The Worst Town in England? Lincoln, Sewerage and the Government Inspectors

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Introduction

In 1870, Arnold Taylor, an inspector in the Local Government Act Office (hereafter LGAO), conducted an inquiry in Lincoln to investigate the sanitary condition of the town under the Sanitary Act of 1866 (29 & 30 Victoria c90).[1] His report concluded that 'there is not a town in England which offers a more flagrant instance of the dereliction of this duty [to provide sewers and sewage treatment] than the city of Lincoln.'[2]

But was it true? Was Lincoln really the worst in England? Was the Corporation derelict in its duty?

Four years after Taylor's inquiry, Lincoln was inspected again. Lieutenant Colonel James Ponsonby Cox, RE, reported to the Local Government Board (LGAO's successor) that Lincoln was still in default of its duties under the Sanitary Act. Was this a fair conclusion? Had anything significantly changed since the earlier inquiry?

A comprehensive sewerage and sewage treatment system was not rushed into at Lincoln. It was discussed and planned at various times from 1849 until 1876, when work started. There were numerous arguments between pro- and anti-sanitarians, covered extensively in the local newspapers as well as in the Corporation's official records. Additionally, the Clerk to the Lincoln Local Board (and later Urban Sanitary Authority), H. K. Hebb, left huge amounts of draft material and correspondence, which forms part of the Hebb's Papers at Lincolnshire Archives and reveals much of the process.

To answer the wider questions, the national context is essential. Sanitation as an issue arose in the 1840s, but rapid technological change in sewerage and sewage disposal meant that towns were faced with having to re-invest after a relatively short period, often in an untried scheme. Comparisons with other towns were an important part of the argument presented, especially by the Lincoln Local Board, during both inquiries. The actions and policy of the Local Government Act Office and Local Government Board are also considered.

Hindsight is clearly an issue. In terms of the development of sanitation it is easy to 'tie ourselves to a belief in the obviousness and inescapability of the Chadwickian program' as Hamlin puts it in his 'Muddling in Bumbledom' article.[3] He argues it is essential to look inside the 'black box' of local government to understand precisely how and why decisions were made (or not made) rather than making presumptions based on the idea of inevitable sanitary progress. A careful examination of the contemporary evidence is needed to present what the situation looked like in Lincoln and how this fits into the national picture.

It would be easy to take the Taylor report on Lincoln at face value. Indeed, most historians have.[4] A look inside Lincoln's 'black box' starts to put one town's sanitary history into proper regional and national context.

National background

Public Health Legislation

What became known as 'the sanitary question' was instigated by the first British cholera epidemic of 1831 to 1832 which led to around 32,000 deaths. During the 1840s the surveys and reports by Edwin Chadwick (1842) and the Health of Towns Commission (1844-1845) led directly to the first Public Health Act in 1848 (11 & 12 Victoria c63). This permissive Act enabled the setting up of Local Boards of Health with powers to carry out (amongst other things) new sewerage and drainage works. There were concerns that the General Board of Health which was to oversee the new Local Boards was determined to centralize power. There were certainly expressions of relief that the Local Government Act 1858 (21 & 22 Victoria c98) made the creation of health authorities voluntary. The General Board of Health's functions were to be undertaken by the Local Government Act Office (under Tom Taylor) and the Medical Department of the Privy Council (under Sir John Simon). The Local Government Act Office had few staff but quickly developed a huge workload, with 568 adoptions of the Local Government Act in the first ten years.[5]

The Sanitary Act 1866 (29 & 30 Victoria c90) was the first public health Act which created compulsory duties. Under clause 49, the LGAO had the power to declare a Local Board of Health in 'default' of its obligations under the Local Government Act 1858, and the Secretary of State could make an 'order' requiring action within a set time, or for someone else to carry out the necessary action at the expense of the local authority. Many towns, however, were required to act as a result of private injunctions rather than national legislation, greatly increasing the number which were compelled to undertake sewerage or sewage treatment works under legal necessity.[6]

In 1871 the LGAO and the Medical Department of the Privy Council merged with the Poor Law Board to form the Local Government Board (hereafter LGB). The new Board seemed to be trying to keep its authority

by avoiding becoming involved in the arguments over rapidly-changing technical solutions to the sanitation question (especially sewage disposal) and reduced the use of clause 49 to coerce towns.

In terms of legislation, the Public Health Act 1872 (35 & 36 Victoria c79) turned town Local Boards into Urban Sanitary Authorities (hereafter USAs) and made the appointment of local Medical Officers of Health obligatory. The Public Health Act 1875 (38 & 39 Victoria c55) consolidated all the legislation since 1848, retaining the powers of the 1866 Sanitary Act clause 49, but giving the LGB the option of appointing someone to carry out the work or using a *mandamus* to enforce action by the sanitary authority.[7]

Sewage Disposal

Chadwick's initial view was that river pollution caused by sewage was 'of almost inappreciable magnitude' compared with the health problems occasioned by the lack of sewers in heavily populated areas. By 1845, Chadwick became convinced of the efficacy of irrigation methods for not only treating raw sewage, but also making it a valuable commodity through the increased crops grown at the sewage farms and its availability as a manure. Unfortunately the value of this manure was vastly over estimated and in 1841 competition also started, with imports of cheap South American guano for use as fertiliser proving very popular with British farmers from the mid 1840s to the early 1860s.[8]

Irrigation worked quite well where there was enough land: around an acre per hundred of population; but in most towns and cities sewage farms rapidly became over-saturated, smelly and ineffective. The raw sewage often included industrial waste from tanneries, glue-making and cloth factories, making its value for agricultural use even more doubtful. In 1857, the *Royal Commission on the Sewage of Towns* concluded that low doses of sewage on agricultural land would not increase productivity enough to cover capital outlay, and that high doses were inappropriate for most plants.[9]

With irrigation not being the milch cow expected, and requiring a large amount of land, other types of sewage treatment were proposed. Between 1856 and 1876, some 400 processes were patented for disposing of sewage, with thirty-two in 1874 alone. Some favoured precipitation, using a mixture of chemicals in settling tanks to separate sewage sludge from 'inoffensive' effluent. Others favoured dry systems, which retained earth-closets and pail collections. These were particularly popular in manufacturing towns, possibly because of water shortages.[10]

