

**THREE LETTERS  
FROM  
THOS. TELFORD**

Salopian 7<sup>th</sup> April 1828.

Dear Sir

I have just received, and perused the Specification for Pipes, it seems very distinct, and comprehensive on expressions is rather open to criticism, but need not be mis understood. I allude to, "Every Pipe shall be cast Solid". Perhaps the word Solid might be left out.

I am truly glad that the Hill Back at the Reservoir, is turning more solid, it has been an arduous and expensive Operation but not to be avoided, perfect safety is absolutely necessary.

Mr. Renwick when here the other day seemed rather disappointed in not having heard from you about the Reservoir, I think you should write him stating your progress and present state.

There is at present no prospect of leaving Scotland so early as May.

Yours sincerely

Jho. Telford

To Mr. Darstone  
Civil Engineer

THREE LETTERS FROM  
THOS. TELFORD

WITH INTRODUCTION AND NOTES

BY

R. A. PAXTON

Civil Engineer

PRIVATELY PRINTED IN SCOTLAND AT THE

**Rathalpin Press**

FOR J. A. BIRKBECK, EDINBURGH

For permission to print these letters thanks are due to F. R. Dinnis, City Engineer and Master of Works, Edinburgh; the South-East of Scotland Water Board; and the Royal Scottish Museum. Thanks are also due to W. H. Makey, City Archivist, Edinburgh, for making available the minutes of the Edinburgh Joint Stock Water Company.

## Introduction

I CAME ACROSS these apparently unpublished letters written by Thomas Telford to the Edinburgh civil engineer James Jardine, whilst searching out historical material for an exhibition held recently in Edinburgh as part of the national celebrations to mark the sesquicentenary of the Institution of Civil Engineers, and considered them of sufficient interest to justify this publication.

Written during the period from September 1820 to January 1822 they relate principally to a £145,000 civil engineering scheme for the improvement of Edinburgh water supply. The works comprised the construction of Glencorse Reservoir in the Pentland Hills and a nine-mile cast iron aqueduct from Crawley Spring, Glencorse, via Liberton and passing through the Castle Hill from the Grassmarket to Princes Street and Queen Street. In 1826 *The Scotsman* considered these works "the most extensive, and we may add the most perfect and complete ever executed in modern times."

At the time of writing the first of these letters, in September 1820, Telford was 63 years of age and one of the leading civil engineers in Britain. Between 1820 and 1823 he was actively engaged on many projects besides the Edinburgh Waterworks. These included:— Drainage of the English Fens, the Harecastle Tunnel on the Trent and Mersey Canal, the Caledonian, Gloucester and Bude Canals, various harbour works, surveys for the Great North Road, the closing stages of the Highland Roads, and the Glasgow to Carlisle and Lanarkshire Roads. Throughout this period he was also devoting much time and effort to promoting the interests of the newly formed Institution of Civil Engineers of which he had just accepted the office of the first president.

When he received the first letter, Jardine had been practising as a civil engineer for about 14 years and was 43 years of age. For about a year he had been Engineer to the Edinburgh Joint

Stock Water Company, with the responsibility for the distribution and supply of water to the Edinburgh area, and also, for the construction of the Waterworks project to the design of Telford and his eminent colleague John Rennie. Telford was responsible for the scheme in close co-operation with Rennie, who appears to have been Engineer to the Landowners who were affected by the works.

In the late eighteenth and early nineteenth centuries with the rapid extension of Edinburgh New Town, demand for water increased at a much greater rate than the supply, and in 1810 the city experienced a severe water shortage. This situation induced the Lord Provost and Magistrates to employ Telford and Dr. T. C. Hope, Professor of Chemistry at Edinburgh University, to report on means for improving the supply. On Telford's recommendation, Jardine was employed by the Town Council to measure the flow of various springs and to determine their levels relative to storage tanks and reservoirs, and also to prepare sections of possible pipe lines from the springs. He duly completed this work and in 1811 both Telford and Hope produced comprehensive reports on the existing water distribution and supply system containing proposals for its improvement. The measures for increasing and improving the supply included a scheme for conducting water from Crawley Spring into the city. The objections of the mill proprietors and landowners using water from Glencorse Burn and the River North Esk to the reduced supply which would follow from the diversion of Crawley Spring was anticipated by Hope and Telford. They proposed the construction and site of Glencorse Compensation-Water Reservoir for the purpose of supplying as much water to the burn in the dry season as was abstracted from it by the diversion of the Spring.

