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by

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**Identity Infrastructure: Redefining London's Grand Union Canal as a
Conduit for Preservation, Mobility, and Community**

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Anna Joan Lake-Smith

Report

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Abstract

Identity Infrastructure: Redefining London's Grand Union Canal as a Conduit for Preservation, Mobility, and Community

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This study examines the past, present, and future of London's Grand Union Canal (the canal) as a critical piece of urban infrastructure. The canal is an inimitable force within the city, acting as both a conduit and a place. The advent of the modern canal in England fueled the Industrial Revolution, but by the 1970s, the Grand Union Canal was nearly forgotten. This study seeks to parse out the qualities of the canal that have allowed it to endure through time, and shifting agendas, and puts forth a design proposal that enhances and protects its character. As London faces the inescapable challenges of the 21st century, attention has turned to the canal as a potential tool. Once again, diverging parties are vying to use the canal to address the problems they deem most important. This study focuses on the political interest in returning freight transport to the canals, arguing that while feasible in some locations, the Grand Union Canal has much greater capacity to shape an equitable, verdant, and prosperous future for London.

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PART I : CONTEXTUALIZING THE CANAL

01 INTRODUCTION

Contemporary urban life depends on the systems that keep the city running – these systems only coming into view when they fail to perform. Most of the time, urban dwellers are blissfully unaware of the complex web of networks working together to ensure the reliability of delivery. However, with few exceptions, these essential systems require physical infrastructure, which must go somewhere. Often, they end up in full view of the communities who lack the clout or resources to occlude detrimental placement decisions. The divide that has always existed between the haves and have-nots is becoming a chasm. Wage inequity, affordable housing shortages, climate change, and political unrest are a few among the many interrelated, inextricable forces driving a colossal wedge between those who hold power and everyone else. Infrastructure is a powerful tool for change, both positive and adverse. In a world increasingly dictated by networks and systems, it is imperative that planners, designers, and policy makers carefully consider how they choose to wield it.

The following pages explore the intersection between the socio-spatial world and the infrastructure that gives it life. Examining London’s Grand Union Canal (the canal) as a strange and unique urban condition, this report asserts that the canal is a critical but underutilized asset with the potential to negotiate a necessary redefinition of urban industry and infrastructure.

Grappling with multiple inexorable challenges of the 21st century city, London is currently at a crossroads in terms of the future of its canals. How the city chooses to respond sends a message to its constituents and its peers about where its priorities lie. Facing international pressure alongside local environmental and health concerns, London’s political entities have expressed interest in the potential for the canals, along with rail, to alleviate some of the congestion and pollution afflicting the road network. Citing the original, industrial role of the canals as justification, policy directives have endorsed a modal shift of freight transport back onto the waterways as one way to reduce carbon dioxide and other pollutant levels. This report makes the case that while physically possible (to an extent), such a shift would not only be detrimental to an important infrastructural asset but would be antithetical to what the canal has come to represent for the city. Concluding with a design proposal strategy,

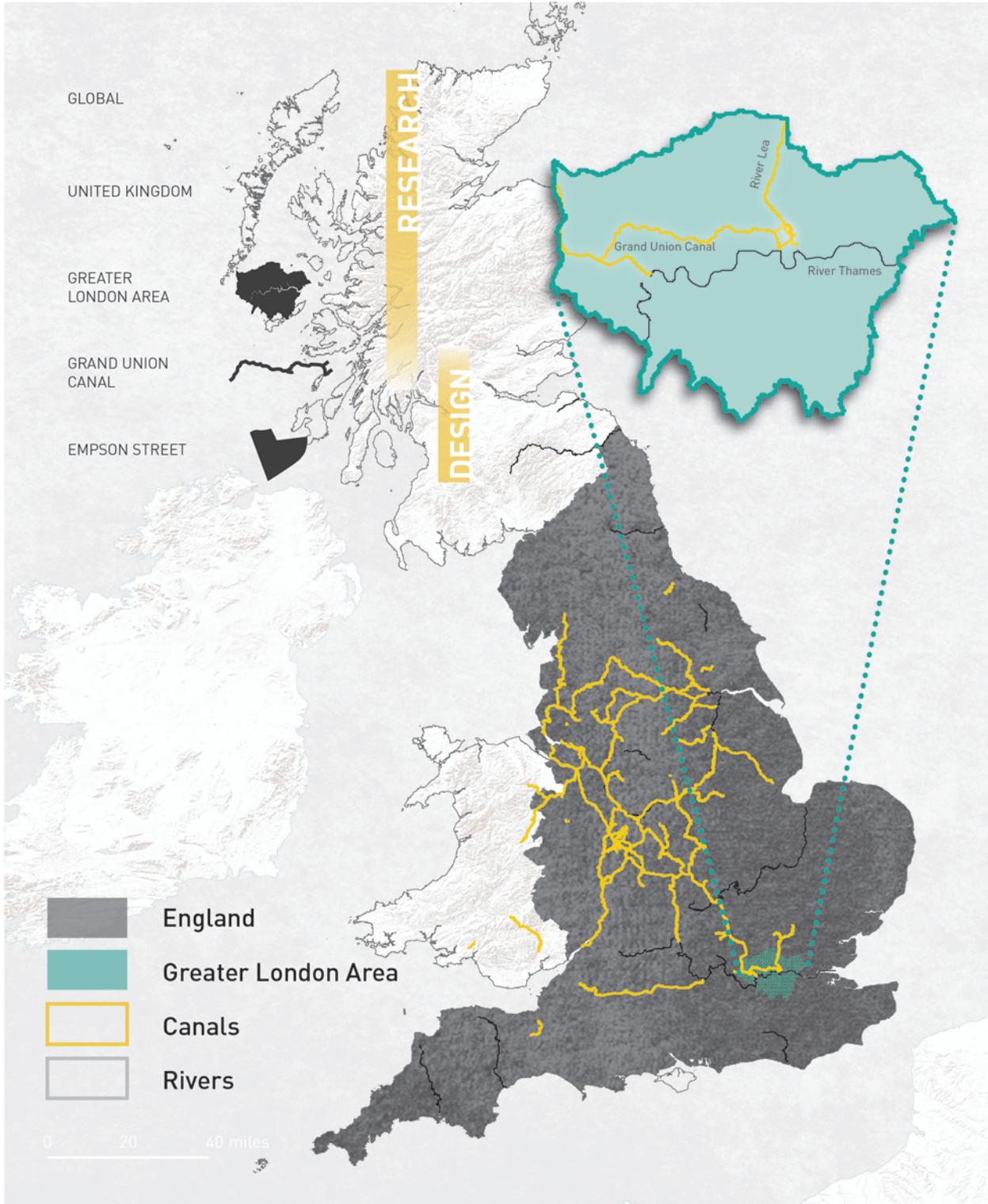


Figure 01 Scope and context of work.

this report proffers another type of solution – a path forward for the canal that will preserve its dual role as place and infrastructure and answers to issues of pollution, inequity, and identity at a systemic level.

A continuous thread through the city, the Grand Union Canal ties together all walks of life. While its story began as an industrial-age infrastructure for transporting goods, the canal now serves as a home to over 10,000 tenants and represents an urban iteration of a condition found across the country. In total, 33,000 narrowboats line the banks of myriad canals, all connected by a system of locks, weirs and dams.

Drawing from landscape and network theories, which have long understood the critical generative power of systems across disciplines, the design proposal envisions the Grand Union Canal as the armature for a new Green Ribbon weaving through the city. Equal parts conceptual and physical network comprised of people, water, ecology, housing, amenity, and economy, the Green Ribbon is an assemblage of resilient land- and water-based communities across the canal. The gestalt effect of the Green Ribbon sees the transformation of small, incremental gestures into a reinvention of new infrastructure. Embracing its paradoxical nature as both a conduit and a destination, the Green Ribbon is both a framework and a tool toward a more visionary, humanistic future. Acting as a datum, running parallel to the River Thames, the canal community roots itself into the surrounding predominantly land-based urban fabric. Acknowledging the canal as a linear microcosm of city, rich with history, knowledge, and innovation, the Green Ribbon becomes a conduit for preservation, mobility, and community, ensuring that canal and canalside dwellers can continue to thrive in the place they call home, well into the 21st century.

The direction of this examination is three-fold. First, it delves into the dynamic history of the UK's canal network, focusing on the trajectory of the Grand Union Canal within the bounds of greater London, and uncovering the superimposed layers of information embedded in its banks. Second, it explores the current statement of the Grand Union Canal through an on-site investigation of the relationship between character and physical form and current planning policy documents at the level of the city. Finally, the report puts forth a design proposal for the future of the Grand Union Canal, proposing a continuous Green Ribbon across the city, rooting the canal into the surrounding physical and social landscapes. Of the three suggested anchor sites, the Empson Street Anchor will be highlighted as a prototype

to illustrate how this network might manifest on the ground. A combination of firsthand, primary, and secondary research and GIS analysis revealed where and how the canal might begin to respond and adapt to the ever-evolving forces of city. In an exploration of how networks can act as a catalyst for the development of urban fabric it is imperative that the design be cognizant of the physical implications, and possibilities, of changing economies. The design proposal pursues a humanistic agenda of equipping underserved communities with tools for collective economic development and resiliency through integrated social, ecological, and production systems.

The canal network is integral to the complex identity of London and is a key player in the relationship between Londoners and their city. The contiguity, that is, connectivity across space and continuity through time, of the canal represents a unique opportunity to reimagine existing infrastructure that has incredible potential in its capacity to span the city, both geographically and socially. By uncovering the nascent possibilities in the canal network within the greater London area, this project seeks to unlock larger-scale systemic advancements as it confronts just a few of the myriad challenges facing the city in the coming decades. A guiding principle is that the canals possess an immense integrity as a heterogeneous panoply of urban history and life that is worth respect and preservation.

More often than not, economic agendas prevail over humanistic ideals, but the Grand Union Canal has quietly avoided that fate. While undeniably a product of, and major contributor to, the modern capitalist economy, the canals' greatest success has been as conveyors of innovation. The advent of the "pure" canal (previously, the technology had been used to canalize existing rivers and waterways) not only brought economic growth to the UK but spurred a new method of network-based problem solving that opened the door for the railways. Even as rail siphoned business from the canals, canal workers were quick to adapt, converting their narrowboats into what could be considered a primitive predecessor to the work/live unit. However, life on the canals during and shortly after their heyday was neither easy nor charmed. Adaptation was a process of survival – much as it is today.

Since the 1880s, when rail began to overtake the waterways as a means of transporting goods, the canal has endured many pressures to concede to more economically viable demands. First from the rail companies themselves, then from an administration that believed the canal had served its civic duty, there have always been differing opinions

regarding how it should be treated. Today, developers hoping to capitalize on premiums generated by waterfront property pursue an individualistic economic agenda. This perspective represents a “business as usual” approach. The Mayor of London, hoping to increase freight transport on the canal, seeks a practical solution to an economic problem, which on paper, appears to be an innovative solution. While undeniably a laudable aim, this report asserts that the canal network is a tenacious and inimitable piece of infrastructure in London that is capable of bringing even greater progress. As the 21st century continues to challenge the stamina and resilience of the city, and subsequently the Grand Union Canal, the only viable path forward is for London to overturn the status quo.

