Permanent infrastructure and requirements of operations, access and maintenance are carefully incorporated for minimal impact. The design is within a wider masterplan for the park, developed through close consultation with local residents and the local authority.



Bakerloo Line Upgrade and Extension

Elephant and Castle, London SE1, UK

Status: Proposed

Completion: April 2040

Proposed by: Local London, South London Partnership, Greater London Authority

The Bakerloo Line Upgrade and Extension is the next big opportunity for London.

The Bakerloo is a vital part of economic infrastructure. But with trains over 50 years old, it urgently needs investment. The upgrade would involve new trains and signalling. The extension would deliver 14 new stations.

The project would support London’s growth and decarbonisation, with tens of thousands of new homes, a £1.5bn boost to GVA, and 20,000 fewer car journeys.



Beam Park

30 Bridgend Cres, Rainham RM13 8XJ, UK

Status: Under Construction

Completion: 2030

Developer: Countryside, L&Q
Architect: Patel Taylor

Beam Park is a 72-acre brownfield site in the London Riverside Opportunity Areas, spanning the London Boroughs of Havering and Barking & Dagenham. The development, with the Beam River running through it, will feature over a third of the site as green public open space, achieve a 350 per cent Net Biodiversity Gain, and be Air Quality Neutral when complete. An Energy Centre has also been delivered with the capacity to serve over 4,000 homes.



London Sub Regional Digital Infrastructure Strategy

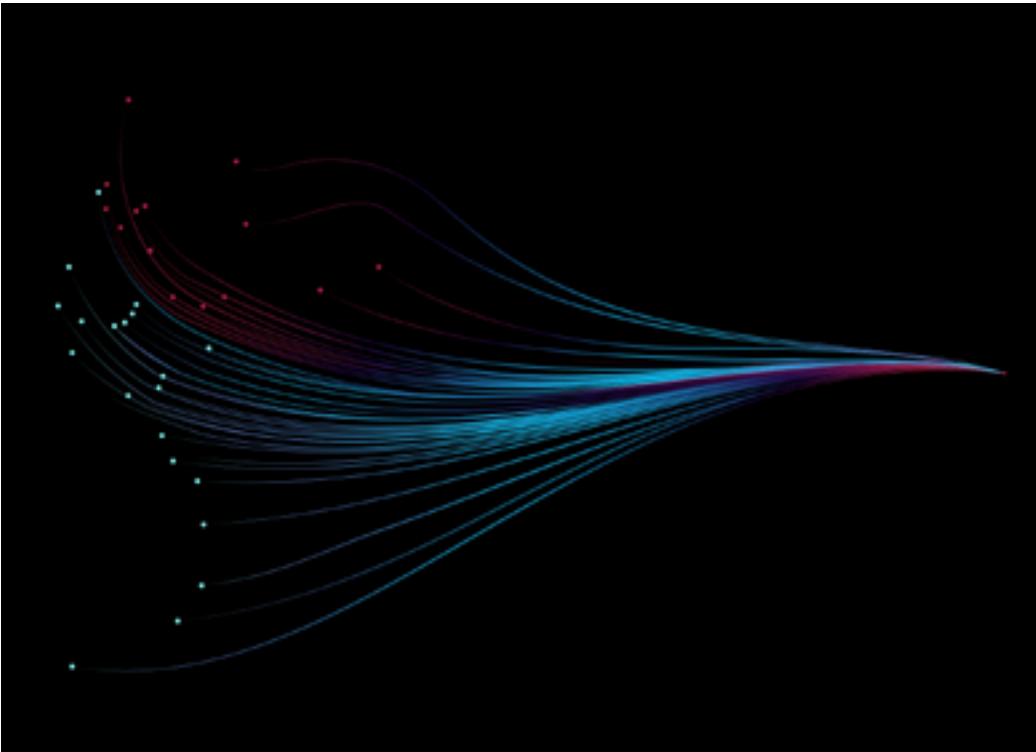
1 Kamal Chunchie Way, London E16 1GB, UK

Status: Built

Completion: January 2024

Collaborators: Central London Forward, London Borough of Southwark, London Borough of Lewisham

Contrary to perceptions, over 100,000 premises in South and East London do not have access to Gigabit internet services. This impedes the lives of residents and efficiency of local businesses. Commercial investment has been constrained by the costs and operational challenges of investing in London. Local London and South London Partnership developed a Digital Infrastructure Strategy that has resulted in increased funding and inward investment for the local authorities.