These proposals were not put into effect, and three years later in December 1814 John Rennie was called in by the Town Council, and after examining the various reports and plans he too reported on means for increasing the supply of water. He appears to have been in agreement with Telford's proposals but recommended that the 12-inch or 10-inch diameter pipe for conducting the water from Crawley Spring should be increased to 16 inches diameter, and that it should also bring in the Black

Springs from the north, via a pipe line adjoining the proposed Glencorse Reservoir.

Even with Rennie's support the proposals were not acted upon, and as the years passed the water shortage became much more acute. As early as 1811, Telford had reported that Edinburgh was being supplied with only one quarter of the water which had been regarded as normal by Robert Mylne, Architect/Engineer, in his 1790 Report on London's water supply, and by 1818 the position had become so serious that a really determined effort was made to improve the situation with the support of leading Edinburgh citizens. In September of that year a plan of Telford and Rennie's proposals for the Crawley Aqueduct and Glencorse Reservoir was drawn up, probably by Jardine.<sup>1</sup> A reduced version of this plan was published and indicated the proposals referred to in an Act of Parliament obtained in July 1819. Under the provisions of this Act, the water interests of the Town Council were transferred to a newly created Edinburgh Joint Stock Water Company with authority to carry out the proposed works.

Jardine was appointed Engineer to the new Company at a salary of £500 per annum and work started almost at once. The letters and notes give an indication of some of the difficulties encountered during construction. The work was completed in 1823 and Edinburgh at last received a "plentiful supply of good wholesome water from the Crawley Spring". Much of the credit for the successful carrying through of the scheme appears due to Jardine particularly in handling the difficulties of the Reservoir excavation between Telford's visits in January and September 1821.<sup>2</sup>

The works as constructed varied a little from the 1818 plan. The Reservoir position was changed and Rennie's proposal to pipe the Black Springs water down the Glencorse valley was not adopted. It is to the credit of all three engineers that the works have required little maintenance and still form an important part of the present day water supply system to Edinburgh.

<sup>1</sup> The South East of Scotland Water Board have in their possession a plan signed by Jardine.

<sup>2</sup> The location of Telford and Rennie at various dates are given in the Appendix.

I

Lanark 15th. Sept. 1820

Dear Sir,

On my return here I have found yours. I am so completely entangled in making arrangements for setting the people to work in this quarter, that it is quite impossible for me to leave it without incurring blame. I am now working from 6 in the morning untill 10 at night, the first meeting of Trustees will be held tomorrow.

The moment I have satisfied this quarter I will proceed to Edinburgh, and be ready to attend you. In the mean time Mr. Rennies opinion and directions will enable you to proceed. And it is very improbable that my opinion will differ much from his.

I remain Yours very sincerely

Thos. Telford.

---

[REVERSE]

LANARK

SEP.  
B 16 A  
1820

Mr. Jardine  
Civil Engineer  
South Hanover Street  
Edinburgh



LETTER I — 15th September 1820

This letter was written from Lanark about a year after the commencement of construction on the Edinburgh Waterworks project.

*Paragraph 1*—Jardine appears to have asked Telford to visit Edinburgh, presumably in connection with the Waterworks. Telford's reply indicates the effort he was making to provide work necessary to offset widespread unemployment in Lanarkshire. Road making at this time required a very considerable, largely unskilled, labour force and the principal inhabitants of the County had been induced to apply for an Exchequer Loan to make roads and bridges. The loan was granted on condition that a local contribution of one third of the estimated cost was deposited with James Hope, Scottish Law Agent for the Commissioners of Highland Roads, as a prerequisite for advertising the contracts.

Under instructions from the Commissioners, Telford proceeded to Lanarkshire as a matter of urgency and prepared plans, specifications and estimates for two lengths of road. The longer, 41 miles in length from Cumbernauld in the north, via Airdrie and Lanark to Abington in the south. The shorter, 24 miles in length crossing the County from Briech Water in the east, via Allanton and Strathaven to Loudoun Hill in the west.

Seven months after this letter was written, the Commissioners reported that Telford had "seconded our intentions in the manner we had reason to expect of him, by hastening to Lanarkshire with proper assistants, and by not leaving the county until after Six Weeks of incessant labour his task was completed." The road lines had been marked out, the contract limits determined and everything prepared for an early start to the work except the local cost contribution, only a small part of which was forthcoming. The small scale of this contribution was very disappointing to Telford and the Commissioners and progress was slow. By April 1821, 8 miles only of the north/south route had been completed, another 10 miles were under contract including Cartland Craigs Bridge, and a sufficient contribution made to enable the contract for the  $4\frac{1}{2}$  mile section of road northwards from Cartland Craigs to Carluke to be advertised.