02 HISTORY OF THE CANALS

Canals have long been a part of England's history. Traceable back to the Romans, who dug small channels to connect rivers and irrigate crops, the ability to manipulate waterways has been a key innovation in the UK's development well into the 1900s. The canals as they are known today, were born as a response to an increasing need to transport goods long distances in an efficient manner. Prior to the inception of the (nearly) complete inland waterway, merchants relied on horse-pulled carts, which were not only slow, but inefficient and unreliable. Each cart could only carry approximately one to two tons of material, and weather conditions could delay a delivery for days. In 1670, the first post-Roman canal opened in Lincolnshire. The 9.5-mile canal stretched from Stamford to Market Deeping, requiring 12 locks to traverse the grade change. While the Stamford Canal marked an important beginning for modern canals, the "golden age of British canals" was not until nearly 100 years later. At the start of the Industrial Revolution in the mid-1700s, the demand for heavy goods, such as coal and iron ore, skyrocketed, especially along routes between large manufacturing cities. In Manchester, a particularly visionary owner of a coal mine, the 3rd Duke of Bridgewater, saw great financial potential in waterborne transportation of coal. Privately funded, the Bridgewater Canal opened in 1761. Rather than the one to two tons of coal carried by cart, one canal boat could transport nearly 30 tons of material. The drastic increase in capacity cracked open the coal market, with prices dropping 2/3 within a single year, and the canal had paid for itself in less than five. Other cities took notice and soon there was a rush to build canals all over England. Termed "Canal Mania", the period between the mid-1770s and the 1830s saw the waterway network grow from 1,000 to over 4,000 miles long. Acting as both cause and effect in rapid industrialization, the shift from road to water was vital to the success of heavy industries, and to the economic prosperity of cities like Manchester, Leeds, and Bristol (Clarke, 2016).

The first canal to be built in London was the Limehouse Cut, which joined the River Thames and the River Lea, allowing barges to bypass the curvy stretches around the Isle of Dogs and Bow Creek. The 1.25-mile cut opened in 1770 following the passing of the River Lea Act in 1766, and only seven years later needed to be widened to increase its capacity and allow two barges to pass. By 1820, with the opening of the Regent's Canal between Camden and Limehouse, London had a fully connected canal stretching across the city from east to west. In its heyday, the Regent's Canal moved an estimated five million tons of goods

of an
INTENDED NAVIGABLE CANAL
 FROM
THE GRAND JUNCTION CANAL AT PADDINGTON
 TO
THE RIVER THAMES AT LIMBHOUSE;
Also of
Intended Reservoirs, Feeders & Headways,
For the supply
 of the said **INTENDED CANAL** with Water.
 AND
of an Intended Collateral Cut or Canal and Basin
IN THE PARISH OF ST. LEONARD SHOREDITCH.
All in the County of Middlesex.

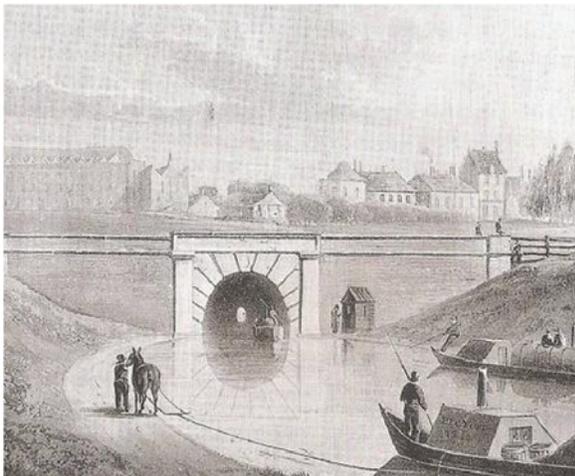
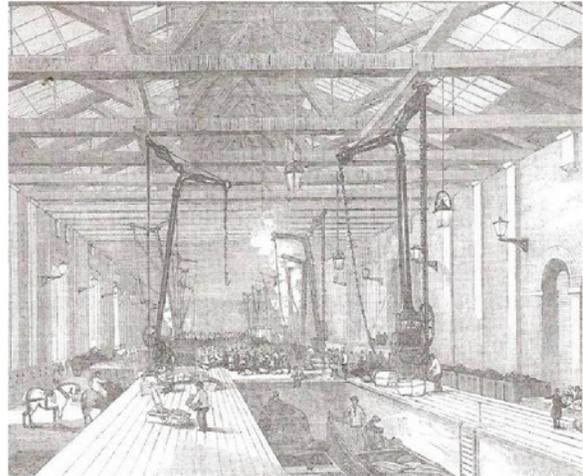


Figure 02 Early images of the Grand Union Canal (Friends of Regent's Canal; Canal and River Trust; Museum of Thin Objects).

each year, but after only 20 years of operation, it faced the same decline as other canals around the country. The use of rail for freight transport took off quickly in the 1830s and 40s, largely as it was much faster than canal boats, but likely also because it was seen as an innovation of the future. Compared to the slow, antiquated, canals operated by those on the fringe of society, the railways epitomized the excitement of speed and technology. By 1850, British canals were carrying less than 2/3 of the cargo transported just ten years prior. The companies and individuals who could not make the transition to rail adapted in other ways, dropping prices of goods (reducing income) and/or bringing their families aboard the narrowboats to lower living costs. Thus, the early “Canal People” communities were born (Canal Junction Ltd., n.d.).

Unlike other European countries, the UK did not widen their canals in an effort to compete with rail by allowing larger crafts passage. Countries like the Netherlands opted to adapt their canals to accommodate bulk transport with vessels carrying over 2,000 tons of material each. Reticence to expand similarly in the UK was likely due, at least in part, to two interrelated factors: one, the canals were all privately held pieces of infrastructure and were subject to very little legislation, and two, the rail companies, also privately held, had an enormous amount of clout. If the entire canal network were to be updated, it would have required the coordination and cooperation of myriad individual companies, as the canal is only as efficient as its narrowest point. Many canal companies found it preferable to sell to one of the rail companies, who were interested in purchasing canals either to eliminate competition or to convert them to railways.

After the First World War, the canals saw a sharp decline in use. The British government offered surplus military vehicles for purchase and were slow to pay restitution for canal infrastructure damaged during the war. Many companies took the opportunity to transition to road transport in the interwar years. In London, however, where the canals still played an important role in inner-city transport of goods, significant investment went into the modernization of the Grand Union Canal. The 1929 merger of the Regent’s Canal and Grand Junction Canal in London and the series of canals linking London and Birmingham, consolidated authority over a major canal artery to one entity. At 286 miles, the Grand Union Canal is still the longest single canal in the UK. Limited by separate ownership of the locks between Braunston and London, the Grand Union Canal was not able to widen that stretch of canal, but the consolidated authority undoubtedly contributed to its preservation.

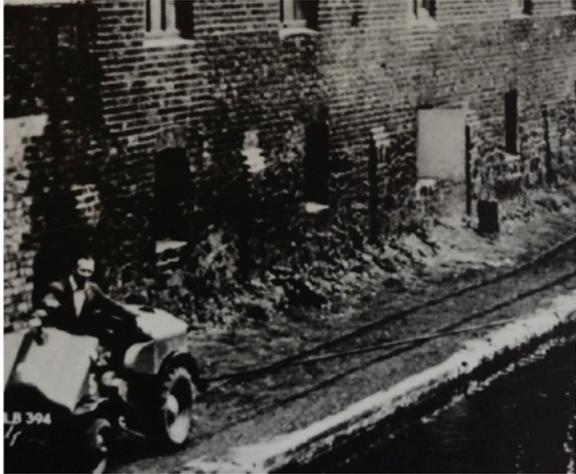


Figure 03 Grand Union Canal in the 20th century, bottom right was taken in 1970 (Friends of Regent's Canal; Canal and River Trust; Museum of Tiny Objects).

World War II brought the Blitz of 1940, a continued preference for the convenience of road networks, and a progressive political shift, all of which caused increased stress on industry along London's canals. In 1945, a governmental turnover from Conservative to Labour spurred the creation of the comprehensive welfare state. Under Prime Minister Clement Attlee, the Party established the National Health Service (NHS), the Bank of England, and the nationalization of many industries, including those in transport and heavy industry. Because the majority of England's canals had been acquired by rail companies in the preceding decades, the nationalization of rail necessitated the transfer of the canals to the newly created British Transport Commission (BTC). The BTC initially expressed interest in retaining the canals for freight transport. However, a 1955 report classifying the city's waterways as needing to be developed, retained, or not worth retention, set requirements for the maintenance levels of each category and granted the Commission the ability to reclassify waterways at any point. The flexibility of this report gave the Commission a great deal of latitude to do as they saw fit with the canals (Canal Junction Ltd., n.d.).

Many canals closed in the 1950s, with the coal industry almost singlehandedly supporting the operation of those that managed to remain open because they were connected to waterside factories. However, after the Clean Air Act of 1956, and the use of coal dropped significantly, the canals were becoming more and more places of leisure rather than conduits of goods. After the unusually harsh winter of 1962-63, when all remaining companies using canal boats were relegated to the roads because of a thick layer of ice on the water, no one returned. The freeze coincided with the Transport Act of 1962 which established the Defra (Department for Environment, Food and Rural Affairs) sponsored British Waterways Board (BWB; later British Waterways and eventually the Canal and River Trust), who officially determined to remove freight from their list of priorities. The Transport Act of 1968 formalized the canal classifications of the 1955 BTC report, giving the BWB complete discretion over the future of the canals.

The small but staunch leisure industry managed to keep the canals open through the 1960s and 70s, riding on the success of L.T.C. Rolt's 1944 book, *Narrow Boat*, which depicted his modest, bucolic life on the canals. The image painted in this book is not dissimilar to a lifestyle that can be found on the canals today, but at the time, it offered a hermetic alternative to the war-torn urbanity that many found enticing. Recreational interest in the canals flourished as expectations regarding quality of life and an interest in local history

grew, engendered by the manageable scale of the physical infrastructure (Clarke, 2016).

In 1948, Rolt and a coterie of canal enthusiasts set up the Inland Waterways Association (IWA). The tenacity with which the IWA protected the canals is largely why they continue to be places of refuge today; the group lobbied against every act of Parliament involving the dissolution of the canals and are credited with getting some of the more contentious, deleterious parts of the Transport Act of 1968 Transport Act excised. Rallies held by the IWA, which showcased the vivacity of the canal community through canal-based wares and art, are the predecessors for many of the celebratory festivals held along the banks of the canals today. These rallies helped to stitch the canal into the urban fabric by bringing the land and water communities together.

The Grand Union Canal remained operational for transport into the 1960s (only one contract held by a jam producer remained in the 1970s), and grassroots efforts continued to fuel the preservation of the canals, eventually gaining enough support to attract larger-scale funding. 1994 saw the closing of the Grosvenor Canal at Pimlico, the last commercial canal, marking the end of the canals' 224-year history as a commercial conduit through London.

03 THE CANALS TODAY

Today, the canal is both a conduit and a destination for people, flora, fauna, and history. The pace of life is slow; boats are limited to a speed of four miles per hour. Even during the regular 9-5 working hours of the week, narrowboats traverse the city, hoping to refuel or to move on to a new mooring spot. It is clear where people have set up along the banks, extending their homes onto the land with storage sheds, laundry lines, and bistro tables. These parts of the canal feel distinctly more permanent than others, which lack a transition between the narrowboats and the towpath. Along the more transient stretches, walkers, joggers, and the like pass within inches of narrowboat windows, challenging the notion of privacy in one's home. Privileged with a rare worm's eye view of the city, canal tenants are uniquely acquainted with pedestrian patterns.

Stretching from Twyford Abbey Road to Shoreditch, the images in *Figure 05 - Figure 09* aim to capture the multiplicity and complexity of the Grand Union Canal. Relatively untouched, the western end is home to antiquated industry and quiet, overgrown landscapes. As the canal moves eastward toward the center of London, it gains energy. From one boat every quarter mile at Kensal Green to an unbroken line - and often double moored in Little Venice - the activity of canal life becomes palpable. Wild vegetation transitions to tended gardens, tourists are more easily spotted, and commercial entities encroach on the banks. Moving further east, formerly-productive buildings rediscovered by enterprising types accompany a sense of aggregated community.

The waterways are managed by the Canal and River Trust (CRT), which formed in 2012 from British Waterways. The CRT oversees all maintenance and operation of the Grand Union Canal, funded by license and mooring fees, outside income (from fiber optic cables underneath towpaths, development holdings, rental income, etc.), and lottery funding.

Two recent developments along the Grand Union Canal offer a window into the differing approaches to the 21st century role of the canal. Both large-scale redevelopments include major rail hubs, brownfield remediation, and infill around historic architecture. Catalyzed by the decision in 1996 to relocate the Channel Tunnel Rail Link (now High Speed 1) from Waterloo to St. Pancras, the King's Cross Central redevelopment is a 67-acre site that will include 50 new buildings, over 1,900 homes (of which, 730 are to be affordable), 20 new



Figure 04 London waterways (Canal and River Trust, 2017).



