Mapping Manchester and its hidden hydraulic engineering

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AT THE BEGINNING of 2009, we designed a new public exhibition that sought to reveal some of the significant ways in which mapping is ingrained into urban life. It demonstrated how maps work and change over time in response to technology, society and economic imperatives, and highlighted visually striking maps of the city of Manchester.

The Mapping Manchester exhibition was on display in the historic reading room of the John Rylands Library on Deansgate, Manchester. It showcased the wealth of cartographic material held by the University of Manchester and other institutions in the city, with generous loans of material from Manchester City Library and Archives and Chetham's Library, including rarely seen maps and obscure plans.

We did not want the exhibition to be just a *treasures from the collection* or a boringly linear *here's the history of our town* or a boosterist celebration of *mapping progress from crude/artistic to sophisticated/scientific* or *art for art's sake*. These maps are more than just pretty pictures. They are powerful tools, instrumental in the making of the contemporary Manchester, and can be read as rich stories of urban life.

Over 80 different maps, plans, diagrams and photographs of the city — published over the last 250 years — were displayed. These ranged in date from an excerpt from the first large scale survey of the city published by William Green in 1794, to a 2008 statistical map of binge drinking hotspots across Manchester. A wide range of formats and themes were displayed, from network diagrams, building plans and strip maps, to three-dimensional bird's-eye views and digital animated mapping.

Stories covered in the exhibition include; the role of mapping in foretelling developments in the road network and public transport, Manchester as the industrial powerhouse and shock city, the social geography of housing through the changing geographies of Hulme, changing moralities in the mapping of disease and drinking and the pleasures of mapping — brought to life by material from one of the world's first theme parks, Belle Vue. And, of more direct relevance to the interests of readers of this journal, we also presented a range of maps and plans relating to the construction of hydraulic infrastructure.

Much of the intellectual challenge in producing the exhibition lay in deciding what to include and what to leave out, from a long list of interesting mapping material. Our rough and ready working criteria were that:

- Big ideas should be represented, telling important stories.
- Items should make a visual intellectual contribution; maps that matter.
- Maps should be unusual, depicting things not seen on A-Z/Google/Ordnance Survey maps.

Figure 1: The exhibition opening, 24 June 2009, in the stunning historic reading room of John Rylands Library. Photograph courtesy of Tinho daCruz.

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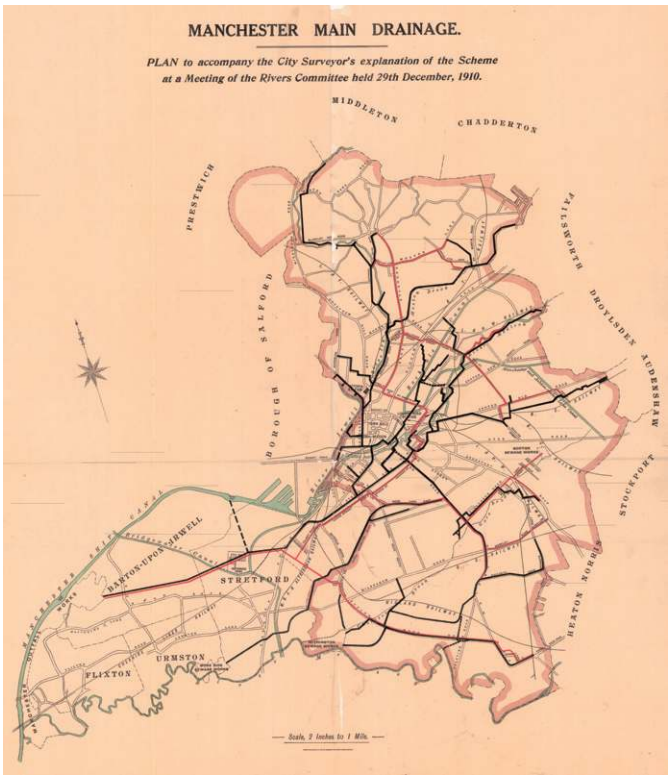
Figure 2: 1910 — General overview of major interceptor sewers in the early 20th century. Courtesy of Manchester Archives and Local Studies Library.