North London Heat and Power Project

Advent Way, London N18 3AH, UK

Status: Built

Completion: July 2024

Client: North London Waste Authority
Architect: Grimshaw Architects
Project Manager: Arup

The NLHPP is transforming Edmonton EcoPark into a hub for waste, recycling, and energy. Run by the North London Waste Authority the Resource Recovery Facility will increase recycling, the Energy Recovery Facility, will divert waste from landfill and generate power, and the off-grid EcoPark House, will support the education outreach of this critical infrastructure. These publicly-owned facilities, will support two million residents in seven London boroughs.



The Well-Line

The Building Centre, 26 Store St,
London WC1E 7BT, UK

Status: Proposed

Completion: 2030

Architect: Chetwoods

The Well-line creates a new underground infrastructure by linking a network of multi-purpose places and spaces, supplied and connected via a repurposed underground brownfield site, delivering long-term health and environmental improvements to Londoners. It will transform the disused underground Post Office Railway, running six miles from Paddington to Whitechapel, into an adaptable high-speed logistics route, reducing traffic congestion and pollution.



BOROUGH

Hackney Council and Zest: a model for EV charging infrastructure

Hillman St, London E8, UK

Status: Under Construction

Completion: 2026

Client: London Borough of Hackney
Project Manager: Zest

"The switch to EVs will help tackle pollution and create a greener, healthier Hackney. We're really happy to be working in partnership with Zest, who are funding, installing and operating the new chargers."

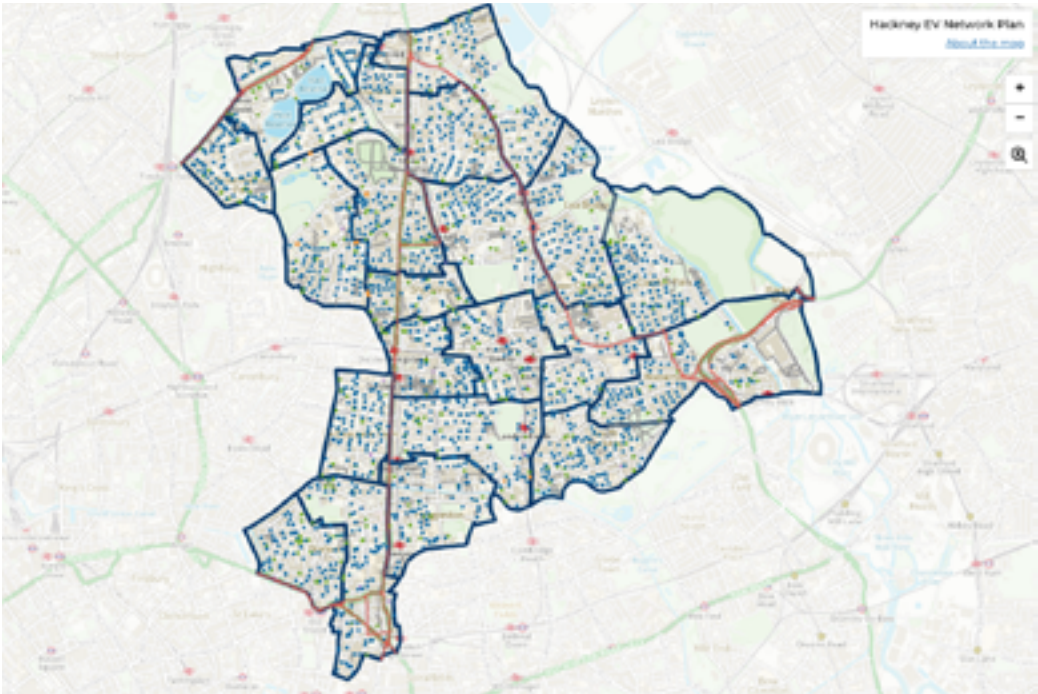
Mete Coban MBE, Deputy Mayor of London for Environment and Energy

Zest has partnered with Hackney Council to fund, deploy and manage 2,600 slow and fast EV charge points across the borough's seven square miles, marking the UK's densest concentration of charging infrastructure. This project supports Hackney's ambitious transport decarbonisation strategy, combining the council's urban planning experience with Zest's expertise in sustainable infrastructure.

For mainstream EV adoption, abundant public charging facilities are crucial. Zest and Hackney have designed a borough-wide network which ensures fairness and accessibility for all, including 10 per cent of chargers on estates, car club charging bays and preferential tariffs for residents.