Figure 05 Capturing the character of the Grand Union Canal today (2017).

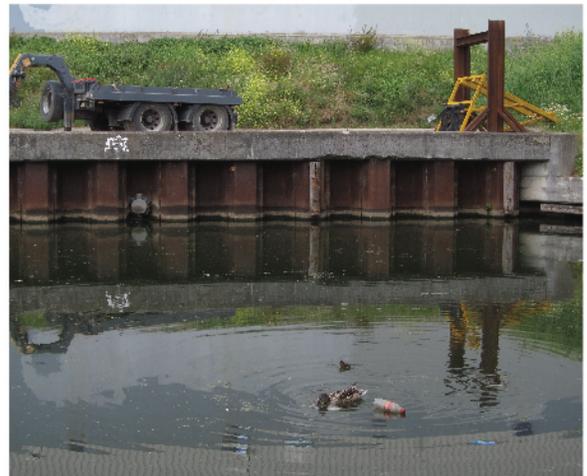


Figure 06 Western side of the canal, from Twyford Abbey Road to Park Royal, 2017.



Figure 07 West-central, from Kensal Green to Little Venice, 2017.

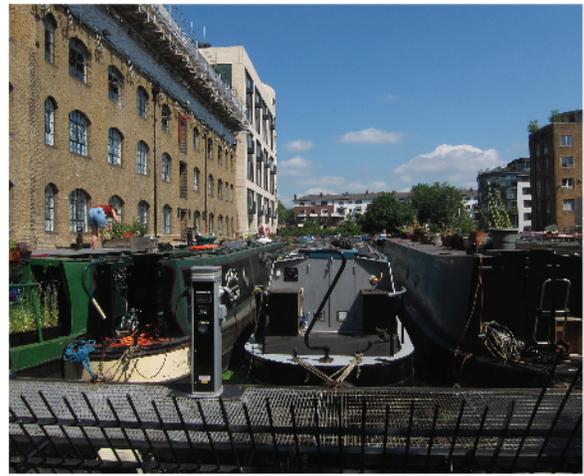


Figure 08 East-central, from Paddington Basin to Granary Square, 2017.



Figure 09 Eastern side of the canal, from Battlebridge Basin to Shoreditch, 2017.

streets, 10 new parks and squares, and 26 acres of open space. When it is completed, the public canal frontage will total nearly seven acres. Developed under the King's Cross Central LP, partnership is a keystone of the design. Bringing in Central Saint Martins of the University of the Arts London and the Waitrose Cookery School as early anchors in the primary public square displays a commitment to education and to the surrounding community. Large private companies, such as Google, Louis Vuitton, and Universal Music occupy some of the highly-coveted office spaces, bringing revenue and resources with them.

The central plaza, known as Granary Square, is a humanistic environment. The scale of the buildings around the square is kept relatively small, so as not to dwarf the people below, and a fountain (which also doubles as a splash pad on warm days) animates the space. Users can control the jets via phone app at certain times, giving them a sense of agency and investment. Many elements of the sites history remain in the development: Granary Square gets its name from the nearby industry, and in the adjacent atrium, the semi-permanent Bagley Stage is a nod to the nightclub that occupied the area in the 1990s (King's Cross Business Partnership Limited, 2018).

A few miles west of King's Cross is the Paddington Waterside development. Expected to be completed this year, the Paddington development has injected 10,000,000 square feet of space into central London over the past two decades. This stretch of canal, where the Paddington Basin met the Grand Junction (now the Grand Union Canal), was among the last to be completed, and was an important connection to Birmingham and then to the rest of England when the rail opened in 1838. Modeled after the King's Cross LP, Paddington is under development by the Paddington Waterside Partnership (The Paddington Partnership, 2018).

The redesign of Paddington Basin includes a new floating park called Merchant Square. Surrounded by 16-story offices, luxury apartments, and a boutique hotel, the square feels more like a courtyard for the elite than a public amenity. The end of the basin has been blocked off to boats entirely, which seems to remove it from its context as part of the Grand Union Canal as well as reinforcing a feeling of order and control. In contrast to Granary Square, which is articulated and complemented by the surrounding buildings, the Paddington Basin serves the buildings around it as a commodified amenity.

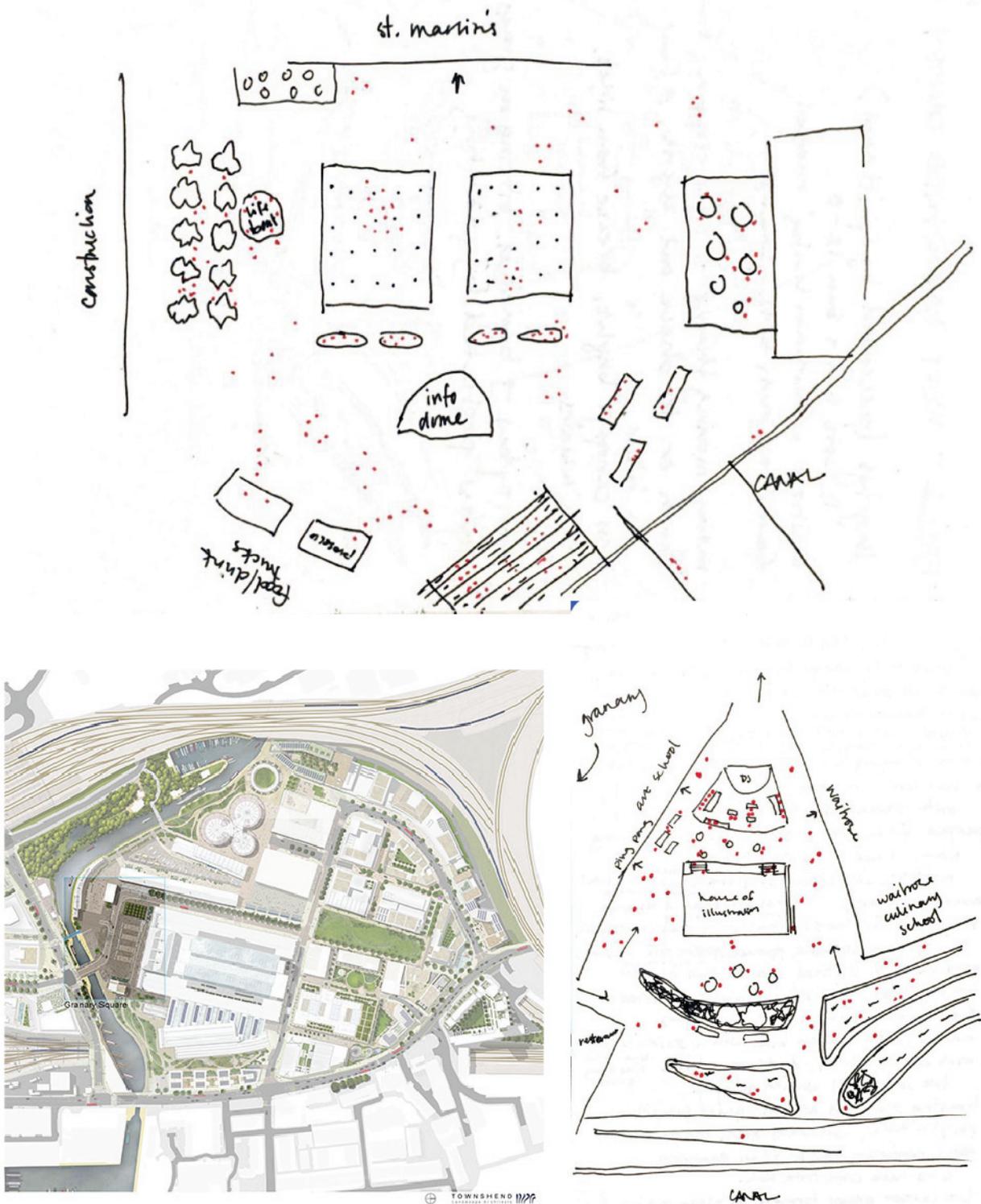


Figure 10 Mapping activity at Granary Square on a warm, sunny Saturday afternoon, 2017. Bottom left: King's Cross master plan (King's Cross)



Figure 11 Top: Granary Square at King's Cross, 10am; Bottom: 3pm, 2017.



Figure 12 Granary Square at King's Cross on a Saturday afternoon, 2017.

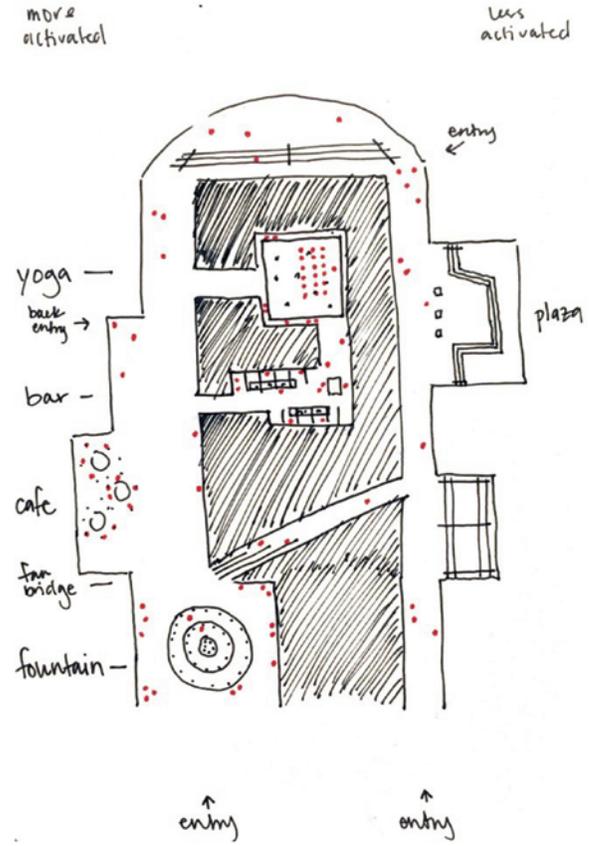


Figure 13 Merchant's Square at Paddington Basin on a Friday afternoon, 2017.

THE LONDON PLAN

First drafted in 2004 after nearly 20 years without a new strategic plan, the London Plan has undergone many revisions to reach its current state. As the latest draft is due to be released in the fall of next year, the policies cited in this report have all been culled from the London Plan 2016. Clearly pushing a global agenda, the plan claims that London ought to be a leader in opportunity, enterprise, quality of life, and addressing climate change. It seeks to do so by “embracing change while promoting its heritage, neighborhoods, and identity, and valuing responsibility, compassion, and citizenship.” [135_31] These goals are embodied in the six major objectives outlined in the opening pages of the nearly 500-page document:

Ensuring London is:

- A city that meets the challenges of economic and population growth
- An internationally competitive and successful city
- A city of diverse, strong, secure, and accessible neighborhoods
- A city that delights the senses and takes care over its buildings and streets
- A city that becomes a world leader in improving the environment
- A city where it is easy, safe, and convenient for everyone to access jobs, opportunities, and facilities

Policies are broken down into topics of Places, People, Economy, Climate Change, Transport, and Living Spaces and Places.

Chapter seven, London’s Living Spaces and Places, describes the city’s waterway network. Made up of the River Thames, Grand Union Canal, Regents Canal, Lee Navigation and other rivers, tributaries, and lakes, the Blue Ribbon Network (BRN) forms its own complete grid across the city. The BRN touches all 32 boroughs, and, although not explicitly mentioned in the London Plan, it ties into a much larger national network of waterways. The inherent interconnectedness of the waterway system makes it one of the city’s most significant networks. Within the Plan, seven policies deal directly with the BRN, engendering their use for human transportation, driving tourism, as an infrastructural element, and as recreation destination, as well as calling for naturalization of edges and restoration of habitat where possible. Policy 7.26 is specifically about freight on the canal:

Strategic

- a. The Mayor seeks to increase the use of the Blue Ribbon Network to transport freight.