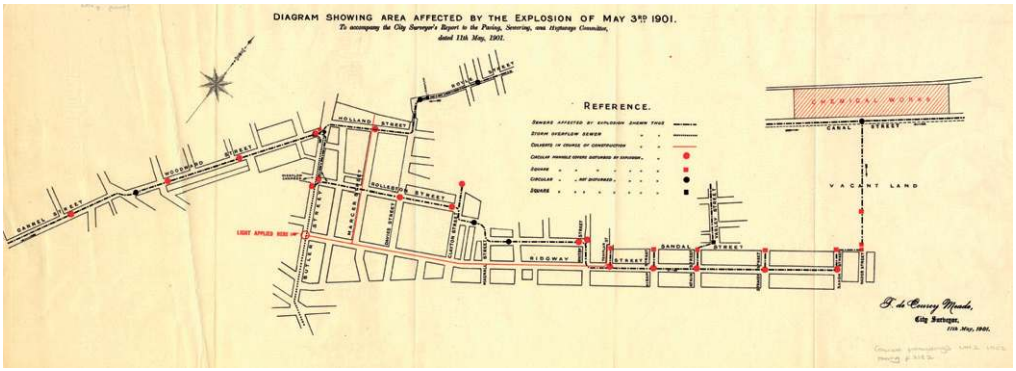


Figure 3: 1901 — Mapping the impact of a sewer explosion. The map is signed by the city surveyor.
Source: Manchester Council Proceeding, 1902, Volume 2, p. 2182. Courtesy of Manchester Archives and Local Studies Library.

- The graphic design should have a visual impact.
- We should include items with intricate details relating to interesting places.
- Some maps should look authentic (old, worn or hand annotated etc).
- Some should reveal 'hidden' geographies.
- Some should be quirky and fun.
- Some should depict schemes never built.
- The geographical extent of the exhibition should be defined by the M60 motorway, but also reflect flows into the city. For example, the Manchester Ship Canal and water supply schemes.
- Personal interests, obsessions and knowledge mattered.
- Practical consideration like sourcing, artefact size and format were important (could we get it and would it fit!).

Space for display was limited to 10 relatively small cabinets and a few vertical printed boards along with a few multimedia screen displays. The end result then was that small, historical and colourful won out over large, digital and monochrome.

The cartographic imagination of the hidden hydraulic city

The second half of the 19th century saw a burst of large-scale hydraulic engineering, which supplied vastly increased amounts of clean drinking water, controlled unruly rivers to eliminate flooding and safely removed sewage, making a vital contribution to the making of sanitary, healthy cities. These bold civic minded urban interventions led to the building of extensive infrastructures planned and engineered during Victorian and Edwardian Manchester, that are now taken for granted, but which remain essential for urban life. Planning maps, engineering plans and construction diagrams now provide a fascinating record of the hidden hydraulic remaking of Manchester.

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In its Victorian heyday, engineering for water was strikingly visible. The hydraulic network and its key nodes — like impressively large dams and extensive new reservoirs, pump houses and water towers — were established as iconic symbols of Victorian engineering progress, celebrated and visited. But over the period 1930-1960 they metaphorically, or literally, disappeared from view, buried underground, hidden as almost secret places in the urban fabric or, in the case of sewage farms, outside the cleansed city. Meanwhile newly visible infrastructures like urban motorway schemes and out of town shopping centres gained cultural power. Unruly river courses have now largely been culverted beneath the city streets. Unpleasant smells and dirt are safely kept away from the sanitized modern city. Mapping the building of these infrastructures was critical, but to date has been almost completely unresearched, perhaps because of the nature of mapping as a taken for granted practical tool.