The threat of action over the pollution of rivers by sewage, whether under legislation or via private injunction also became a factor from the 1860s, with sewage farms used to process town waste and try to avoid litigation rather than make a profit.[11]

The Society of Arts ran annual conferences from 1876 to 1880 on 'The Health and Sewage of Towns' which were intended to concentrate on the experiences of towns of particular methods of sewage treatment rather than get embroiled in scientific debate, or listen to companies advertising their systems.[12]

Lincoln background

The industrial revolution came late to Lincoln (the first railway arrived in 1846) and it changed enormously from the 1840s to the 1870s. There was an increase in population of 168 percent between 1841 and 1881 from 13,896 to 37,313, with the largest increase (39.4 percent) between 1871 and 1881.[13]

There were also considerable changes in the occupational structure of Lincoln, especially with the development of the agricultural machinery industry. Clayton and Shuttleworth started in 1842 with twelve men, which had risen to six hundred men and boys by 1854, nine hundred by 1861 and twelve hundred men by 1870. Iron foundries were also set up in Lincoln by Robert Robey, William Foster and Michael Penistan, but the most successful was Joseph Ruston who had a firm employing seven hundred by 1870.[14]

Lincoln was governed by a Corporation, which was medieval in origin and by the nineteenth century had considerable amounts of land so that no regular borough rate was deemed necessary. Following the Municipal Corporations Act 1835, there were eighteen councillors (in three wards) and six aldermen. The Conservatives were in power from the late 1840s (although 1859-61 was very finely balanced) until the elections of November 1866. From then on the Liberals gained ascendancy, with the Conservatives down to one alderman in 1872 to 1874 and no representative at all in 1874 to 1875. Apart from during the 1865 to 1867 phase of the sewerage history, party politics played little part, with pro- and anti-sanitarians on both sides. With the disappearance of the Conservatives from the Corporation, Liberals broke into their own factions.[15]

Lincoln's sewerage history

Over the period 1849 to 1876, the Lincoln Corporation (later sitting as a Local Board then Urban Sanitary Authority) considered sewerage and sewage disposal schemes in five main phases: 1849 to 1850, 1858 to 1859, 1865 to 1867, 1870 to 1871 and 1871 to 1876.[16]

In the first phase in January 1849, the sanitary purposes committee of the Corporation was authorized 'to obtain a plan for the sewerage or sub-drainage of the city and of the probable expense thereof'.[17] A major reason for this was that the Lincoln average death rate for the last seven years had been found to be twenty-four in the thousand, which meant that the Public Health Act 1848 could be applied by the General Board of Health, regardless of local opinion.

George Giles, civil engineer, in Lincoln to build the railway, was employed and reported in September 1849 on the state of drainage in Lincoln. He found there was no system of underground drainage in the city, at best covered channels into the river Witham; that house drainage consisted of sending waste water into open channels in the street and that privies and water-closets emptied into cesspools. Giles proposed separating house and surface drainage and replacing privies with water-closets. All the drainage was to flow into the Witham at Stamp End lock (to the east of the town), but should be treated first. He put forward various ideas: applying liquid sewage to land; reservoirs for filtration; and William Higgs' chemical precipitate method, which he recommended. The cost was estimated at £29,388.[18]

After considerable discussion, including rowdy public meetings, the Corporation were unable to raise a favourable petition from at least ten percent of the rated inhabitants. The General Board of Health declined to force the issue and the Act could not be adopted.

Concern with the state of health of Lincoln in 1858 led to a series of meetings with a view to adopting the 1858 Local Government Act and setting up a Local Board. Fierce local opposition, and a change of regime after the municipal elections in November 1858, meant that the Act was rejected in February 1859.[19]

In the third phase, the situation in 1865 was a party political one, with the Conservatives taking power in the November elections and forcing a vote in January 1866 to adopt the 1858 Local Government Act. The Lincoln Local Board was set up in April 1866 and quickly went about preparing instructions for engineers tendering for the drainage and sewage disposal work. These were confirmed in August 1866, with a closing date for plans of 31 December.[20]

Three such schemes were received: from M. O. Tarbotton (engineer, surveyor to Nottingham Corporation); John Lawson (engineer) and Michael Drury (local surveyor). They ranged in cost from £15,400 (Drury) to £26,960 (Tarbotton) and £50,000 (Lawson).[21] The Local Board meeting to discuss the plans, held on 15 January 1867, was another lively one.[22]

> Great interest being felt in this matter, and parish and ward meetings having been held on the subject, the body of the hall was well filled with citizens, principally of the working class, nearly all of whom were evidently opposed to the drainage of the city, judging from the frequent expression of their approbation or dissent to what was said though checked by the Mayor.

The meeting was also highly political, the Liberals having gained a majority of councillors at the November 1866 elections. It was resolved not to go ahead with any of the schemes.[23]

Fig.1. W. J. Mantle, Lincoln schoolmaster and strong sanitarian about 1873, photograph © Royal Geographical Society (with the Institute of British Geographers).

The Taylor Inquiry

Background to Arnold Taylor's 1870 inquiry

By the beginning of the fourth phase the Liberals were the ruling party on the Corporation. The starting point can be seen as W. J. Mantle's evidence to the Second *Royal Sanitary Commission*, taken on 4 April 1870.[24] Mantle, a Lincoln schoolteacher, was chairman of the (recently created) sanitary committee of the Lincoln Union (Fig.1). Following problems with the sanitary condition of the Lincoln Workhouse, Mantle tried to get the guardians to complain more generally of the inaction of the Lincoln Local Board. Mantle also discussed the matter with the Local Government Act Office, but it was clear that they would only conduct an inquiry as a result of a direct complaint. In August 1870, Mantle sent in a memorial (petition) asking the LGAO to take action under the 1866 Sanitary Act against Lincoln Local Board. The memorial called attention to the state of the river Witham passing through central Lincoln:[25]

> For many years the said canal has been the receptacle of the greater portion of the sewage of the city …
>
> The water is confined by locks, and is stagnant during several months of the year: consequently the stench emitted during the summer and autumn is most offensive and dangerous to the health of the inhabitants generally and more particularly of those who reside near the canal.
>
> We, therefore, pray that the Home Secretary will compel the Local Board of this city to take immediate

> steps for purifying this canal, as we are fearful that a serious outbreak of disease will shortly occur.