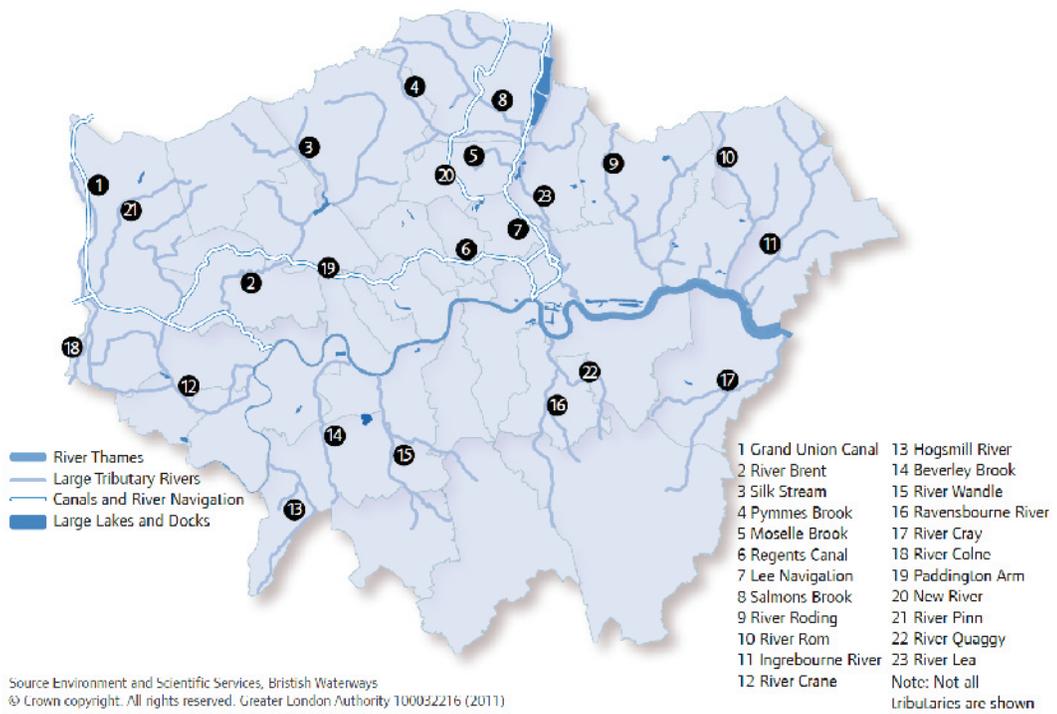
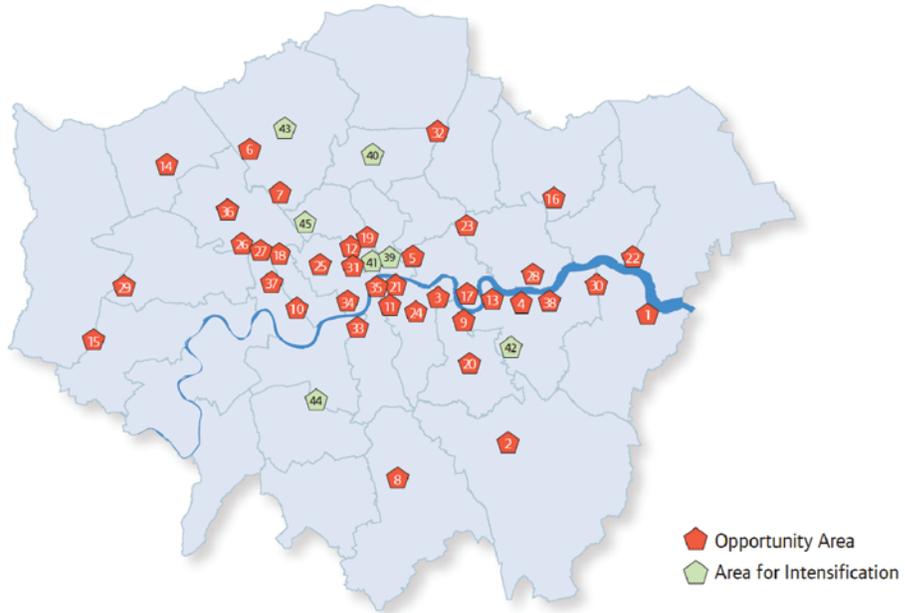
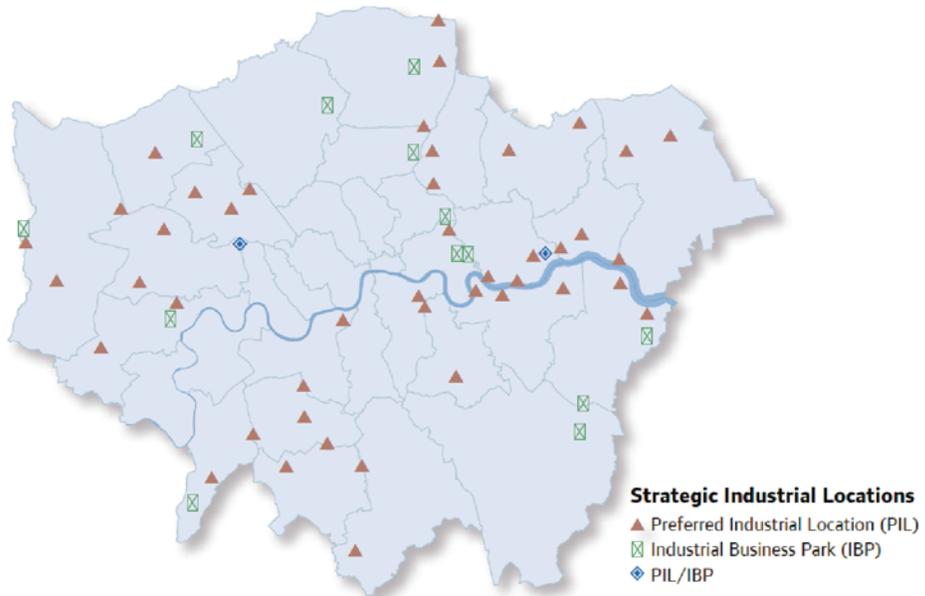


Figure 14 Blue Ribbon Network (London Plan, 2016).



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Figure 15 Opportunity Areas and Strategic Industrial Locations (London Plan, 2016).

Planning decisions

A. Development proposals:

- a. should protect existing facilities for waterborne freight traffic, in particular safeguarded wharves should only be used for waterborne freight handling use. The redevelopment of safeguarded wharves for other land uses should only be accepted if the wharf is no longer viable or capable of being made viable for waterborne freight handling, (criteria for assessing the viability of wharves are set out in paragraph 7.77). Temporary uses should only be allowed where they do not preclude the wharf being reused for waterborne freight handling uses (see paragraph 7.78). The Mayor will review the designation of safeguarded wharves prior to 2012.
- b. which increase the use of safeguarded wharves for waterborne freight transport, especially on wharves which are currently not handling freight by water, will be supported
- c. adjacent or opposite safeguarded wharves should be designed to minimise the potential for conflicts of use and disturbance
- d. close to navigable waterways should maximize water transport for bulk materials, particularly during demolition and construction phases.

LDF (Local Development Framework) preparation

- B. Within LDFs boroughs should identify locations that are suitable for additional waterborne freight.

The Plan acknowledges that water transport of freight is desired because of its sustainability metrics, but that the canal's utility may be better suited to low value, non-time-critical movements (Mayor of London, 2016).

In a commitment to safeguarding existing wharves, the Plan states that "the Mayor will support positive action, including the use of compulsory purchase powers where necessary, to bring inactive sites into use." Policy support for the protection of wharves has been around since the late 1990's. Policy 7.30 mandates that "Development proposals along London's canal network...should respect their local character and contribute to their accessibility and active water related uses, in particular transport uses, where these are possible," (Mayor of London, 2016).

According to the section on wharf safeguarding in the London Plan, the viability of a wharf is a matter of five factors:

1. Its physical conditions: size and shape, intermodal access, surrounding land use, etc.
2. Its location in the network: proximity to current and future markets, etc.
3. How much of an impact it can have on reducing road freight movements: a measure of volume and relative location
4. Its connections to surrounding wharves, handling sites, etc.
5. Its market competition: availability, comparison to other similar wharves

One caution, however, is that “the BRN should not be used as an extension of the developable land in London nor should parts of it be a continuous line of moored craft,” (Mayor of London, 2016).

LONDON ASSEMBLY ENVIRONMENT COMMITTEE: MOORINGS ON LONDON'S WATERWAYS

Roughly 1/3 of narrowboats serve as primary residences, with an estimated 4,000 to 5,000 boats moored at any given time. The policies and politics of mooring can be a source of tension for boaters. Permanent mooring can cost as much as \$12,000 annually and can be difficult to obtain due to long waiting lists. With the canal gaining popularity as a relatively affordable solution to rising housing prices in the city – narrowboat itself can cost anywhere from \$10,000 used to \$70,000 for a new vessel – there are more boats needing a place to moor, and hidden gems are less likely to stay hidden. In 2011, the CRT estimated there were 600 boats in non-permanent mooring spots; that number jumped to 950 in just two years. Instead, many opt for a \$700 continuous cruising license, which mandates that the boat be moved every two weeks across a distance of at least twenty miles over the course of the year (London Assembly Environment Committee, 2003).

The constant shuffling coupled with a growing canal population often results in an uneven distribution of boats along the canal. In many of the more popular mooring places, boats are docked two, three, or even four across. In basins this causes little issue, but along the banks of the canals, the stacking of boats can make it difficult for other crafts to navigate. Such a high density of boats can also begin to have negative effects on the surrounding area, especially in terms of water quality and waste. Narrowboats store solid waste onboard until it can be disposed of at designated sites along the banks, but greywater goes directly into

the canal. Most boaters are conscious of the products they use, but when many boats are docked together for a significant amount of time, toxicity levels in the water can begin to rise.

Mooring can also be made difficult because of competition with other modes for space. For example, in a few places, Transport for London (TfL) has put in new bike paths but left no cleats, ties, or grass for boaters to moor to, essentially rendering them no-parking zones (London Assembly Environment Committee, 2003).

The London Assembly (LA) Environment Committee 2013 report, “Moor or less: Moorings on London’s Waterways,” proposes policy directives to various responsible entities that specifically focus on supply and demand of mooring on the Grand Union Canal. Through qualitative interviews and analysis of data provided by the CRT, the report found that mooring and facilities for boaters is not keeping pace with the growing canal population. First, the committee recommends increasing mooring supply along the canal banks, and tasks the CRT with ensuring compatible and accessible design. Secondly, the report calls for planning authorities’ more stringent enforcement of the London Plan Blue Ribbon Network and suggests the Mayor should codify the residential use of the canal in the next draft of the London Plan. One of the report’s more innovative suggestions proposes a cooperative structure for mooring communities to help keep costs affordable to boaters.

Regarding environmental effects of residential narrowboats, the London Assembly Environmental Committee report calls for an update to existing legislation around emissions on the waterways. Describing it as “dated and not universally known,” the report suggests righter regulations that better match those on road vehicles.

SECURING LONDON’S WATER FUTURE: THE MAYOR’S WATER STRATEGY, 2011

The Grand Union Canal is remarkably absent from the 2011 Mayor’s Water Strategy. Aside from appearing alongside rivers and streams in general statements, the only specific mention of the canal is in a discussion of raw water transfer as a possible but unlikely option to increase water supply to the city. The strategy outlines programs to hybridize and retrofit water and energy systems at the scale of the city, but it fails to assign responsibility to the canals. While the 2011 strategy was released three years prior to the planning decision to greenlight the new Thames Tideway Tunnel, it seems unlikely that the Mayor’s Office would

not have been aware of the strategic location of the canal in the waterway network. The Thames Tideway Tunnel is a massive investment set to reach completion in 2023 to reduce sewage overflow into the River Thames, with its final segment running directly underneath the Limehouse Cut. It is worth noting, however, that this document was drafted under former Mayor Boris Johnson; current Mayor Sadiq Kahn appears to take a more holistic view of the waterways network (Mayor of London, 2011).