The partnership is set for at least fifteen years, ensuring ongoing maintenance and 24/7 driver support to provide a reliable service for future generations. Zest's approach makes charging convenient, integrating charge points where residents typically park. Innovations, including lamp post chargers and street parking bay buildouts, help keep pavements clear, making EV adoption accessible and convenient for all.

London's poor air quality poses serious health risks, whilst the success of the central London ULEZ demonstrates that strong policies can lead to significant improvements. Zest's extensive rollout with Hackney will improve air quality and reduce noise pollution, enhancing residents' health across the borough and beyond. As a B Corporation, Zest is further committed to supporting Hackney's communities, offering a variety of educational workshops on decarbonisation, promoting volunteer efforts and providing local job opportunities.



Barking Energy Centre

1 Gurdwara Way, Barking IG11 8JD, UK

Status: Under Construction

Completion: October 2024

Client: B&D Energy
Architect: alma-nac
Structural Engineer: BDP
Services Engineer: RED
Contractor: Ameresco Ltd
Client Design Advisor: Be First

Supplying heat to over 10,000 homes, The Barking Energy Centre (BEC) is a strategic response to the Council's recent declaration of a Climate Emergency. Located at the edge of the borough, BEC is a highly visible landmark when entering Barking by road. By architecturally celebrating the building's function, BEC becomes a landmark of the Low Carbon Energy Network and a signpost of the borough's aspirations of becoming the Green Capital of the Capital.



Camden Highline

42 Camden Gardens, London NW1 9PQ, UK

Status: Proposed

Completion: 2027

Client: Camden Highline
Architect: vPPR Architects
Engineer: AKT II, Tony Gee
Landscape Architect: Field Operations
Planning Consultant: Lichfields
Planting Designer: Piet Oudolf
Community Engagement: Street Space
Artist: Hew Locke
Light Consultant: Speirs & Major
Graphic Designer: Pentagram
Heritage Consultant: Authentic Futures
Quantity Surveyor: RLB
Environmental Design Consultant: Atelier Ten

Camden Highline is a registered charity which will transform the disused railway viaduct between Camden Town and King's Cross into a new green park for London, providing essential local green space to 20,000 people living within 500m of the route. It will serve as a connective tissue, linking people to amenities and joining existing green spaces as part of the Camden Green Loop. It will also establish four distinct ecosystems, increasing biodiversity.



MASTERPLANS

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Lombard Square

Hadden Road (Stop WR),
London SE28 0BT, UK

Status: Under Construction

Completion: 2030

Client/Developer: BDP
Developer: Berkeley Group, Peabody
Planning Consultant: Gerald Eve

"I am incredibly proud to play a role in transforming a once derelict and complex brownfield site into one of the UK's largest mixed-use, zero-carbon developments, serviced by an Open Loop Ground Source Heat Pump system. Despite the extremely challenging delivery environment, the successful implementation demonstrates our commitment to setting a benchmark for sustainability and innovation.

This initiative provides residents with a low-carbon, affordable, and reliable heating solution. Alongside the scheme's exceptional sustainability credentials, the delivery of 1,913 much needed homes and high quality public open space is a source of great pride. This is just the beginning, and I am excited to see how our community will benefit from the Ground Source Heat Pump, continue to grow and thrive in the years to come."

Paul Prichard, Development Director,
Berkeley Group

Situated on the site of disused industrial land, and once Arsenal FC's stadium, Lombard Square revitalises a 17-acre inaccessible brownfield site into a new thriving green community.

This pioneering scheme will on completion comprise 1,913 new homes and 47,000 sq ft of industrial, community, commercial and workspace. It is addressing climate change head-on in its delivery of modern, mixed-use regeneration by being one of the largest residential zero-carbon developments in the UK serviced by an Open Loop Ground Source Heat Pump system.

Following the approval of the masterplan planning consent in 2021, Berkeley's proposals for Lombard Square were evolved to incorporate Ground Source Heat Pumps and improve the already exemplar sustainability credentials of the development.

The Open Loop Ground Source Heat Pump system utilises the site's unique geological position through using submersible pumps to raise water from wells typically 100m – 150m deep. Heat is then exchanged with abstracted water before it is re-injected into the ground to provide over 90 per cent of the annual heat demands of the homes.

For residents, this offers an affordable, reliable and low carbon heat solution for their homes. From a performance perspective, the introduction of the Ground Source Heat Pumps has reduced carbon emissions (over Part L of 2013 Building Regulations, applicable when the development received planning consent, by up to 74 per cent) when compared to an Air Source Heat Pump system. Whilst on newer phases, comparable to 2021 Building Regulations, the carbon emissions reduction is around 70 per cent. These savings have also enabled the number of energy centres previously required across the development be reduced from three to one.