Mapping Manchester's expanding sewage systems

In a short book from 1979, city engineer Geoffrey Read details how sewer construction in Manchester picked up and paralleled the rapid urban expansion of the city in the period from 1830 to 1860. Lower level underground construction took place and purpose-built sewers began to carry polluted water some distance to river outfalls, with sewers constructed under existing streets. The pressures of development and population growth encouraged engineering innovation and brick construction gradually came to be supplanted by manufactured moulded clay pipes, usually ovoid or egg shaped. This encouraged a better flow, but jointing was prone to failure.

The 1840s and 1850s were the period of most rapid growth of the system and a gradual rise in the amount of domestic sewage, along with increasing industrial waste, led to a progressive decline in the quality of Manchester's river water quality, in particular around outfalls. A partial solution to this problem was enacted with the construction of a series of 21 deeper and much larger interceptor sewers, designed to carry effluent to two huge outfall sewers that

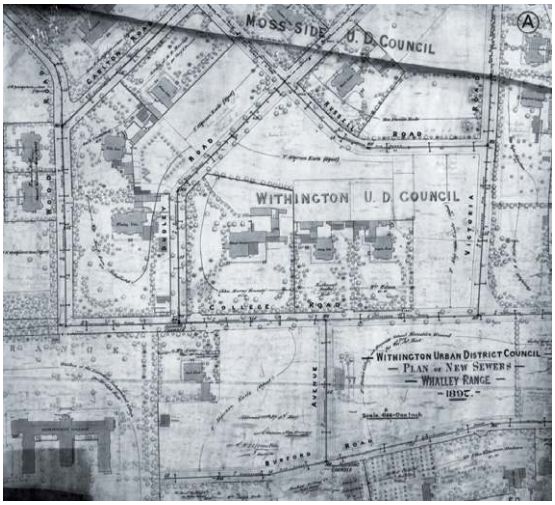


Figure 4: 1897 — Local sewers drawn onto an OS base map. Note, photographic copy of poor quality original artefact.
Courtesy of the Greater Manchester County Record Office.