The prime object of immediate relief to the manufacturing community of Lanarkshire was, therefore, largely unrealised, although the roads were eventually completed by the autumn of 1823.

*Paragraph 2*—The matter requiring Rennie's opinions and directions was probably the collapse of the west bank of the hillside at the Glencorse Reservoir embankment site due to excavation for the cut-off trench. On September 18 Rennie reported that he had given Jardine directions to alter the line of the reservoir head a little, with the object of avoiding some re-excavation and including fallen earth from the west bank as part of the embankment. Rennie also referred to the fact that the "ditch or channel which is now cutting for a puddle gutter<sup>3</sup> has not as yet shewed any solid rock in its bottom to the whole extent of the valley."

The absence of solid rock in the excavation was beginning to concern the Engineers. It was considered essential for the stability of the embankment that its puddle wall core should extend down through the gravel and other alluvial matter and be founded on solid rock for the full width of the valley, and the deeper the trench required, the more difficult the excavation, with greater risk of further land slips.

On January 10, 1821, following an inspection of the works, Telford endorsed his agreement to Rennie's report, but due to further developments at the Reservoir site he made a further report himself. The excavation had by then reached a depth 25 feet below the level of the burn and there had been a further land slip. By driving piles in the bottom of the excavation an indication of solid matter 11 to 14 feet lower had been obtained. In fact the solid rock was to prove much deeper still and as the depth of excavation increased, fears were expressed that the whole scheme would have to be abandoned.

Jardine's address was actually 9 Hanover Street, Edinburgh, at the time all three letters were written.

<sup>3</sup> An impervious clay-core wall to be incorporated into the reservoir embankment. would be founded in this channel.

## II

Salopian 7th. April 1821.

Dear Sir,

I have just received, and perused the Specification for Pipes, it seems very distinct, and comprehensive. One expression is rather open to criticism, but need not be misunderstood. I allude to, "Every Pipe shall be cast Solid." Perhaps the word Solid might be left out.

I am truly glad that the Hill Rock at the Reservoir, is becoming more solid, it has been an arduous and expensive Operation but not to be avoided, perfect safety is absolutely necessary.

Mr. Rennie when here the other day seemed rather disappointed in not having heard from you about the Reservoir, I think you should write him stating your progress and present state.

There is at present no prospect of my being in Scotland so early as May.

I remain Yours sincerely  
Thos. Telford.

To Mr. Jardine  
Civil Engineer

---

*ENDORSED ON REVERSE:*

Thomas Telford Esqr  
London 7 April 1821

© 1968 The South-East of Scotland Water Board

LETTER II — 7th April 1821.

*Address*—Written from Telford's rooms at the Salopian Coffee House, Charing Cross, London.

*Paragraph 1*—The cast iron aqueduct pipes alone appear to have cost £40,000 to £50,000 and formed a substantial part of the whole scheme. The specification required the pipes to be cast vertically in 9 foot lengths with faucets<sup>4</sup> downwards, in various diameters from 15 to 20 inches. The specification appears to have been printed and the contract advertised some weeks before Telford's letter was written, as Jardine submitted estimates he had received for forming and supplying the pipes to the Water Company meeting held on the April 12, 1821. On the following day the Company accepted the offer made by William Jessop for the Butterley Iron Company of Derbyshire with the condition of a £10,000 surety.

In July, Jardine reported that the pipes did not appear to have been cast in all respects as required by the contract and directed by Mr. Rennie, and the Company accepted Jardine's recommendation to send an inspector to the iron foundry. The inspector found that the pipes were not being cast as specified and in September, the Company proposed to cancel Butterley's contract and agree to accept all pipes which had been delivered and proved as a condition for cancellation. However, Jessop visited Edinburgh and apparently satisfied Jardine and the Company, as pipes continued to be delivered to the site until July 1822.

Each pipe was proved by subjecting it to a pressure equal to that of a column of water from 300 to 800 feet high. The pipe was filled with water, and firmly plugged at each end with a connection through one plug to a forcing pump, by means of which the pressure was applied.

The method of jointing the pipes is also of interest. The spigot of one pipe was inserted into the socket of the pipe already laid, as far as it would go, and a piece of rope yarn driven into the socket to seal the joint. An iron hoop was then clasped round the joint and sealed with clay. Molten lead was poured into the joint through an opening in the hoop forming a ring of lead which was driven firmly into place by staving chisels.