Ectogrid at Silvertown

Silvertown Way, London E16, UK

Status: Under Construction

Completion: 2027

Client: London Borough of Newham
Developer: Lendlease
Contractor: E.ON

"Sustainability is at the heart of everything we do at Lendlease and a low-carbon energy network is central to our vision for Silvertown. We're delighted to extend our relationship with E.ON and to be working with them to deliver their pioneering ectogrid™ in the UK for the first time. Unlocking this complex site is the result of close partnerships—including the London Borough of Newham, the GLA, Homes England, and The Guinness Partnership—and in E.ON we have secured an equally strong partner to support us in delivering on our zero-carbon ambitions."

Ed Mayes, Development Director for Silvertown

E.ON and Lendlease have signed an agreement to develop a pioneering low carbon energy network that will serve about 6,500 new homes and business properties at Silvertown in East London. Silvertown is being transformed as a vibrant new heart for the Royal Docks and a new visitor destination for London. Plans include the restoration of the iconic Millennium Mills and construction of about 6,500 homes alongside next-generation workspace, shops, restaurants, bars and a water sports centre. The regeneration of the area will deliver significant opportunities for the local community, creating more than 6,000 new jobs.

The 760,000 sqm Silvertown site will be the UK's first development of E.ON's pioneering ectogrid™ system, an energy sharing network based on balancing heat pump and cooling technology that, once complete, will save approximately 4,000 tonnes of CO2 a year—88 per cent lower emissions than from traditional gas boilers. The core principle of ectogrid™ is to provide heating and cooling by first using existing energy sources available locally, such as air, water or ground. Each connected building sends excess heating or cooling to other buildings as needed, and by sharing, balancing, and storing energy in rotation, ectogrid™ uses all available energy before adding any 'new' energy, drastically reducing consumption, costs and environmental impact.



Brent Cross Town

Pennine Drive, London NW2, UK

Status: Planning Granted

Completion: 2035

Developer: Related Argent
Architect: Allies and Morrison
Landscape Architect: Makower

As part of its pledge to be net zero carbon by 2030, Brent Cross Town is collaborating with Vattenfall to design and deliver a low carbon heat and cooling network serving the town’s residential and commercial properties. The network’s fully-electric energy centre will generate low carbon heating and cooling using technologies such as heat pumps, electrical boilers, chillers, and thermal stores, forming one of the largest facilities of this kind in Europe.



Earls Court Development

Earl’s Court, London, SW5 9QA

Status: Proposed

Completion: July 2025

Client: Earls Court Development Company
Architect: Hawkins\Brown, Studio Egret West
M&E / Sustainability Engineer, Acoustic Consultant, Services Engineer: Hoare Lea

The Earls Court Development adopts an all-electric energy approach, eliminating on-site emissions, supported by an innovative 5th generation ‘ambient loop’ energy sharing network. This state-of-the-art system will significantly cut energy use and foster energy sharing throughout the Earls Court Development, slashing carbon emissions by over 70 per cent compared to traditional gas boilers. The system facilitates energy sharing between plots and buildings.



King's Cross

Granary Square, London N1C, UK

Status: Under Construction

Completion: 2026

Developer: Related Argent
Masterplan: Allies and Morrison
Masterplan: Porphyrios Associates
Landscape Architect: Townshend Landscape Architects

King's Cross is committed to achieving NZC by 2035. Part of the solution to achieving this target includes the decarbonisation of the existing district energy network. Green gas is already secured to supply the estate. The next step is to remove fossil fuels from the generation and distribution of heating and cooling, replacing existing plants with renewable technologies, including ground and air source heat pumps, heat recovery heat pumps and electric boilers.



Portman Energy Network (PEN)

42 Portman Square, London W1H 6AR, UK

Status: Proposed

Completion: 2025

Client: The Portman Estate
Engineer: Buro Happold
Project Manager: Bioregional
M&E / Sustainability Engineer: ICAX

The Portman Estate is embarking on a detailed feasibility study into the development of a fifth-generation district energy network, connected to the London Chalk Aquifer. Supported by a Government grant, Buro Happold will undertake the study to determine the next steps for the design, commercialisation and construction of the network's first phase. The ambition is for phased network expansion to decarbonise heat at a district level.