The replies of the Lincoln Local Board to the complaints were considered inadequate and the Local Government Act Office arranged to hold an inquiry in Lincoln on 5 October 1870. The Local Board in the meantime sent out questionnaires to various towns about the methods of sewage disposal they used and there were negotiations with the Great Northern Railway Company over improving the flow of water into the river. At the Local Board meeting held on the eve of the inquiry, a petition was received signed by about 2560 inhabitants asking the Board to continue its opposition to underground sewerage.[26]

Arnold Taylor

Royston Lambert argues that much of the considerable pressure put on Local Boards by the LGAO came from one of their engineering inspectors, Arnold Taylor. He conducted thirty-nine of the first fifty inquiries under the 1866 Act and almost invariably declared local authorities 'guilty'. As Lambert puts it, if a Local Board 'delayed or dared to question the report and sentence, Arnold Taylor came into his own, sweeping aside protests and issuing threats (in language so strong that his brother sometimes had to tone it down); and the localities concerned frequently gave way'.[27]

Arnold Taylor's brother was Tom Taylor, the head of the LGAO (and also a playwright, editor of *Punch* and friend of Lewis Carroll). They came from Bishop Wearmouth (Sunderland) and their father was a brewer and alderman. Arnold Taylor had been appointed to his post at the LGAO in 1865 and had a legal background.[28]

Arnold Taylor's actions in Lincoln were not impartial. Taylor treated the 13 August 1870 memorial as a draft, pointing out that the state of the river was not the responsibility of the Local Board, although they did have a duty to keep sewage out of the river or purify it beforehand to stop it polluting the water. He advised Mantle directly to rewrite the memorial to meet the conditions of the Act, but also said that 'in memorials of this kind, it is always desirable that as much local support as possible should be firm in order that the hands of the central authority may be strengthened – hence the expediency of a fair number of good signatures.'[29]

Mantle duly provided another memorial, calling attention to the 'neglect of the Local Board of this city to provide proper drains and an outfall for the sewage of the city', saying that this was causing the pollution of the river and asking for an inquiry under the 1866 Sanitary Act.[30] This second memorial had twenty-one signatures of clergy (including the Dean and the Archdeacon of Lincoln), surgeons and solicitors with 'and forty-four others' written on it in red.

Fig.2. Alderman T. J. N. Brogden, leader of the anti-sanitarians in 1870, mayoral portrait from 1879 (photograph R. A. Davey, courtesy of Lincoln City Council).

There is also a note by Taylor on file dated September 1870 (one month before the inquiry) concerning the replies received from Lincoln Local Board saying:[31]

> from my own knowledge of Lincoln obtained at previous inquiries there I have reason to think that the sanitary condition of the place is generally defective ...

The 1870 Inquiry

Taylor did hear at the inquiry evidence concerning the lack of drainage in the town, cesspool contamination of wells, the incidence of fever and the effect of sewage outflow into the Witham above Stamp End lock.[32] Joseph Shuttleworth, of Clayton and Shuttleworth, one of the town's largest employers, gave evidence that the river water in the Witham by their works (opposite the lock) was too bad to be used for 'engine or manufacturing purposes' and their employees were sick from the stench. Taylor also visited Stamp End lock and Brayford Pool to smell the water for himself. He saw (and smelt) what he expected and reported accordingly.[33]

> The most extraordinary views appear to prevail amongst some of the members of the Local Board, as well as amongst these 2,560 inhabitants ... on the subject of underground drainage. They speak of it as if it were a new invention, and raise difficulties about the ventilation and flushing of sewers, as if ample provision in these respects did not form an essential part of every well-considered plan of town sewerage. I make the statement with regret, but there is no

> doubt, that at the time of the inquiry, now under report, the majority of the Local Board were not only opposed to the adoption of any system of main sewerage, but were decided against the proper performance of the duties thrown upon them, by the Sewage and Sanitary Acts with regard to the prevention of river pollution by the discharge of town sewage.

Taylor was certainly using a broad brush. In response to the (accepted) memorial of August 1870, the Lincoln Local Board had sent back a robust reply to the LGAO that 'the city of Lincoln is in a perfectly healthy state and that the offensive smell arising from the river has been mainly caused by the exceptionally dry season of the present year' and that they would set up a committee. But this resolution had only been agreed by twelve of the Local Board of twenty-four: three hardy souls had abstained and nine had simply absented themselves. (Many of the main resolutions in Lincoln's sewerage history had been decided as a result of people failing to turn up on the day.) It is clear from the *Lincolnshire Chronicle* that opposition to the Taylor inquiry had been orchestrated by Councillors W. B. Maltby, Shepherd and Cooling and Alderman Brogden (Figs 2 and 3), who organised the counter memorial and public meeting and then argued against sanitation at the Town Council and Local Board.[34]

But one of the most interesting aspects of Taylor's report is what he omits. He castigates those citizens and Local Board members who are deemed anti-sanitarians, because they raise issues concerning the safety of sewers, and yet fails to mention the ongoing technical debate about sewage disposal, the most important issue of the day, although it must have been impossible to miss in the newspapers and learned journals.

The situation in 1870 was highly charged, with the *Surrey Comet* commenting that 'the present state of indecision which prevails in regard to the question how best to dispose of the sewage of large towns, becomes day by day more apparent'.[35] It then went on to describe the evidence to the House of Commons committee in March 1870 concerning the relative merits of irrigation and chemical precipitation methods.