SAFEGUARDED WHARVES REVIEW, MAYOR OF LONDON, 2011

A subsidiary to the London Plan, the Safeguarded Wharves Review outlines the priority to preserve waterway infrastructure. The review makes the case that the potential for freight on the canals lies primarily in construction materials, the temporary nature of which, makes it difficult to target certain wharves for upgrading through policy.

However, there is also potential for construction material consolidation and transfer centres elsewhere on the canal network to serve as a source of origin for the construction materials bound for these new canal side developments. The other potential uses are for waste and recycling centres on the canal network and some potential for other bulk goods. The key question consultees were asked was whether they could provide evidence that these potential future uses of the canal network were viable without subsidy and, if not, to identify the key barriers to viability.

The reactivation of the canal network for freight use is an aspiration held by many stakeholders, especially in light of the sustainability agenda. However, it is important given the context of public expenditure cuts and the competing demands for the scarce resource of land that a realistic and evidence-based assessment of the likelihood of freight being transported on the waterway network in the future is made (Mayor of London, 2011).

04 COUNTERING FREIGHT ON THE CANAL

The London Plan addresses freight networks and industrial land uses within the transportation chapter. Policy 6.14 calls for an improvement of freight distribution and suggests that one way to do so might be to promote movement by waterway. It also notes that transfer, consolidation, and ‘break bulk’ facilities are imperative for a modal shift to occur (Mayor of London, 2016). In terms of where these operations and facilities will take place, Policy 4.4 addresses the management of industrial land. It takes a somewhat conservative standpoint in that it suggests the retention of industrial land as future demand for such sites is still a large unknown. It posits that industrial land might be adapted to accommodate smaller-scale industry, such as ‘services for the service industry’ with the provision that it be able to revert if need be (Mayor of London, 2016).

Individual boroughs are tasked with the identification of Strategic Industrial Locations within their boundaries. Designation protects the sites against development pressure to convert to another use. Separated into two categories, SILs represent the places where more contentious land uses are permissible, and the land has largely already been consolidated to accommodate uses at larger scales. Many SILs have advantageous access to intermodal transportation.

According to the 2014 London Freight Data Report, freight traffic accounts for around a quarter of road transport CO₂ emissions on London’s roads but only 1/5th of all vehicle kilometers traveled. Most of the goods vehicles in London are light goods vehicles, which are better able to navigate narrow and/or nonlinear streets at the beginning and end of trips. Comparatively, private vehicles traveled 80% of all vehicle kilometers traveled. Overall, London is a net importer of goods, with only 44% of trips originating and ending within greater London. Goods transported by rail are coming into the city at four times the volume of the goods leaving the same way (Allen, Browne, & Woodburn, 2014).

The overwhelming majority of goods transport takes place on roads, with over 130 million tons transported in 2012 alone. The remainder, a combined 17 million tons was moved by water, rail, and air. A mere .02% of goods were transported along the canals, likely representing small, infrequent quantities of locally-produced materials and/or construction materials being sent to a specific site. It is becoming more common for development projects

to mandate that some or all of their building materials arrive via rail or water, as Crossrail has done (Allen, Browne, & Woodburn, 2014).

Like many cities around the world, London is home to an ideologically and economically divided political system. Still grappling with the fallout from the Brexit vote, the city, and the nation, are facing many great challenges in the coming decades. Currently held by Sadiq Kahn of the Labour party, the Mayor of London serves as the head of the Greater London Authority (GLA), which consists of 25 elected officials: the London Assembly. The GLA have their hands in all aspects of planning and those tangentially related, but are namely responsible for all strategic planning applications, land, and housing. The power and legacy imbued to the GLA is political as well as spatial; it is one of the largest land owners in the city. A single document guides the way London combats these challenges, laying out a sanguine plan for the future. Overseen by the Mayor of London and the Greater London Authority, the London Plan is an ever-evolving roadmap for the city over the next 20 to 25 years. The United Kingdom is divided into counties, of which the Greater London Authority was born in the mid-1960s, but individual entities are responsible for the management of regional assets.

Congestion and air pollution are inexorably intertwined threats to 21st century London. Both play a major role in the public, environmental, and economic health of the city, which in turn affect equity, accessibility, biodiversity, water quality, productivity, and more. The topic of air pollution is often described in broad terms, but there are many types of pollutants that adversely affect air quality and subsequently public health. Largely, the gross excess of these pollutants can be attributed to fossil fuel combustion. London collects data on 5 pollutants. First, the city collects data on Carbon Monoxide (CO), which is produced when fuel does not fully combust and affects the blood's ability to transport oxygen. In a confined environment, Carbon Monoxide poisoning can be lethal.

The London Air Quality Network of King's College London estimates that nearly 90% of Carbon Monoxide emissions in the UK are from road transport. Second, London measures Nitrogen Dioxide (NO₂), prolonged exposure to which can cause the lining of the lungs to become inflamed. Approximately 50% of Nitrogen oxides are attributed to road transport; vehicles with diesel engines are especially culpable. Third, the city measures Ozone (O₃), which is formed when Nitrogen Dioxide and other pollutants react with hydrocarbons in

sunlight. Very necessary to greater atmospheric function, Ozone is not naturally so close to the Earth's surface where it can cause inflammation of the lungs, eyes, and throat.

While in urban contexts, other noxious pollutants tend to absorb Ozone molecules, sequestration of the particles that form Ozone is very slow, making it both more common in suburban areas, and a very difficult pollutant to abate. Fourth, London is concerned about levels of Sulphur Dioxide (SO₂), which is emitted by burning sulfur. It is commonly found in high levels near power stations and refineries where coal and oil are burning. Significantly less prevalent since the Industrial Revolution, it still presents a health risk on its own and in the formation of particulate matter. Particulate matter is the last pollutant of immediate concern. Particles can form from reactions between other pollutants but can also be anything from metal to rubber to salt. Particles are not distinguished by their makeup but by their size. Measured in two categories, 10 or fewer micrometers and 2.5 or fewer micrometers, both can settle in the lining of airways and lungs and can lead to exacerbated heart and lung conditions or premature death (London Air)

Globally, the UK's air pollution levels are considered average; in urban areas, the annual mean concentration of fine particulate matter (PM_{2.5}; measured in micrograms per cubic meter, µg/m³) is between 10.1 and 15 µg/m³. While the US, Canada, Australia have levels below 10 µg/m³, India, China, and much of Central Africa have levels above 35 µg/m³. However, zooming into the Greater London Area reveals the urban nature of the air pollution problem. With an overall level around 15 µg/m³, Central London experiences an average fine particulate matter concentration of 19 or 20 µg/m³, with some of the larger streets reaching into the high 20s and low 30s. Not only do these levels fail the city's annual mean objective, but they are colossally dangerous, especially to anyone with prolonged exposure or a compromised immune system.

After a 'final warning' from the European Commission on the state of the UK's air pollution levels, the exploration of alternative reduction methods is even more pressing (BBC News, 2017). According to the Commission, each year, over 400,000 people in the EU die prematurely due to effects of air pollution, over 40,000 of those in the UK alone. In its warning, which it also issued to Germany, France, Spain, and Italy, it proffered two primary avenues towards reduction: decreasing traffic volumes and/or increasing electric vehicle prevalence. In an ideal world, the UK would do both, but the change will not happen

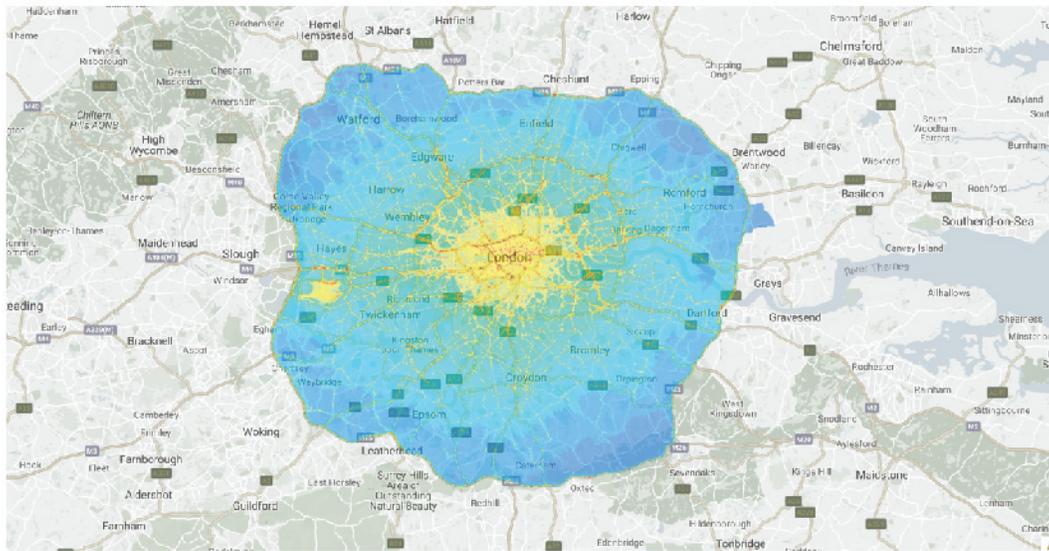


Figure 16 Top: Nitrogen Dioxide levels in London, 2013; Bottom: Fine Particulate Matter levels in London, 2013 (London Air).

overnight – it is not likely to happen in the two-month probationary period granted by the Commission (Mayor of London, 2010).

Khan has not shied away from expressing his frustration with the national government's Air Quality Plan released last year. Unsurprisingly, it takes a conservative, policy-heavy stance. It appears to be playing a long game rather than confronting urgent issues, to which Kahn responded with, "a half-hearted commitment from Government simply isn't good enough.... Londoners suffering right now simply can't afford to wait until 2040." Despite finding that clean air zones are efficient, cost-effective measures in reducing air pollution, the Air Quality Plan earmarked the tool as a last resort tactic (Taylor, 2017). A dearth of funding accompanied the lackluster policies, and overall the AQP was met with widespread criticism (Mayor of London, 2017).

In Denmark, the city of Copenhagen has quantified the value and detriment to society of riding a bike over driving a car: a bike is worth 37 cents per mile, while each vehicle mile traveled costs the city 27 cents. The city also has closed off large swaths of the city to vehicle traffic, giving over space to pedestrians and cyclists. Nationally, Danes are paying over 100% of the value of the vehicle in tax, which also serves as a significant deterrent to driving. The city of Freiburg, Germany, has inverted their transportation model such that if a resident wishes to own a car, they are required to pay an exorbitant amount to park it at the edge of town. Affordable public transit, less expensive housing, and ample bike routes successfully incentivize residents to choose active modes of transportation. Delhi, India, has been experimenting with innovative methods to reduce their traffic load, such as a switch off-style schedule for odd and even-numbered license plates, and an on-demand bus share system.

Compared to its peers, London is not pulling their innovative weight, for the global population nor for its residents. The aim of this report is to explore one grassroots tactic that can contribute to the suite of solutions the UK will need to employ in the coming years.