PROJECTS

The Arbour at Brent Cross West Station

Brent Cross West Station, Brent Cross, London NW2 6LW, UK

Status: Built

Completion: December 2023

Client: Related Argent,
London Borough of Barnet
Architect: shedkm, Studio Egret West,
Chapman Taylor
Engineer: Heyne Tillett Steel
Structural Engineer: Atelier Ten
Landscape Architect: Gillespies
Fire Consultant: OFR
Facade Engineer: FMDC
Project Manager: MACE, Gardiner & Theobald LLP
Contractor: VolkerFitzpatrick
Quantity Surveyor: Faithful+Gould

"Brent Cross West station, the first major new mainline station in London in over a decade, will be transformative for northwest London, better connecting Brent Cross with the rest of the capital and unlocking wider development in the area. The station will serve as a gateway to Brent Cross Town, a brand-new neighbourhood delivering new homes, creating jobs, and aiming to be net zero by 2030."

Sadiq Khan, Mayor of London

shedkm and Studio Egret West have co-authored the innovative design behind the entrance to the brand new station at Brent Cross West, which was opened by the Mayor of London Sadiq Khan in December 2023.

The design creates a befitting arrival point to a new destination at Brent Cross Town and, picking up the masterplan's wider themes of wellbeing and access to nature, combines both the station functionality with a planted public space.

The station's impressive, highly sustainable eastern entrance, The Arbour, which provides a gateway into Brent Cross Town, was co-authored by Studio Egret West and shedkm, with Studio Egret West retained to evolve the design through detail and construction stages. It includes a lofty timber canopy that covers a multi-level arrival sequence, picking up Brent Cross Town's focus on wellbeing and access to nature by combining functionality with a planted public space. The large-scale glulam timber frame was developed to sit comfortably between, and connect to, two future office buildings.

The Arbour is also home to a giant piece of public art, 'Time passes & still I think of you', by celebrated Barnet-raised artist Giles Round, which covers 250 sqm of the station's main concourse with brightly coloured vitreous enamel panels.

Brent Cross West is the first new mainline station to be built in London in over a decade. The impressive Thameslink station is the gateway to new neighbourhood Brent Cross Town, where shedkm have also designed offices for Related Argent and Barnet Council.

Brent Cross Town will deliver 6,700 new homes, 3 million sq ft of offices creating space for 25,000 employees, and a new high street.



Brent Cross Town Electrical Substation

Pennine Drive, London NW2, UK

Status: Planning Granted

Completion: 2023

Developer: Related Argent
Architect: Allies and Morrison
Landscape Architect: makower

"This amazing piece of public art, designed in collaboration between artist Lakwena and architect IF_DO, is set to become a great landmark for London in this highly visible location. It sets the tone for the wider Brent Cross Town neighbourhood and demonstrates our commitment to art, culture and low carbon development. It would have been easy to take the more traditional route of enclosing the substation in a nondescript box and to miss the opportunity that is now so evident. Instead, we have demonstrated that even the most functional pieces of infrastructure can play an important role in defining place and lifting the spirits."

Nick Searl, Executive Director, Related Argent

How do you transform a utilitarian substation into a joyful, uplifting landmark? That was the challenge of the Brent Cross Town Substation and the opportunity presented by a site that an estimated six million people go past every year.

As one of the first structures delivered at Brent Cross Town and completed in 2023, the substation presented an opportunity to help define the identity of the development. Designed by architects IF_DO in collaboration with the artist Lakwena, the exuberant colour scheme and vast scale of the substation wrap ensures it has become a local landmark to inspire and instil pride in the local community.

The substation creates a powerful sense of motion as viewers move past it. The wrap comprises four undulating bands that expand and compress, and triangular-shaped 'lenticular' panels, with each outward-facing surface treated in a different colour. At 21-metres-high and 52-metres-long, it is one of the largest permanent public artworks in the country.

As well as being a piece of public art, the design was developed to operate as a hardworking, durable piece of infrastructure, and incorporates extensive technical requirements relating to the substation operations inside. The substation will supply electricity to the whole of Brent Cross Town, including 6,700 new homes, 3 million sq ft of offices and retail and leisure spaces. It will power the town's district heating and cooling centre being created with Swedish energy company Vattenfall.

Fitting the net zero carbon town, the environmental impact of the substation structure has been minimised through circular economy principles and low-carbon concrete, with half of the structural steel reused from old oil pipelines.



Colindale Station Upgrade

120 Colindale Ave, London NW9 5GX, UK

Status: Under Construction

Completion: 2025

Client: Transport for London
Architect: BDP, SOM
Engineer: AtkinsRéalis
Planning Consultant: Avison Young
Contractor: Morgan Sindall

"I have been heavily involved in the development of the Colindale station upgrade project for many years. It is very satisfying to see the work progressing on site, with the demolition of the old station and installation of the new infrastructure. There have been numerous issues that have had to be overcome along the way, including those related to design, business case, funding, community relations, planning and the impact of the pandemic.