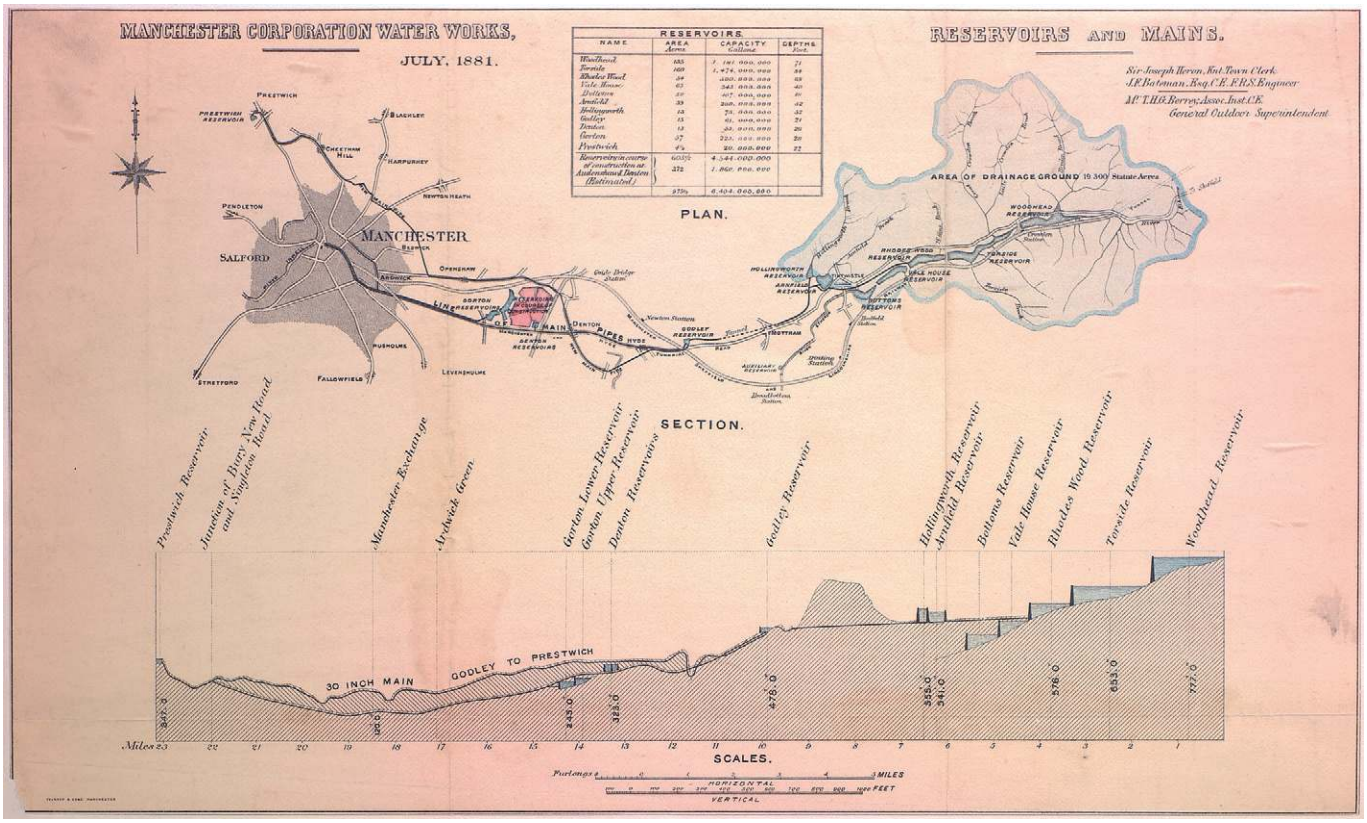


Figure 5: 1881 — The Longdendalewater supply system envisioned in map, section and tabular form. Courtesy of Manchester Archives and Local Studies Library.

led out of the city to a newly constructed sewage treatment works at Davyhulme, lying in open country next to the Ship Canal (itself another massive project of Victorian hydraulic engineering).

Davyhulme was constructed in 1894 and, with subsequent development, became one of the largest sewage treatment plants in Europe. Some 56km of these brick 4.5m diameter sewers were laid, and connections made between this and the local networks between 1903 and 1914. A final phase, from 1911 onwards, saw a second batch of 16 new interceptors constructed, work on which was in the main completed by the 1930s. The system requires frequent maintenance and lies unnoticed beneath Manchester's streets, apart from occasional explosions from the build up of sewer gases and fortunately infrequent sewer collapses of the older parts of the network.

The majority of surviving sewer plans, now held on photographic negatives by the Greater Manchester County Record Office, are simple but high quality monochrome documents, usually charting the line of an individual sewer and a sectional view, but also sometimes recording the name of the draughtsman, surveyor and contractor, reflecting a strong degree of professional pride in the quality of the drawings. From these plans it is possible to identify the type of sewer, its construction details, and the date of installation. They sometimes show additional information like street or building layout, or the relation of the sewer to other adjacent underground utility information. In addition to the individual detailed sewer plans there are overview maps of the local sewer network, usually overlain onto

