Interdisciplinary Studies in the Long Nineteenth Century

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Nineteenth-Century Infrastructures before 'Infrastructure'

Nicola Kirkby

What is at stake when we bring nineteenth-century projects into dialogue with critical infrastructure studies? This introduction highlights the conceptual, material, and geopolitical stakes of Victorian infrastructure, as explored in contributions to this issue of *19*. By opening up margins of contested meaning in and around large-scale systems during a unique period of development, this introduction lays a foundation for the road ahead in nineteenth-century infrastructure studies.

To think infrastructurally with nineteenth-century material is to think anachronistically. We inhabit a world shaped and organized by nineteenth-century infrastructures in uneven yet persistent ways. The inaccessibility in the twenty-first century of most of London's underground railway network for wheelchair users and parents with buggies is only one example of how Victorian legacies both enable and restrict social and spatial connections in the present day. These Victorian infrastructures now creak and strain under the combined pressures of an increased population, changing needs and expectations, and yet — colossal in scale and expensive to build — they remain difficult to replace. For example, London's sewerage system, built in the 1860s and 1870s, was blocked by a 250-metre-long fatberg in 2017: a toxic mass of grease and sanitary products unimagined by its Victorian mastermind, Joseph Bazalgette.[1] Infrastructure's *longue durée* does not always denote integrated, networked design of the kind that saw London's sewers constructed in line with new embankments, however. Often the result of private speculation, many nineteenth-century infrastructures developed in a haphazard, piecemeal fashion. It is no surprise that imagery of the period such as Gustave Doré's 1872 engraving, *Over London by Rail* positions new viaducts, railways, and roads as technologies for pinning down and boxing in urban environments, as much as for enabling new connections (*Fig. 1*).

In the past as in the present, lived experiences converge with the construction of large-scale material configurations; individuals and communities find what Caroline Levine has described as 'affordances' of 'constraints and possibilities' within these structures for their own ends.[2] Much like its object of research, this issue of *19* has taken form in dialogue with the opportunities and challenges of its time. The global pandemic brought infrastructure into focus in new ways as societies rushed to dismantle entrenched habits and dependencies with the aim of slowing infection rates.[3] This issue developed from a conference, 'Breaking the Network Infrastructure and Community (Fractures) in the Long Nineteenth Century', organized by Joanna Hofer-Robinson at University College Cork.[4] Building on intellectually generous discussion at and beyond

[1] The fatberg is now in the Museum of London's permanent collection. See 'Putting Fatberg on Display', Museum of London <https://www.museumoflondon.org.uk/discover/putting-fatberg-display> [accessed 24 October 2023].

[2] Caroline Levine, *Forms: Whole, Rhythm, Hierarchy, Network* (Princeton: Princeton University Press, 2015), p. 6.

[3] Human loss and risk of infection were keenly felt. Recent humanities scholarship from the period sets such trauma alongside so-called 'lockdown cultures' resulting from widespread measures to limit public circulation beyond the home except for essential workers. See *Lockdown Cultures: The Arts and Humanities in the Year of the Pandemic, 2020–21*, ed. by Stella Bruzzi and others (London: UCL Press, 2022) <https://www.uclpress.co.uk/products/206915> [accessed 24 October 2023].

[4] This event was made possible with the support of Joanna Hofer-Robinson's Irish Research Council New Foundations Award. I owe much to Hofer-Robinson, whose keen insights into nineteenth-century infrastructure have shaped this issue and its introduction. Keynote papers from the conference by Claire Connolly and James L. Smith, Nicola Kirkby,