*Paragraph 2*—Three months had passed since Telford's site

<sup>4</sup> Sockets.

report on the reservoir cut-off trench excavation and he was truly glad to learn that the rock was becoming more solid. It is clear that Telford considered a solid foundation absolutely necessary for the safety of the reservoir.

*Paragraph 3*—Rennie does not appear to have visited the works since the previous September when he reported fully to the Water Company both on the design of the works and progress at the reservoir site.

*Paragraph 4*—It appears likely that Jardine wished Telford to inspect the excavation at the reservoir. Certainly as the summer progressed and solid rock had still not been reached, Jardine appears to have requested the presence of his distant colleagues on several occasions. In the Water Company minutes for August 23, 1821, it was recorded that letters from Rennie and Telford had been received expressing their fears that they might not be able to be in Edinburgh for some time. Mr. Stuart, lawyer and Clerk to the Company was instructed to inform them of the urgent necessity of their being in Edinburgh together, "the work at the compensation Reservoir being nearly at a stop, until they appear," presumably to examine the cut-off trench excavation and draw up a specification for the reservoir embankment and ancillary works.

It was not until early September that Jardine was able to report to the Company that Telford had arrived and was anxious for Rennie to be present before preparing the specification for the Compensation Reservoir. However, Rennie was unable to travel to Scotland due to ill-health and on September 27 at a meeting of the Company, it was decided to request in writing his views to Telford's proposals. Rennie's views do not appear to have been obtained, as according to Smiles,<sup>5</sup> his last business letter was written on the September 28 and he died on October 4, aged 61. Smiles also refers to what was probably Rennie's last letter to Jardine (whom Smiles calls Jerdan) as being written a little before the September 28, which indicated that Rennie had been heavily engaged in making preparations for the Bills he was expecting to carry through Parliament in the forthcoming Session.

<sup>5</sup>See Bibliography.

### III

London 29th. Jany. 1822.

Dear Sir,

On the 14th. Decr. I wrote you from Cambridge, stating my anxiety to know what progress was made with the foundation of the Glencorse Burn Reservoir, but have not, as yet, received any acknowledgement of this letter's having reached you. I have therefore again to repeat the beforementioned request, it being a subject in which I cannot help taking a considerable interest.

Ansd. 11 Feby 1822

Since I last wrote I have received two letters from Alexr. Forbes expressing dissatisfaction at my award, in leaving any matter to the discretion of the Committee requiring a revision of that part of the decision, and demanding his Accounts and Papers.—Which are now in your possession; Now not being a great Lawyer, I beg you will learn of Mr. Stuart how far this man has any legal claim for Revision or Papers.

I hope you will have the goodness to reply to this, addressed to the Post Office Bangor City North Wales

I remain Dear Sir Yours very sincerely

Thos. Telford.

[REVERSE]

FEB  
B 2 M  
1822

  
FREE  
30 JA 30  
1822

London Thirtieth Janry 1822 [*underneath postmark*]

Mr. Jardine  
Civil Engineer  
Hanover Street

Fr J. Rickman  
Edinburgh

*Crown copyright 1933/84*

LETTER III — 29th January 1822

This letter was probably written from 24 Abingdon Street, Westminster, the address to which Telford had moved from his rooms at the Salopian Coffee House.

*Paragraph 1*—On November 5, 1821, Telford was at last able to report that a solid foundation had been reached in the cut-off trench across the full width of the valley and that preparations had been made to commence the puddle bank. The excavation was very considerable, according to Colston,<sup>6</sup> not less than 53 feet deep and some indication of its volume can be gauged from Jardine's report several months after the commencement of work, that between mid-March and mid-April 1822 "There has been carried down and puddled in the Head upwards of 10,000 cubic yards of puddle earth" and that the top of the bank was then just below the level of the bed of the burn. The puddle wall was 60 feet thick and eventually extended nearly to the full 120-foot height of the embankment.

*Paragraph 2*—Alexander Forbes quarried and carted stone for the aqueduct from Straiton Quarry from October 1820 until July 1821, when following difficulties at the quarry, perhaps in getting suitable stone, his contract was cancelled by mutual consent. All matters requiring to be settled were referred to Telford, who on the November 5, 1821, awarded Forbes £1,944 11s. 1d. for his work, but also awarded that £245 was due by Forbes for not implementing the terms of his contract. Telford concluded his award, "In regard to the Quarry, it appears to have turned out worse than there was reason to expect when begun upon for these works . . . it remains for the Directors to make any allowance or not as they see fit." The Directors were not prepared to make any allowance and this appears to have been the reason for Forbes's letters.