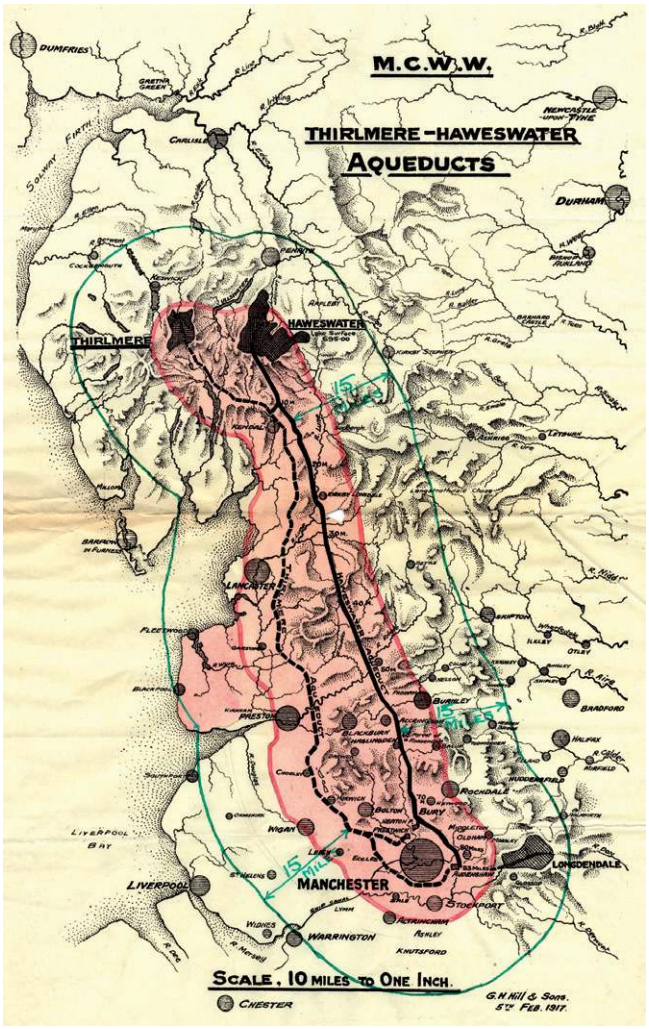


Figure 6: 1917 — Mapping the aqueduct routes from the massive Lake District reservoirs to Manchester. The sheer scale of the hydraulic engineering represented is impressive. Courtesy of Manchester Archives and Local Studies Library.