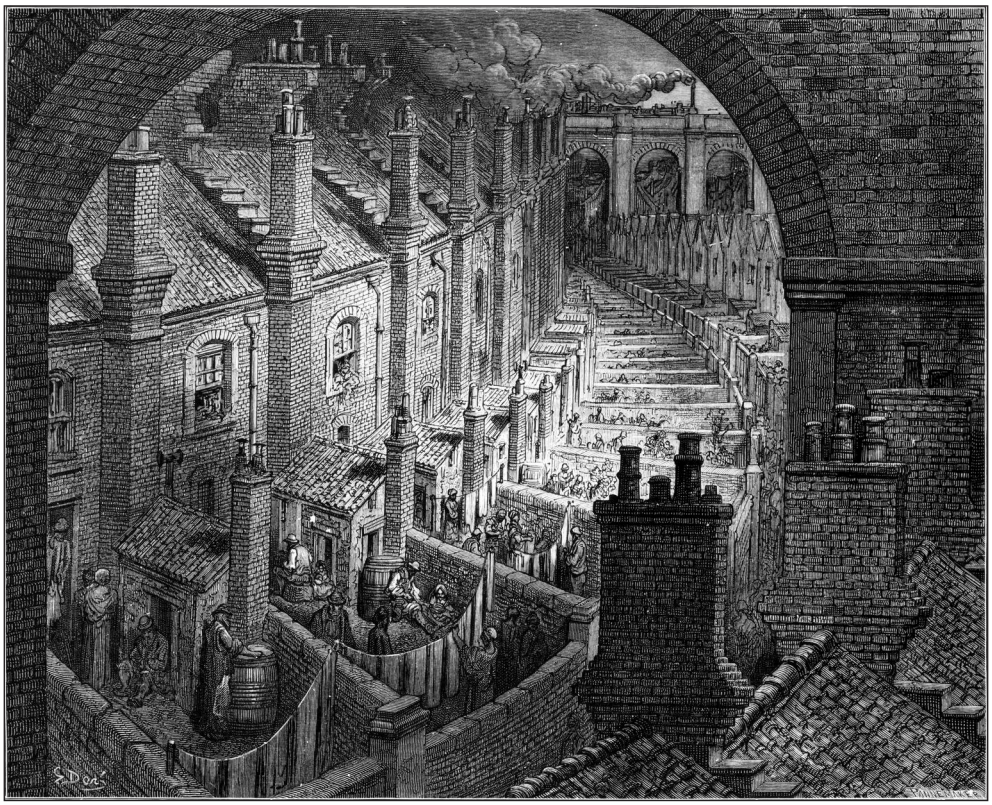

Fig. 1: Gustave Doré, *Over London by Rail*, 1872, wood engraving. Image courtesy of the Science Museum Group, CC BY-NC-SA.

that event, this issue of *19* on 'Nineteenth-Century Infrastructures' provides new insight into who nineteenth-century infrastructure was for, whose connectivity mattered, and how public-facing systems reinforced or undermined social belonging and exclusion. The articles that follow interrogate how thinkers of the period imaginatively harnessed such significant change through the century, examining infrastructure in conceptual, social, and international configurations.

Despite so much of what we may now think of as infrastructure developing out of nineteenth-century projects, *infrastructure* as a term did not settle into anglophone discourse until the following century. In its fleeting appearances in late nineteenth-century English, infrastructure tended to refer to nationally directed projects in France

Ruth Livesey, and Nitin Sinha are available to view online. Initially devised to be in-person, this event gained much from delegates able to join discussion from various disciplines and time zones. Hofer-Robinson and I are grateful to contributors (from within and beyond that event), collaborators, and peer reviewers for persisting with this issue through such unusual and challenging times. Joanna Hofer-Robinson, 'Breaking the Network', online symposium <https://breakingthenetwork.com/> [accessed 24 October 2023].

and its colonial territories.[5] In an 1889 anglophone engineering magazine's overview of French railway building, infrastructure adheres to its prefix, *infra*, as something situated beneath surface-level operations:

> The general tendency during the past year has been to obtain above all things an excellent infrastructure. A great deal of money has been spent in obtaining proper ballast; embankments are made extra wide with slopes more than sufficient to retain them. The rails are accurately laid with carefully packed sleepers and firmly spiked chairs. No expense is spared in building better lines on the principle that the outlay will be remunerative owing to the future cost of maintenance being less.[6]

Infrastructure emerges quietly onto this anglophone page, unitalicized, glossed, or defined. It lacks any textual scaffolding that might flag it as a loan word, suggesting some integration into English discourse. In French, *infrastructure* denoted the trackbed, cuttings, and embankments that underpinned locomotive travel, known by anglophone engineers of the period as the 'permanent way' (*OED*). Excellent infrastructure perhaps lacks the foreclosing rigidity of a 'permanent way'. But the term also carried national connotations in France, where railways were built and run by the state. In Britain, meanwhile, private companies took on the responsibility, risk, and reward of laying tracks towards a composite and commercial infrastructure. Even when partially integrated into anglophone discourse around civil engineering and public utilities, nineteenth-century infrastructure promised a long road ahead. Then as now, nineteenth-century infrastructures matter in multifaceted ways that exceed any one system's intended function or geographical and historical locale.