The *Surrey Comet* article and extract of evidence were sent out by the Native Guano Company, a firm advocating their own precipitation method: 'the ABC process for utilizing sewage'. Nevertheless, witnesses against treatment of sewage by irrigation to the House of Commons committee included Dr Henry Letheby, Medical Officer of Health for London and Professor of Chemistry at the London Hospital, and Thomas Hawksley, the famous civil engineer (who worked on the initial water supply to Lincoln). They both argued that irrigation was positively injurious to health.

There were many inquiries like that of the Commons committee. Organizations like the Institution of Civil Engineers also examined the question closely. They devoted extensive sections in their journal in the 1860s and 1870s to look at various methods of sewage treatment. Both the British Association for the Advancement of Science and the Social Science Congress had papers on the treatment of sewage at their annual meetings in 1870.[36]

They were aware of these issues in Lincoln. Hebb, the clerk to the Local Board, raised the issue at the inquiry, as did Councillor Cooling at the Local Board meeting following receipt of the letter from the LGAO. Indeed, the collection of information about what was going on was almost obsessive. Numerous questionnaires were sent to other towns, visits made by Local Board members to sewage treatment facilities and information collected on rival methods. Hebb wrote to eight local towns before the Taylor inquiry, and found that five put all their sewage in the river or estuary, and the other three used rudimentary settling tanks and sold the solid waste.[37]

In Nottingham, the discharge of its sewage into the Trent led, in 1868, to threats of legal action by local landowners. The Local Board worked with neighbouring parishes and established a Nottingham District Sewage Utilization Board, got a local Act passed in 1872 and set up a sewage irrigation scheme. The reply to Hebb's inquiry of September 1870 was that, under threat of legal proceedings, they were considering what to do.[38]

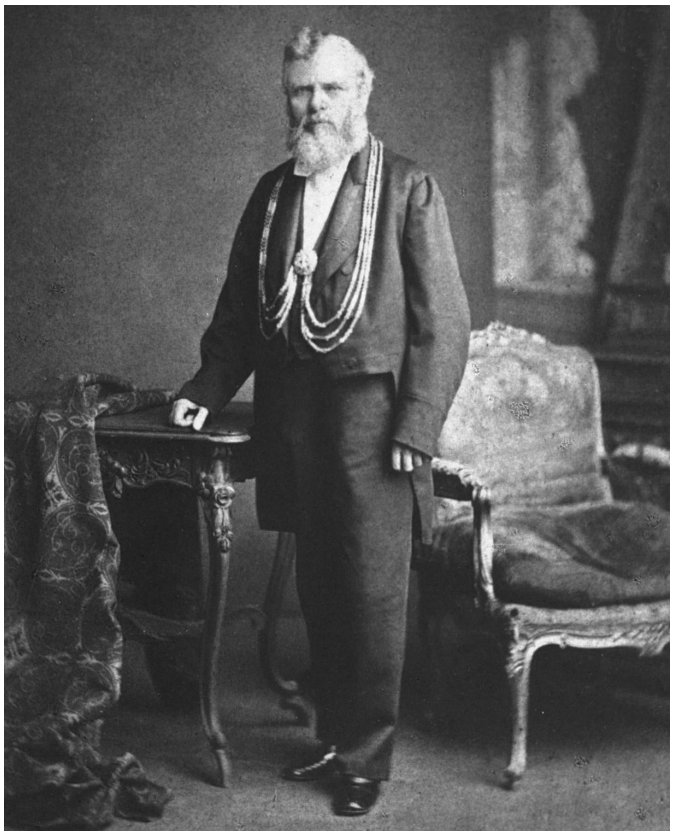

Fig.3. Alderman W. B. Maltby, anti-sanitarian, Mayor 1874-1875, mayoral portrait (photograph R. A. Davey, courtesy of Lincoln City Council).

In terms of sewage disposal, Taylor could have found the same situation as Lincoln virtually anywhere. During the summer of 1870, Northampton had a death rate of forty-two per thousand (the national average for that September being twenty-four per thousand). The Northampton Improvement Commissioners were in the courts in July arguing that they had failed to obey an injunction to treat their sewage because they did not know which method to use. Leeds and the surrounding townships, according to a chancery case in June 1870, turned the river Aire 'from a comparatively pure and wholesome stream into a open sewer, wholly unfit for the use of cattle or human beings…' In the very week of Taylor's inquiry, the Thames was having an average of 387,600 cubic metres of untreated sewage pumped into it daily, as reported in *The Times*.[39]

It is extraordinary that Taylor only remarks that 'they shrink from the outlay needed for a system of sewage disposal, which would convert what is now a nuisance and an offence into a valuable manure and purifier.' without reference to the strenuous national debate on the subject.[40]

Aftermath

Taylor's report reached Lincoln in January 1871, with a letter from the LGAO. The Local Board were given three months to decide upon their course of action, which they managed to extend to mid September by sending a deputation to the Home Secretary. The Local Board set up a special sewerage committee in June 1871. The committee's report was approved on 1 August, when it was resolved to retain the engineers Lawson and Mansergh to undertake the sewerage work and buy suitable land for sewage disposal.[41]

Lincoln 1871 to 1874

Work continued towards underground sewerage, with land purchased in 1871 and 1872 for a sewage farm and Lawson and Mansergh being paid on account for preparing plans in April 1872. The Local Board (now an Urban Sanitary Authority) finally received the plans and estimates from James Mansergh by 3 October 1873. The cost was estimated at £81,300 (excluding land and house connections) and the council was said to 'hesitate'. The issue seems to have been then simply shelved.[42]

The following towns were visited by the special sewerage committee between 1871 and 1874 to view their sewerage and sewage schemes: Tonbridge Wells, Eton, Romford, Bedford, Manchester, Hull, Ashton-under-Lyne and Birmingham. This last trip, to Birmingham in February 1874, appears to have been crucial. The printed report (including proposals) was passed at the USA meeting of 5 May 1874, but when the committee tried to recommend in July that the scheme should then go ahead, it was blocked. Opponents of the scheme of sewage treatment proposed (using lime precipitation in tanks) argued that the Local Government Board should be consulted on the best method of sewage treatment to use.[43]