As already mentioned, Stuart was Clerk to the Water Company and also a Writer to the Signet.

*Paragraph 3*—Telford proceeded to Bangor and on the February 8, 1822 wrote a progress report on the Holyhead Road Improvement. After describing various roadworks completed and in

<sup>6</sup> See Bibliography.

progress he gives details of the Menai Bridge then at an early stage of construction. The Caernarvonshire pier had been completed to roadway level and the Anglesey pier to 15 feet above the springing of the arches. The bridge was officially opened on January 30, 1826.

Jardine appears to have replied to Telford on February 11, 1822.

*Reverse*—The reverse of the letter bears two postmarks, the earlier one bearing the word "FREE" and surmounted with a crown. At the bottom left of the address is a signature which is probably that of John Rickman, Parliamentary Clerk, close associate and near neighbour of Telford, who appears to have franked the letter for him so that it would go post free. Rickman edited Telford's Autobiography published in 1838.



APPENDIX

NOTATION OF TERMS, NAMES AND PLACES AT VARIOUS  
DATES FROM SEPTEMBER 1870 TO FEBRUARY 1882. COMPARED  
WITH THE LETTERS AND WATER COMPASS RECORDS.

APPENDIX AND BIBLIOGRAPHY

RENNIE

TELFORD

1870 Sept. 14, 1870

Sept. 11, 1870 and  
Nov. 27, Edinburgh

Jan. 10, Edinburgh

April 7, London

1871 July April (p. 106),  
London

Sept. 6, Edinburgh

Nov. 7, Edinburgh  
(Date copied 1871)

Dec. 14, Cambridge

1872 Jan. 29, London

Early 1872 (p. 112)

1873

1874

1875

1876

1877

1878

1879

1880

1881

1882

1883

1884

1885

1886

1887

1888

1889

1890

1891

1892

1893

1894

1895

1896

## APPENDIX

LOCATION OF TELFORD, RENNIE AND JARDINE AT VARIOUS  
DATES FROM SEPTEMBER 1820 TO FEBRUARY 1822, COMPILED  
FROM THE LETTERS AND WATER COMPANY MINUTES.

TELFORD	RENNIE
1820 Sept. 15, Lanark	1820 Sept. 11, 12, 16, and
Nov. 22, Edinburgh	18, Edinburgh
1821 Jan. 10, Edinburgh	
April 7, London	1821 Early April (pre-7th),
Sept. 6, Edinburgh	London
Nov. 5, Edinburgh	<i>(Died October 4, 1821)</i>
Dec. 14, Cambridge	
1822 Jan. 29, London	
Early Feb. (on or pre-	
8th), Bangor	

NOTE—From the Letters and Minutes, Jardine does not appear to have left Edinburgh during this period except to visit the works in the county. Telford and Rennie were based on London and their visits to Edinburgh relatively infrequent, so that although the Edinburgh dates given most probably form part of a longer visit, it appears unlikely that they made any other visits in connection with the Waterworks.

## BIBLIOGRAPHY

PARLIAMENTARY PAPERS *Ninth Report of the Commissioners for Roads and Bridges in the Highlands of Scotland.* 1821.

*First Report of the Select Committee on the Roads from London to Holyhead, and from Chester to Holyhead; etc., North Wales.* 1822.

SMILES, S. *Lives of the Engineers, Vol. II.* London, 1861.

COLSTON, J. *The Edinburgh and District Water Supply.* Edinburgh, 1890.

TELFORD, T. *Life of Thomas Telford, Civil Engineer.* London, 1838.

TELFORD, T. AND HOPE, T. C. *Reports on the means of improving the supply of water for the city of Edinburgh.* Edinburgh, 1813.

*An Act for more effectually supplying the City of Edinburgh and places adjacent with Water.* (2d July 1819.) (59 Geo. III, Cap. cxvi.)

*An Economical Plan for an Additional Supply of Water for the City of Edinburgh,* Edinburgh, 1817.

*The Post-Office Annual Directory.* Edinburgh, 1819-23.

Manuscript Minutes of the Edinburgh Joint Stock Water Company, 1819-23.

*The Scotsman.* Vol. IX, No. 603, 1825.

*Reduced Plan of the proposed Aqueduct from Crawley Spring, Glencorse Burn and Black Springs to the City of Edinburgh.* September 1818.

Manuscript Minutes of Edinburgh Town Council, 1814.

1968

PRINTED AT THE PRIVATE PRESS OF J. A. BIRKBECK

---

250 printed