Nineteenth-century thought, as expressed through and about steam-age transport and communication systems, has had lasting impact on how we conceive infrastructure in the present, and has been under-represented in the 'infrastructural turn' in humanities to date.[7] Despite significant contributions to critical infrastructure studies from scholars of the nineteenth century, foundational contexts often remain underexplored in an interdisciplinary field dominated by twentieth-century and contemporary case

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[5] See Ashley Carse, 'Keyword: Infrastructure: How a Humble French Engineering Term Shaped the Modern World', in *Infrastructures and Social Complexity: A Companion*, ed. by Penelope Harvey, Casper Bruun Jensen, and Atsuro Morita (Abingdon: Routledge, 2017), pp. 27–39 (p. 29).

[6] 'The Progress of French Railways during 1888', *Railway Engineer*, February 1889, pp. 39–40 (p. 39).

[7] Infrastructure studies has gathered momentum as an interdisciplinary endeavour, extending beyond its home disciplines of anthropology, human geography, engineering, and sociology, and into creative humanities. An interdisciplinary and international collective of scholars has recently collated contributions to this field and produced primers for those seeking a way into its broad critical terrain. See CI Collective, 'Critical Infrastructure Studies', 2019 <https://cistudies.org> [accessed 24 October 2023].

studies.[8] Without insight into nineteenth-century developments that have ramified, collapsed, and adapted into forms familiar to our present, the foundation of critical infrastructure studies would remain incomplete. In this issue Joanna Hofer-Robinson and I gather six articles that offer detailed analysis of selected systems, and together provide insights that extend across a range of Victorian cultural contexts. Our issue expands recent inroads into nineteenth-century infrastructure, including Kelly Rich, Nicole Rizzuto, and Susan Zieger's collection, *The Aesthetic Life of Infrastructure*, which approaches infrastructure as inextricable from racial, affective, and environmental challenges that persist through time, within and beyond nineteenth-century projects.[9] *Victorian Literature and Culture*'s forthcoming 'Keywords' issue on infrastructures, edited by Zarena Aslami and Timothy Watson, will no doubt provide further coordinates through short essays that tease out various ways in which infrastructure defined what it meant to live as a Victorian.[10] In his tongue-in-cheek definition of infrastructure as 'things and also the relation between things', Brian Larkin signals the impossibility of providing a definitive history of infrastructure. Yet he also cautions against defining it more closely: 'we are reminded that discussing an infrastructure is a categorical act. It is a moment of tearing into those heterogeneous networks to define which aspect of which network is to be discussed and which parts will be ignored.'[11] Our overall aim in this issue, then, is to lend momentum to critical inquiry through six articles that speak to the dynamism of nineteenth-century infrastructure as it was entangled with Victorian culture.

If those thinking imaginatively with connective systems and structures throughout long nineteenth-century anglophone society did not consider such works to be 'infra', — operating beneath and enabling daily life — then how did they conceptualize them? When he groups 'Steamboats, Viaducts, and Railways' (1833) into a single disruptive category, for example, William Wordsworth distinguishes emergent systems of 'motions and means' as unlike anything previously rendered into verse. Defying previous limits of mobility associated with water, air, and earth, there is much space in

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[8] See, for example, Caroline Levine's research trajectory from 'strategic formalism' in *Victorian Studies*, to her book-length study, *Forms*, which draws on examples from the nineteenth century to the present to articulate the relationship between part and whole in complex systems. Caroline Levine, 'Strategic Formalism: Toward a New Method in Cultural Studies', *Victorian Studies*, 48 (2006), 625–57; Levine, *Forms*; and Caroline Levine, '"The Strange Familiar": Structure, Infrastructure, and Adichie's *Americanah*', *MFS Modern Fiction Studies*, 61 (2015), 587–605.