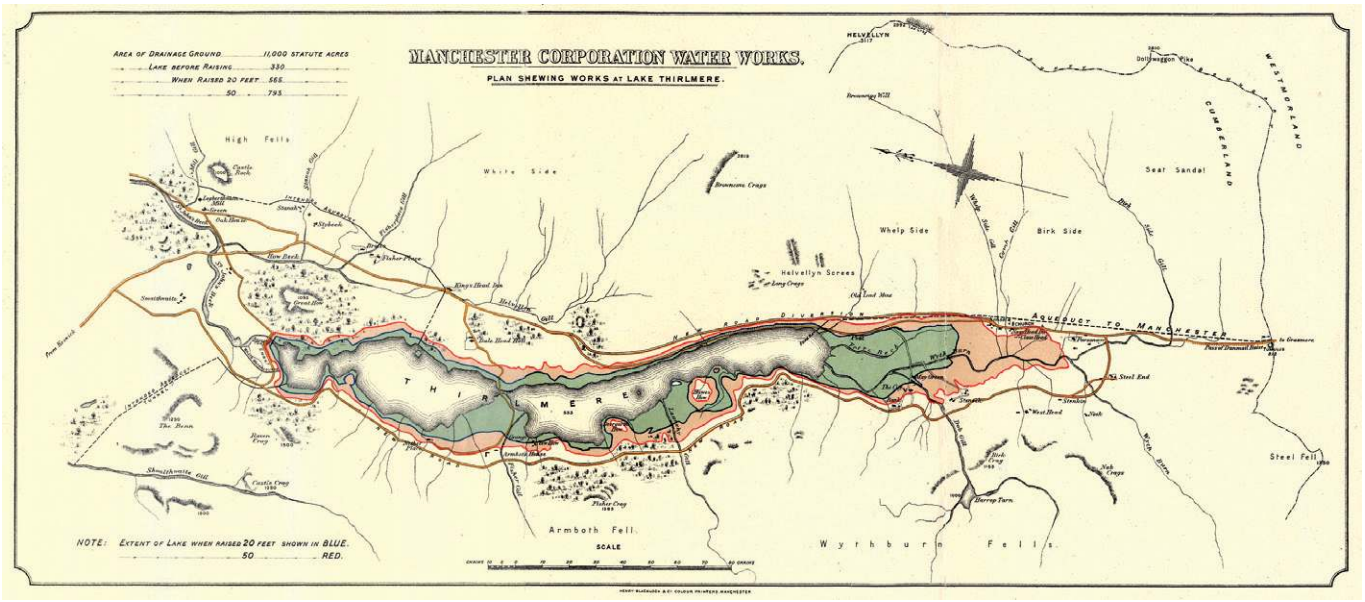
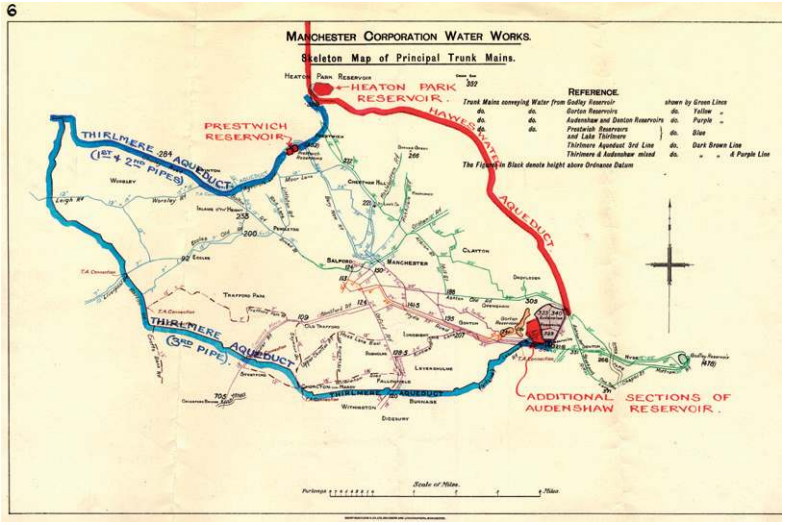


Figure 7: Changing Thirlmere from a lake to a controlled reservoir.
Source: Insert map included in Harwood, JJ 1895 The History and Description of the Thirlmere Water Scheme. Courtesy of John Rylands University Library.

an existing Ordnance Survey base (Figure 4). Smaller scale sewer maps also exist. For example, charting the location and interrelations of the larger main drainage system instigated in the programme of interceptor sewer construction in the early twentieth century and produced as a promotional display to persuade the local authority to invest in the scheme.

Delivering drinking water

The second focus for hydraulic engineering in the city lay with the drinking water supply. In the early years of industrial expansion there was only a limited engineering intervention to provide clean water to the city. Until the middle of the 19th century, Manchester relied upon local sources, from wells, rainwater collection systems or the nearest stream. However, dramatic environmental degeneration in the 19th century rapidly increased the amount of domestic effluent and industrial pollution in this runoff and consequently the quality of river water declined to such an extent that by the 1830s de Toqueville commented on "*Manchester's fetid muddy waters, stained with a thousand colours*" and likened the whole city to a cesspool. In the first half of the 19th century, the private Manchester and Salford Waterworks Company conspicuously failed to improve this situation



throughout its 35 year existence, with demand for water frequently outstripping their unreliable supply system. Even by 1846, piping only provided sporadic clean water to around a quarter of households.

Not until 1847 when a bill authorised local control of the company under public ownership did a realistic mechanism for improving the situation become possible. This saw the municipal corporation boldly reaching out well beyond its civic boundaries into the upland hinterland of the Peak District and enacting engineer John Frederic Latrobe Bateman's ambitious schemes for reservoirs in the Longdendale valley that would be connected to the city by an underground 18 mile long aqueduct and a series of service reservoirs. The first Pennine water reached the city in 1851 flowing under gravity. The scheme grew in steps to become a impressive chain of seven reservoirs covering about 500 acres, completed by 1871, that still supplies water, working much as it was initially designed.