TABLE 01 THE FREIGHT ARGUMENT

	Human and Political Arguments	Physical Arguments
For	<p>2008 Climate Change Act: UK must reduce greenhouse gas emissions by 24% by 2020 (defra, 2011)</p> <p>Mounting pressure from EU</p> <p>Gesture towards priorities of sustainable transport and divesting in an auto-centric model of cities</p> <p>Scale is appropriate for pilot programs that could be monitored and evaluated easily and comprehensively</p> <p>Slower but higher frequency trips could create jobs as distributors need to cover overlapping shifts</p> <p>Training in data collection and analysis could simultaneously take place</p> <p>Necessity (or desire) to adapt watercrafts to sustainably carry goods could yield new vessel technology and typologies and would have the potential to revolutionize freight networks city- and nationwide</p>	<p>Easier to create temporary docks and loading/unloading points as they can then be moved when the need arises</p> <p>A single narrowboat has roughly the same carrying capacity as a small goods vehicle, around 30 tons, but requires less fuel</p> <p>Congestion reduction on a per-unit basis, although more calculations are required to factor in opportunity cost of time, as road transport can be as much as ten times faster</p> <p>Air pollution reduction, again, requiring further calculations to understand impact of time</p>
Against	<p>Costs can be higher or are not low enough to offset the cost of the switch</p> <p>Canal vessels can only be as wide as the narrowest point of their journey allows, and the canals as they are currently, were not built to any official size standards</p> <p>Opportunities for how to make modal shifts are opaque</p> <p>Network information is less robust and more difficult to obtain</p> <p>Not enough skilled staff and training programs to cope with modal shift</p> <p>Land access to historic wharves is limited</p> <p>Freight loses out to housing, development, and public space (defra, 2011)</p> <p>Speed: vessels must move very slowly, would affect delivery times and cannot compete with roads</p> <p>No formal data on demand forecasts</p>	<p>Shortage of wharves and existing 'suitable waterside infrastructure' (defra, 2011)</p> <p>Steel, construction material wharves least likely to adapt to future industries</p> <p>Amount of infrastructure investment needed may not justify the benefits in the eyes of some</p> <p>Since the CRT does not receive funding from the government, it is assumed that they would be responsible for developing adjacent land to suit freight transport needs</p>

TABLE 02 CANAL FREIGHT OPPORTUNITIES AND CHALLENGES

	Human and Political	Physical
Opportunities	<p>Changing economies (and maturing generations) could bring new potential for demand of 'slow goods'</p> <p>Large millennial interest in individuality, craft, and localism</p> <p>Could be an ideological interest in the return to the economic purpose of the canals</p> <p>Scale appropriate to test shared economy models, such as boat share, hiring individuals to move goods, etc.</p> <p>Cruising narrowboats traverse large distances each year anyway, there may be a way to incentivize a sharing economy-type model of transportation</p>	<p>reduced carbon emissions</p> <p>reduced congestion on roads</p> <p>potential for intermodal junctures where rail lines cross the canal</p> <p>with goods moving in boats, it would open the potential for floating markets where vendors can 'plug in and out'</p> <p>'Dedicated berths' like paper, ink, sugar, timber, etc. more likely because they require less infrastructure investment to transform (Mayor of London, 2011)</p> <p>Could spur development along canal because of the ease of obtaining building materials</p>
Challenges	<p>Reticence from the Canal and River Trust; without their approval, a modal shift may be extremely difficult if not impossible</p> <p>Political boundaries require policy and enforcement from the Mayor across jurisdictions</p> <p>CRT has no backing from TFL – intermodal connections potentially more difficult</p>	<p>Reduced carbon emissions</p> <p>Reduced congestion on roads</p> <p>Potential for intermodal junctures where rail lines cross the canal</p> <p>With goods moving in boats, it would open the potential for floating markets where vendors can 'plug in and out'</p> <p>'Dedicated berths' like paper, ink, sugar, timber, etc. more likely because they require less infrastructure investment to transform (Mayor of London, 2011)</p> <p>Could spur development along canal because of the ease of obtaining building materials</p>

PART II : THE CASE FOR THE GREEN RIBBON

05 FRAMEWORK

In an age where information transfer is measured in milliseconds, the physical form of place struggles to adapt at an adequate pace. The result of this hasty attempt at assimilation is often sterilized, un-humanistic environments. In globalized cities, the contemporary perception of the spatio-temporal relationship of place is shifting, and the distinction is beginning to collapse. Already, it is more common to express a place as 30 minutes away, rather than 6 miles. Staticity is viewed as a liability, and commercial entities are more concerned with coverage than density (LeCavalier, 2016).

The design proposal follows from the conclusion that freight no longer has a place on London's canals. Borrowing from theories in landscape and network analysis, it first asserts that cities can no longer be defined simply as solid objects in a field. At the very least, the city of tomorrow must be conceived as a field flowing around a series of objects. As the spatio-temporal collapse encompasses the city, it becomes imperative to arm the more vulnerable – in that some element of their character is derived from a relationship to either dimension – assets with strategies for protection. Cities are dynamic, organic beings, in which the role of the designer is to direct growth. In order to build flexibility – and thereby resiliency – into the urban form, this direction must be acknowledged, respected, and celebrated. Thus, this proposal adopts a systems-based approach to impress the importance of the Grand Union Canal as an object of memory, conduit for preservation, and place of refuge in the city of London. An understanding of the ways in which the act of layering systems begins to push and pull on the objects within the city will inform the ultimate realization of a fully-integrated canal system.

Historically, cities located near critical geographical features, such as navigable rivers for trading or valleys that offered protection from harsh climates. These specific sets of geographic conditions beget very different types of cities, whose identities then grew out of their economic and cultural heritage. In the 21st century, cities are no longer so dependent on their geographic surroundings; there are technological innovations, albeit often temporary and/or myopic, to combat urban challenges as they arise, especially in wealthier areas.

Water can be trucked or brought in via aqueduct, heating and air conditioning enable people to live in otherwise uninhabitable climates, and the internet can connect to anywhere in the world with the click of a button. In the 20th century, in many cases, geography became more about convenience and identity than economic necessity (Lyster, 2018). London is one of the world's largest financial centers, but its status as such has little, if anything, to do with its geography (outside of the sector's historic trajectory). Alpha cities, like London, grow because they have a quorum of young, willing residents, a culture of openness, robust education systems, flexible economies, and an invested public (Ross, 2016). As cities aim to cater to their more lucrative industries, many of which are made up of highly mobile people, there is a dissolution of localized responses to geography: a globalization of homogeneity. While the growth of powerful economic sectors is undeniably critical to cities' ability to remain competitive, complete sterilization will drive out those who might be in lower skilled positions or who have lived in the city their entire lives by necessity and the mobile, educated magnates by choice. Cities need to remember that complex, inviting urban spaces foster a shared identity and are ultimately what make a place livable in the long run. Rather than designing with broad strokes, which merely places a bandage over larger issues, invoking citizen empowerment and drawing the urban viscera into the foreground initiates the healing of the fissure. This is precisely the space that the Green Ribbon occupies: it serves as an antidote to the defects in the globalized urban milieu. Promoting a humanistic agenda, the Green Ribbon prioritizes the enfranchisement of its residents, both land- and water-based, over the capitalistic financial gain of any single institution. Recognizing that the determinant of success in this scheme is collective economic development, the power of the Green Ribbon is in its duality as infrastructure as tool while simultaneously as benchmark.

Interrelativity and organic, incremental growth have long been a part of the landscape architecture and landscape urbanism discussions. However, only within in the last 20 years or so has this conversation crossed over into the traditionally engineering-driven topic of infrastructure. The term infrastructure carries with it the advantage and disadvantage of ambiguity. Typically, infrastructure is thought of as interchangeable with the things this report terms "urban viscera": the fundamental facilities and organizations necessary to the operation of society. The table below is an inclusive but not extensive list of the different urban systems and networks that fall into the topic of infrastructure. Linguistically, "infra" means below, although in common parlance, infra-structure generally refers to inner-structure. Sociologist Leigh Star wrote extensively about the meaning and role of

infrastructure in society, often using the then-emerging internet as a prime example (Star, *The Ethnography of Infrastructure*, 1999). She describes infrastructure as relational, writing that “infrastructure is something that emerges for people in practice, connected to activities and structures...an infrastructure occurs when the tension between local and global is resolved,” (Star & Ruhleder, 1996; Star, 1999). Meaning, the mere existence of tracks, trains, and stations do not constitute infrastructure until they are of use to someone. In the moment someone needs to take the train to get from point A to point B, only then do these objects become infrastructure.

Others, however would argue that because these objects possess the potential to act as infrastructure, that inherently makes them infrastructure, describing a different form of relational interpretation. For example, in her most recent book, *Extrastatecraft*, architect and theorist Keller Easterling calls upon the theory of disposition to explain how infrastructural space operates. Defining disposition as, “the character or propensity of an organization that results from all its activity. It is the medium, not the message...not the object form, but the active form,” Easterling avoids ascribing a classification to infrastructure (Easterling, 2014).

Both Star and Easterling agree that infrastructure is a dynamic container for information. Embedded in any given system are markers of its makers. Similar to the way an expert coder can dive into another’s code and extract character traits of its author, a process of inversion – i.e. renegotiating the boundary between solid and void – reveals the accretion of history that produced the infrastructural form. The Grand Union Canal is unique in that it is a deterministic condition of confluence, acting as both an artifact of memory and a microcosm of greater societal values. This dispositional duality positions the canal at the crux of the redefinition – or perhaps as the redefinition itself – of urban infrastructure.

While the canal network may not be suitable to absorb a substantial amount of freight transport, lessons from logistics networks are valuable. From an understanding of how logistics networks operate, emerges a framework for how the canal network can respond to the surrounding urban condition through other means. This proposal focuses on a strategy in which designing the intrinsic (predictable) provides the opportunity for the extrinsic (unpredictable) forces to flourish. Borrowing a method of designing for contingency employed by InfraNet Lab / Lateral Office, the Green Ribbon is a multivalent network of surfaces, containers, and conduits that celebrate the untraditional, ebullient, itinerant essence of

the Grand Union Canal (Bhatia, 2011). Derived from the contingency theory of organization developed by Harvard Business School professors Paul R. Lawrence and Jay W. Lorsch in their book *Organization and Environment: Managing Differentiation and Integration*, InfraNet Lab/ Lateral Office put forth an approach to architecture as a dynamic response to real-time information (Lawrence & Lorsch, 1977). This opportunistic method of intervention operates on three simultaneous formats of space: surfaces (planes of mediation) containers (nodes or enclosures), and conduits (carriers of matter and energy). This report adds an additional layer of coding, performance, to arrive at a descriptive mosaic of performative character that accounts for the paradoxical nature of the canal. The canal is, definitionally, a conduit of people and goods, but it is also an important civic thread that unites many types of people across time, place, and class. The aim of the Green Ribbon is to reintegrate industrial heritage into the narrative of the canal in a way that responds to 21st century challenges, while preserving and celebrating its rich grassroots culture. The Empson Street anchor is the catalyst for the Green Ribbon isochrone that will ultimately redefine the meaning of urban industry.

06 THE GREEN RIBBON

The design proposal, as a manifestation of the larger strategic vision for the canal network as a whole, layers network infrastructures spatially and intentionally ambiguously, embracing the potential for adaptation. Intended to capture the essence of a network-based realization of place, this design gestures towards a subversion of the notion of designated program. Instead, it is a spatialized representation of typology with suggestive programmatic prescriptions, realistically acknowledging the nuance required in an identity- and community-driven design.

Thus, the Green Ribbon begins as a purely geometric response to the physical geography of the Grand Union Canal and adjacent land; its shape is derived from a GIS analysis of overlapping layers of information. As an inverted infrastructure, the Green Ribbon is a solid, contiguous east-west entity around and through which the land and other systems interact. The canal itself is the base layer, which following a series of criteria begins to annex land as the layers accrue. The first layer of annexation is the London Plan's Opportunity Areas. Recognizing these areas as critical places where the priorities of the greater city and those of its counterpoint could combine to create containers of intersection that contribute to the distributed network of activity centers at the city scale. Second, in anticipation of continued deindustrialization and changing urban land use needs in industrial and commercial sectors, the London Plan's Strategic Industrial Locations make up the second layer of annexation. The union of these three layers produces as many common points. These points of intersection form the anchors of the Green Ribbon, tying it into three (extant or approved rail is one criterion in the selection of Opportunity Areas) of the city's critical networks. These connections root the Green Ribbon into the city, giving it legitimacy and access to outside resources. Acting as centers of exchange, each of these anchors has its own systematic function and accommodates different scale uses. Over time, they will develop their own character and sense of identity, melding that of the canal with that of the surrounding area.