[9] *The Aesthetic Life of Infrastructure: Race, Affect, Environment*, ed. by Kelly M. Rich, Nicole M. Rizzuto, and Susan Zieger (Evanston, IL: Northwestern University Press, 2023). While too recent to integrate into contributions to this issue of *19*, this collection has opened up much new ground in reading infrastructure across disciplines and periods.

[10] 'Keywords: Infrastructure', ed. by Zarena Aslami and Timothy Watson, *Victorian Literature and Culture*, forthcoming, 2024 <https://www.cambridge.org/core/journals/victorian-literature-and-culture> [accessed 24 October 2023].

[11] Brian Larkin, 'The Politics and Poetics of Infrastructure', *Annual Review of Anthropology*, 42 (2013), 327–43 (pp. 329–30).

and around nineteenth-century projects to renegotiate interfaces with humanity and with the non-human world. Technologies that harnessed once-diffusive steam power and contained and directed invisible electrical currents to human purpose remediated daily life, often in ways that were difficult to accommodate within existing literary and artistic forms.[12] Beyond raising new questions about technological potential, writers also invited novel approaches to articulating shifting perspectives on the world, laying imaginative pathways resistant to reversal or change. From Maria Edgeworth's attempts to redefine 'net-work' in the face of gathering infrastructural change in the Harry and Lucy stories (1801–25), James Smith, Claire Connolly, and Daniella Traynor's article for this issue illustrates how early nineteenth-century conceptual co-dependence between network and infrastructure impacts those seeking to represent historical patterns of movement using digital humanities mapping methods today. Arguing that 'scholars, infrastructure, and research aids can mutually shape one another', Smith, Connolly, and Traynor assert the vital role that human curiosity plays in forging new pathways through vast historical corpora. To conduct such research is to anticipate future requirements with a perspective that Akhil Gupta identifies as central to infrastructural development: 'Perhaps because of the investment involved, infrastructure is almost always built to exceed present needs: it is built in anticipation of a not yet achieved future.'[13]

Whether reflecting on technological or scientific changes or speculating on whatever might come next, Victorian thinkers had their own strategies for navigating ever more complex perspectives on where life might lead. Alfred Lord Tennyson deftly condenses these into imagery as 'the ringing grooves of change' in a phrase now more famous for its misunderstanding of railway infrastructure than its characterization of nineteenth-century modernity.[14] Tennyson nonetheless captures something of the cognitive clamour experienced as constant adjustments to daily routine for some, and upheavals of understanding on a universal scale for others.[15] From geological observations of 'deep time' that aged the Earth by billions of years and Darwinian theories of evolution that integrated humanity into branches of ecology, to thermodynamic

[12] For a detailed reading of this process as it pertains to railway infrastructure, see Nicola Kirkby, 'Railway Imaginary in the 1830s: Finding Form', in *Nineteenth-Century Literature in Transition: The 1830s*, ed. by John Gardner and David Stewart (Cambridge: Cambridge University Press, forthcoming, 2024).

[13] Akhil Gupta, 'The Future in Ruins: Thoughts on the Temporality of Infrastructure', in *The Promise of Infrastructure* (Durham, NC: Duke University Press, 2018), pp. 62–79 (p. 63).

[14] 'Locksley Hall', in *The Poems of Tennyson*, ed. by Christopher Ricks, 2nd edn, 3 vols (Harlow: Longman, 1987), II, 118–30.

[15] Helen Kingstone provides a distilled definition of modernity with further reading insofar as it relates to individual(ism), statehood, internationalization, technology and ecology, and temporality. Each of these concerns intersects with public-facing infrastructures in myriad ways. See Helen Kingstone, *Panoramas and Compilations in Nineteenth-Century Britain: Seeing the Big Picture* (Cham: Palgrave Macmillan, 2023), p. 2.

laws that vastly adjusted perspectives on life into a framework of inevitable entropy, thinkers of this period were in the habit of adapting thought into new patterns and frames of reference.[16] In Victorian studies we owe much to a wealth of scholarship published before the infrastructural turn that provides rich analyses of the cultural and imaginative significance of transport, communications, energy, and sanitation systems as they changed through the period.[17] By explicitly connecting such work to critical infrastructure studies in this issue, we can build further interdisciplinary connections between nineteenth-century studies and fields that tend to turn to contemporary complexities and the recent past, including sociology, anthropology, and human geography.