By this stage the anti-sanitarians were led by William Cottingham, a chemist who had been on the Corporation since 1866. His main argument was with the lack of clarity over how to treat the sewage, saying: 'it was a strange thing that with all our men of science, our governmental officials, and our skilled engineers, that some satisfactory mode of dealing with the sewage of towns had not yet been devised.' He went on to say that 'Lincoln, too, was not in a position to act as a pioneer in this great and expensive experiment. Let the large towns which could much better afford it take the initiative.'[44]

Cottingham then listed the amounts spent on sewage treatment by Birmingham, Leicester, Nottingham, Derby, Leeds, Bradford and Salford all, in his view, yielding unsatisfactory results.[45]

Following this, the LGB became involved again, sending copies of petitions received in August and October (the latter organized by Mantle). The Corporation's response to the petitions revealed some shifting of attitude. The special sewerage committee's recommendation to combine the lime precipitation method proposed in May with 'intermittent downward filtration' was agreed in November 1874. At the same meeting, Alderman W. B. Maltby pushed through a resolution which said they should ask the LGB its intentions before committing money to the scheme. He did, however, admit that it was uncertainty about the success of particular methods of sewage disposal which had caused the delay. He declared that 'it was said that the government intended to take up the subject of sanitary reform next session, and if so no doubt some uniform scheme would be devised which Lincoln would adopt. He hoped the subject would thus be taken in hand, for the influence of government was needed.'[46]

This view did have some foundation. According to Bellamy, on the one hand, the LGB wanted to verify schemes suggested by districts rather than discuss the merits of any particular method. On the other hand, Robert Rawlinson, the chief engineering inspector, did produce sample plans for sewers and involved himself in the wider discussions of sewage treatment. The confusion over the efficacy of the various methods was acknowledged in May 1874 by Edmund Wodehouse, a general inspector of the Board, who admitted that 'having regard to the existing condition of sanitary science, to the different opinions entertained even by those best qualified to form a judgment on the subject … I do not think it is to be wondered at, that sanitary authorities should be of many minds upon the subject …'.[47]

The Cox Inquiry

The Local Government Board set up a further inquiry under section 49 of the Sanitary Act 1866, under the

direction of Lieutenant-Colonel James Ponsonby Cox, RE, on 22 December 1874.[48] Colonel Cox was a career soldier from the Royal Engineers, who had joined the LGB only months earlier. This was a very different background from Arnold Taylor.[49]

Ahead of the Cox inquiry, letters were sent to other towns asking about their sewerage system and sewage works (Fig.4). In 1873 Lincoln's death rate had been twenty-five per thousand and it was running at twenty-six per thousand for 1874.[50]

The situation in Birmingham by December 1874 was made clear in a comprehensive letter from the borough surveyor, William Till. The Corporation had been caught in a Chancery case since 1872, unable to continue with sewerage schemes already started. In terms of sewage treatment, the Corporation had leased 130 acres for an 'experimental irrigation farm' under the threat of further proceedings. It was then proposed by the public works committee that a two thousand acre sewage farm should be undertaken. This scheme being rejected, a smaller one, which involved intermittent downward filtration was proposed in a Bill, but rejected on its third reading in the House of Commons. Eventually the Corporation settled on clarifying the sewage with cream of lime.[51]

The letter from Leicester (which came in just after the inquiry) attached a printed notice of the sewerage and sewage works. They also used cream of lime to precipitate the sewage, and then settling tanks, with proposals to add a further filtering tank. The system had not fundamentally changed over the proceeding years, yet in 1868 they had been the site of a large experiment using the ABC process, so they were clearly searching for an alternative method at that stage.[52]

The 1874 Inquiry

The Cox inquiry covered very much the same ground as that of Taylor in 1870. The representative of the memorialists, Mr Toynbee, pointed out that[53]

> The same state of things existed now that did at Mr Arnold Taylor's enquiry four years ago, though every provision had been made by the sanitary authority for carrying out a system of drainage, but which they had failed to carry into effect, as soon as the pressure from the Local Government Board was taken off; and it was evident from the movements of the sanitary authority and the resolutions they had passed from time to time that they did not intend to

Town	Current Death Rate (per 1000)	Drainage Costs	Running Costs (pa)	Type of system	Notes
Bilston	23	£20,000	£1200	Sewers with filtration at outfall.	Water into Birmingham Canal.
Birmingham	26.6	£250,000 (approx)	£10,000	Suspension tanks and sewage farm.	Legal action since 1872.
Blackburn	23.6	£85,000	£850	Solid matter into tanks, liquid to land.	Litigation for 16 years.
Gainsborough	21½	£1800	–	–	1870 gives liquid into Trent, solid from privies sold.
Grantham	–	–	–	–	Presently awaiting LGB inquiry into current system.
Kingston-upon-Hull	25	£60,000	£2774	Gravitation sewers.	Sewage treatment not given (tidal river).
Leeds	'Reduced very little'	£55,000	–	–	Injunction against Corporation.
Leicester	25.5	£70,000	£1,400	Precipitation by cream of lime, then filtered.	System completed 20 years ago.
Newark	22	£3800	Do not understand question	Sewers into branch of Trent.	–

Fig.4. Questionnaire replies, December 1874.

> do anything unless they could get the government at their back, and thus shift the responsibility from their shoulders to those of the Local Government Board.

Mr Tweed, the town clerk, declared on behalf of the Corporation:[54]

> They were also ready to carry out any system which promised satisfactory results; and in doing so they, as representatives of ratepayers, were perfectly justified, and the inhabitants of Lincoln were of that opinion. The health of the city was not such as to make it necessary that a system of drainage should be carried out at once.
>
> All that could be done had been until a good plan had been matured and found to answer. He therefore begged for more time, as there was no disposition to evade the matter, but only to wait for further information, believing that it was for the best interests of the city that they should defer the matter. Other towns had carried out expensive systems, and then injunctions had been issued against them, and much money had been spent in litigation.