TABLE 03 COMPARING OPPORTUNITY AREAS

Opportunity Areas Containing Green Ribbon Anchor Sites			Other Major Canalside Developments		
	<i>Lower Lea Valley: Empson Street</i>	<i>Park Royal</i>	<i>Heathrow: Hayes Industrial Area</i>	<i>Paddington Waterside</i>	<i>King's Cross Central</i>
Acreage	3,460	1,762	1,730	94	131
Indicative employment capacity	50,000	10,000	12,000	5,000	25,000
Minimum new homes	32,000	1,500	9,000	1,000	1,900
Approximate Jobs:Housing	1.56	6.67	1.33	5.00	13.16
OA Planning Framework progress	In preparation	In preparation	Proposed	Adopted	Adopted
OA Planning Framework key agenda items	<p>Acknowledge role as junction of two nationally important growth corridors</p> <p>Careful consideration of nature conservation areas</p> <p>Large new office and residential centers</p> <p>Queen Elizabeth Olympic Park to become important landscape and development catalyst</p> <p>Managed release of industrial sites</p>	<p>Meet needs of modern logistics, waste management, and industrial functions</p> <p>Mixed use near transit</p> <p>Integrate with Old Oak Common, White City, and Kensal Canalside OAs</p>	<p>Recognize airport as driver of growth, particularly in logistics and tourism</p> <p>Attractiveness to businesses</p> <p>Careful consideration of nature conservation areas</p> <p>Support bio-science and creative/media sectors and support services at variety of scales</p>	<p>Office and residential uses</p> <p>High density</p> <p>Complement "distinct canalside character"</p> <p>Enhance environmental quality</p> <p>Minimize car use</p> <p>Integrate with surrounding area</p>	<p>Public transport accessibility</p> <p>Integrate intermodal networks</p> <p>Link academic and business sectors</p> <p>Capture heritage value</p> <p>Secure environmental quality</p> <p>Minimize car use</p>

Secondary surfaces emerge when residential and civic land uses are removed, and rail lines are overlaid on top of the remaining industrial, commercial, and open space (after also extracting cemeteries and conservation land) along the canal. Focusing on rail intersections ensures the longevity of the secondary sites and the viability of any development that may occur.

Representing the Green Ribbon as a singular conduit through the city illustrates that while the scale and performative functions of the anchors may be larger and more complex, the humanistic ideology is pervasive from end to end. In a similar process, metaphorically mapping the essence and the history of the canal onto the vision of the new industrial infrastructure generates a programmatic prescription of small-scale making and growing. Embodying the ethos of the entrepreneurial canal communities and the innovative, industrious nature of those on adjacent land, the Green Ribbon becomes a rich mosaic of collective identity across the city, where the makers and growers of the city can continue to earn a living and build community.

Table 04 characterizes the changes in different aspects of the Grand Union Canal over time and into the future, imagining both a freight-centric path and that of the Green Ribbon.

TABLE 04 RE-CODING THE CANAL

	Past – 1770 to mid-1800s	Present – 1970 to today	Future A – Freight	Future B – Green Ribbon
Physically	cut channels through largely agrarian landscapes; loud, dirty, purely functional space	cut channels through urban landscapes; often overgrown in some places; becoming crowded	widened uniformly; locks modernized to operate more quickly	widened, but incrementally, for improvement of canal life
Spatially	robust network, tied in at anchors; centralized network	squeezed into densely packed urban fabric; adjacent land uses might shrink or disappear by widening; linear network	linear network; large, industrial equipment; noisy	adjacent land uses contribute to the canal; linear network
Socially	predominantly lower-wage, working class men; boys' club (generally); difficult life; disenfranchised, little to no voice	a place for people to escape confines of land society; recreation + leisure; nomadic; community derived from transience; identity as Canal Person, not always tied to a physical geography; CRT: "The Regent's Canal tiptoes through the capital. This is a city walk through the backdoor, catching London in private, with its slippers on."	canals might force out many of the residential communities; could compromise towpath continuity, reducing recreational access; retrofit construction period would likely happen sequentially or in rapid succession, putting stress on extant communities	identity of Canal People and heritage maintained; better integration with land communities, each with something to offer the other; shared ownership over amphibious spaces; option to identify with a geographic place; new heritage walk along the Green Ribbon with in situ markers of its industrial past
Economically	major driver of economy	not generative	contributing to formal economy, even if minimally	small-scale, generative at an individual level; informal economy
Ecologically	divided eco-systems; pollution prevented flourishing of species	overgrowth promotes species propagation; areas of pollution are still of concern	retrofitting would likely cause stress on plant and animal life; without concerted effort, wouldn't encourage species propagation	continuous belt of biodiversity; self-cleaning as much as possible; suitable for growing food; educational, treasured



Figure 17 Anchor sites emerge from an overlay of Opportunity Areas and Strategic Industrial Locations. There are three that are located along the canal.

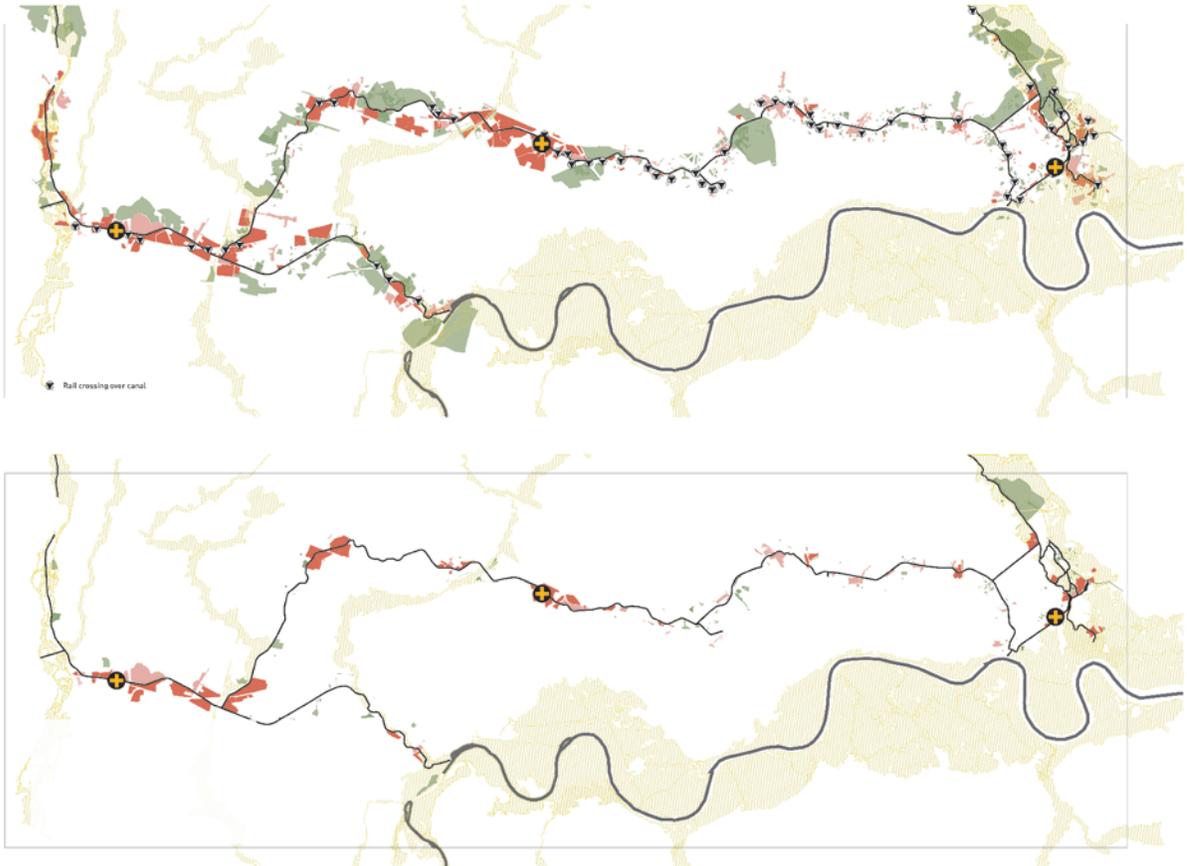


Figure 18 *First filtering out residential and civic property, and then those that are not crossed by rail, the Green Ribbon begins to take its shape.*

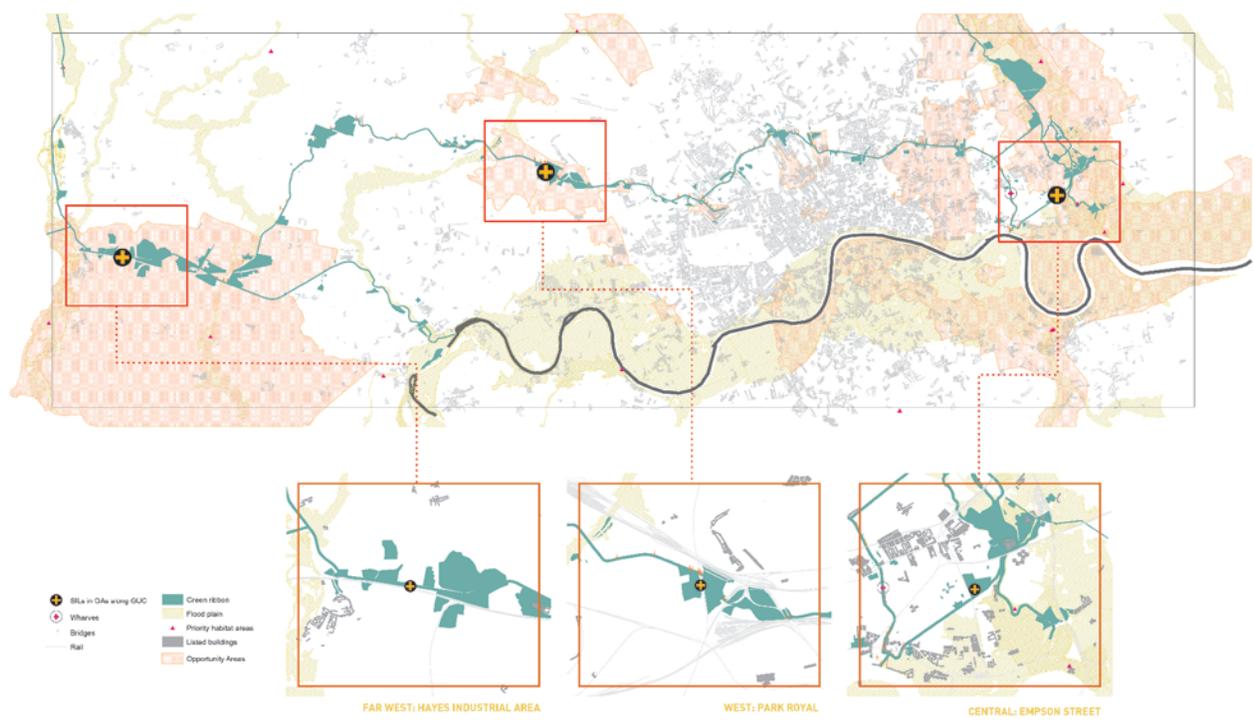


Figure 19 The Green Ribbon, as a single, unified shape.

7. EMPSON STREET

The smallest of the three Green Ribbon anchors, Empson Street, is the interface between the water community of the canal and the land community of Bromley-by-Bow in Tower Hamlets. A hub of production (material, vegetal, and intellectual), Empson Street is a site of great activity and energy. It sets the bar for the Hayes Industrial Area, Park Royal, and future secondary sites for how to sustainably integrate new, small-scale industry into a vibrant community, while embracing the eventual need to adapt to a changing climate and economy.

The design of the Empson Street proposal relies on a series of basic assumptions about the qualities and nature of humanistic urban environments. First, that convenience is a major factor in people's decisions about where to live, work, play, etc. – that a multiplicity of amenities should be easily accessible, physically and socially. Second, that a wide range of activities best caters to a diverse population. Similarly, that a rich diversity of people should be accommodated in order to foster the growth of a vibrant community. Fourth, that demonstrated investment in place, through design, upkeep, or otherwise, inculcates a desire for others to do the same. Fifth, a hierarchy of scale should be represented to encourage different types of interactions and allow people to build interpersonal relationships and a collective identity that can adapt, in situ, over time. Sixth, that a sense of harmony and order gives people a sense of structure and allows them to more easily develop their own understanding and interpretation of space. Seventh, that freedom from intrusion is a tenet of democracy and is imperative to an equitable future. And finally, eighth, that a connection to nature satisfies a biological need, promotes a healthy environment, and serves as a familiar depiction of physical growth (Speck, 2006).