Going beyond the open approach of critical infrastructure studies, whose aim is 'to think [...] about the built, repaired, and lived things of the world — how we make them and how they make us', contributors to this issue have taken their cue from what nineteenth-century sources reveal about continuities between logistical and institutional provision during the period.[18] As Ruth Livesey demonstrates in her article on institutional change in Anthony Trollope's Barsetshire Chronicles series (1855–67), infrastructure is not something we can altogether separate from other civic institutions in nineteenth-century studies. Both could only operate through shared ways of working together, and Trollope channels his aptitude for managing large-scale change in his long career with the General Post Office when devising his multivolume series, providing — as Livesey argues — uncanny moments of recognition for the frustration his characters feel in the face of unexpected restructuring. A focus on the material artefacts of Victorian infrastructure can prevent us from perceiving entrenched ways of thinking and working in long-standing institutions that set parameters around proposed change through the century. Not all infrastructure is designed to facilitate the movement of matter, and Victorian infrastructural legacies are not only material. Samantha Pinto

[16] Gillian Beer, *Darwin's Plots: Evolutionary Narrative in Darwin, George Eliot and Nineteenth-Century Fiction*, 3rd edn (Cambridge: Cambridge University Press, 2009); Barri J. Gold, *ThermoPoetics: Energy in Victorian Literature and Science* (Cambridge, MA: MIT Press, 2012); Devin Griffiths, *The Age of Analogy: Science and Literature between the Darwins* (Baltimore: Johns Hopkins University Press, 2016); and Sally Shuttleworth, *George Eliot and Nineteenth-Century Science: The Make-Believe of a Beginning* (Cambridge: Cambridge University Press, 1984).

[17] A far from exhaustive list of studies in this area includes Jonathan H. Grossman, *Charles Dickens's Networks: Public Transport and the Novel* (Oxford: Oxford University Press, 2012); David M. Henkin, *The Postal Age: The Emergence of Modern Communications in Nineteenth-Century America* (Chicago: University of Chicago Press, 2006); Ruth Livesey, *Writing the Stage Coach Nation: Locality on the Move in Nineteenth-Century British Literature* (Oxford: Oxford University Press, 2016); Richard Menke, *Telegraphic Realism: Victorian Fiction and Other Information Systems* (Stanford: Stanford University Press, 2008); Laura Otis, *Networking: Communicating with Bodies and Machines in the Nineteenth Century* (Ann Arbor: University of Michigan Press, 2001); and Kate Thomas, *Postal Pleasures: Sex, Scandal, and Victorian Letters* (Oxford: Oxford University Press, 2012).

[18] CI Collective, Mission Statement.

has described adjacent organizations as 'soft institutional offshoots — including hospitality, healthcare, and publishing', and these were as integral to nineteenth-century development as projects more readily recognized as infrastructure.[19]

While infrastructure is a mode of human expression with too long a history to distil here, industrialization, innovative expansion, and overtly exploitative resourcing set nineteenth-century development apart from previous and subsequent eras. Advances in steam technology, electricity, and print culture emboldened those envisioning large-scale projects in sharing and seeking support for their designs, but fuel dependence could also forestall creative and commercial ventures.[20] Victorian civil engineers were also less challenged to find both physical and imaginative space for superstructures than their twentieth- and twenty-first century counterparts, who had to work with, around, or against the hefty engineering legacy of engineers of the so-called steam age. Working with vastly adjusted parameters of possibility, then, any proposed solution to an infrastructural requirement could take many forms. While building new infrastructure for public use may have been a collaborative practice in terms of resourcing material and labour, Samuel Smiles reframed such developments as single-author endeavours by eminent Victorian engineers.[21] As we continue to 'undiscipline' Victorian studies from such narratives, our contributors have been alert to such hyperbole and myth-making around individual and national contributions to infrastructural projects that occlude historically and geographically diverse developments in expertise.[22]