The first half of 2024, covering the lead up to a ten-day track closure of part of the Northern line and the commencement of a six-month station closure, has been particularly challenging because of the need to put in place adequate alternative transport arrangements and to undertake extensive public and stakeholder engagement. Nevertheless, I am confident that when the scheme is completed by early 2026, the new station will be a building of which Transport for London, Barnet Council and the local community will all be proud."

David Leboff, Principal Sponsor,
TfL Investment Planning

Colindale station is being upgraded to provide sufficient capacity to cater for the demand generated by one of London's fastest-growing neighbourhoods.

The station improvements include a new landmark entrance building containing a spacious new ticket hall with a much larger gateline, a lift providing step-free access from the street to platform level and an accessible toilet with infant changing and other facilities. It will also feature a new in-station retail space and a sustainable blue-and-green roof drainage system with wild plants. In addition, enhancements will be made to the urban realm in front of the station, including more cycle parking.

Overall, the project will significantly improve journey times for people with reduced mobility and improve the customer experience and safety through reduced station congestion. It will create a new, high quality, station building which acts as a landmark for the local area and instil pride in place. Furthermore, it will provide greater access to jobs and employment for those excluded from access to opportunities and support sustainable housing development within the station catchment, encouraging investment within the highly deprived local area and supporting mode shift to low-carbon travel.

The area in which the investment is taking place has issues of deprivation and health inequalities. It has been identified as a priority growth area. The project will enhance travel provision, encourage investment into local development and support wider regeneration. It will make the local transport network accessible to everyone, including excluded groups within the local community. This context fully aligns with the wider Levelling Up agenda, acting as a catalyst to delivering wider change in local neighbourhood prosperity.



Bloom Brixton

120 Brixton Hill, London SW2 1RS, UK

Status: Built

Completion: March 2024

Developer: Bloom Developments
Architect: Chetwoods
Structural Engineer: Burrows Graham
Contractor: MCS Group
Quantity Surveyor: Feasibility

A multi-tenanted industrial estate of five, two-storey units provides flexible space options for varied tenants. Features targeting BREEAM Excellent include low carbon technology to reduce energy consumption, soft landscaping to enhance the ecological value of the site, and sustainable travel facilities. Responding to its surroundings, the design and materials selection have taken into detailed consideration the site's surrounding historic context.



Bloom Greenwich

Peterboat Cl, London SE10, UK

Status: Under Construction

Completion: July 2024

Developer: Bloom Developments
Architect: Chetwoods
Structural Engineer: Burrows Graham
Quantity Surveyor: Feasibility
Contractor: Magrock

An efficient and sustainable ultra-urban warehouse that repurposes and intensifies SIL land, while delivering predicted net-carbon savings greater than 77 per cent, and proactively enhancing urban greening in and around the site. The local context has been considered in the building typology to create a more unified and attractive frontage to surrounding roads, enhanced by the introduction of urban greening between the site boundary and the building line.



Bugsby's Way

75 Bugsby's Way, London SE10 0QJ

Status: Proposed

Completion: 2030

Client: GLA
Architect: Chetwoods

A multi-use scheme to support a range of businesses from logistics operators to SMEs on a key Strategic Industrial Land (SIL) site prioritises adding social, environmental, and economic value to surrounding communities. To fulfil ambitions for public realm enhancements the designs incorporate accessible spaces for wider recreational, educational and local activity uses. Also, regenerative design and circular economy principles are included.



City of London Markets

Former Barking Reach Power Station, Chequers Lane, Dagenham, RM9 6PF

Status: Planning Granted

Completion: 2030

Client: City of London Corporation
Architect: Chetwoods

The relocation of Billingsgate and Smithfield wholesale markets to an industrial site at Dagenham Dock will regenerate 42 acres of industrial land into a modern, sustainable wholesale food market. The design approach will create modern food market facilities, stimulating the local neighbourhood and economy by creating a new food hub destination, and ensuring resilience in the food supply chain of London and wider region.



Cory Energy River Road Barking

54–60 River Road, Barking, IG11 0DS

Status: Planning Granted

Completion: 2026

Developer: Cory Group
Architect: Chetwoods

Cory’s new purpose-built industrial waste handling building in Barking forms part of the world’s largest single-site waste decarbonising project. The development modernises an existing Safeguarded Waste Site, refurbishing two Safeguarded Wharves and connecting to Rippleway Wharf and the River Roding for container stacking and barge loading. It transforms waste movement, reducing on-road vehicle traffic and increasing waste through-put capacity at the site.