Colonel Cox also decided that the Urban Sanitary Authority was in default and the LGB issued a formal order on 8 March 1875, compelling commencement of sewerage works within four months.[55] This time, the report does not seem to have been sent to Lincoln, merely the decision.

Aftermath

The sanitary authority was by now split down the middle as to whether to go ahead with the scheme proposed by the special sewerage committee, or try to get further information from the LGB on how they should dispose of the sewage. There was also doubt expressed as to whether the order would be enforced. A deputation was sent to the LGB in late May to gain more information or more time: and the deadline was extended until 8 October. The special sewerage committee decided to stick to its proposals, which were put to the vote and lost again on 5 October.[56]

The LGB obtained a 'rule' at the High Court of Justice, Queen's Bench Division on 23 November 1875, threatening a writ of *mandamus* to enforce the order of 8 March 1875. Lincoln Corporation decided to instruct counsel to fight the *mandamus*, but on receipt of counsel's opinion in January 1876, realised that they had no option but to agree to go ahead with Mansergh's scheme of 1873. The Local Government Board were granted their *mandamus* ruling on 21 February 1876, but in reality it was already all over. Mansergh completed his plans by June 1876, the first contract for works (£63,605) was awarded in September 1876, and a loan of £84,000 agreed to by the LGB in January 1877. The work was completed in 1880.[57]

Conclusion

So was Lincoln the worst town in England in 1870? Was it in default of its duties as a sanitary authority in 1870 and 1874?

Taylor did say similar things about other towns. He said of Brentwood in August 1870 that the 'majority of the ratepayers, especially those of the smaller class, are opposed to all proper sanitary improvements'.[58]

He is also quoted as saying (albeit slightly later than Lincoln) about New Brompton (near Chatham) that 'he had never seen a town in such a disgraceful state'.[59] So this was common rhetoric for Taylor. As can be seen from the examples of Northampton, Leeds and London, given above, Lincoln was certainly not alone.

Had anything changed between the two inquiries? The situation over sewage disposal had become more, rather than less, confused and they were painfully aware of this in Lincoln. The special sewerage committee, after many visits to other towns, realised that a flexible proposal, which could be changed at little cost, was the only way of providing a solution to the main problem: Lincoln could not continue indefinitely without underground sewers or sewage treatment, but no scheme for the latter was an unqualified success.

The amount of information available added to the confusion. Council meetings were frequently reduced to speeches about new methods of sewage disposal or arguments over death rates. Even the *Lincoln, Rutland and Stamford Mercury,* formerly a strong advocate of sewerage, felt in August 1874 that sending a memorial to the LGB was of little use, saying that 'until some complete and satisfactory scheme of utilizing sewage is discovered, it seems idle to begin works that may ultimately prove unnecessary.'[60]

It was in 1886 that the eventual breakthrough of biological sewage treatment occurred (almost by accident) when William Dibdin's temporary solution to the problem of Thames pollution proved to be highly successful.[61]

The subject of 'default' was not as clear cut as the petitioners supposed. Bellamy points out that the LGB realised that a lack of provision or evidence of insanitary conditions were insufficient to declare a local authority in default. A tighter legal definition was established in the late 1870s, where the sanitary authority had to be shown to be culpable and wilful in that default.[62] This would have been difficult to prove in Lincoln.

A close look at the Taylor and Cox inquiries and their local and national contexts reveals the difficulty of decision-making at times of technological change. When the costs involved are far higher than any public works previously undertaken and the results uncertain, there is no wonder that fear of failure dominates decisions. The anti-sanitarians in Lincoln felt that this risk should be borne by the government, and to a certain extent this happened when the sanitary authority was compelled to go ahead with the scheme proposed.

Taylor's simple judgement on Lincoln has hidden the real story of those difficult years. All of us who benefit from Victorian infrastructure should, perhaps, give

those councillors, aldermen and officials the courtesy of considering exactly how it was achieved.