Those shaping Victorian public works inherited much from eighteenth-century technological advances and ambitions for reshaping the built environment. Indeed, nineteenth-century civil engineers sustained a long-established imaginative drive, which David Alff encapsulates as 'seventeenth- and eighteenth-century ideas for endeavour [that] formed in minds and strived to matter' even if 'more often than not,

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[19] It would be a mistake to read 'soft' here as lesser or inherently flimsy. Pinto's use of the term speaks to continuities with present-day software, which has greater capacity to be redevised remotely and implemented *in situ*, compared with built apparatuses. See Samantha Pinto, 'Infrastructure and Intimacies: Early Black Women's Writing and the Care Work of Colonialism', in *The Aesthetic Life of Infrastructure*, ed. by Rich, Rizzuto, and Zieger, pp. 60–77 (p. 61).

[20] See Nicola Kirkby, 'Steam Engines', in *Technology and Literature*, ed. by Adam Hammond, Cambridge Critical Concepts (Cambridge: Cambridge University Press, forthcoming, 2024), pp. 236–50.

[21] See Samuel Smiles, *Lives of the Engineers, with an Account of their Principal Works*, 3 vols (London: Murray, 1861).

[22] See Ronjaunee Chatterjee, Alicia Mireles Christoff, and Amy R. Wong, 'Introduction: Undisciplining Victorian Studies', *Victorian Studies*, 62 (2020), 369–91. Across interdisciplinary nineteenth-century studies, and in North American scholarship in particular, there has been an overwhelmingly positive response to Chatterjee, Christoff, and Wong's call to undiscipline. Joanna Hofer-Robinson and I have sought to include a range of nineteenth-century and scholarly perspectives in our issue, but also acknowledge its partial scope. This is in part reflective of the current pressure scholars with expertise beyond canonical texts and contexts now face in supplying increased demand for labour in producing and reviewing new research while others tool up.

something went awry'.[23] The imaginative drive that Alff examines in a Restoration period becomes increasingly traceable through the late eighteenth and nineteenth centuries, thanks in part to the growing accessibility of print publication for those championing successful and forestalled projects. Caroline Sumpter complicates the relationship between print culture and infrastructure in her contribution, by examining how journalism visualizes its own infrastructure. In her reading of a selection of newspapers, Sumpter provides a sharp account of how journalists arranged information in impactful and attention-steering ways, culminating in the imagined collapse of the industry by the end of the century as presented in the serially issued fictions, William Morris's 'News from Nowhere' (1890) and H. G. Wells's 'The War of the Worlds' (1897).

Substantial research from the Global South has shown particularly forcefully how access to infrastructure is bound up with inclusion as a citizen, with (a lack of) connection to a grid as a means of reinforcing the vulnerability of less privileged communities or a vector for biopolitical violence.[24] The question that Brenda Chalfin poses of urban development in recent Ghanaian history is one well worth bringing to nineteenth-century projects: 'might such infrastructure [...] provide the basis of political membership for persons excluded from formal state resources and recognition?'[25] Karin Koehler's article provides a counterpoint to this question by examining historical resistance in Wales to British state infrastructure as fictionalized in Amy Dillwyn's *The Rebecca Rioter* (1880). Koehler demonstrates how Dillwyn rejects the *Bildungsroman* mode (popular among London publishers) to produce an imaginatively innovative novel that voices Welsh perspectives in structure and content and speaks to the ways in which infrastructure could deepen geopolitical margins within the Four Nations. Alicia Barnes, meanwhile, traces an unsettling vulnerability for those championing railway infrastructure's imagined capacity to secure British state control across the Four Nations and the empire: what happens when the system breaks? In her article on George Chesney's 'The Battle of Dorking' (1871), Barnes explores this risk within a gathering culture of invasion anxiety that brought suburban railways in the English South-East and Surrey into particular focus. For all that English xenophobia drives

[23] Alff's title, the 'wreckage of intentions', might refer equally to the material outcome of many strident visions for exploring and reconfiguring the world in subsequent centuries. David Alff, *The Wreckage of Intentions: Projects in British Culture, 1660–1730* (Philadelphia: University of Pennsylvania Press, 2017), p. 167.