Firestone LDN | A West Cross Development

Firestone LDN, West Cross Industrial Park, Brentford TW8 9DE

Status: Planning Granted

Completion: 2026

Developer: Legal & General Investment Management
Architect: Chetwoods
Project Manager: Gardiner & Theobald LLP

Sensitive placemaking was key to the design approach to a high profile super-prime industrial unit. It required a modern and innovative response to a site with an iconic history as the former 1928 Art Deco Firestone Building. The design took historic references and conserved some of the original features of the Art Deco history of the site, while addressing aspiration for an intensification of development on the site that targeted a BREEAM excellent rating.



GLP G Park London Stratford

Stratford Place, London W1C, UK

Status: Proposed

Completion: 2026

Developer: GLP
Architect: Chetwoods

A highly-sustainable industrial and logistics scheme is proposed that will be an exemplar for urban projects. It incorporates extensive placemaking initiatives to integrate it into the wider area, bringing together communities with 20,000 sq ft of proposed public realm. Also, the proposed approach to materials demonstrates a proactive methodology to an industry-wide transition to a circular economy. The scheme is subject to planning approval.



Industria

Unit 18, The Io Centre, 49-71 River Rd.,
Barking IG11 0DR, UK

Status: Built

Completion: August 2023

Client: London Borough of Barking & Dagenham
and Be First
Architect: Haworth Tompkins
Structural Engineer: Pinnacle
Industrial Architect: Ashton Smith Associates
Services Engineer: MBA Consulting Engineers
Quantity Surveyor: Fulkers Bailey Russell
Contractor: McLaren

Industria is an innovative and ambitious approach to modern industrial design and the UK's first multi-storey light-industrial scheme that densifies and diversifies workspace in a move away from the traditional typology of single-storey, low density 'sheds'. The building delivers 11,400 sqm of industrial space across 45 SME and Flatted Factory units of varying scales.



Lewisham Gateway

Station Road, London SE13 7RY, UK

Status: Under Construction

Completion: August 2024

Client: London Borough of Lewisham
Developer: Muse
Architect: UN Studio
Contractor: Balfour Beatty
Landscape Architect: PRP Architects
Planning Consultant: Quod

A 20 year long project, re-imagining a congested traffic island, to create a well-connected community with a new commercial heart.



Orchard Wharf

Orchard Place, Tower Hamlets, London SW1, UK

Status: Proposed

Completion: 2027

Client: Regal London
Wharf Architect: Aukett Swanke
Residential Architect: Howells
Landscape Architect: Spacehub Design Ltd
Structural Engineer: HDR
Services Engineer: Wallace Whittle
Planning Consultant: Montagu Evans

The safeguarded Orchard Wharf design is future proofed and operationally agile for all river-borne logistics for many generations. Both traditional and innovative, it enables river e-vessels to deliver freight cargo to the Wharf for a major reduction in road use, and onto the community via cargo bikes and e-vans. Its inherently sustainable hybrid design blends river use employment with affordable student homes, and a new public realm.



Regenerating spaces in Waterman's Green

Putney Embankment, London, UK

Status: Built

Completion: December 2023

Client: London Borough of Wandsworth and Richmond
Landscape Architect: Project Centre Ltd
Other: Project Centre Ltd

Project Centre, with Wandsworth Borough Council, transformed the previously narrow and overlooked space of Waterman's Green into a sustainable, safe, and thriving community hub.

Our multi-disciplinary team reinvigorated the footpath by introducing planting, furniture, art, and sustainable amenities, as well as prioritising pedestrians and cyclists over vehicular traffic. Refurbishing Waterman's Green rejuvenated the entire stretch of the riverside walk



Royal Wharf Pier

Bonnet St, Newham, London E16, UK

Status: Built

Completion: November 2019

Developer: Ballymore and Oxley
Architect: Nex-
Contractor: McLaughlin and Harvey
Planning Consultant: Rolfe Judd

Located beside Ballymore and Oxley's Royal Wharf development in London's Royal Docks, our Royal Wharf Pier brings the very first floating public space to London and the Thames.

The 130m long pier and its new riverboat terminal address the practical requirements of Thames Clippers' traffic while also providing a memorable new public space that can be enjoyed by the community, Londoners and visitors alike.