Notes

1. This article is based on research initially carried out for an MA dissertation: B. George, 'Lincoln Corporation and the Provision of Underground Sewers 1848-76' (University of Nottingham, MA dissertation, 2003). Thanks to Joy Wheeler of the Royal Geographical Society Picture Library for figure 1, the photograph of W. J. Mantle, and to Dennis Mills for figures 2 and 3, the photographs of T. J. N. Brogden and W. B. Maltby.
2. A. Taylor, *Report on an inquiry held at Lincoln, on a memorial from owners and ratepayers, complaining (under section 49 of the Sanitary Act, 1866) that the Town Council, who are the Local Board for the Borough, had made default in providing their district with proper main sewerage and sewage outfall* (Lincoln, 1871), p.15.
3. C. Hamlin, 'Muddling in Bumbledom: on the enormity of large sanitary improvements in four British towns, 1855-1885', *Victorian Studies*, 32, 1 (1988), p.59.
4. For example, the frequently quoted F. Hill, *Victorian Lincoln* (Cambridge, 1974), pp.168-69.
5. Cholera deaths: A. S. Wohl, *Endangered Lives: public health in Victorian Britain* (1983), p.118; a comprehensive study of the LGAO is found in R. Lambert, 'Central and local relations in mid-Victorian England: the Local Government Act Office, 1858-71', *Victorian Studies*, 6, 2 (1962), pp.121-50.
6. Four examples of this in are given in Hamlin, 'Muddling in Bumbledom', pp.60-61.
7. R. M. Gutchen, 'Local improvements and centralization in nineteenth century England', *Historical Journal*, 4, 1 (1961), p.95n. A writ of *mandamus* compels certain actions to take place.
8. See J. Sheail, 'Town wastes, agricultural sustainability and Victorian sewage', *Urban History*, 23, 2 (1996), pp.191-02; 203; 199.
9. C. Hamlin, 'Providence and putrefaction: Victorian sanitarians and the natural theology of health and disease', *Victorian Studies*, 28, 3 (1985), p.393; Sheail, 'Town wastes', pp.201-02.
10. For patents and processes see: Sheail, 'Town wastes', pp.206, 194-95; Wohl, *Endangered Lives*, pp.104, 95-101; Hamlin, 'Providence and putrefaction', p.394. A contemporary summary of sewage treatment can be found in a letter to *The Times* from J. Bailey Denton, who also makes the water shortage point. *The Times,* 27 September 1871, p.4, col.E.
11. Sheail, 'Town wastes', p.203. A letter in *The Times* in August 1875 points out that according to parliamentary returns made in 1873, only two out of twenty-five sewage farms which had been operating more than one year, had made a working profit. Letter from 'Midland Counties', *The Times*, 16 August 1875, p.10, col.B.
12. Hamlin, 'Providence and putrefaction', pp.396-97.
13. Taken from census enumerations.
14. See N. R. Wright, *Lincolnshire Towns and Industry 1700-1914* (Lincoln, 1982), p.143; Hill, *Victorian Lincoln*, pp.121-22.
15. Hill, *Victorian Lincoln*, pp.46-47; political affiliations taken from the *Lincoln, Rutland and Stamford* Mercury (hereafter *LR&SM*) 1846-1876. The terms 'Conservative' and 'Liberal' are used since these were the contemporary newspaper descriptions.
16. The initial phase 1849-50 has now been comprehensively covered by Dennis Mills in his recent publications: D. Mills, 'Sources and resources: public health, environment and surveying', *Social History of Medicine*, 22, 1 (2009), pp.153-63; 'Local studies in sanitary reform: the importance of the engineering aspect – Lincoln 1848-1850', *The Local Historian*, 39, 3 (2009), pp.207-17; and *Public Health, Sewers and Politics in Lincoln, 1848-50* (forthcoming).
17. Lincoln Corporation Minutes, 5 January 1849, Lincolnshire Archives (hereafter LA) L1/1/1/10.
18. G. Giles, *Report made to the Sanitary Committee of the Corporation of Lincoln on a general underground sewerage of the city and an estimate of the probable cost of effecting the same by Geo Giles, Esq to which is appended a report of the Sanitary Committee made thereon to the Council of the Corporation* (Lincoln, 1849), pp.16; 41-49; 50.
19. *LR&SM*, 4 February 1859, p.5, col.4.
20. Special committee (to frame instructions for engineers), Lincoln Local Board (hereafter Lincoln LB) committees' minutes, 16 August 1866, LA L1/1/11/1.
21. M. Drury: 'A paper upon town drainage', pp.6-7, LA Hebb's Papers (hereafter HP) Box 67; M. O. Tarbotton: 'Report to the Mayor, Aldermen and citizens ... of Lincoln on the sewerage and sewage utilization of the city', p.34, LA HP Box 65; Lawson: reported in *LR&SM*, 18 January 1867, p.6, cols 2-3.
22. *LR&SM*, 18 January 1867, p.6, col.2.
23. Lincoln LB meeting, 15 January 1867, reported in *LR&SM*, 18 January 1867*,* p.6, cols 2-3.
24. *Royal Sanitary Commission,* Second Report PP 1871 281-II (XXXV), pp.140-46.
25. Copy of petition dated 13 August 1870, 'Correspondence of General Board of Health and successors, Lincoln, 1849-71', The National Archives, MH13/112.
26. Letters from LGAO to Lincoln LB, 8 September 1870 and 10 September 1870, LA HP Box 1; questionnaires *circa* 13 September 1870, LA HP Box 1; Lincoln LB committees' minutes, 27 September 1870, LA L1/1/11/3; Lincoln LB meeting, 4 October 1870 reported in *LR&SM*, 7 October 1870, p.5, col.1.
27. Lambert, 'Central and local', pp.139-41.
28. Lambert, 'Central and local', p.128; information on father from Inner Temple Admissions website - www.innertemple.org.uk/archive/itad, accessed 3 February 2010. In 1851 Arnold Taylor was a secretary to a civil examiner, living in the Inner Temple and he argued at the Royal Sanitary Commission in 1869 that an engineering inspector could have legal qualifications. 1851 Census: HO 107/1527/280/6; on legal qualifications: quoted in C. Bellamy, *Administering Central-Local Relations, 1871-1919: the Local Government Board in its Fiscal and Cultural Context* (Manchester, 1988), p.116.
29. Draft reply by A. Taylor to W. J. Mantle, 15 August 1870, 'Correspondence'. The perceived importance of the status of signatories on memorials to central government may have distorted the evidence concerning support for sanitation by poorer ratepayers.
30. Memorial to LGAO dated 16 August 1870, 'Correspondence'.
31. Note on file by A. Taylor, 3 September 1870, 'Correspondence'. Taylor was in Lincoln in June 1866 and April 1870 conducting inquiries which did not cover sanitation issues directly.
32. Report of the inquiry in *LR&SM*, 7 October 1870*,* p.5, cols 1-2; Taylor, *Report*, pp.10-11.
33. Taylor, *Report*, pp.14-15.
34. Lincoln LB committees' minutes, 22 August 1870, LA L1/1/11/3; *Lincolnshire Chronicle* (hereafter *LC*), 7 October 1870, p.4, col.3. Brogden had been a pro-sanitarian until 1866.
35. *Surrey Comet*, 26 March 1870, off-print sent to Lincoln LB by the Native Guano Company, 27 April 1870, LA HP Box 69.