TABLE 05 EMPSON STREET SITE CONTEXT

	past	present
what, generally	former rail yard, with a match factory with council housing bombed in 1940, big fire, furniture makers, industrial equipment packers	industrial estate, privately owned (by whom is unclear); large-scale distributors of things like office supplies, warehouses, small-scale things like photography studios, screen printing, monthly market
physical relationship to canal	primarily functional; gantries extended out from the long shed at the center to hoist goods in and out of narrowboats	physical barrier; largely impervious cover forces rainwater to pool along the edge until it can drain into the canal; towpath on opposite side, only accessible by circuitous route
who	working class, industry workers	large Bangladeshi population, many young children, and high rate of children and elders living in poverty
what, broadly	industrial estate adjacent to rail yard and vacant land, surrounded by small, council attached houses	diverse neighborhood with well-respected neighborhood center, elementary schools, health care center, near Lea River Valley, although separated by the A12
strengths		shell of match factory building still standing, not listed as a brownfield site, proximity to Bromley-by-Bow Community Centre and Marners Primary School, Limehouse Arts Foundation
weaknesses		lost a lot of original buildings in a fire after it was bombed in the Blitz in 1940, hard edge to canal
opportunities		DLR rail, proximity to Lower Lea Valley park, Devons Road Market
challenges		A12, limited pedestrian connection across canal

Envisioning the Empson Street neighborhood as one that serves both the land- and water-based, a reciprocity forms between the two communities.

RECIPROCITY BETWEEN LAND AND CANAL COMMUNITIES

To be gained from land community	To be gained from canal community
locally-grown food	personal transportation
a home base	transportation of goods
permanence (if they so choose), refuge	value of slower-paced life
option for a geographically-based sense of identity	value of living minimally
a place to go to school and/or work	sense of adventure and exploration
a place to get mail	legible connection to the history of the area, even if it's not their history
systems for rainwater harvest, greywater recycling	option for a canal-based sense of identity
advocacy	institutional knowledge
pooled community resources	small-scale living
	advocacy
	pooled community resource



Figure 20 *There is currently a hard edge between Empson Street and the Limehouse Cut. Rainwater pools near the wall before it can drain into the canal.*



Figure 21 While there are two parks to the north and south of Empson Street, the only green space on the site is where plants have taken over a dirt mound.

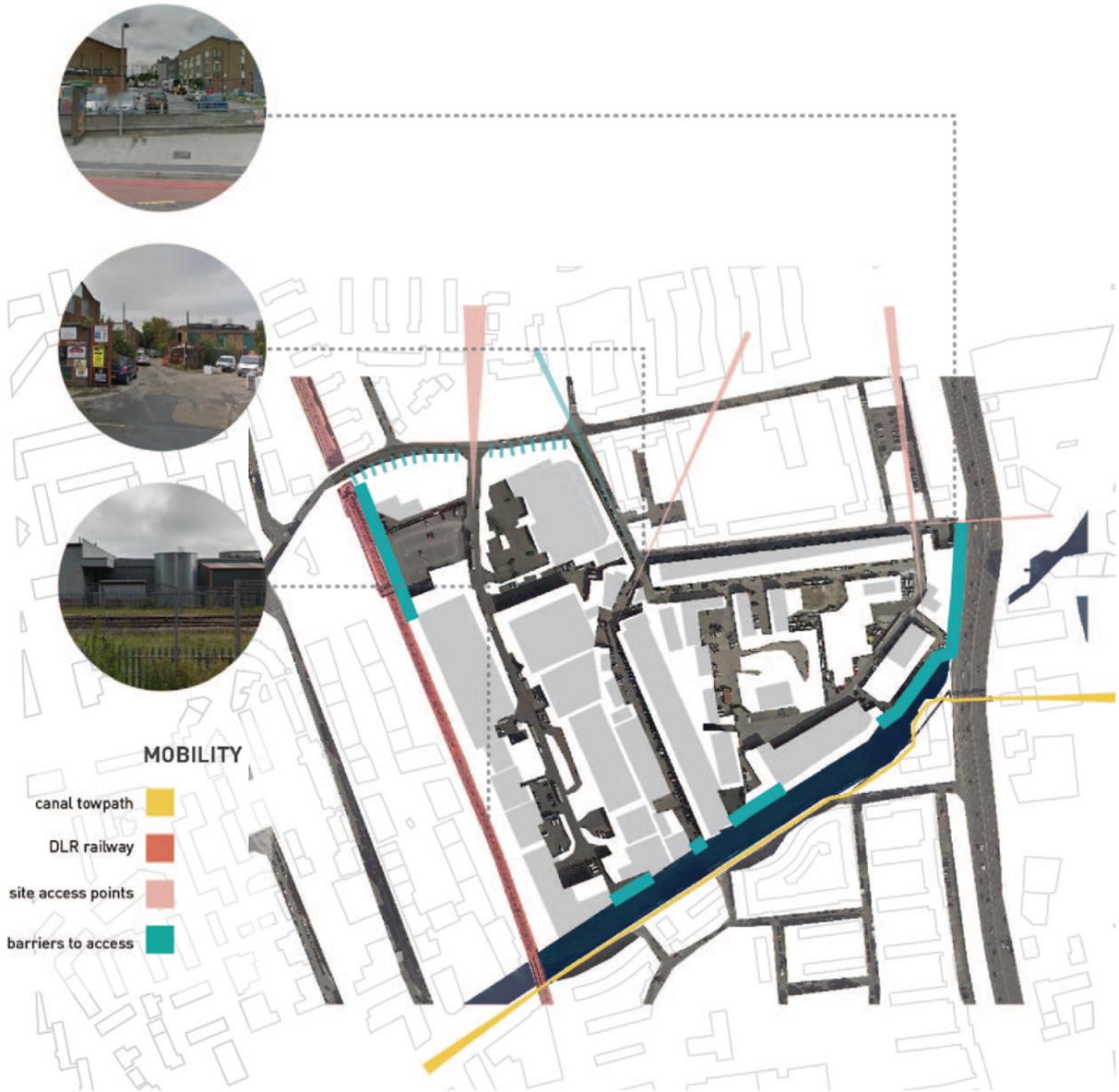
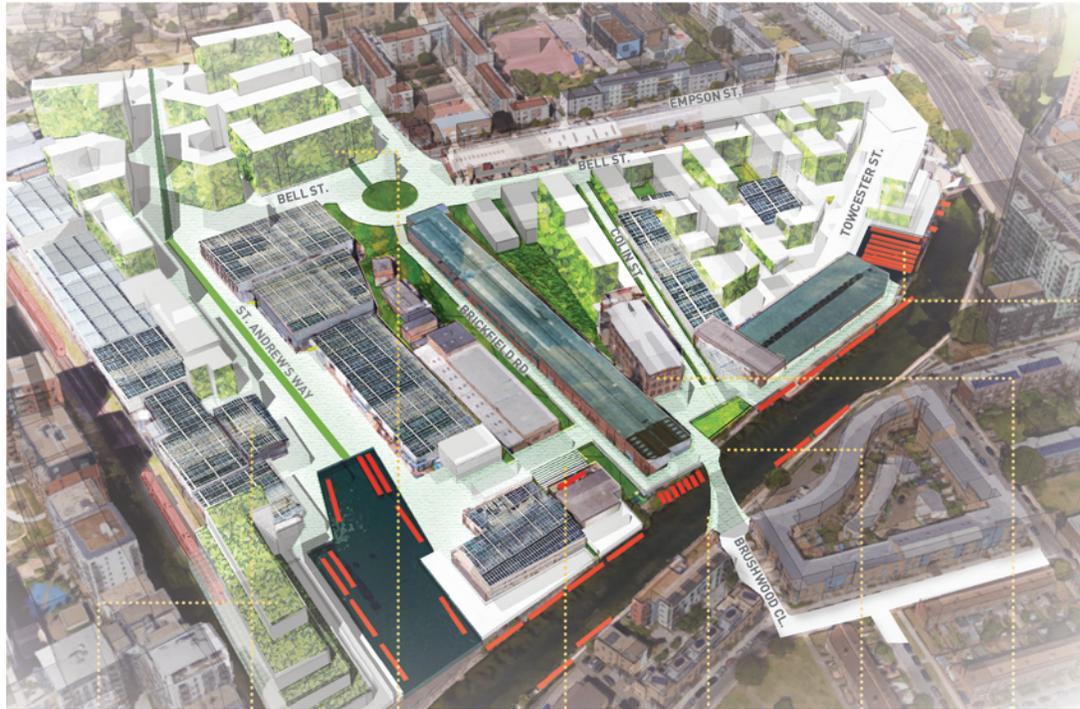


Figure 22 Site is only accessible on the north edge, and access points are discrete. There is a connection to the towpath via the A12 at the eastern edge.



Figure 23 The buildings on the eastern side of the site are older and serve heavier industrial operations. Most of the western side is storage and/or offices.



CANAL TO RAIL
TRANSFER POINT



VERTICAL
GROWING ON
SOUTHERN
FACADES



NEW PED BRIDGE
CONNECTS TO
POPLAR WARD



MATCH FACTORY
BUILDING REMAINS IN
USE BY LIMEHOUSE
ARTS FOUNDATION



WAREHOUSES
CONVERTED TO
GREENHOUSES



RAINWATER
CAPTURE BASIN
DOUBLES AS
PERFORMANCE
VENUE



DOCKED, FLOATING
GARDEN SOFTENS
CANAL
EDGE



TEMPORARY
FLOATING MARKET
NEXT TO PERMANENT
MARKET HALL



Figure 24 Empson Street master plan.



Figure 25 Empson Street vision. The floating community teaching garden is shown at the right, and the Limehouse Arts Building is preserved to the left.



Figure 26 The expansion and impact of the Green Ribbon.

08 DISCUSSION AND CONCLUSION

Widening the already narrow canals would require tearing down existing council and older housing stock, destroying habitats that have formed along the banks, and a great deal of financial investment for a disproportionate benefit. London would better turn to radically redesigning their existing street network, exploring new, sustainable technologies, and supporting (with finances, policy, and rhetoric) a cultural shift towards a people-first urban environment.

Shaped by 200 years of use, the Grand Union Canal is ripe with history, memory, and stories to be discovered. Nestling future development in and among those histories not only allows for their physical preservation but protects the propagation of identity and character. Out of a reverence of the past informs a responsibility to the future, and the more that new users and residents are aware of how the city came to be, the more likely they are to feel inspired to enrich it. The Green Ribbon is a tool for people to reclaim the space lost to changing industries and perspectives. The three anchor sites root the canal into the larger production and distribution networks, catalyzing the growth of an urban infrastructure that directly serves its users. The framework of the Green Ribbon directs the cultivation of the informal making and growing markets in an opportunistic, rather than deterministic, manner, acknowledging that people need agency rather than outside solutions.

The canal is where city happens, a place where the act of living is crafted by the individual. The Green Ribbon offers canal and canal-adjacent dwellers the support of a larger system if they choose to plug into it. A system of aggregate parts, the Green Ribbon is made by and for its community. The original strength of Britain's canal network was its ability to connect people to opportunity, which gave rise to great innovation. While forcing the canal to conform to today's standards of speed and volume may be achievable, it would be at great detriment to the character of urban life in London.

Over the last 50+ years, canal communities have had to fight to be seen and heard. Even today, political discourse still focuses on the economic potential of the canals over the quality of life of its inhabitants. An understanding of the inherent potential for the canals to enfranchise its communities is one way in which cities like London can rediscover their existing assets. The realization of the Green Ribbon will only be possible with a combined

grassroots and top-down approach, in which competitiveness is measured qualitatively. By refusing to relegate fringe societies and urban viscera to the perimeter, which increasingly seems to be a moving target, London can begin to address the gargantuan issue of inequity. A paradigm shift is long overdue: the city's speed- and technology-driven vision of modernity lacks the level of complexity that is embedded in the challenges it faces. While there will never be a magic bullet solution to climate change, inequity, or anything else, cities are already armed with a welter of intelligence to make moves in the right direction and the infrastructure to support them. The problem simply lies in the angle of attack.

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