SEGRO Park Wapping

SEGRO Park Wapping, The Highway
Trading Centre, Heckford Street, London
E1W 3HR

Status: Planning Granted

Completion: 2026

Developer: SEGRO
Architect: Chetwoods

Regeneration and intensification of a brownfield site to deliver 95,000 sq ft of flexible, lower-carbon industrial, with supporting office space. The scheme will help drive social, economic and ecological benefits with a more sustainable and healthy design; applies circular economy principles; and retains biodiversity. The typology is informed by the area’s rich history, urban fabric and the vibrant character of today’s neighbouring communities.



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FURTHER READING

London Infrastructure Plan 2050
Greater London Authority (2014)

Mayor's transport strategy 2018
Greater London Authority (2018)

Freight and servicing action plan
Transport for London (2019)

Industrial logistics: Can London deliver?
New London Architecture (2023)

Delivering the Mayor's Transport Strategy 2022/23
Transport for London (2022)

London environment strategy
Greater London Authority (2021)

Green infrastructure and biodiversity plan 2024
Transport for London (2024)

Planes, Trains & Drains
New London Architecture (2013)

Delivering for 2035: Upgrading the grid for a secure, clean and sustainable future
National Grid (2023)

London Surface Water Strategy Interim Report
Greater London Authority (2024)

London climate resilience review
Greater London Authority (2024)

ACKNOWLEDGEMENTS

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Gwyn Stubbings, GLP
James Trimmer, Port of London Authority
Robin Woodbridge, Prologis

Special thanks the following people for sharing their time, expertise and insights, and their own research through interviews, discussion and/or participation in NLA workshops and events:

Frank Anatole, Network Rail
Ajit Bansal, London Borough of Hounslow
Delia Bat, Gerald Eve
Artur Carulla, Allies and Morrison
Casey Castilla, Vorboss
Ashley Collins, Montagu Evans
Martijn Cooijmans, London Borough of Islington
Paul Creed, Royal Docks
Asif Din, Perkins & Will
Stacy Dowding, WSP
Benoit Dufour, Related Argent
Richard Ellis, Peabody
Dan Epstein, Useful Simple Trust
Louis Fantis, Chetwoods
Paul Ford, Zest
David Francis, West London Alliance
Olly Freedman, Proptivity
Alex Gilbert, Transport for London
Rupert Green, AtkinsRéalis
Chris Hogwood, Landsec
Jason Horner, Hilson Moran
Dr Kat Ibbotson, WSP
Philippa Illingworth, Old Oak and Park Royal Development Corporation (OPDC)
Hannah Jameson, London Councils
Shravan Joshi MBE, City of London Corporation
Holger Kessler, AtkinsRéalis
Chetan Lad, Greater London Authority
Rosanna Lawes, London Legacy Development Corporation
Keven Le Doujet, E.ON
Michael Leather, Arcadis
Chris Lockwood, Avison Young
Jason Longhurst, Prologis
Stephen Lorimer, Building Atlas

Jeremy Martin, London Borough of Hackney
Louise McGough, Greater London Authority
Jamie McKechnie, SLR Consulting
Anna Lisa McSweeney, White Arkitekter
Sarah Merrick, Ripple Energy
Rhod Morgan, Vorboss
Francis Moss, London Borough of Ealing
Ushna Mughal, Knight Dragon
Maja Nesdale, Arcadis
Channa Karunaratne, AECOM
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Thomas O’Connor, National Grid
Stephen O’Malley, Civic Engineers
Tom Osbourne, Prologis
Geoffrey Palmer, Sweco
Amar Parkinson, Knight Dragon
Polly Persechino, South London Partnership
Anthony Peter, Related Argent
Simon Joe Portal, Drees & Sommer
Julia Prescott, Deputy Chair, National Infrastructure Commission
Mathieu Proctor, Greater London Authority
Elizabeth Rapoport, Living Places & Chair, London Surface Water Strategic Group
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Nick Winser, UK’s Electricity Networks Commissioner
Qiao Zhang, Barking Riverside

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Solomon Green-Eames

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Design
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Marketing & Communications:
Chris Forsdike

Data
With special thanks to the Greater London Authority and Ordnance Survey for their support in supplying data, as well as to UK Power Networks, Data Centre Map, and ZapMap.

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Our 30,000+ members work across all aspects of city governance, planning, design, development, and management, spanning public and private sectors.

Guided by the New London Agenda — our best practice framework for city-making — we come together year-round to develop new collective solutions for London: forming new ideas and partnerships, enhancing lifelong skills, and empowering a more diverse workforce. Our work has global relevance and is shared with cities worldwide.

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