[24] See Malini Ranganathan, 'Paying for Pipes, Claiming Citizenship: Political Agency and Water Reforms at the Urban Periphery', *International Journal of Urban and Regional Research*, 38 (2014), 590–608; and Dennis Rodgers and Bruce O'Neill, 'Infrastructural Violence: Introduction to the Special Issue', *Ethnography*, 13 (2012), 401–12.

[25] Brenda Chalfin, '"Wastelandia": Infrastructure and the Commonwealth of Waste in Urban Ghana', *Ethnos*, 82 (2017), 648–71 (p. 648).

such fiction, Barnes reveals, those defending Dorking in Chesney's farce are most at risk of being trapped by their own system as the railway grinds to a halt.

Infrastructural functionality also relies on values often eschewed by nationalist bravado: practices of care, maintenance, and repair that position infrastructures as assemblages subject to constant making and remaking through collaboration and shared use. This live aspect of infrastructure-as-process offers opportunities for those seeking to change systems from within, provided that they have the time and expertise to understand the bigger picture. For example, Nikhil Anand's recent investigation into water supply networks in Mumbai demonstrates the key roles that utility workers play in determining access to urban water flows, even redirecting supply to exclude or include certain residents.[26] Infrastructural labourers can thereby claim the power to modify imposed social experiences and arrangements on a level disproportionate to their social and political status. But shifting dependencies between human and non-human components that together enlivened nineteenth-century infrastructure raised questions about the existential risks of such practice over time. Central to Laura Otis's book, *Networking*, which details human interface with nineteenth-century machines, is a rising anxiety 'about where "we" end and our networks begin' (p. 10). Such tension propels Charles Dickens's short story, 'The Signalman', which ambiguously presents a railway signal-box worker as both a liability to an otherwise rational system and as an automaton that channels that system's most violent capabilities.[27] Since the nineteenth century, infrastructural labour has been increasingly occluded at the point of public access, particularly where such labour threatens Western imperialist thought. Nineteenth-century infrastructure developed out of a vast range of expertise extending across and between national borders in ways often occluded by well-archived Anglocentric journalism from the Victorian period. In her investigation of electromagnetic field theory 'around the wire' as imagined towards the end of the century in Bram Stoker's *Dracula* (1897), our final contributor, Kameron Sanzo, questions the limits of infrastructural influence. Sanzo illustrates how imperialist ambitions to expand underwater telegraph networks forestalled when British companies eschewed Indigenous expertise and eco-literacy to aggressively harvest gutta-percha in the Indonesian archipelago. After less than a century, this vital insulating material for underwater cables was at risk of exhaustion and extinction. While transmitting

[26] Nikhil Anand, *Hydraulic City: Water and the Infrastructures of Citizenship in Mumbai* (Durham, NC: Duke University Press, 2017).

[27] See Charles Dickens, 'No. 1 Branch Line: The Signalman', in *Mugby Junction*, ed. by Robert Macfarlane (London: Hesperus, 2005), pp. 54–66; and Luke Thurston, 'Zigzag: *The Signalman*', in *Literary Ghosts from the Victorians to Modernism: The Haunting Interval* (Abingdon: Routledge, 2012), pp. 34–53 (p. 42).

information electrically may seem abstract, Sanzo asserts that there is a material cost to such processes that extends well beyond the apparatus of infrastructure.[28]

Ambitious, unwieldy, and potentially exhausting, nineteenth-century infrastructure leaves a complex legacy that resists definition or resolution. It oscillates somewhere between the thrill in human connection over space and time, and the weight of damage on a global scale encapsulated in the term *Anthropocene*. To research infrastructure is often to persist in asking questions, knowing too well that any answers will be entangled with interdependent concepts, institutions, and (inter)national ramifications. As Susan Zieger reminds us in her Afterword to this issue, gathering insights from across all six articles, 'we crave infrastructure', and there is much at stake in our insistence on keeping it within human scope.

[28] Hannah Ritchie and Max Roser have recently visualized global inequalities in carbon emissions, noting in many cases that countries with relatively low emissions are likely to be more greatly impacted by climate change than high-emitting counterparts. See Hannah Ritchie and Max Roser, 'CO_2 Emissions', *Our World in Data*, 2020 <https://ourworldindata.org/co2-emissions> [accessed 24 October 2023].