36. Examples of committees: *Royal Commission to inquire into the best mode of distributing sewage of towns* - three reports: PP 1857-8 2372 (XXXII); PP 1861 2882 (XXXIII); PP 1865 3472 (XXVII); *Royal Commission to inquire into the best means of preventing pollution of rivers*, Second Report, PP 1870 c181 (XL); Civil Engineers: *Minutes of the Proceedings of the Institution of Civil Engineers*, 24, 1864-1865, pp.257-525; 32, 2, 1870-1871, pp.371-420; 45, 3, 1874-1875, pp.130-224; 49, 3, 1876-1877, pp.175-220; BAAS Liverpool meeting reported in *The Times* 22 September 1870, p.10, col.A; Social Science Congress, Newcastle reported 27 September 1870, p.4, col.B.
37. Hebb: report of inquiry in *LC*, 7 October 1870, p.5, cols 3-4; Cooling: Lincoln LB meeting as committee 22 August 1870, reported in *LR&SM,* 26 August 1870, p.5, col.2; replies to letters from Boston, Derby, Gainsborough, Grantham, Great Grimsby, Horncastle, Newark and Nottingham. Grantham and Horncastle used settling tanks and Gainsborough sold the solid from privies. Letter sent on about 13 September 1870, LA HP Box 1.
38. R. A. Church, *Economic and Social Change in a Midland Town: Victorian Nottingham 1815-1900* (1966), pp.202-03; LA HP Box 1.
39. From reports in *The Times*, 2 November 1870, p.9, col.E; 5 October 1870, p.11, col.B; 22 July 1870, p.11, col.D; 10 June 1870, p.10, col.F.
40. Taylor, *Report*, p.15.
41. The local newspapers covered the report extensively, with the *LC* publishing it in full. *LC*, 3 February 1871, p.6, col.5 and p.7, col.1; extension of time: letter from T. Taylor, LGAO to H. K. Hebb, 24 July 1871, LA HP Box 1; Lincoln LB committees' minutes, 19 June 1871, LA L1/1/11/4; Lincoln LB minutes, 1 August 1871, LA L1/1/10/2.
42. Lincoln LB minutes, 7 November 1871 and 6 February 1872, LA L1/1/10/2; and Lincoln LB committees' minutes, 8 April 1872, LA L1/1/11/4; 'Draft affidavit of the Mayor of Lincoln [William Beard] in case of Local Government Board v Lincoln Corporation', 8 January 1876, p.11-12, LA HP Box 68.
43. Beard, 'Mayor's affidavit', p.8. Total expenditure on visits by the Local Board was said to be £200; Lincoln USA minutes, 5 May 1874 and 7 July 1874, LA L1/1/10/2-3.
44. Lincoln Corporation minutes 18 September 1866, LA L1/1/1/11; Lincoln USA meeting 7 July 1874, reported in *LR&SM*, 10 July 1874, p.5, col.2.
45. Cottingham himself favoured a dry-earth system. See printed copy of letter from *Lincoln Journal*, 15 December 1874, LA HP Box 66.
46. The October 1874 memorial which contained 206 names also complained about a 'flagrant dereliction of duty' on the part of the sanitary authority in not carrying out a scheme of drainage. Lincoln USA meeting 3 November 1874, reported in *LR&SM*, 6 November 1874, p.5, col.2. See also, B. George, 'Rediscovered: Lincoln's lost sewerage petition', *Lincolnshire Past and Present*, 81 (Autumn 2010), pp.14-19.
47. Bellamy, *Administering Central-Local Relations,* pp.124-25, 211-12.
48. Lincoln USA minutes, 1 December 1874, LA L1/1/10/3.
49. He had been put on the Royal Engineers' 'temporary reserve list' in September 1874. Bellamy also confirms there was an additional engineering inspector at the LGB from 1874. *London Gazette*, 18 September 1874, p.4430, Bellamy, *Administering Central-Local Relations*, p.210.
50. See LA HP Box 66 for replies, notes and death rates.
51. Letter from William Till to J. T. Tweed, Lincoln town clerk, 17 December 1874, LA HP Box 66; see also E. P. Hennock, *Fit and Proper Persons: Ideal and Reality in Nineteenth Century Urban Government* (1973), pp.107-11.
52. Letter from E. L. Stephens, CE, borough engineer, borough of Leicester, dated 26 December 1874, LA HP Box 66; See *The Times*, 4 August 1868, p.4, cols C-D.
53. Report in *LR&SM,* 25 December 1874, p.8, col.4.
54. *Ibid*.
55. Lincoln USA minutes, 6 April 1875, LA L1/1/10/3.
56. Lincoln USA meeting, 6 April 1875, reported in *LR&SM*, 9 April 1875, p.4, col.6; Lincoln USA minutes, 8 May 1875, LA L1/1/10/3; Lincoln USA committees' minutes, 22 May 1875 and 19 June 1875, LA L1/1/11/9; Lincoln USA minutes, 5 October 1875, LA L1/1/10/3.
57. Lincoln USA committees' minutes, 15 December 1875, LA L1/1/11/9; Lincoln USA minutes 4 January 1876 and 7 March 1876, LA L1/1/10/3; Lincoln USA committees' minutes, 1 June 1876, LA L1/1/11/10; Lincoln USA minutes, 11 September 1876, LA L1/1/10/3; letter from LGB to Lincoln USA 22 January 1877, LA HP Box 7.
58. Quoted in Gutchen, 'Local improvements', p.94n.
59. Quoted in *The Times*, 12 January 1872, p.11, col.F.
60. *LR&SM*, 14 August 1874, p.4, col.7.
61. C. Hamlin, 'William Dibdin and the idea of biological sewage treatment', *Technology and Culture*, 29, 2 (1988), pp.189-218. Three other similar systems were developed independently around the same time.
62. Bellamy, *Administering Central-Local Relations*, p.218. A defining case was that of Bolton Local Board 1877-1878.

Town	Current Death Rate (per 1000)	Drainage Costs	Running Costs (pa)	Type of system	Notes
Bilston	23	£20,000	£1200	Sewers with filtration at outfall.	Water into Birmingham canal.
Birmingham	26.6	£250,000 (approx)	£10,000	Suspension tanks and sewage farm.	Legal action since 1872.
Blackburn	23.6	£85,000	£850	Solid matter into tanks, liquid to land.	Litigation for 16 years.
Gainsborough	21½	£1800	-	-	1870 gives liquid into Trent, solid from privies sold.
Grantham	-	-	-	-	Presently awaiting LGB inquiry into current system.
Kingston-upon-Hull	25	£60,000	£2774	Gravitation sewers.	Sewage treatment not given (tidal river).
Leeds	'Reduced very little'	£55,000	-	-	Injunction against Corporation.
Leicester	25.5	£70,000	£1,400	Precipitation by cream of lime, then filtered.	System completed 20 years ago.
Newark	22	£3800	Do not understand question	Sewers into branch of Trent.	-