As the reservoirs in Longdendale were being planned and built, so demand for domestic water increased. More homes were connected to a piped supply and it was becoming clear that sources in the Peak District would soon be inadequate. Thirlmere in the Lake District was proposed as a second and even longer distance addition, in the face of considerable opposition from a nascent conservation movement. The act authorising the scheme was passed in 1879, and the project to dam the lake, raise its level and construct an ambitious 96 mile aqueduct to the city was completed by 1894. Subsequent schemes in the Lake District saw Haweswater dammed, raising its water levels significantly, and the construction of a separate aqueduct south to the city. Subsequently, connections to other sources in Cumbria have augmented this supply.

Mapping was also critical for these projects. The laying of water pipes across the city involved less excavation than sewer construction, and detailed plan records of the historical installation of this network do not seem to have survived. Coloured overview maps at a

Figure 8: Mapping the addition of a major ring main around the city to distribute water from Lake District.
Courtesy of Manchester Archives and Local Studies Library.

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smaller scale chart the changing distribution of water across the city and map the re-scaling of supply from Longdendale and the various Lake District schemes.

Numerous parliamentary proposals also chart the detail of these schemes in proposal form, focusing in particular on the effects on road routes, details of land ownership and needs for compulsory purchase. The format of these proposal plans, in large folios, on heavy paper, with a very particular aesthetic of graphics and copious amounts of white space speaks to the need for a clear display, but also suggests how serious and significant were the schemes being proposed for parliamentary approval.

Ongoing research

You can find out more about the exhibition (it closes 28 March 2010) and our ongoing research at www.mappingmanchester.org

We are continuing beyond the temporary exhibition, seeking out more maps and plans with the aim of producing a comprehensive, large-format book. And we'd welcome your comments and suggestions. If you have any interesting maps and plans relating to the design and construction of civil infrastructures in Manchester – especially if they are iconic engineering projects and are visually intriguing, please do get in contact. We are sure there are many more maps of Manchester that need to be unearthed.

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www.mappingmanchester.org

Further reading

Copies of the following books relevant to this article are available in local studies in Manchester Central Library.

Ashworth G, 1987, *Lost Rivers of Manchester*, Willow Publishing: Altrincham
Bateman JF, 1884, *History and Description of the Manchester Waterworks*, TJ Day: Manchester
City of Manchester Waterworks Committee, 1974, Water for the Millions: Manchester Corporation Waterworks 1847-1974
Manchester City Council: Manchester
Harwood JJ, 1895, *The History and Description of the Thirlmere Water Scheme*, Blacklock: Manchester
Hoyle N and Sankey K, 1994, *Thirlmere Water: A Hundred Miles, A Hundred Years*, Centwrite: Bury
John S and Guest P, 1986, 'Mapping Manchester's Sewers: The Engineering Archives Project', *Manchester Region Local History Review 2(2)*: 33-37
Platt HL, 2005, *Shock Cities: the Environmental Transformation and Reform of Manchester and Chicago*. University of Chicago Press: Chicago
Quayle T, 2006, *Manchester's Water: The Reservoirs in the Hill*, Tempus Publishing: Stroud
Read GF, 1979, *Manchester's Main Drainage System Past and Present*, City of Manchester Highways Committee: Manchester
Read GF and Vickeridge I, 1997, *Sewers: Rehabilitation and New Construction*, Arnold: London.
Ritvo H, 2009, *The Dawn of Green: Manchester, Thirlmere and Modern Environmentalism*, University of Chicago Press: Chicago

Figure 9: Original parliamentary plan detailing the extent of the proposed Torside reservoir.
Courtesy of United Utilities, Longdendale Bottoms office. Photographic capture by Ben Lycett.